

M7 Westlink APZ Bushfire Management

Review of environmental factors

Transport for NSW | December 2020



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Prepared by Advitech Environmental and Transport for NSW

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Document controls

Approval and authorisation

Title	M7 Westlink APZ Bushfire Management Minor Works Review of Environmental Factors
Accepted on behalf of Transport for NSW by:	Sonja Shand Senior Project Manager Private Motorways
Signed:	
Dated:	11 Jan 2021

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1. Introduction

The purpose of the Minor Works Review of Environmental Factors (REF) is to describe the proposal, to document the likely impacts of the proposal on the environment, to detail mitigation measures to be implemented and to determine whether or not the project can proceed. For the purposes of this work, Transport for NSW is the proponent and determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The description of the proposed works and assessment of associated environmental impacts has been undertaken in the context of Clause 228 of the Environmental Planning and Assessment Regulation 2000, the factors in *Is an EIS Required? Best Practice Guidelines for Part 5 of the Environmental Planning and Assessment Act 1979* (*Is an EIS required?* guidelines) (DUAP, 1995/1996), *Roads and Related Facilities EIS Guideline* (DUAP, 1996) the *Biodiversity Conservation Act 2016* (BC Act), the *Fisheries Management Act 1994* (FM Act) and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

In doing so, the REF helps to fulfil the requirements of section 5.5 of the EP&A Act including that the Transport for NSW examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning under Division 5.2 of the EP&A Act
- The significance of any impact on threatened species as defined by the BC Act and/or FM Act, in section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report
- The potential for the proposal to significantly impact a Matter of National Environmental Significance (MNES), including nationally listed threatened biodiversity matters, or the environment of Commonwealth land. Where a significant impact is considered likely on nationally listed biodiversity matters, either the proposal must be reconsidered or a Project REF must be prepared.

2. The proposal

2.1 Description

2.1.1 Proposal location

Table 1: Location Details

Location details	
Title	M7 Westlink APZ Bushfire Management
Road name and number	M7 Westlink
Closest cross road(s)	Old Windsor Road at eastern end of proposal
Chainage of works	33200-33650 (Sciarra Crescent) 39000-39100 (Valerie Ave) 35800 (Montview Way APZ 2) 37000-37250 (Montview Way APZ 3) 35800-36000 (Knightbridge Avenue)
Local government area	Blacktown City Council and The Hills Shire Council
Transport for NSW region	Sydney (Western sub-region)

2.1.2 Description and objectives of the proposed work

Lendlease (Westlink Services Pty Limited), on behalf of Transport for NSW proposes to undertake bushfire protection within the Asset Protection Zones (APZ) of the M7 Westlink Motorway (M7) corridor in Western Sydney (see **Figures 1 to 9**). The primary objective of this proposal is to achieve compliant or acceptable APZs to reduce the risk of life and property loss from bushfire.

The NSW Rural Fire Service (RFS) Bushfire Protection for Existing Development (RFS, 2016) defines an APZ as an area between a bushfire hazard and buildings which is more intensively and routinely managed to minimise fuel loads and reduce the potential radiant heat levels, flame contact, ember and smoke attack on life and property.

Each APZ site along the M7 is located adjacent to residential development and consists of bushland corridors between 30 and 40 metres wide, except for Valerie Avenue (100 metres). The sites are located in the northern section of the M7 corridor between Richmond Road and the M2 Motorway.

Works will be carried out in line with the M7 Corridor Bushfire Asset Protection Zone Assessment recommendations (Peterson Bushfire, 2017) (attached at **Appendix I**), key features of the proposal including:

- Establishment of APZ clearance boundaries for five APZs. These sites and the corresponding works are listed in **Table 2**
- Routine maintenance works including slashing operations along rear fences within the M7 corridor.

The proposal is anticipated to involve the following work methodology:

- Tree canopies thinned to achieve gaps of two to five metres between crowns

- Small clumps of trees to be pruned to enable larger gaps (minimum 5.0 m) to the next adjacent crown
- Tree removal preference is to be given to trees with least health or longevity, and with least ecological benefit
- Removal of understorey shrubs and saplings within the APZ sites. If retained, they are to be thinned to form clumps or individuals so they do not comprise more than 20% of the total APZ area
- Groundcovers (that is, grasses) to be slashed
- Removal of all dead vegetative material
- Removal of excess leaf litter providing a thin cover over the ground (5 cm).

Works will be undertaken utilising a climbing arborist, 6.0 t excavator equipped with an FAE flail mower, track-mounted skid-steer loader with tree grabs and forestry mulcher, 4 x 4 truck and chipper, as well as small plant (chainsaws, brush-cutter, handsaws). All equipment will be located to site each day by individual contractors. Access to each site is detailed in **Figures 2 to 9** and in the dot points below.

- Valerie Avenue – Access is from a reserve at Warronga Ave, the existing maintenance track runs south to the project area
- Montview Way – For access to the Montview APZ 2 and APZ 3 work areas a reserve will be used. To access the reserve temporary alterations to a fence will occur. The reserve has existing access to work areas
- Knightsbridge Avenue – An existing gate that is used by the M7 will provide access to the work area
- Sciarra Crescent – Two gates will be used, one is a council gate into a reserve on Trevor Toms Drive (regularly mown exotic grass) and a gate maintained by the M7 into the APZ area. This is a maintenance track.

Sites indicated in the previous APZ assessment that will be excluded from the proposed work are Goodhall Avenue at Baulkham Hills, Valerie Avenue at Baulkham Hills (APZ 1), and Isabell Street at Cecil Hills.

Table 2: Proposed Fuel Management Works within the APZ Sites (from Peterson Bushfire, 2017).

APZ site	Extent of APZ from boundary or noise wall	Comments	Existing Maintenance
Valerie Avenue, Baulkham Hills APZ 2	10.0 m	<p>Works conducted from the rear boundary of No. 47-55 Valerie Ave, target the removal of 13 native trees and introduced woody weeds.</p> <p>The defined APZ is 127 linear metres as per bushfire specification (Appendix I).</p> <p>The distance from the boundary before impacting on the riparian area varies between a minimum of 20 metres to 36 metres. A</p>	<p>Continued maintenance along rear of boundaries, along pathways, roads and drainage features as per management requirements.</p> <p>Slashing of grass behind residences occurs 4 times per year on all sites except for Valerie Ave which is sloping, rocky and mesic due to influence of riparian area.</p>

APZ site	Extent of APZ from boundary or noise wall	Comments	Existing Maintenance
		Threatened Ecological Community (TEC) lies downslope.	
Montview Way, Glenwood APZ 2	7.0 m	<p>Works conducted behind the rear boundary of No.4 Montview Way target the removal of 13 trees.</p> <p>The defined APZ is 26 linear metres as per bushfire specification (Appendix I).</p> <p>Only one house with minimal existing APZ (2.0 to 3.0 m in yard) within substantial hazard on downslope. Current maintenance lacking.</p>	
Montview Way, Glenwood APZ 3	3.0 m	<p>Works conducted behind two residences on two streets:</p> <ul style="list-style-type: none"> - No. 8 Kingsview Way - No.6 Montview Way <p>Works target the removal of 23 trees.</p> <p>The defined APZ is 269 linear metres as per bushfire specification (Appendix I).</p> <p>Current maintenance along rear boundary lacking.</p>	
Knightsbridge Avenue, Glenwood APZ 2	6.0 m	<p>Works conducted behind two streets:</p> <ul style="list-style-type: none"> - No. 24-44 Knightsbridge Ave - No. 5, 8, 10 and 11 Bethany Place <p>Works target the removal of 25 trees.</p> <p>The defined APZ is 410 linear metres as per bushfire specification (Appendix I).</p> <p>Narrow yards. APZ works to</p>	

APZ site	Extent of APZ from boundary or noise wall	Comments	Existing Maintenance
		complement existing slashing.	
Sciarra Crescent, Acacia Gardens	5.0 m	<p>Works conducted from the rear boundary of No. 28-46 Sciarra Crescent, target the removal of 8 trees.</p> <p>The defined APZ is 403 linear metres as per bushfire specification (Appendix I).</p> <p>Narrow yards. APZ works to complement existing slashing.</p>	

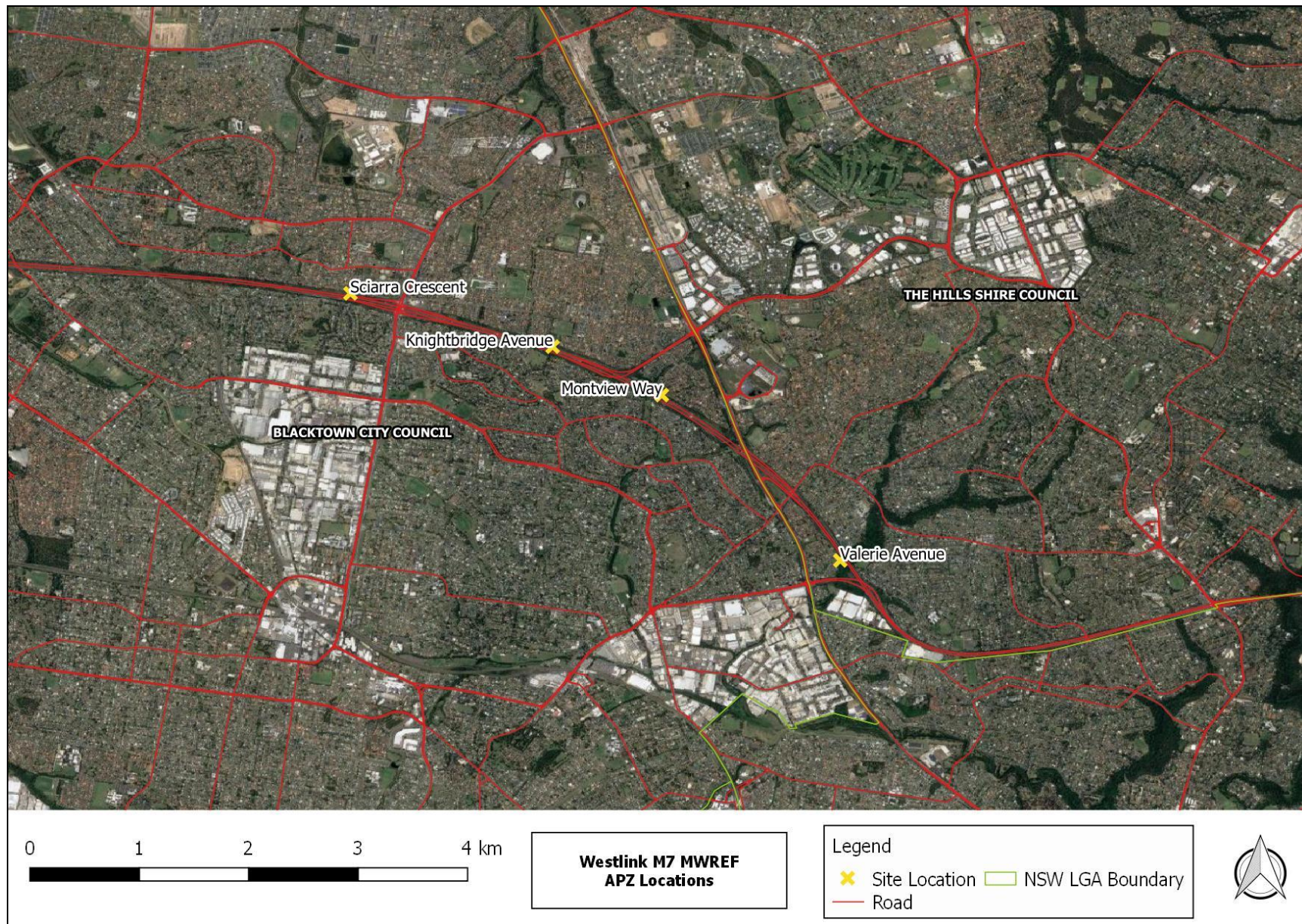


Figure 1: Location of all proposed works locations.



Figure 2: Knightsbridge Avenue proposed works location.

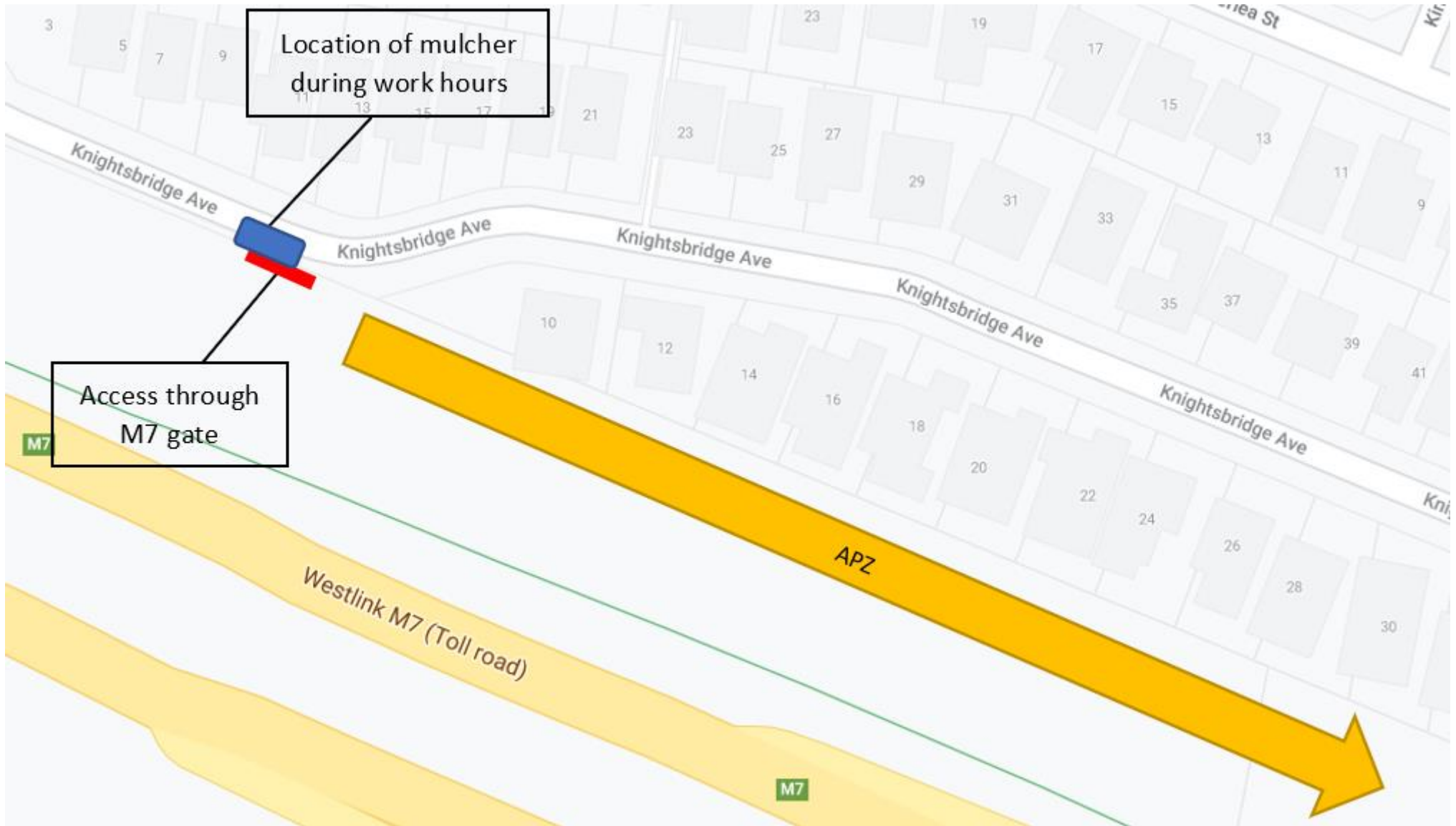


Figure 3: Knightsbridge Avenue APZ Access

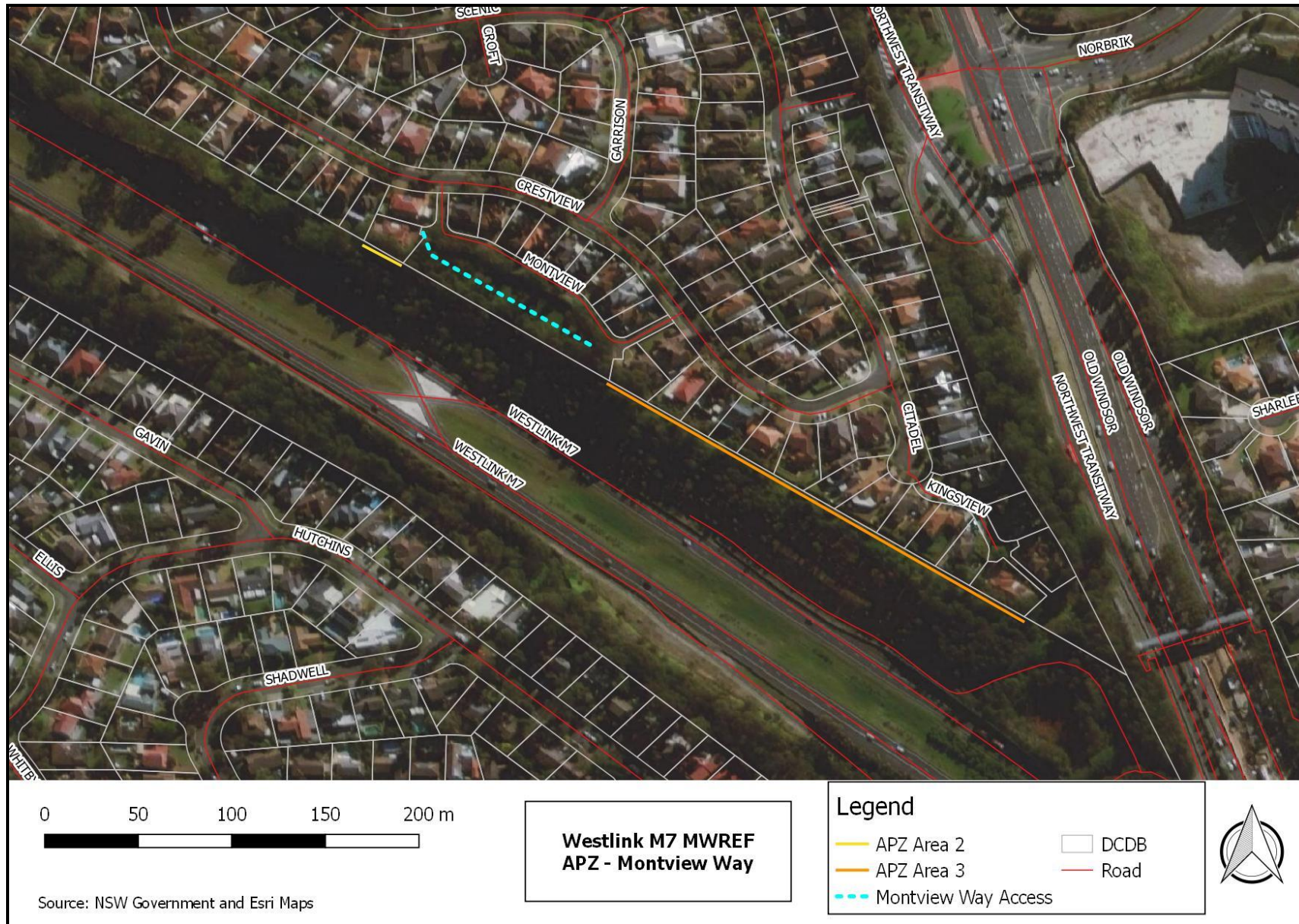


Figure 4: Montview Way proposed works locations (both sites).

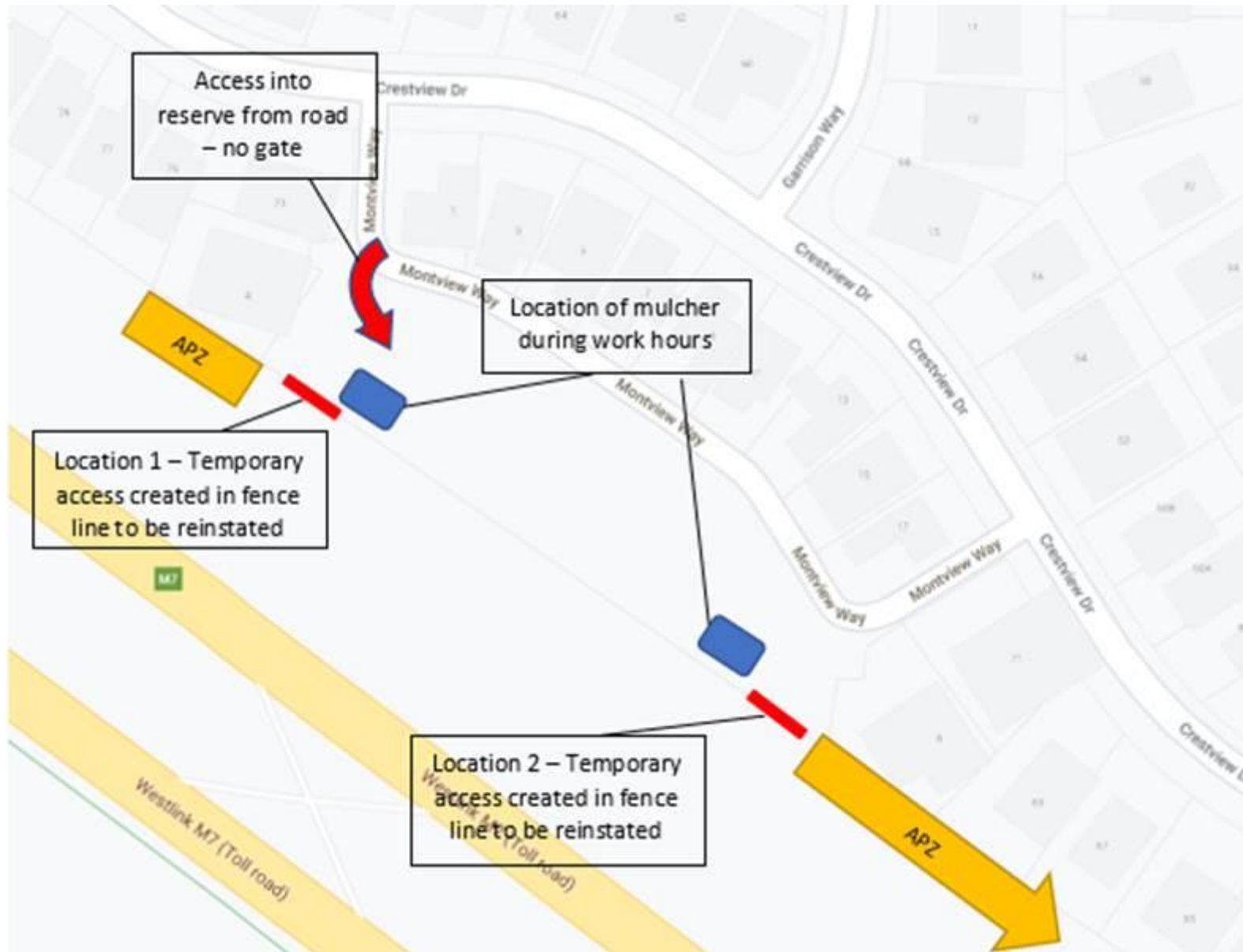


Figure 5: Montview Way APZ Access



Figure 6: Sciarra Crescent proposed works location.

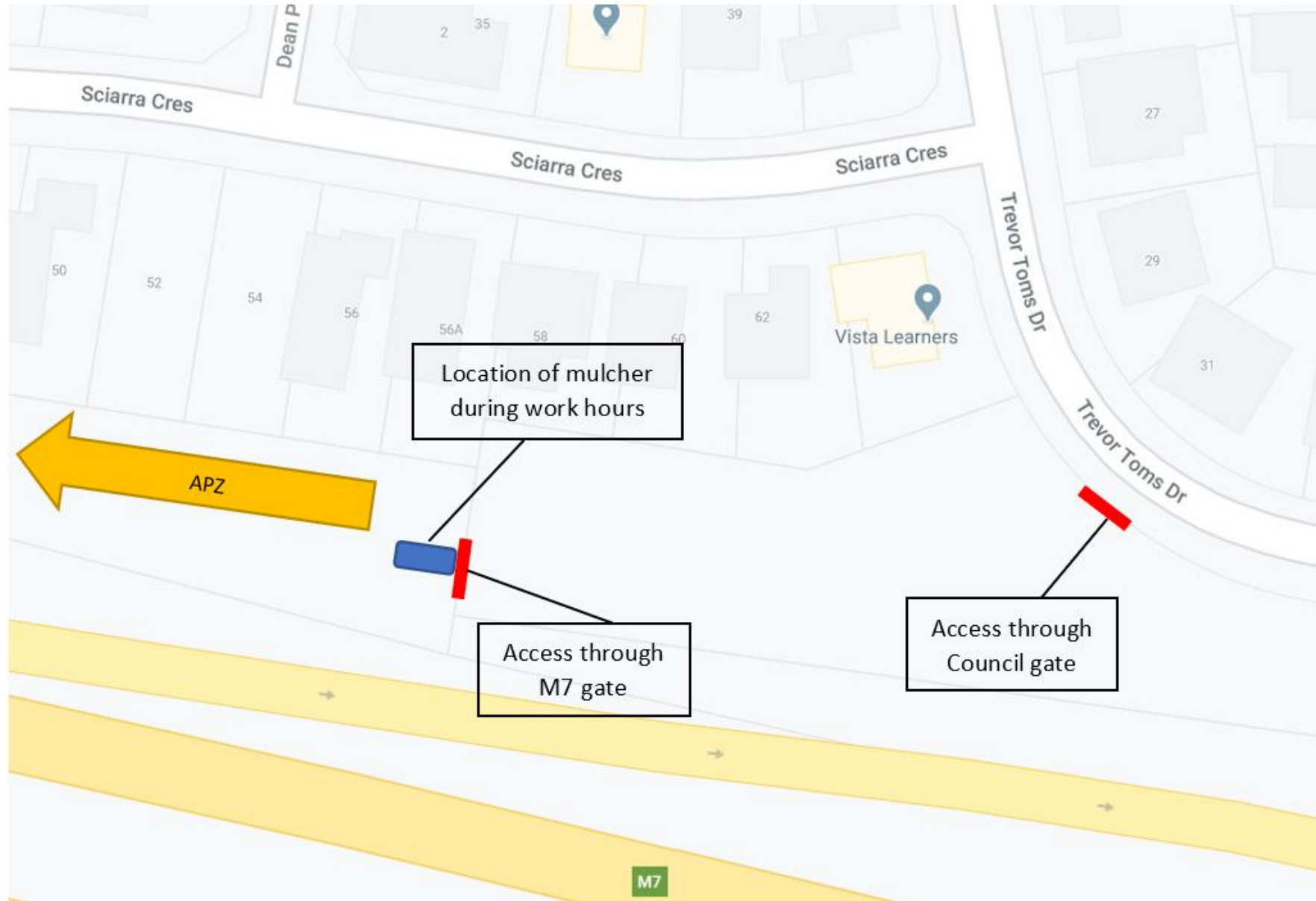


Figure 7: Sciarras Crescent APZ Access

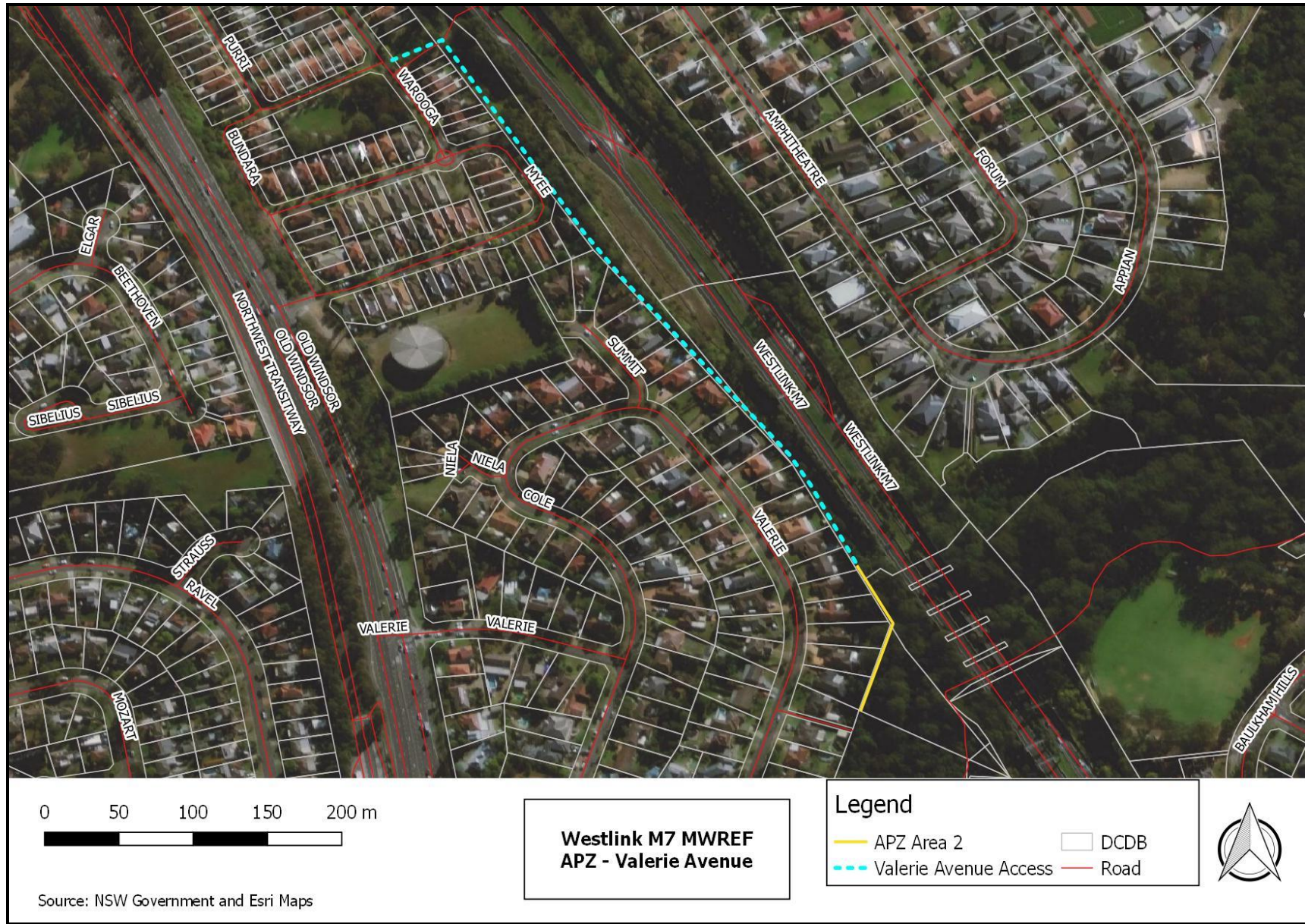


Figure 8: Valerie Avenue proposed works location.

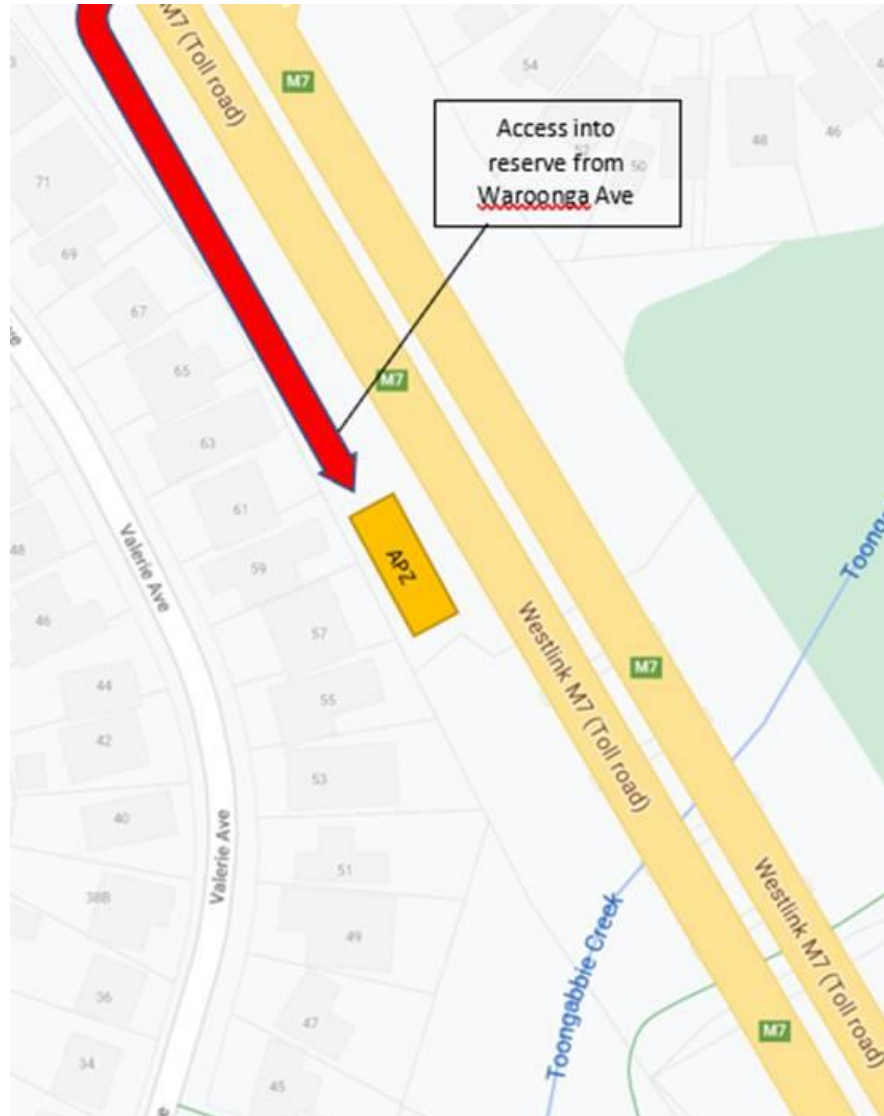


Figure 9: Valerie Avenue APZ Access

2.1.3 Ancillary facilities

Ancillary facilities		
Will the proposal require the use or installation of a compound site?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Will the proposal require the use or installation of a stockpile site?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Are any other ancillary facilities required (eg temporary plants, parking areas, access tracks)?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

2.1.4 Proposed date of commencement

It is anticipated that activities would commence in late 2020. The proposal is estimated to take one month or 20 working days, as outlined below for each site:

APZ Site	Estimated Work Days
Valerie Avenue, Baulkham Hills APZ 2	5
Montview Way, Glenwood APZ 2	2
Montview Way, Glenwood APZ 3	5
Montview Way, Glenwood APZ 3	5
Sciarra Crescent, Acacia Gardens	3
Total Work Days	20

This estimation works on the assumptions that:

- Weather and site conditions are favourable
- Work is continuous Monday to Friday, week to week for 4 weeks.

A buffer for the above two factors is to be implemented into the project management schedule. It is therefore likely that the overall project from start to finish may take two months.

2.2 Need and options

2.2.1 Options considered

Two options were identified for the proposal and evaluated against the proposal objective to achieve compliant or acceptable APZs to reduce the risk of life and property loss from bushfire and the following

three criteria:

- Environmental impacts
- Social impact
- Economic impacts.

The preferred option which performed best against these criteria and the proposal objectives was selected. The two options considered for the proposed works are:

Option 1: Do nothing

Option 1 is the 'do nothing' option and the APZs remain in their current state.

Advantages:

- This option would have no impact on the environment at the proposed sites
- No short term cost for corridor maintenance or rehabilitation
- There would be no delays experienced by motorists or the surrounding community resulting from the proposed works.

Disadvantages:

- Increased risk of life and property loss from bushfire
- Ongoing maintenance costs
- Negatively impact on efficiency and management of the APZs
- Increased bushfire fuel load (dead vegetative material and excess leaf litter)
- Increase in understorey shrubs and saplings to more than 20% composition within the APZ sites
- No mitigation of bushfire safety risks
- This option would not meet the objectives of the proposal to undertake bushfire protection within the APZs along the M7 corridor.

Option 2: Bushfire protection within the APZs of the M7 Westlink Motorway corridor

This option would require bushfire protection within the APZs along the M7 corridor and entail the following key features:

- Establish APZ clearance boundaries for five APZs. These sites are listed in **Table 2**
- Routine maintenance works including slashing operations, removal of weed species and removal of various trees along rear fences within the M7 corridor.

Advantages:

- Decrease in bushfire fuel load (dead vegetative material and excess leaf litter)
- Reduction in risk of life and property loss from bushfire
- Reduced maintenance costs
- Positively impact on efficiency and management of the APZs

- Decrease in understorey shrubs and saplings to less than 20% composition within the APZ sites
- Mitigation of bushfire safety risks
- This option would meet the objectives of the proposal to undertake bushfire protection within the APZs along the M7 corridor.

Disadvantages:

- Option 2 would require more capital expenditure than Option 1
- The proposal may cause very short term impacts to traffic flows through lane closures and traffic control measures during works
- The proposal would cause greater short term environmental impacts than that expected from Option 1.

2.3 Statutory and planning framework

2.3.1 State Environmental Planning Policy (Infrastructure) 2007 (ISEPP)

ISEPP aims to facilitate the effective delivery of infrastructure across the state, including for roads and road infrastructure facilities. Clause 48(3) of the ISEPP permits bush fire hazard reduction work or the construction of fire trails to be carried out by any person without consent.

As the proposed works are appropriately characterised as development for the purposes of ‘bush fire hazard reduction’, it can be assessed under Part 5 of the EP&A Act. Development consent from council is not required.

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974* and does not affect land or development regulated by State Environmental Planning Policy No. 14 – Coastal Wetlands, State Environmental Planning Policy No. 26 – Littoral Rainforests or State Environmental Planning Policy (Major Projects) 2005.

2.3.2 Other relevant legislation and environmental planning instruments

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974* and does not require development consent or approval under State Environmental Planning Policy (Coastal Management) 2018, State Environmental Planning Policy (State Significant Precincts) 2005 or State Environmental Planning Policy (State and Regional Development) 2011.

Further, clause 5.11 of Appendix 1 of the State Environmental Planning Policy (Sydney Growth Centres) 2006 notes that bush fire hazard reduction work authorised by the *Rural Fires Act 1997* may be carried out on any land without consent otherwise required by this SEPP. Nonetheless, none of the five project sites are located within Sydney Growth Centres (see **Figure 10**).

Biodiversity Conservation Act 2017 and Fisheries Management Act 1994

The purpose of the *Biodiversity Conservation Act 2016* (BC Act) is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development. Section 5AA of the EP&A Act is subject to the provisions of Part 7 of the BC Act and Part 7A of the *Fisheries Management Act 1994* (FM Act), which relate to the operation of this Act in connection with the terrestrial and aquatic environment.

Combined, these acts list a number of factors to be taken into account when deciding if there is the likelihood of a significant impact on threatened species, populations and their habitat or on ecological communities. If there is a chance of an impact, then an assessment of significance would be required to determine the significance of the impact. The potential for impact on ecology has been considered in **Section 3.7** of this REF and is supported by relevant assessments of significance (**Appendix X**). The assessment concludes that the proposal would be unlikely to have a significant impact on any threatened species, populations, ecological communities or their habitats.

National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) provides controls in relation to the protection of land reserved under the NPW Act as well as controls in relation to the protection of items of cultural heritage. It is an offence under the NPW Act to 'harm' Aboriginal objects or sites of Aboriginal significance without an Aboriginal Heritage Impact Permit (AHIP). The proposed works have been considered under Stage One of the Transport for NSW *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) (see **Section 3.6** and **Appendix II**). The procedure assists Transport for NSW meet its legislative responsibilities regarding consultation and investigation of potential impacts on Aboriginal cultural heritage, while also establishing a due diligence defence for the strict liability offence of harming an Aboriginal object under the Act. Aboriginal cultural heritage has been assessed in **Section 3.6**. The assessment concluded that the proposal is unlikely to affect Aboriginal cultural heritage.

Heritage Act 1977

The purpose of the *Heritage Act, 1977* is to preserve and conserve state and local items of significance in relation to a place, building, work, relic, moveable object or precinct, in relation to the historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value of the item. The proposed works have been assessed in **Section 3.5**. The assessment concluded that the proposal is unlikely to affect Non-Aboriginal heritage.

State Environmental Planning Policy (Sydney Region Growth Centres) 2006

SEPP (Sydney Region Growth Centres) provides planning controls for designated growth centres in the Sydney Basin. The proposal is well distanced from the North West Growth Centre and the South West Growth Centre and will not impact on these areas (**Figure 10**).

Biosecurity Act 2015

This Act is about managing diseases and pests that may cause harm to human, animal or plant health or the environment. The *Biosecurity Act 2015* replaced the *Noxious Weeds Act 1993*, which provided regulatory controls and powers to manage noxious weeds in NSW. The *Biosecurity Act 2015* streamlines and modernises the way weeds are managed in NSW. NSW Department of Industry (Primary Industries) administer the *Biosecurity Act 2015* and determine the weed species covered by regulatory tools such as Prohibited Matter, Control Orders and Biosecurity Zones. Several weeds listed in the *Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022* were observed at each site (see **Section 3.7**). These weeds would require a strategic response in accordance with steps prescribed in this plan.

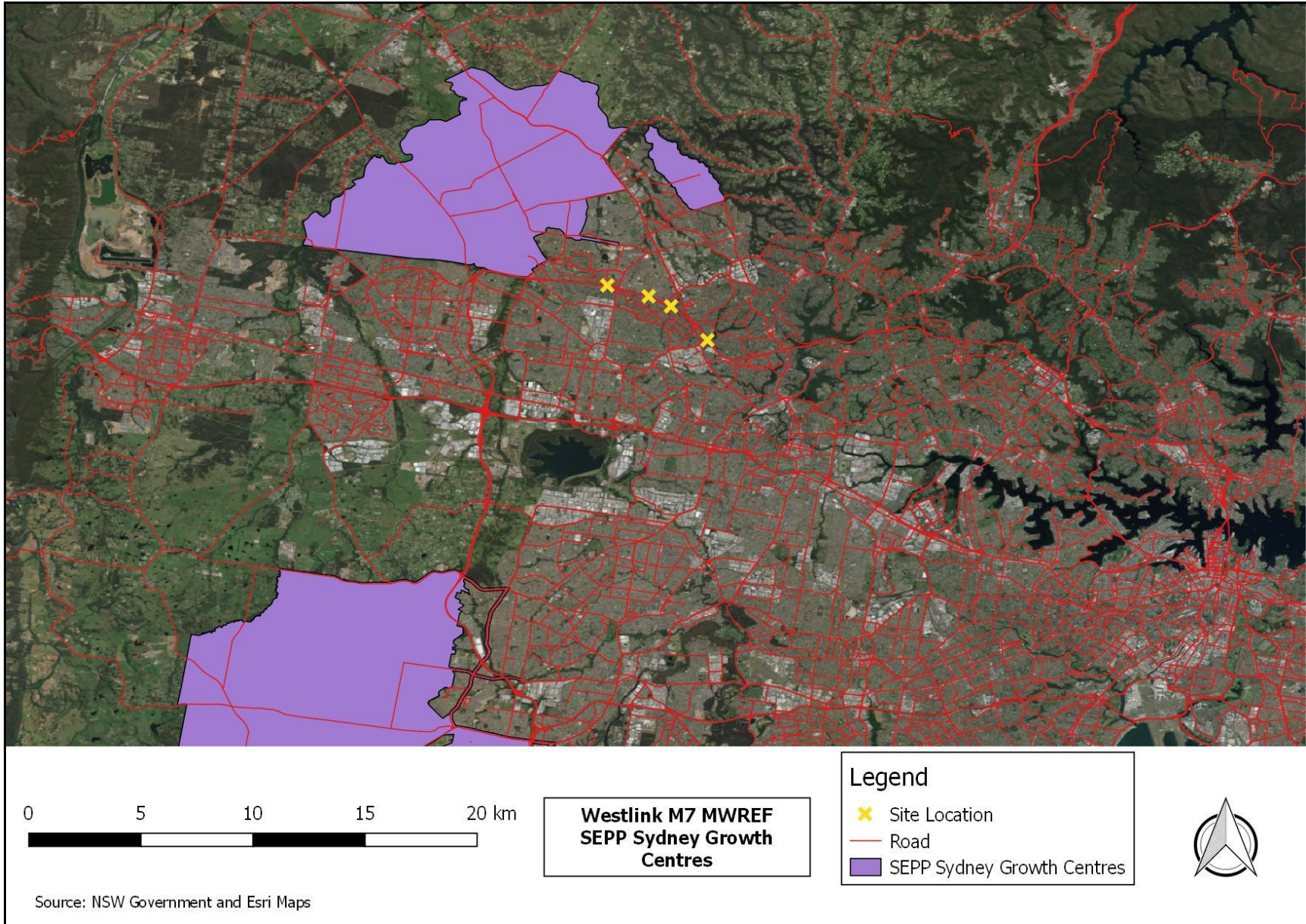


Figure 10: Sydney Growth Centres.

Roads Act 1993

Works affecting roads, including traffic control and road closures, are regulated under the *Roads Act 1993*. The proposed activity would not involve physical works and structures relating to a classified road, or to traffic through both construction and operational stages of the activity. Road Occupancy Licences and Road Opening Permits that are generally required under the *Roads Act 1993* for approval will not need to be considered for the proposed works.

Rural Fires Act 1997

The objects of the *Rural Fires Act 1997* (RF Act) are to provide:

- (a) for the prevention, mitigation and suppression of bush and other fires in local government areas (or parts of areas) and other parts of the State constituted as rural fire districts, and*
- (b) for the co-ordination of bush fire fighting and bush fire prevention throughout the State, and*
- (c) for the protection of persons from injury or death, and property from damage, arising from fires, and*
- (c1) for the protection of infrastructure and environmental, economic, cultural, agricultural and community assets from damage arising from fires, and*
- (d) for the protection of the environment by requiring certain activities referred to in paragraphs (a)–(c1) to be carried out having regard to the principles of ecologically sustainable development described in section 6 (2) of the Protection of the Environment Administration Act 1991.*

The RF Act requires owners and/or occupiers of land to take any practicable steps required to prevent the occurrence of bush fires on their land, and to minimise the danger of the spread of bush fire on or from land in their care and control (section 63). There is also a requirement during the bush fire danger season for occupiers and owners to take all possible steps to extinguish any fires that occur on their land, regardless of how the fire started (section 64). Further, the ISEPP requires that works are undertaken in accordance with the relevant Bush Fire Risk Management Plan (BFRMP). NSW Rural Fire Service has released several publications providing guidance about bush fire risk management that must be followed; these guidelines include the *Standards for Asset Protection Zones* (attached at **Appendix III**), the *Bushfire Environmental Assessment Code for NSW* (attached at **Appendix IV**), and *Planning for Bush Fire Protection* (attached at **Appendix XIII**).

The Cumberland BFRMP notes that authorities responsible for the management of road reserves should have a management plan to reduce the 'available fuel' for bush fires along road sides as a treatment to reduce the potential for road side ignitions and fire spread. Management of roadsides will assist in fire fighter safety during operations on roadsides and improve public safety. As such, Transport for NSW is required to manage its road reserve assets according to the Cumberland and The Hills BFRMPs (attached at **Appendix V** and **VI**). See **Section 3.13**.

Therefore, an M7 site scale response to broader landscape bushfire management is that the works will be carried out in line with the M7 Corridor Bushfire Asset Protection Zone Assessment recommendations (Peterson Bushfire, 2017) (attached at **Appendix I**).

2.3.3 Environment Protection and Biodiversity Conservation Act 1999

Under the Federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), referral is required to the Australian Government for proposed actions that have the potential to significantly impact on Matters of National Environmental Significance (MNES) or the environment of Commonwealth land. These are considered in **Section 4.2** of the REF. The assessment of the proposal impact on Matters of National Environmental Significance and the environment of Commonwealth land found that there is unlikely to be a significant impact on relevant Matters of National Environmental Significance. Accordingly, the proposal has not been referred to the Australian Government Department of the Environment.

2.4 Community and agency consultation

2.4.1 ISEPP consultation

Part 2 of the ISEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. This is detailed below:

Is consultation with Council required under clauses 13-15 of the infrastructure SEPP?		
Are the works likely to have a substantial impact on the stormwater management services which are provided by council?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Are the works likely to generate traffic to an extent that will strain the capacity of the existing road system in a local government area?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Will the works involve connection to a council owned sewerage system? If so, will this connection have a substantial impact on the capacity of the system?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Will the works involve connection to a council owned water supply system? If so, will this require the use of a substantial volume of water?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a minor or inconsequential disruption to pedestrian or vehicular flow?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Valerie Avenue works may affect Public Recreation Land (RE1) through a minor or inconsequential disruption. The work is located on the border of residential (R2) and RE1 zoned land. The land is in The Hills Shire LGA.		
Will the works involve more than a minor or inconsequential excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Is there a local heritage item (that is not also a state heritage item) or a heritage conservation area in the study area for the works? If yes, does a heritage assessment indicate that the potential impacts to the heritage significance of the item/area are more than minor or inconsequential?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Does the proposal include a car park intended for the use by commuters using regular bus services?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Does the project propose a bus depot?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Is consultation with Council required under clauses 13-15 of the infrastructure SEPP?

Does the project propose a permanent road maintenance depot or associated infrastructure, such as garages, sheds, tool houses, storage yards, training facilities and workers amenities?

Yes

No

Is the proposal within the coastal vulnerability area and is inconsistent with a certified coastal management program applying to that land?

Yes

No/NA

Are the works located on flood liable land? If so, will the works change flooding patterns to more than a minor extent?

Yes

No

Is consultation with a public authority (other than Council) required under clause 15 and 16 of the Infrastructure SEPP?

Are the works located on flood liable land? (to any extent) (ISEPP 15AA) If so, do the works comprise more than minor alterations or additions to, or the demolition of, a building, emergency works or routine maintenance.

Yes

No/NA

Are the works adjacent to a national park, nature reserve or other area reserved under the *National Parks and Wildlife Act 1974*, or on land acquired under that Act?

Yes

No

Are the works on land in Zone E1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?

Yes

No

Are the works adjacent to an aquatic reserve or a marine park declared under the *Marine Estate Management Act 2014*?

Yes

No

Is the proposal in the foreshore area as defined by the *Sydney Harbour Foreshore Authority Act 1998* (now known as the *Place Management NSW Act 1998*)?

Yes

No

Are the works for the purpose of residential development, an educational establishment, a health services facility, a correctional facility or group home in bush fire prone land?

Yes

No

Would the works increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map?

Yes

No

Is consultation with Council required under clauses 13-15 of the infrastructure SEPP?

Are the works on buffer land around the defence communications facility near Morundah? (Note: refer to Defence Communications Facility Buffer Map referred to in clause 5.15 of Lockhardt LEP 2012, Narrandera LEP 2013 and Urana LEP 2011).

Yes

No

Are the works on land in a mine subsidence district within the meaning of the *Mine Subsidence Compensation Act 1961*?

Yes

No

2.4.2 Other agency and community consultation

Agency stakeholders that will be consulted in regard to the proposal are presented in the following table.

Record of Stakeholder Involvement

Blacktown City Council

Transport for NSW will contact Council to provide forward notice of the of the proposed works and advise of any issues Council may have regarding the intended works.

The Hills Shire Council

Transport for NSW will contact Council to provide forward notice of the of the proposed works and advise of any issues Council may have regarding the intended works. In regards to the Valerie Avenue works that are located on the border of residential (R2) and RE1 zoned land, and which may lead to a minor or inconsequential disruption to that RE1 zoned land, Council will be notified within the statutory timeframe of that work.

Community consultation will be carried out due to potential noise and access impacts to nearby residents. Safeguard measures (outlined in **Sections 3.3** and **3.9**) will be put in place to ensure the community is informed of the pending works.

2.5 Public utility adjustment

No public utilities would be impacted by the proposed works.

2.6 Property acquisition

No property adjustments are anticipated.

3. Environmental assessment

This section provides a detailed description of the potential environmental impacts associated with the proposal. All aspects of the environment potentially impacted upon by the proposal are considered. This includes consideration of the factors specified in the guidelines *Is an EIS required?* (DUAP 1999) and *Roads and Related Facilities EIS Guideline* (DUAP, 1996). The factors specified in clause 228(2) of the Environmental Planning and Assessment Regulation 2000 and the matters of national environmental significance under the Federal *Environment Protection and Biodiversity Conservation Act 1999* are also considered in section 5. Site-specific safeguards are provided to ameliorate the identified potential impacts.

3.1 Soil

Description of existing environmental and potential impacts		
<p>Are there any known occurrences of salinity or acid sulfate soils in the area?</p> <p>Figure 11 provides the proximity of all known acid sulphate soils in the region. None of the five project sites are impacted by acid sulphate soils.</p>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<p>Does the proposal involve the disturbance of large areas (eg >2ha) for earthworks?</p>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<p>Does the site have constraints for erosion and sedimentation controls such as steep gradients or narrow corridors?</p>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<p>Are there any sensitive receiving environments that are located in or nearby the likely proposal footprint or that would likely receive stormwater discharge from the project?</p> <p>The only sensitive environment that lies close to any of the five sites is the Valerie Avenue site. This site lies adjacent to Toongabbie Creek. All works that are undertaken within the 10.0 m site buffer will be protected through the implementation of safeguards as detailed below. As such, the proposed work will not impact any riparian environment.</p>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
<p>Is there any evidence within or nearby the likely footprint of potential contamination?</p>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<p>Is the likely proposal footprint in or nearby highly sloping landform?</p> <p>There are no highly sloping environments within any of the sites, except for roadside embankments and for the Valerie Street APZ2 which steeply inclines to a riparian area (Toongabbie Creek). Any impacts will be minimised through the implementation of safeguards as detailed below.</p>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
<p>Is the proposals likely to result in more than 2.5ha (area) of exposed soil?</p>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

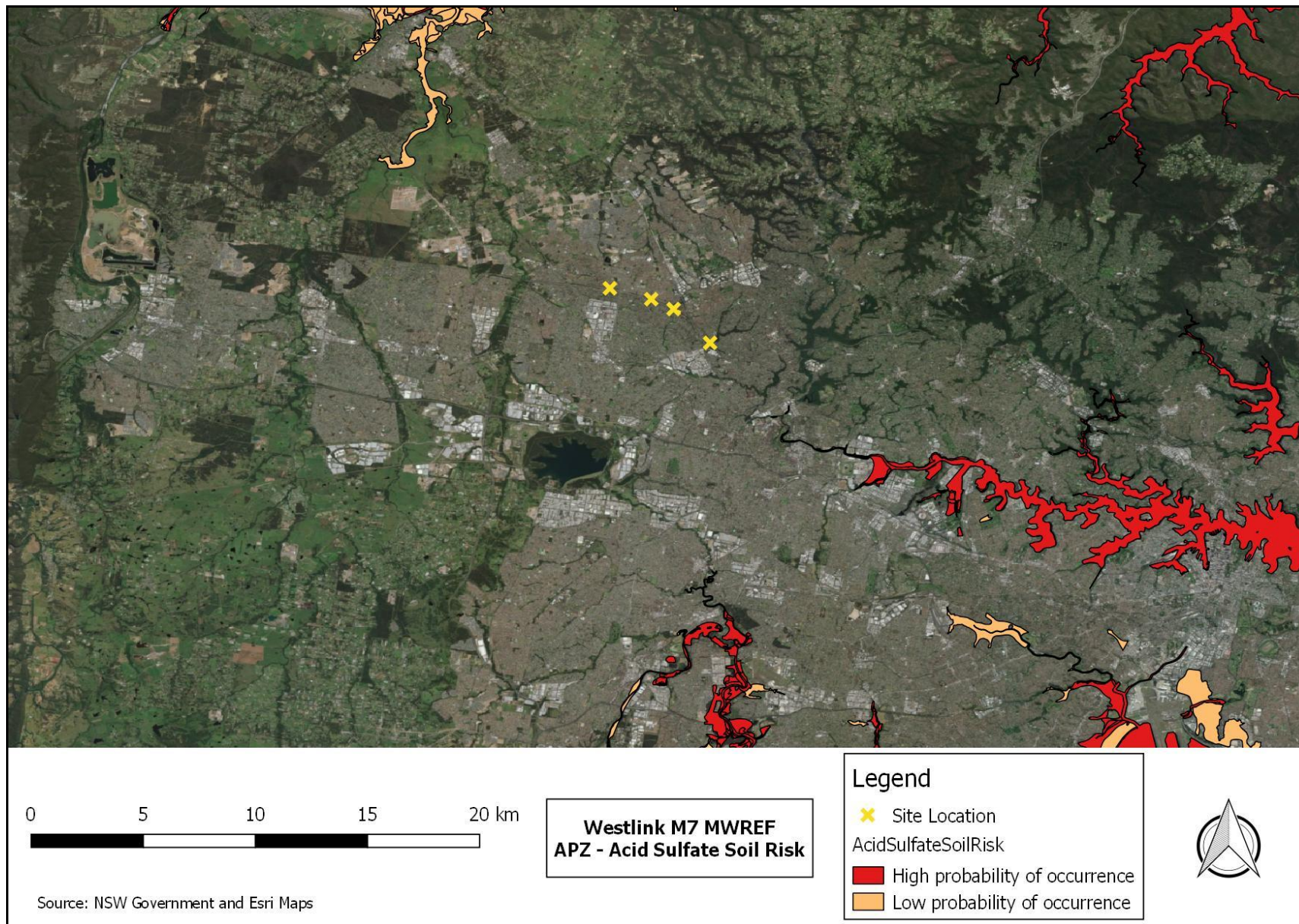


Figure 11: Location of Acid Sulphate Soils.

Safeguards

Safeguards to be implemented are:

- E1. Erosion and sediment control measures are to be implemented and maintained where required to prevent sediment moving off-site and sediment laden water entering any water course, drainage lines, or drain inlets
- E2. Erosion and sedimentation controls are to be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request
- E3. Erosion and sediment control measures are not to be removed until the works are complete and areas are stabilised
- E4. Work areas are to be stabilised progressively during the works.

3.2 Waterways and water quality

Description of existing environment and potential impacts

Is the proposal located within, adjacent to or near a waterway?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
The Valerie Avenue site lies adjacent to Toongabbie Creek. All works that are undertaken within the 10.0 m site buffer will be protected through the implementation of safeguards as detailed below. As such, the proposed work will not impact any riparian environment. It should be noted that the water quality of Toongabbie Creek has been in a generally poor condition for many years with high levels of suspended solids, nutrients and faecal coliforms.		
Is the location known to flood or be prone to water logging?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Is the proposal located within or immediately adjacent to the area managed by Sydney Catchment Authority covered by State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Would the proposal be undertaken on a bridge or ferry?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Is the proposal likely to require the extraction of water from a local water course (not mains)?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Safeguards

Safeguards to be implemented are:

- W1. Long term erosion and sediment management control options will be employed that include seeding with a cover crop and hydromulching/hydroseeding, planting or stabilisation with jute mesh or similar product. Options will be tailored to site specifics
- W2. There is to be no release of dirty water into drainage lines and/or waterways

- W3. Visual monitoring of local water quality (that is, turbidity, hydrocarbon spills/slicks) is to be undertaken on a regular basis to identify any potential spills or deficient erosion and sediment controls
- W4. Water quality control measures are to be used to prevent any materials (for example, concrete, grout, sediment, and so on) entering drain inlets or waterways
- W5. Measures to control pollutants from stormwater and spills would be investigated and incorporated in the pavement drainage system at locations where it discharges to the receiving drainage lines. Measures aimed at reducing flow rates during rain events and potential scour would also be incorporated in the design of the pavement drainage system
- W6. Excess debris from cleaning and washing is removed using hand tools
- W7. Refuelling of plant and equipment may occur on the road formation if it is not possible or is impractical to relocate the plant to a designated refuelling area and would include use of mobile containment bunds and access to mobile spill kits
- W8. An emergency spill kit is to be kept on site at all times. All staff are to be made aware of the location of the spill kit and be trained in its use
- W9. If an incident (for example, a spill) occurs, the Roads and Maritime *Environmental Incident Classification and Reporting Procedure* is to be followed and the Transport for NSW Contract Manager notified as soon as practicable.

3.3 Noise and vibration

Description of existing environmental and potential impacts		
Are there any residential properties or other noise sensitive areas near the location of the proposal that may be affected by the work (i.e. church, school, hospital):		
During construction?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
<p>There are several residential receivers that are located in close proximity to the proposed works and within a direct line of sight to the proposed activities. Refer to Figures 12 to 16 for the locations of these receivers. A distance-based noise assessment for each site was carried out using the Transport for NSW <i>Maintenance Noise Estimator</i> and is provided in Figure 17.</p> <p>The proposed works are considered essential maintenance activities intended to protect residents and their properties from the impact of bushfires. The work is intended to be carried out during standard work hours and along an extremely busy motorway. It is expected that there will be limited noise impacts from the proposed works.</p>		
During operation?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Description of existing environmental and potential impacts

Is the proposal going to be undertaken only during standard working hours?

Yes

No

Standard working hours are as follows:
 Monday-Friday: 7:00 am to 6.00 pm
 Saturday: 8.00 am to 1.00 pm
 Sunday and Public Holidays: no work

Is any explosive blasting required for the proposal?

Yes

No

Would construction noise or vibration from the proposal affect sensitive receivers?

Yes

No

Would operation of the proposal alter the noise environment for sensitive receivers? This might include, but not be limited to, altering the line or level of an existing carriageway, changing traffic flow, adding extra lanes, increasing traffic volume, increasing the number of heavy vehicles, removing obstacles that provide shielding including changing the angle of view of the traffic, changing the type of pavement, increasing traffic speeds by more than 10km/hr or installing audio-tactile line markings.

Yes

No

Would the proposal result in vibration being experienced by any surrounding properties or infrastructure during operation?

Yes

No

Safeguards

Safeguards to be implemented are:

N1. Noise impacts are to be minimised in accordance with Roads and Maritime *Maintenance Noise Estimator*

N2. Notification to affected community members within a minimum of seven calendar days prior to the start of works is to include:

- Details of the proposal
- The duration of works and working hours
- Any changed traffic or access arrangements
- How to lodge a complaint or obtain more information
- Contact name and details

N3. A number of residences are highly noise impacted. Impacts to these residences will be minimised with implementation of respite periods and staging of works (mainly to limit impacts due to use of chainsaws and mulchers).

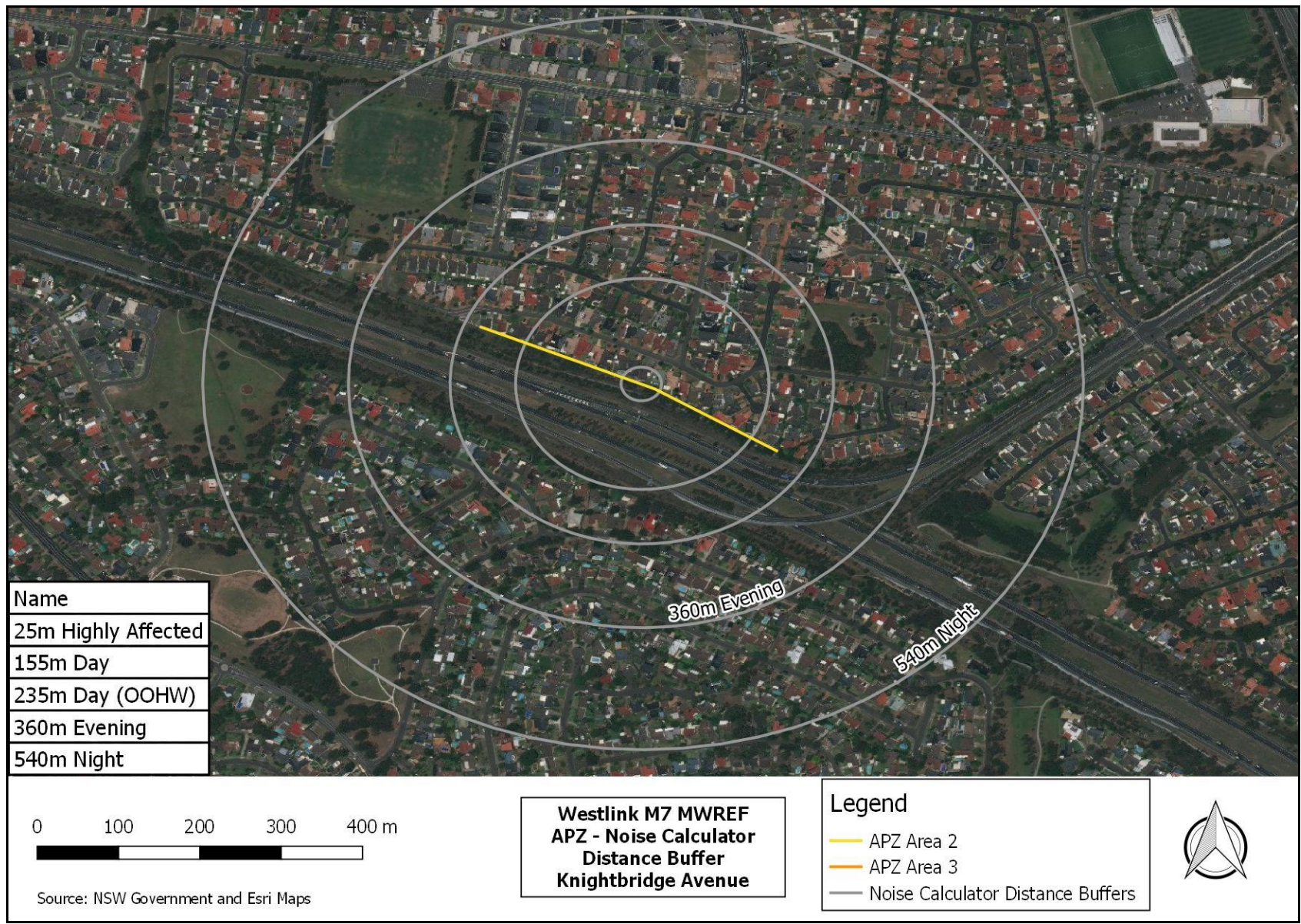


Figure 12: Knightsbridge Avenue Sensitive Receivers.

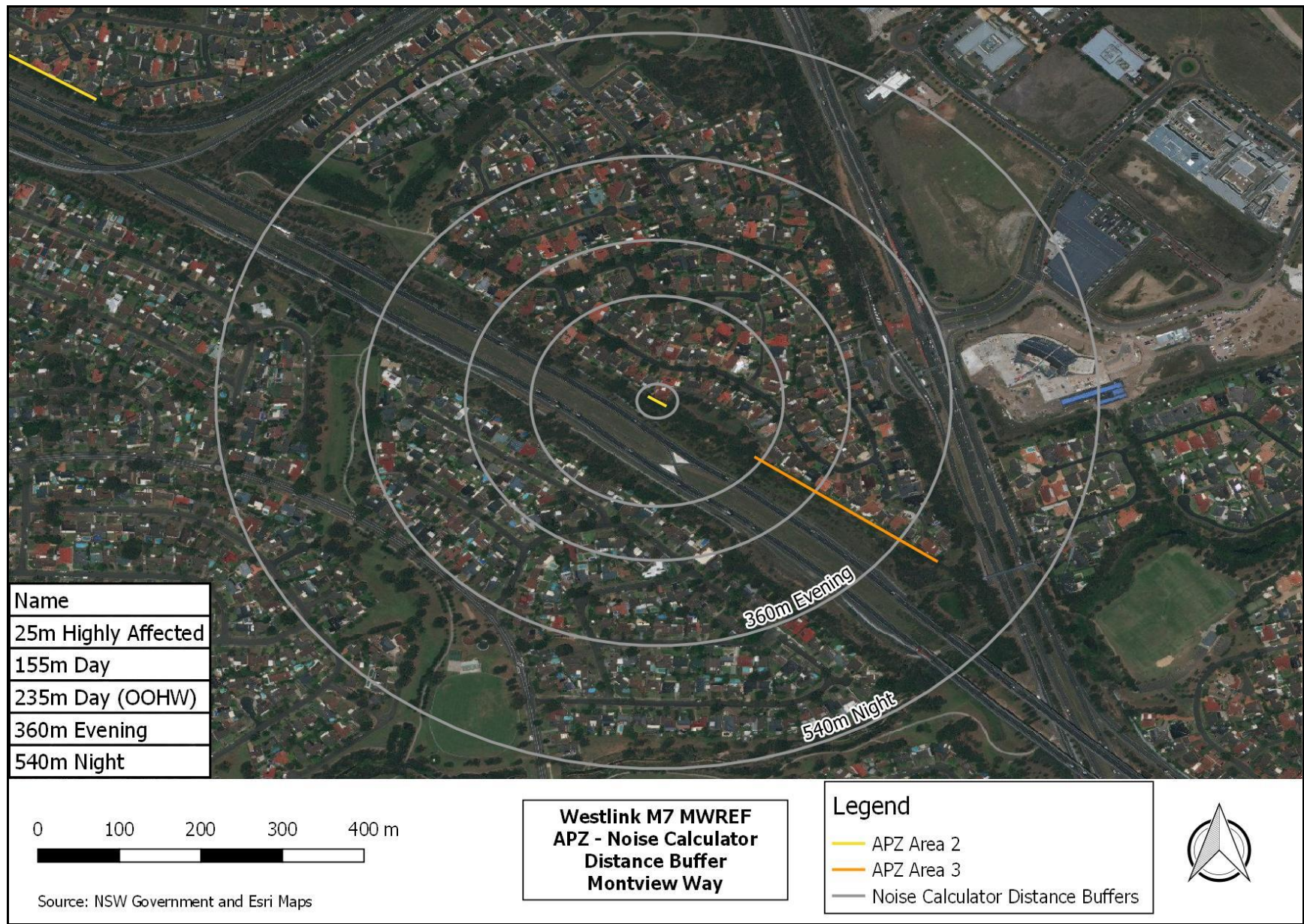


Figure 13: Montview Way Sensitive Receivers (APZ2).

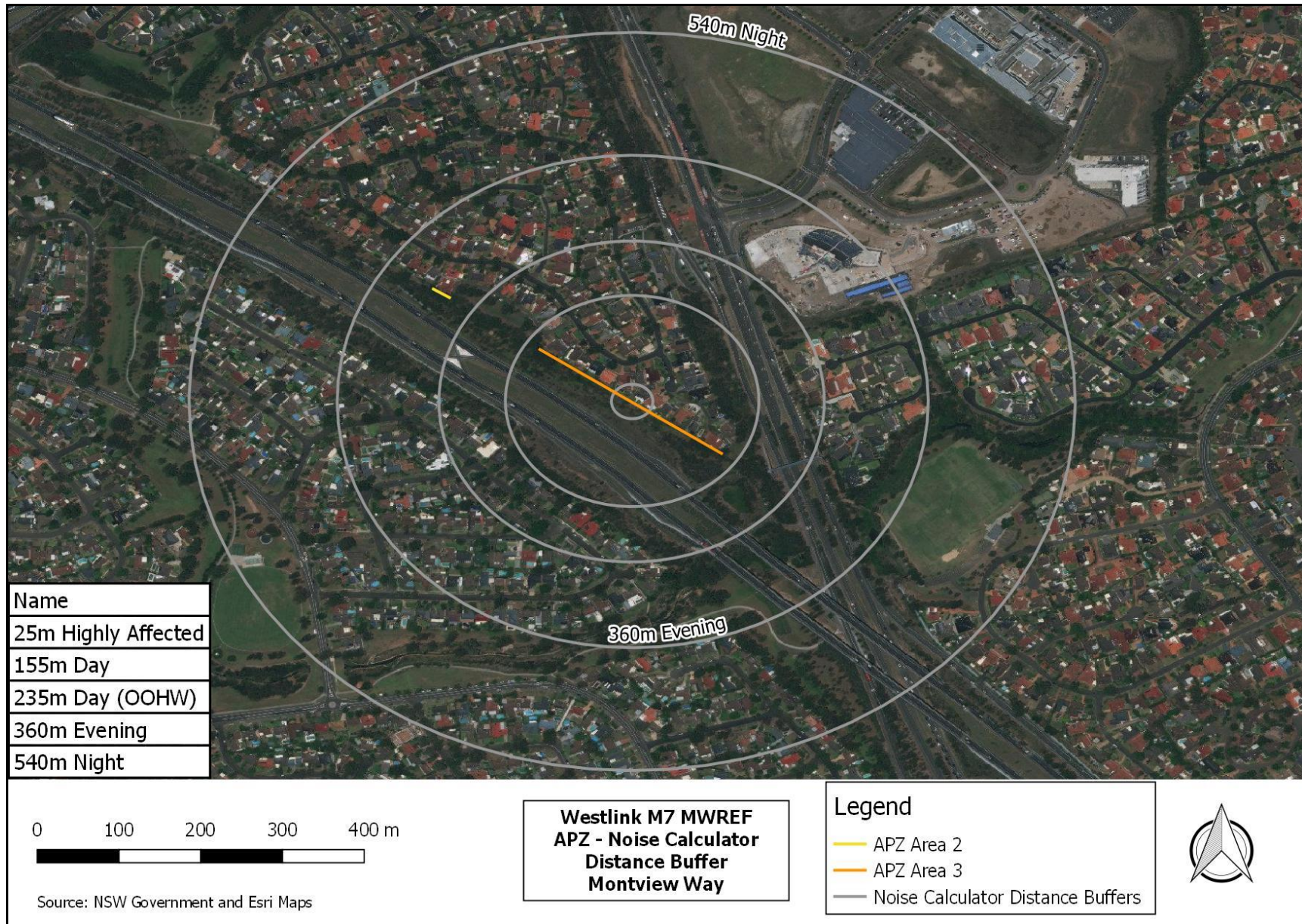


Figure 14: Montview Way Sensitive Receivers (APZ3).

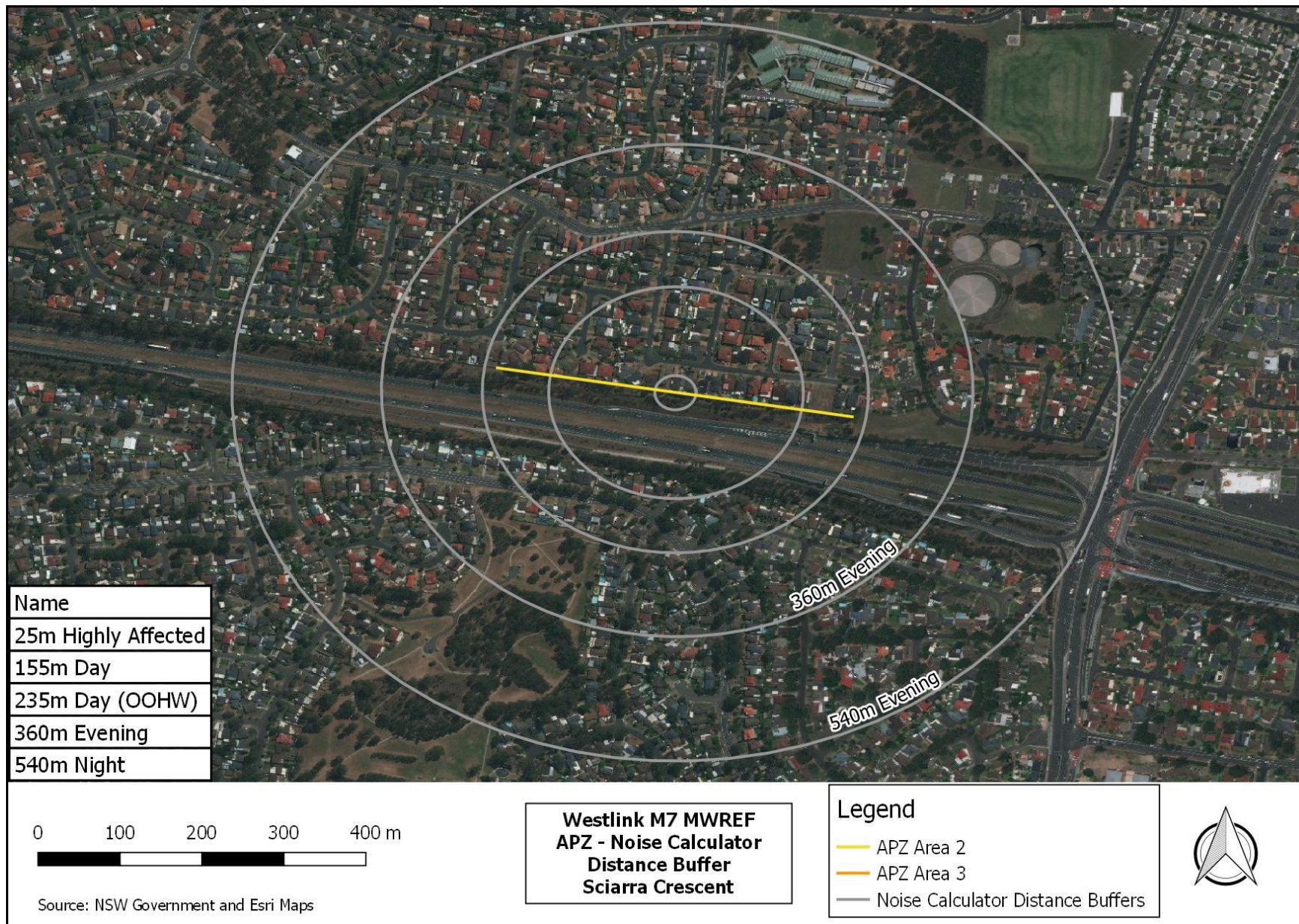


Figure 15: Sciarras Crescent Sensitive Receivers.

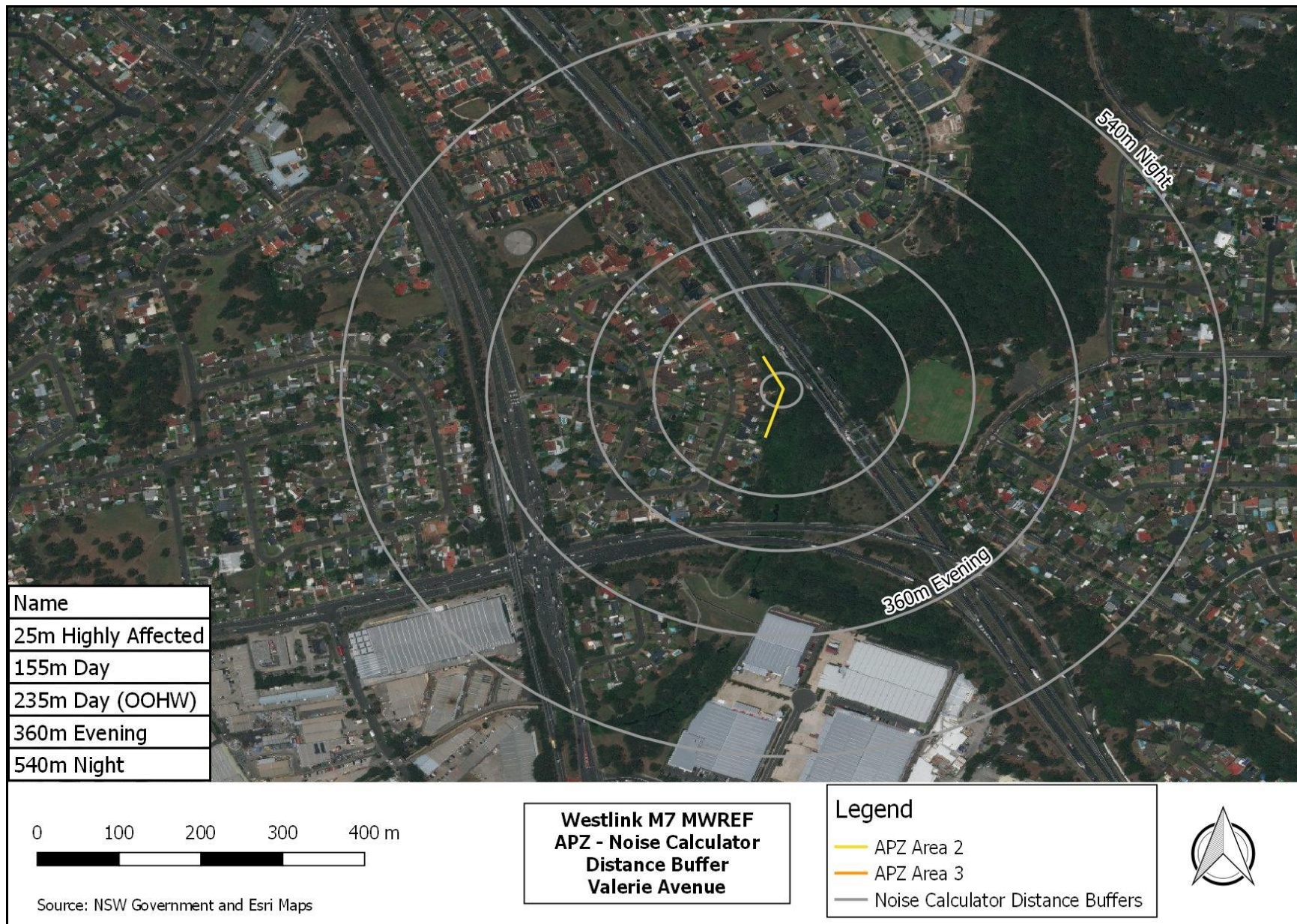


Figure 16: Valerie Avenue Sensitive Receivers.

Distanced Based Assessment (Construction Scenario)

Steps for Screening Assessment:

- Schedule noisy works to occur in standard hours where possible or before 11pm and implement Standard Measures.
- Select the representative noise area category. The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
- Select the scenario. If not found in drop-down list, refer to 'Source List' and select a representative scenario with similar plant combination.
- Is there line of sight to receiver? Select the appropriate scenario from the drop down list.
Identify and implement standard mitigation measures where feasible and reasonable. Include any shielding implemented as part of the standard mitigation measures by changing the selection in the 'Is there line of sight to receiver' drop-down list. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier and any gaps would compromise the acoustic integrity of the solid barrier.
- Determine if there are any receivers (both residential and non-residential receivers) within the affected distance for each relevant time period. Consider background noise measurements to check assumption in Step #2 if:
 - there are many affected receivers and the impact duration at any one receiver is more than 3 weeks; or
 - there are a few affected receivers and the impact duration at any one receiver is more than 6 weeks.
 Note that consideration need to be given to the construction staging plan when determining impact duration.
- Identify if there are any receivers within the additional mitigation measures distances and identify feasible and reasonable measures at each receiver
- Where night works are involved, identify sleep disturbance affected distance.
- Document the outcomes of these steps.
(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Estimator should be investigated on a project-by-project basis.

Abbreviation	Measure
N	Notification
SN	Specific notifications
PC	Phone calls
IB	Individual briefings
RO	Respite offer
R1	Respite period 1
R2	Respite period 2
DR	Duration respite
AA	Alternative accommodation
V	Verification

Note that spot check verification of noise levels and individual briefings are not required for projects with less than 3 weeks impact duration

Please pick from drop-down list in orange cells

Noise area category		R3
RBL or LA90 Background level (dB(A))	Day	50
	Evening	45
	Night	40
LAeq(15minute) Noise Mangement Level (dB(A))	Day	60
	Day (OOHW)	55
	Evening	50
	Night	45
Scenario		Corridor clearing
Is there line of sight to receiver?		No (behind solid barrier)

		Residential receiver															
		LAeq(15minute) noise level above background (LA90)															
		5 to 10 dB(A)			10 to 20 dB(A)			20 to 30 dB(A)			> 30 dB(A)			LAeq(15minute) 75 dB(A) or greater (Highly affected)			Sleep disturbance LAmax 65
		Noticeable			Clearly audible			Moderately intrusive			Highly intrusive						Affected distance (m)
Affected distance (m)		Measures	Within distance (m)	Mitigation level (dB(A))	Measures	Within distance (m)	Mitigation level (dB(A))	Measures	Within distance (m)	Mitigation level (dB(A))	Measures	Within distance (m)	Mitigation level (dB(A))	Measures	Within distance (m)	Mitigation level (dB(A))	Affected distance (m)
		Undeveloped green fields, rural areas with isolated dwellings	Day	135													
Day (OOHW)	195																
Evening	290																
Night	N		420	45	N, R1, DR	135	60	N, R1, DR	45	70	N, R1, DR, PC, SN	15	80	N, PC, RO	25	75	155
Highly Affected	25																
Developed settlements (urban and suburban)	Day	155															
	Day (OOHW)	235															
	Evening	360															
	Night	N	540	45	N, R1, DR	155	60	N, R1, DR	50	70	N, R1, DR, PC, SN	15	80	N, PC, RO	25	75	180
	Highly Affected	25															
Propagation across a valley / over water	Day	190															
	Day (OOHW)	305															
	Evening	485															
	Night	N	745	45	N, R1, DR	190	60	N, R1, DR	60	70	N, R1, DR, PC, SN	15	80	N, PC, RO	25	75	230
	Highly Affected	25															

Figure 17: Noise Distanced Based Assessment.

3.4 Air Quality

Description of existing environmental and potential impacts		
Is the proposal likely to result in large areas (>2ha) of exposed soils?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Are there any dust sensitive receivers located within the vicinity of the proposal during the construction period?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Residential receptors are located within the vicinity (see Figures 12 to 16). It is not expected that any dust will be generated from the proposed works.		
Is there likely to be an emission to air during construction?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
As no material is to be burnt on site, any emissions are only expected to be from exhaust fumes. The impacts on nearby receivers will be minimal given the types of machinery to be utilised and the distance of operation from any of the sensitive receivers. Impacts will be minimised by implementing the safeguards listed below.		

Safeguards

Safeguards to be implemented are:

- A1. Measures (including watering or covering exposed areas) are to be used to minimise or prevent air pollution and dust
- A2. Works that may generate dust are not to be carried out during strong winds or in weather conditions where high levels of dust or air borne particulates are likely
- A3. Vegetation or other materials are not to be burnt on site
- A4. Vehicles transporting waste or other materials that would produce odours or dust are to be covered during transportation
- A5. Stockpiles or areas that may generate dust, are to be managed to suppress dust emissions in accordance with the Transport for NSW *Stockpile Site Management Guideline* (EMS-TG-10)

3.5 Non-Aboriginal heritage

Description of existing environmental and potential impacts		
Have online heritage database searches been completed?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
<ul style="list-style-type: none"> • Transport for NSW section 170 register • NSW Heritage database • Commonwealth EPBC heritage list • Australian Heritage Places Inventory 		

Description of existing environmental and potential impacts

- Local Environmental Plan(s) heritage items

All database searches were completed on 21 October, 2019, and are provided at **Appendix VII**. No heritage items will be impacted by the proposed works.

Are there any items of non-Aboriginal heritage or heritage conservation areas listed on relevant heritage databases/registers that are located within the vicinity of the proposal?

Yes

No

Joyce Farmhouse (15- 15A Valerie Avenue, Baulkham Hills, NSW 2153) is listed in the Local Environmental Plan (LEP), Schedule 1 and The Hills LEP 2012 (listing 127) on the NSW Heritage Register. The property will not be impacted from the proposed works (see **Figure 18**).

Are there any items of potential non-Aboriginal heritage significance which are not listed on relevant heritage databases/registers that are in the vicinity of the proposal?

Yes

No

Outside of the project area (approximately 20 m) sandstone steps are set into the embankment (see **Photo 1**). According to the heritage searches the steps are not heritage listed. It is unclear the exact age and providence of the steps. Location: Latitude -33.763823, Longitude 150.961625.



Photo 1: Sandstone Steps at Valerie Avenue.

Is the proposal likely to occur in or near features that indicate potential archaeological remains?

Yes

No

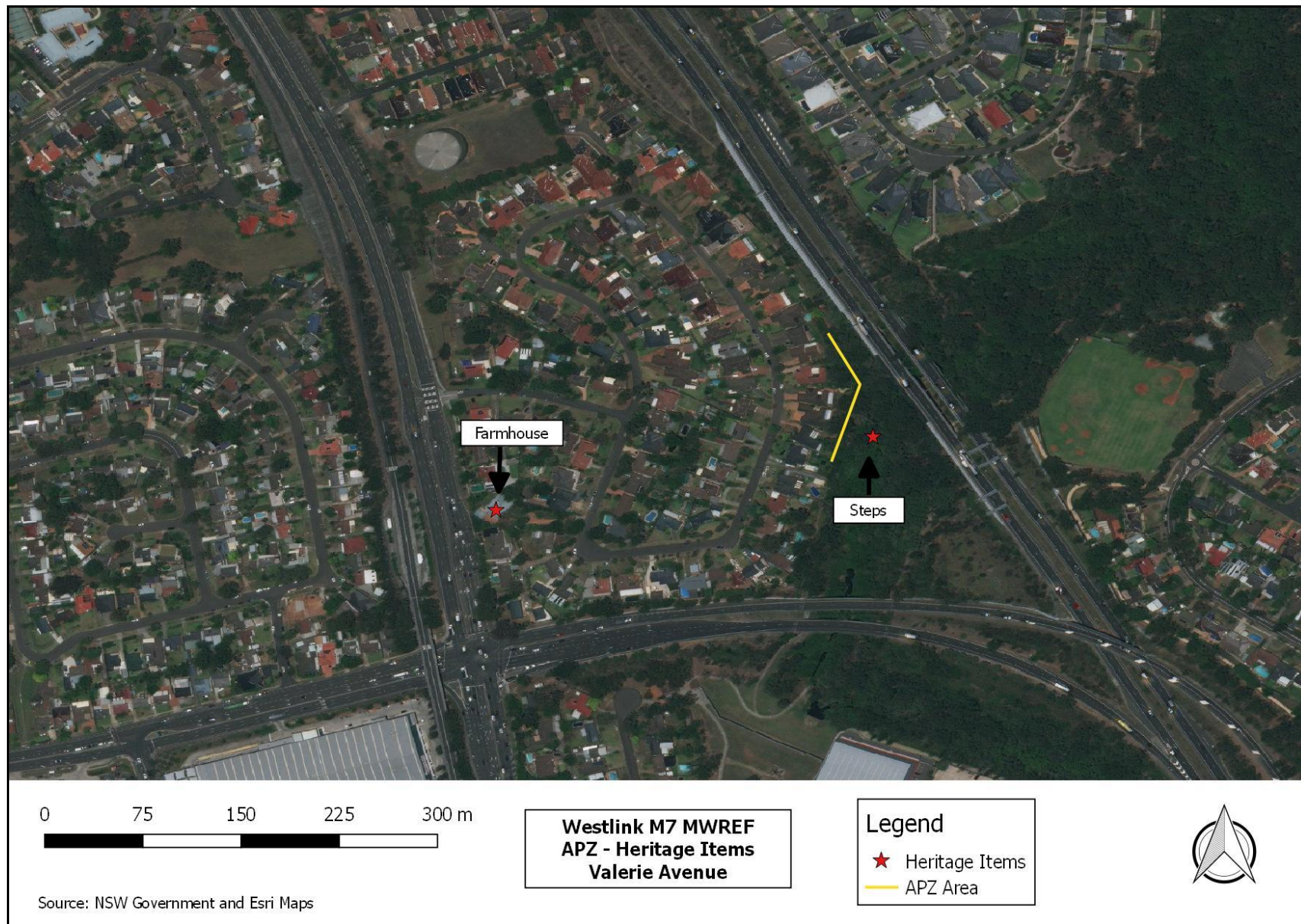


Figure 18: Location of Joyce Farmhouse and Valerie Avenue sandstone steps.

Safeguards

Safeguards to be implemented are:

- H1. If unexpected archaeological remains are uncovered during the works, all works must cease in the vicinity of the material/find and the steps in the Transport for NSW *Standard Management Procedure: Unexpected Heritage Items* must be followed. The Transport for NSW Senior Environment Specialist - Heritage must be contacted immediately
- H2. If any items defined as relics under the NSW *Heritage Act 1977* are uncovered during the works, all works must cease in the vicinity of the find and the Transport for NSW Senior Environment Specialist - Heritage contacted immediately.

3.6 Aboriginal Heritage

Description of existing environmental and potential impacts		
<p>Would the proposal involve disturbance in any area that has not been subject to previous ground disturbances?</p> <p>The proposal area has previously been subject to vegetation clearing and ground disturbing activities including M7 corridor plantings and development. Disturbance would be made within the 10.0 m clear zone; however, it is unlikely that any Aboriginal artefact would be disturbed.</p>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<p>Have online AHIMS search been completed?</p> <p>Yes, an AHIMS extensive search was conducted on 6 November, 2019, for the project sites, and basic searches again conducted on 27 July, 2020. The search indicated six sites, all of which are located within close proximity to the Montview APZ3 site, but at a sufficient distance from the intended works that would not result in any impact. The extensive search is not included in this REF due to the sensitive nature of the sites (burial, camp site and artefacts). The Stage One <i>Procedure for Aboriginal Cultural Heritage Consultation and Investigation</i> (PACHCI) assessment is included at Appendix II.</p>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
<p>Is there potential for the proposal to impact on any items of Aboriginal heritage?</p>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<p>Would the proposal involve the removal of mature native trees?</p> <p>Up to 82 trees may be removed to establish the required clear zone; however, it is unlikely that any Aboriginal artefacts would be disturbed.</p>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
<p>Would the proposals impact on any features that may indicate any potential archaeological remains?</p>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Description of existing environmental and potential impacts

Is the proposal consistent with the requirements of the Transport for NSW Procedure for Aboriginal cultural heritage consultation and investigation (PACHCI)?

Yes

No

A Stage One PACHCI assessment conducted by Transport for NSW (attached at **Appendix II**) found that it is unlikely any harm would come to any known Aboriginal site, place or landscape.

Safeguards

Safeguards to be implemented are:

- B1. If Aboriginal heritage items are uncovered during the works, all works in the vicinity of the find must cease and the Transport for NSW Aboriginal cultural heritage officer and regional environment manager contacted immediately. Steps in the Transport for NSW *Standard Management Procedure: Unexpected Heritage Items* must be followed.

3.7 Biodiversity

The biodiversity assessment involved:

- Site assessment of each site (ground truthing) undertaken for all five sites over a period of two days on the 23 and 24 October, 2019
- Research and database searches
- Assessments of significance (5 part tests).

The assessment was conducted by an Advitech Ecologist in conjunction with the Westlink Services Environmental Officer. Each site was walked from boundary to boundary. The field assessment included flora and fauna identification, GPS recording of trees and general observations related to the proposal. The information gathered in the field assessment was supported by data base searches as well as identifying sites requiring Assessments of Significance.

Description of existing environmental and potential impacts

Have relevant database searches been carried out?

Yes

No

The following databases searches were conducted:

- Commonwealth EPBC Act Protected Matters Search report (20.0 km search radius - which covers all proposal sites) was conducted on 7 November, 2019 (see **Appendix VIII**)
- OEH Bionet Atlas of NSW Wildlife database search (10.0 km search radius) was conducted on 7 November, 2019 (see **Appendix IX**)
- OEH Vegetation information system (VIS) database
- DoEE Species Profiles and Threats Database (SPRAT).

Did the database searches identify any endangered ecological communities, threatened flora and/or threatened or protected fauna, or migratory species in or within the vicinity of the proposed works? Both Federal and State listed

Yes

No

Description of existing environmental and potential impacts

matters must be considered.

A list of threatened species identified within a 10.0 km radius of the proposal areas is attached within **Appendices IX and X** and a summary of the findings is provided below:

DPIE Bionet Atlas of NSW (Appendix IX)

No critically endangered species under the BC Act and four critically endangered species under the EPBC Act

26 endangered species under the BC Act and eight endangered species under the EPBC Act

52 vulnerable species under the BC Act and 17 vulnerable species under the EPBC Act

13 Migratory species protected by international treaties.

EPBC Act Protected Matters Search Tool (Appendix VIII)

Ten Threatened Ecological Communities

91 Threatened Species

58 Migratory Species.

Is the proposal likely to impact Nationally listed threatened species, ecological communities or migratory species?

Yes

No

The DPIE Bionet Atlas database search identified 94 threatened species within a 10.0 km radius of the proposal sites. A site assessment was undertaken on the 23 and 24 October, 2019. Although no threatened species were recorded at the proposal sites during the site assessment, a habitat suitability assessment identified that seven threatened species and two Critically Endangered Ecological Communities (CEECs) may be impacted by the proposed works (listed in **Table 3**). The proposal will impact habitat that may provide foraging resources or shelter for threatened fauna (including nomadic pollinators). **Appendix X** contains an Assessment of Significance (AoS) for each of the species/plant communities listed below in **Table 3**.

Table 3:Threatened Species and Ecological Communities.

Species/ Community	NSW status	EPBC status	Sites	Type of impact
<i>Anthochaera Phrygia</i> (Regent Honeyeater)	E	CE	All	Removal of foraging habitat
<i>Glossopsitta pusilla</i> (Little Lorikeet)	V		All	Removal of foraging habitat
<i>Lathamus discolor</i> (Swift Parrot)	E	CE	All	Removal of foraging habitat

Description of existing environmental and potential impacts

<i>Meridolum corneovirens</i> (Cumberland Plain Land Snail)	E		Montview Way APZ2; Valerie Ave	Removal of habitat
<i>Pommerhelix duralensis</i> (Dural Land Snail)	E	E	Valerie Ave	Removal of habitat
<i>Pteropus poliocephalus</i> (Grey-headed Flying-fox)	V	V	All	Removal of foraging habitat
<i>Ninox strenua</i> (Powerful Owl)	V		Valerie Ave	Impact to potential roosting sites
<i>Cumberland Plain Woodland in the Sydney Basin Bioregion</i>	CE	CE	Montview Way APZ2	Removal of habitat
<i>Shale Sandstone Transition Forest in the Sydney Basin Bioregion</i>	CE	CE	Valerie Ave	Removal of habitat

The AoS found that none of the threatened entities identified above will be significantly impacted by the proposed works. A brief summary of potential impacts to threatened entities is provided below:

Affected flora

No threatened flora were identified during the field survey. Ground cover in APZs was dominated by exotic herbaceous plants. Three of the five sites (excluding Valerie Avenue and Montview Avenue APZ 2) have also been subject to previous ground disturbance works and are currently managed as APZs (at least mowed annually). Given thorough coverage of narrow APZ corridors, no threatened flora is considered to occur in the proposal sites or likely to be impacted by the project.

Affected fauna

Nomadic pollinators (Swift Parrot, Regent Honeyeater, Grey-headed Flying Fox and Little Lorikeet) are considered likely to forage in trees within the proposal sites. These pollinators would pass through the proposal sites during movements between larger habitat patches with suitable foraging resources. The APZ areas contain feed trees (including *Eucalyptus tereticornis* and *Corymbia maculata*), which help support these species, especially during winter when there is a lack of trees in flower. In total, 43 winter flowering trees (**Table 4**) are proposed to be impacted across the five sites.

The AoS determined that habitat is unlikely to be critical for the survival of any of these species given the linear, fragmented extent of habitat to be impacted and retention of winter flowering trees in the proposal locations.

The Powerful Owl is known to roost in dense mid-canopy along riparian corridors. Weeds, including *Ligustrum lucidum*, can form a part of this habitat

Description of existing environmental and potential impacts

component (found in the Valerie Avenue APZ). The Powerful Owl has been recorded approximately 400 m north east of the Valerie Avenue APZ along the Toongabbie Creek riparian corridor (William Joyce Reserve), including nesting in this vicinity (last Bionet record from 2014). The AoS determined that this species is unlikely to be adversely impacted by the proposed works. The proposal will not impact core riparian habitat (only vegetation located along a 127 m disturbed edge of the riparian habitat patch). Furthermore, works are scheduled to take place outside of the breeding season (May to October) preventing disturbance to any potential active nest site.

Potential habitat is available for the Cumberland Plain Land Snail and Dural Land Snail at Valerie Avenue (for both species) and Montview Avenue (APZ 2) (Cumberland Plain Land Snail only). Targeted searches did not locate any snails, furthermore, no snails or snail shells indicating potential or historic occupation were encountered in the proposed APZ corridors. The proposal will only impact a small amount of potential habitat that may support threatened snails, necessary to meet APZ fuel management requirements. No known existing populations of snails will be affected by APZ works. The AoS determined that the proposal is not likely to fragment or isolate habitat that may impact the long term survival of snails in the locality.

Affected threatened ecological communities

Native vegetation forming part of the CEECs, *Cumberland Plain Woodland* and *Shale Sandstone Transition Forest in the Sydney Basin Bioregion* meet the scientific determination of the respective CEEC under the BC Act. Up to 0.081 ha of *Cumberland Plain Woodland* is proposed to be impacted at Montview Avenue APZ 2, this includes clearing 13 native trees, (regrowth or advanced regrowth in form). Mature (possibly remnant) trees in this area will not be impacted.

Up to 0.063 of *Shale Sandstone Transition Forest* is proposed to be impacted at Valerie Avenue APZ. Up to 13 native trees, formative of the CEEC (regrowth or advanced regrowth in form) are proposed to be cleared. Mature (remnant) trees in this area will not be impacted.

Vegetation in both APZs (at Montview and Valerie Avenue) does not meet the condition thresholds for the CEEC under the EPBC Act, primarily because perennial understory vegetation cover is < 30% (Commonwealth of Australia, 2010, 2014). The AoSs concluded that the project would not have a significant impact on either of the CEECs given the lack of other structural layers or species diversity representative of the CEECs, and that the composition of the CEECs locally would not be modified by the project.

Would the proposal require the removal of any other vegetation?

Yes

No

The proposal sites are situated in relatively narrow corridors between the M7 motorway and residential areas. A description of the existing environment (including vegetation to be removed) of each site is provided below. A species list for each site is provided in **Appendix XII**.

- Sciarra Crescent: the APZ (5.0 m from residential boundary) will impact an existing area that is mowed biannually (**Photo 2**). This area is dominated

Description of existing environmental and potential impacts

by an exotic herbaceous groundcover including *Lolium spp.* (Rye grass) and *Cenchrus clandestinus* (Kikuyu Grass). Up to eight trees growing on an noise embankment will be cleared to meet fuel management specifications. A review of historic satellite imagery shows that vegetation to be impacted forms apart of M7 plantings. Tree species to be impacted include (*Eucalyptus tereticornis*, *Melaleuca stypheliodes* and *M. decora*). Vegetation to be impacted is not indicative of any TEC.



Photo 2: Sciarra Crescent APZ showing trees growing on embankment.

- Knightsbridge Avenue: the APZ (6.0 m from residential boundary) will impact an existing storm water / fire trail management area (**Photo 3**), consisting primarily of planted *Eucalyptus tereticornis* and *E. amplifolia*, just off a noise wall. 25 trees proposed to be cleared to meet fuel management specifications. Vegetation to be impacted is not indicative of any TEC.

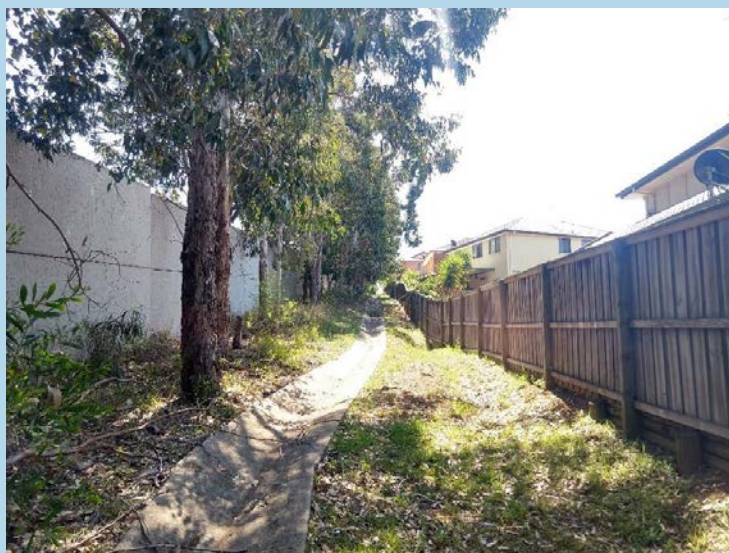


Photo 3: Knightsbridge Avenue APZ showing table drain.

- Montview Way APZ2: the APZ (3.0 m from residential boundary) consists of trees in various growth form stages including regrowth, advanced regrowth and mature (**Photo 5**). The ground layer is dominated by exotic grasses and forbs including *Ehrharta erecta*. Native grasses and forbs

Description of existing environmental and potential impacts

(including *Oplismenus aemulus* and *Dichondra repens*) occur in low cover. Thirteen trees growing close to the residential boundary (including two that are only subject to limb removal) are proposed to be cleared/impacted to meet fuel management specifications. Old satellite imagery suggests that these trees were present prior to the construction of the M7 (no tree hollows were observed). Vegetation in the proposal area (while degraded and likely includes planted trees) is consistent with poor condition *Cumberland Plain Woodland* (a Critically Endangered Ecological Community). Vegetation just west of this proposal site, was found to be consistent with PCT 850 (*Grey Box – Forest Red Gum Grassy Woodland*) which is also associated with *Cumberland Plain Woodland*. The proposal site holds regeneration potential and includes an individual mature *E. tereticornis* tree (which will not be impacted by the proposed works).



Photo 4: Montview Way APZ2 showing trees close to the boundary and representative of a *Cumberland Plain Woodland* in poor condition with disturbed ground layer.

- Montview Way APZ3: the APZ (7.0m from residential boundary) is primarily cleared. 23 trees growing close to the residential boundary (all located adjacent two residencies) will be cleared to meet fuel management specifications (**Photo 4**). Old satellite imagery shows these trees were present prior to the construction of the M7. The growth form of these trees is at advanced regeneration, with stems as large as 80 cm in diameter recorded (no tree hollows were observed). The groundcover includes primarily of exotic grasses and forbs such as *Bromus catharticus* and *Trifolium repens*. Two species of trees would be impacted (*Casuarina glauca* and *Corymbia maculata*). Vegetation is not indicative of any TEC.

Description of existing environmental and potential impacts



Photo 5: Montview Way APZ3 showing large trees close to boundary of 6 Montview Way.

- Valerie Avenue: the APZ (10.0 m from residential boundary) consists of existing cleared grassy areas, dense thickets of weeds and occasional native plants (**Photo 6**). The APZ is dominated by weeds including *Tradescantia fluminensis*, *Nephrolepis cordifolia* and *Chlorophytum comosum* in the ground layer, and *Ligustrum lucidum* and *Jacaranda spp* in the mid storey. Occasional native plants include *Microlaena stipoides* and *Lomandra longifolia* in the groundlayer, *Pittosporum undulatum* and *Breynia oblongifolia* in the mid storey and *Corymbia maculata* and *Eucalyptus spp.* in the over story.



Photo 6: Valerie Avenue APZ showing understory dominated by *Ligustrum lucidum* and *Jacaranda spp.*

Large, mature trees will not be impacted to achieve the recommended fuel management specifications. The majority of vegetation to be impacted is introduced. Up to 13 regrowth trees (*C. maculata* or *Eucalyptus spp.*) are proposed to be cleared. Vegetation in the proposal area (while degraded) is likely consistent with poor condition *Shale Sandstone Transition Forest* (a Critically Endangered ecological community). PCT 1281 best fitted the community (which is also mapped over the proposal site according to the Sydney Metro SVTM (State Vegetation Type Map).

Description of existing environmental and potential impacts

Would the proposal affect any tree hollows or hollow logs?

Yes

No

Are there any known areas of outstanding biodiversity value or areas mapped as 'littoral rainforest' or 'coastal wetland' in the Coastal Management SEPP in or within the vicinity of the proposed work?

Yes

No

Vegetation at Valerie Avenue (see **Figure 19**) is mapped on the Biodiversity Values Map but is not an area of Outstanding Biodiversity Value.

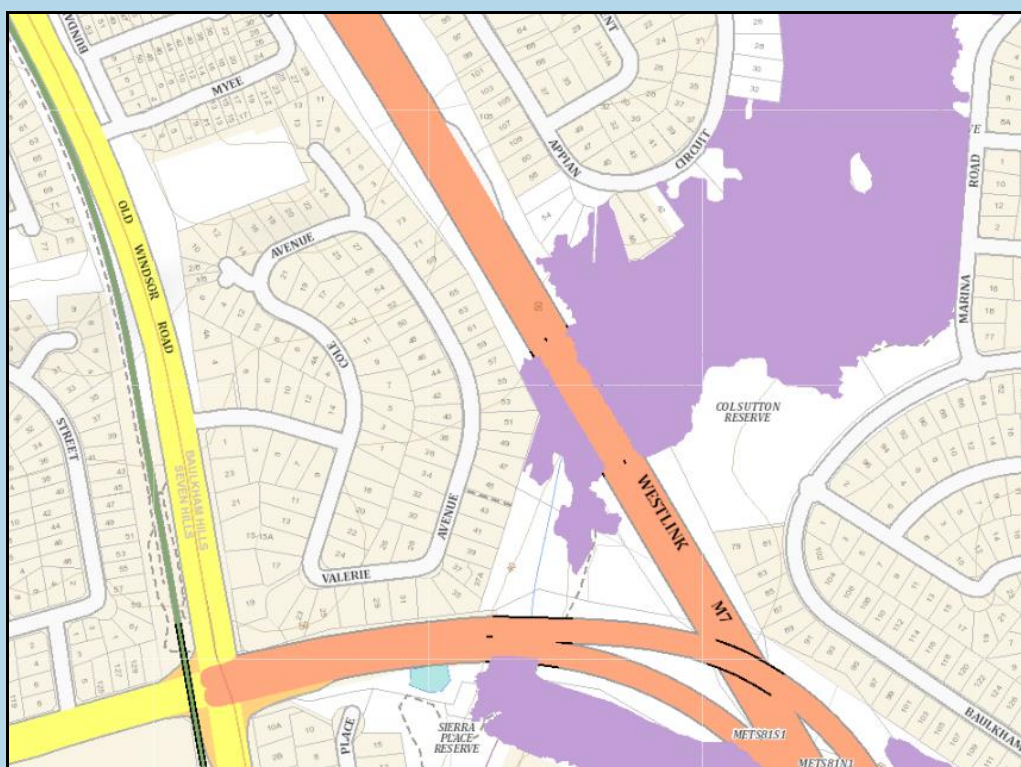


Figure 19: Valerie Ave site indicated in the Biodiversity Values Map.

Would the proposal provide any additional barriers to the movement of wildlife?

Yes

No

As the canopy will be thinned and space between canopies increased, this may have an impact on the movement of fauna between canopies, such as gliders and possums. The safeguards listed will ensure impact to these species are minimised.

Would the proposal disturb any natural waterways or aquatic habitat?

Yes

No

Would the proposal disturb any crevices or other locations (such as on bridges and culverts) for potential bat habitat?

Yes

No

Table 4: Summary of Impacts to Native Vegetation and Habitat.

Site name	Site width (m) and proposed APZ width (in parentheses)	Area of vegetation to be impacted (ha)	Area of CEEC (poor condition) to be impacted (ha)	Total no. native trees to be impacted ¹	Total no. of winter flowering trees to be impacted ²
Sciarra Crescent	403m and APZ5m.	0.320	-	8	2
Knightsbridge Avenue	410m and APZ6m.	0.166	-	25	14
Montview May APZ 2	26 and APZ 7m.	0.081	0.081 <i>Cumberland Plain Woodland</i>	13	9
Montview Way APZ 3	269m and APZ 3m.	0.018	-	23	6
Valerie Avenue	(127 10m)	0.127	0.063 <i>Shale Sandstone Transition Forest</i>	13	12
Total		0.712	0.144	82	43

¹ **Appendix VI** contains a list of tree species recorded at each site, including stem diameter size class and a map of where trees proposed to be cleared are located.

² Potential nomadic pollinator habitat.

Safeguards

Safeguards to be implemented are:

- F1. There will be no disturbance or damage to threatened species or critical habitat
- F2. Works are not to harm threatened fauna (including where they inhabit bridges or other structures eg timber fence posts or maritime piles)
- F3. If unexpected threatened fauna or flora species are discovered, stop works immediately and follow the Transport for NSW *Unexpected Threatened Species Find Procedure* in the Transport for NSW *Biodiversity Guidelines 2011 – Guide 1: Pre-clearing process*
- F4. Works are not to create an ongoing barrier to the movement of wildlife
- F5. Any revegetation of areas disturbed by the proposed works would be undertaken in accordance with Transport for NSW *QA Specification R178 – Vegetation* and the Transport for NSW *Biodiversity Guidelines 2011 - Guide 3: Re-establishment of native vegetation*
- F6. Fauna handling would be undertaken by an appropriately licenced ecologist and in accordance with the requirements the Transport for NSW *Biodiversity Guidelines - Guide 9: Fauna Handling*
- F7. To reduce the introduction and spread of noxious and environmental weeds, vegetation within areas to be cleared will be managed in accordance with the Transport for NSW *Biodiversity Guidelines - Guide 6: Weed Management* and with the steps prescribed in the *Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022*
- F8. Actions will be carried out to ensure all machinery is free from weeds and pathogens when placed on site, and to avoid spreading weeds and pathogens from site. Weeds and sediment will be removed from equipment and be disposed of in an appropriate waste receptacle or at a registered facility in accordance with the Transport for NSW *Biodiversity Guidelines -Guide 6: Weed Management* and

with the steps prescribed in the *Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022*

- F9. All pathogens (for example, Chytrid, Myrtle Rust and Phytophthora) are to be managed in accordance with the Transport for NSW *Biodiversity Guidelines - Guide 7: Pathogen Management* and the *DECC Statement of Intent 1: Infection of native plants by Phytophthora cinnamomi* (for Phytophthora)
- F10. Works will not be undertaken at the Valerie Avenue APZ between the months of May to October to prevent possible disturbance to Powerful Owl roosting habitat located in the Toongabbie Creek riparian corridor
- F11. A supervisor and an appropriately licenced ecologist will be onsite during the works to manage appropriate clearance of tree crowns to avoid over clearing.

3.8 Trees

Description of existing environmental and potential impacts		
Does the proposal involve pruning, trimming or removal of any tree/s? Up to 82 trees are subject to clearing or trimming (listed in Appendix IX and as indicated in Figures 20 to 24).	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Do the trees form part of a streetscape, an avenue or roadside planting? Some trees form part of the original plantings when the M7 was constructed. None are considered as having heritage value.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Have the trees been planted by a community group, landcare group or by council or is the tree a memorial or part of a memorial group eg. has a plaque?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Do the trees form part of a heritage listing or have other heritage value?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Safeguards

Safeguards to be implemented are:

- TR1. Trees will be removed in accordance with Transport for NSW *Biodiversity Guidelines - Guide 4: Clearing of Vegetation and Removal of Bushrock*
- TR2. Pruning and trimming of trees will be undertaken by a qualified arborist in accordance with *Australian Standard 4373-2007 Pruning of amenity trees*
- TR3. Only trees listed in **Appendix XI** will be cleared or trimmed. If there is any doubt on whether a tree is marked for removal, the site Environmental Officer is to be notified for confirmation before the tree is impacted
- TR4. Under no circumstance will trees not marked for removal be cleared

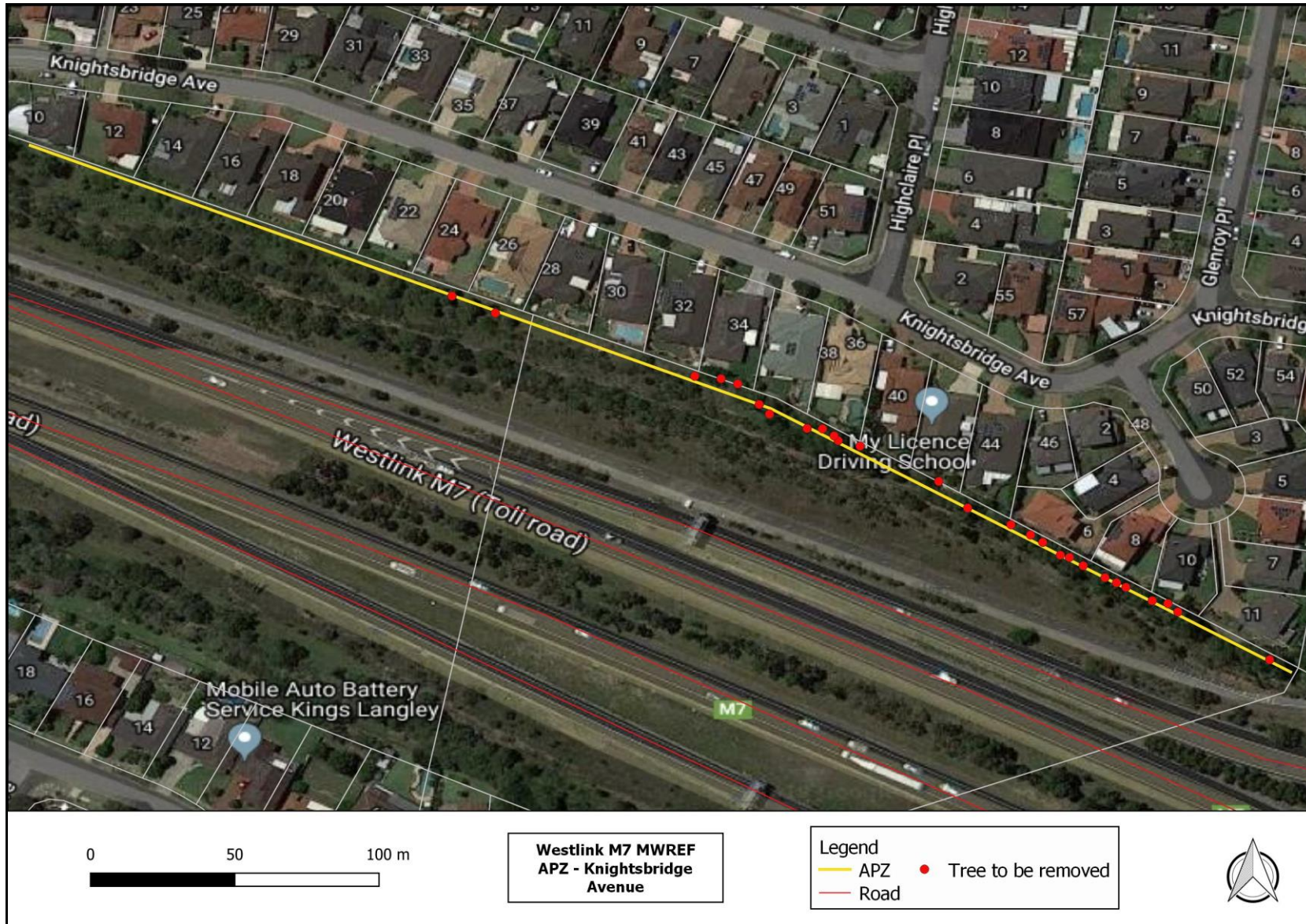


Figure 20: Knightsbridge Avenue Trees to be Removed.



Figure 21: Montview Way APZ2 Trees to be Removed.

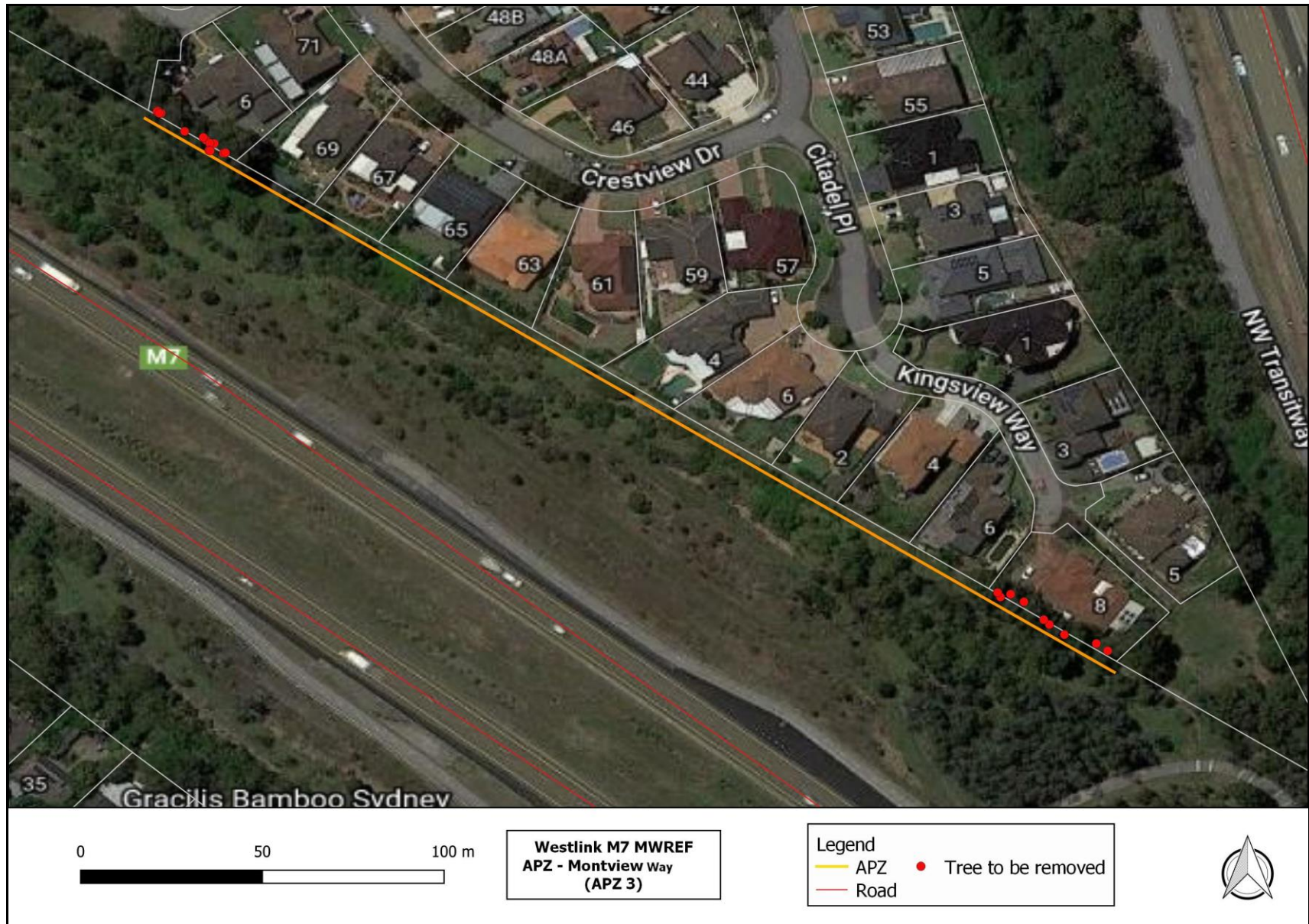


Figure 22: Montview Way APZ3 Trees to be Removed.

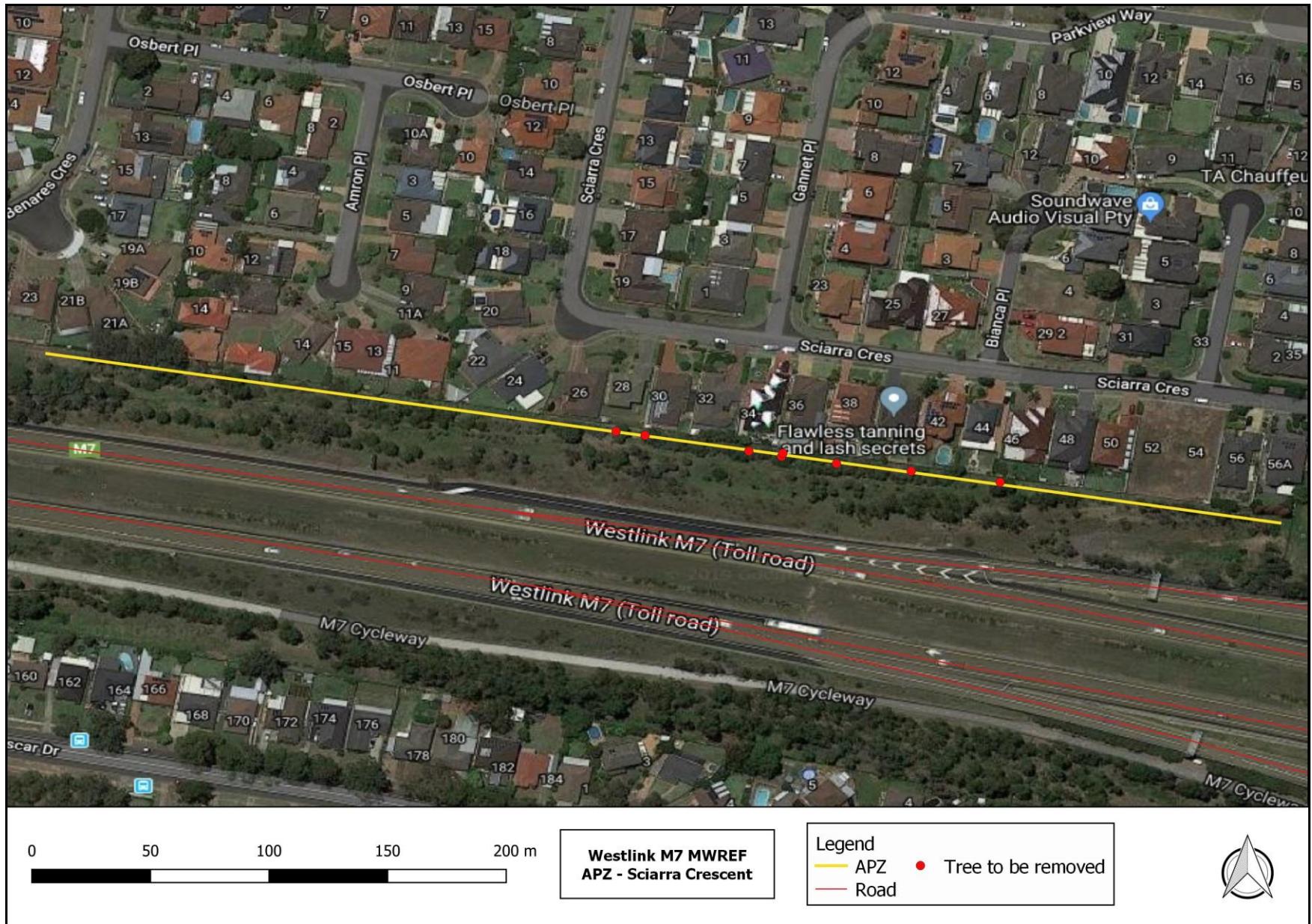


Figure 23: Sciarra Crescent Trees to be Removed.

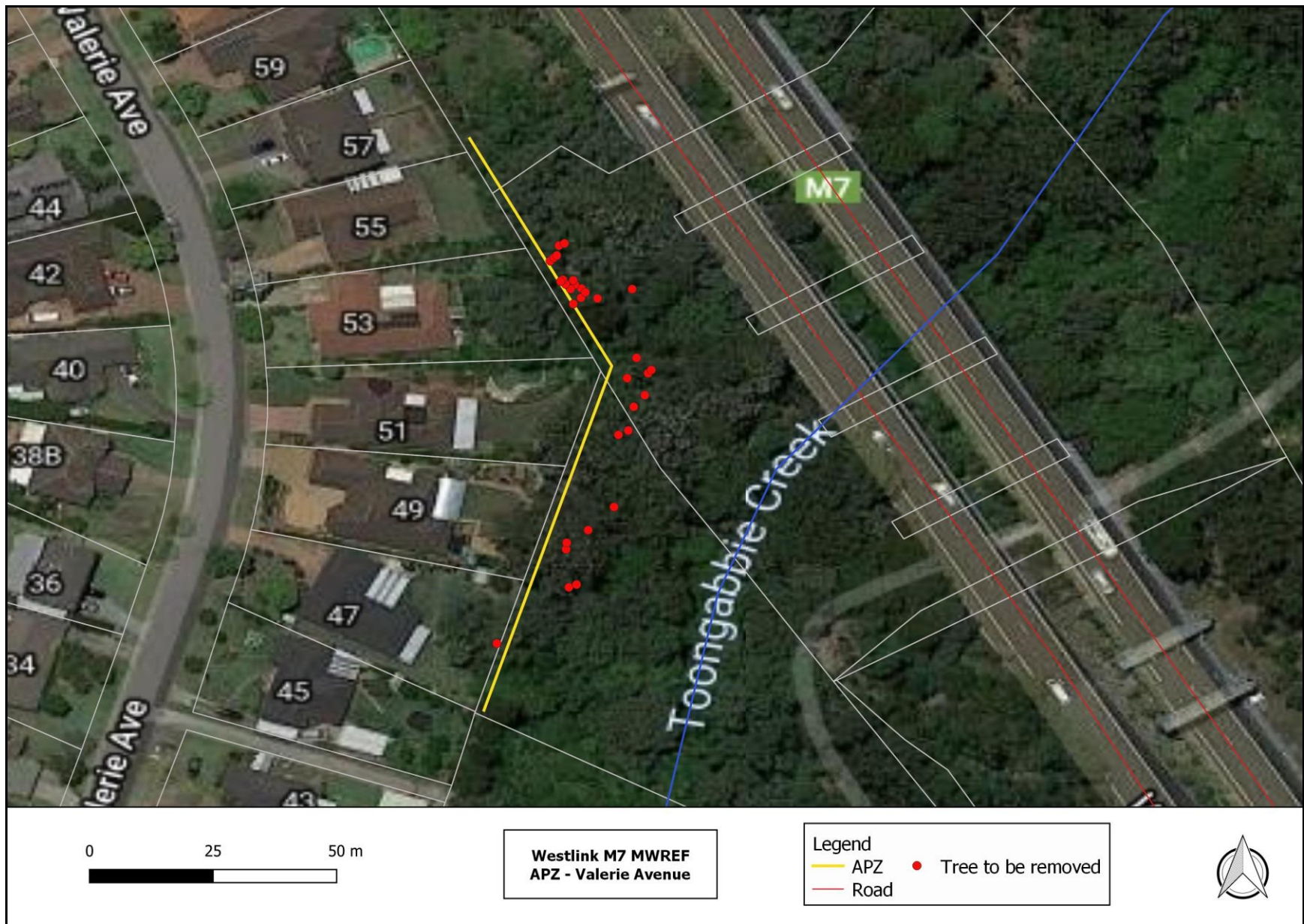


Figure 24: Valerie Avenue Trees to be Removed (native and introduced).

3.9 Traffic and transport

Description of existing environmental and potential impacts		
<p>Is the proposal likely to result in detours or disruptions to traffic flow (vehicular, cycle and pedestrian) or access during construction?</p> <p>The proposal may cause very short-term impacts to traffic flows through lane closures and traffic control measures during works. During the proposed works, traffic would be diverted around planned work activities. It is intended to close one lane only at any time to allow for a continued flow of traffic. Traffic would be managed manually throughout work activities by traffic controllers. Lane closures would cause less than 10 minute delays for traffic on local roads or the M7.</p> <p>As part of the traffic management plan for the APZ project, appropriate measures will be included for cyclists and pedestrians. This may entail signage alerting people to work being undertaken in the area, as well as detours or cordons as required. Impacts to cyclists and pedestrians are considered minimal and relate only to access and movement, otherwise managed by traffic controllers.</p>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
<p>Is the proposal likely to affect any other transport nodes or transport infrastructure (eg bus stops, bus routes) in the surrounding area? Or result in detours or disruptions to traffic flow (vehicular, cycle and pedestrian) or access during operation?</p>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Safeguards

Safeguards to be implemented are:

- T1. Where possible, current traffic movements and property accesses are to be maintained during the works. Any disturbance is to be minimised to prevent unnecessary traffic delays
- T2. A traffic management plan will be prepared in accordance with the *Traffic Control at Work Sites Manual* (RTA, 2010a) and *Australian Standard 1742.3 Manual of uniform control devices*

3.10 Socio-economic

Description of existing environmental and potential impacts		
<p>Is the proposal likely to impact on local business?</p> <p>Noise impacts may be experienced by local residential based businesses such as driving schools at Knightsbridge Avenue and Valerie Avenue, as well as a beauty salon at Sciarra Crescent.</p>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
<p>Is the proposal likely to require any property acquisition?</p>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Description of existing environmental and potential impacts

Is the proposal likely to alter any access for properties (either temporarily or permanently)?

Yes

No

Is the proposal likely to alter any on-street parking arrangements (either temporarily or permanently)?

Yes

No

Is the proposal likely to change pedestrian movements or pedestrian access (either temporarily or permanently)?

Yes

No

For safety, a clear zone in the APZ corridor will be required whilst work is conducted, this may temporarily alter pedestrian access. Nonetheless, the project sites are not considered as thoroughfares with regular pedestrian traffic.

Is the proposal likely to impact on any items or places of social value to the community (either temporarily or permanently)?

Yes

No

Is the proposal likely to reduce or change visibility of any businesses, farms, tourist attractions or the like (either temporarily or permanently)?

Yes

No

Safeguards

Safeguards to be implemented are:

- C1. Complaints received are to be recorded and attended to promptly
- C2. Existing access for nearby and adjoining properties is to be maintained at all times during the works unless otherwise agreed to by the affected property owner
- C3. Works would be completed within the shortest duration possible and only during the standard permitted construction hours
- C4. Potentially affected land owners and occupiers would be notified five working days prior to the commencement of works.

3.11 Landscape character and visual amenity

Description of existing environmental and potential impacts

Is the proposed work over or near an important physical or cultural element or landscape? (heritage items and areas, distinctive or historic built form, National Parks, conservation areas, scenic highways etc)?

Yes

No

Description of existing environmental and potential impacts		
Would the proposal obstruct or intrude upon the character or views of a valued landscape or urban area. For example, locally significant topography, a rural landscape or a park, a river, lake or the ocean or a historic or distinctive townscape or landmark?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Would the proposal require the removal of mature trees or stands of vegetation, either native or introduced? Up to 82 trees may be removed or impacted to establish requisite APZs. The trees are all close to residents' boundaries (posing fire safety risk) and a substantial backdrop (depth) of vegetation exists on all sites behind the trees. Whilst the visual amenity will change slightly, the visual existence of native vegetation behind the resident's houses will not change. It is more likely that the feel of the boundary interface will change from slight increases in light and warmth associated with tree removal on the boundary interface. This is not regarded as a visual impact to residents, rather a visual and senses adjustment that preserves visual amenity whilst mitigating fire risk in the interests of protecting life and property.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Would the proposal result in large areas of shotcrete visible from the road or adjacent properties?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Would the proposal involve new noise walls or visible changes to existing noise walls?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Would the proposal involve the removal or reuse of large areas of road corridor, landscape, either verges or medians?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Would the proposal involve substantial changes to the appearance of a bridge (including piers, girders, abutments and parapets) that are visible from the road or residential areas?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
If involving lighting, would the proposal create unwanted light spillage on residential properties at night (in construction or operation)?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Would any new structures or features being constructed result in over shadowing to adjoining properties or areas?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Safeguards

Safeguards to be implemented are:

- V1. Landscaping is to be managed in accordance with the RMS *Landscape Guideline*
- V2. Works to be carried out in accordance with RMS *Environmental Impact Assessment Practice Note - Guideline for Landscape Character and Visual Impact Assessment EIA-N04*.

3.12 Waste

Description of existing environmental and potential impacts		
Is the proposal likely to generate >200 tonnes of waste material (contaminated and /or non-contaminated material)?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Is the proposal likely to require a licence from EPA?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Is the proposal likely to require the removal of asbestos?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Safeguards

Safeguards to be implemented are:

M1. Resource management hierarchy principles are to be followed:

- Avoid unnecessary resource consumption as a priority
- Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery)
- Disposal is undertaken as a last resort (in accordance with the *Waste Avoidance & Resource Recovery Act 2001*)

M2. Bulk project waste (that is, fill) that needs to be removed from site and sent to a licensed landfill and resource recovery facility not owned by Transport for NSW is to have prior formal written approval from the facility, in accordance with *Environmental Direction No. 20 – Legal Off-site Disposal of Roads and Maritime Services Waste*. This includes other waste transported for reuse, recycling, disposal or stockpiling

M3. There is to be no disposal or reuse of construction waste on to other land

M4. Waste is not to be burnt on site

M5. Waste material is not to be left on site once the works have been completed

M6. Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day

M7. As the proposed works are aimed at protecting assets within Inner Protection Areas (IPAs) within the meaning of Appendix 4 of the RFS *Planning for Bush Fire Protection* guideline (attached at **Appendix XIII**), all leaves and vegetation debris will be removed as a result of intended works

M8. If vegetation is to be mulched and transported off site for beneficial reuse, it is to be assessed for the presence of weeds, pest, and other disease and a Mulch Management Plan prepared in accordance with the *Roads and Maritime Technical Procedure: Mulch Management*.

3.13 Fire History

Description of existing environmental and potential impacts		
Are the proposed works located in an area with a high fire frequency?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Description of existing environmental and potential impacts

Whilst records on fire history for the specific sites are not available, field observations at all sites suggest either a long interval between fires or no fire activity since construction of the tollway.

This is evidenced by;

- absence of juvenile obligate seeders from soil seed banks triggered by fire
- absence of resprouters triggered by fire
- accumulation of ground layer biomass
- absence of scarred burnt trunks

The proposed works are not located in areas of high fire frequency.

During increased impacts of climate change and global heating, the direct risk to homes from bushfire events is heightened and higher than expected fire frequencies may be experienced.

Safeguards

Safeguards to be implemented are:

FH1. Works will be carried out in line with the M7 Corridor Bushfire Asset Protection Zone Assessment recommendations (Peterson Bushfire, 2017) (attached at **Appendix I**), as well as the following Rural Fire Service guidelines:

- *Standards for Asset Protection Zones* (attached at **Appendix III**)
- *Bushfire Environmental Assessment Code for NSW* (attached at **Appendix IV**)
- *Planning for Bush Fire Protection* (attached at **Appendix XIII**)

FH2. Road reserve assets will be managed in accordance with the Cumberland Bush Fire Risk management Plan and The Hills Bush Fire Risk Management Plan (attached at **Appendix V** and **VI**).

4. Consideration of State and Commonwealth environmental factors

4.1 Environmental Planning and Assessment Regulation 2000 checklist

In addition to the requirements of the *Is an EIS required?*, the following factors listed in clause 228(2) of the Environmental Planning and Assessment Regulation, 2000 have also been considered to assess the likely impacts of the proposal on the natural and built environment. This consideration is required to comply with sections 5.5 and 5.7 of the EP&A Act.

Table 5: Impacts of the Proposal on the Natural and Built Environment.

Environmental factor	Impact
<p>(a) Any environmental impact on a community?</p> <p>The proposed works may cause minor short term environmental impacts on the community, such as noise; however, the potential impacts would be minimised with the implementation of the safeguards as detailed in this MWREF. The maintenance works would have an environmental impact on the community from the removal of trees and undergrowth; however, in the long term, residents and road users would benefit from safer conditions.</p>	<p>Short-term negative impact</p> <p>Positive long-term</p>
<p>(b) Any transformation of a locality?</p> <p>The proposed works would not significantly transform the locality as the proposed works would generally be contained within the existing Asset Protection Zone and be carried out on existing assets.</p>	<p>Negligible</p>
<p>(c) Any environmental impact on the ecosystems of a locality?</p> <p>The proposal would have a minor impact on ecosystems within the project area through vegetation removal. The proposal would not significantly alter any high quality habitat. The potential impacts on ecosystems would be minimised by implementing the safeguards detailed in Section 3.</p>	<p>Minor negative short term impact</p>
<p>(d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?</p> <p>The proposed works would not reduce the aesthetic, recreational, scientific or other environmental quality or value of the locality, as works would generally be contained with the existing road formation.</p>	<p>Nil</p>
<p>(e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations?</p> <p>The proposed works would not have an effect on any other locality, place or building of significance or other special value, and any potential would be minimised with the implementation of the safeguards detailed in Section 3.</p>	<p>Negligible</p>

<p>(f) Any impact on habitat of any protected animals (within the meaning of the <i>Biodiversity Conservation Act 2016</i>)?</p> <p>The proposed works would have negligible impact on the habitat of any protected or threatened fauna. The implementation of the safeguards given in Section 3 would also minimise any potential impacts.</p>	Negligible
<p>(g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?</p> <p>The proposed works would not endanger any species of animal, plant or other form of life, whether living on land, in water or in the air due to the limited scope of works for the proposed activities and the implementation of the safeguards given in Section 3.</p>	Negligible
<p>(h) Any long-term effects on the environment?</p> <p>The proposal would have positive long term effects on the environment due to improved safety for road users and residents. There are no anticipated negative long term effects on the environment from the proposal due to the limited scope of these works and the implementation of the safeguards given in Section 3.</p>	Positive long-term
<p>(i) Any degradation of the quality of the environment?</p> <p>The proposed works would potentially degrade the quality of the environment in the short term, however the potential impacts would be minimised with the implementation of the safeguards given in Section 3.</p>	Minor negative short term impact
<p>(j) Any risk to the safety of the environment?</p> <p>The proposed works would have minimal risk to the safety of the environment due to the limited scope of works for the maintenance activities covered in this MWREF, and the potential impacts would be minimised with the implementation of the safeguards given in Section 3.</p>	Minor negative short term
<p>(k) Any reduction in the range of beneficial uses of the environment?</p> <p>The proposed works would cause a minor reduction in the use of the road from lane closures, which would potentially increase travelling time for road users in the short term. There would long term benefits by increasing safety.</p>	Minor negative short term Positive long-term
<p>(l) Any pollution of the environment?</p> <p>The proposed works would potentially cause pollution of the environment; however, the potential risk and impacts would be minimised with the implementation of the safeguards given in Section 3.</p>	Minor negative short term
<p>(m) Any environmental problems associated with the disposal of waste?</p> <p>The waste generated during the proposed works would be recycled or disposed of in accordance with Section 3 of this MWREF. No environmental problems are anticipated for the disposal of waste.</p>	Negligible

<p>(n) Any increased demands on resources, natural or otherwise which are, or are likely to become, in short supply?</p> <p>The waste generated during the proposed works would be recycled or disposed of in accordance with Section 3. No environmental problems are anticipated for the disposal of waste.</p>	Negligible
<p>(o) Any cumulative environmental effect with other existing or likely future activities?</p> <p>The proposed activities have limited potential to have cumulative environmental effects with existing or likely future activities. The effects would be minimal due to the limited scope of works for the activities covered in this MWREF. The potential impacts on the environment would be minimised with the implementation of the safeguards given in Section 3.</p>	Minor negative short term
<p>(p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions?</p> <p>The proposed works would not impact on coastal processes and coastal hazards, including those under projected climate change conditions.</p>	Nil

4.2 Matters of National Environmental Significance checklist

Under the environmental assessment provisions of the EPBC Act, the following Matters of National Environmental Significance are required to be considered to:

- Assist in determining whether the proposal should be referred to the Australian Government Department of the Environment and Energy
- For nationally listed threatened species, ecological communities and migratory species, whether the impacts are significant and should be assessed via a Project REF.

Table 6: Matters of National Environmental Significance.

Factor	Impact
<p>(a) Any impact on a World Heritage property? No impact to World Heritage properties would occur.</p>	Nil
<p>(b) Any impact on a National Heritage place? No impact on a National Heritage place would occur.</p>	Nil
<p>(c) Any impact on a wetland of international importance (often called 'Ramsar' wetlands)? No impact on a wetland of international importance would occur.</p>	Nil
<p>(d) Any impact on nationally threatened species, ecological communities or migratory species? 91 Nationally listed threatened species, 58 EPBC Act listed migratory species and 10 threatened ecological communities were identified as having the potential to occur within 10 km of the proposed sites. Nine of these species or communities are likely to be impacted by the proposed works.</p>	Negligible
<p>(e) Any impact on a Commonwealth marine area? The proposal would not impact a Commonwealth marine area.</p>	Nil
<p>(f) Does the proposal involve a nuclear action (including uranium mining)? The proposal would not involve a nuclear action.</p>	Nil
<p>Additionally, any impact (direct or indirect) on the environment of Commonwealth land? The proposed activity does not have the potential to impact either directly or indirectly on Commonwealth land.</p>	Nil

5. Summary of safeguards and environmental management measures

This section provides a summary of the site specific environmental safeguards and management measures identified in described in chapters 3 and 4 of this REF. These safeguards will be implemented to reduce potential environmental impacts throughout construction and operation. A framework for managing the potential impacts is provided with reference to environmental management plans and relevant Transport for NSW QA specifications. Any potential licence and or approval requirements required prior to construction are also listed.

Table 7: Proposal Safeguards.

Safeguards for the proposed work	
Soil	<p>E1. Erosion and sediment control measures are to be implemented and maintained where required to prevent sediment moving off-site and sediment laden water entering any water course, drainage lines, or drain inlets</p> <p>E2. Erosion and sedimentation controls are to be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request</p> <p>E3. Erosion and sediment control measures are not to be removed until the works are complete and areas are stabilised</p> <p>E4. Work areas are to be stabilised progressively during the works</p>
Waterways and water quality	<p>W1. Long term erosion and sediment management control options include seeding with a cover crop and hydromulching/hydroseeding, planting or stabilisation with jute mesh or similar product. Options will be tailored to site specifics.</p> <p>W2. There is to be no release of dirty water into drainage lines and/or waterways</p> <p>W3. Visual monitoring of local water quality (that is, turbidity, hydrocarbon spills/slicks) is to be undertaken on a regular basis to identify any potential spills or deficient erosion and sediment controls</p> <p>W4. Water quality control measures are to be used to prevent any materials (for example, concrete, grout, sediment, and so on) entering drain inlets or waterways</p> <p>W5. Measures to control pollutants from stormwater and spills would be investigated and incorporated in the pavement drainage system at locations where it discharges to the receiving drainage lines. Measures aimed at reducing flow rates during rain events and potential scour would also be incorporated in the design of the pavement drainage system</p> <p>W6. Excess debris from cleaning and washing is removed using hand tools</p> <p>W7. Refuelling of plant and equipment may occur on the road formation if it is not possible or is impractical to relocate the plant to a designated refuelling area and would include use of mobile containment bunds</p>

Safeguards for the proposed work

	<p>and access to mobile spill kits</p> <p>W8. An emergency spill kit is to be kept on site at all times. All staff are to be made aware of the location of the spill kit and be trained in its use</p> <p>W9. If an incident (for example, a spill) occurs, the RMS <i>Environmental Incident Classification and Reporting Procedure</i> is to be followed and the Transport for NSW Contract Manager notified as soon as practicable.</p>
Noise and vibration	<p>N1. Noise impacts are to be minimised in accordance with RMS <i>Maintenance Noise Estimator</i></p> <p>N2. Notification to affected community members within a minimum of seven calendar days prior to the start of works is to include:</p> <ul style="list-style-type: none"> • Details of the proposal • The duration of works and working hours • Any changed traffic or access arrangements • How to lodge a complaint or obtain more information • Contact name and details <p>N3. A number of residences are highly noise impacted. Impacts to these residences will be minimised with implementation of respite periods and staging of works (mainly to limit impacts due to use of chainsaws and mulchers).</p>
Air quality	<p>A1. Measures (including watering or covering exposed areas) are to be used to minimise or prevent air pollution and dust</p> <p>A2. Works that may generate dust are not to be carried out during strong winds or in weather conditions where high levels of dust or air borne particulates are likely</p> <p>A3. Vegetation or other materials are not to be burnt on site</p> <p>A4. Vehicles transporting waste or other materials that would produce odours or dust are to be covered during transportation</p> <p>A5. Stockpiles or areas that may generate dust, are to be managed to suppress dust emissions in accordance with the RMS <i>Stockpile Site Management Guideline</i> (EMS-TG-10)</p>
Non-Aboriginal Heritage	<p>H1. If unexpected archaeological remains are uncovered during the works, all works must cease in the vicinity of the material/find and the steps in the RMS <i>Standard Management Procedure: Unexpected Heritage Items</i> must be followed. The Transport for NSW Senior Environment Specialist - Heritage must be</p>

Safeguards for the proposed work

	<p>contacted immediately</p> <p>H2. If any items defined as relics under the NSW <i>Heritage Act 1977</i> are uncovered during the works, all works must cease in the vicinity of the find and the Transport for NSW Senior Environment Specialist - Heritage contacted immediately.</p>
Aboriginal Heritage	<p>B1. If Aboriginal heritage items are uncovered during the works, all works in the vicinity of the find must cease and the Transport for NSW Aboriginal cultural heritage officer and regional environment manager contacted immediately. Steps in the RMS <i>Standard Management Procedure: Unexpected Heritage Items</i> must be followed.</p>
Biodiversity	<p>F1. There will be no disturbance or damage to threatened species or critical habitat</p> <p>F2. Works are not to harm threatened fauna (including where they inhabit bridges or other structures eg timber fence posts or maritime piles)</p> <p>F3. If unexpected threatened fauna or flora species are discovered, stop works immediately and follow the RMS <i>Unexpected Threatened Species Find Procedure</i> in the Transport for NSW <i>Biodiversity Guidelines 2011 – Guide 1: Pre-clearing process</i></p> <p>F4. Works are not to create an ongoing barrier to the movement of wildlife</p> <p>F5. Any revegetation of areas disturbed by the proposed works would be undertaken in accordance with Transport for NSW <i>QA Specification R178 – Vegetation</i> and the Transport for NSW <i>Biodiversity Guidelines 2011 - Guide 3: Re-establishment of native vegetation</i></p> <p>F6. Fauna handling would be undertaken by an appropriately licenced ecologist and in accordance with the requirements the RMS <i>Biodiversity Guidelines - Guide 9: Fauna Handling</i></p> <p>F7. To reduce the introduction and spread of noxious and environmental weeds, vegetation within areas to be cleared will be managed in accordance with the RMS <i>Biodiversity Guidelines - Guide 6: Weed Management</i> and with the steps prescribed in the <i>Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022</i></p> <p>F8. Actions will be carried out to ensure all machinery is free from weeds and pathogens when placed on site, and to avoid spreading weeds and pathogens from site. Weeds and sediment will be removed from equipment and be disposed of in an appropriate waste receptacle or at a registered facility in accordance with the RMS <i>Biodiversity Guidelines -Guide 6: Weed Management</i> and with the steps prescribed in the <i>Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022</i></p>

Safeguards for the proposed work

	<p>F9. All pathogens (for example, Chytrid, Myrtle Rust and Phytophthora) are to be managed in accordance with the RMS <i>Biodiversity Guidelines - Guide 7: Pathogen Management</i> and the <i>DECC Statement of Intent 1: Infection of native plants by Phytophthora cinnamomi</i> (for Phytophthora)</p> <p>F10. Works will not be undertaken at the Valerie Avenue APZ between the months of May to October to prevent possible disturbance to Powerful Owl roosting habitat located in the Toongabbie Creek riparian corridor</p> <p>F11. A supervisor and an appropriately licenced ecologist will be onsite during the works to manage appropriate clearance of tree crowns to avoid over clearing.</p>
Trees	<p>TR1. Trees will be removed in accordance with Transport for NSW <i>Biodiversity Guidelines - Guide 4: Clearing of Vegetation and Removal of Bushrock</i></p> <p>TR2. Pruning and trimming of trees will be undertaken by a qualified arborist in accordance with <i>Australian Standard 4373-2007 Pruning of amenity trees</i></p> <p>TR3. Only trees listed in Appendix XI will be cleared or trimmed. If there is any doubt on whether a tree is marked for removal, the site Environmental Officer is to be notified for confirmation before the tree is impacted</p> <p>TR4. Under no circumstance will trees not marked for removal be cleared</p>
Traffic and transport	<p>T1. Where possible, current traffic movements and property accesses are to be maintained during the works. Any disturbance is to be minimised to prevent unnecessary traffic delays</p> <p>T2. A traffic management plan will be prepared in accordance with the <i>Traffic Control at Work Sites Manual</i> (RTA, 2010a) and <i>Australian Standard 1742.3 Manual of uniform control devices</i></p>
Socio-economic	<p>C1. Complaints received are to be recorded and attended to promptly</p> <p>C2. Existing access for nearby and adjoining properties is to be maintained at all times during the works unless otherwise agreed to by the affected property owner</p> <p>C3. Works would be completed within the shortest duration possible and only during the standard permitted construction hours</p> <p>C4. Potentially affected land owners and occupiers would be notified five working days prior to the commencement of works.</p>
Landscape character and visual amenity	<p>V1. Landscaping is to be managed in accordance with the RMS <i>Landscape Guideline</i></p> <p>V2. Works to be carried out in accordance with RMS</p>

Safeguards for the proposed work

	<p><i>Environmental Impact Assessment Practice Note - Guideline for Landscape Character and Visual Impact Assessment EIA-N04.</i></p>
Waste	<p>M1. Resource management hierarchy principles are to be followed:</p> <ul style="list-style-type: none"> • Avoid unnecessary resource consumption as a priority • Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery) • Disposal is undertaken as a last resort (in accordance with the <i>Waste Avoidance & Resource Recovery Act 2001</i>) <p>M2. Bulk project waste (that is, fill) that needs to be removed from site and sent to a licensed landfill and resource recovery facility not owned by Transport for NSW is to have prior formal written approval from the facility, in accordance with <i>Environmental Direction No. 20 – Legal Off-site Disposal of Roads and Maritime Services Waste</i>. This includes other waste transported for reuse, recycling, disposal or stockpiling</p> <p>M3. There is to be no disposal or reuse of construction waste on to other land</p> <p>M4. Waste is not to be burnt on site</p> <p>M5. Waste material is not to be left on site once the works have been completed</p> <p>M6. Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day</p> <p>M7. As the proposed works are aimed at protecting assets within Inner Protection Areas (IPAs) within the meaning of Appendix 4 of the RFS <i>Planning for Bush Fire Protection</i> guideline (attached at Appendix XIII), all leaves and vegetation debris will be removed as a result of intended works</p> <p>M8. If vegetation is to be mulched and transported off site for beneficial reuse, it is to be assessed for the presence of weeds, pest, and other disease and a Mulch Management Plan prepared in accordance with the <i>Roads and Maritime Technical Procedure: Mulch Management</i>.</p>
Fire History	<p>FH1. Works will be carried out in line with the M7 Corridor Bushfire Asset Protection Zone Assessment recommendations (Peterson Bushfire, 2017) (attached at Appendix I), as well as the following Rural Fire Service guidelines:</p> <ul style="list-style-type: none"> • <i>Standards for Asset Protection Zones</i> (attached at Appendix III) • <i>Bushfire Environmental Assessment Code for NSW</i> (attached at Appendix IV) • <i>Planning for Bush Fire Protection</i> (attached at Appendix XIII)

Safeguards for the proposed work

FH2. Road reserve assets will be managed in accordance with the Cumberland Bush Fire Risk management Plan and The Hills Bush Fire Risk Management Plan (attached at **Appendix V** and **VI**).

5.1 Licensing and approvals

It is anticipated that no licences and or approvals will be required for the proposed works associated with the proposed works.

5.2 Other requirements

Requirement

Environmental management plan sent to TfNSW EM for review.

Yes

No

6. Certification, review and decision

6.1 Certification

This minor works REF provides a true and fair review of the proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposal.

Originally prepared and updated by:



Jake Brown
Environmental Scientist
Advitech Environmental
Date: 8 December, 2020

Minor Works REF reviewed by:



Dr Rod Bennison
Lead Environmental Scientist
Advitech Environmental
Date: 8 December, 2020

6.2 Environment staff review

The Minor Works REF has been reviewed and considered against the requirements of sections 5.5 and 5.7 of the *Environmental Planning and Assessment Act 1979*.

In considering the proposal this assessment has examined and taken into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of that activity as addressed in the Minor Works REF and associated information. This assessment is considered to be in accordance with the factors required to be considered under clause 228 of the Environmental Planning and Assessment Regulation 2000.

The proposal described in the Minor Works REF will have some environmental impacts which can be ameliorated satisfactorily. Having regard to the safeguard and management measures proposed, this assessment has considered that these impacts are unlikely to be significant and therefore an approval for the proposal does not need to be sought under Division 5.2 of the *Environmental Planning and Assessment Act 1979*.

The assessment has considered the potential impacts of the activity on areas of outstanding value and on threatened species, ecological communities or their habitats for both terrestrial and aquatic species as defined by the *Biodiversity Conservation Act 2016* and the *Fisheries Management Act 1994*.

The proposal described in the Minor Works REF will not affect areas of outstanding value. The activity described in the Minor Works REF will not significantly affect threatened species ecological communities or their habitats. Therefore a species impact statement is not required.

The assessment has also addressed the potential impacts on the activity on matters of national environmental significance and any impacts on the environment of Commonwealth land and concluded that there will be no significant impacts. Therefore, there is no need for a referral to be made to the Australian Government Department of the Environment and Energy for a decision by the Commonwealth Minister for the Environment and Energy on whether assessment and approval is required under the *Environment Protection and Biodiversity Conservation Act 1999*.

The Minor Works REF is considered to meet all relevant requirements.

6.3 Environment staff recommendation

It is recommended that the proposal to maintain the Asset Protection Zones along the M7 as described in this Minor Works REF proceed subject to the implementation of all safeguards identified in the Minor Works REF and compliance with all other relevant statutory approvals, licences, permits and authorisations.

The Minor Works REF has examined and taken into account to the fullest extent possible all matters likely to affect the environment by reason of the activity and established that the activity is not likely to significantly affect the environment or threatened species, ecological communities or their habitats.

The Minor Works REF has concluded that there will be no significant impacts on matters of national environmental significance or any impacts on the environment of Commonwealth land.

The Minor Works REF determination will remain current for five years until December 2025 at which time it shall lapse if works have not been physically commenced. The pre-construction checklist must be completed prior to the commencement of any works.

Recommended by:

Tracey Austin

Transport for NSW Environment Manager, Sydney Region

6.4 Determination

In accordance with the above recommendation and sections 5.5 and 5.7 of the *Environmental Planning and Assessment Act 1979*, I determine that Transport for NSW may proceed with the activity.



Sonja Shand

Transport for NSW Senior Project Manager, Private Motorways

Appendix I

M7 Corridor Bushfire Asset Protection Zone Assessment



**M7 Corridor
Bushfire Asset
Protection Zone
Assessment**

**Prepared for:
M7 Westlink Services**

11 August 2017

(Ref: 16080)

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FPA AUSTRALIA (NO.BPAD18882)
BPAD LEVEL 3 ACCREDITED PRACTITIONER
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1 Introduction

1.1 Background and project context

This report presents the first assessment of Asset Protection Zones (APZ) for bushfire protection undertaken for the M7 Motorway corridor lands, Western Sydney, commissioned by M7 Westlink Services. This study follows on from the development of a Bushfire Hazard Assessment (Eco Logical Australia 2013), Bushfire Fuel Assessment Strategy (Eco Logical Australia 2016) and Bushfire Fuel Load Monitoring Program (Peterson Bushfire 2016). The commission of this study was the key recommendation of the Fuel Load Monitoring Program and was referred to in the previous studies. An outline of each study and their relationship is listed below:

1. Bushfire Hazard Assessment (Eco Logical Australia 2013):
 - a. Identification and analysis of the nature of the bushfire hazard;
 - b. Assess risk and divide the corridor into risk profiles to guide further assessment.
2. Bushfire Fuel Assessment Strategy (Eco Logical Australia 2016):
 - a. Outlines management strategies based on the risk assessment from the previous study;
 - b. Recommends management zoning and fuel load monitoring, providing a monitoring procedure.
3. Bushfire Fuel Load Monitoring Program (Peterson Bushfire 2016):
 - a. Presents the first fuel load assessment along the corridor;
 - b. Key finding is that the fuel levels are within acceptable limits;
 - c. Key recommendation is for the assessment of APZ at the corridor interface with existing residential development.

The first two studies provide the introductory information on the location, legislative responsibilities, bushfire hazard such as vegetation community and topography, and bushfire environment such as fire ignition sources and fire history. Packaged together, the three studies move towards a comprehensive assessment into bushfire risk management for the M7 corridor. The most recent study concluded that with fuel loads within management thresholds, an assessment of APZ is required to address appropriate hazard separation from adjoining residences, which is the foremost important bushfire protection measure and key to bushfire risk management.

1.2 Purpose and objectives

The purpose of this study is to act on the key recommendation of the previous study (Peterson Bushfire 2016) by providing M7 Westlink Services a report on the management of APZs along the length of the M7 corridor. The specific objectives are:

- a) Provide advice on the importance of an APZ in the total suite of bushfire risk treatments;
- b) Provide advice on the requirements of APZ assessment for existing development;
- c) Assess where APZs are to be considered along the corridor;
- d) Determine appropriate APZ dimension;

- e) Inspect APZ sites to confirm APZ dimension and define placement of the APZ including establishment and maintenance requirements.

1.3 Importance of the APZ

The NSW Rural Fire Service (RFS) document *Bushfire Protection for Existing Development* (RFS 2016) defines an APZ as an area between a bushfire hazard and buildings which is more intensively and routinely managed to minimise fuel loads and reduce the potential radiant heat levels, flame contact, ember and smoke attack on life and property. The APZ dimension is dependent on an assessment of the hazard (vegetation type and slope) as guided by the accepted assessment methodology, however many other factors can influence the dimension such as bushfire risk and environmental constraints.

Property loss surveys undertaken after the 2009 Victorian Bushfires (Blanchi *et. al.* 2010) indicates that 60% of houses destroyed in Kinglake and Marysville were within 10 m of bushland. The Royal Commission concluded that clearing vegetation immediately surrounding the house was twice as effective as prescribed burning within the adjacent hazard. Similarly, survey data from California (which has experienced house loss 10 times that of Australia) shows a strong correlation between house loss and vegetation up against buildings. The provision of an APZ to separate the hazard from the building is an essential part of reducing the risk of life and property loss from bushfire, and widely recognised as the foremost important bushfire protection measure in bushfire risk management for the protection of buildings.

1.4 Assessment of APZ for existing assets – BPED guidelines

A methodology for the assessment of APZs for existing assets is only a relatively recent introduction to the bushfire management sphere in NSW. The NSW Rural Fire Service (RFS) draft document *Bushfire Protection for Existing Development* (RFS 2016) was released for public comment early 2017. Versions of the draft have been in existence since early 2015, preceded by the RFS document *Discussion Paper – Asset Protection Zones for Existing Development* (RFS 2013). Although not yet formally released, it is understood that the RFS are applying it in practice and bushfire consultancies are applying the methodology as best practice in the absence of other guidelines.

The delay in such a methodology is due to the complex nature of designing APZs for existing development as opposed to new development. *Planning for Bushfire Protection 2006* (RFS 2006) and *AS 3959-2009 Construction of buildings in bushfire-prone areas* (SAI Global 2009) are used to prescribe an APZ dimension for development proposals on bushfire prone land whereby the APZ dimension is based on a building construction standard and other measures in combination (e.g. adequate access and water supply) that can be achieved in planning new developments but are not achievable for existing developments.

Taking into account the constraints of existing development, the document *Bushfire Protection for Existing Development* (referred to as 'BPED' throughout this report) aims to provide a reasonable level of bushfire protection to buildings by ensuring an appropriate hazard separation and defensible space, allowing ongoing maintenance of fuels, and promoting the concept of 'shared responsibility' between the land manager and adjoining property owners.

2 Methodology

APZs were assessed following the methodology specified in Section 3 of BPED. The following steps were undertaken in order to apply BPED:

Step 1 – Desk-top assessment

A desk-top assessment of the corridor was undertaken to identify the bushfire hazards and any adjacent development that may require asset protection based on the following considerations:

- a) A bushfire hazard was defined as a corridor of bushland greater than 20 m width. Section 3.2 (1) of BPED refers to ‘excluded’ vegetation in the RFS document *Guide for Bushfire Prone Land Mapping* (RFS 2015), including corridors less than 20 m in width, as low threat not requiring specific treatments under BPED.
- b) A lot of the corridor does not present a hazard, such as access ways, drainage basins, and other cleared areas.
- c) A lot of the corridor is not adjacent existing development. Adjoining lands can consist of other bushland areas such as the Western Sydney Parklands, large rural lots, industrial estates with adequate setbacks, roads and paddocks. Assessment was identified for those residential areas that ‘backed-onto’ a bushland corridor that was greater than 20 m wide.

Step 2 – Hazard and APZ assessment

The required APZ dimension was determined by combining the known vegetation community and effective slope in accordance with BPED methodology. This was achieved by using the Short Fire Run (SFR) methodology as stated at Section 3.2 (3) of BPED and outlined within the RFS document *Short Fire Run - Methodology for Assessing Bushfire Risk for Low Risk Vegetation* (RFS 2017). SFR was used rather than the APZ dimension listed in Appendix 1 of BPED due to the restricted length of fire run within the narrow corridors of vegetation towards the residential interface. The following was considered:

- a) The vegetation classification was pre-determined by previous studies.
- b) The effective slope was determined by available contour data complemented by field validation (see Step 3).
- c) The vegetation (i.e. corresponding fuel loads) and slope inputs were used in a SFR model to determine the APZ dimension required to ensure a maximum radiant heat flux of 19 kW/m² at the building interface using a Fire Danger Index (FDI) of 50 in accordance with the BPED specifications.

Step 3 - Field validation

The corridor interface locations identified in Step 1 were inspected. Data was collected to ascertain the current APZ dimension resulting from routine maintenance within private properties and the corridor, validate vegetation and slope classification, take photographs and record any maintenance activities or recommendations for further fuel management works.

3 Results

3.1 Desk-top assessment

The desk-top assessment identified 18 interface locations that qualified for an assessment of an APZ. Some locations were of considerable length with varying conditions and therefore were split into sub-sections, resulting in a total of 26 separate APZ sites. Each site is identified on figures located in Appendix 1.

Each site consisted of corridors of bushland at least 20 m wide adjacent residential development. Narrower corridors of bushland are excluded as low threat in accordance with BPED. No other development types such as Special Fire Protection Purpose (SFPP) development, industrial estates or retail/commercial development were identified on the corridor interface adjacent a bushfire hazard wider than 20 m. Most of the APZ sites were located in the northern section of the M7 corridor in Sections A1 to A3 between Richmond Road and the M2. The remaining sections south to the Hume Highway have predominantly undeveloped lands adjacent or very narrow and unvegetated sections compared to the north.

All but three bushland corridors were less than 50 m wide, with the majority being between 30 and 40 m. The three sites exceeding 50 m were Valerie Avenue, Baulkham Hills (100 m) and Nathan Crescent, Dean Park and Isabell Street, Cecil Hills (both 70 m). The width of the bushland corridor for each site is listed within the APZ site tables located in Appendix 1.

3.2 Hazard and APZ assessment

The hazard was fairly consistent along the length of the M7 corridor, being remnant or recreated Shale Plains and Shale Hills Woodland assemblages. The vegetation at the northern end of the corridor approaching the M2 Motorway was recorded to be forest within the steep incised gullies adjacent Goodhall Avenue, Baulkham Hills Road and Valerie Avenue, Baulkham Hills.

The effective slope was the steep gradient of the embankments between the houses and the Motorway. The slopes were within, or exceeding, the maximum slope class of '15-20°' and were either downslope or upslope leading away from the houses.

The consistency of the hazard parameters along the length of the M7 corridor enabled standardising inputs to be used by the SFR methodology to aid in ease of application and management over such a large area of interface and so many sites. For example, most of the corridor resulted in a hazard classification of woodland on downslope 15-20° or upslope for a corridor width between 20 and 50 m. Table 1 below lists the results of the APZ dimensions provided by the SFR methodology for six corridor dimensions. All are based on woodland on a downslope 15-20°. Upslopes were not assessed as the APZ dimensions resulting from upslopes would be less than 10 m and a 10 m APZ is the minimum requirement of BPED. Table 1 lists a recommended 10 m APZ dimension for corridors less than 50 m wide, and 15 m APZ dimension for corridors greater than 50 m wide. The size of 50 m was considered a reasonable point to group the APZ dimension considering the dimension did not increase significantly with each

incremental increase in corridor width of 10 m. Also, 50 m was the point of rounding up or down to the nearest 5 m increment to assist in application in the field.

The SFR methodology offers a reduced APZ dimension compared to the dimension listed in Appendix 1 of BPED (26 m), owing to the short fire development period available within narrow corridors and resulting lower intensity fires reaching the development interface.

Only one site (Valerie Avenue, Baulkham Hills) did not rely on the SFR methodology as the bushland corridor was in excess of 100 m wide. The APZ dimension within Appendix 1 of BPED was used in this instance.

Table 1: SFR APZ dimensions and recommended application to M7 corridor

Bushland corridor width	SFR APZ dimension	Recommended APZ group
20 m	9.5 m	10 m
30 m	10.7 m	
40 m	11.5 m	
50 m	12.3 m	15 m
60 m	12.8 m	
70 m	13.3 m	

3.3 Field validation

The APZ sites were inspected over the days of 29th and 30th June 2017. The findings of the existing and recommended APZ works at each site are listed within the APZ site tables within Appendix 1. All sites had an APZ of some dimension with most having an APZ that complied or exceeded the recommended dimension shown in Table 1 above. As most bushland corridors were less than 50 m wide, the required APZ was commonly 10 m. The majority of the existing APZ (approximately 70-80%) consisted of backyards within private property (approximately 7 m) with the remainder complemented by the slashing and drainage controls within the M7 corridor along the boundary fence (approximately 3 m).

Older development stock had deeper yards, approaching 10 m, whilst newer development had much smaller yards, many as narrow as 3 m. The distances within the yards varied between and within sites and there were always exceptions. An average or majority rule had to be employed in this study to ensure standard APZ dimensions to assist in ease of assessment and maintenance.

In addition to APZ separation, the existence of boundary fences and noise attenuation walls is also considered greatly beneficial in terms of radiant heat shielding and compartmentalisation of the hazard.

Eight APZs across six sites had additional fuel management works recommended in order to achieve compliant or acceptable APZ dimension and/or condition. These sites and the corresponding works are listed in Table 2 below. Three of the sites listed in Table 2 are recommended to have an APZ less than the recommended dimension due to site environmental site constraints.

Table 2: APZ sites with recommended fuel management works

APZ site	Recommended works (measured from boundary)	Comment
Goodhall Avenue, Baulkham Hills	Establish 3 m APZ along boundary to enable access and defensible space.	Minor defensible space to ensure access. Steep embankment into riparian area limits the amount of works that can be undertaken.
Valerie Avenue, Baulkham Hills APZ 1	Establish 4-10 m APZ to noise wall.	Represents distance between boundary fence and noise wall. Steep drop into riparian area beyond wall. Potential EEC.
Valerie Avenue, Baulkham Hills APZ 2	Establish 10 m APZ.	Distance from boundary before impacting on riparian area. Potential EEC.
Montview Way, Glenwood APZ 2	Establish 7 m APZ from boundary.	Only one house with minimal existing APZ (2-3 m in yard) within substantial hazard on downslope. Current maintenance lacking.
Montview Way, Glenwood APZ 3	Establish 3 m APZ from boundary.	Current maintenance along rear boundary lacking.
Knightsbridge Avenue, Glenwood APZ 2	Establish 6 m APZ from boundary (or to noise wall).	Narrow yards. APZ works to complement existing slashing.
Sciarra Crescent, Acacia Gardens	Establish 5 m APZ from boundary.	Narrow yards. APZ works to complement existing slashing.
Isabell Street, Cecil Hills	Establish 13 m APZ from boundary adjacent house at northern end.	Only one house requires APZ. Was installed before and now unmaintained.

4 Discussion

4.1 Short fire run (SFR)

Using the SFR methodology option provided by Section 3.2.3 of BPED provides a more accurate outcome of required APZ dimension for narrow corridors of vegetation. The hazard assessment leading to the APZ dimension of 26 m listed in Appendix 1 of BPED would grossly overestimate the expected fire behaviour within the corridor and resulting radiant heat at the interface. In addition, achieving a 26 m APZ would mean clearing an additional 13 m (approximately) into the corridor which would remove one third of the corridor in most instances, further reducing the hazard and risk, and requiring vegetation management works on steep embankments.

The reduced fire run towards the interface is also complemented by the compartmentalisation of the corridor into sections by roads, shared pathways and drainage controls. These features would assist in the control of fire spread along the length of the corridor, and many instances from the motorway towards the interface where batters change slope, the shared pathway provides a 4-5 m separation, and noise attenuation walls act as a break.

In summary, the bushfire environment along the motorway corridor presents far less of a threat than that of bushland reserve of Western Sydney. A threat that allows the application of the SFR methodology to determine APZ dimension.

4.2 Additional protection

In addition to the APZ dimension, there are elements that provide additional protection from the impacts of bushfire. In most instances there are two radiant heat shields. The boundary fence provides immediate radiant heat protection from the adjacent fuel within the corridor. It is well-documented (Bushfire CRC & AFAC 2005) that boundary fences play an important role in property protection by shielding the house by approximately 2 m of flame height and creating a barrier from flame impingement at lower intensity fires such as grassfires common to the M7 corridor.

Both colorbond and timber fences were present at approximately equal proportion, with both forms providing protection. The timber fences are known to ignite after the passage of the main fire front. Providing the fence is not within a few metres of the house, then the secondary fire caused by the fence should not present a threat to the house. Nearly all fences were lapped and capped which have been proven (Bushfire CRC & AFAC 2005) to prolong ignition time compared to that of a standard paling fence.

A noise attenuation wall was present at two-thirds of the sites, providing radiant heat and fire control benefits. The pre-cast concrete panel walls will not buckle and warp during a fire like colorbond can and are taller providing more radiant heat protection compared to a boundary fence. In some instances the noise wall was close to the boundary offering true radiant heat protection, however in most instances the wall was located away from the boundary, usually at the top of the embankment providing mostly the benefit of fire control.

The benefits of radiant heat shielding provided by the boundary fence and noise attenuation walls have not been quantified as part of this study. An accepted modelling methodology exists to calculate the APZ reduction by use of standard colorbond fences as a radiant heat shield. The reduction can be approximately 10%. Radiant heat shields are an accepted protection strategy that can slightly reduce the dimension of the APZ.

4.3 APZ compliance

The available APZs existing along the M7 corridor comply or exceed the APZ dimension required by BPED for all but eight sites as listed in Table 2, Section 3.3. The existing APZs consist of the routine maintenance of backyards and regular slashing operations along the rear fences within the M7 corridor. Additional vegetation management is recommended with the aim to achieve compliance for the eight sites identified as prescribed in Table 2.

Environmental constraints will prevent compliance being achieved at the three sites of Goodall Avenue and Valerie Avenue APZs 1 and 2, Baulkham Hills. A combination of steep slopes and sensitive riparian vegetation constrains the ability to clear to the required distance. The recommended distances are based on the available land prior to the commencement of steep slopes and the riparian vegetation.

Non-compliance of APZ dimension is common for existing development where environmental constraints often exist. It has been an accepted methodology to provide a defensible space rather than an APZ calculated on radiant heat impacts where vegetation clearance is not deemed acceptable. This approach has been employed on many APZ studies for existing development by managers of bushland reserves such as local councils. Such a strategy is recognised since an APZ or defensible space is only but one in a combination of measures relied upon for bushfire protection. Reducing the effectiveness of one strategy can be offset by increasing the effectiveness of another.

4.4 Measures in combination

Even though it is a fundamental mitigation strategy, as a single measure, providing an APZ will not always prevent house loss, deaths or injuries as a result of bushfires. There is not one bushfire protection measure that can exclusively address bushfire risk. The choice of measures will depend on the level of risk and the ability to implement measures in consideration of constraints. There are many different types of measures ranging from the clearing of vegetation to preparing a bushfire evacuation plan, and all can be grouped into the six broad categories of APZ, building construction, access, water supply, landscaping, and emergency management arrangements (RFS 2006). The RFS uses these categories in their bushfire risk management planning process for existing development (RFS 2008), and in the assessment of new development in bushfire prone areas (RFS 2006a; RFS 2006b). Each measure or group of measures is considered important to address components of risk however, in order to address the overall bushfire risk at a site, all six bushfire protection measures must be addressed as measures in combination. That said, it is widely accepted that the APZ is the most important measure. The previous studies for the M7 (ELA 2013 and 2016) outline the other measures and their respective risk management zones.

This study addresses the APZ as a protection measure, however BPED requires targeted awareness programs to adjoining residents to educate them on the level of bushfire risk and the other measures in combination that they can employ within their properties under a *shared responsibility* of the risk.

4.5 Shared responsibility

An objective of BPED is the promotion of the concept of shared responsibility between the land managers. Bushfire risk assessment takes into consideration the hazard and threat as well as the vulnerability of the asset. Residents must share the responsibility to address the risk by implementing protection measures within their property such as ember protection for houses, appropriate landscaping, emergency and evacuation procedures and general maintenance.

The accepted conditions and bushfire behaviour upon which the APZ dimensions are calculated are based on assumptions that the residents will be able to implement other protection measures within their property. Without promoting the shared responsibility, the objectives of BPED and effectiveness of the APZ, particularly for those sites where a compliant APZ could not be achieved, may not be accomplished.

For this reason, Figure 2 at Section 2.1 of BPED should be implemented across the APZ sites, specifically, awareness for sites that will have a compliant APZ, and targeted consultation for sites that will have a non-compliant APZ after implementing the APZ recommendations.

4.6 Limitations and residual risk

Residual risk can be defined as the bushfire risk that remains after the implementation of bushfire protection measures such as an APZ. It acknowledges that despite the measures that are able to be put in place, some risk to life and property from bushfire will remain. The concept of residual risk is inherent in all bushfire prone areas and all bushfire protection strategies. Bushfire loss can be reduced or avoided in some cases, but cannot be entirely prevented. A balance needs to be struck between measures taken to reduce or avoid harm and loss due to bushfire, and the protection of other values, such as the environment. This compromise involves acceptance of residual risk - the inevitability of some loss of life, property, infrastructure and community assets.

Section 1.6 of BPED states the limitations of the methodology clearly, and these limitations apply to this study. Limitations such as evolution of bushfire science, varying weather and climatic conditions, varying fuel conditions, variations in human behaviour and ability to respond are inherent in all bushfire protection strategies and apply to those strategies proposed for the M7 corridor.

4.7 Fuel management specifications

It is not the role of this study to prescribe how the works are to be carried out, however the specifications of vegetative fuel are important as this can greatly influence the effectiveness of an APZ. All APZs works as recommended within Table 2 are to achieve the following specifications:

- Tree canopies must be thinned to prevent a continuous canopy by achieving gaps of 2 to 5 m between crowns. Small clumps of trees can remain forming one larger crown providing larger gaps to the next adjacent crown of minimum 5 m is achieved. Preference for removal is to be given to trees with least health or longevity, and with least ecological benefit.
- Understorey shrubs and saplings are preferably not to be within the APZ. If retained, they are to be thinned to form clumps or individuals so that they do not comprise more than 20% of the total APZ area.
- Groundcovers (i.e. grasses) are to be slashed and ground fuels are to be reduced by removing all dead vegetative material and raking and removing leaf litter excess to that providing a thin (e.g. 5 cm) cover over the ground.

5 Recommendations

Table 3 below is a compilation of recommendations made within Section 3 and 4. Applying the recommendations will achieve compliance of the objectives of this study listed at Section 1.2 and the aim and objectives of BPED.

Table 3: Recommendations

Recommendation		Report section	
APZ works	Goodhall Avenue, Baulkham Hills	Establish 3 m APZ along boundary to enable access and defensible space.	Table 2; Section 3.3 & Section 4.7
	Valerie Avenue, Baulkham Hills APZ 1	Establish 4-10 m APZ to noise wall.	
	Valerie Avenue, Baulkham Hills APZ 2	Establish 10 m APZ.	
	Montview Way, Glenwood APZ 2	Establish 7 m APZ from boundary.	
	Montview Way, Glenwood APZ 3	Establish 3 m APZ from boundary.	
	Knightsbridge Avenue, Glenwood APZ 2	Establish 6 m APZ from boundary (or to noise wall).	
	Sciarra Crescent, Acacia Gardens	Establish 5 m APZ from boundary.	
	Isabell Street, Cecil Hills	Establish 13 m APZ from boundary adjacent house at northern end.	
Maintain existing	Continue maintenance along rear of boundaries, along pathways, roads and drainage features as per management requirements.	Section 3.3	
Targeted awareness for residents	Figure 2 at Section 2.1 of the BPED guidelines should be implemented across the APZ sites, specifically, awareness for sites that will have a compliant APZ, and targeted consultation for sites that will have a non-compliant APZ after implementing the APZ recommendations.	Section 4.5	

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Appendix 1: APZ sites (figures and tables)

APZ Site – Goodhall Avenue, Baulkham Hills		Section A3 – High Risk
APZ No. 1		
<i>Parameter</i>	<i>Result</i>	<i>Comment</i>
Hazard corridor width	40 m	Riparian on steep, rocky slope down to watercourse. Heavy weed infestation from climbers
Vegetation classification	Forest	
Effective slope	Downslope 15-20°	
Recommended APZ	10 m	SFR - Hazard less than 50 m in width
Current APZ	Yard: 4 m	Narrow yards
	M7: 0 m	No maintenance along boundary
Boundary fence	Mixture	No fence in many cases
Noise attenuation wall	None	
Recommendation	Establish 3 m APZ along boundary to enable access and defensible space. Unable to achieve large APZ due to environmental constraint of steep slope and riparian zone.	

APZ Site – Goodhall Avenue, Baulkham Hills		Section A3 – High Risk
APZ No. 2		
<i>Parameter</i>	<i>Result</i>	<i>Comment</i>
Hazard corridor width	40 m	Riparian on steep, rocky slope down to watercourse. Heavy weed infestation from climbers
Vegetation classification	Forest	
Effective slope	Downslope 15-20°	
Recommended APZ	10 m	SFR - Hazard less than 50 m in width
Current APZ	Yard: 4 m	Narrow yards
	M7: 6 m	Flat area before slope
Boundary fence	Mixture	No fence in many cases
Noise attenuation wall	None	
Recommendation	Continue maintenance	



Legend

-  Photo Points
-  APZ 1
-  APZ 2



Date: 11/08/2017

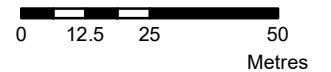


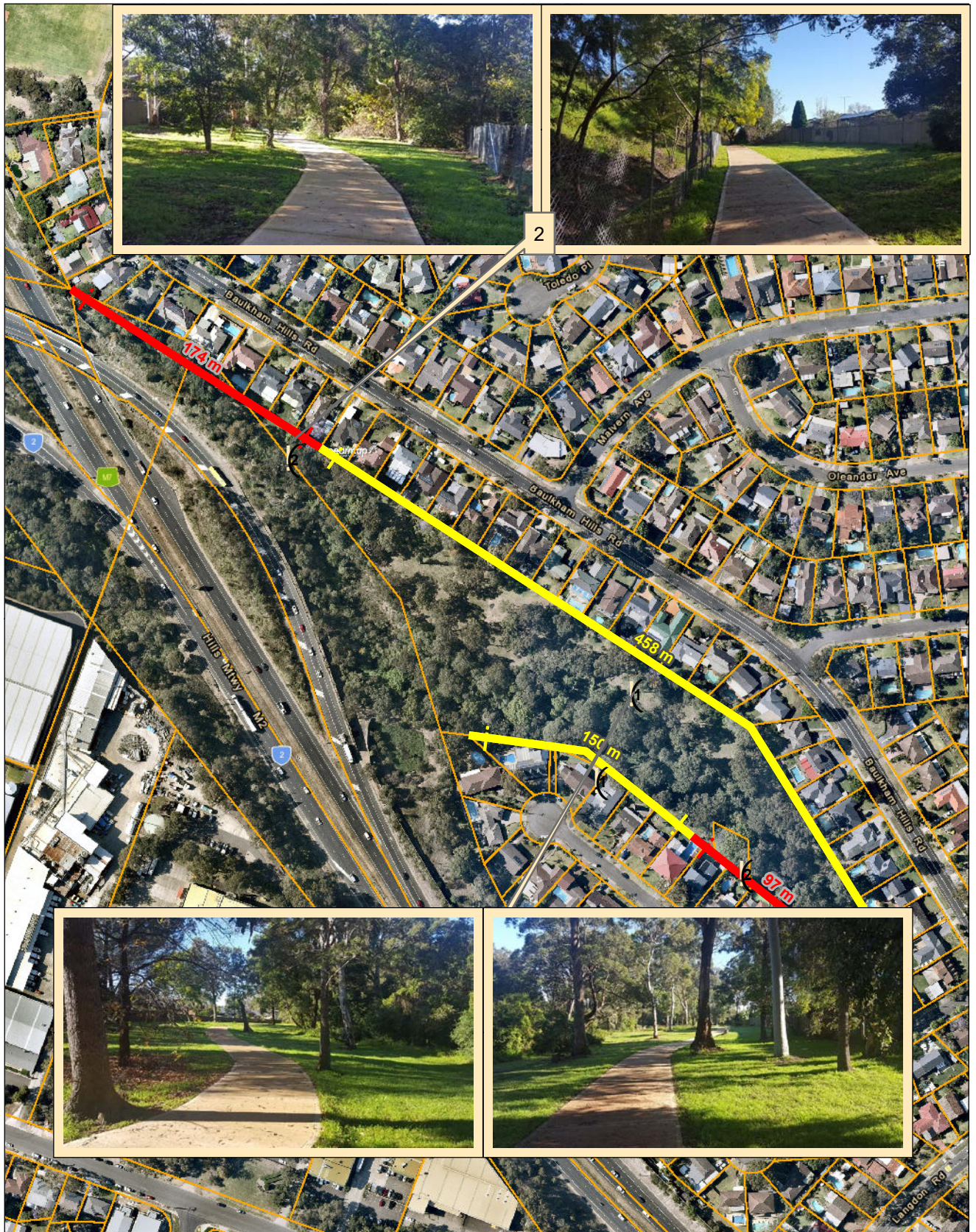
Figure 1: Goodhall Avenue, Baulkham Hills (Section A3 - High Risk)

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

APZ Site – Baulkham Hills Road, Baulkham Hills		Section A3 – High Risk
APZ No. 1		
<i>Parameter</i>	<i>Result</i>	<i>Comment</i>
Hazard corridor width	40 m	Riparian on steep, rocky slope down to watercourse. Heavy weed infestation from climbers
Vegetation classification	Forest	
Effective slope	Downslope 15-20°	
Recommended APZ	10 m	SFR - Hazard less than 50 m in width
Current APZ	Yard: 7 m	Parkland
	M7: 20-30 m	
Boundary fence	Mixture	No fence in some cases
Noise attenuation wall	None	
Recommendation	Continue maintenance	

APZ Site – Baulkham Hills Road, Baulkham Hills		Section A3 – High Risk
APZ No. 2		
<i>Parameter</i>	<i>Result</i>	<i>Comment</i>
Hazard corridor width	20-30 m	Regenerating woodland on upslope leading up to motorway
Vegetation classification	Woodland	
Effective slope	Upslope	
Recommended APZ	10 m	SFR - Hazard less than 50 m in width
Current APZ	Yard: Varies	Total APZ minimum 14 m
	M7: Varies	
Boundary fence	Mixture	No fence in some cases
Noise attenuation wall	None	
Recommendation	Continue maintenance	



Legend

-  Photo Points
-  APZ 1
-  APZ 2



Date: 11/08/2017

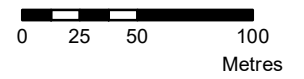


Figure 2: Baulkham Hills Road, Baulkham Hills (Section A3 - High Risk)

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

APZ Site – Valerie Avenue, Baulkham Hills		Section A3 – High Risk
APZ No. 1		
<i>Parameter</i>	<i>Result</i>	<i>Comment</i>
Hazard corridor width	100 m	Riparian on steep, rocky slope down to watercourse. Heavy weed infestation from Privet resembling rainforest.
Vegetation classification	Forest	
Effective slope	Downslope 15-20°	
Recommended APZ	43 m	In accordance with BPED Appendix 1
Current APZ	Yard: 19 m	Narrow yards
	M7: 4-10 m	No maintenance along boundary
Boundary fence	Colorbond & timber	
Noise attenuation wall	Yes	8-10 m reducing to 4 m from boundary
Recommendation	Establish 4-10 m APZ to noise wall. Unable to achieve larger APZ due to environmental constraint of steep slope, riparian zone and possible EEC. Noise wall provides good radiant heat protection.	

APZ Site – Valerie Avenue, Baulkham Hills		Section A3 – High Risk
APZ No. 2		
<i>Parameter</i>	<i>Result</i>	<i>Comment</i>
Hazard corridor width	100 m	Riparian on steep, rocky slope down to watercourse. Heavy weed infestation from Privet resembling rainforest.
Vegetation classification	Forest	
Effective slope	Downslope 15-20°	
Recommended APZ	43 m	In accordance with BPED Appendix 1
Current APZ	Yard: 16 m	Narrow yards
	M7: 0 m	No maintenance along boundary
Boundary fence	Mixture	
Noise attenuation wall	No	
Recommendation	Establish 10 m APZ . Unable to achieve larger APZ due to environmental constraint of steep slope, riparian zone and possible EEC.	



Legend

-  Photo Points
-  APZ 1
-  APZ 2



Date: 11/08/2017

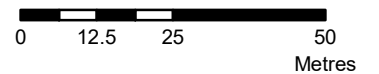


Figure 3: Valerie Avenue, Baulkham Hills (Section A3 - High Risk)

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

APZ Site – Amphitheatre Circuit, Baulkham Hills		Section A3 – High Risk
APZ No. 1		
<i>Parameter</i>	<i>Result</i>	<i>Comment</i>
Hazard corridor width	35 m	Steep upslope to noise wall followed by downslope to motorway
Vegetation classification	Woodland	
Effective slope	Upslope	
Recommended APZ	10 m	SFR - Hazard less than 50 m in width
Current APZ	Yard: 8 m	New construction where smaller yards
	M7: 2 m	
Boundary fence	Colorbond & timber	
Noise attenuation wall	Yes	Located at top of upslope
Recommendation	Continue maintenance	

APZ Site – Amphitheatre Circuit, Baulkham Hills		Section A3 – High Risk
APZ No. 2		
<i>Parameter</i>	<i>Result</i>	<i>Comment</i>
Hazard corridor width	30 m	Steep upslope to noise wall followed by downslope to motorway
Vegetation classification	Woodland	
Effective slope	Upslope	
Recommended APZ	10 m	SFR - Hazard less than 50 m in width
Current APZ	Yard: 14 m	
	M7: 3 m	
Boundary fence	Colorbond & timber	
Noise attenuation wall	Yes	Located at top of upslope
Recommendation	Continue maintenance	



Legend

-  Photo Points
-  APZ 1
-  APZ 2



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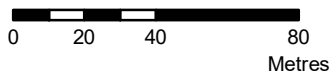


Figure 4: Amphitheatre Circuit, Baulkham Hills (Section A3 - High Risk)

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap



Legend

-  Photo Points
-  APZ 2



Date: 11/08/2017

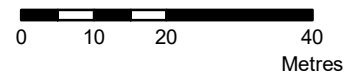


Figure 5: Amphitheatre Circuit, Baulkham Hills (Section A3 - High Risk)

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

APZ Site – Warooga Avenue, Baulkham Hills		Section A3 – High Risk
APZ No. 1		
<i>Parameter</i>	<i>Result</i>	<i>Comment</i>
Hazard corridor width	30 m	Short upslope to noise wall followed by downslope to motorway. Southern end of corridor narrows to 15-20 m with limited vegetation due to drainage controls
Vegetation classification	Woodland	
Effective slope	Downslope 15-20°	
Recommended APZ	10 m	SFR - Hazard less than 50 m in width
Current APZ	Yard:	8 m
	M7:	2 m
Boundary fence	Timber	
Noise attenuation wall	Yes	Located at top of upslope
Recommendation	Continue maintenance	

APZ Site – Warooga Avenue, Baulkham Hills		Section A3 – High Risk
APZ No. 2		
<i>Parameter</i>	<i>Result</i>	<i>Comment</i>
Hazard corridor width	20-30 m	Upslope to noise wall adjacent motorway. Minimal planting and hazard between boundary and noise wall
Vegetation classification	Woodland	
Effective slope	Upslope	
Recommended APZ	10 m	SFR - Hazard less than 50 m in width
Current APZ	Yard:	7 m
	M7:	3 m
Boundary fence	Timber	
Noise attenuation wall	Yes	Located at top of upslope
Recommendation	Continue maintenance	



Legend

-  Photo Points
-  APZ 1
-  APZ 2



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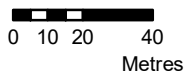


Figure 6: Warooga Avenue, Baulkham Hills (Section A3 - High Risk)

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap



Legend

-  Photo Points
-  APZ 2



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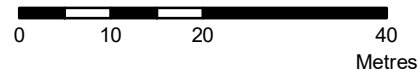
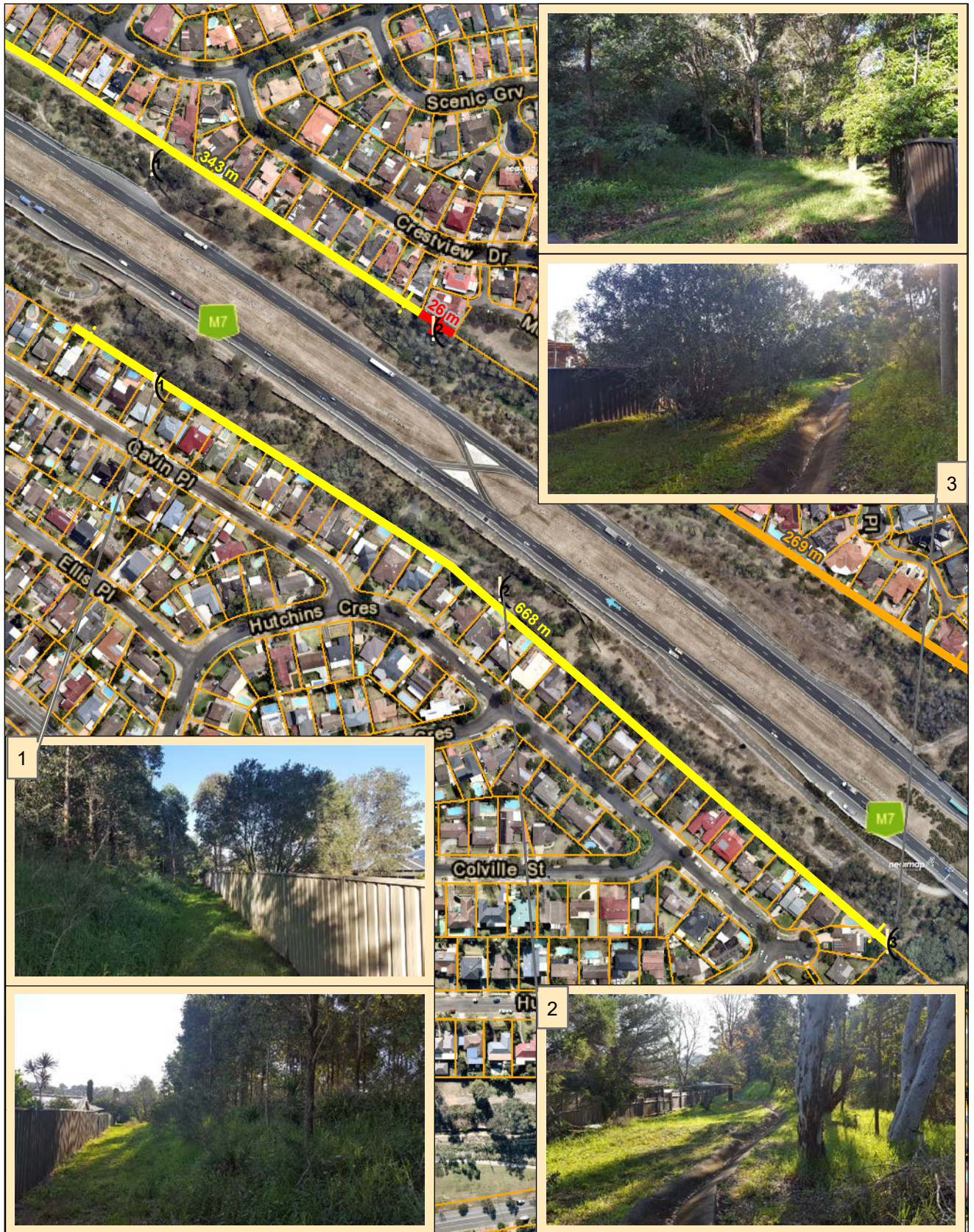


Figure 7: Warooga Avenue, Baulkham Hills (Section A3 - High Risk)

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

APZ Site – Gavin Place, Kings Langley		Section A2 – Low Risk	
APZ No. 1			
Parameter	Result		Comment
Hazard corridor width	30 m		Upslope to noise wall adjacent motorway.
Vegetation classification	Woodland		
Effective slope	Upslope		
Recommended APZ	10 m		SFR - Hazard less than 50 m in width
Current APZ	Yard:	9 m	
	M7:	2 m	
Boundary fence	Colorbond		
Noise attenuation wall	Yes		Located at top of upslope
Recommendation	Continue maintenance		



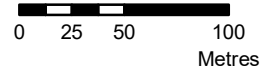
Legend

-  Photo Points
-  APZ 1
-  APZ 2
-  APZ 3

Figure 8: Gavin Place, Kings Langley (Section A2 - Low Risk)



Date: 11/08/2017



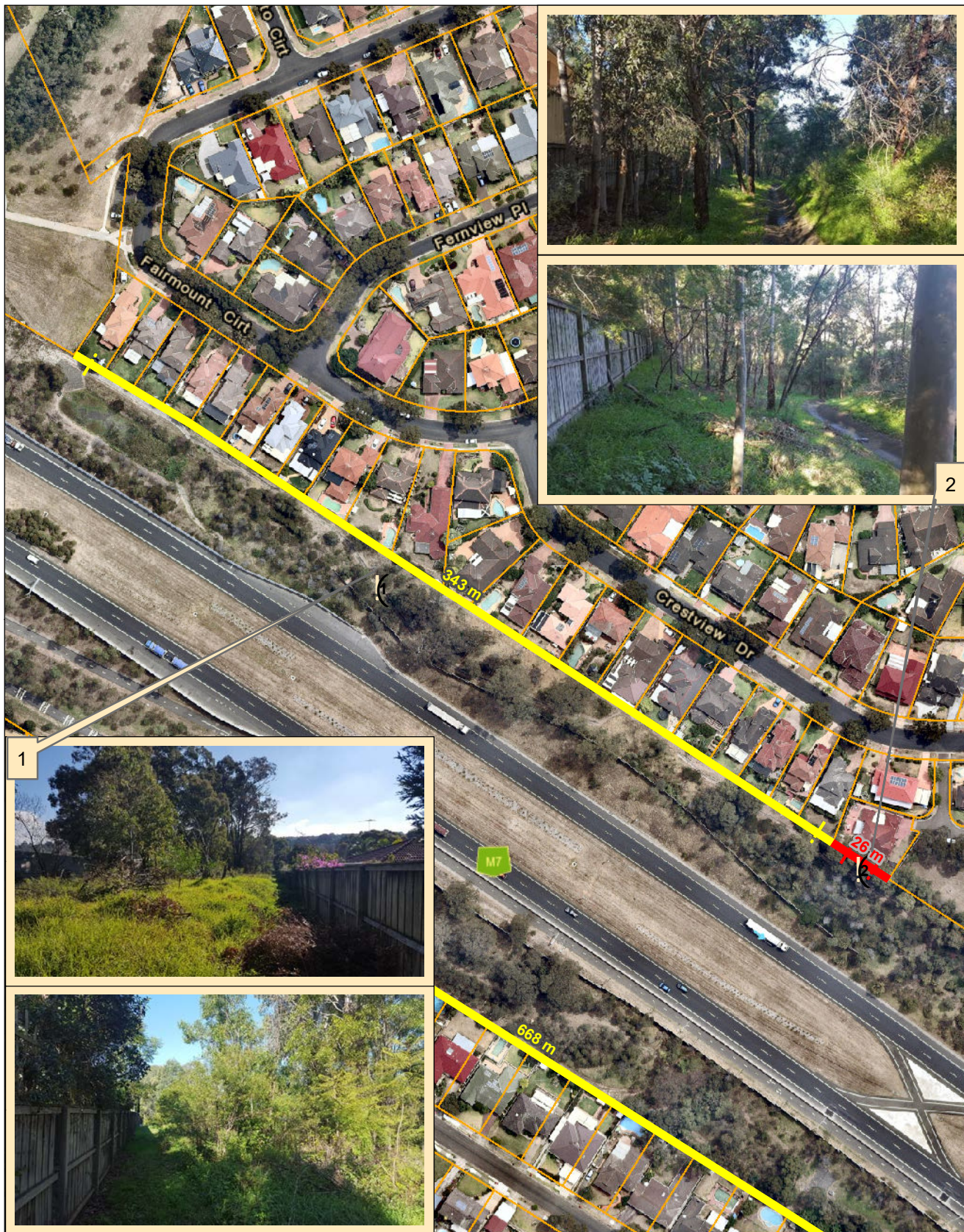
Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

APZ Site – Montview Way, Glenwood		Section A2 – Low Risk
APZ No. 1		
<i>Parameter</i>	<i>Result</i>	<i>Comment</i>
Hazard corridor width	35 m	Upslope to noise wall, followed by downslope to motorway
Vegetation classification	Woodland	
Effective slope	Upslope	
Recommended APZ	10 m	SFR - Hazard less than 50 m in width
Current APZ	Yard: 7 m	
	M7: 3 m	
Boundary fence	Timber	
Noise attenuation wall	Yes	Located at top of upslope
Recommendation	Continue maintenance	

APZ Site – Montview Way, Glenwood		Section A2 – Low Risk
APZ No. 2		
<i>Parameter</i>	<i>Result</i>	<i>Comment</i>
Hazard corridor width	40 m	Downslope into drainage basin in the south-east direction
Vegetation classification	Woodland	
Effective slope	Downslope 5-10°	
Recommended APZ	10 m	SFR - Hazard less than 50 m in width
Current APZ	Yard: 3 m	
	M7: 0 m	Maintenance lacking with vegetation along the boundary
Boundary fence	Timber	
Noise attenuation wall	Yes	Located at top of upslope
Recommendation	Establish 7 m APZ from boundary. No obvious site constraint. Larger trees along boundary may remain as screening from the motorway.	

APZ Site – Montview Way, Glenwood		Section A2 – Low Risk	
APZ No. 3			
<i>Parameter</i>	<i>Result</i>		<i>Comment</i>
Hazard corridor width	50 m		Upslope to noise wall, followed by downslope to motorway
Vegetation classification	Woodland		
Effective slope	Upslope		
Recommended APZ	10 m		SFR - Hazard less than 50 m in width
Current APZ	Yard:	7 m	Maintenance lacking with vegetation along the boundary
	M7:	0-3 m	
Boundary fence	Timber		
Noise attenuation wall	Yes		Located at top of upslope
Recommendation	Establish 3 m APZ from boundary. No obvious site constraint. Larger trees along boundary may remain as screening from the motorway.		



Legend

-  Photo Points
-  APZ 1
-  APZ 2



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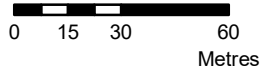


Figure 9: Montview Way, Glenwood (Section A2 - Low Risk)

Coordinate System: GDA 1994 MGA Zone 56

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Legend

-  Photo Points
-  APZ 1
-  APZ 3



Date: 11/08/2017

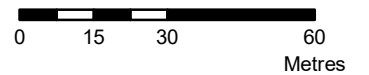


Figure 10: Montview Way, Glenwood (Section A2 - Low Risk)

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

APZ Site – Knightsbridge Avenue, Glenwood		Section A2 – Low Risk
APZ No. 1		
<i>Parameter</i>	<i>Result</i>	<i>Comment</i>
Hazard corridor width	40 m	Upslope to noise wall, followed by downslope to motorway
Vegetation classification	Woodland	
Effective slope	Upslope	
Recommended APZ	10 m	SFR - Hazard less than 50 m in width
Current APZ	Yard: 8 m	
	M7: 3 m	
Boundary fence	Timber	
Noise attenuation wall	No	
Recommendation	Continue maintenance	

APZ Site – Knightsbridge Avenue, Glenwood		Section A2 – Low Risk
APZ No. 2		
<i>Parameter</i>	<i>Result</i>	<i>Comment</i>
Hazard corridor width	30 m	Upslope to noise wall, followed by downslope to motorway
Vegetation classification	Woodland	
Effective slope	Downslope 15-20°	
Recommended APZ	10 m	SFR - Hazard less than 50 m in width
Current APZ	Yard: Varies	Yards can be narrow (~4 m) however limited hazard between boundary and noise wall giving close to 10 m
	M7: Varies	
Boundary fence	Timber	
Noise attenuation wall	Yes	
Recommendation	Establish 6 m APZ from boundary (or to noise wall)	



Legend

-  Photo Points
-  APZ 1



Date: 11/08/2017

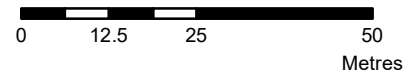


Figure 11: Knightsbridge Avenue, Glenwood (Section A2 - Low Risk)

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

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Legend

-  Photo Points
-  APZ 1
-  APZ 2



Date: 11/08/2017

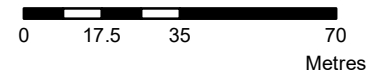


Figure 12: Knightsbridge Avenue, Glenwood (Section A2 - Low Risk)

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

APZ Site – Rosina Crescent, Kings Langley		Section A2 – Low Risk
APZ No. 1		
<i>Parameter</i>	<i>Result</i>	<i>Comment</i>
Hazard corridor width	30 m	Upslope to noise wall, followed by downslope to motorway
Vegetation classification	Woodland	
Effective slope	Upslope	
Recommended APZ	10 m	SFR - Hazard less than 50 m in width
Current APZ	Yard: 8 m	Large yards
	M7: 3 m	Some larger cleared areas
Boundary fence	Colorbond	
Noise attenuation wall	Yes	Located at top of slope mid-way in corridor
Recommendation	Continue maintenance	



Legend

-  Photo Points
-  APZ 1
-  APZ 2



Date: 11/08/2017

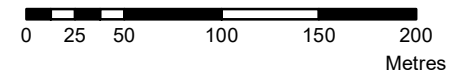


Figure 13: Rosina Crescent, Kings Langley (Section A2 - Low Risk)

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

APZ Site – Laurina Way, Glenwood		Section A2 – Low Risk	
APZ No. 1			
Parameter	Result		Comment
Hazard corridor width	40 m		Large drainage basin
Vegetation classification	Woodland		
Effective slope	Downslope 15-20°		
Recommended APZ	10 m		SFR - Hazard less than 50 m in width
Current APZ	Yard:	>10 m	Large yards
	M7:	3 m	
Boundary fence	Timber		
Noise attenuation wall	Yes		Located at boundary
Recommendation	Continue maintenance		



Legend

 APZ 1



Date: 11/08/2017

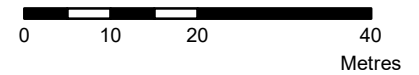


Figure 14: Laurina Way, Glenwood (Section A2 - Low Risk)

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

APZ Site – Galea Drive, Glenwood		Section A2 – Low Risk	
APZ No. 1			
<i>Parameter</i>	<i>Result</i>		<i>Comment</i>
Hazard corridor width	40 m		Upslope to noise wall, followed by downslope to motorway
Vegetation classification	Woodland		
Effective slope	Upslope		
Recommended APZ	10 m		SFR - Hazard less than 50 m in width
Current APZ	Yard:	8 m	Large yards
	M7:	3 m	Some larger cleared areas
Boundary fence	Timber		
Noise attenuation wall	Yes		Located at top of slope mid-way in corridor
Recommendation	Continue maintenance		



Legend

-  Photo Points
-  APZ 1



Date: 11/08/2017

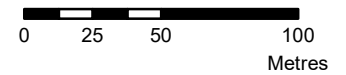


Figure 15: Galea Drive, Glenwood (Section A2 - Low Risk)

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

APZ Site – Sciarra Crescent, Acacia Gardens		Section A2 – Low Risk	
APZ No. 1			
<i>Parameter</i>	<i>Result</i>		<i>Comment</i>
Hazard corridor width	30 m		
Vegetation classification	Woodland		
Effective slope	Downslope 15-20°		
Recommended APZ	10 m		SFR - Hazard less than 50 m in width
Current APZ	Yard:	5 m	Small yards
	M7:	3 m	
Boundary fence	Colorbond		
Noise attenuation wall	No		
Recommendation	Establish 5 m APZ from boundary		

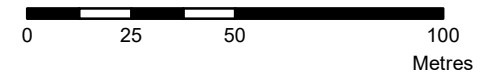


Legend

-  Photo Points
-  APZ 1



Date: 11/08/2017



Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

Figure 16: Sciarra Crescent, Acacia Gardens (Section A2 - Low Risk)

APZ Site – Sheridan Crescent, Quakers Hill		Section A2 – Low Risk
APZ No. 1		
Parameter	Result	Comment
Hazard corridor width	30-50 m	4WD access along rear for most of interface
Vegetation classification	Woodland	
Effective slope	Upslope	
Recommended APZ	10 m	SFR - Hazard less than 50 m in width
Current APZ	Yard: 7 m	
	M7: 3 m	
Boundary fence	Colorbond	
Noise attenuation wall	Yes	
Recommendation	Continue maintenance	



Legend

-  Photo Points
-  APZ 1



Date: 11/08/2017



Figure 17: Sherridon Crescent, Quakers Hill (Section A2 - Low Risk)

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

APZ Site – Rowntree Street, Quakers Hill		Section A1 – Low Risk
APZ No. 1		
<i>Parameter</i>	<i>Result</i>	<i>Comment</i>
Hazard corridor width	30 m	Flat to noisewall then downslope. Minimal hazard between noisewall and boundary (minimum separation of 5 m)
Vegetation classification	Woodland	
Effective slope	Downslope 15-20°	
Recommended APZ	10 m	SFR - Hazard less than 50 m in width
Current APZ	Yard: 10 m	
	M7: >3 m	
Boundary fence	Colorbond	
Noise attenuation wall	Yes	
Recommendation	Continue maintenance	



Legend

-  Photo Points
-  APZ 1



Date: 11/08/2017

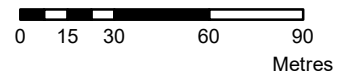


Figure 18: Rowntree Street, Quakers Hill (Section A1 - Low Risk)

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

APZ Site – Nathan Crescent, Dean Park		Section A1 – High Risk
APZ No. 1		
<i>Parameter</i>	<i>Result</i>	<i>Comment</i>
Hazard corridor width	70 m	Remnant woodland on slopes less than the assumed 15-20° downslope.
Vegetation classification	Woodland	
Effective slope	Downslope 15-20°	
Recommended APZ	15 m	SFR - Hazard greater than 50 m in width
Current APZ	Yard: 10 m	4WD access along boundary
	M7: 5 m	
Boundary fence	Colorbond	
Noise attenuation wall	No	
Recommendation	Continue maintenance	



Legend

 APZ 1



Date: 11/08/2017



Figure 19: Nathans Crescent, Dean Park (Section A1 - High Risk)



Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

APZ Site – Woodley Crescent, Glendenning		Section A1 – Low Risk
APZ No. 1		
<i>Parameter</i>	<i>Result</i>	<i>Comment</i>
Hazard corridor width	20-30 m	Upslope to middle of corridor followed by downslope to motorway
Vegetation classification	Woodland	
Effective slope	Upslope	
Recommended APZ	10 m	SFR - Hazard less than 50 m in width
Current APZ	Yard: 7 m	
	M7: 3 m	
Boundary fence	Colorbond	
Noise attenuation wall	No	
Recommendation	Continue maintenance	



Legend

-  Photo Points
-  APZ 1



Date: 11/08/2017

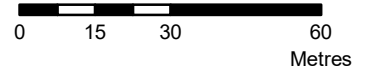
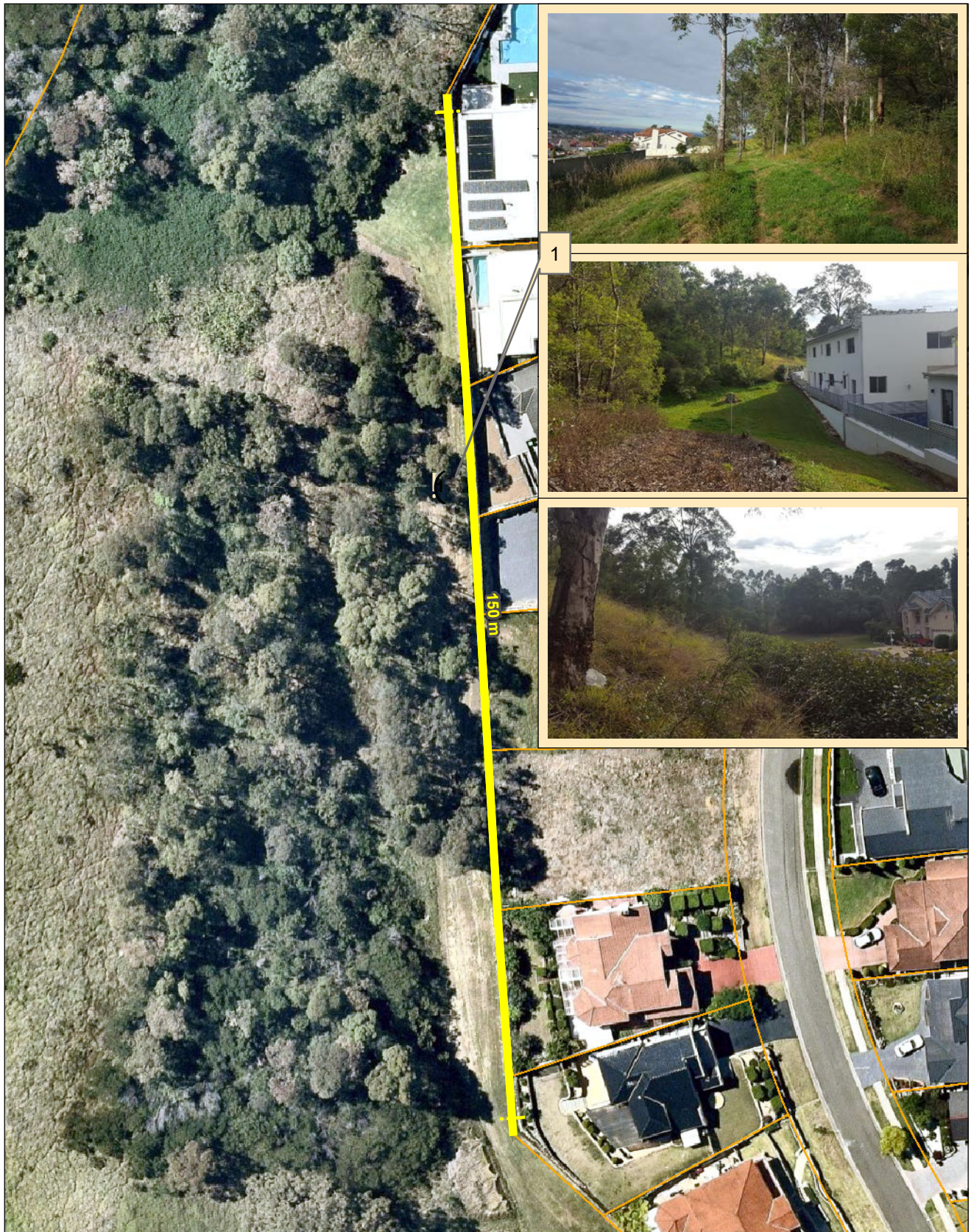


Figure 20: Woodley Crescent, Glendenning (Section A1 - Low Risk)



Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

APZ Site – Isabell Street, Cecil Hills		Section D1 – Moderate Risk	
APZ No. 1			
<i>Parameter</i>	<i>Result</i>		<i>Comment</i>
Hazard corridor width	60-70 m		Remnant woodland on upslopes
Vegetation classification	Woodland		
Effective slope	Upslope		
Recommended APZ	15 m		SFR - Hazard greater than 50 m in width
Current APZ	Yard:	2-15 m	
	M7:	10 m	
Boundary fence	Colorbond		
Noise attenuation wall	No		
Recommendation	Establish 13 m APZ from boundary adjacent house at northern end		



Legend

-  Photo Points
-  APZ 1



Date: 11/08/2017

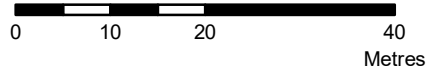


Figure 21: Isabell Street, Cecil Hills (Section A1 - Moderate Risk)

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

APZ Site – Dobroyd Drive, Elizabeth Hills		Section D1 – High Risk
APZ No. 1		
<i>Parameter</i>	<i>Result</i>	<i>Comment</i>
Hazard corridor width	30-40 m	Predominantly grassland with scattered planted eucalypts. Dissected by shared pathway 4-5 m wide mid-corridor
Vegetation classification	Woodland	
Effective slope	Downslope 15-20°	
Recommended APZ	10 m	SFR - Hazard less than 50 m in width
Current APZ	Yard: 3 m	The noise wall provides the radiant heat protection in lieu of compliant APZ, particularly as hazard is grassland and new house construction
	M7: 3 m	
Boundary fence	Noise wall	
Noise attenuation wall	Yes	Wall is boundary fence
Recommendation	Continue maintenance	



Legend

-  Photo Points
-  APZ 1



Date: 11/08/2017

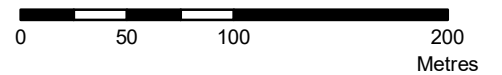


Figure 22: Dobroyd Drive, Elizabeth Hills (Section D1 - High Risk)

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

Appendix II

Stage One PACHCI Assessment Letter and AHIMS Searches



19 August, 2020

Sonja Shand
Project Manager
Transport for New South Wales

Dear Sonja,

Preliminary assessment results for the Minor Works Review of Environmental Factors (MWREF to Consider the Extension and Vegetation Modification to Existing Asset Protection Zones (APZ based on Stage 1 of the *Procedure for Aboriginal cultural heritage consultation and investigation* (the procedure)).

The project, as indicated in the checklist attached was assessed as being unlikely to have an impact on Aboriginal cultural heritage.

The assessment is based on the following due diligence considerations:

- The project works are not likely to impact mature trees.
- The project is unlikely to harm known Aboriginal objects or places (AHIMS sites).
- The AHIMS search did not indicate the presence of recorded Aboriginal sites in the study area.
- The study area does contain landscape features that indicate the presence of Aboriginal objects, based on the Office of Environment and Heritage's *Due diligence Code of Practice for the Protection of Aboriginal objects in NSW* and the Roads and Maritime Services' procedure, however, the cultural heritage potential of the study area appears to be reduced due to past disturbances in the form of the construction of residential development and the M7 Motorway.

Your project may proceed in accordance with the environmental impact assessment process, as relevant, and all other relevant approvals.

If the scope of your project changes, you must contact me and your regional environmental staff to reassess any potential impacts on Aboriginal cultural heritage.

Please ensure that works remain within the designated areas as indicated in the checklist attached.

RMS staff and/or contractors should be aware of the potential of Aboriginal objects (including skeletal remains) being discovered during the course of the project, if this occurs all works in the vicinity of the find must cease. Follow the steps outlined in the Roads and Maritime Services' *Unexpected Archaeological Finds Procedure*.

For further assistance in this matter please do not hesitate to contact me.

Yours sincerely



Lee Davison
Aboriginal Cultural Heritage Officer

Stage 1 Roads and Maritime Services assessment

Procedure for Aboriginal cultural heritage consultation and investigation: Resource 3

Aim

The project manager (or their representative) must provide the information requested in this checklist to the regional Aboriginal cultural heritage adviser. This information will assist them in determining whether the project may affect Aboriginal cultural heritage in accordance with Stage 1 of the procedure.

Please **provide** this completed cover sheet, along with the required information, to your regional Aboriginal cultural heritage adviser.

Contact details for this project

Name of project:

Minor Works Review of Environmental Factors (MWREF to Consider the Extension and Vegetation Modification to Existing Asset Protection Zones (APZ).

Project manager:

Sonja Shand
TfNSW

Environmental officer undertaking/managing the environmental impact assessment:

Tracey Austin
TfNSW

Corporate communications officer, if any:

N/A

Date:

4 August, 2020

Action	Status <input checked="" type="checkbox"/>
Item 1 Attach an overview of the project. The overview must include the known scope and extent of the proposed works; compound site requirements; access and movement of plant; re-location and/or provision of utilities; the location of noise walls, sedimentation basins, shared pathways, cycle ways, and so on.	<input checked="" type="checkbox"/>
Item 2 Attach a map/plan of the study area that clearly outlines the extent and scope of the project. The map/plan should also include topographical information where available.	<input checked="" type="checkbox"/>
Item 3	<input type="checkbox"/>

If land acquisition is required, provide details about this.	
Item 4 Attach a brief description of current and past land use, where known. For example, the study area land is currently used as a car park/road reserve/farming/etc. and was formally used for a car park/road reserve/farming.	<input checked="" type="checkbox"/>
Item 5 Describe the timeframe for the project along with key milestones and deliverables.	<input checked="" type="checkbox"/>
Item 6 Please attach the results of the Office of Environment and Heritage's Aboriginal Heritage Information Management System (AHIMS) Basic Search - http://www.environment.nsw.gov.au/licences/WhatInformationCanYouObtainFromAHIMS.htm If required, please include the results of an AHIMS Extensive Search . These results should be plotted on a map/plan covering the study area.	<input checked="" type="checkbox"/>
Item 7 Attach the results of the following heritage searches relevant to the study area: <ul style="list-style-type: none"> • Native Title Register search • State Heritage Inventory search • Australian Heritage Database search 	<input checked="" type="checkbox"/>
Item 8 Attach a copy of any heritage assessment (Aboriginal or non-Aboriginal) previously prepared for the study area/project?	<input type="checkbox"/>
Item 9 Attach a copy of any environmental impact assessment previously prepared for the study area/project?	<input type="checkbox"/>

Item 1

Roads and Maritime proposes to undertake bushfire protection within the Asset Protection Zones (APZ) of the M7 Westlink Motorway corridor in Western Sydney. The primary objective of this proposal is to achieve compliant or acceptable APZ to reduce the risk of life and property loss from bushfire. The locations are:

1. Valerie Avenue, Baulkham Hills, APZ 2
2. Montview Way Glenwood, APZ 2
3. Montview Way Glenwood, APZ 3
4. Knightsbridge Avenue, Glenwood, APZ 2
5. Sciarra Crescent, Acacia Gardens

The NSW Rural Fire Service (RFS) Bushfire Protection for Existing Development (RFS 2016) defines an APZ as an area between a bushfire hazard and buildings which is more intensively and routinely managed to minimise fuel loads and reduce the potential radiant heat levels, flame contact, ember and smoke attack on life and property.

Each APZ site along the M7 Motorway is located adjacent to residential development and consists of bushland corridors between 30 and 40 metres wide, except for Valerie Avenue (100 metres). Most of the APZ sites are located in the northern section of the M7 corridor between Richmond Road and the M2. The remaining site (Valerie Street) is located south towards the M5 and is adjacent to undeveloped lands or very narrow and unvegetated sections.

Based on the M7 Corridor Bushfire Asset Protection Zone Assessment recommendations (dated August, 2017), key features of the proposal would include:

- Establish APZ clearance boundaries for five APZs.
- Routine maintenance works including slashing operations along rear fences within the M7 corridor.

The proposal is anticipated to involve the following work methodology:

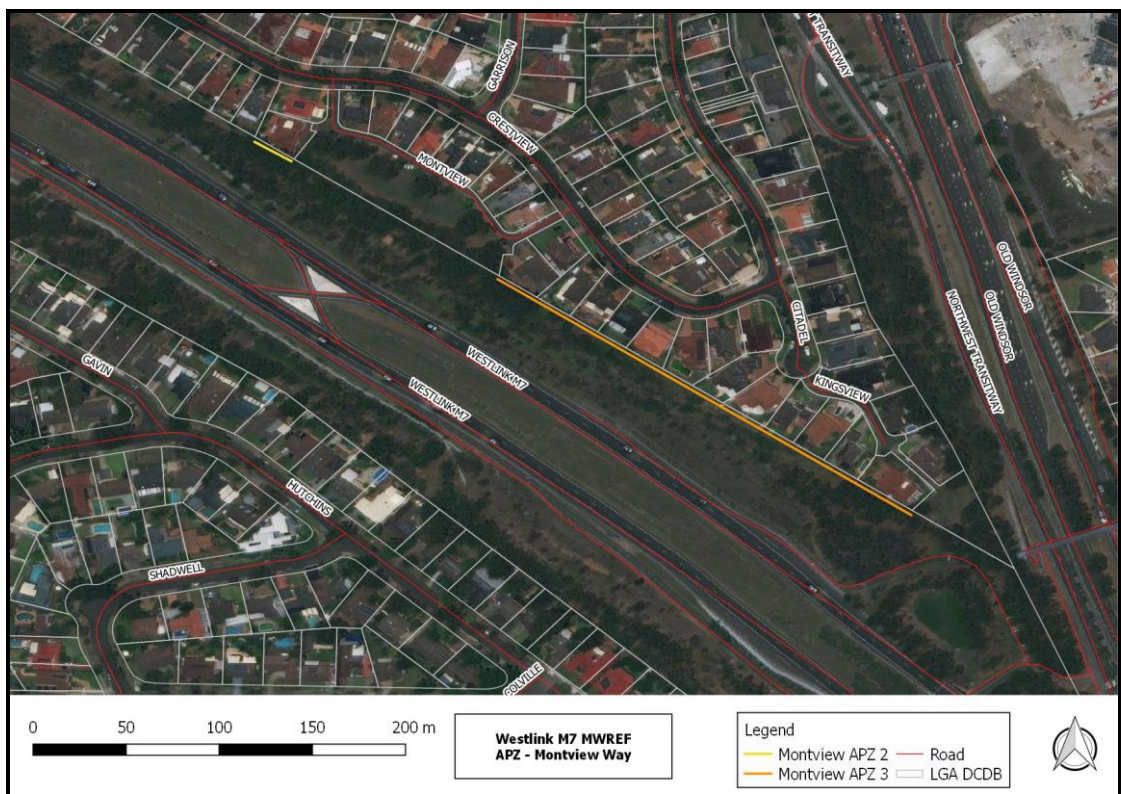
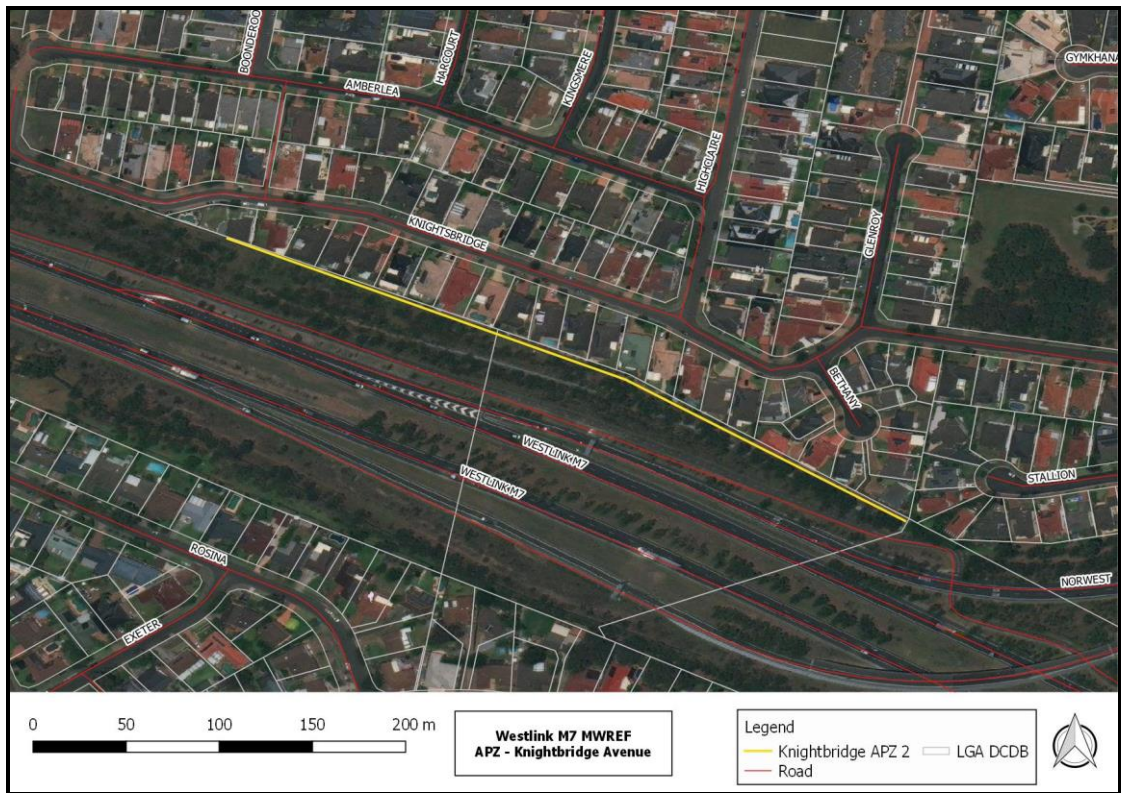
- Tree canopies thinned to achieve gaps of two to five metres between crowns.
- Small clumps of trees to be pruned to enable larger gaps (minimum five metres) to the next adjacent crown.
- Tree removal preference is to be given to trees with least health or longevity, and with least ecological benefit.
- Removal of understorey shrubs and saplings within the APZ sites. If retained, they are to be thinned to form clumps or individuals so they do not comprise more than 20% of the total APZ area.
- Groundcovers (mainly grasses) to be slashed.
- Removal of all dead vegetative material.
- Removal of excess leaf litter providing a thin cover over the ground (5cm).

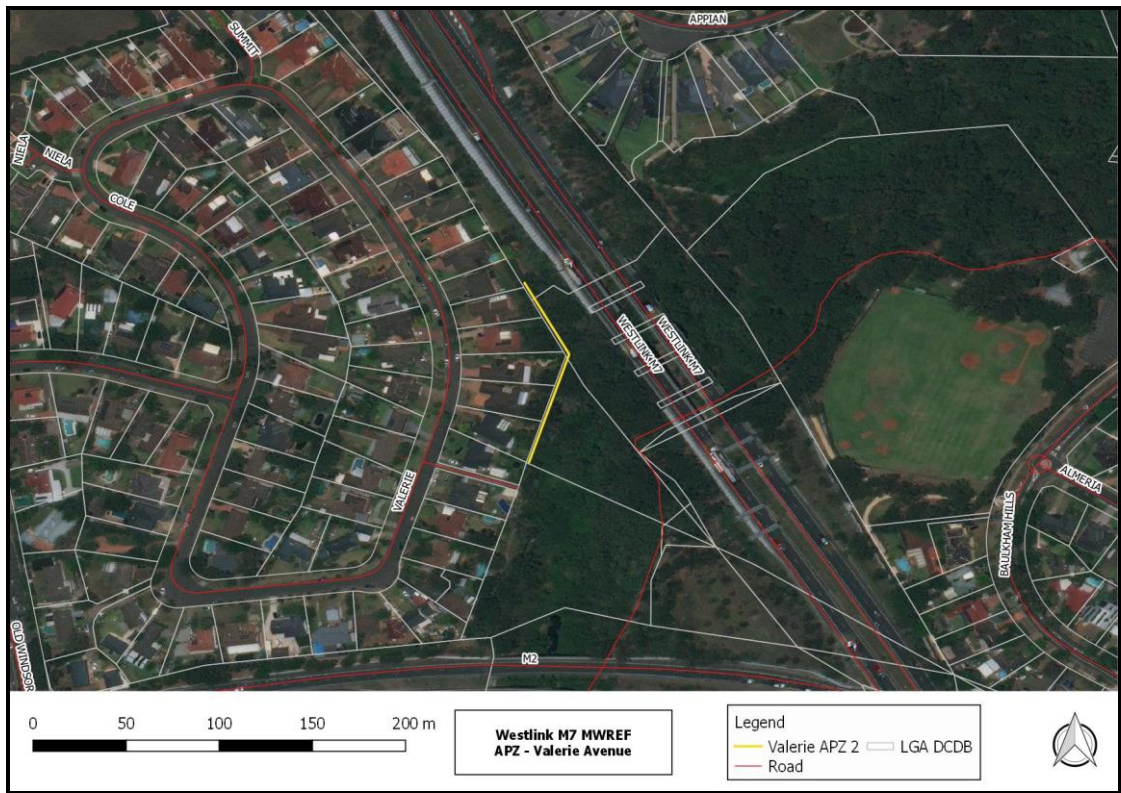
Plant to be used in the proposal delivery would include chainsaw, handsaw, chipper, work vehicles, stump and a grinding machine.

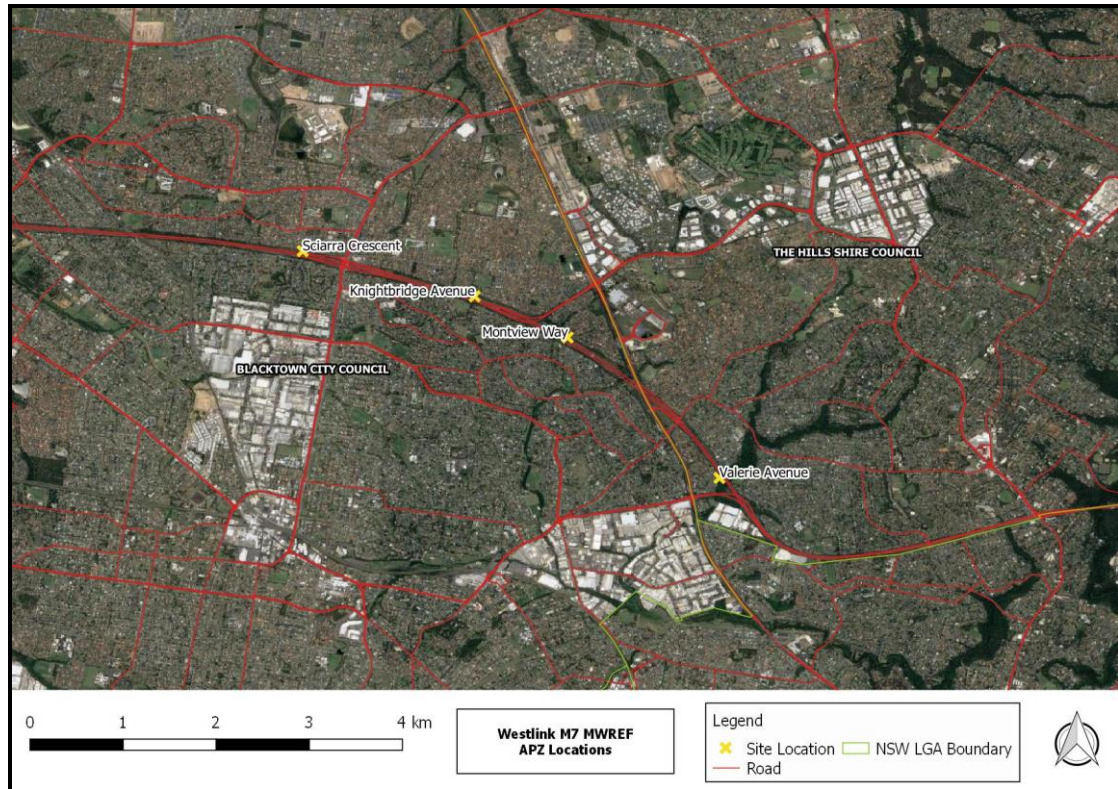
The designated locations of compounds and parking will be confirmed during the project development stage.

APZ sites excluded from the proposal are Goodhall Avenue, Baulkham Hills, Valerie Avenue, Baulkham Hills (APZ 1).

Item 2







Item 4

Current land use includes:

- Residential.
- Road reserve and corridor.
- Reserves.

Past land uses according to include:

- Agriculture.

Kass, T. 2005, Western Sydney Thematic History. State Heritage Register Project. NSW Heritage Office, Retrieved 7 November, 2019

<<https://www.environment.nsw.gov.au/resources/heritagebranch/heritage/ThematicHistoryWesternSydney.pdf>>.

Heritage Office (HO) and Department of Urban Affairs and Planning (DUAP) 1996, Regional Histories: Regional Histories of New South Wales. Sydney. Retrieved 7 November, 2019

<<https://www.environment.nsw.gov.au/resources/heritagebranch/heritage/RegionalHistoriesPt2SydneyHunter.pdf>>

Item 5

Timeline:

- MWREF Before the 15 November, 2020
- APZ protection works before 15 December, 2020

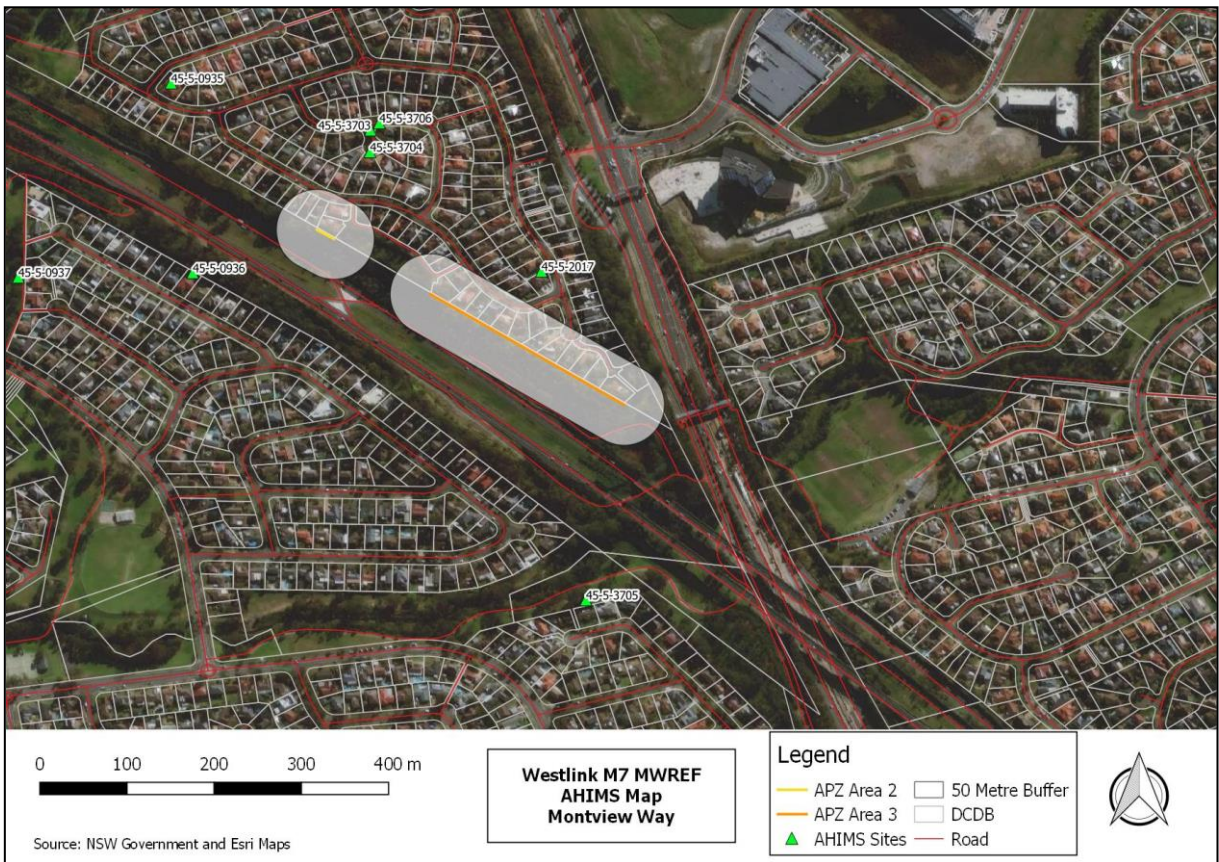
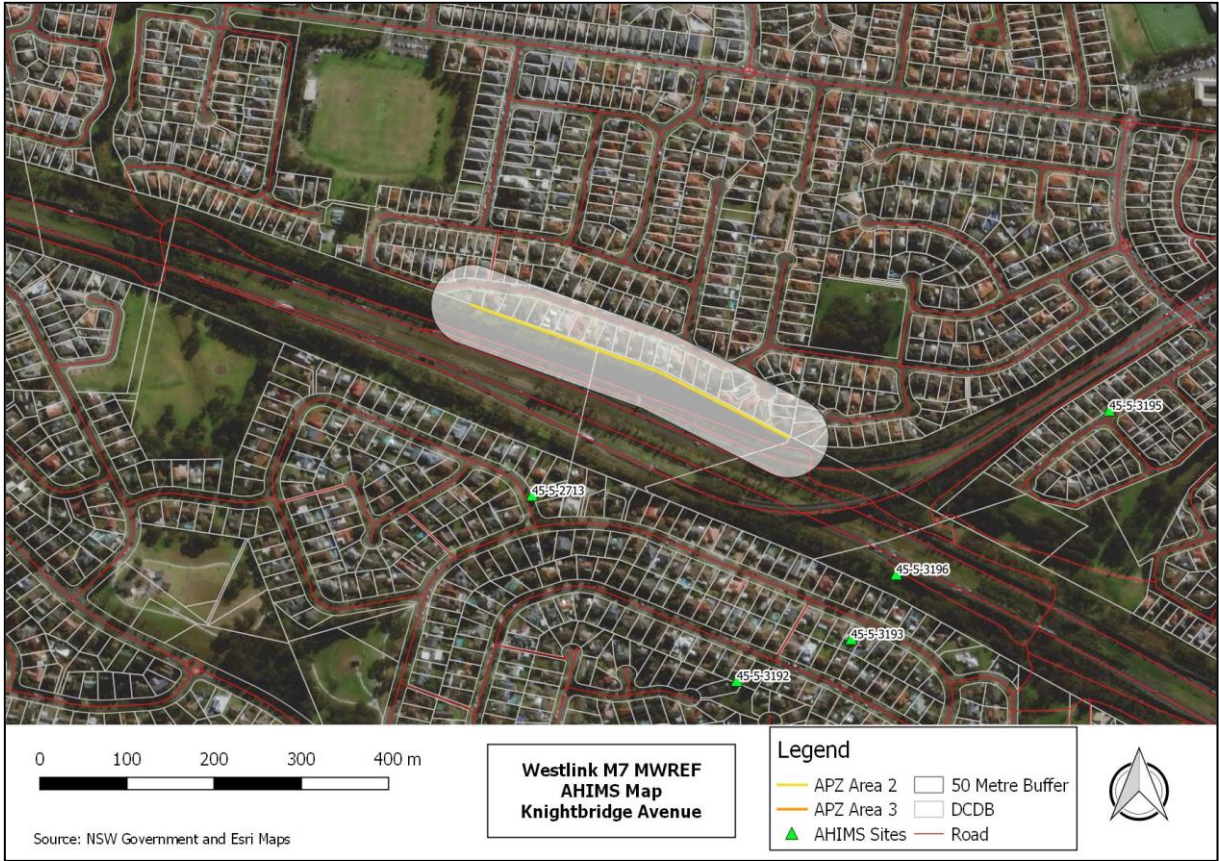
Ideally the project will be completed before summer or shortly into summer to provide the greatest protection possible through the APZ modifications.

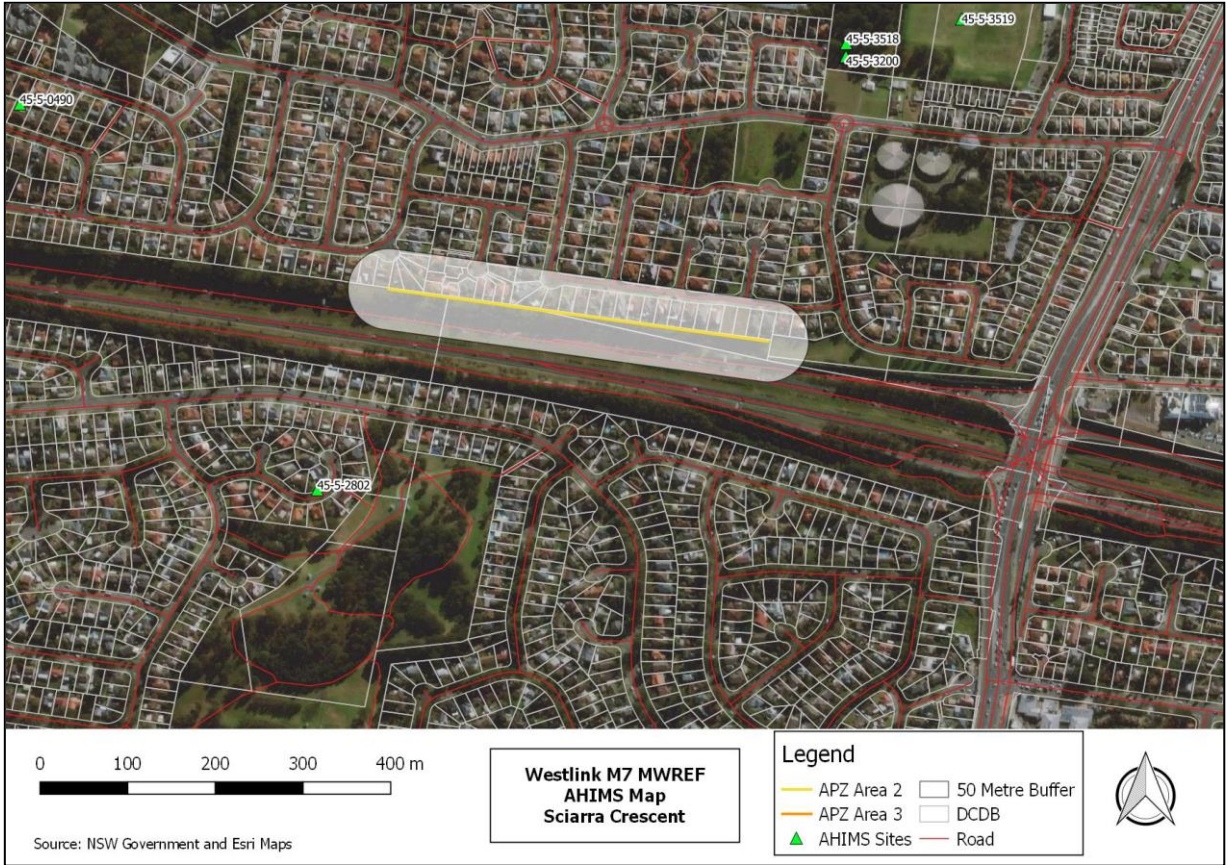
Item 6

Please see included map of results and attached AHIMS basic searches with a 50 metre buffer (27 July, 2020) and the extensive search which covers all five sites from 6 November, 2019. A basic search was completed on 30 July, 2020 to confirm no new AHIMS sites have been added to the extensive search area.

1. Valerie Ave, Baulkham Hills;
2. Montview Way Glenwood (two sites);
3. Knightsbridge Avenue, Glenwood; and
4. Sciarra Crescent, Acacia Gardens.







Item 7

See attachments.

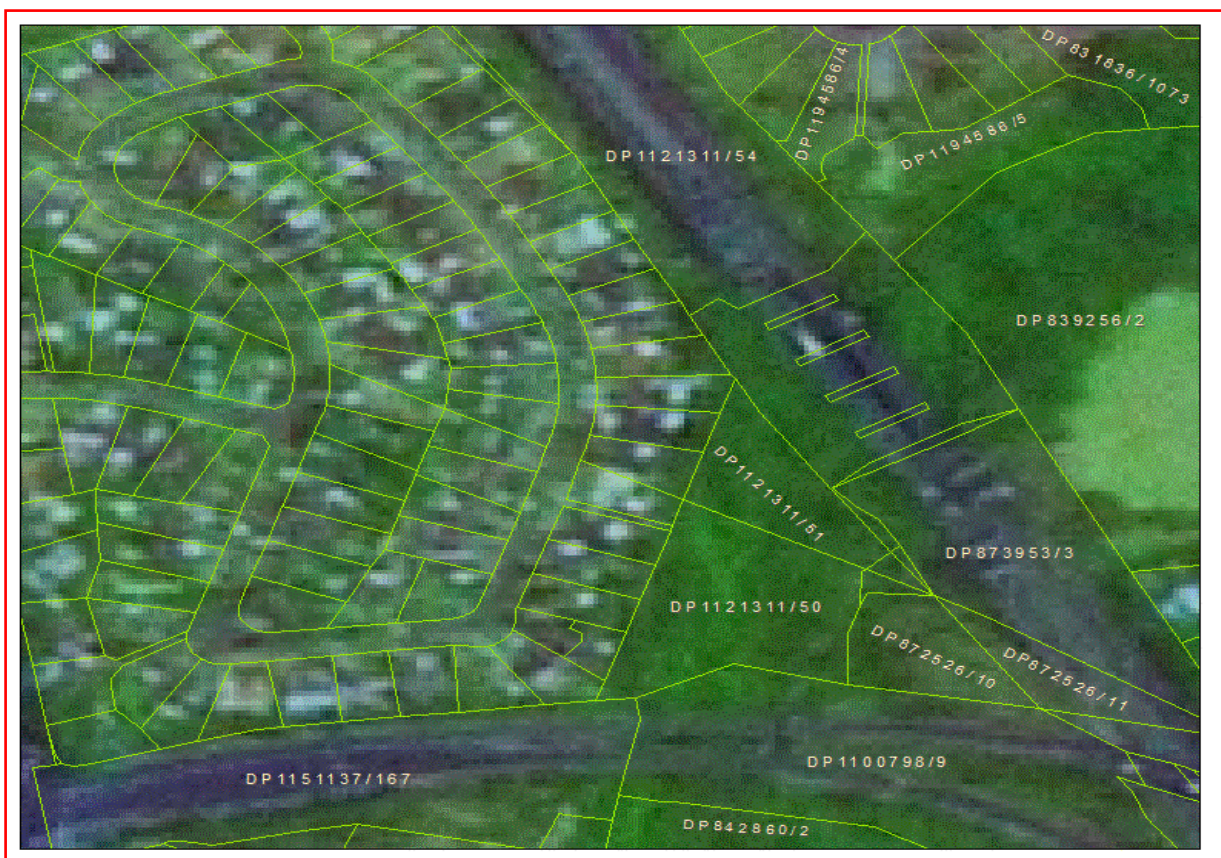
Advitech Pty Limited
PO Box 207
Mayfield New South Wales 2304
Attention: Rod Bennison
Email: rod.bennison@advitech.com.au

Date: 27 July 2020

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -33.765, 150.9589 - Lat, Long To : -33.7624, 150.963 with a Buffer of 50 meters, conducted by Rod Bennison on 27 July 2020.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

1	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the [NSW Government Gazette \(http://www.nsw.gov.au/gazette\)](http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

Advitech Pty Limited
PO Box 207
Mayfield New South Wales 2304
Attention: Rod Bennison
Email: rod.bennison@advitech.com.au

Date: 27 July 2020

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -33.7454, 150.9341 - Lat, Long To : -33.7417, 150.9399 with a Buffer of 50 meters, conducted by Rod Bennison on 27 July 2020.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

2	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the [NSW Government Gazette \(http://www.nsw.gov.au/gazette\)](http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

Advitech Pty Limited
PO Box 207
Mayfield New South Wales 2304
Attention: Rod Bennison
Email: rod.bennison@advitech.com.au

Date: 27 July 2020

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -33.7512, 150.9453 - Lat, Long To : -33.7475, 150.9512 with a Buffer of 50 meters, conducted by Rod Bennison on 27 July 2020.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

5	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the [NSW Government Gazette \(http://www.nsw.gov.au/gazette\)](http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

Advitech Pty Limited
PO Box 207
Mayfield New South Wales 2304
Attention: Rod Bennison
Email: rod.bennison@advitech.com.au

Date: 27 July 2020

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -33.7387, 150.9096 - Lat, Long To : -33.7352, 150.9151 with a Buffer of 50 meters, conducted by Rod Bennison on 27 July 2020.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

1	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the [NSW Government Gazette \(http://www.nsw.gov.au/gazette\)](http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

Appendix III

Standards for Asset Protection Zones

STANDARDS FOR ASSET PROTECTION ZONES

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INTRODUCTION

For thousands of years bush fires have been a natural part of the Australian landscape. They are inevitable and essential, as many Australian plants and animals have adapted to fire as part of their life cycle.

In recent years developments in bushland areas have increased the risk of bush fires harming people and their homes and property. But landowners can significantly reduce the impact of bush fires on their property by identifying and minimising bush fire hazards. There are a number of ways to reduce the level of hazard to your property, but one of the most important is the creation and maintenance of an Asset Protection Zone (APZ).

A well located and maintained APZ should be used in conjunction with other preparations such as good property maintenance, appropriate building materials and developing a family action plan.

WHAT IS AN ASSET PROTECTION ZONE?

An Asset Protection Zone (APZ) is a fuel reduced area surrounding a built asset or structure. This can include any residential building or major building such as farm and machinery sheds, or industrial, commercial or heritage buildings.

An APZ provides:

- a buffer zone between a bush fire hazard and an asset;
- an area of reduced bush fire fuel that allows suppression of fire;
- an area from which backburning may be conducted; and
- an area which allows emergency services access and provides a relatively safe area for firefighters and home owners to defend their property.

Potential bush fire fuels should be minimised within an APZ. This is so that the vegetation within the planned zone does not provide a path for the transfer of fire to the asset either from the ground level or through the tree canopy.

WHAT WILL THE APZ DO?

An APZ, if designed correctly and maintained regularly, will reduce the risk of:

- direct flame contact on the asset;
- damage to the built asset from intense radiant heat; and
- ember attack on the asset.

WHERE SHOULD I PUT AN APZ?

An APZ is located between an asset and a bush fire hazard.

The APZ should be located wholly within your land. You cannot undertake any clearing of vegetation on a neighbour's property, including National Park estate, Crown land or land under the management of your local council, unless you have written approval.

If you believe that the land adjacent to your property is a bush fire hazard and should be part of an APZ, you can have the matter investigated by contacting the NSW Rural Fire Service (RFS).

There are six steps to creating and maintaining an APZ. These are:

1. Determine if an APZ is required;
2. Determine what approvals are required for constructing your APZ;
3. Determine the APZ width required;
4. Determine what hazard reduction method is required to reduce bush fire fuel in your APZ;
5. Take measures to prevent soil erosion in your APZ; and
6. Landscape and regularly monitor in your APZ for fuel regrowth.

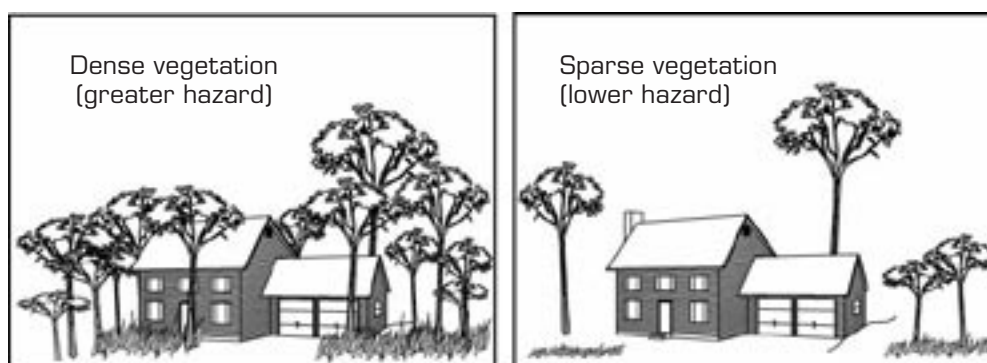
STEP 1. DETERMINE IF AN APZ IS REQUIRED

Recognising that a bush fire hazard exists is the first step in developing an APZ for your property.

If you have vegetation close to your asset and you live in a bush fire prone or high risk area, you should consider creating and maintaining an APZ.

Generally, the more flammable and dense the vegetation, the greater the hazard will be. However, the hazard potential is also influenced by factors such as slope.

- A large area of continuous vegetation on sloping land may increase the potential bush fire hazard.
- The amount of vegetation around a house will influence the intensity and severity of a bush fire.
- The higher the available fuel the more intense a fire will be.



Isolated areas of vegetation are generally not a bush fire hazard, as they are not large enough to produce fire of an intensity that will threaten dwellings.

This includes:

- bushland areas of less than one hectare that are isolated from large bushland areas; and
- narrow strips of vegetation along road and river corridors.

If you are not sure if there is a bush fire hazard in or around your property, contact your local NSW Rural Fire Service Fire Control Centre or your local council for advice.

STEP 2. DETERMINE WHAT APPROVALS ARE REQUIRED FOR CONSTRUCTING YOUR APZ

If you intend to undertake bush fire hazard reduction works to create or maintain an APZ you must gain the written consent of the landowner.

Subdivided land or construction of a new dwelling

If you are constructing an APZ for a new dwelling you will need to comply with the requirements in *Planning for Bushfire Protection*. Any approvals required will have to be obtained as part of the Development Application process.

Existing asset

If you wish to create or maintain an APZ for an existing structure you may need to obtain an environmental approval. The RFS offers a free environmental assessment and certificate issuing service for essential hazard reduction works. For more information see the RFS document *Application Instructions for a Bush Fire Hazard Reduction Certificate* or contact your local RFS Fire Control Centre to determine if you can use this approval process.

Bear in mind that all work undertaken must be consistent with any existing land management agreements (e.g. a conservation agreement, or property vegetation plan) entered into by the property owner.

If your current development consent provides for an APZ, you do not need further approvals for works that are consistent with this consent.

If you intend to burn off to reduce fuel levels on your property you may also need to obtain a Fire Permit through the RFS or NSW Fire Brigades. See the RFS document *Before You Light That Fire* for an explanation of when a permit is required.

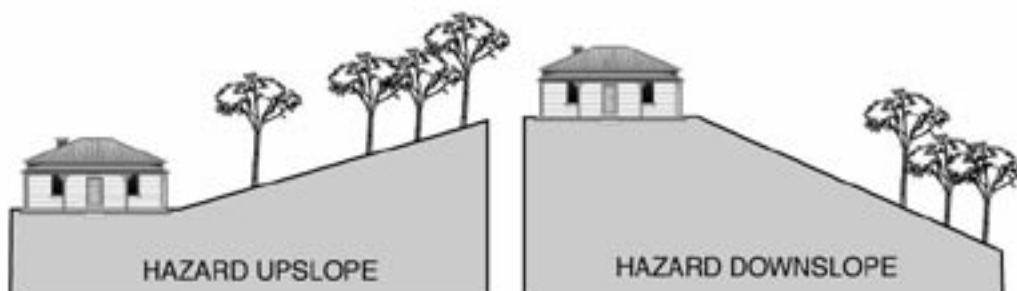
STEP 3. DETERMINE THE APZ WIDTH

The size of the APZ required around your asset depends on the nature of the asset, the slope of the area, the type and structure of nearby vegetation and whether the vegetation is managed.

Fires burn faster uphill than downhill, so the APZ will need to be larger if the hazard is downslope of the asset.



Gentle slopes require a smaller APZ distance than steep slopes



A hazard downslope will require a greater APZ distance than a hazard upslope of the asset

Different types of vegetation (for example, forests, rainforests, woodlands, grasslands) behave differently during a bush fire. For example, a forest with shrubby understorey is likely to result in a higher intensity fire than a woodland with a grassy understorey and would therefore require a greater APZ width.

A key benefit of an APZ is that it reduces radiant heat and the potential for direct flame contact on homes and other buildings. Residential dwellings require a wider APZ than sheds or stockyards because the dwelling is more likely to be used as a refuge during bush fire.

Subdivided land or construction of a new dwelling

If you are constructing a new asset, the principles of *Planning for Bushfire Protection* should be applied. Your Development Application approval will detail the exact APZ distance required.

Existing asset

If you wish to create an APZ around an existing asset and you require environmental approval, the Bush Fire Environmental Assessment Code provides a streamlined assessment process. Your Bush Fire Hazard Reduction Certificate (or alternate environmental approval) will specify the maximum APZ width allowed.

For further information on APZ widths see *Planning for Bushfire Protection* or the *Bush Fire Environmental Assessment Code* (available on the RFS website), or contact your local RFS Fire Control Centre.

STEP 4. DETERMINE WHAT HAZARD REDUCTION METHOD IS REQUIRED TO REDUCE BUSH FIRE FUEL IN YOUR APZ

The intensity of bush fires can be greatly reduced where there is little to no available fuel for burning. In order to control bush fire fuels you can reduce, remove or change the state of the fuel through several means.

Reduction of fuel does not require removal of all vegetation, which would cause environmental damage. Also, trees and plants can provide you with some bush fire protection from strong winds, intense heat and flying embers (by filtering embers) and changing wind patterns. Some ground cover is also needed to prevent soil erosion.

Fuels can be controlled by:

1. raking or manual removal of fine fuels

Ground fuels such as fallen leaves, twigs (less than 6 mm in diameter) and bark should be removed on a regular basis. This is fuel that burns quickly and increases the intensity of a fire.

Fine fuels can be removed by hand or with tools such as rakes, hoes and shovels.

2. mowing or grazing of grass

Grass needs to be kept short and, where possible, green.

3. removal or pruning of trees, shrubs and understorey

The control of existing vegetation involves both selective fuel reduction (removal, thinning and pruning) and the retention of vegetation.

Prune or remove trees so that you do not have a continuous tree canopy leading from the hazard to the asset. Separate tree crowns by two to five metres. A canopy should not overhang within two to five metres of a dwelling.

Native trees and shrubs should be retained as clumps or islands and should maintain a covering of no more than 20% of the area.

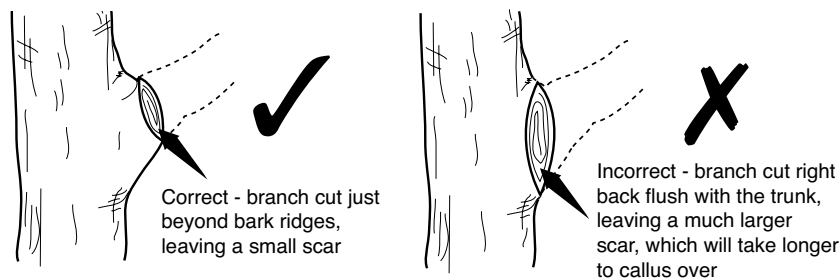
When choosing plants for removal, the following basic rules should be followed:

1. Remove noxious and environmental weeds first. Your local council can provide you with a list of environmental weeds or 'undesirable species'. Alternatively, a list of noxious weeds can be obtained at www.agric.nsw.gov.au/noxweed/;
2. Remove more flammable species such as those with rough, flaky or stringy bark; and
3. Remove or thin understory plants, trees and shrubs less than three metres in height

The removal of significant native species should be avoided.

Prune in accordance with the following standards:

- Use sharp tools. These will enable clean cuts and will minimise damage to the tree.
- Decide which branches are to be removed before commencing work. Ensure that you maintain a balanced, natural distribution of foliage and branches.
- Remove only what is necessary.
- Cut branches just beyond bark ridges, leaving a small scar.
- Remove smaller branches and deadwood first.



There are three primary methods of pruning trees in APZs:

1. Crown lifting (skirting)

Remove the lowest branches (up to two metres from the ground). Crown lifting may inhibit the transfer of fire between the ground fuel and the tree canopy.

2. Thinning

Remove smaller secondary branches whilst retaining the main structural branches of the tree. Thinning may minimise the intensity of a fire.

3. Selective pruning

Remove branches that are specifically identified as creating a bush fire hazard (such as those overhanging assets or those which create a continuous tree canopy). Selective pruning can be used to prevent direct flame contact between trees and assets.

Your Bush Fire Hazard Reduction Certificate or local council may restrict the amount or method of pruning allowed in your APZ.

See the *Australian Standard 4373 (Pruning of Amenity Trees)* for more information on tree pruning.

4. Slashing and trittering

Slashing and trittering are economical methods of fuel reduction for large APZs that have good access. However, these methods may leave large amounts of slashed fuels (grass clippings etc) which, when dry, may become a fire hazard. For slashing or trittering to be effective, the cut material must be removed or allowed to decompose well before summer starts.

If clippings are removed, dispose of them in a green waste bin if available or compost on site (dumping clippings in the bush is illegal and it increases the bush fire hazard on your or your neighbour's property).

Although slashing and trittering are effective in inhibiting the growth of weeds, it is preferable that weeds are completely removed.

Care must be taken not to leave sharp stakes and stumps that may be a safety hazard.

5. Ploughing and grading

Ploughing and grading can produce effective firebreaks. However, in areas where this method is applied, frequent maintenance may be required to minimise the potential for erosion. Loose soil from ploughed or graded ground may erode in steep areas, particularly where there is high rainfall and strong winds.

6. Burning (hazard reduction burning)

Hazard reduction burning is a method of removing ground litter and fine fuels by fire. Hazard reduction burning of vegetation is often used by land management agencies for broad area bush fire control, or to provide a fuel reduced buffer around urban areas.

Any hazard reduction burning, including pile burns, must be planned carefully and carried out with extreme caution under correct weather conditions. Otherwise there is a real danger that the fire will become out of control. More bush fires result from escaped burning off work than from any other single cause.

It is YOUR responsibility to contain any fire lit on your property. If the fire escapes your property boundaries you may be liable for the damage it causes.

Hazard reduction burns must therefore be carefully planned to ensure that they are safe, controlled, effective and environmentally sound. There are many factors that need to be considered in a burn plan. These include smoke control, scorch height, frequency of burning and cut off points (or control lines) for the fire. For further information see the RFS document *Standards for Low Intensity Bush Fire Hazard Reduction Burning*, or contact your local RFS for advice.

7. Burning (pile burning)

In some cases, where fuel removal is impractical due to the terrain, or where material cannot be disposed of by the normal garbage collection or composted on site, you may use pile burning to dispose of material that has been removed in creating or maintaining an APZ.

For further information on pile burning, see the RFS document *Standards for Pile Burning*.

In areas where smoke regulations control burning in the open, you will need to obtain a Bush Fire Hazard Reduction Certificate or written approval from Council for burning. During the bush fire danger period a Fire Permit will also be required. See the RFS document *Before You Light that Fire* for further details.

STEP 5. TAKE MEASURES TO PREVENT SOIL EROSION

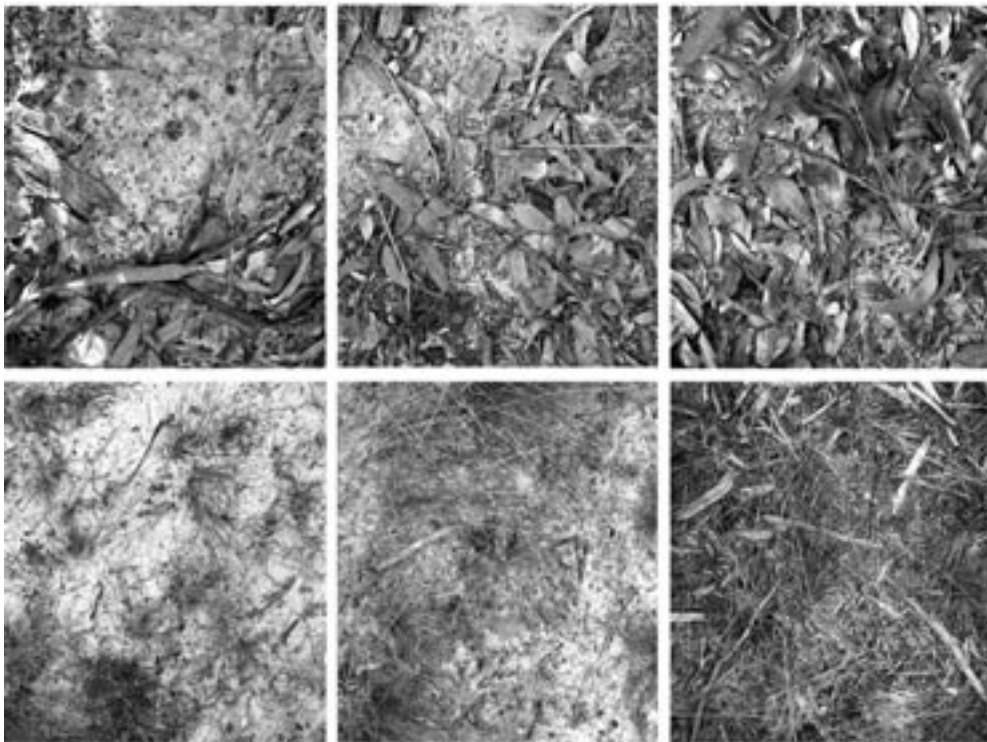
While the removal of fuel is necessary to reduce a bush fire hazard, you also need to consider soil stability, particularly on sloping areas.

Soil erosion can greatly reduce the quality of your land through:

- loss of top soil, nutrients, vegetation and seeds
- reduced soil structure, stability and quality
- blocking and polluting water courses and drainage lines

A small amount of ground cover can greatly improve soil stability and does not constitute a significant bush fire hazard. Ground cover includes any material which directly covers the soil surface such as vegetation, twigs, leaf litter, clippings or rocks. A permanent ground cover should be established (for example, short grass). This will provide an area that is easy to maintain and prevent soil erosion.

When using mechanical hazard reduction methods, you should retain a ground cover of at least 75% to prevent soil erosion. However, if your area is particularly susceptible to soil erosion, your Hazard Reduction Certificate may require that 90% ground cover be retained.



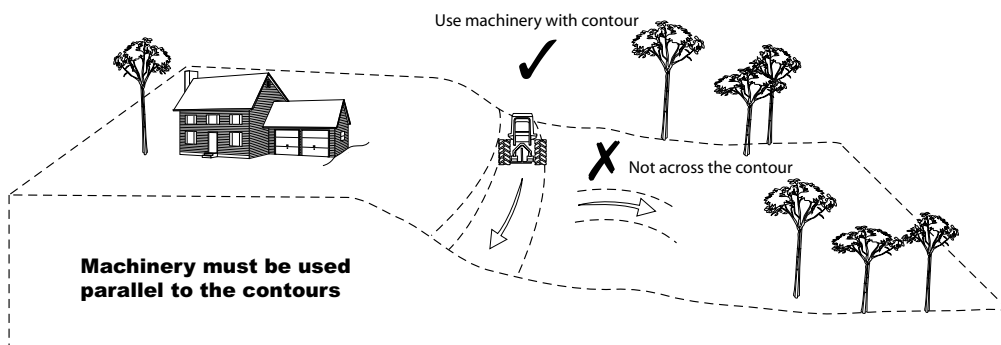
50%

75%

100%

Ground Cover

To reduce the incidence of soil erosion caused by the use of heavy machinery such as ploughs, dozers and graders, machinery must be used parallel to the contours. Vegetation should be allowed to regenerate, but be managed to maintain a low fuel load.



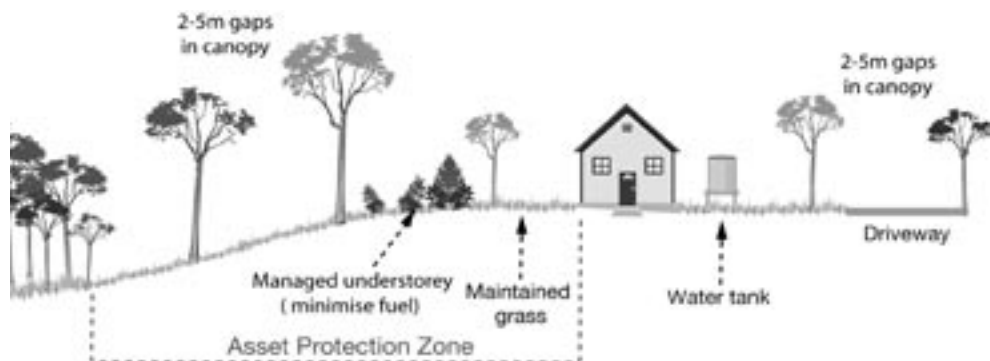
STEP 6. ONGOING MANAGEMENT AND LANDSCAPING

Your home and garden can blend with the natural environment and be landscaped to minimise the impact of fire at the same time. To provide an effective APZ, you need to plan the layout of your garden to include features such as fire resistant plants, radiant heat barriers and windbreaks.

Layout of gardens in an APZ

When creating and maintaining a garden that is part of an APZ you should:

- ensure that vegetation does not provide a continuous path to the house;
- remove all noxious and environmental weeds;
- plant or clear vegetation into clumps rather than continuous rows;
- prune low branches two metres from the ground to prevent a ground fire from spreading into trees;
- locate vegetation far enough away from the asset so that plants will not ignite the asset by direct flame contact or radiant heat emission;
- plant and maintain short green grass around the house as this will slow the fire and reduce fire intensity. Alternatively, provide non-flammable pathways directly around the dwelling;
- ensure that shrubs and other plants do not directly abut the dwelling. Where this does occur, gardens should contain low-flammability plants and non flammable ground cover such as pebbles and crush tile; and
- avoid erecting brush type fencing and planting “pencil pine” type trees next to buildings, as these are highly flammable.



Removal of other materials

Woodpiles, wooden sheds, combustible material, storage areas, large quantities of garden mulch, stacked flammable building materials etc. should be located away from the house. These items should preferably be located in a designated cleared location with no direct contact with bush fire hazard vegetation.

Other protective features

You can also take advantage of existing or proposed protective features such as fire trails, gravel paths, rows of trees, dams, creeks, swimming pools, tennis courts and vegetable gardens as part of the property's APZ.

PLANTS FOR BUSH FIRE PRONE GARDENS

When designing your garden it is important to consider the type of plant species and their flammability as well as their placement and arrangement.

Given the right conditions, all plants will burn. However, some plants are less flammable than others.

Trees with loose, fibrous or stringy bark should be avoided. These trees can easily ignite and encourage the ground fire to spread up to, and then through, the crown of the trees.

- Plants that are less flammable, have the following features:
- high moisture content
 - high levels of salt
 - low volatile oil content of leaves
 - smooth barks without “ribbons” hanging from branches or trunks; and
 - dense crown and elevated branches.

When choosing less flammable plants, be sure not to introduce noxious or environmental weed species into your garden that can cause greater long-term environmental damage.

For further information on appropriate plant species for your locality, contact your local council, plant nurseries or plant society.

If you require information on how to care for fire damaged trees, refer to the Firewise brochure *Trees and Fire Resistance; Regeneration and care of fire damaged trees*.

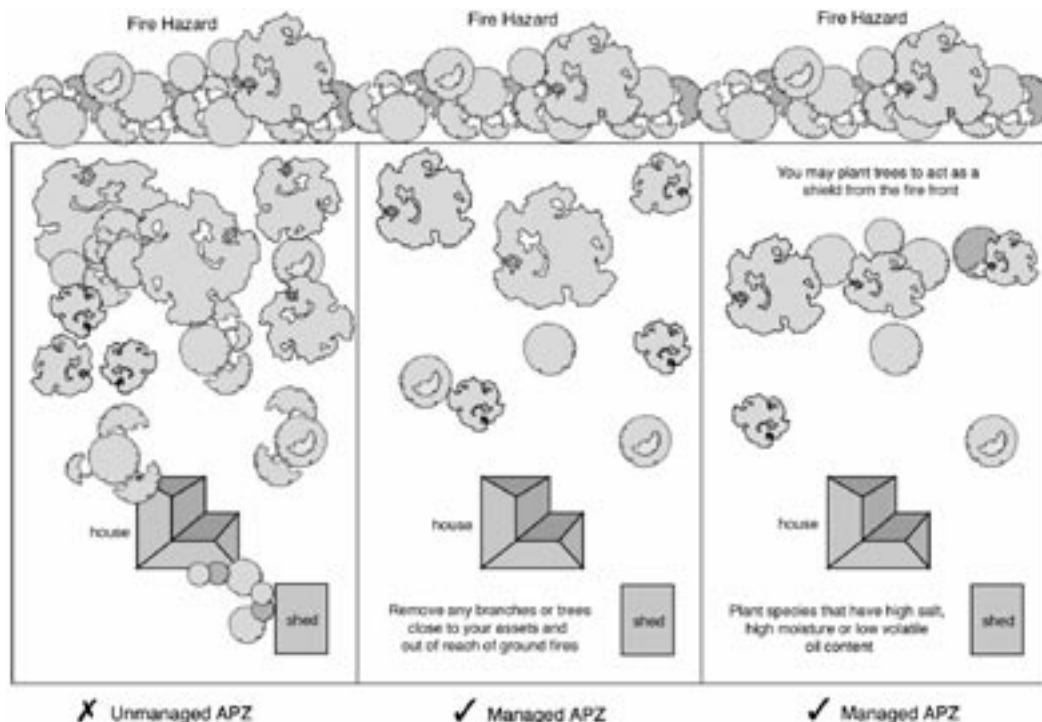
WIND BREAKS

Rows of trees can provide a wind break to trap embers and flying debris that could otherwise reach the house or asset.

You need to be aware of local wind conditions associated with bush fires and position the wind break accordingly. Your local RFS Fire Control Centre can provide you with further advice.

When choosing trees and shrubs, make sure you seek advice as to their maximum height. Their height may vary depending on location of planting and local conditions. As a general rule, plant trees at the same distance away from the asset as their maximum height.

When creating a wind break, remember that the object is to slow the wind and to catch embers rather than trying to block the wind. In trying to block the wind, turbulence is created on both sides of the wind break making fire behaviour erratic.



HOW CAN I FIND OUT MORE?

The following documents are available from your local Fire Control Centre and from the NSW RFS website at www.rfs.nsw.gov.au.

- Before You Light That Fire
- Standards for Low Intensity Bush Fire Hazard Reduction Burning
- Standards for Pile Burning
- Application Instructions for a Bush Fire Hazard Reduction Certificate

If you require any further information please contact:

- your local NSW Rural Fire Service Fire Control Centre. Location details are available on the RFS website or
- call the NSW RFS Enquiry Line 1800 679 737 (Monday to Friday, 9am to 5pm), or
- the NSW RFS website at www.rfs.nsw.gov.au.

**Produced by the NSW Rural Fire Service, Locked Mail Bag 17,
GRANVILLE, NSW 2142. Ph. 1800 679 737**

www.rfs.nsw.gov.au

Appendix IV

Bushfire Environmental Assessment Code for NSW

BUSH FIRE ENVIRONMENTAL ASSESSMENT CODE

for

New South Wales

February 2006

NSW RURAL FIRE SERVICE

...for our community



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Bush Fire Environmental Assessment Code for New South Wales

Part 1 Preliminary

1.1 Title

This is the *Bush Fire Environmental Assessment Code for New South Wales* (the “Code”).

1.2 Commencement

This Code is to commence on the 1st day of February 2006.

1.3 Dictionary and definitions

Words that are defined in the Dictionary at the end of this Code have the meanings given to them by the Dictionary.

Expressions defined in section 100A of the *Rural Fires Act 1997* also have the meaning so defined.

A definition within the Dictionary of the *Rural Fires Act 1997* applies to this Code, except where defined in the Dictionary at the end of this Code.

1.4 Purpose

The purpose of this Code is to provide a streamlined environmental assessment process for use by issuing authorities and certifying authorities in determining bush fire hazard reduction certificates (“certificates”).

It is a requirement of section 100J of the *Rural Fires Act 1997* that the Commissioner, in preparing this Code, has regard to:

- (a) the principles of ecological sustainable development, and
- (b) considerations under section 111 of the *Environmental Planning & Assessment Act 1979*.

1.5 Authority

This Code has been prepared pursuant to sections 100J to 100N of the *Rural Fires Act 1997*.

1.6 Bush fire hazard reduction certificates by issuing authorities

An issuing authority may issue a certificate under section 100F of the *Rural Fires Act 1997* for bush fire hazard reduction work on private land or any other land not covered by a certifying authority. Local authorities are issuing authorities for certificates. In most cases, local authorities have conferred the function to issue certificates on the Commissioner of the NSW Rural Fire Service under section 12A of the *Rural Fires Act 1997*.

In the case of multiple land tenures for one hazard reduction activity, one certificate can be issued to cover that activity, provided the activity has the written consent of all land owners or occupiers.

1.7 Bush fire hazard reduction certificates by certifying authorities

A certifying authority may issue a certificate under section 100G of the *Rural Fires Act 1997* for bush fire hazard reduction work on land as described in Table 1.1.

Land	Certifying Authority
Any land where the work is directed by the Commissioner of the NSW Rural Fire Service	Commissioner of the NSW Rural Fire Service
Any land that is vested in or under the control of a local authority	The local authority for the area in which the land is situated
Unoccupied Crown land	Department of Lands
Land that is dedicated or reserved, or acquired for the purpose of reservation under the <i>Forestry Act 1916</i>	Forests NSW
Land that is dedicated or reserved, or acquired for the purpose of dedication or reservation under the <i>National Parks and Wildlife Act 1974</i>	Department of Environment and Conservation (Parks and Wildlife Division)
Land that is vested in or under the control of RailCorp	RailCorp
Land that is vested in or under the control of the Rail Infrastructure Corporation	Rail Infrastructure Corporation
Land that is vested in or under the control of the Roads and Traffic Authority	Roads and Traffic Authority
Land that is within the catchment area of a water authority	The water catchment authority of that land

Table 1.1 Land under the control of certifying authorities

1.8 Application for a bush fire hazard reduction certificate

An application for a certificate for work to be carried out on private land, or land not covered by a certifying authority, must be made to the issuing authority in writing in accordance with clause 47 of the *Rural Fires Regulation 2002*. Application forms complying with this are available from the Rural Fire Service.

1.9 Charges

Under section 100F of the *Rural Fires Act 1997* there is no charge for an application for or issue of a certificate.

1.10 Duration of a certificate

Under section 100I of the *Rural Fires Act 1997* a certificate becomes effective and operates for a period of 12 months commencing on the date endorsed on the certificate.

1.11 Refusal to issue and right of appeal

Under section 100F of the *Rural Fires Act 1997* there is no right of appeal against a determination of, or a failure or refusal to determine an application for a certificate. A person may seek approval, consent or other authorisation for bush fire hazard reduction work under relevant environmental legislation, even if an issuing authority has refused or failed to issue a certificate.

1.12 Reporting

Certificates must be recorded within the Bush Fire Risk Information Management System (BRIMS) for the purpose of reporting under section 74 of the *Rural Fires Act 1997*.

The holder of a certificate must advise the issuing authority within 7 days of completing the work specified within the certificate.

1.13 Enforcement

In the event that a person fails to comply with a condition or requirement of a certificate, the work carried out may be subject to enforcement action under the provisions of the environmental legislation offended by the work, as if that certificate had not been issued. That is, legal action is not taken to remedy or restrain a breach of a certificate, but rather the failure to obtain the required consent or approval.

Under section 100H of the *Rural Fires Act 1997* any person may bring proceedings in the Land and Environment Court for an order to remedy or restrain a breach of a Certificate.

1.14 Review

This Code will be reviewed by the Commissioner of the NSW Rural Fire Service within 5 years of operation and amended in accordance with section 100O of the *Rural Fires Act 1997* if required.

1.15 Revocation of Code

The *Bush Fire Environmental Assessment Code for Asset Protection and Strategic Fire Advantage Zones*, July 2003 is revoked.

Part 2 Determination of a Bush Fire Hazard Reduction Certificate

2.1 Process of determination

A certificate must not be issued unless a bush fire risk management plan applies to the land.

2.2 Time to determine an application

Determination of an application for a certificate must be completed within 7 days, or a longer period if agreed to by the applicant, after lodgement of the application, in accordance with clause 1.8.

2.3 Land excluded from the Code

For the purposes of section 100A of the *Rural Fires Act 1997*, the following lands are “excluded lands” and a certificate cannot be issued for work on that land under this Code:

- (a) land to which *State Environmental Planning Policy No 14—Coastal Wetlands* applies,
- (b) land to which *State Environmental Planning Policy No 26—Littoral Rainforests* applies,
- (c) land declared by the Minister for the Environment under section 47 of the *Threatened Species Conservation Act 1995* to be critical habitat,
- (d) land within Lord Howe Island, or
- (e) any other land prescribed by the regulations.

Under section 100C(5) of the *Rural Fires Act 1997*, a certificate cannot be issued on land to which an integrated forestry operations approval within the meaning of the *Forestry and National Park Estate Act 1998* applies.

2.4 Land on which the Code is restricted

A certificate cannot be issued for the following land categories, except where works involve only the manual removal of noxious or environmental weeds (as defined within clause 4.9) in accordance with Part 4:

- (a) the following vegetation formations (as defined in Keith 2004):
 - rainforests,
 - saline wetlands,
 - freshwater wetland classes: montane bogs and fens, coastal freshwater lagoons, montane lakes,
 - alpine complex,
- (b) wetlands of international significance under the RAMSAR Convention,
- (c) a wilderness area within the meaning of the *Wilderness Act 1987*, or
- (d) coastal dune vegetation within 100 metres of the mean high water mark.

2.5 Activities to which the Code does not apply

A certificate cannot be issued for the following activities:

- (a) the construction and/or maintenance of a track, trail or road,
- (b) agricultural activities that do not have an existing requirement for environmental assessment, such as stubble burning, burning of sugar cane and diseased crops,
- (c) vegetation clearing other than for bush fire hazard reduction work,
- (d) burning of:
 - green garden waste,
 - construction and industrial waste, or
 - other rubbish,
- (e) burning of windrows resulting from any purpose (e.g. clearing for development or agriculture) other than plantation operations as per clause 3.3.1 and 3.4.1,
- (f) burning for bush regeneration or ecological purposes.

2.6 Existing land management agreements

If any of the following land management agreements have been entered into, the conditions on the certificate must not be inconsistent with that agreement:

- (a) any conservation agreement entered into under Division 12 of Part 4 of the *National Parks and Wildlife Act 1974*,
- (b) any property agreement entered into under Part 5 of the *Native Vegetation Conservation Act 1997*,
- (c) any Trust Agreement entered into under Part 3 of the *Nature Conservation Trust Act 2001*,
- (d) any property management plan approved by the Director-General of National Parks and Wildlife under section 91 of the *Threatened Species Conservation Act 1995*, or
- (e) any Property Vegetation Plan agreement entered into under Part 4 of the *Native Vegetation Act 2003*.

2.7 Previous development consents and approvals

If a development consent under the *Environmental Planning & Assessment Act 1979* has been granted for the land on which the work is proposed and the consent allows for the provision of an asset protection zone or other bush fire protection measure and the proposed work is in accordance with the consent, a certificate is not required.

A certificate must not be inconsistent with the provisions of any current development consent. In particular, a certificate must not allow damage to vegetation contrary to the conditions of a consent.

A certificate must not be inconsistent with a permit issued under Part 3A of the *Rivers and Foreshores Improvement Act 1948* or an authorisation under the *Plantations and Reafforestation Act 1999*.

2.8 Owners consent to undertake bush fire hazard reduction work

Under section 100F of the *Rural Fires Act 1997*, any application to an issuing authority for a certificate must include the written consent of all owners or occupiers of the land upon which the work is proposed to be undertaken.

Part 3 Type of Hazard Reduction

3.1 Purpose of works

The work must be for the purpose of bush fire hazard reduction. This Code only covers work as defined in clauses 3.2, 3.3 and 3.4.

The work must be carried out in accordance with a bush fire risk management plan that applies to the land.

3.2 Asset Protection Zones (APZ)

Asset Protection Zones provide fuel reduced areas around assets or groups of assets which are adjacent to bush fire hazards. APZs generally contain highly modified vegetation to reduce the radiant heat impact during a fire, and provide a defensible space to allow residents and fire fighters to operate after the passage of the fire front.

An APZ alone may not provide complete protection, and should be accompanied by appropriate building construction and maintenance, and may also be complemented with a strategic fire advantage zone.

This Code covers Asset Protection Zones for:

- residential buildings,
- special fire protection buildings (as defined in section 100B of the *Rural Fires Act 1997*; e.g. schools, hospitals, retirement villages),
- major buildings (such as communication towers, farm sheds, hay sheds, machinery sheds, industrial buildings, commercial buildings),
- plantations, and
- boundary fences (being a fence erected on the boundary separating land owned by different persons/agencies).

The area and extent of work permissible for an APZ must be described as a condition within the certificate, or a map defining the boundaries and extent of work permissible for an APZ must be attached to the certificate.

3.2.1 Maximum extent of work permissible within an APZ

3.2.1.1 Residential and special fire protection buildings

The maximum extent of work for residential and special fire protection buildings must be no greater than the distances specified in Table 3.1.

All distances are measured in the horizontal plane from the edge of the building.

Slope	Distance
Hazard upslope	20 metres
Hazard downslope <10°	20 metres
Hazard downslope 10°-15°	30 metres
Hazard downslope >15°	40 metres

Table 3.1 Maximum APZ widths for residential and special fire protection buildings

3.2.1.2 Major buildings

The maximum extent of work for major buildings must be no greater than 20 metres, as measured in the horizontal plane from the edge of the building.

3.2.1.3 Boundary fences

The maximum width of work along a boundary fence must be no greater than 6 metres on each side of the fence. Work must not involve the removal of native vegetation older than 10 years.

3.2.1.4 Plantations

Work is only permissible within the boundaries of the plantation or for the maintenance of existing slashed breaks. The maximum extent of work for plantations must be no greater than 30 metres. Work must not involve the mechanical removal of native vegetation that has been retained to be managed for biodiversity outcomes as part of a plantation authorisation under Division 6 of the *Plantations and Reafforestation (Code) Regulation 2001*.

3.2.2 Work permissible within an APZ

Only the following works are permissible within an APZ:

- (a) Mechanical work for the maintenance or establishment of APZs in accordance with the requirements of Part 4.
- (b) Pruning and tree removal in accordance with the requirements of Part 4.
- (c) Prescribed burning in accordance with the requirements of Part 5.
- (d) Construction of control lines in accordance with the requirements of Part 5.
- (e) Pile burning for disposal of vegetation material removed during APZ or SFAZ works, only where the material in the pile cannot be disposed of by the normal garbage collection or be composted on site. Evidence of approval (a certificate or any approval, consent or authorisation otherwise required) for the collection of the material forming the pile must be presented before a certificate can be issued to burn a pile. Works must be assessed in accordance with the requirements of clauses 5.1, 5.2, 5.4, 5.6, 5.7, 5.8 and 5.9.

3.3 Strategic Fire Advantage Zones (SFAZ)

Strategic Fire Advantage Zones are land that is mapped or described as such in a bush fire risk management plan.

Where a plantation is identified within a bush fire risk management plan, and a SFAZ is described in the text of the plan, SFAZ works by low intensity prescribed burning are permissible up to the first natural/existing containment line within 1000 metres of the boundary of the plantation.

A SFAZ is intended:

- to provide fuel reduced areas which enable the protection of assets by firefighters when asset protection zones are not in place,
- to complement asset protection zones where these do not provide adequate protection,
- to provide strategically located fuel reduced areas to reduce the potential for large wildfires to develop,
- to provide areas where fire can more easily be suppressed, or
- to provide strategically located fuel reduced areas to reduce vulnerability of assets which are susceptible to fire.

A map defining the boundaries and extent of permissible work for a SFAZ must be attached to the certificate.

3.3.1 Work permissible within a SFAZ

Only the following works are permissible within a SFAZ:

- (a) Mechanical work along existing linear fire breaks that are identified in a bush fire risk management plan, or up to a maximum of 6 metres from boundary fences. Works must not involve the removal of native vegetation older than 10 years. Works must be assessed in accordance with the requirements of Part 4.
- (b) Prescribed burning in accordance with the requirements of Part 5.
- (c) Construction of control lines in accordance with the requirements of Part 5.
- (d) Pile burning for disposal of vegetation material removed during APZ or SFAZ works, only where the material in the pile cannot be disposed of by the normal garbage collection or be composted on site. Evidence of approval (a certificate or any approval, consent or authorisation otherwise required) for the collection of the material forming the pile must be presented before a certificate can be issued to burn a pile. Works must be assessed in accordance with the requirements of clauses 5.1, 5.2, 5.4, 5.6, 5.7, 5.8 and 5.9.
- (e) Windrow burning for disposal of windrows created as part of plantation operations (as defined in the *Plantations and Reafforestation Act 1999*). Evidence of approval to create the windrow must be presented before a certificate can be issued to burn a windrow. Works must be assessed in accordance with the requirements of Part 5.

3.4 Land Management Zones (LMZ)

Land Management Zones are land that is mapped or described as such in a bush fire risk management plan.

Hazard reduction in a LMZ should aim to achieve fire protection objectives by providing a mosaic of areas with varying fuel load structures within the landscape. A mosaic pattern provides areas of lower fuel loads where suppression efforts are safer and have a greater chance of success. LMZs should be managed so as to provide optimum fire frequencies required for the maintenance of biodiversity.

A map defining the boundaries and extent of permissible work for a LMZ must be attached to the certificate.

3.4.1 Work permissible within a LMZ

Only the following works are permissible within a LMZ:

- (a) Prescribed burning in accordance with the requirements of Part 5.
- (b) Construction of control lines in accordance with the requirements of Part 5.
- (c) Windrow burning for disposal of windrows created as part of plantation operations (as defined in the *Plantations and Reafforestation Act 1999*). Evidence of approval to create the windrow must be presented before a certificate can be issued to burn a windrow. Works must be assessed in accordance with the requirements of Part 5.

Part 4 Mechanical Hazard Reduction

4.1 Land to which mechanical works do not apply

A certificate can not be issued for mechanical works (other than hand tool control lines) in land supporting isolated areas of vegetation including:

- (a) any isolated area of vegetation less than 1 hectare in size that is separated from any other area of vegetation larger than one hectare by a distance of at least 100 metres, or
- (b) strips of vegetation less than 20 metres wide associated with a linear feature such as a road, rail, river or stream corridor.

4.2 Standards to prevent soil erosion and instability

Mechanical works that result in an exposed soil surface render the ground vulnerable to erosion. To minimise soil erosion, at least 75% ground cover should be retained as described in the RFS document *Standards for Asset Protection Zones*. In areas to be maintained permanently as APZs, a suitable groundcover (e.g. short grass cover) is to be established.

4.2.1 Standards for soil erosion and instability where maps of Soil Erosion Risk are available

A certificate may only be issued where works are consistent with the requirements of the relevant mapped Soil Erosion Risk classification as specified in Tables 4.1 and 4.2.

Where land is mapped as susceptible to mass movement, works must be consistent with the relevant conditions specified in Tables 4.1 and 4.2.

Soil Erosion Risk (tonnes/ha/yr)	Use of hand tools and hand held machinery	Use of slashing machinery	Use of graders, ploughs and dozers Note that slashing is preferred	Removal and pruning of trees
0-40	Permitted	Permitted	All topsoil must remain on the soil surface	Permitted
40-80	Permitted	Permitted	All topsoil must remain on the soil surface Where possible, machinery work must be conducted parallel to contours	Permitted
80-150	Permitted	Vegetation must not be slashed below 5 cm Retain slashed vegetation to ensure that at least 90% ground cover is maintained	Not permitted	Root structure of removed trees must be left undisturbed
150-220	Permitted	Vegetation must not be slashed below 10 cm Retain slashed vegetation to ensure that at least 90% ground cover is maintained	Not permitted	Only pruning of trees permissible, 75% of original canopy cover must be retained
Over 220 or land mapped as susceptible to mass movement	Permitted	Not permitted	Not permitted	Only pruning of trees permissible, 75% of original canopy cover must be retained

Table 4.1 Works permissible within APZs

Soil Erosion Risk (tonnes/ha/yr)	Use of hand tools and hand held machinery	Use of slashing machinery	Use of graders, ploughs and dozers
0-40	Permitted	Permitted	All topsoil must remain on the soil surface
40-80	Permitted	Vegetation must not be slashed below 5 cm	All topsoil must remain on the soil surface Where possible, machinery work must be conducted parallel to contours There must be a time interval of 2 years between successive work
80-150	Permitted	Vegetation must not be slashed below 5 cm Retain slashed vegetation to ensure that at least 90% ground cover is maintained	Not permitted
150-220	Permitted	Vegetation must not be slashed below 10 cm Retain slashed vegetation to ensure that at least 90% ground cover is maintained	Not permitted
Over 220 or land mapped as susceptible to mass movement	Permitted	Not permitted	Not permitted

Table 4.2 Works permissible within SFAZs

4.2.2 Standards for soil erosion and instability where maps of Soil Erosion Risk are not available

4.2.2.1 Use of hand tools and hand held machinery

- Permissible on all slopes.

4.2.2.2 Use of slashing machinery

- Not permitted on slopes greater than 18°.
- On slopes greater than 10° slashing must not leave vegetation shorter than 10 cm from the ground surface.

Note: the operation of machinery on slopes greater than 15° may be unsafe.

4.2.2.3 Use of graders, ploughs and dozers

- Not permitted on slopes greater than 10°.
- Machinery work must not reshape the soil surface or result in re-direction of surface water runoff.
- All topsoil must remain on the soil surface.
- Machinery work should be conducted parallel to contours.

4.2.2.4 Tree removal and pruning

- Only permitted within APZs.
- Where trees are removed on slopes greater than 10°, the root structure must be left undisturbed.
- Tree removal is not permitted on slopes greater than 18°.
- Pruning is only permitted on slopes greater than 18° if at least 75% of the original canopy cover is retained.

4.3 Standards for the protection of riparian buffers

Mechanical work must be excluded from all vegetation adjacent to a water body (i.e. the riparian buffer zone) within the distances specified in Tables 4.3 and 4.4. The distance (metres) is measured from the highest bank or shore (or mean high water for tidal waters) on either side of the water body.

The riparian buffer zones do not apply to APZ works within the following vegetation classes of Keith (2004): coastal heath swamps, coastal swamp forests and coastal floodplain wetlands.

Water body	Use of hand tools and hand held machinery	Use of slashing machinery	Use of graders, ploughs and dozers	Removal of trees
1 st Order and unmapped streams	5	5	10	5
2 nd Order Streams; Wetlands, Lakes and Lagoons greater than or equal to 0.1 ha but less than 0.5 ha	5	10	15	10
3 rd Order Streams; Wetlands, Lakes and Lagoons greater than or equal to 0.5 ha but less than 2 ha	10	15	20	15
4 th Order Streams & greater; Estuaries; Wetlands, Lakes and Lagoons greater than or equal to 2 ha	10	20	20	20

Table 4.3 Riparian buffer zones for APZs (metres)

Water body	Use of hand tools and hand held machinery	Use of slashing machinery	Use of graders, ploughs and dozers
1 st Order and unmapped streams	5	5	10
2 nd Order Streams; Wetlands, Lakes and Lagoons greater than or equal to 0.1 ha but less than 0.5 ha	5	10	20
3 rd Order Streams; Wetlands, Lakes and Lagoons greater than or equal to 0.5 ha but less than 2 ha	10	15	30
4 th Order Streams and greater; Estuaries; Wetlands, Lakes and Lagoons greater than or equal to 2 ha	15	20	40

Table 4.4 Riparian buffer zones for SFAZs (metres)

4.4 Standards for the protection of native vegetation

The following criteria apply to tree removal/pruning works for the creation and/or maintenance of an APZ:

- Any part of a tree within 5 metres of the building may be removed (this may involve pruning of the tree, rather than total removal).
- The canopy throughout the APZ should be discontinuous. Tree crowns may be separated by a maximum of 5 metres (this may involve pruning of trees, rather than total removal).
- Skirting (the removal of lower branches) to separate the tree canopy from the ground or understorey vegetation should be used in preference to tree removal where appropriate.
- Any pruning or branch removal must be carried out in accordance with the Rural Fires Service *Standards for Asset Protection Zones* or AS 4373—1996 *Pruning of amenity trees*.

In selecting trees for removal:

- Species that are listed by the local authority as noxious or environmental weeds should be removed in preference to other species.
- Non-native woody plants should be removed in preference to native species.
- Species with rough, flaky or stringy bark should be removed in preference to those with smooth or tightly held bark.
- Small trees without hollows should be removed in preference to larger trees and trees with hollows.
- Locally common species should be removed in preference to species listed by the local authority as regionally significant, or valuable for habitat or food source.
- Trees that have been determined to be dangerous by the local authority should be removed in preference to other trees.

4.5 Standards for the protection of biodiversity

4.5.1 Determining presence of threatened species, populations or ecological communities

The Threatened Species Hazard Reduction Map must be used to determine if threatened species, populations or ecological communities are present at the site. In addition, a certifying authority must determine the likely presence or otherwise of any threatened species, populations or ecological communities from such data, reports or papers available to the certifying authority.

4.5.2 Determining management conditions from the Threatened Species Hazard Reduction List

Where threatened species, populations or ecological communities are identified by the Threatened Species Hazard Reduction Map (and by other means in the case of certifying authorities) as present at the site, then the management actions identified within the Threatened Species Hazard Reduction List must be imposed as a condition of the certificate.

4.5.3 Modifying management conditions from the Threatened Species Hazard Reduction List

4.5.3.1 Modifying management conditions for issuing authorities

Where conditions on the Threatened Species Hazard Reduction List would prevent the works, an issuing authority may proceed to assess the certificate if a licence under Section 91 (or a certificate under Section 95(2)) of the *Threatened Species Conservation Act 1995* has been issued by DEC. The conditions in the s91 licence (or s95(2) certificate) must be imposed.

4.5.3.2 Modifying management conditions for certifying authorities

Where conditions on the Threatened Species Hazard Reduction List would prevent the works, a certifying authority may proceed to assess the certificate in the following circumstances:

- (a) If a site inspection (under the DEC *Threatened Biodiversity Survey and Assessment Guidelines for Developments and Activities*) indicates that the species, population or ecological community of concern, or their habitat, is not likely to occur at the site, or
- (b) If a site assessment/inspection (under the DEC *Threatened Biodiversity Survey and Assessment Guidelines for Developments and Activities*) indicates that the location of the species, population or ecological community of concern or their habitat is such that the conditions can be modified to protect the species. The principles of making such a modification to the conditions are detailed in the explanatory notes of the Threatened Species Hazard Reduction List and must be followed, or
- (c) If a licence under Section 91 (or a certificate under Section 95(2)) of the *Threatened Species Conservation Act 1995* has been issued by DEC. The conditions in the s91 licence (or s95(2) certificate) must be imposed.

4.6 Standards for the protection of Aboriginal heritage

4.6.1 Determining presence of Aboriginal heritage sites

4.6.1.1 Determining presence for issuing authorities

The issuing authority must refer the application to the DEC (Cultural Heritage Division) in the following circumstances:

- slashing areas not previously subject to slashing, trittering, removal of many trees, or earthworks,
- trittering areas not previously subject to trittering, significant tree removal, or earthworks, or
- removal of trees greater than 100 cm diameter at breast height.

The issuing authority must provide the DEC with a full copy of the applicant's application for a certificate, and any other relevant information held by the issuing authority necessary to ascertain the location of the proposed hazard reduction work (e.g. maps).

The DEC will provide information within 3 working days, detailing any Aboriginal sites of concern. The 3 working day turn around does not commence until receipt of the documents (as specified above) by the DEC. If the DEC does not meet the 3 working day turn around then the issuing authority may proceed to issue the certificate.

4.6.1.2 Determining presence for certifying authorities

Certifying authorities that do not have a data licence agreement must refer the proposal details to the DEC (Cultural Heritage Division) in the circumstances described in 4.6.1.1.

The DEC will provide information within 3 working days, detailing any Aboriginal sites of concern. The 3 working day turn around does not commence until receipt of the documents by the DEC. If the DEC does not meet the 3 working day turn around then the certifying authority must consult with DEC before proceeding with the certificate.

Certifying authorities that have a data licence agreement in place with the DEC are not required to refer to the DEC (for the areas subject to the licence agreement).

4.6.2 Determining management conditions for Aboriginal heritage

Where Aboriginal heritage sites are indicated to be present, then hazard reduction works must be undertaken in accordance with the relevant conditions specified in the RFS/DEC document *Conditions for Hazard Reduction and Aboriginal Heritage*.

4.7 Standards for the protection of other cultural heritage

If there is a site on the national, state or local heritage register that may be affected by the proposed work, conditions must be imposed to protect the site. Such conditions must be consistent with the RFS/NSW Heritage Office document *Guidelines for Bush Fire Hazard Reduction Works Affecting Heritage Items*.

4.8 Standards for the protection of significant environmental protection areas

If there are any environmental protection areas zoned within the local environmental plan (LEP) or plan of management relevant to the area of proposed work, conditions must be imposed to ensure the works are consistent with the objectives of the zone/plan to protect the environmental values of the area.

4.9 Standards relating to weeds

If there are species listed by the local authority as noxious or environmental weeds within the area where work is proposed, conditions must be imposed to prevent the spread of weeds.

Herbicides can only be used within this Code for removing weeds.

Herbicides cannot be used within 100 metres of the known location of any species listed in the Threatened Species Hazard Reduction List, unless the List states otherwise. The use of herbicides near water bodies must not be undertaken if likely to result in water pollution

Where herbicides are to be used, conditions must be imposed that the user is required to:

- use only herbicides registered by the Australian Pesticides and Veterinary Medicines Authority (www.apvma.gov.au) that are approved for the intended situation of use,
- strictly adhere to any directions on the label,
- operate in accordance with Weed CRCs Best Practices Management Guidelines,
- not risk injury to persons, property and non-target plants and animals through the use of a herbicide,
- use in accordance with the requirements of the *Pesticides Act 1999*, and the *Protection of Environment (Operations) Act 1997*, and
- operate in accordance with the *Noxious Weeds Act 1993*.

Part 5 Hazard Reduction using Prescribed Burning

5.1 Land to which burning does not apply

A certificate cannot be issued for prescribed burning (including burning of piles and windrows) on:

- (a) land that contains peat soils, or
- (b) land that is mapped or described as a fire exclusion zone in a bush fire risk management plan.

5.2 Type of burn

- A certificate cannot be issued for high intensity prescribed burning in forest, woodland or wetland vegetation formations (as defined in Keith 2004).
- A certificate cannot be issued for moderate or high intensity prescribed burning in land supporting isolated areas (as defined in clause 4.1) of forest, woodland or wetland vegetation formations.
- Low intensity prescribed burning must be conducted in accordance with the NSW Rural Fire Service *Standards for Low Intensity Bush Fire Hazard Reduction Burning*.
- All prescribed burning in grasslands must be conducted in accordance with the NSW Rural Fire Service *Standards for Low Intensity Bush Fire Hazard Reduction Burning*.
- Moderate intensity prescribed burning must be conducted with a fire fighting agency in attendance and in accordance with an agency approved burn plan (except in grassland).
- High intensity prescribed burning (in heathland or shrubland vegetation formations of Keith 2004) must be conducted with a fire fighting agency in attendance and in accordance with an agency approved burn plan.
- Pile burning must be conducted in accordance with the NSW Rural Fire Service *Standards for Pile Burning*.
- Windrow burning must be conducted in accordance with the requirements of the *Plantations and Reafforestation (Code) Regulation 2001* and the NSW Rural Fire Service *Standards for Windrow Burning*.

5.3 Construction of control lines

Prescribed burns must be contained within planned control lines. The closest natural/existing containment lines to the intended perimeter of the burn should be used where available. Construction of additional control lines must be limited to the minimum extent necessary to carry out the burn safely. The width of a control line must not exceed 4 metres.

Construction of control lines is only permitted where works are consistent with the requirements of the relevant mapped Soil Erosion Risk as specified in Table 5.1. Where maps of Soil Erosion Risk are not available works must be consistent with the requirements of clause 4.2.2.

Where land is mapped as susceptible to mass movement, works must be consistent with the relevant conditions specified in Table 5.1.

Soil Erosion Risk (tonnes/ha/yr)	Use of hand tools and hand held machinery	Use of slashing machinery	Use of graders, ploughs and dozers	Tree removal
0-40	Permitted	Permitted	Permitted in APZ and SFAZ only	Permitted in APZ only
40-80	Permitted	Permitted in SFAZ and APZ only	Permitted in APZ only	Permitted in APZ only
80-150	Permitted	Permitted in APZ only	Not permitted	Not permitted
150-220	Permitted	Not permitted	Not permitted	Not permitted
Over 220 or land mapped as susceptible to mass movement	Permitted	Not permitted	Not permitted	Not permitted

Table 5.1 Conditions for control line construction where Soil Erosion Risk maps are available

Control lines must be constructed in a manner that minimises the potential for soil erosion. Control lines should be constructed where native vegetation has already been disturbed, in preference to undisturbed vegetation. Conditions must be imposed that control lines constructed through native vegetation in SFAZs and LMZs must be allowed to regenerate following the burn.

Control lines that run parallel to a water body must not be constructed within the riparian buffer distances specified in Table 4.3. Control lines may be constructed within riparian buffers where they are constructed perpendicular to a stream. Drainage structures must be constructed between 5 and 20 metres of the highest bank of the stream.

Drainage structures (such as crossbanks and culverts) must be constructed at 50 metre intervals under the following circumstances:

- (a) where the Soil Erosion Risk is greater than 80 (t/ha/yr) (or slope greater than 18° where soil erosion risk maps are not available), and
- (b) the control line will be perpendicular to the contour, and
- (c) the control line will be greater than 1 metre wide.

Construction of drainage structures must be conducted in accordance with the NSW Rural Fire Service *Standards for Low Intensity Bush Fire Hazard Reduction Burning*.

5.4 Standards for the protection of biodiversity – threatened species

5.4.1 Determining presence of threatened species, populations or ecological communities

The Threatened Species Hazard Reduction Map must be used to determine if threatened species, populations or ecological communities are present at the site. In addition, a certifying authority must determine the likely presence or otherwise of any threatened species, populations or ecological communities from such data, reports or papers available to the certifying authority.

5.4.2 Determining management conditions from the Threatened Species Hazard Reduction List

Where threatened species, populations or ecological communities are identified by the Threatened Species Hazard Reduction Map (and by other means in the case of certifying authorities) as present at the site, then the management actions identified within the Threatened Species Hazard Reduction List must be imposed as a condition of the certificate.

5.4.3 Modifying management conditions from the Threatened Species Hazard Reduction List

5.4.3.1 Modifying management conditions for issuing authorities

Where conditions on the Threatened Species Hazard Reduction List would prevent the works, an issuing authority may proceed to assess the certificate if a licence under Section 91 (or a certificate under Section 95(2)) of the *Threatened Species Conservation Act 1995* has been issued by DEC. The conditions in the s91 licence (or s95(2) certificate) must be imposed.

5.4.3.2 Modifying management conditions for certifying authorities

Where conditions on the Threatened Species Hazard Reduction List would prevent the works, a certifying authority may proceed to assess the certificate in the following circumstances:

- (a) If a site inspection (under the DEC *Threatened Biodiversity Survey and Assessment Guidelines for Developments and Activities*) indicates that the species, population or ecological community of concern, or their habitat, is not likely to occur at the site, or
- (b) If a site assessment/inspection (under the DEC *Threatened Biodiversity Survey and Assessment Guidelines for Developments and Activities*) indicates that the location of the species, population or ecological community of concern or their habitat is such that the conditions can be modified to protect the species. The principles of making such a modification to the conditions are detailed in the explanatory notes of the Threatened Species Hazard Reduction List and must be followed, or
- (c) If a licence under Section 91 (or a certificate under Section 95(2)) of the *Threatened Species Conservation Act 1995* has been issued by DEC. The conditions in the s91 licence (or s95(2) certificate) must be imposed.

5.5 Standards for the protection of biodiversity – fire regimes and fire interval thresholds

The issuing/certifying authority must determine the primary vegetation formation to be burned within the gross area proposed for hazard reduction burning, and apply the appropriate minimum fire interval. In situations where other vegetation formations occur as a significant proportion within the primary vegetation, then the appropriate fire interval must be addressed for these vegetation formations as well. The issuing/certifying authority must also consider sensitive vegetation communities (e.g. rainforest or wet sclerophyll forest gullies) and impose a condition on the certificate to ensure that the potential for burning these areas is minimised through appropriate implementation of the burn.

The issuing/certifying authority must determine the fire history of the site of proposed works from all records available to the issuing/certifying authority. Where no fire history is recorded for the site, the time since fire of the proposed burn area must be determined by a site inspection.

Where a burn for which a certificate has been issued is carried out but does not achieve the objectives of the burn, a further burn may be carried out within the terms of the certificate for any area that was identified within the certificate in order to achieve those objectives.

5.5.1 Fire interval thresholds from the Threatened Species Hazard Reduction List

If threatened species, populations or ecological communities were identified as present at the site in clause 5.4.1, a certificate may only be issued for prescribed burning in any management zone if the time since fire is longer than, or equal to, the fire interval required by the Threatened Species Hazard Reduction List (if specified).

5.5.2 Fire interval thresholds for APZs

A certificate may be issued for prescribed burning in an APZ regardless of fire interval, unless threatened species, populations or ecological communities are identified, as per clause 5.5.1.

5.5.3 Fire interval thresholds for SFAZs

A certificate may only be issued for prescribed burning in a SFAZ if the time since fire is longer than, or equal to, the minimum fire interval in the bush fire risk management plan. If the minimum fire interval requirements are not defined or adequately mapped in the bush fire risk management plan, a certificate may be issued if the time since fire is longer than, or equal to, the minimum fire interval for SFAZ in Appendix A.

5.5.4 Fire regime requirements for LMZs

If the minimum fire interval requirements are described within the bush fire risk management plan for land management zones, these are to be used in clauses 5.5.4.1 and 5.5.4.2. If the minimum fire interval requirements are not defined or adequately mapped in the bush fire risk management plan, the minimum fire intervals for LMZ in Appendix A are to be used in clauses 5.5.4.1 and 5.5.4.2.

5.5.4.1 Fire interval thresholds for LMZs

A certificate may only be issued for prescribed burning in a LMZ if either of the two conditions below can be met:

- (a) i The time since fire must be longer than, or equal to, the minimum fire interval for LMZ, and
- ii If the recorded fire history for the burn area includes more than the most recent fire then:
 - The time between the most recent fire and the fire preceding this must be longer than, or equal to, the minimum fire interval, or
 - If the time between the most recent fire and the fire preceding this was shorter than the minimum fire interval requirements, then the time since fire must be longer than, or equal to, the minimum fire interval multiplied by 1.5.
- (b) If the time since fire is less than the minimum fire interval for LMZ but longer than, or equal to, the minimum fire interval for SFAZ, then the time between the most recent fire and the fire preceding this must be recorded and be longer than, or equal to, the minimum fire interval for LMZ.

5.5.4.2 Landscape consideration of fire regime for LMZs

A certificate may only be issued for prescribed burning in a LMZ if:

- (a) within the area covered by the bush fire risk management plan, less than 50% of the dominant vegetation formation of the proposed burn area has been burnt within the last 24 months,
- (b) within a vegetation community identified as regionally significant, part of the community is to remain at a time since fire of at least equal to the minimum fire interval for LMZ,
- (c) within a known wildlife corridor, part of the area is to remain at a time since fire of at least equal to the minimum fire interval for LMZ, and
- (d) the landscape is being managed to maintain a mosaic of varying age structures.

5.6 Fire permits

The person acting on a certificate must ascertain whether at the proposed time of the burn a fire permit is required under section 87 or section 88 of the *Rural Fires Act 1997*. If a fire permit is required, this must be obtained prior to conducting the burn.

5.7 Notification of fire fighting authorities

The person acting on a certificate must give at least 24 hours notice prior to lighting the burn as follows:

- in a Rural Fire District, to the fire control officer,
- in a NSW Fire Brigade District, to the officer in charge of the fire station nearest the land on which the burn is to be conducted.

5.8 No Burn days

On making notification in clause 5.7, the person must ascertain from the local fire control officer or officer in charge of the nearest NSW Fire Brigade station whether:

- a No Burn Notice has been or is likely to be issued by the DEC, and
- if the proposed activity qualifies for an exemption from the No Burn Notice.

5.9 Standards relating to the effects of smoke

For the purpose of this Code:

- small fires are prescribed burns up to 1 hectare in size and pile burns
- large fires are prescribed burns greater than 1 hectare in size and windrow burns

5.9.1 Adjoining land and neighbouring residences

Conditions must be imposed that at least 24 hours notification of the intended date of the burn must be given to all adjoining landholders and:

- for a small fire, the owners/occupiers of any residential premises within 50 metres.
- for a large fire, the owners/occupiers of any residential premises within 200 metres.

5.9.2 Sensitive locations

Sensitive locations include schools, hospitals, residential aged care facilities, ventilation intakes (e.g. mine shafts), airports and the like.

If any of these locations are within 100 metres of a small fire or 1000 metres of a large fire, conditions must be imposed that:

- the owner/manager must be given at least 7 days notification of the intended date of the burn, and
- burning is to be carried out only when the facility is closed or not operating, or the prevailing or forecast weather patterns indicate that the wind will be blowing away from it.

Where circumstances warrant, for example local topography channels smoke, the distances specified above should be increased.

Consideration should be given to whether burning should be restricted to daylight hours.

5.9.3 Traffic

Where smoke has the potential to detrimentally affect traffic, conditions must be imposed requiring that the person acting on the certificate must:

- at least 2 weeks prior to the planned burn, liaise with police and the relevant road authority (RTA or Local Council) to determine when traffic conditions are likely to be most suitable to carry out the burn and any requirements for road safety and traffic management including public communications, signage, constraints on ingress and egress from the road carriageway,
- comply with any requirements so specified, unless those requirements are contrary to any other condition of the certificate, in which case the work cannot be conducted, and
- notify the relevant road authority (RTA or Local Council) 24 hours before the proposed burn if the conditions are such that the smoke will affect a nearby road.

5.9.4 Tourism

If tourism is significant in the area and identified in the bush fire risk management plan, conditions may be applied to the certificate to ensure that the planned timing of the burn takes into account visitation during peak holiday periods or during major sporting or community events and the need to minimise adverse impact.

5.9.5 Power Lines

If high voltage powerlines are located within the boundaries of the proposed burn, conditions must be imposed requiring that the person acting on the certificate must:

- at least 7 days prior to the planned burn, liaise with the electricity provider to determine when conditions are likely to be most suitable to carry out the burn and any safety requirements, and
- comply with any requirements so specified, unless those requirements are contrary to any other condition of the certificate, in which case the work cannot be conducted.

5.9.6 Significant bat colonies

If a significant bat colony identified by the DEC for the purpose of this Code is within 100 metres of a small fire or 1000 metres of a large fire, conditions must be imposed that the burn is to be carried out only when:

- the forecast weather conditions indicates that the wind will be blowing away from that area, or
- it is known that the colony is not present at the proposed time of the burn.

5.10 Standards to prevent soil erosion and instability

If a moderate intensity burn is being used, conditions must be imposed that the burn plan must include measures to ensure that moderate intensity fire is not used in areas mapped with a Soil Erosion Risk of greater than 150 (t/ha/yr). Where maps of Soil Erosion Risk are not available, the burn plan must include measures to ensure that moderate intensity fire is not used on soil surface slopes greater than 18°.

5.11 Standards for the protection of riparian buffers

No lighting of a prescribed burn is permitted within the riparian buffer zone distances specified in Table 5.2. No lighting of a windrow burn is permitted within 20 metres of any water body. The distance (metres) is measured from the highest bank or shore (or mean high water for tidal waters) on either side of the water body.

For prescribed burns being conducted near water bodies, all reasonable steps (excluding clearing vegetation and the use of foams or retardants) should be taken to ensure that the fire does not burn within the riparian buffer zone. Fires should be lit under conditions so that if they do burn within the riparian buffer zones they are patchy and low intensity.

Riparian buffer zone restrictions do not apply to prescribed burns within the following vegetation formations of Keith (2004): freshwater wetlands (excluding vegetation classes excluded under clause 2.4) and forested wetlands.

Water body	Riparian buffer zone width (metres)
1 st Order and unmapped streams	5
2 nd Order Streams; Wetlands, Lakes and Lagoons greater than or equal to 0.1 ha but less than 0.5 ha	5
3 rd Order Streams; Wetlands, Lakes and Lagoons greater than or equal to 0.5 ha but less than 2 ha	10
4 th Order Streams & greater; Estuaries; Wetlands, Lakes and Lagoons greater than or equal to 2 ha	20

Table 5.2 Riparian buffer zone widths for burning

5.12 Standards for the protection of Aboriginal heritage

5.12.1 Determining presence of Aboriginal heritage sites

5.12.1.1 Determining presence for issuing authorities

The issuing authority must refer the application to the DEC (Cultural Heritage Division) where burning is proposed in the following circumstances:

- unharvested native forest areas, and areas in asset protection zones not previously subject to burning, where there is a likelihood that scarred and carved trees exist, and
- land with known rocky outcrops, rock platforms or rock shelters, where there is a likelihood of artwork (especially painted art) existing.

The issuing authority must provide the DEC with a full copy of the applicant's application for a certificate, and any other relevant information held by the issuing authority necessary to ascertain the location of the proposed hazard reduction work (e.g. maps).

The DEC will provide information within 3 working days, detailing any Aboriginal sites of concern. The 3 working day turn around does not commence until receipt of the documents (as specified above) by the DEC.

If the DEC does not meet the 3 working day turn around then the issuing authority may proceed to issue the certificate.

5.12.1.2 Determining presence for certifying authorities

Certifying authorities that do not have a data licence agreement must refer the proposal details to DEC (Cultural Heritage Division) in the circumstances described in 5.12.1.

The DEC will provide information within 3 working days, detailing any Aboriginal sites of concern. The 3 working day turn around does not commence until receipt of the documents (as specified above) by the DEC. If the DEC does not meet the 3 working day turn around then the certifying authority must consult with DEC before proceeding with the certificate.

Certifying authorities that have a data licence agreement in place with the DEC are not required to refer to the DEC (for the areas subject to the licence agreement).

5.12.2 Determining management conditions for Aboriginal heritage

Where Aboriginal heritage sites are indicated to be present, then the hazard reduction works must be undertaken in accordance with the relevant conditions specified in the RFS/DEC document *Conditions for Hazard Reduction and Aboriginal Heritage*.

5.13 Standards for the protection of other cultural heritage

If there is a site on the national, state or local heritage register that may be affected by the proposed work, conditions must be imposed to protect the site. Such conditions must be consistent with the RFS/NSW Heritage Office document *Guidelines for Bush Fire Hazard Reduction Works Affecting Heritage Items*.

5.14 Standards for the protection of significant environmental protection areas

If there are any environmental protection areas zoned within the local environmental plan (LEP) or plan of management relevant to the area of proposed work conditions must be imposed to ensure the works are consistent with the objectives of the zone/plan to protect the environmental values of the area.

5.15 Standards relating to weeds

If there are species listed by the local authority as noxious or environmental weeds within the area where work is proposed, conditions must be imposed to prevent the spread of weeds.

Herbicides can only be used within this Code for removing weeds.

Herbicides cannot be used within 100 metres of the known location of any species listed in the Threatened Species Hazard Reduction List, unless the List states otherwise. The use of herbicides near water bodies must not be undertaken if likely to result in water pollution.

Where herbicides are to be used, conditions must be imposed that the user is required to:

- use only herbicides registered by the Australian Pesticides and Veterinary Medicines Authority (www.apvma.gov.au) that are approved for the intended situation of use,
- strictly adhere to any directions on the label,
- not risk injury to persons, property and non-target plants and animals through the use of a herbicide,
- operate in accordance with Weed CRCs Best Practices Management Guidelines,
- use in accordance with the requirements of the *Pesticides Act 1999*, and the *Protection of Environment (Operations) Act 1997*, and
- operate in accordance with the *Noxious Weeds Act 1993*.

Dictionary

approved burn plan means a prescribed burning plan approved by a fire fighting agency.

biodiversity means the variety of life forms, different species of plants, animals and micro-organisms, the genes they contain and the ecosystem they form.

boundary fence means a fence erected on the boundary separating land owned by different persons/agencies.

bush fire mosaics are areas within a landscape which have been or are planned to be burned at different times.

control line means a defined perimeter used to stop a fire escaping from a designated burn area.

drainage structure means any structure (such as a culvert, crossbank, mitre etc) that diverts the flow or potential flow of water onto a stable surface capable of handling concentrated flow (such as a vegetated or non-erosive surface).

fire interval means the length of time between successive fires on an area of land.

high intensity prescribed burning means the use of fire intended to result in the removal of a substantial portion of the shrub layer. On average flame heights will be greater than two metres and some canopy fire may occur.

Keith (2004) refers to David Keith, (2004) *Ocean Shores to Desert Dunes: the native vegetation of NSW and the ACT*. DIPNR (NSW) and NSW NPWS (DEC).

low intensity prescribed burning means the use of fire intended to result in the removal of the leaf litter, grass and shrub layer with minimal canopy scorching. Fires will be patchy and the actual area burnt may vary between 40% and 80%. The average flame height will be less than one metre. This can be achieved by lighting under conditions where a combination of some or all of following factors influence fire behaviour - low fuel loads, moist fuels, low temperatures, high humidity, low wind speeds and fire lighting patterns.

maintenance only includes work undertaken to ensure a structure or infrastructure retains its original function, and does not include upgrading for a higher level of use, nor includes work undertaken on areas which have not been maintained for more than 10 years.

mechanical work includes the use of:

- hand tools (e.g. rakes, hoes, leaf blowers)
- hand held machinery (e.g. brushcutters, domestic-size lawn mowers, chainsaws)
- slashing machinery (e.g. ride-on lawn mowers, slashers, triters, reach mower/flail head extensions)
- graders, dozers, and ploughs for removal of vegetation only, not earth-moving.

moderate intensity prescribed burning means the use of fire intended to result in the removal of a substantial portion of the shrub layer. On average flame heights will be between one and two metres and some canopy scorching may occur. These fires are often patchy and the moister creeks generally will not be burnt. This type of prescribed burning is generally used for hazard reduction to provide asset protection closer to the urban interface.

native vegetation means any indigenous vegetation as defined in section 6 of the *Native Vegetation Act 2003*.

natural/existing containment line means an existing feature that is adequate as a control line (e.g. a road, track, trail, watercourse, cleared area).

peat soils means soils containing a significant amount of peat at the surface, which may pose a bushfire threat upon drying out.

Planning for Bush Fire Protection means the document of that name as published and adopted for the time being by the NSW Government.

plantation is as defined in section 5 of the *Plantations and Reafforestation Act 1999*, where the area covered is greater than 30 hectares.

significant bat colonies are those areas identified by the DEC as being significant and for which current data is available.

Soil Erosion Risk (SER) means a classification given to an area of land from the DIPNR SER map. The SER map has been derived from soil regolith, rainfall erosivity and slope values.

stream means a natural or artificially enhanced channel down which surface water concentrates and flows that is identified on a 1:25,000 topographic map published by the Government (or if not published, the map of the finest scale so published) and classified as being perennial, intermittent or seasonal, or ephemeral where:

- a) perennial means a stream that flows continuously, these streams are generally associated with a water table in the localities through which they flow, and
- b) intermittent or seasonal means a stream that flows only in certain times of the year, and
- c) ephemeral means a stream that flows only in direct response to rainfall, and whose channel is mostly above the water table.

stream order means the ranked number given to a watercourse using the Strahler system.

time since fire means the length of time since an area of land was last burnt, as at the date of determining the certificate.

Threatened Species Hazard Reduction List means the document of that name (inclusive of Parts 1, 2 and 3) prepared by DEC and located on the RFS website. It includes a list of threatened species, populations and ecological communities and associated management conditions.

Threatened Species Hazard Reduction Map means the data layers containing localities of threatened species, populations and ecological communities prepared by DEC (or maps identified by DEC to be suitable) for the purpose of implementing the Threatened Species Hazard Reduction List.

tree means a perennial plant with one or more self-supporting trunks, which has:

- a) a height of 3 metres or more, or
- b) a branch spread of 3 metres or more, or
- c) at least one trunk with a girth of 300 millimetres or more at a height of 1.3 metres above ground level.

vegetation class is as defined in Keith (2004).

vegetation community means a vegetation assemblage specified within a vegetation map or report. It may or may not correlate directly with one of the vegetation classes specified within Keith (2004).

vegetation formation means a broad vegetation grouping, either as defined in Keith (2004) or as described within a bush fire risk management plan.

Weed CRCs Best Practices Management Guidelines are guidelines for bush regeneration weed management. They can be accessed at the Weed CRC website (www.weeds.crc.org.au)

wetland means any shallow body of water (such as marsh, billabong, swamp or sedgeland) that is inundated cyclically, intermittently or permanently with water.

windrow means a row of cut vegetation pushed up for clearing (for example timber which is pushed into lines for burning during a clearing operation) and includes post logging waste material.

water body means a natural water body, whether or not artificially modified that is identified on a 1:25,000 topographic map published by the Government (or if not published, the map of the finest scale so published), including:

- a) a lake, lagoon or wetland,
- b) a stream, or
- c) tidal waters including any bay, estuary or inlet.

Appendix A - Fire Interval Table for SFAZs and LMZs.

Vegetation Formation (and Chapter in Keith 2004)	Minimum fire interval for SFAZ (years)	Minimum fire interval for LMZ (years)
Rainforests (1)	No burning permitted	No burning permitted
Wet sclerophyll forests (shrubby subformation) (2)	25	30 Low intensity fire only
Wet sclerophyll forests (grassy subformation) (2)	10	15 Low intensity fire only
Grassy woodlands (3)	5	8
Grasslands (4)	2	3
Dry sclerophyll forests (shrub/grass subformation) (5)	5	8
Dry sclerophyll forests (shrubby subformation) (5)	7	10
Heathlands (6)	7	10
Alpine complex (7)	No burning permitted	No burning permitted
Freshwater wetlands (8) excluding classes excluded under 2.4	7	10
Forested wetlands (9)	7	10
Saline wetlands (10)	No burning permitted	No burning permitted
Semi-arid woodlands (grassy subformation) (11)	6	9
Semi-arid woodlands (shrubby subformation) (11)	10	15
Arid shrublands (chenopod subformation) (12)	No burning permitted	No burning permitted
Arid shrublands (acacia subformation) (12)	10	15

- This schedule has been prepared for the specific purpose of this code and cannot be used as a guide for other purposes.

Appendix V

Cumberland Bushfire Risk Management Plan

Cumberland Zone Bush Fire Management Committee

Bush Fire Risk Management Plan

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Authorisation

In accordance with Part 3 Division 4 of the Rural Fires Act 1997, this Draft Plan has been prepared by the Cumberland Zone Bush Fire Management Committee and has been endorsed at the BFMC meeting on 23 June 2010 for submission to the Bush Fire Coordinating Committee.

Recommended



Chairperson *S. L. Weymon*
Cumberland Zone Bush Fire Management Committee



Approved



.....
Shane Fitzsimmons, AFSM *22-9-10*
Chairman
NSW Bush Fire Coordinating Committee

On behalf of the
NSW Bush Fire Coordinating Committee

Amendment List

Amendment		Entered	
Number	Date	Signature	Date

Glossary

Assets: anything valued by the community which includes houses, crops, heritage buildings and places, infrastructure, the environment, businesses, and forests, that may be at risk from bush fire.

Bush Fire: a general term used to describe fire in vegetation, includes grass fire.

Bush Fire Hazard: the potential severity of a bush fire, which is determined by fuel load, fuel arrangement and topography under a given climatic condition.

Bush Fire Risk: the chance of a bush fire igniting, spreading and causing damage to the community or the assets they value.

Bush Fire Risk Management: a systematic process that provides a range of treatments which contribute to the well being of communities and the environment, which suffer the adverse effects of wildfire/bush fire.

Bush Fire Threat: potential bush fire exposure of an asset due to the proximity and type of a hazard and the slope on which the hazard is situated.

Consequence: outcome or impact of a bush fire event.

Fire Fighting Authorities: the NSW Rural Fire Service, NSW Fire Brigades, the National Parks and Wildlife Service and Forests NSW.

Likelihood: the chance of a bush fire igniting and spreading.

Major Bush Fire: A bush fire which requires the attendance of multiple brigades, or causes damage to property or injury to one or more persons.

Display area: geographic area determined by the Bush Fire Management Committee which is used to provide a suitable area and scale for community participation and mapping display purposes.

Recovery costs: the capacity of an asset to recover from the impacts of a bush fire.

Risk Acceptance: an informed decision to accept the consequences and the likelihood of a particular risk.

Risk Analysis: a systematic process to understand the nature of and to deduce the level of risk.

Risk Assessment: the overall process of risk identification, risk analysis and risk evaluation.

Risk Identification: the process of determining what, where, when, why, and how something could happen.

Risk Treatment: the process of selection and implementation of measures to modify risk.

Vulnerability: the susceptibility of an asset to the impacts of bush fire.

Chapter 1. Introduction

1.1 Background

Under the *Rural Fires Act 1997* the Bush Fire Coordinating Committee (BFCC) must constitute a Bush Fire Management Committee (BFMC) for each area in the State, which is subject to the risk of bush fires. Each BFMC is required to prepare and submit to the BFCC a draft Bush Fire Risk Management Plan (BFRMP).

A BFRMP is a strategic document that identifies community assets at risk and sets out a five-year program of coordinated multi-agency treatments to reduce the risk of bush fire to the assets. Treatments may include such things as hazard reduction burning, grazing, community education, fire trail maintenance and establishing community fireguard groups.

Annual programs to implement the treatments identified in this plan will be undertaken by the relevant land managers and fire fighting authorities.

In exercising its functions under the *Rural Fires Act 1997*, including the preparation of a draft bush fire risk management plan, the Cumberland Zone BFMC is required to have regard to the principles of ecologically sustainable development (ESD).

This document and the accompanying maps together form the BFRMP for the Cumberland Zone BFMC area.

This BFRMP has been prepared by the Cumberland Zone BFMC and covers both public and private lands. This BFRMP must be reviewed and updated within each successive five-year period from the constitution of the BFMC.

The BFCC recognises that climate change has the potential to increase bush fire risk. The risk assessment process applied in this BFRMP is based on current climatic conditions. The BFCC will monitor information on climate change and will modify the process when necessary.

1.2 Aim and Objectives

The **aim** of this BFRMP is to minimise the risk of adverse impact of bush fires on life, property and the environment.

The **objectives** of this BFRMP are to:

- reduce the number of human-induced bush fire ignitions that cause damage to life, property and the environment;
- manage fuel to reduce the rate of spread and intensity of bush fires, while minimising environmental/ecological impacts;
- reduce the community's vulnerability to bush fires by improving its preparedness; and
- effectively contain fires with a potential to cause damage to life, property and the environment.

1.3 Description of the Cumberland BFMC Area

1.3.1 Location and land tenure

The Cumberland Zone BFMC area is located to the west of Sydney, between Parramatta and the Blue Mountains and includes the Local Government Area/s of Blacktown, Fairfield and Penrith LGA's. Blacktown is around 35 kilometres from Sydney, Fairfield is 32 kilometres and Penrith is 54 kilometres from Sydney.

The area covered by the Cumberland Zone BFMC is 75800 hectares and includes the land tenures outlined in Table 1.1. The Blacktown LGA is around 247 square kilometres, Fairfield is around 104 square kilometre and Penrith is around 407 square kilometres, totalling 758 square kilometres.

Land Manager*	Hectares	% of BFMC area
National Parks & Wildlife Service (total)	2004	5.2%
• Blue Mountains National Park	804	
• Mulgoa Nature Reserve	213	
• Agnes Banks Nature Reserve	126	
• Castlereagh Nature Reserve	493	
• Rouse Hill Regional Park	43	
• Prospect Nature Reserve	325	
• Wianamatta Regional Park	63	
Western Sydney Parklands Trust (total)	1379	3.7%
• Western Sydney Regional Park	563	
• Additional land managed by WSPT	816	
Department of Lands	1830	2.4%
Department of Defence	2000	2.7%
Other Commonwealth Land	996	1.3%
Penrith Lakes Development	2000	2.6%
All other	62208	82.1%

Table 1.1 Land Tenure

1.3.2 Climate and bush fire season

The typical climate in the Cumberland Zone BFMC area is warm temperate experiencing warm to hot summers and cool to mild winters with predominately summer/autumn rainfall and dry winter and spring. The bush fire season generally runs from October to March, And may occasionally be brought forward due to dry winter conditions and long cured grassland.

The prevailing weather conditions associated with the bush fire season in the Cumberland Zone BFMC area are in two parts, the dry winter with August September winds providing potential fire conditions for the cured grassland areas, and the second is the north-westerly winds accompanied by high temperatures and low relative humidity providing weather conditions conducive for large spreading bush fires.

1.3.3 Population and demographic information

The population of the Cumberland Zone BFMC area is approximately 631,000 people spread over the three local government areas (Penrith: 180,000; Blacktown: 217,000; Fairfield: 180,000) .

The Blacktown LGA;the population is concentrated in the lower half of the LGA, with the upper half predominately rural residential with increasing population density occurring along the eastern and north-eastern areas due to significant urban expansion;

The Penrith LGA; the population is concentrated along the Great Western High that traverses East West across the LGA and represents around one-fifth of the population. The lower two fifths is predominately rural areas consisting of agricultural activities, the upper two-fifths is rural residential with average block size of 1 hectare. In both rural areas, there are still large areas of remnant bush land.

The Fairfield LGA; has a population that is densely concentrated east of Cowpasture Road covering two thirds of the LGA, with the remaining third and mainly rural residential.

The following issues have been identified within the Cumberland Zone BFMC area as potentially impacting on the ability of certain sections of the community to prepare themselves for fire:

- high level of people with non English speaking background. Blacktown LGA for example has a very high diversity of ethnic and cultural backgrounds with 184 countries and 156 languages represented. Within the rural residential area of Fairfield there is a high number of Vietnamese background families, many of whom do not speak English.

The following data has been sourced from the Australian Bureau of Statistics using the 2006 Census Data.

	Blacktown		Fairfield		Penrith		Combined	
Personal Characteristics								
Total Persons	271709		179893		172140		623742	
Indigenous persons (comprising Aboriginal & Torres Strait Islanders)	7055		1113		4048		12216	
Age Groups		%		%		%		%
0-4	22409	8.2	12025	6.7	12874	7.5	47308	7.6
5-14	44408	16.3	26754	14.9	26655	15.5	97817	15.6
15-24	39669	14.9	27344	15.2	26901	15.6	93914	15.1
25-54	118030	43.4	76071	42.3	74710	43.4	268811	43.1

55-64	24957	9.2	17615	9.8	16955	9.8	59527	9.5
65 & over	22235	8.5	20085	11.2	14046	8.2	56366	9.0
	Blacktown		Fairfield		Penrith		Combined	
Medium Age	32		34		32		32.6	
Born in Australia	160480	59.1	74700	41.5	127056	73.8	362236	58.1
Other Countries of Origin	Philippines	5.9	Vietnam	13.7	England	4.2		
	India	2.7	Iraq	5.8	New Zealand	1.7		
	New Zealand	2.4	Cambodia	3.6	Philippines	1.5		
	England	2.3	Italy	2.6	India	0.9		
	Fiji	2	China	2.1	Scotland	0.8		
English only spoken at home	168820	62.1	49493	27.5	140937	81.9	359250	57.6
Other languages spoken	Tagalog	3.6	Vietnamese	17	Arabic	1.5		
	Arabic	3.2	Arabic	6.4	Italian	0.9		
	Hindi	2.6	Assyria	6.1	Maltese	0.8		
	Filipino	2.1	Cantonese	5.6	Tagalog	0.8		
	Samoan	1.2	Spanish	4.3	Greek	0.7		
Total Families								
Couple families with children	38341		25419		23893		87653	
Couple families without children	18315		10775		13128		42218	
One parent families	14219		10110		8531		32860	
Other families	1113		982		634		2729	
Dwelling Characteristics								
Total Occupied private dwellings	93412		58730		62165		214307	
Separate house	74606		42898		49948		167452	
Fully Owned / Under Mortgage	56557		35292		40264		132113	
Rented	26490		16374		15283		58147	

1.3.4 History of bush fire frequency and ignition cause

The Cumberland Zone BFMC area has on average over 450 bush and grass fires per year, of which only a few are considered to be major fires. The following are the number of bush and grass incident calls attended on a yearly basis over the past 6 years.

No. of Bush & Grass Fires annually (based on information within FIRS):

- 2002-2003 - 739
- 2003-2004 - 399
- 2004-2005 - 407
- 2005-2006 - 544
- 2006-2007 - 399
- 2007-2008 - 241

The main sources of ignition in the Cumberland Zone BFMC area are:

- Illegal burning: mainly within the rural areas of all 3 local government areas, where burning is not conducted in accordance with the Protection of the Environment Operations (Clean Air) Regulations 2000 or the Rural Fires Regulations.
- Car dumping: the dumping of cars and setting them alight in bush land areas is a regular occurrence, mainly in the Castlereagh and Londonderry areas.
- Lightning: is generally associated with the summer thunderstorm activity and mainly affects the southern areas of the Zone, however is known to occur in the northern parts of the Penrith LGA.
- Deliberately lit fires: there is a high occurrence of deliberately lit fires within the Wilmot / Bidwill, Glenmore Park, Ropes Creek areas, where there are areas of bushland around and within built up areas.

Chapter 2. Identifying and Assessing the Bush Fire Risk

2.1 Process

The Australia/New Zealand Standard *AS/NZS 4360: 2004 Risk Management* was used as the basis for the risk assessment process. See Figure 2.1 for the steps involved. For a detailed description of the process undertaken see the Bush Fire Risk Management Planning Guidelines for Bush Fire Management Committees on the RFS website: www.rfs.nsw.gov.au.

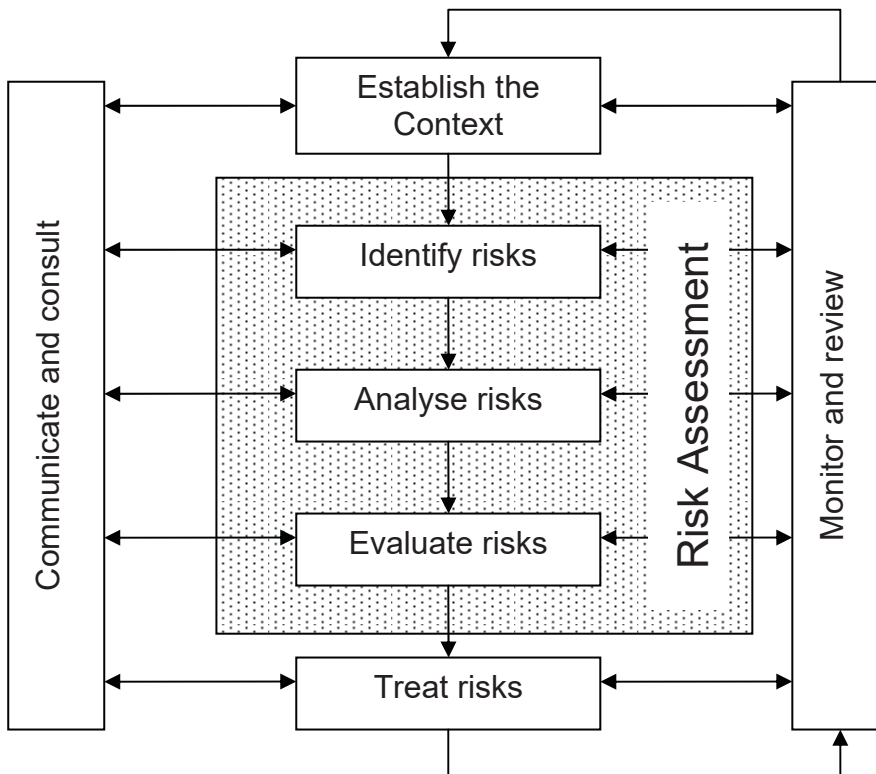


Figure 2.1 Overview of the risk assessment process

2.2 Communication and Consultation

Community participation is an integral part of risk management. The Community Participation Strategy involved developing and implementing a process to address the needs, issues and concerns of stakeholders within the BFMC area in regards to the BFRMP. See Appendix 1 for the Community Participation Strategy used by the Cumberland Zone BFMC in preparing this BFRMP.

2.3 Identifying the Bush Fire Risk

Identifying the level of bush fire risk firstly involved identifying important community assets considered to be at risk from bush fire in the Cumberland Zone BFMC area, and then assessing the likelihood and consequence ratings.

2.3.1 Assets

BFMC members and the community, including RFS volunteers, identified assets within the Cumberland Zone BFMC that they believed were at risk of bush fire.

The assets were divided into four asset types:

Human settlement

- Residential areas including urban bushland interface areas and rural properties;
- Special Fire Protection areas including schools, hospitals, nursing homes, and tourist facilities; and
- Other human settlement areas including commercial and industrial areas where distinct from major towns.

Economic

- Agricultural; e.g. major silos, regional saleyards, cropping/grazing land;
- Commercial/industrial e.g. major industries, waste treatment plants, sawmills;
- Infrastructure e.g. large power lines, gas and oil pipelines, railway lines, electricity substations, communication facilities;
- Tourist and recreational e.g. tourist sites and facilities, resorts, retreats;
- Mines;
- Commercial forests e.g. pine plantations, eucalypt plantations and commercial native forests; and
- Drinking water catchments.

Environmental

- Threatened species, populations and ecological communities and Ramsar wetlands;
- Locally important species and ecological communities, such as species and ecological communities especially sensitive to fire.

Cultural

- Aboriginal significance – Aboriginal places and items of significance;
- Non-indigenous heritage – places and items arising from the early occupation of NSW by European or other non-indigenous settlers; and
- Other cultural assets – community halls, clubs and recreational facilities.

See Appendix 2 for the full list of assets identified in the Cumberland Zone BFMC area. See maps 1-4 for the location of assets to be treated under this BFRMP.

2.3.2 Assessing the Bush Fire Risk - Consequence

Once the assets were identified, the consequence of a bush fire impacting on these assets was assessed.

See Appendix 2 for the consequence ratings assigned to each asset identified in the Cumberland BFMC area.

The different asset types had different assessment processes used to determine the consequence. These processes are identified below.

Human settlement

A potential fire behaviour model using vegetation type, slope and separation distance was used to produce a threat rating for human settlement assets. The vulnerability of the asset to a bush fire was also assessed and a rating assigned. These ratings were then used to assess the consequence of a bush fire impacting upon a human settlement asset.

Special Fire Protection (SFP) assets were considered inherently more vulnerable to bush fire due to mobility capacity, knowledge or other issues relating to their inhabitants, (e.g. the elderly, infirm, children or tourists) and therefore stricter requirements for vulnerability assessment and rating were applied.

Economic

The level of economic impact e.g. local, regional or state, as well as the economic recovery costs (how long and complicated a financial recovery will be) of the asset were identified. These ratings were used to assess the consequence of a bush fire impacting upon an economic asset.

Environmental

Environmental assets with known minimum fire threshold were assessed to determine if they were at risk of a bush fire within the 5 year life of the BFRMP using fire history data. Those environmental assets which were within or above the fire threshold were not assessed in the BFRMP, as the negative impact of a fire within the 5 year period was determined as being low and may even be of benefit to the asset and surrounding habitat.

The vulnerability of an environmental asset was determined by its conservation status and its geographic extent (distribution across the landscape). Vulnerability and potential impact

of bush fire were used to assess the consequence of a bush fire impacting upon an environmental asset.

Cultural

For non-indigenous historical, Aboriginal and other cultural assets a potential fire behaviour model using fuel load, slope and proximity was used to produce a threat rating. The physical vulnerability of the asset to a bush fire was also assessed. These ratings were then used to assess the consequence of a bush fire impacting upon a cultural asset.

2.3.3 Assessing the Bush Fire Risk - Likelihood

For all asset types the likelihood of a bush fire occurring was assessed. This involves considering fire history, including ignition cause and patterns, known fire paths, access, containment potential and potential fire run (size of the vegetated area). See Appendix 2 for the likelihood ratings assigned to each asset identified in the Cumberland BFMC area.

2.3.4 Identifying the level of risk

The consequence and likelihood ratings were then used to identify the level of risk. See Appendix 2 for the risk ratings assigned to each asset identified in the Cumberland Zone BFMC area.

2.3.5 Evaluating the Bush Fire Risk

Once the risk ratings for each asset were identified, they were evaluated to:

- a) confirm that risk levels identified in the risk analysis process are appropriate and reflect the relative seriousness of the bush fire risk;
- b) identify which assets require treatments; and
- c) identify treatment priorities.

2.3.6 Prioritising Treatments

No organisation has limitless resources to deal with adverse risk. It is therefore necessary to define priorities. The bush fire risk ratings determined were used to prioritise the risk treatments, i.e. areas of extreme risk were considered first for treatment, then very high, then high then medium then low.

2.3.7 Risk Acceptability

Risks below a certain level were assessed as not requiring treatment within the life of this plan. This is due to a combination of the number of extreme, very high and very high risk priorities and the capacity to undertake the works. Within the Cumberland Zone BFMC

area the level of acceptability is medium. Areas of medium and low risk are likely to be managed by routine procedures and so do not require a specific application of resources.

The Cumberland Zone BFMC has accepted that there will be extreme and very high risk to some environmental and aboriginal cultural assets of significance. The Cumberland Zone BFMC will not be applying specific treatments to these assets as they may not be appropriate or may have the potential to damage the asset. However, the protection and management of these assets will be taken into account during the planning of treatments for the area. The BFMC wide treatments, in addition to scheduled treatments such as prescribed burns and fire trail maintenance, are likely to contribute toward the reduction of risk to these assets.

Chapter 3. Treating the Risk

3.1 Bush Fire Management Zones

Bush Fire Management Zones were identified within the Cumberland Zone BFMC area and mapped (see maps 1-4). These zones identify the fire management intent for a specific area. See Table 3.1 for descriptions of the zones and their purposes. The four categories of Bush Fire Management Zones are:

- Asset Protection Zone (APZ);
- Strategic Fire Advantage Zone (SFAZ);
- Land Management Zone (LMZ); and
- Fire Exclusion Zone (FEZ).

Zone	Purpose	Suppression Objective(s)	Zone characteristics
Asset Protection Zone	To protect human life, property and highly valued public assets and values.	To enable the safe use of Direct Attack suppression strategies within the zone. To minimise bush fire impacts on undefended assets.	As per RFS document <i>Standards for Asset Protection Zones</i> .
Strategic Fire Advantage Zone	To provide strategic areas of fire protection advantage which will reduce the speed and intensity of bush fires, and reduce the potential for spot fire development; To aid containment of wildfires to existing management boundaries.	To improve the likelihood and safe use of: Parallel Attack suppression strategies within the zone. and/or Indirect Attack (back burning) in high to very high fire weather conditions within the zone. To reduce the likelihood of: Crown fire development within the zone. and/or Spot fire ignition potential from the zone	Zone width related to suppression objectives and dependant upon: <ul style="list-style-type: none"> • Topography • Aspect • Spotting propensity • Location of adjacent firebreaks • Mosaic pattern of treatment Assess Overall Fuel Hazard (OFH) once vegetation communities reach minimum fire thresholds within this plan. Management practices should aim to achieve mosaic fuel reduction patterns so that the majority of the SFAZ has an OFH of less than high.
Zone	Purpose	Suppression Objective(s)	Zone characteristics
Land Management Zone	To meet relevant land management objectives in areas where APZs or SFAZs are not appropriate.	As per the land management and fire protection objectives of the responsible land management agency. To reduce the likelihood of spread of fires. To undertake mosaic burning	As appropriate to achieve land management e.g. heritage and/or fire protection e.g. broad scale mosaic burning objectives.
Fire Exclusion Zone	To exclude bush fires.	N/A	Variable dependant on size of fire sensitive area requiring protection.

Table 3.1 Bush Fire Management Zones: Purpose, objectives and characteristics

NB: OFH refers the Overall Fuel Hazard Guide as described in the document published by (Dept. of Sustainability and Environment 3rd ed. 1999 & NPWS version); State-wide procedures for assessment of fuel hazard will be developed in conjunction with the BFCC.

Note: All areas that are not mapped or described as APZs or SFAZs are considered as LMZs.

3.2 BFMC Wide Treatments

BFMC wide treatments are activities which reduce the overall bush fire risk within the BFMC area and are undertaken on an ongoing basis as part of normal business. These treatments are not linked to specific assets in the BFRMP, rather they are applied across all or part of the BFMC area as designated by legislation or agency policy. BFMC wide treatments include the following:

- **Reviewing the bush fire prone land map**

These maps identify bush fire prone land and are used to trigger whether a development application is assessed using *Planning for Bush Fire Protection*¹.

- **Ensuring developments in bush fire prone land comply with *Planning for Bush Fire Protection***

This assessment process requires new applications for development to include bush fire protection measures.

- **Using the Local Environment Plan/s (LEPs) to control developments in areas with a bush fire risk**

LEPs can be used to exclude development in extreme bush fire risk areas or where bush fire protection measures cannot be incorporated.

- **Varying the standard bush fire danger period as required**

In years where the weather is particularly adverse the bush fire danger period may be brought in early or extended. This is assessed every year by the BFMC.

- **Requiring permits during the bush fire danger period**

In the bush fire danger period a fire safety permit is required to light a fire in the open. Permits specify conditions such as fire fighting equipment that must be on site, or restrict burns based on weather conditions.

- **Prosecution of offenders in relation to deliberate ignitions**

Under the *Rural Fires Act 1997* persons may be prosecuted for breaching the conditions on a fire permit, lighting a fire during a Total Fire Ban, allowing fire to escape their property, or other breaches of the Act. In addition the member agencies of the BFMC will co-ordinate with the NSW Police in relation to the prosecution of arsonists under the Crimes Act 1900.

¹ NSW Rural Fire Service 2006 *Planning for Bush Fire Protection: A guide for councils, planners, fire authorities and developers*.

- **Investigation of bush fire cause**

All bush fires which do not have a known cause are investigated to identify how they started.

- **Normal fire suppression activities**

Responding to bush fire is a normal business activity for the fire fighting authorities.

- **Assessing and managing compliance with strategic fire fighting resource allocation provisions**

Strategic fire fighting resource allocation provisions is the process used to identify the number of stations, brigades and appliances required in an area, and considers members, training, assets and hazards.

- **Preparation of a S52 Operations Coordination Plan**

The Operations Coordination Plan is prepared biannually and sets out how coordinated fire fighting will occur. It includes specific operational restrictions on fire fighting techniques in certain areas, where fires will be managed from, and how agencies involved can communicate during operations.

- **Fire Management Plans or Plans of Management**

Some land management agencies have developed fire management plans or plans of management with specific fire or fuel management strategies, for example a Forests NSW Regional Fuel Management Risk Plan, a NPWS Fire Management Strategy. These publicly exhibited plans form the basis for operational fire planning on public parks, reserves and forests.

- **Bush Fire Hazard Complaints**

If someone is concerned about possible bush fire hazards on a neighbouring property or any other land, then this can be reported to the RFS Commissioner or their local RFS Fire Control Centre. The complaint will be investigated and may result in a notice being issued to the landowner or manager to reduce the hazard.

- **Enforcement of Protection of the Environment Operations (Clean Air) Regulations (2000)**

Local government (Blacktown, Fairfield & Penrith) are to enforce the approval / restrictions for burning in the open under the Protection of the Environment Operations (Clean Air) Regulations 2000. Where a LGA is listed in Schedule 2, an 'Approval to Burn' is to be developed and maintained annually in consultation with the local NSW Rural Fire Service.

- **Establishment of Cumberland Zone BFMC Fire Investigation Working Group**

The Cumberland Zone BFMC to establish a Fire Investigation Working Group to coordinate and communicate between those agencies that have a responsibility to investigate the cause and origin of wildfires within the Cumberland Zone.

- **Utilise local media to promote fire safety and awareness**

As a tool to provide fire safety and fire awareness information to the public, the utilisation of local media to disseminate this information in the following areas;

- bush fire preparedness

- lighting fire restrictions
- Bush Fire Danger Period commencement
- **BFMC Fire Trails & Gates Register**

Fire trails are required to be registered by the BFMC and are to meet BFCC Policy on the standard for fire trails. To ensure the accessibility by fire services, an annual inspection should be undertaken of all BFMC registered fire trails.
- **Management of Road Reserves within Bush Fire Prone Areas**

Authorities responsible for the management of road reserves should have a management plan to reduce the ‘available fuel’ for bush fires along road sides as a treatment to reduce the potential for road side ignitions and fire spread. Management of roadsides will assist in fire fighter safety during operations on roadsides and improve public safety.

3.3 Asset Specific Treatments

There are four broad strategy groups available to treat the bush fire risk to assets identified in the BFRMP. The types of asset specific treatments in each strategy group used in the Cumberland Zone BFMC area are listed below. A full list of the treatment strategies in the Cumberland Zone BFMC area are in Appendix 3.

Strategy	Targeted treatments used in the Cumberland Zone BFMC area
Hazard Reduction	<ul style="list-style-type: none"> ● APZ – Inspect & maintain as required. ● SFAZ – Inspect & treat as required ● LMZ – Inspect & treat as required ● Undertake strategic mosaic burning ● Inspect SFAZ and maintain when required ● Electricity Easements - Inspect and treat as required
Strategy	● Targeted treatments used in the Cumberland Zone BFMC area
Community Education	<ul style="list-style-type: none"> ● Conduct Community Engagement Activity within area ● Distribute PCC Approval to Burn information
Property Planning	<ul style="list-style-type: none"> ● Develop Fire Management Plan ● Develop a Bush Fire Emergency Evacuation Plan
Preparedness	<ul style="list-style-type: none"> ● Undertake Property Preparedness Assessments ● Static Water Supply

Table 3.2 Asset specific treatments used in the Cumberland Zone BFMC area

3.4 Fire Thresholds

The vegetation in the Cumberland Zone BFMC area was classified into fire threshold categories (Table 3.3*).

Vegetation formation	Minimum SFAZ Threshold	Minimum LMZ Threshold	Maximum Threshold	Notes
Rainforest	NA	NA	NA	Fire should be avoided.
Alpine complex	NA	NA	NA	Fire should be avoided.
Wet Sclerophyll forest (shrubby subformation)	25	30	60	Crown fires should be avoided in the lower end of the interval range.
Wet Sclerophyll forest (grassy subformation)	10	15	50	Crown fires should be avoided in the lower end of the interval range.
Grassy woodland	5	8	40	Minimum interval of 10 years should apply in the southern Tablelands area. Occasional intervals greater than 15 years may be desirable.
Grassland	2	3	10	Occasional intervals greater than 7 years should be included in coastal areas. There was insufficient data to give a maximum interval; available evidence indicates maximum intervals should be approximately 10 years.
Dry sclerophyll forest (shrub/grass subformation)	5	8	50	Occasional intervals greater than 25 years may be desirable.
Dry sclerophyll forest (shrub subformation)	7	10	30	Occasional intervals greater than 25 years may be desirable.
Heathlands	7	10	30	Occasional intervals greater than 20 years may be desirable.
Freshwater wetlands	6	10	35	Occasional intervals greater than 30 years may be desirable.
Forested wetlands	7	10	35	Some intervals greater than 20 years may be desirable.
Saline wetlands	NA	NA	NA	Fire should be avoided.
Semi-arid woodlands (grassy subformation)	6	9	No max	Not enough data for a maximum fire interval.
Semi-arid woodlands (shrubby subformation)	10	15	No Max	Not enough data for a maximum fire interval.
Arid shrublands (chenopod subformation)	NA	NA	NA	Fire should be avoided.
Arid shrublands (acacia subformation)	10	15	No Max	Not enough data for a maximum fire interval.

Table 3.3 Fire Thresholds for Vegetation Categories

3.5 Annual Works Programs

The land management agencies and fire fighting authorities responsible for implementing the treatments identified in this plan will include those treatments in their annual works programs detailing how, when, and where the required activities will be undertaken.

3.6 Implementation

When the treatments identified in this BFRMP are implemented there are a number of issues that need to be considered by the responsible agency including environmental assessments and approvals, smoke management and prescribed burn plans.

Local permit issuing/hazard reduction burning exclusion periods

In the Cumberland Zone) BFMC area the following applies:

- Blacktown and Fairfield LGA's are regarded as 'No Burn' areas as implied by the Protection of the Environment Operations (Control Burning) Regulations 2000. The issuing of Fire Safety Permits as per the Rural Fires Act, are restricted to agricultural purpose (primary producing) and approved ecological burns during the Bush Fire Danger Period.
- Penrith City council has developed an Open Burning Policy restricting the size and location of the lighting of dead and dry vegetation and for it to be conducted between 1 April and 30 September. The issuing of Fire Safety Permits as per the Rural Fires Act, are restricted to agricultural purpose (primary producing) and approved ecological burns during the Bush Fire Danger Period.

Chapter 4. Performance Monitoring and Reviewing

4.1 Review

This BFRMP must be reviewed and updated within each successive five-year period from the constitution of the BFMC. The Cumberland Zone BFMC will also review this plan as necessary to account for any changes in context or risk. This may be triggered by a range of circumstances, including but not limited to:

- changes to the BFMC area, organisational responsibilities or legislation;
- changes to the bush fire risk in the area; or
- following a major fire event.

4.2 Monitoring

The BFMC is required to monitor progress towards the completion of treatment works listed in the BFRMP, and the timeliness of the works.

4.3 Reporting

The BFMC is required to report annually to the BFCC on its progress in implementing the bush fire risk management activities identified in this plan.

4.4 Performance Measurements

State wide performance measurements which are linked to the BFRMP have been identified by the BFCC. All BFMCs must use these to monitor and report on their success in reducing the bush fire risk in their BFMC area.

APPENDICES

Appendix 1 Community Participation Strategy

Appendix 2 Asset Register

Appendix 3 Treatment Register

Appendix 4 Maps 1-4

Appendix 1 Community Participation Strategy

Cumberland Zone Bush Fire Risk Management Plan Community Engagement Brief

Prepared by:
Cumberland Zone Community Safety Group
On behalf of Cumberland Zone Bush Fire Management Committee

Background

The Bush Fire Management Committee (BFMC) have the responsibility to prepare a Bush Fire Risk Management Plan (BFRMP) for their area and for this plan to be reviewed every 5 years in accordance with the *Rural Fires Act 1997*.

Aims of Community Participation Strategy

The community participation strategy is an essential part of the BFRMP process and should be prepared early on in the process. Communication and consultation with the community is an essential tool in ensuring the success of the BFRMP. The process of the Community Participation Strategy is to address the needs, issues and concerns of stakeholders within the BFMC area in regards to bush fire.

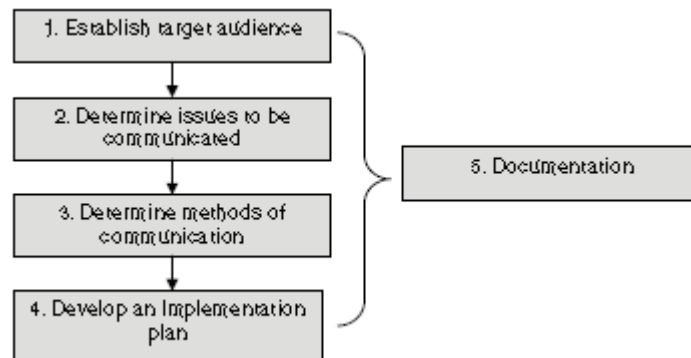
The purpose of a community participation strategy is to:

- ensure that specific and targeted communication occurs between the BFMC and the community and other stakeholders throughout the development of a BFRMP;
- ensure prominent stakeholders do not make judgements on the acceptability of a risk based on their own perception;
- provide greater opportunity for local brigades, land holders and other stakeholders to have input into the bush fire risk management process;
- ensure that the community's concerns and perceptions of bush fire risk are identified, understood, documented and addressed;
- improve community confidence in bush fire risk management across the landscape and provide the community with a sense of ownership of the BFRMP; and
- educate the community regarding bush fire risk management in the area and their responsibilities, so that they can contribute towards risk reduction.

Steps of Development of a Community Participation Strategy

The BFMC acknowledges that any strategy for community participation on the BFRMP will require communications to be dependent upon the targeted audience and have consideration of communities availability and resources.

The following are the steps that have been used as the basis of the community participation strategy.



Targeted Audiences

BFMC Agencies: It will be the responsibility for the agency representatives on the BFMC to take the information back to their agency and communicate the plan to their agency.

Residential communities: These are those that live or have assets within the area, particularly those that may be affected by bush fires.

Community Groups: A range of community groups will be invited to review to the BFRMP and to provide feedback.

RFS Brigades: As brigades play an integral role within the community and bush fire management, brigades provide an opportunity to provide feedback and to inform others within their communities.

Cumberland Zone Community Safety Group: This is group of volunteers representing local brigades and those that are actively involved in community engagement.

Information to be communicated

The key information to be communicated are:

- What is a Bush Fire Risk Management Plan
- Process of developing a Bush Fire Risk Management Plan
- How it may affect the community
- Identification of risk in the area;
- Understanding treatment strategies
- Public Exhibition

Methods of communications

It is identified that there needs to be various forms of consultation in order to address the different target audiences as well as the type of information that may be appropriate for a particular audience.

The methods and targeted audiences that will be deployed to engage the public on the Bush Fire Risk Management Plan, are as follows:

- Letter box drops: This is a letter to owner/occupier of a targeted area that informs them of the process and invites them to view the plan and provide feedback;
- Local Newspaper: Advertisements and special articles places in local newspapers distributed to areas affected by the Bush Fire Risk Management Plan;
- Cumberland Zone website: develop a website to promote the Bush Fire Risk Management Plan and provide an opportunity to provide feedback;
- Brigade Information Sessions: information sessions at selected brigade stations that are opened to the public to attend;
 - Stations identified are:
 - Mulgoa
 - Londonderry
 - Marsden Park
 - Horlsey Park
 - Erskine Park
- Information Kiosk: Information stands to be located in strategic places such as shopping centres;
 - Locations of kiosks are:
 - Penrith Plaza
 - Emu Plains Shopping Centre

The BFMC have agreed not to conduct public meetings as method of communications as they are difficult to arrange and, with past experiences, and reflects that it is difficult to gain valuable and constructive feedback.

Documentation

Refer to Community Participation Communications Plan.

Community Participation Communications Plan

Date	Targeted Audience	Method of Communication	Method of Notification	Key Message / purpose	Resources	Responsibility
3 July 2008	Cumberland Community Safety Group	Workshop	Email	RFS Brigade workshop	Nil	Justin Back
10 September 2008	BFMC Sub Committee	Workshop	Email	Stakeholder contribution	Nil	Justin Back
11 June 2009	BFMC Sub Committee	Meeting	Email	Treatment listing review	Nil	Justin Back
5 Nov 2009	Cumberland Community Safety Group	Meeting	Email	RFS Update	Nil	Justin Back
24 March 2010	BFMC Meeting	Meeting	Email	Stakeholder contribution / review of draft to go on exhibition	Maps & presentation	Justin Back
1 April 2010	Cumberland Community Safety Group	Presentation	Email	Stakeholder contribution	Maps & presentation	Justin Back
22 April 2010	RFS Brigades	Presentation	Email	Stakeholder contribution	Maps & presentation	Justin Back
24 April 2010	General Public	Kiosk	Nil	Feedback	Printing & distribution	Justin Back

Community Participation Feedback

Submissions / feedback in writing will be invited from the community to provide information to the Bush Fire Management Committee on any particular issues in relation to the Draft Bush Fire Risk Management for further consideration by that committee.

Feedback on the Draft Plan will be encouraged; however will be considered on relevance and in the broader terms of the Plan.

Appendix 2 Asset Register

Appendix 3 Treatment Register

Appendix 4 Maps 1-4

Appendix 2 - Asset Register

Priority	Map reference number	Asset type	Asset sub type	Asset name	Asset Location	LGA	Likelihood	Consequence	Risk
1A	0	Environment	Endangered	Environmental Assets of High Consequence		Penrith	Almost certain	Catastrophic	Extreme
1B	1	Human Settlement	Residential	Marsden Park Rural Residential Area	Rural residential areas of Marsden Park	Blacktown	Likely	Catastrophic	Extreme
1B	2	Human Settlement	Other	Pioneer Memorial Church	Rooty Hill Road South, Rooty Hill	Blacktown	Likely	Catastrophic	Extreme
1C	0	Cultural	Aboriginal Significance	Aboriginal Assets of High Vulnerability		Penrith	Almost certain	Major	Extreme
1C	3	Human Settlement	Residential	Glenmore Park Interface	Southern side of Glenmore Park, adjacent to Mulgoa NR	Penrith	Almost certain	Major	Extreme
1C	4	Human Settlement	Residential	Castlereagh / Cranebrook Rural Residential Area	Rural residential areas of Castlereagh & Cranebrook	Penrith	Almost certain	Major	Extreme
1C	5	Human Settlement	Residential	Londonderry Rural Residential Area	Rural residential areas of Londonderry	Penrith	Almost certain	Major	Extreme
2A	6	Human Settlement	Residential	Leonay Interface	Western & southern areas of Leonay	Penrith	Likely	Major	Very High
2A	7	Human Settlement	Residential	Mulgoa Hills Interface	Western side of Park River Close, Mulgoa	Penrith	Likely	Major	Very High
2A	8	Human Settlement	Residential	Timbertop Residential Interface	Adjacent Timbertop Reserve, Prospect	Blacktown	Likely	Major	Very High
2A	9	Human Settlement	Residential	Vineyard Rural Residential Area	Rural residential areas of Vineyard	Blacktown	Likely	Major	Very High
2A	10	Human Settlement	Special Fire Protection	Wallacia Public School	Mulgoa Road, Wallacia	Penrith	Likely	Major	Very High
2A	11	Human Settlement	Special Fire Protection	Emmaus Catholic College	Bakers Lane, Kemps Creek	Penrith	Likely	Major	Very High
2A	12	Human Settlement	Special Fire Protection	Emmaus Retirement Village	Bakers Lane, Kemps Creek	Penrith	Likely	Major	Very High
2A	13	Human Settlement	Special Fire Protection	Trinity Catholic Primary School	Bakers Lane, Kemps Creek	Penrith	Likely	Major	Very High
2B	14	Economic	Infrastructure	Defence Establishment Orchard Hills	The Northern Road, Orchard Hills	Penrith	Possible	Catastrophic	Very High
2C	0	Cultural	Aboriginal Significance	Aboriginal Assets of Moderate Vulnerability		Penrith	Almost certain	Moderate	Very High
2C	15	Human Settlement	Residential	Emu Heights Interface	Properties adjacent to escarpment, Emu Heights	Penrith	Almost certain	Moderate	Very High
2C	16	Economic	Commercial	Northern Auto Wreckers	The Northern Road, Londonderry	Penrith	Almost certain	Moderate	Very High
2C	17	Economic	Commercial	Jamison Shopping Complex	Mulgoa Road, Jamisontown	Penrith	Almost certain	Moderate	Very High
3A	18	Economic	Tourist and Recreational	Sydney International Equestrian Centre	Wallgrove Road, Horsley Park	Blacktown	Likely	Moderate	High
3A	19	Economic	Tourist and Recreational	Narranginy Reserve	Knox Road, Doonside	Blacktown	Likely	Moderate	High
3A	20	Human Settlement	Residential	Mulgoa Hills Residential	Properties west of Mulgoa Township	Penrith	Likely	Moderate	High
3A	21	Human Settlement	Residential	Mulgoa Township	Built up area of Mulgoa	Penrith	Likely	Moderate	High
3A	22	Human Settlement	Residential	South West Rural Residential Area	Rural areas in southern area of Penrith LGA	Penrith	Likely	Moderate	High
3A	23	Human Settlement	Residential	Wentworth Street Interface	Wentworth Street, Orchard Hills adjacent to DEOH	Penrith	Likely	Moderate	High
3A	24	Human Settlement	Residential	Cowpasture Road Interface	Adjacent to Western Sydney Parklands Trust	Fairfield	Likely	Moderate	High
3A	25	Human Settlement	Special Fire Protection	Mulgoa Public School	Mulgoa Road, Mulgoa	Penrith	Likely	Moderate	High
3A	26	Human Settlement	Special Fire Protection	Mamre Christian College	Bakers Lane, Kemps Creek	Penrith	Likely	Moderate	High
3A	27	Human Settlement	Special Fire Protection	Marsden Park Public School	Garfield Road West, Marsden Park	Blacktown	Likely	Moderate	High
3A	28	Economic	Infrastructure	Water Reservoir - Fairfield	Fairfield City Farm	Fairfield	Likely	Moderate	High
3A	29	Human Settlement	Residential	Doctor Charles Mckay Reserve		Blacktown	Likely	Moderate	High
3B	30	Economic	Infrastructure	Sydney Water Pipeline		Penrith	Possible	Major	High
3B	31	Human Settlement	Residential	Wilmot Shalvey Bidwill ASA Interface	Properties adjacent to ASA in Wilmot, Shalvey & Bidwill	Blacktown	Possible	Major	High
3B	32	Human Settlement	Residential	Berkshire Park Llandilo Rural Residential Area	Rural residential areas of Berkshire Park and Llandilo	Penrith	Possible	Major	High
3B	33	Economic	Infrastructure	Electrical Substation - Old Wallgrove Road	Old Wallgrove Road, Eastern Creek	Blacktown	Possible	Major	High
3B	34	Human Settlement	Special Fire Protection	Nepean District Christian School	Mulgoa Road, Mulgoa	Penrith	Possible	Major	High
3B	35	Economic	Infrastructure	Electrical Substation - Mulgoa Road	Mulgoa Road, Regentville	Penrith	Possible	Major	High
3B	36	Economic	Infrastructure	RAAF Transmitting Towers	Londonderry Road, Londonderry	Penrith	Possible	Major	High
3B	37	Human Settlement	Other	John Moroney Correctional Facility	The Northern Road, Berkshire Park	Penrith	Possible	Major	High
3B	38	Economic	Commercial	Test Safe Australia	Londonderry Road, Londonderry	Penrith	Possible	Major	High
3B	39	Economic	Infrastructure	Sewerage Treatment Plant - Penrith	Castlereagh Road, Penrith	Penrith	Possible	Major	High
3B	40	Human Settlement	Residential	Hickies Lane Interface	Properties adjacent to Hickies Lane, Penrith	Penrith	Possible	Major	High
3B	41	Human Settlement	Special Fire Protection	St Pauls Grammer School	Taylor Road, Cranebrook	Penrith	Possible	Major	High
3B	42	Economic	Infrastructure	International Radio Transmitting Station	ASA Shanes Park	Blacktown	Possible	Major	High
3B	43	Human Settlement	Residential	Ellsworth Drive Interface	Ellsworth Drive, Tregear	Blacktown	Possible	Major	High

Priority	Map reference number	Asset type	Asset sub type	Asset name	Asset Location	LGA	Likelihood	Consequence	Risk
3B	44	Human Settlement	Other	Mosque	Richmond Road, Blacktown	Blacktown	Possible	Major	High
3B	45	Economic	Commercial	Vineyard Industrial Area	Western area of Vineyard	Blacktown	Possible	Major	High
3C	46	Human Settlement	Special Fire Protection	Mount Schoenstatt	Fairlight Road, Mulgoa	Penrith	Unlikely	Catastrophic	High
3D	47	Economic	Infrastructure	Tesltra Communications	Devlin Road	Penrith	Almost certain	Minor	High
4	48	Economic	Tourist and Recreational	Calmsley Hill Farm	Darling Street, Abbotsbury	Fairfield	Possible	Moderate	Medium
4	49	Economic	Tourist and Recreational	Penrith Rowing Complex	Castlereagh Road, Penrith	Penrith	Possible	Moderate	Medium
4	50	Economic	Tourist and Recreational	Penrith Water Water Rafting	Castlereagh Road, Penrith	Penrith	Possible	Moderate	Medium
4	51	Human Settlement	Residential	Orchard Hills Rural Residential Area	Rural residential areas of Orchard Hills	Penrith	Possible	Moderate	Medium
4	52	Human Settlement	Residential	Erskine Park East Interface	Properties adjacent to Ropes Creek, Erskine Park	Penrith	Possible	Moderate	Medium
4	53	Human Settlement	Residential	Horsley Park Rural Residential Area		Blacktown	Possible	Moderate	Medium
4	54	Human Settlement	Residential	Doonside Road Interface	Eastern side Doonside Road, Prospect	Blacktown	Unlikely	Major	Medium
4	55	Human Settlement	Residential	Nurragingy Interface East	Eastern side Knox Road, Doonside	Blacktown	Unlikely	Major	Medium
4	56	Human Settlement	Residential	Doonside Road Interface	Doonside Road, Doonside	Blacktown	Unlikely	Major	Medium
4	57	Human Settlement	Residential	Ropes Crossing	New estate off Forester Road, Ropes Crossing	Blacktown	Unlikely	Major	Medium
4	58	Human Settlement	Residential	Vincent Road Interface	Vincent Road, Cranebrook	Penrith	Possible	Moderate	Medium
4	59	Human Settlement	Special Fire Protection	Emu Heights Public School	Wedmore Road, Emu Heights	Penrith	Possible	Moderate	Medium
4	60	Economic	Mines	Penrith Lakes Development	North of Penrith City	Penrith	Possible	Moderate	Medium
4	61	Economic	Agricultural	Marsden Park Agricultural Area	Richmond Road, Marsden Park	Blacktown	Likely	Minor	Medium
4	62	Economic	Commercial	Erskine Park Industrial Area	Lenore Road, Erskine Park	Penrith	Unlikely	Major	Medium
4	63	Economic	Commercial	Wallgrove Industrial Area	Wallgrove Road, Eastern Creek	Blacktown	Possible	Moderate	Medium
4	64	Economic	Tourist and Recreational	Eastern Creek Raceway Complex	Ferrers Road, Eastern Creek	Blacktown	Possible	Moderate	Medium
4	65	Economic	Infrastructure	Prospect Water Filtration Plant	Ferrers Road, Wetherill Park	Blacktown	Unlikely	Major	Medium
4	66	Economic	Commercial	Eastern Creek Industrial Area	Peter Brock Drive, Eastern Creek	Blacktown	Possible	Moderate	Medium
4	67	Economic	Tourist and Recreational	Windbourne Retreat Conference Centre	Mulgoa Road, Mulgoa	Penrith	Likely	Minor	Medium
4	68	Human Settlement	Special Fire Protection	Regal Oaks Retirement Village	Park Road, Wallacia	Penrith	Unlikely	Major	Medium
4	69	Human Settlement	Special Fire Protection	Leonay Public School	Leonay Parade, Leonay	Penrith	Possible	Moderate	Medium
4	70	Human Settlement	Special Fire Protection	Edinglassie Retirement Village	Great Western Highway, Emu Plains	Penrith	Possible	Moderate	Medium
4	71	Human Settlement	Special Fire Protection	Our Lady of the Way Primary School	Forbes Street, Emu Plains	Penrith	Possible	Moderate	Medium
4	72	Human Settlement	Special Fire Protection	Emu Heights Child Care Centre	Wedmore Road, Emu Heights	Penrith	Possible	Moderate	Medium
4	73	Human Settlement	Special Fire Protection	Cherrywood Village	The Northern Road, Llandilo	Penrith	Possible	Moderate	Medium
4	74	Human Settlement	Special Fire Protection	Xavier College	Ninth Ave, Llandilo	Penrith	Unlikely	Major	Medium
4	75	Human Settlement	Special Fire Protection	Castlereagh Public School	Post Office Road, Castlereagh	Penrith	Possible	Moderate	Medium
4	76	Human Settlement	Special Fire Protection	Lakes Christian Collage	East Wilchard Road, Cranebrook	Penrith	Possible	Moderate	Medium
4	77	Human Settlement	Special Fire Protection	Castlereagh Child Care Centre	Castlereagh Road, Castlereagh	Penrith	Possible	Moderate	Medium
4	78	Human Settlement	Special Fire Protection	Londonderry Public School	Trahlee Road, Londonderry	Penrith	Possible	Moderate	Medium
4	79	Human Settlement	Residential	Boronia Road Interface	Boronia Road, North St Marys	Penrith	Possible	Moderate	Medium
4	80	Economic	Tourist and Recreational	Town and Country Caravan Park	Hollinsworth Drive, Marsden Park	Blacktown	Possible	Moderate	Medium
4	81	Economic	Infrastructure	Sewerage Treatment Plant - Riverstone	Bandon Road, Vineyard	Blacktown	Unlikely	Major	Medium
4	82	Economic	Commercial	Austral Bricks - Old Wallgrove Road	Old Wallgrove Road, Eastern Creek	Fairfield	Possible	Moderate	Medium
4	83	Economic	Commercial	Monier Brick & Tiles - Emu Plains	Mackellar Street, Emu Plains	Penrith	Possible	Moderate	Medium
4	84	Human Settlement	Residential	Glenmore Park South East		Penrith	Likely	Minor	Medium
NA	85	Economic	Tourist and Recreational	Glenmore Country Club	Mulgoa Road, Regentville	Penrith	Possible	Minor	Low
NA	86	Economic	Tourist and Recreational	Mamre House	Mamre Road, St Clair	Penrith	Possible	Minor	Low
NA	87	Economic	Tourist and Recreational	Richmond Race Track	Londonderry Road, Londonderry	Penrith	Possible	Minor	Low
NA	88	Economic	Tourist and Recreational	PCYC Motorbike Club	Rickards Road, Castlereagh	Penrith	Possible	Minor	Low
NA	89	Economic	Tourist and Recreational	Emu Plains Sports & Recreational Club	Leonay Parade, Leonay	Penrith	Possible	Minor	Low
NA	90	Economic	Tourist and Recreational	Wallacia Golf Club	Park Road, Wallacia	Penrith	Unlikely	Minor	Low
NA	91	Economic	Tourist and Recreational	Bill Spillstead Canine Complex	Luddenham Road	Penrith	Unlikely	Minor	Low

Priority	Map reference number	Asset type	Asset sub type	Asset name	Asset Location	LGA	Likelihood	Consequence	Risk
NA	92	Economic	Tourist and Recreational	Nepean Shores	Tench Avenue, Jamisontown	Penrith	Possible	Minor	Low
NA	93	Economic	Tourist and Recreational	Nepean River Caravan Park	Mackellar Street, Emu Plains	Penrith	Possible	Minor	Low
NA	94	Human Settlement	Residential	Wallacia Township	Built up area of Wallacia	Penrith	Unlikely	Moderate	Low
NA	95	Human Settlement	Residential	St Clair Interface West	Eastern side Mamre Road, St Clair	Penrith	Unlikely	Moderate	Low
NA	96	Human Settlement	Residential	St Clair Interface South	Southern interface of St Clair & Erskine Park	Penrith	Unlikely	Moderate	Low
NA	97	Human Settlement	Residential	Werrington Interface	Area adjacent along southern side old ADI site	Penrith	Unlikely	Moderate	Low
NA	98	Human Settlement	Residential	Stoney Creek Rural Residential Area			Unlikely	Moderate	Low
NA	99	Economic	Tourist and Recreational	C.A.R.E.S. Traffic School	Reen Road, Prospect	Blacktown	Possible	Minor	Low
NA	100	Economic	Mines	Mulgoa Quarries	Luddenham Road, Erskine Park	Penrith	Unlikely	Moderate	Low
NA	101	Economic	Tourist and Recreational	Wallacia Caravan Park	Silverdale Road, Wallacia	Penrith	Unlikely	Minor	Low
NA	102	Economic	Tourist and Recreational	Wallacia Bowling Club	Park Road, Wallacia	Penrith	Unlikely	Minor	Low
NA	103	Economic	Commercial	Wallacia Shopping Village	Mulgoa Road, Wallacia	Penrith	Possible	Minor	Low
NA	104	Economic	Commercial	Mulgoa Tip	Mulgoa Road, Mulgoa	Penrith	Possible	Minor	Low
NA	105	Human Settlement	Other	Emu Plains Correctional Centre	Old Bathurst Road, Emu Plains	Penrith	Unlikely	Moderate	Low
NA	106	Economic	Tourist and Recreational	Dunheved Golf Course	Links Road, St Marys	Penrith	Unlikely	Minor	Low
NA	107	Economic	Infrastructure	Water Treatment Plant - Orchard Hills	The Chase, Orchard Hills	Penrith	Unlikely	Moderate	Low
NA	108	Human Settlement	Special Fire Protection	Regentville Public School	School House Road, Regentville	Penrith	Unlikely	Minor	Low
NA	109	Human Settlement	Special Fire Protection	Llandilo Public School	Seventh Avenue, Llandilo	Penrith	Unlikely	Moderate	Low
NA	110	Economic	Commercial	CSR PGH Brickworks - Marsden Park	Townson Road, Marsden Park	Blacktown	Unlikely	Moderate	Low
NA	111	Human Settlement	Special Fire Protection	Vineyard Public School	Bandon Road, Vineyard	Blacktown	Unlikely	Moderate	Low
NA	112	Human Settlement	Special Fire Protection	Riverstone Public School	Garfield Road East, Riverstone	Blacktown	Unlikely	Moderate	Low
NA	113	Human Settlement	Special Fire Protection	University Western Sydney	Quakers Hill Parkway, Quakers Hill	Blacktown	Unlikely	Moderate	Low
NA	114	Human Settlement	Other	Parklea Prison	Sentry Drive, Parklea	Blacktown	Unlikely	Moderate	Low
NA	115	Human Settlement	Special Fire Protection	Mount View Nursing Home	Mulgoa Road, Penrith	Penrith	Unlikely	Moderate	Low
NA	116	Economic	Tourist and Recreational	Blacktown Pistol Club	Hammerli Way, Shalvey	Blacktown	Possible	Minor	Low
NA	117	Human Settlement	Residential	Emu Plains residential		Penrith	Possible	Minor	Low

Priority (Risk Rating)	Asset ID	Asset Name	Strategy	Treatment ID	Action Description	Comment	Responsible Agencies	Other RA	Support Agencies	Other SA	1011	1112	1213	1314	1415	
NA (Low)	105	Emu Plains Correctional Centre	Community Education	175	Conduct Community Engagement Activity within area		NSWFB				[1011]	[1112]	[1213]	[1314]	[1415]	
	106	Dunheved Golf Course														
	107	Water Treatment Plant - Orchard Hills	Hazard Reduction	46	SFAZ - Inspect & treat as required (FMP)	Inspect & treat SFAZ in accordance with agency management plan	Defence		RFS			[1011]	[1112]	[1213]	[1314]	[1415]
				176	APZ - Inspect & maintain as required	APZ - Inspect & maintain in accordance with agency policies & procedures	RFS					[1011]	[1112]	[1213]	[1314]	
	108	Regentville Public School														
	109	Llandilo Public School	Community Education	179	Conduct Community Engagement Activity		RFS					[1011]	[1112]	[1213]	[1314]	[1415]
	110	CSR PGH Brickworks - Marsden Park	Hazard Reduction	181	APZ - Inspect & maintain as required	APZ - Inspect & maintain in accordance with agency policies & procedures	RFS					[1011]	[1112]	[1213]	[1314]	[1415]
	111	Vineyard Public School														
	112	Riverstone Public School														
	113	University Western Sydney														
	114	Parklea Prison														
	115	Mount View Nursing Home														
	116	Blacktown Pistol Club	Hazard Reduction	83	APZ - Inspect & maintain as required	APZ - Inspect & maintain in accordance with agency policies & procedures	RFS					[1011]	[1112]	[1213]	[1314]	[1415]
				84	Conduct strategic mosaic burning		RFS						[1011]	[1112]	[1213]	[1314]
	117	Emu Plains residential	Hazard Reduction	183	APZ - Inspect & maintain as required	APZ - Inspect & maintain in accordance with agency policies & procedures	RFS					[1011]	[1112]	[1213]	[1314]	[1415]

Cumberland Zone BFMC Bush Fire Risk Management Plan

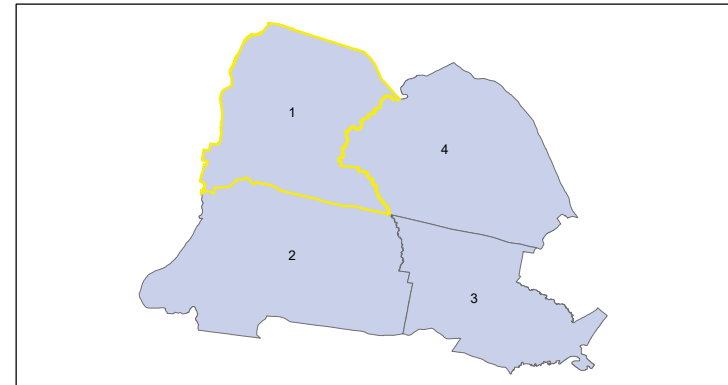
North West 2010 Display Area
Map 1 of 4

This Bush Fire Risk Management Plan (BFRMP) has been prepared by the Cumberland Zone Bush Fire Management Committee (BFMC) pursuant to section 52 of the Rural Fires Act 1997.

The aim of this BFRMP is to reduce the adverse impact of bush fires on life, property and the environment.

- The objectives of this BFRMP are to:
- reduce the number of human-induced bush fire ignitions that cause damage to life, property or the environment;
 - manage fuel to reduce the spread and intensity of bush fires while minimising environmental/ecological impacts;
 - reduce the community's vulnerability to bush fires by improving its preparedness; and
 - effectively contain fires with a potential to cause damage to life, property and the environment.

This map forms part of the BFRMP for the Cumberland Zone BFMC, covering the local government area(s) of Blackdown, Fairfield and Penrith. It should be viewed in conjunction with the accompanying BFRMP document which provides further details on the BFMC area, the assets assessed and the risk assessment process used.



Review
Under the Rural Fires Act 1997 this plan must be reviewed and updated within each successive five year period following the constitution of the BFMC. The Cumberland Zone BFMC will also review this plan as necessary. This may be triggered by a range of circumstances, including but not limited to:

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- changes to the bush fire risk in the area; or
- following a major fire event.

Assets
This BFRMP identifies the assets that are considered by the Cumberland Zone BFMC and community to be at risk from bush fires, assesses the bush fire risk to each asset and assigns treatments designed to mitigate the risk. Assets in the BFMC area identified as requiring treatments are listed in the assets table. Other assets within the BFMC area that were assessed as not requiring treatments within the life of this plan are listed in the appendix to the BFRMP document. The Map Ref number "NA" denotes non-spatial assets.

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- reviewing the bush fire prone land map;
- ensuring developments in the bush fire prone land comply with Planning for Bush Fire Protection;
- using the Local Environment Plans (LEPs) to control development in areas with a bush fire risk;
- paying the standard bush fire danger period as required;
- requiring permits during bush fire danger periods
- prosecution of arsonists/offenders
- investigation of bush fire cause;
- normal fire suppression activities;
- assessing and managing compliance with strategic fire-fighting resource allocation management systems;
- preparation of a S2 Operations Coordination Plan;
- fire management plans or plans of management; and
- bush fire hazard complaints.

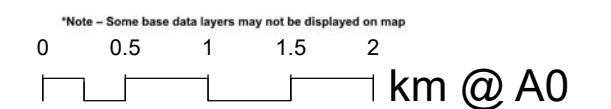
Note on LMAZ. All areas not specifically mapped as an APZ, SFAZ or FEZ are considered as LMAZ for this risk management plan. For areas identified by an LMAZ polygon on the map, please refer to the BFRMP document for the specific land management objectives.

Zone	Purpose	Suppression Objective(s)	Zone characteristics
Asset Protection Zone	To protect human life, property and highly valued public assets and values.	To enable the safe use of Direct Attack suppression strategies within the zone. To minimise bush fire impacts on unclassified assets.	As per RFS document Standards for Asset Protection Zones.
Strategic Fire Advantage Zone	To provide strategic areas of fire protection advantage which will reduce the spread and intensity of bush fires, and reduce the potential for spot fire development. To act as containment of wildfires to existing land management boundaries.	To improve the likelihood and safe use of Parallel Attack suppression strategies within the zone. Indirect Attack (back burning) in high to very high fire weather conditions within the zone. To reduce the likelihood of Crown fire development within the zone. To reduce the likelihood of Spot fire ignition potential from the zone.	Zone with related to suppression objectives and dependent upon: - Topography - Aspect - Spotting propensity - Location of adjacent freetanks - Mosaic pattern of treatment - Assess Overall Fuel Hazard (OFH) once vegetation communities reach minimum fire thresholds within this plan. Management practices should aim to achieve mosaic fuel reduction patterns so that the majority of the SFAZ has an OFH of less than high.
Land Management Zone	To meet relevant land management objectives in areas where APZs or SFAZs are not appropriate.	To reduce the likelihood of spread of fires. To undertake mosaic burning	As appropriate to achieve land management e.g. heritage and/or fire protection e.g. broad scale mosaic burning objectives.
Fire Exclusion Zone	To exclude bush fires.	N/A	Variable dependent on size of fire sensitive area requiring protection.

- Assets**
- Human - Residential
 - Human - Other
 - Special Fire Protection
 - Economic - Agricultural
 - Economic - Commercial
 - Economic - Infrastructure
 - Economic - Tourism and Recreational
 - Economic - Mines
 - Commercial Forests
 - Drinking Water Catchments
 - Environmental - Locally Important
 - Environmental - Vulnerable (Species)
 - Environmental - Vulnerable (Spices)
 - Cultural - Heritage
 - Cultural - Other
 - Cultural - Non Indigenous

- Bush Fire Management Zones**
- Fire Exclusion Zone (FEZ)
 - Asset Protection Zone (APZ)
 - Land Management Zone (LMAZ)
 - Strategic Fire Advantage Zone (SFAZ)

- Base Data Layers**
- Major Roads Sealed
 - Secondary Road Sealed
 - Local Road Sealed
 - Local Road Unsealed
 - Local Road Unspecified
 - 4WD Track Unspecified
 - Path
 - Heavy Rail
 - Light Rail
 - Heavy Rail Sliding
 - Drainage Potential
 - High-Line Potential
 - Hydro-Line Potential
 - Control (100m)
 - Control (50m)
 - Map Display Area
 - Local Government Area
 - Crown Land
 - State Forests
 - National Park



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Authorized by _____ of Cumberland Zone BFMC.

Date created: Thursday, 17 June 2010

BFRR version 2.0.1.5 + S

Cumberland Zone BFMC Bush Fire Risk Management Plan

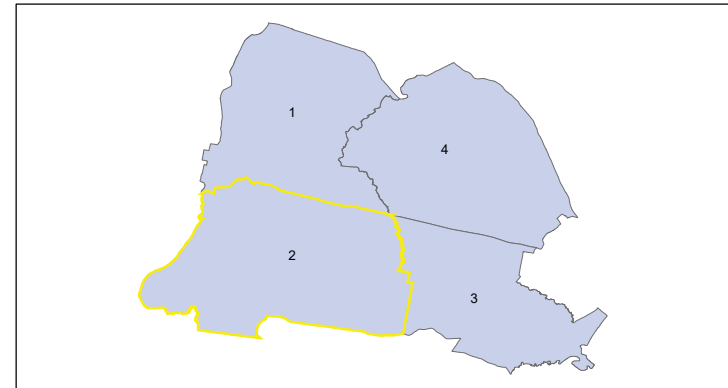
South West 2016 Display Area
Map 2 of 4

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- using the Local Environment Plans (LEPs) to control development in areas with a bush fire risk;
- varying the standard bush fire danger period as required;
- requiring permits during bush fire danger periods
- prosecution of arsonists/offenders
- investigation of bush fire cause;
- normal fire suppression activities;
- assessing and managing compliance with strategic fire-fighting resource allocation management systems;
- preparation of a S2 Operations Coordination Plan;
- fire management plans or plans of management; and
- bush fire hazard complaints.

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Land Management Zone	To meet relevant land management objectives in areas where APZs or SFAZs are not appropriate.	To reduce the likelihood of spread of fires. To undertake mosaic burning	As appropriate to achieve land management and fire protection objectives of the responsible land management agency. To reduce the likelihood of spread of fires. To undertake mosaic burning
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 - Path
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 - Control (50m)
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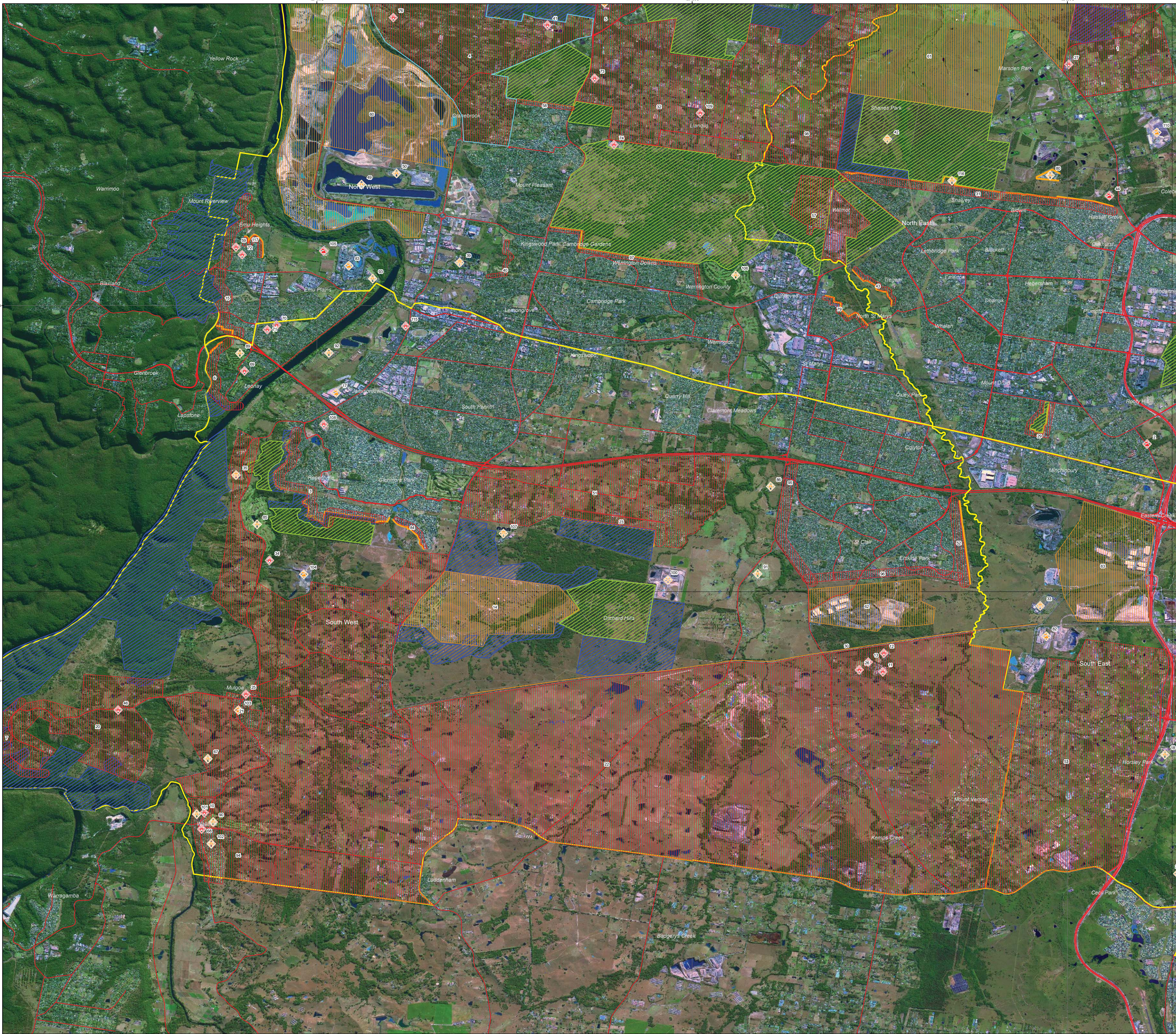
*Note - Some base data layers may not be displayed on map
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BFRR version 2.0.1.5 + S



Cumberland Zone BFMC Bush Fire Risk Management Plan

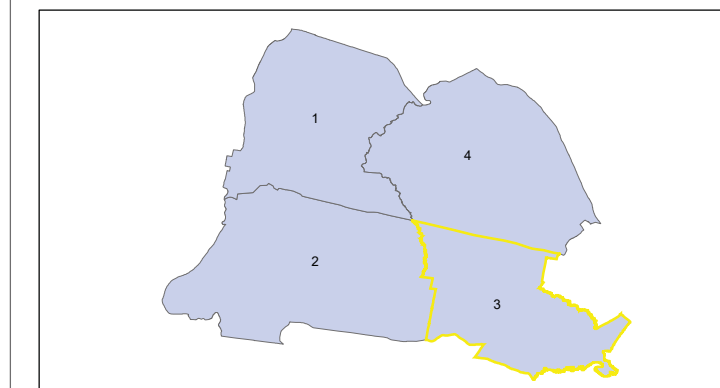
South East 2010 Display Area
Map 3 of 4

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- requiring permits during bush fire danger periods
- prosecution of arsonists/offenders
- investigation of bush fire cause;
- normal fire suppression activities;
- assessing and managing compliance with strategic fire-fighting resource allocation management systems;
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Note on LMAZ. All areas not specifically mapped as an APZ, SFAZ or FEZ are considered as LMAZ for this risk management plan. For areas identified by an LMAZ polygon on the map, please refer to the BFRMP document for the specific land management objectives.

Zone	Purpose	Suppression Objective(s)	Zone characteristics
Asset Protection Zone	To protect human life, property and highly valued public assets and values.	To enable the safe use of Direct Attack suppression strategies within the zone. To minimise bush fire impacts on unattended assets.	As per RFS document Standards for Asset Protection Zones.
Strategic Fire Advantage Zone	To provide strategic areas of fire protection advantage which will reduce the spread and intensity of bush fires, and reduce the potential for spot fire development. To use containment of wildfires to existing management boundaries.	To improve the likelihood and safe use of: Parallel Attack suppression strategies within the zone. Indirect Attack (back burning) in high to very high fire weather conditions within the zone. To reduce the likelihood of: Crown fire development within the zone. Spot fire ignition potential from the zone.	Zone with related to suppression objectives and dependent upon: - Topography - Aspect - Spotting propensity - Location of adjacent freeways - Mosaic pattern of treatment Assess Overall Fuel Hazard (OFH) once vegetation communities reach minimum fire thresholds within this plan. Management practices should aim to achieve mosaic fuel reduction patterns so that the majority of the SFAZ has an OFH of less than high.
Land Management Zone	To meet relevant land management objectives in areas where APZs or SFAZs are not appropriate.	To reduce the likelihood of spread of fires. To undertake mosaic burning	As appropriate to achieve land management and fire protection objectives e.g. heritage and/or broad scale mosaic burning objectives.
Fire Exclusion Zone	To exclude bush fires.	N/A	Variable dependent on size of fire sensitive area requiring protection.

Assets	
	Human - Residential
	Human - Other
	Special Fire Protection
	Economic - Agricultural
	Economic - Commercial
	Economic - Infrastructure
	Economic - Tourism and Recreational
	Economic - Mines
	Commercial Forests
	Drinking Water Catchments
	Environmental - Locally Important
	Environmental - Vulnerable
	Environmental - Openland
	Cultural - Heritage
	Cultural - Other
	Cultural - Non Indigenous

Bush Fire Management Zones	
	Fire Exclusion Zone (FEZ)
	Asset Protection Zone (APZ)
	Land Management Zone (LMAZ)
	Strategic Fire Advantage Zone (SFAZ)

Base Data Layers	
	Major Roads Sealed
	Major Roads Unsealed
	Secondary Road Sealed
	Secondary Road Unsealed
	Local Road Sealed
	Local Road Unsealed
	Local Road Unspecified
	4WD Track Unspecified
	Path
	Heavy Rail
	Light Rail
	Heavy Rail Sliding
	Drainage Potential
	Drainage Non Potential
	Hydro-Line Potential
	Hydro-Line Non Potential
	Contour (100m)
	Contour (50m)
	Map Display Area
	Local Government Area
	Crown Land
	State Forests
	National Park

*Note - Some base data layers may not be displayed on map

0 0.5 1 1.5 2
km @ A0

Disclaimer
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The Cumberland Zone BFMC can not guarantee and assumes no legal liability or responsibility for the accuracy.

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Date created: Thursday, 17 June 2010

BFRR version 2.0.1.5 + S



Cumberland Zone BFMC Bush Fire Risk Management Plan

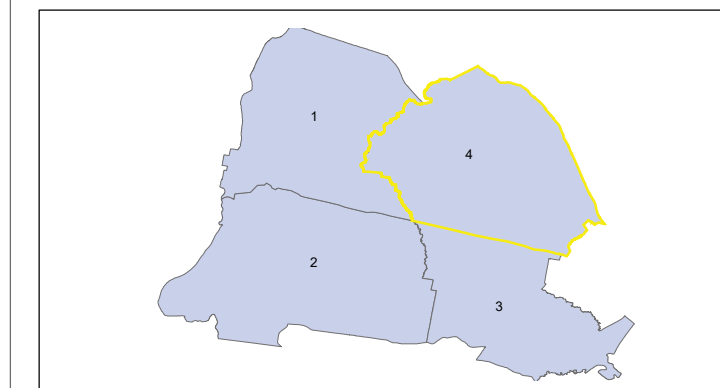
North East 2010 Display Area
Map 4 of 4

This Bush Fire Risk Management Plan (BFRMP) has been prepared by the Cumberland Zone Bush Fire Management Committee (BFMC) pursuant to section 52 of the Rural Fires Act 1997.

The aim of this BFRMP is to reduce the adverse impact of bush fires on life, property and the environment.

- The objectives of this BFRMP are to:
- reduce the number of human-induced bush fire ignitions that cause damage to life, property or the environment;
 - manage fuel to reduce the spread and intensity of bush fires while minimising environmental/ecological impacts;
 - reduce the community's vulnerability to bush fires by improving its preparedness; and
 - effectively contain fires with a potential to cause damage to life, property and the environment.

This map forms part of the BFRMP for the Cumberland Zone BFMC, covering the local government area(s) of Blacktown, Fairfield and Penrith. It should be viewed in conjunction with the accompanying BFRMP document which provides further details on the BFMC area, the assets assessed and the risk assessment process used.



Review
Under the Rural Fires Act 1997 this plan must be reviewed and updated within each successive five year period following the constitution of the BFMC. The Cumberland Zone BFMC will also review this plan as necessary. This may be triggered by a range of circumstances, including but not limited to:

- changes to the BFMC area, organisational responsibilities or legislation;
- changes to the bush fire risk in the area; or
- following a major fire event.

Assets
This BFRMP identifies the assets that are considered by the Cumberland Zone BFMC and community to be at risk from bush fires, assesses the bush fire risk to each asset and assigns treatments designed to mitigate the risk. Assets in the BFMC area identified as requiring treatments are listed in the assets table. Other assets within the BFMC area that were assessed as not requiring treatments within the life of this plan are listed in the appendix to the BFRMP document. The Map Ref number "NA" denotes non-spatial assets.

Treatments
Specific treatments assigned to assets in the Cumberland Zone area are listed in the treatments table and linked to the assets which they are designed to protect. Standard BFMC wide treatments (i.e. not linked to a specific asset) which occur on an ongoing basis within the BFMC area are:

- reviewing the bush fire prone land map;
- ensuring developments in the bush fire prone land comply with Planning for Bush Fire Protection;
- using the Local Environment Plans (LEPs) to control development in areas with a bush fire risk;
- varying the standard bush fire danger period as required;
- requiring permits during bush fire danger periods;
- prosecution of arsonists/offenders;
- investigation of bush fire cause;
- normal fire suppression activities;
- assessing and managing compliance with strategic fire-fighting resource allocation management systems;
- preparation of a S2 Operations Coordination Plan;
- fire management plans or plans of management; and
- bush fire hazard complaints.

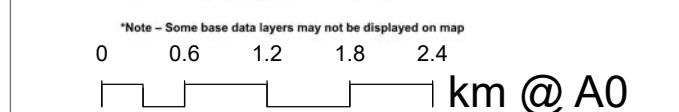
Note on LMZ: All areas not specifically mapped as an APZ, SFAZ or FEZ are considered as LMZ for this risk management plan. For areas identified by an LMZ polygon on the map, please refer to the BFRMP document for the specific land management objectives.

Zone	Purpose	Suppression Objective(s)	Zone characteristics
Asset Protection Zone	To protect human life, property and highly valued public assets and values.	To enable the safe use of Direct Attack suppression strategies within the zone. To minimise bush fire impacts on unoccupied assets.	As per RFS document Standards for Asset Protection Zones.
Strategic Fire Advantage Zone	To provide strategic areas of fire protection advantage which will reduce the spread and intensity of bush fires, and reduce the potential for spot fire development. To act containment of wildfires to existing land management boundaries.	To improve the likelihood and safe use of Parallel Attack suppression strategies within the zone. Location of adjacent freeways and indirect attack (back burning) in high to very high fire weather conditions within the zone. To reduce the likelihood of Crown fire development within the zone, and/or Spot fire ignition potential from the zone.	Zone width related to suppression objectives and dependent upon: - Topography - Aspect - Spotting propensity - Location of adjacent freeways - Mosaic pattern of treatment Assess Overall Fuel Hazard (OFH) once vegetation communities reach minimum fire thresholds within this plan. Management practices should aim to achieve mosaic fuel reduction patterns so that the majority of the SFAZ has an OFH of less than high.
Land Management Zone	To meet relevant land management objectives in areas where APZ or SFAZs are not appropriate.	To reduce the likelihood of spread of fires. To undertake mosaic burning	As appropriate to achieve land management objectives e.g. heritage and/or fire protection e.g. broad scale mosaic burning objectives.
Fire Exclusion Zone	To exclude bush fires.	N/A	Variable dependent on size of fire sensitive area requiring protection.

- Assets**
- Human - Residential
 - Human - Other
 - Special Fire Protection
 - Economic - Agricultural
 - Economic - Commercial
 - Economic - Infrastructure
 - Economic - Tourism and Recreational
 - Economic - Mines
 - Commercial Forests
 - Drinking Water Catchments
 - Environmental - Locally Important
 - Environmental - Vulnerable
 - Environmental - (Species)
 - Cultural - Heritage
 - Cultural - Other
 - Cultural - Non Indigenous

- Bush Fire Management Zones**
- Fire Exclusion Zone (FEZ)
 - Asset Protection Zone (APZ)
 - Land Management Zone (LMZ)
 - Strategic Fire Advantage Zone (SFAZ)

- Base Data Layers**
- Major Roads Sealed
 - Secondary Road Sealed
 - Local Road Sealed
 - Local Road Unsealed
 - Local Road Unspecified
 - 4WD Track Unspecified
 - Path
 - Heavy Rail
 - Light Rail
 - Heavy Rail Sliding
 - Drainage Potential
 - Drainage Non Potential
 - Hydro-Line Potential
 - Hydro-Line Non Potential
 - Contour (100m)
 - Contour (50m)
 - Map Display Area
 - Local Government Area
 - Crown Land
 - State Forests
 - National Park



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Date created: Thursday, 17 June 2010

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Appendix VI

The Hills Bushfire Risk Management Plan

The Hills Bush Fire Management Committee

Bush Fire Risk Management Plan



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Authorisation

In accordance with Part 3 Division 4 of the Rural Fires Act 1997, this Plan has been prepared by The Hills Bush Fire Management Committee and has been endorsed at the BFMC meeting on 04/04/2019 for submission to the Bush Fire Coordinating Committee.

Recommended



9/8/19

Clr Robyn Preston
Chairperson
The Hills Bush Fire Management Committee

Approved



On behalf of the
NSW Bush Fire Coordinating Committee

Amendment List

Amendment		Entered	
Number	Date	Signature	Date

Glossary

Assets: anything valued by the community which includes houses, crops, heritage buildings and places, infrastructure, the environment, businesses, and forests, that may be at risk from bush fire.

Bush Fire: a general term used to describe fire in vegetation, includes grass fire.

Bush Fire Hazard: the potential severity of a bush fire, which is determined by fuel load, fuel arrangement and topography under a given climatic condition.

Bush Fire Risk: the chance of a bush fire igniting, spreading and causing damage to the community or the assets they value.

Bush Fire Risk Management: a systematic process that provides a range of treatments which contribute to the well being of communities and the environment, which suffer the adverse effects of wildfire/bush fire.

Bush Fire Threat: potential bush fire exposure of an asset due to the proximity and type of a hazard and the slope on which the hazard is situated.

Consequence: outcome or impact of a bush fire event.

Fire Fighting Authorities: the NSW Rural Fire Service, NSW Fire Brigades, the National Parks and Wildlife Service and Forests NSW.

Likelihood: the chance of a bush fire igniting and spreading.

Major Bush Fire: A bush fire which requires the attendance of multiple brigades, or causes damage to property or injury to one or more persons.

Display area: geographic area determined by the Bush Fire Management Committee which is used to provide a suitable area and scale for community participation and mapping display purposes.

Recovery costs: the capacity of an asset to recover from the impacts of a bush fire.

Risk Acceptance: an informed decision to accept the consequences and the likelihood of a particular risk.

Risk Analysis: a systematic process to understand the nature of and to deduce the level of risk.

Risk Assessment: the overall process of risk identification, risk analysis and risk evaluation.

Risk Identification: the process of determining what, where, when, why, and how something could happen.

Risk Treatment: the process of selection and implementation of measures to modify risk.

Vulnerability: the susceptibility of an asset to the impacts of bush fire.

Chapter 1. Introduction

1.1 Background

Under the *Rural Fires Act 1997* the Bush Fire Coordinating Committee (BFCC) must constitute a Bush Fire Management Committee (BFMC) for each area in the State, which is subject to the risk of bush fires. Each BFMC is required to prepare and submit to the BFCC a draft Bush Fire Risk Management Plan (BFRMP).

A BFRMP is a strategic document that identifies community assets at risk and sets out a five-year program of coordinated multi-agency treatments to reduce the risk of bush fire to the assets. Treatments may include such things as hazard reduction burning, community education and fire trail maintenance.

Annual programs to implement the treatments identified in this plan will be undertaken by the relevant land managers and fire fighting authorities.

In exercising its functions under the *Rural Fires Act 1997*, including the preparation of a bush fire risk management plan, the Hills BFMC is required to have regard to the principles of ecologically sustainable development (ESD).

This document and the accompanying maps together form the BFRMP for The Hills BFMC area.

This BFRMP has been prepared by The Hills BFMC and covers both public and private lands. This BFRMP must be reviewed and updated within each successive five-year period from the constitution of the BFMC.

The BFCC recognises that climate change has the potential to increase bush fire risk. The risk assessment process applied in this BFRMP is based on current climatic conditions. The BFCC will monitor information on climate change and will modify the process when necessary.

1.2 Aim and Objectives

The **aim** of this BFRMP is to minimise the risk of adverse impact of bush fires on life, property and the environment.

The **objectives** of this BFRMP are to:

- reduce the number of human-induced bush fire ignitions that cause damage to life, property and the environment;
- manage fuel to reduce the rate of spread and intensity of bush fires, while minimising environmental/ecological impacts;
- reduce the community's vulnerability to bush fires by improving its preparedness; and
- effectively contain fires with a potential to cause damage to life, property and the environment.

1.3 Description of The Hills BFMC Area

1.3.1 Location and land tenure

The Hills BFMC area is located in Sydney's North West in New South Wales and includes the Local Government Area of The Hills Shire.

The area covered by The Hills BFMC is approximately 38,630 hectares and includes the land tenures outlined in Table 1.1.

Table 1.1 Land Tenure

Land Manager	% of BFMC area (Approx)
National Parks and Wildlife Service	1.5
Forestry Corporation of NSW	0.1
Department of Lands	9.0
Local Government	7.0
Private	81.4
Other (including Sydney Water, RMS, Endeavour Energy, Department of Education and Training, Department of Planning)	1.0

1.3.2 Climate and bush fire season

The typical/average climate in The Hills BFMC area is warm summers and cool winters with the most rainfall received during summer and autumn (December to May) and a drier winter and spring (June to November).

The start of the normal bush fire season coincides with northwest winds, which often prevail during late spring (Sep/Oct). The majority of serious bushfires occur from this period until the onset of autumn.

1.3.3 Population and demographic information

The Hills BFMC area is predominantly residential and rural. The rural areas in the northern part of the Shire boast significant amounts of agriculture, national parks, as well as semi-rural and rural-residential living. The southern parts of the Shire feature well-established residential and commercial areas as well as large areas of recent residential and employment development.

The population of The Hills BFMC area is approximately 172,473 people with the major population centres being the more established Baulkham Hills, Castle Hill and West Pennant Hills. Areas of growth now and into the future however include the precincts of Kellyville, North Kellyville, Rouse Hill and Box Hill with some increase in the more rural areas of Kenthurst, Glenorie, Maroota and South Maroota due to Rural Cluster Subdivisions.

1.3.4 History of bush fire frequency and ignition cause

The Hills BFMC area has on average 153 bush fires per year, of which approximately 4 on average can be considered to be major fires.

Major bush fires that have occurred in The Hills Shire were in 1939, 1975, 1991, 1994, 2002, 2006. The most notable were in 1991 and 2002. In 1991 a 1630Ha fire burnt through Kenthurst under a NW wind and resulted in the loss of two lives and the destruction of 7 homes. In 2002 over 45,000Ha were burnt after 3 fires joined together. The fire destroyed 31 homes and 47 other structures and damaged many more.

Most commonly today the main sources of ignition in The Hills BFMC area are:

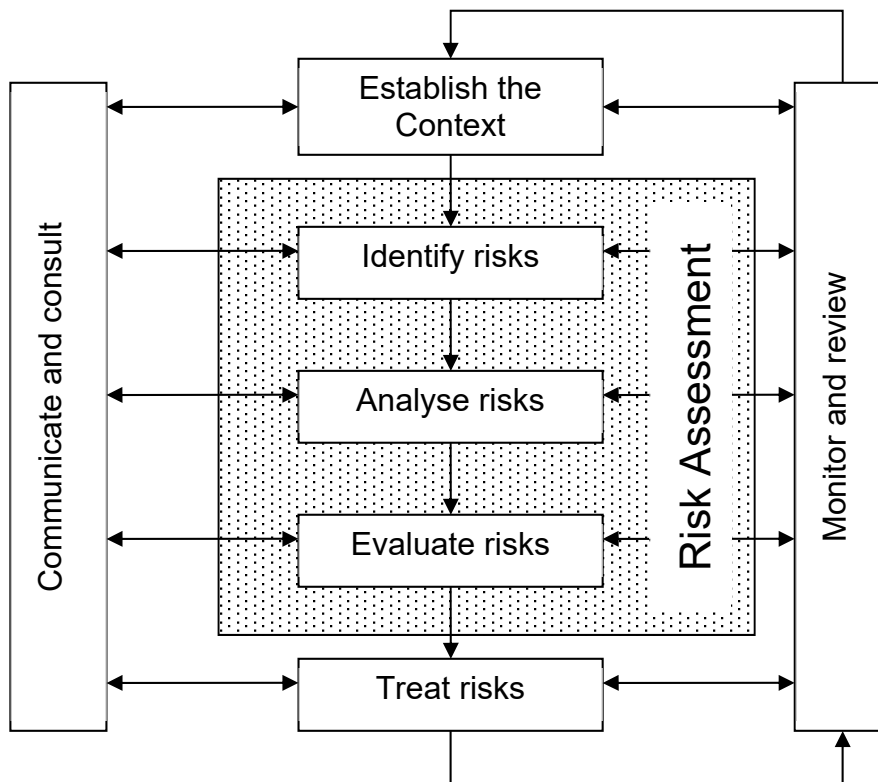
- Escaped private hazard reductions burns;
- Lightning; and
- Arson.

Chapter 2. Identifying and Assessing the Bush Fire Risk

2.1 Process

The Australia/New Zealand Standard *AS/NZS 4360: 2004 Risk Management* was used as the basis for the risk assessment process. See Figure 2.1 for the steps involved. For a detailed description of the process undertaken see the Bush Fire Risk Management Planning Guidelines for Bush Fire Management Committees on the RFS website: www.rfs.nsw.gov.au.

Figure 2.1 Overview of the risk assessment process



2.2 Communication and Consultation

Community participation is an integral part of risk management. The Community Participation Strategy involved developing and implementing a process to address the needs, issues and concerns of stakeholders within the BFMC area in regards to the BFRMP. See Appendix 1 for the Community Participation Strategy used by The Hills BFMC in preparing this BFRMP.

2.3 Identifying the Bush Fire Risk

Identifying the level of bush fire risk firstly involved identifying important community assets considered to be at risk from bush fire in The Hills BFMC area, and then assessing the likelihood and consequence ratings.

2.3.1 Assets

BFMC members and the community, including RFS volunteers, identified assets within The Hills BFMC that they believed were at risk of bush fire. The assets were divided into four asset types:

Human settlement

- Residential areas including urban bushland interface areas and rural properties;
- Special Fire Protection areas including schools, hospitals, nursing homes, and tourist facilities;
- Other human settlement areas including commercial and industrial areas where distinct from major towns; and
- Neighbourhood Safer Place (NSP) is defined by the *Rural Fires Act 1997* as *land or a building designated as a neighbourhood safer place under section 62C*. NSPs provide a place of last resort for people during a bush fire. All designated NSP locations for NSW are available at www.rfs.nsw.gov.au.

Economic

- Agricultural; e.g. orchards, plant nurseries, cropping/grazing land;
- Commercial/industrial e.g. major industries, waste treatment plants;
- Infrastructure e.g. regional and domestic power supply lines, gas and oil pipelines, railway lines, electricity substations, communication facilities and supply lines;
- Tourist and recreational e.g. tourist sites and facilities, resorts, retreats;
- Rural based home industry and infrastructure; and
- Mining sand and hard rock and various infrastructure.

Environmental

- Threatened species, populations and endangered ecological communities and Ramsar wetlands;
- Locally important species and ecological communities, such as species and ecological communities especially sensitive to fire.
- SEPP Coastal Management 2018.

Cultural

- Aboriginal significance – Aboriginal places and items of significance;
- Non-indigenous heritage – places and items arising from the early occupation of NSW by European or other non-indigenous settlers; and
- Other cultural assets – community halls, clubs and recreational facilities.

See Appendix 2 for the full list of assets identified within The Hills BFMC area. See maps 1-4 for the location of assets to be treated under this BFRMP.

Note: The more sensitive Assets (ie Environmental and Indigenous Cultural) do not appear within the Map Display Areas so as to protect their locations from being disclosed to the general public. Despite this specific treatments for their protection from high fire intensities and too frequent regimes are taken into account during fire management and planning processes.

2.3.2 Assessing the Bush Fire Risk - Consequence

Once the assets were identified, the consequence of a bush fire impacting on these assets was assessed.

See Appendix 2 for the consequence ratings assigned to each asset identified in The Hills BFMC area.

The different asset types had different assessment processes used to determine the consequence. These processes are identified below.

Human settlement

A potential fire behaviour model using vegetation type, slope and separation distance was used to produce a threat rating for human settlement assets. The vulnerability of the asset to a bush fire was also assessed and a rating assigned. These ratings were then used to assess the consequence of a bush fire impacting upon a human settlement asset.

Special Fire Protection (SFP) assets were considered inherently more vulnerable to bush fire due to mobility capacity, knowledge or other issues relating to their inhabitants, (e.g. the elderly, infirm, children or tourists) and therefore stricter requirements for vulnerability assessment and rating were applied.

Due to circumstances surrounding NSPs and their use during a bush fire, stricter requirements for vulnerability assessment and rating will also apply to these assets.

Economic

The level of economic impact e.g. local, regional or state, as well as the economic recovery costs (how long and complicated a financial recovery will be) of the asset were identified. These ratings were used to assess the consequence of a bush fire impacting upon an economic asset.

Environmental

Environmental assets with known minimum fire threshold were assessed to determine if they were at risk of a bush fire within the 5 year life of the BFRMP. Those environmental assets which were within or above the fire threshold were not assessed in the BFRMP, as the negative impact of a fire within the 5 year period was determined as being low and may even be of benefit to the asset and surrounding habitat.

The vulnerability of an environmental asset was determined by its conservation status and its geographic extent (distribution across the landscape). Vulnerability and potential impact of bush fire were used to assess the consequence of a bush fire impacting upon an environmental asset.

Cultural

For non-indigenous historical, Aboriginal and other cultural assets a potential fire behaviour model using fuel load, slope and proximity was used to produce a threat rating. The physical vulnerability of the asset to a bush fire was also assessed. These ratings were then used to assess the consequence of a bush fire impacting upon a cultural asset.

2.3.3 Assessing the Bush Fire Risk - Likelihood

For all asset types the likelihood of a bush fire occurring was assessed. This involves considering fire history, including ignition cause and patterns, known fire paths, access, containment potential and potential fire run (size of the vegetated area). See Appendix 2 for the likelihood ratings assigned to each asset identified in The Hills BFMC area.

2.3.4 Identifying the level of risk

The consequence and likelihood ratings were then used to identify the level of risk. See Appendix 2 for the risk ratings assigned to each asset identified in The Hills BFMC area.

2.3.5 Evaluating the Bush Fire Risk

Once the risk ratings for each asset were identified, they were evaluated to:

- a) confirm that risk levels identified in the risk analysis process are appropriate and reflect the relative seriousness of the bush fire risk;
- b) identify which assets require treatments; and
- c) identify treatment priorities.

2.3.6 Prioritising Treatments

No organisation has limitless resources to deal with adverse risk. It is therefore necessary to define priorities. The bush fire risk ratings determined were used to prioritise the risk treatments, i.e. areas of extreme risk were considered first for treatment, then very high, then high then medium then low.

2.3.7 Risk Acceptability

Risks below a certain level were assessed as not requiring treatment within the life of this plan. This is due to a combination of risk priority and capacity to undertake the works. Within The Hills BFMC area the level of acceptability is high. Areas of high, medium or low risk are likely to be managed by routine procedures and so do not require a specific application of resources.

The Hills BFMC has accepted that there will be extreme and very high risk to some environmental, aboriginal and non indigenous cultural assets of significance. The Hills BFMC will not be applying specific treatments to these assets as they may not be appropriate or may have the potential to damage the asset. However, the protection and management of these assets will be taken into account during the planning of treatments for the area. The BFMC wide treatments, in addition to scheduled treatments such as prescribed burns and fire trail maintenance, are likely to contribute toward the reduction of risk to these assets.

All NSPs for a BFMC area will require ongoing treatment by the applicable land owner to ensure that the asset remains viable as a place of last resort for people during a bush fire. Therefore, all NSP assets are allocated specific treatments in this Plan, regardless of the level of bush fire risk identified and the risk acceptability nominated by The Hills BFMC.

Chapter 3. Treating the Risk

3.1 Bush Fire Management Zones

Bush Fire Management Zones were identified within The Hills BFMC area and mapped (see maps 1-4). These zones identify the fire management intent for a specific area. See Table 3.1 for descriptions of the zones and their purposes. The four categories of Bush Fire Management Zones are:

- Asset Protection Zone (APZ);
- Strategic Fire Advantage Zone (SFAZ);
- Land Management Zone (LMZ); and
- Fire Exclusion Zone (FEZ).

Table 3.1 Bush Fire Management Zones: Purpose, objectives and characteristics

Zone	Purpose	Suppression Objective(s)	Zone characteristics
Asset Protection Zone	To protect human life, property and highly valued public assets and values.	To enable the safe use of Direct Attack suppression strategies within the zone. To minimise bush fire impacts on undefended assets.	As per RFS document <i>Standards for Asset Protection Zones</i> .
Strategic Fire Advantage Zone	To provide strategic areas of fire protection advantage which will reduce the speed and intensity of bush fires, and reduce the potential for spot fire development; To aid containment of wildfires to existing management boundaries.	To improve the likelihood and safe use of: Parallel Attack suppression strategies within the zone. and/or Indirect Attack (back burning) in high to very high fire weather conditions within the zone. To reduce the likelihood of: Crown fire development within the zone. and/or Spot fire ignition potential from the zone	Zone width related to suppression objectives and dependant upon: <ul style="list-style-type: none"> • Topography • Aspect • Spotting propensity • Location of adjacent firebreaks • Mosaic pattern of treatment Assess Overall Fuel Hazard (OFH) once vegetation communities reach minimum fire thresholds within this plan. Management practices should aim to achieve mosaic fuel reduction patterns so that the majority of the SFAZ has an OFH of less than high.
Land Management Zone	To meet relevant land management objectives in areas where APZs or SFAZs are not appropriate.	As per the land management and fire protection objectives of the responsible land management agency. To reduce the likelihood of spread of fires. To undertake mosaic burning	As appropriate to achieve land management e.g. heritage and/or fire protection e.g. broad scale mosaic burning objectives.
Fire Exclusion Zone	To exclude bush fires.	N/A	Variable dependant on size of fire sensitive area requiring protection.

NB: OFH refers the Overall Fuel Hazard Guide as described in the document published by (Dept. of Sustainability and Environment 3rd ed. 1999 & NPWS version); State-wide procedures for assessment of fuel hazard will be developed in conjunction with the BFCC.

Note: All areas that are not mapped or described as APZs, SFAZs or FEZs are considered as LMZs.

3.2 BFMC Wide Treatments

BFMC wide treatments are activities which reduce the overall bush fire risk within the BFMC area and are undertaken on an ongoing basis as part of normal business. These treatments are not linked to specific assets in the BFRMP, rather they are applied across all or part of the BFMC area as designated by legislation or agency policy. BFMC wide treatments include the following:

- **Reviewing the bush fire prone land map**

These maps identify bush fire prone land and are used to trigger whether a development application is assessed using *Planning for Bush Fire Protection*¹.

- **Ensuring developments in bush fire prone land comply with *Planning for Bush Fire Protection***

This assessment process requires new applications for development to include bush fire protection measures.

- **Using the Local Environment Plan/s (LEPs) to control developments in areas with a bush fire risk**

LEPs can be used to exclude development in extreme bush fire risk areas or where bush fire protection measures cannot be incorporated.

- **Varying the standard bush fire danger period as required**

In years where the weather is particularly adverse the bush fire danger period may be brought in early or extended. This is assessed every year by the BFMC. The standard bush fire danger period in The Hills BFMC area is 1st October to 31st March.

- **Requiring permits during the bush fire danger period**

In the bush fire danger period a fire safety permit is required to light a fire in the open. Permits specify conditions such as fire fighting equipment that must be on site, or restrict burns based on weather conditions.

- **Prosecution of arsonists/offenders**

Under the *Rural Fires Act 1997* persons may be prosecuted for breaching the conditions on a fire permit, lighting a fire during a Total Fire Ban, allowing fire to escape their property, or other breaches of the Act.

- **Investigation of bush fire cause**

All bush fires which do not have a known cause are investigated to identify how they started.

- **Normal fire suppression activities**

Responding to bush fire is a normal business activity for the fire fighting authorities.

¹ NSW Rural Fire Service 2006 *Planning for Bush Fire Protection: A guide for councils, planners, fire authorities and developers*.

- **Assessing and managing compliance with strategic fire fighting resource allocation provisions**

Strategic fire fighting resource allocation provisions is the process used to identify the number of stations, brigades and appliances required in an area, and considers members, training, assets and hazards.

- **Preparation of a S52 Operations Coordination Plan**

The Operations Coordination Plan is prepared biannually and sets out how coordinated fire fighting will occur. It includes specific operational restrictions on fire fighting techniques in certain areas, where fires will be managed from, and how agencies involved can communicate during operations.

- **Fire Management Plans or Plans of Management**

Land management agencies within the Hills BFMC (such as NPWS, Forestry Corporation of NSW, Council or Bidjigal Reserve Trust board) have developed fire management plans or plans of management with specific fire or fuel management strategies. These plans form the basis for operational fire planning on public parks, reserves, biobanking and operational sites and forests.

- **Bush Fire Hazard Complaints**

If someone is concerned about possible bush fire hazards on a neighbouring property or any other land, then this can be reported to the RFS Commissioner or their local RFS Fire Control Centre. The complaint will be investigated and may result in a notice being issued to the landowner or manager to reduce the hazard.

3.3 Asset Specific Treatments

There are four broad strategy groups available to treat the bush fire risk to assets identified in the BFRMP.

The types of asset specific treatments in each strategy group used in The Hills BFMC area are listed below. A full list of the treatment strategies in The Hills BFMC area are in Appendix 3.

Table 3.2 Asset specific treatments used in The Hills BFMC area

Strategy	Targeted treatments used in The Hills BFMC area
Hazard Reduction	<ul style="list-style-type: none"> • Inspect Asset Protection Zones (APZs) and maintain as required. • Implement The Hills BFMC Prescribed Burning Works Plan to maintain fuel loads to prescription (<5t/ha). • Implement vegetation maintenance as per HV Network Management Plans of Endeavour Energy and TransGrid.
Community Education	<ul style="list-style-type: none"> • Target interface areas for bush fire community engagement programs.
Property Planning	<ul style="list-style-type: none"> • Assist vulnerable developments to prepare bushfire emergency procedures for their facilities and occupants. Procedures will determine their evacuation and/or shelter in place options.
Preparedness	<ul style="list-style-type: none"> • Inspect and maintain existing fire trails as per The Hills BFMC FAFT Plan. • Maintain Community Fire Units and training as per FRNSW policy

3.4 Fire Thresholds

The vegetation in The Hills BFMC area has been classified into fire threshold categories. These are defined below in Table 3.3.

Table 3.3 Fire Thresholds for Vegetation Categories

Vegetation formation	Minimum SFAZ Threshold	Minimum LMZ Threshold	Maximum Threshold	Notes
Rainforest	NA	NA	NA	Fire should be avoided.
Wet Sclerophyll forest (shrubby subformation)	25	30	60	Crown fires should be avoided in the lower end of the interval range.
Wet Sclerophyll forest (grassy subformation)	10	15	50	Crown fires should be avoided in the lower end of the interval range.
Grassy woodland	5	8	40	Minimum interval of 10 years should apply in the southern Tablelands area. Occasional intervals greater than 15 years may be desirable.
Grassland	2	3	10	Occasional intervals greater than 7 years should be included in coastal areas. There was insufficient data to give a maximum interval; available evidence indicates maximum intervals should be approximately 10 years.
Dry sclerophyll forest (shrub/grass subformation)	5	8	50	Occasional intervals greater than 25 years may be desirable.
Dry sclerophyll forest (shrub subformation)	7	10	30	Occasional intervals greater than 25 years may be desirable.
Heathlands	7	10	30	Occasional intervals greater than 20 years may be desirable.
Freshwater wetlands	6	10	35	Occasional intervals greater than 30 years may be desirable.
Forested wetlands	7	10	35	Some intervals greater than 20 years may be desirable.
Saline wetlands	NA	NA	NA	Fire should be avoided.
Semi-arid woodlands (grassy subformation)	6	9	No max	Not enough data for a maximum fire interval.
Semi-arid woodlands (shrubby subformation)	10	15	No max	Not enough data for a maximum fire interval.
Arid shrublands (chenopod subformation)	NA	NA	NA	Fire should be avoided.
Arid shrublands (acacia subformation)	10	15	No max	Not enough data for a maximum fire interval.

3.5 Annual Works Programs

The land management agencies and fire fighting authorities responsible for implementing the treatments identified in this plan will include those treatments in their annual works programs detailing how, when, and where the required activities will be undertaken.

3.6 Implementation

When the treatments identified in this BFRMP are implemented there are a number of issues that need to be considered by the responsible agency including environmental assessments and approvals, smoke management and prescribed burn plans.

Chapter 4. Performance Monitoring and Reviewing

4.1 Review

This BFRMP must be reviewed and updated within each successive five-year period from the constitution of the BFMC. The Hills BFMC will also review this plan as necessary to account for any changes in context or risk. This may be triggered by a range of circumstances, including but not limited to:

- changes to the BFMC area, organisational responsibilities or legislation;
- changes to the bush fire risk in the area; or
- following a major fire event.

4.2 Monitoring

The BFMC is required to monitor progress towards the completion of treatment works listed in the BFRMP, and the timeliness of the works.

4.3 Reporting

The BFMC is required to report annually to the BFCC on its progress in implementing the bush fire risk management activities identified in this plan.

4.4 Performance Measurements

State wide performance measurements which are linked to the BFRMP have been identified by the BFCC. All BFMCs must use these to monitor and report on their success in reducing the bush fire risk in their BFMC area.

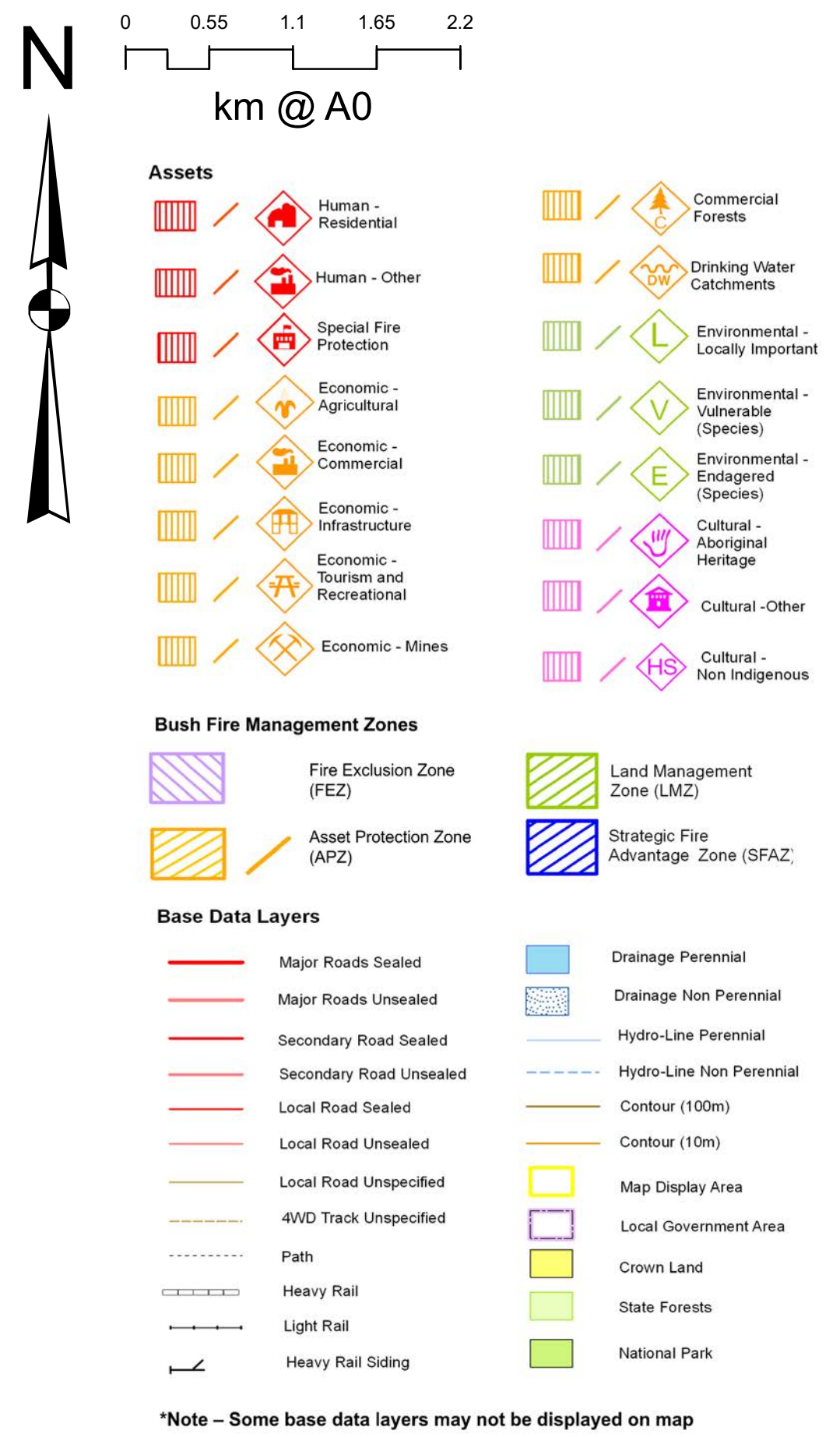
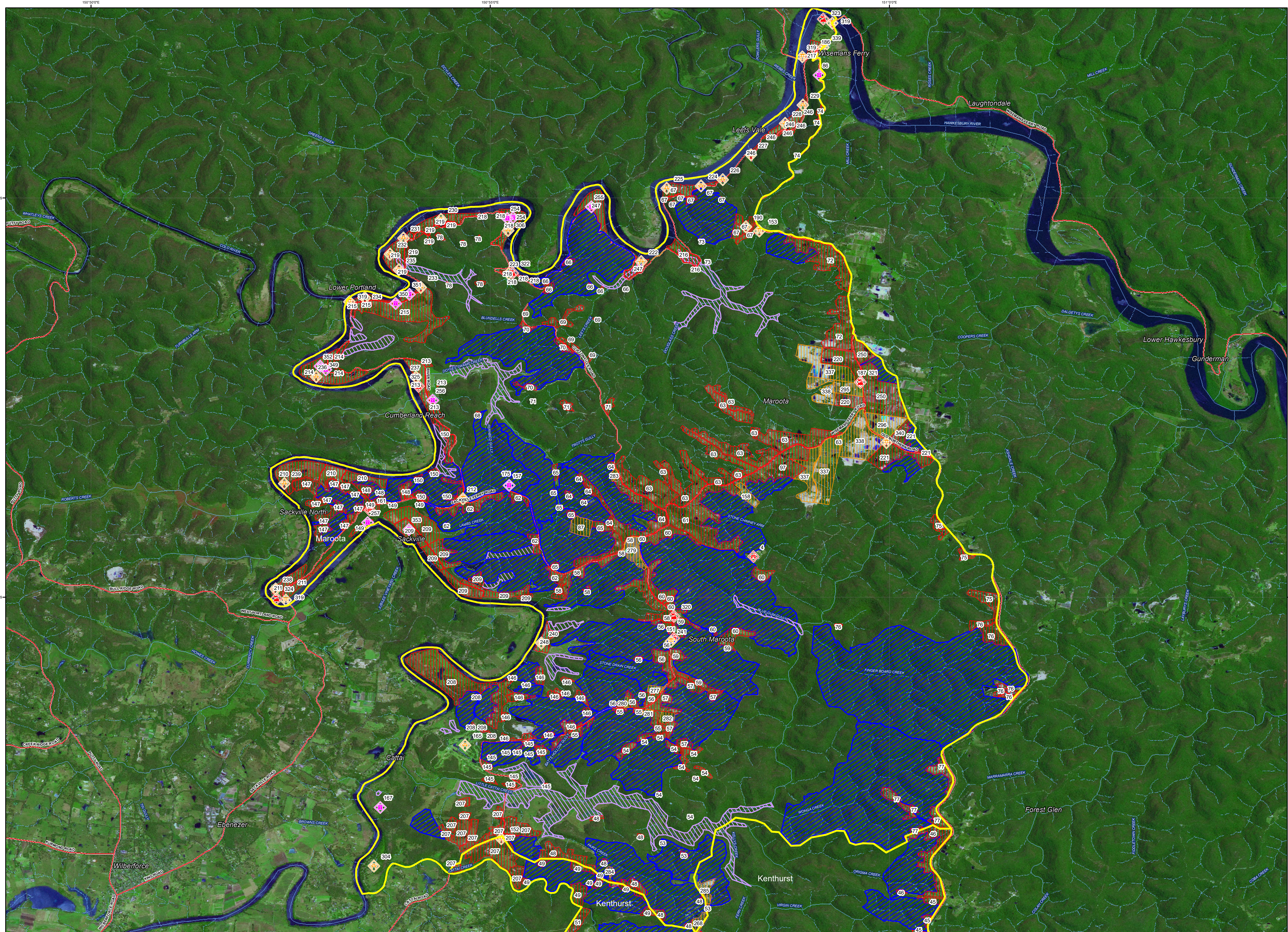
Appendix 1 Community Participation Strategy

Appendix 2 Asset Register

Appendix 3 Treatment Register

Appendix 4 Maps 1-4

- Map 1 – Maroota
- Map 2 – Kenthurst
- Map 3 – Glenhaven
- Map 4 – North Rocks



ID	Treatment strategy	Action	Agencies (Support)
T1	Hazard Reduction	Maintain APZ	LGA
T3	Hazard Reduction	Undertake Hazard Reduction Burning	RFS
T4	Community Education	Conduct Community Engagement Activity	RFS
T5	Property Planning	Develop/Implement Bushfire Emergency	Private (RFS)
T7	Preparedness	Inspect and Maintain Fire Trail	RFS
T8	Preparedness	Inspect and Maintain Fire Trail	DPI
T9	Hazard Reduction	Undertake Hazard Reduction Burning	RFS
T10	Preparedness	Inspect and Maintain Fire Trail	RFS, DPI
T11	Preparedness	Inspect and Maintain Fire Trail	LGA, RFS, DPI
T12	Preparedness	Inspect and Maintain Fire Trail	LGA, RFS
T13	Preparedness	Inspect and Maintain Fire Trail	LGA, OEH, RFS, DPI
T22	Hazard Reduction	Undertake Vegetation Maintenance	TransGrid
T32	Hazard Reduction	Maintain APZ	TransGrid
T33	Hazard Reduction	Maintain APZ	Telstra
T34	Hazard Reduction	Undertake Vegetation Maintenance	Endeavour Energy
T36	Other	Manage Neighbourhood Safer Place	LGA, RFS
T37	Other	Manage Neighbourhood Safer Place	RFS, NSW Department of
T38	Other	Manage Neighbourhood Safer Place	Private, RFS

Map Ref	Asset name	Asset type	Subtype	Risk level	Priority	Treatment
4	Days Road Christian Community Centre	Human	Special Fire	Extreme	1B	T5
48	Glenorie (Smallwood to Halcrows)	Human	Residential	Extreme	1B	T4,9,10
53	Glenorie (Smallwood to Broadwater)	Human	Residential	Extreme	1B	T4,9,10
54	South Maroota (Chilvers to Floyds)	Human	Residential	Extreme	1B	T4,3,8,7
55	South Maroota (Wheeny Creek to)	Human	Residential	Extreme	1B	T4,7,9
56	South Maroota (Pacific Park to Charcoal)	Human	Residential	Extreme	1B	T4,9,13
57	South Maroota (Kearney to Floyds)	Human	Residential	Extreme	1B	T4,9,10
58	South Maroota (Pacific Park to Sackville)	Human	Residential	Extreme	1B	T4,9,12
59	South Maroota (Pauls to Kearney)	Human	Residential	Extreme	1B	T4,9,10
60	South Maroota (Pauls to Days)	Human	Residential	Extreme	1B	T4,9,10
61	South Maroota (Days to Wisemans)	Human	Residential	Extreme	1B	T4,9
62	Sackville North (Sackville Ferry to Mud)	Human	Residential	Extreme	1B	T4,9,10
64	South Maroota (Gallaghers to Tuff Hill)	Human	Residential	Extreme	1B	T4,9,10
65	South Maroota (Sackville Ferry to Tuff Hill)	Human	Residential	Extreme	1B	T9,4,10
66	Lower Portland (Lower half moon to)	Human	Residential	Extreme	1B	T4,9,11
67	Wisemans Ferry (Cardiffs to M Shersa)	Human	Residential	Extreme	1B	T4,10,9
68	Sackville North (Tuff Hill to River East)	Human	Residential	Extreme	1B	T4,9
69	Lower Portland (Cliftonville to Lower Half)	Human	Residential	Extreme	1B	T4,11
70	Lower Portland (Barjacks to Dargle)	Human	Residential	Extreme	1B	T4,9,11
71	Maroota (Barjacks to Cliftonville)	Human	Residential	Extreme	1B	T4,9,11
72	Maroota (Dalgely to Mr Sharp)	Human	Residential	Extreme	1B	T4,9
73	Leets Vale (River to Mr Sharps)	Human	Residential	Extreme	1B	T4,9,10
74	Wisemans Ferry (Old Northern to River)	Human	Residential	Extreme	1B	T1,4
75	Maroota (Idewild to Maroota Tracks)	Human	Residential	Extreme	1B	T4,11
76	Glenorie (Yoothamurra to Idewild)	Human	Residential	Extreme	1B	T4,9,11
77	Glenorie (Spur to Yoothamurra)	Human	Residential	Extreme	1B	T9,4,10
78	Lower Portland (Quasimodo)	Human	Residential	Extreme	1B	T4,10
NA	Transgrid Transmission Lines	Economic	Infrastructure	Very High	2A	T22
NA	Telstra Infrastructure/Communications	Economic	Infrastructure	Very High	2A	T33
NA	Endeavour Energy Network	Economic	Infrastructure	Very High	2A	T34
87	Kiata Country Club	Economic	Tourist and	Very High	2A	T5,10,9,4
97	Maroota (Haerses)	Human	Residential	Very High	2A	T9,4
145	Cattai (Wheeny Creek to Wisemans)	Human	Residential	Very High	2A	T4,9,7
146	South Maroota (Charcoal to O'Briens)	Human	Residential	Very High	2A	T4,9,7
147	Sackville North (Sackville Ferry to)	Human	Residential	Very High	2A	T4,9
148	Sackville North (Sackville Ferry to)	Human	Residential	Very High	2A	T9,4
149	Sackville North (Chapel Hill to Sackville)	Human	Residential	Very High	2A	T4
150	Sackville North (Moss Ridge to River)	Human	Residential	Very High	2A	T9,4
151	Forgotten Valley Mobile Preschool	Human	Special Fire	Very High	2A	T5
153	Substation (5016 Old Northern Road)	Economic	Infrastructure	Very High	2A	T32
158	Portelli's Cottage Farm	Economic	Agricultural	Very High	2A	T9
161	Brewongle Environment & Education	Human	Special Fire	Very High	2A	T5
320	South Maroota Community Centre	Human	Other	Low	NA	T36
321	Maroota Public School Building NSP	Human	Other	Low	NA	T37
322	Cliftonville Lodge Resort Kiosk Building	Human	Other	Low	NA	T36
323	Wisemans Ferry Park Open Space NSP	Human	Other	Low	NA	T36
324	Ullinbarr Water Ski Park Open Space	Human	Other	Low	NA	T36
325	Dargle Ski Park Open Space NSP	Human	Other	Low	NA	T36

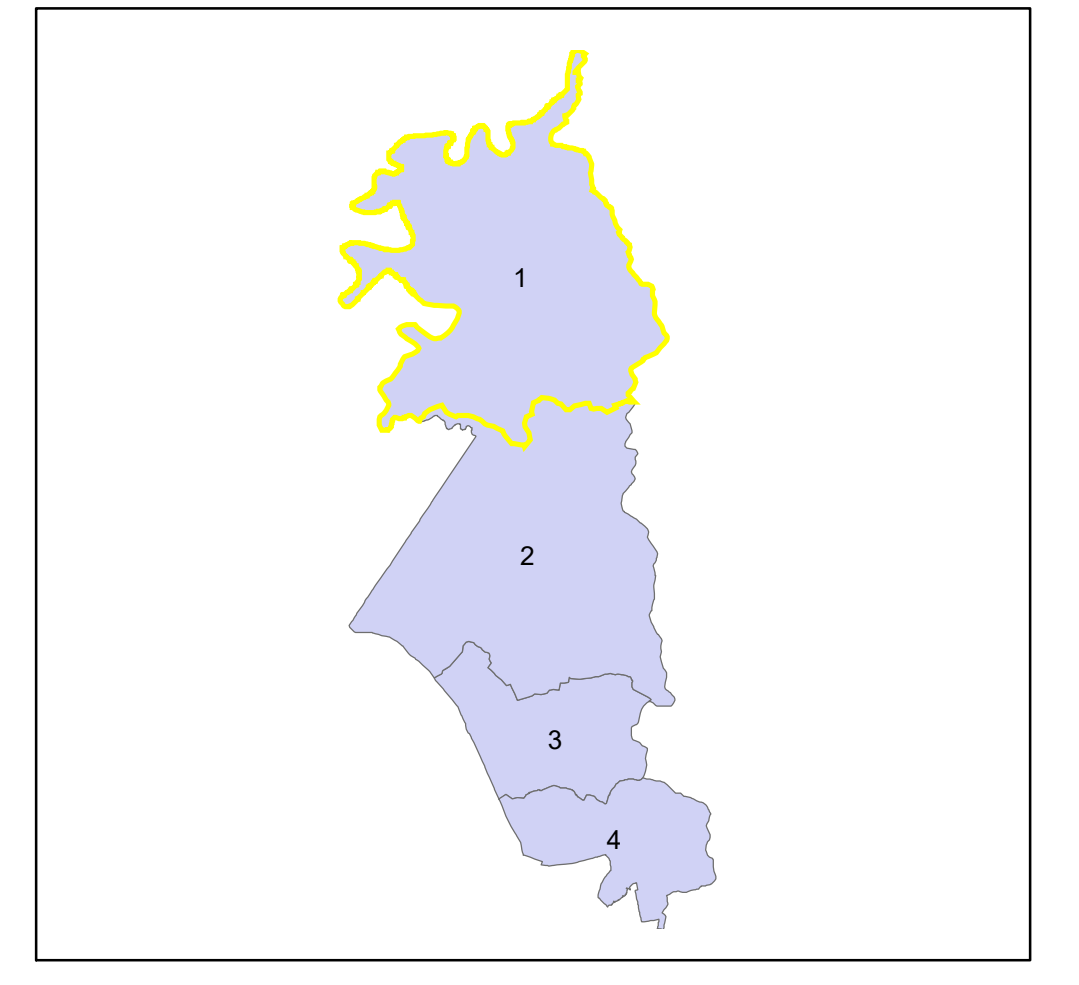
The Hills BFM Bush Fire Risk Management Plan 2019

Maroota - Map Display Area
Map 1 of 4

This Bush Fire Risk Management Plan (BFRMP) has been prepared by the The Hills Bush Fire Management Committee (BFMC) pursuant to section 52 of the Rural Fires Act 1997.

The aim of this BFRMP is to reduce the adverse impact of bush fires on life, property and the environment.
The objectives of this BFRMP are to:
- reduce the number of human-induced bush fire ignitions that cause damage to life, property or the environment;
- manage fuel to reduce the spread and intensity of bush fires while minimising environmental/ecological impacts;
- reduce the community's vulnerability to bush fires by improving its preparedness; and
- effectively contain fires with a potential to cause damage to life, property and the environment.

This map forms part of the BFRMP for the The Hills BFMC, covering the local government areas of The Hills. It should be viewed in conjunction with the accompanying BFRMP document which provides further details on the BFMC area, the assets assessed and the risk assessment process used.



Review
Under the Rural Fires Act 1997 this plan must be reviewed and updated within each successive five year period following the constitution of the BFMC. The Hills BFMC will also review this plan as necessary. This may be triggered by a range of circumstances, including but not limited to:
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- changes to the bush fire risk in the area; or
- following a major fire event.

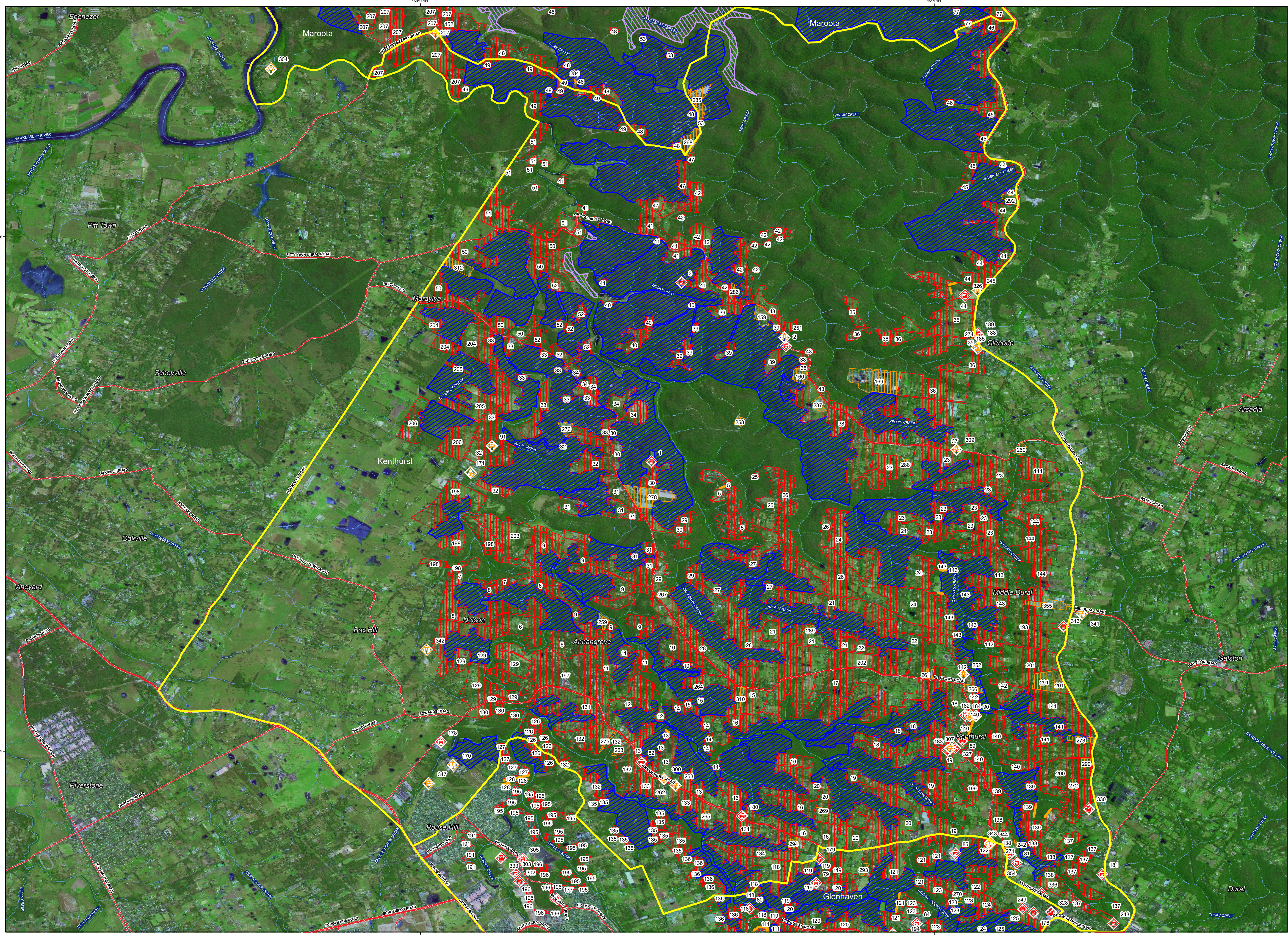
Assets
This BFRMP identifies the assets that are considered by the The Hills BFMC and community to be at risk from bush fire. It assesses the bush fire risk to each asset and assigns treatments designed to mitigate the risk. Assets in the BFMC area identified as requiring treatments are listed in the assets table. Other assets within the BFMC area that were assessed as not requiring treatments within the life of this plan are listed in the appendix to the BFRMP document. The Map Ref number "NA" denotes non-spatial assets.

Treatments
Specific treatments assigned to assets in the The Hills area are listed in the treatments table and linked to the assets which they are designed to protect. Standard BFMC wide treatments (i.e. not linked to a specific asset) which occur on an ongoing basis within the BFMC area are:
- reviewing the bush fire prone land map;
- ensuring developments in the bush fire prone land comply with Planning for Bush Fire Protection;
- using the Local Environment Plan's (LEPs) to control development in areas with a bush fire risk;
- varying the standard bush fire danger period as required;
- requiring permits during bush fire danger periods
- prosecution of arsonists/offenders
- investigation of bush fire causes;
- normal fire suppression activities;
- assessing and managing compliance with strategic fire-fighting resource allocation management systems;
- preparation of a S2 Operations Coordination Plan;

Note on LMZ: All areas not specifically mapped as an APZ, SFAZ or FEZ are considered as LMZ for this risk management plan. For areas identified by an LMZ polygon on the map, please refer to the BFRMP document for the specific land management objectives.

Zone	Purpose	Suppression	Zone
Asset Protection Zone	To protect human life, property and highly valued public assets and values.	To enable the safe use of Direct Attack suppression strategies within the zone. To minimise bush fire impacts on undefended assets.	As per RFS document Standards for Asset Protection Zones .
Strategic Fire Advantage Zone	To provide strategic areas of fire protection advantage which will reduce the speed and intensity of bush fire, and reduce the potential for spot fire and/or development. To aid containment of wildfire by weathering management boundaries.	To improve the likelihood and safe use of Parallel Attack suppression strategies within the zone. Indirect Attack (back burning) in high to very high fire weathering conditions within the zone. To reduce the likelihood of: Crown fire development within the zone; and/or Spot fire ignition potential from the zone.	Zone width related to suppression objectives and dependant upon: - Topography - Aspect - Spotting propensity - Location of adjacent fire breaks - Mosaic pattern of treatment Assess Overall Fuel Hazard (OFH) once vegetation communities reach minimum fire thresholds within this plan. Management practices should aim to achieve mosaic fuel reduction patterns so that the majority of the SFAZ has an OFH of less than high.
Land Management Zone	To meet relevant land management objectives in area where APZs or SFAZs are not appropriate.	As per the land management and fire protection objectives of the responsible land management agency. To reduce the likelihood of spread of fires. To undertake mosaic burning.	As appropriate to achieve land management, e.g. heritage and/or fire protection e.g. broad scale mosaic burning objectives.
Fire Exclusion Zone	To exclude bush fires.	NA	Variable dependant on size of fire sensitive area requiring protection.

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Date created: Friday, 10 May 2019



Map Ref	Asset name	Asset type	Subtype	Risk level	Priority	Treatment
1	Kenthurst Study Centre	Human	Special Fire	Extreme	1B	T5
2	Hillside Public School	Human	Special Fire	Extreme	1B	T5
3	Youth With a Mission	Human	Special Fire	Extreme	1B	T5
5	Kenthurst (Nyari to Cadwells)	Human	Residential	Extreme	1B	T12;6;4,1
6	Annangrove (Everett to Hillclimb)	Human	Residential	Extreme	1B	T4,9
7	Annangrove (Nelson to Amanda)	Human	Residential	Extreme	1B	T4,9
8	Nelson (Nelson to Everett)	Human	Residential	Extreme	1B	T4,9
9	Kenthurst (Johnson to Pedvin)	Human	Residential	Extreme	1B	T2,4,9
10	Kenthurst (Burrell to Tallawung)	Human	Residential	Extreme	1B	T4,9
11	Annangrove (Pedvin to O'Keefe)	Human	Residential	Extreme	1B	T4,9,2
12	Annangrove (Whites Ridge to Woodland)	Human	Residential	Extreme	1B	T4,9,2
13	Annangrove (Woodland to Gibber)	Human	Residential	Extreme	1B	T2,4,9
14	Kenthurst (Campbell to Nicholli)	Human	Residential	Extreme	1B	T9,4
15	Kenthurst (Blue Gum to Campbell)	Human	Residential	Extreme	1B	T9,4
16	Annangrove (Campbell to Aston)	Human	Residential	Extreme	1B	T4,9,12
17	Kenthurst (Campbell to Ellendale)	Human	Residential	Extreme	1B	T4,9,7
18	Kenthurst (Lisbon to Jones)	Human	Residential	Extreme	1B	T9,4,7
19	Kenthurst (Jones to Sedger)	Human	Residential	Extreme	1B	T4,7,9
20	Kenthurst (Sedger to Raym)	Human	Residential	Extreme	1B	T4,9,7
21	Kenthurst (Binalong to Marleba)	Human	Residential	Extreme	1B	T4,9
22	Kenthurst (Pamela to Hilton)	Human	Residential	Extreme	1B	T4,9
23	Middle Dural (Kandara to Smiths)	Human	Residential	Extreme	1B	T4,10,9
24	Kenthurst (Hazeldean to Roughley)	Human	Residential	Extreme	1B	T9,4,10,1
25	Kenthurst (Cadwells to Porters)	Human	Residential	Extreme	1B	T6,4,8
26	Kenthurst (Gibbs to Allawah)	Human	Residential	Extreme	1B	T4,8
27	Kenthurst (Orana to Nyari)	Human	Residential	Extreme	1B	T11,4,9
28	Kenthurst (Orana to Pitt Town)	Human	Residential	Extreme	1B	T4,9
29	Kenthurst (Coppertall to Orana)	Human	Residential	Extreme	1B	T10,4,9
30	Kenthurst (Coppertall to Allawah)	Human	Residential	Extreme	1B	T10,4,9
31	Kenthurst (Pyes to Lang)	Human	Residential	Extreme	1B	T10,4,9
32	Kenthurst (McClymonts to Pyes)	Human	Residential	Extreme	1B	T4,10,9
33	Kenthurst (McClymonts to Maguires)	Human	Residential	Extreme	1B	T4,9
34	Kenthurst (Gibbs to Allawah)	Human	Residential	Extreme	1B	T4,9,8
35	Glenorie (Schwebel to Sernellf)	Human	Residential	Extreme	1B	T4,12
36	Glenorie (Boronia to Schwebel)	Human	Residential	Extreme	1B	T7,4
37	Glenorie (Cattal Ridge to Boronia)	Human	Residential	Extreme	1B	T9,4
38	Glenorie (Smiths to Cattal Ridge)	Human	Residential	Extreme	1B	T9,4,8
39	Glenorie (Cattal Ridge to Miller)	Human	Residential	Extreme	1B	T4,9,7
40	Glenorie (Miller)	Human	Residential	Extreme	1B	T4,9
41	Glenorie (Miller to Newman)	Human	Residential	Extreme	1B	T4,10,9
42	Glenorie (Neich to Fern Gully)	Human	Residential	Extreme	1B	T9,4,7
43	Glenorie (Cattal Ridge to Neich)	Human	Residential	Extreme	1B	T4
44	Glenorie (Mount View to Sernellf)	Human	Residential	Extreme	1B	T9,4,10,1
45	Glenorie (Mount View to Cockatoo)	Human	Residential	Extreme	1B	T4,9,10
46	Glenorie (Cockatoo to Broadwater)	Human	Residential	Extreme	1B	T4,9,10
47	Glenorie (Newman to Cattal Creek)	Human	Residential	Extreme	1B	T9,4,10
49	Cattal (Halcrows to Gas Pipeline)	Human	Residential	Extreme	1B	T4,9,7
50	Maraylya (Cattal Ridge to PittTown)	Human	Residential	Extreme	1B	T4,9,8
51	Maraylya (Cattal Ridge to St Johns)	Human	Residential	Extreme	1B	T4
52	Kenthurst (Pitt Town to Hidden Valley)	Human	Residential	Extreme	1B	T8,4,9
NA	Telstra Infrastructure/Communications	Economic	Infrastructure	Very High	2A	T33
NA	Endeavour Energy Network	Economic	Infrastructure	Very High	2A	T34
NA	Transgrid Transmission Lines	Economic	Infrastructure	Very High	2A	T22
81	The Hills Grammar School	Human	Special Fire	Very High	2A	T27
82	Annangrove Public School	Human	Special Fire	Very High	2A	T27
89	Kenthurst Public School	Human	Special Fire	Very High	2A	T27
90	Kenthurst Preschool Kindergarten	Human	Special Fire	Very High	2A	T5
91	Bilabong Retreat	Economic	Tourist and	Very High	2A	T5,4,9,10
118	Annangrove (Glenhaven to Colbran)	Human	Residential	Very High	2A	T4,9
127	Rouse Hill (Mile End to Empress)	Human	Residential	Very High	2A	T4,9
129	Annangrove (Blind to Amaroo Park)	Human	Residential	Very High	2A	T4,9
130	Annangrove (Edwards)	Human	Residential	Very High	2A	T4
131	Annangrove (Annangrove to Langlands)	Human	Residential	Very High	2A	T4,9
132	Annangrove (Langlands to Stringer)	Human	Residential	Very High	2A	T4,9
133	Annangrove (Annangrove to Kingcott)	Human	Residential	Very High	2A	T4,9
134	Annangrove (Annangrove to Colbran)	Human	Residential	Very High	2A	T4,9
135	Kellyville (Bruce to Withers)	Human	Residential	Very High	2A	T4,9
136	Kellyville (Samantha Riley to Withers)	Human	Residential	Very High	2A	T9,4
137	Dural (Pelitt to Derriwong)	Human	Residential	Very High	2A	T4
138	Dural (Derriwong to Kenthurst)	Human	Residential	Very High	2A	T4,9
139	Dural (Langford to Kenthurst)	Human	Residential	Very High	2A	T4,9,31
140	Dural (Nelson to Wyoming)	Human	Residential	Very High	2A	T4,1
141	Dural (Wyoming to Wirmunga)	Human	Residential	Very High	2A	T4,9
142	Dural (Dobell to Glenroy)	Human	Residential	Very High	2A	T4,9
143	Middle Dural (Glenroy to Roughley)	Human	Residential	Very High	2A	T4,9,1
144	Middle Dural (Cranstons to Pinus)	Human	Residential	Very High	2A	T4
152	Substation (Halcrows Rd Cattal)	Economic	Infrastructure	Very High	2A	T32
159	Melinda Hart Equestrian	Economic	Agricultural	Very High	2A	T7,9
160	Weinerts Performance Horses	Economic	Agricultural	Very High	2A	T9,8
326	Les Shore Oval Clubhouse Building NSP	Human	Other	Low	NA	T36
327	Kenthurst Uniting Church Building NSP	Human	Other	Low	NA	T38
330	Dural Country Club Building NSP	Human	Other	Low	NA	T38

The Hills BFMC Bush Fire Risk Management Plan 2019

Kenthurst - Map Display Area
Map 2 of 4

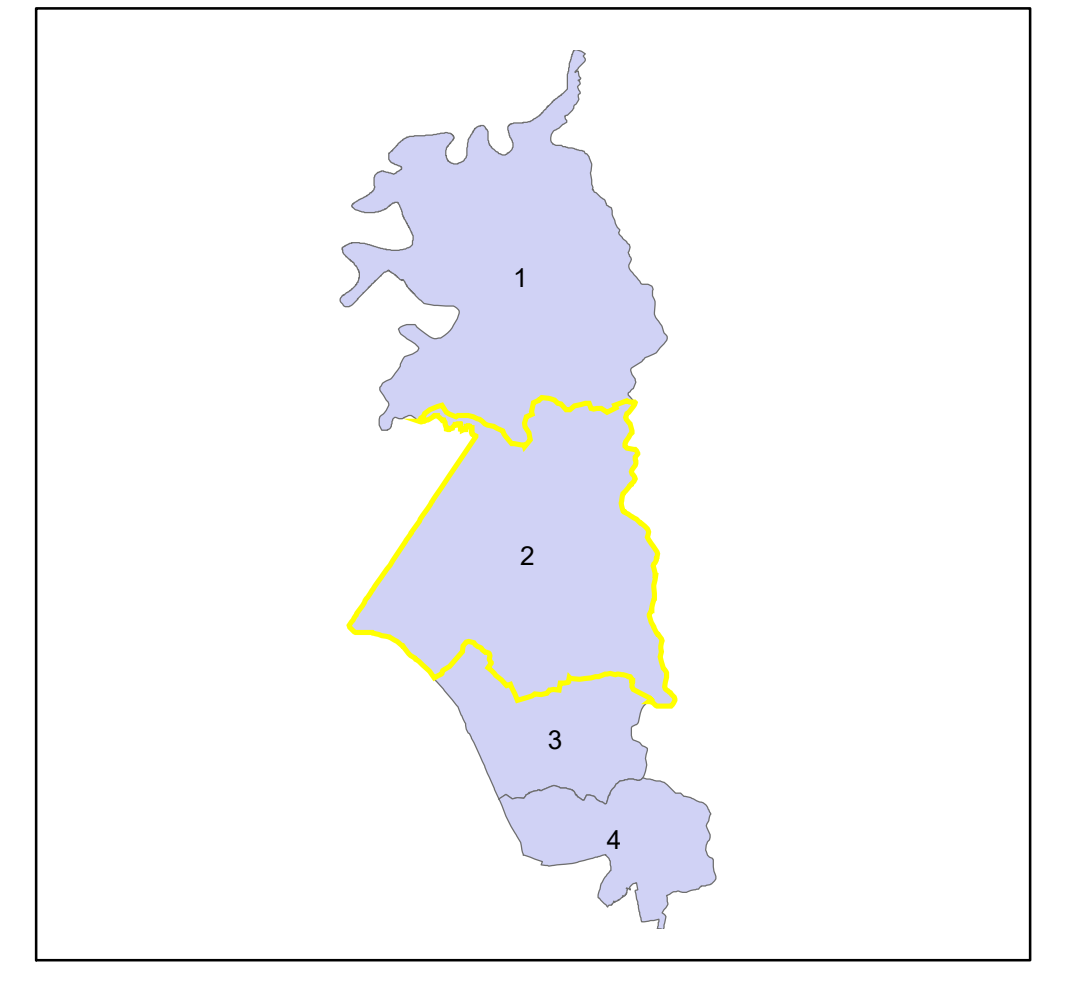
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Treatments
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- using the Local Environment Plan's (LEPs) to control development in areas with a bush fire risk;
- requiring permits during bush fire danger periods;
- prosecution of arsonists/offenders;
- investigation of bush fire causes;
- normal fire suppression activities;
- assessing and managing compliance with strategic fire-fighting resource allocation management systems;
- preparation of a S22 Operations Coordination Plan;

Note on LMZ: All areas not specifically mapped as an APZ, SFZ or FEZ are considered as LMZ for this risk management plan. For areas identified by an LMZ polygon on the map, please refer to the BFMP document for the specific land management objectives.

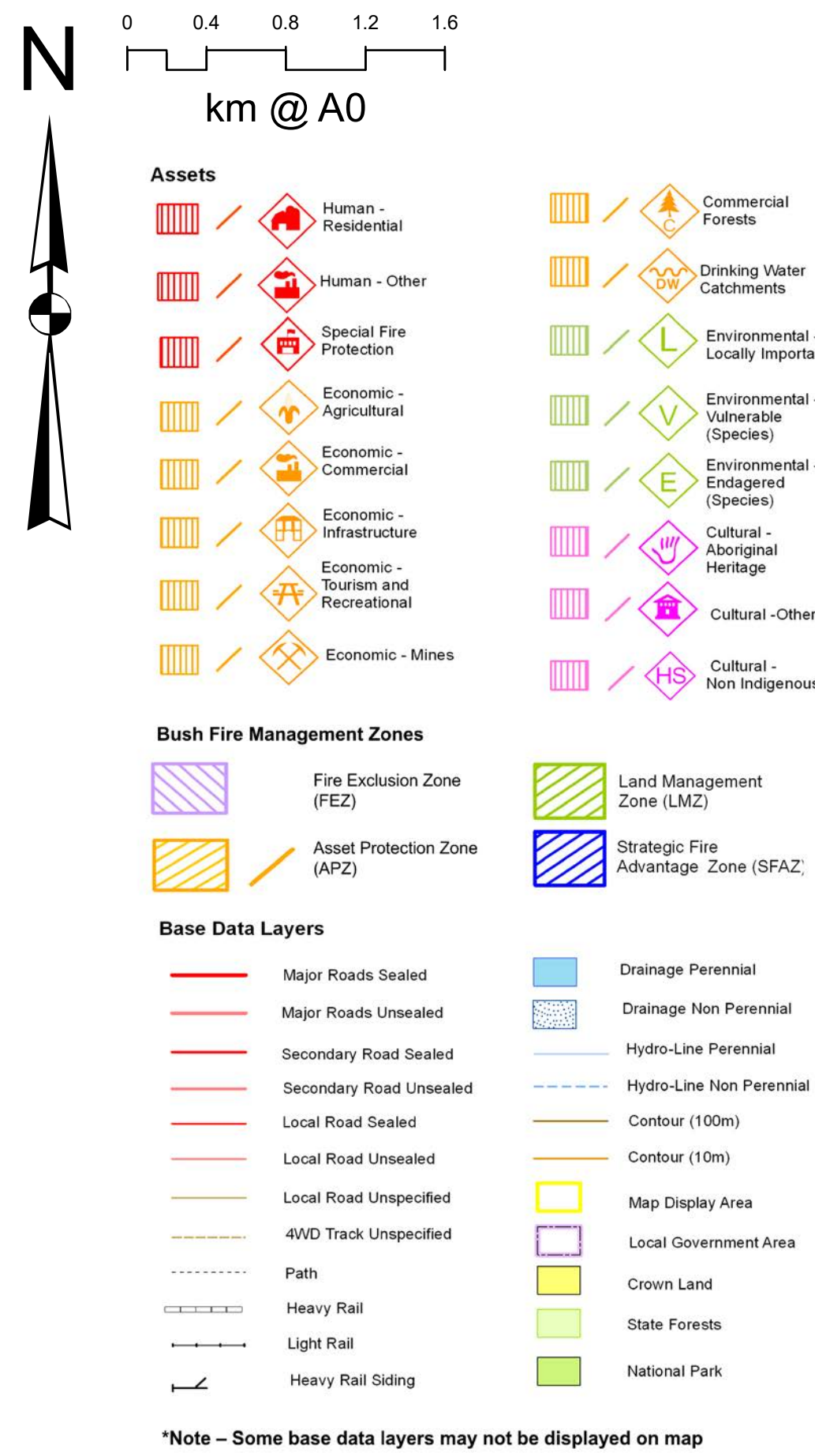
Zone	Purpose	Suppression	Zone
Asset Protection Zone	To protect human life, property and highly valued public assets and values.	To enable the safe use of Direct Attack suppression strategies within the zone.	As per RFS document Standards for Asset Protection Zones.
Strategic Fire Advantage Zone	To provide strategic areas of fire protection advantage which will reduce the speed and intensity of bush fire, and reduce the potential for spot fire development. To aid containment of wildfires to existing management boundaries.	To improve the likelihood and safe use of Parallel Attack suppression strategies within the zone. Indirect Attack (back burning) in high to very high fire weather conditions within the zone. To reduce the likelihood of Crown fire development within the zone. Spot fire ignition potential from the zone.	Zone width related to suppression objectives and dependent upon: - Topography - Aspect - Spotting propensity - Location of adjacent fire breaks - Mosaic pattern of treatment Assess Overall Fuel Hazard (OFH) once vegetation communities reach minimum fire thresholds within this plan. Management practices should aim to achieve mosaic fuel reduction patterns so that the majority of the SFZ has an OFH of less than high.
Land Management Zone	To meet relevant land management and fire protection objectives in area where APZs or SFZs are not appropriate.	As per the land management and fire protection objectives of the responsible land management agency. To reduce the likelihood of spread of fires. To undertake mosaic burning.	As appropriate to achieve land management, e.g. heritage and/or fire protection e.g. broad scale mosaic burning objectives.
Fire Exclusion Zone	To exclude bush fires.	NA	Variable dependant on size of fire sensitive area requiring protection.

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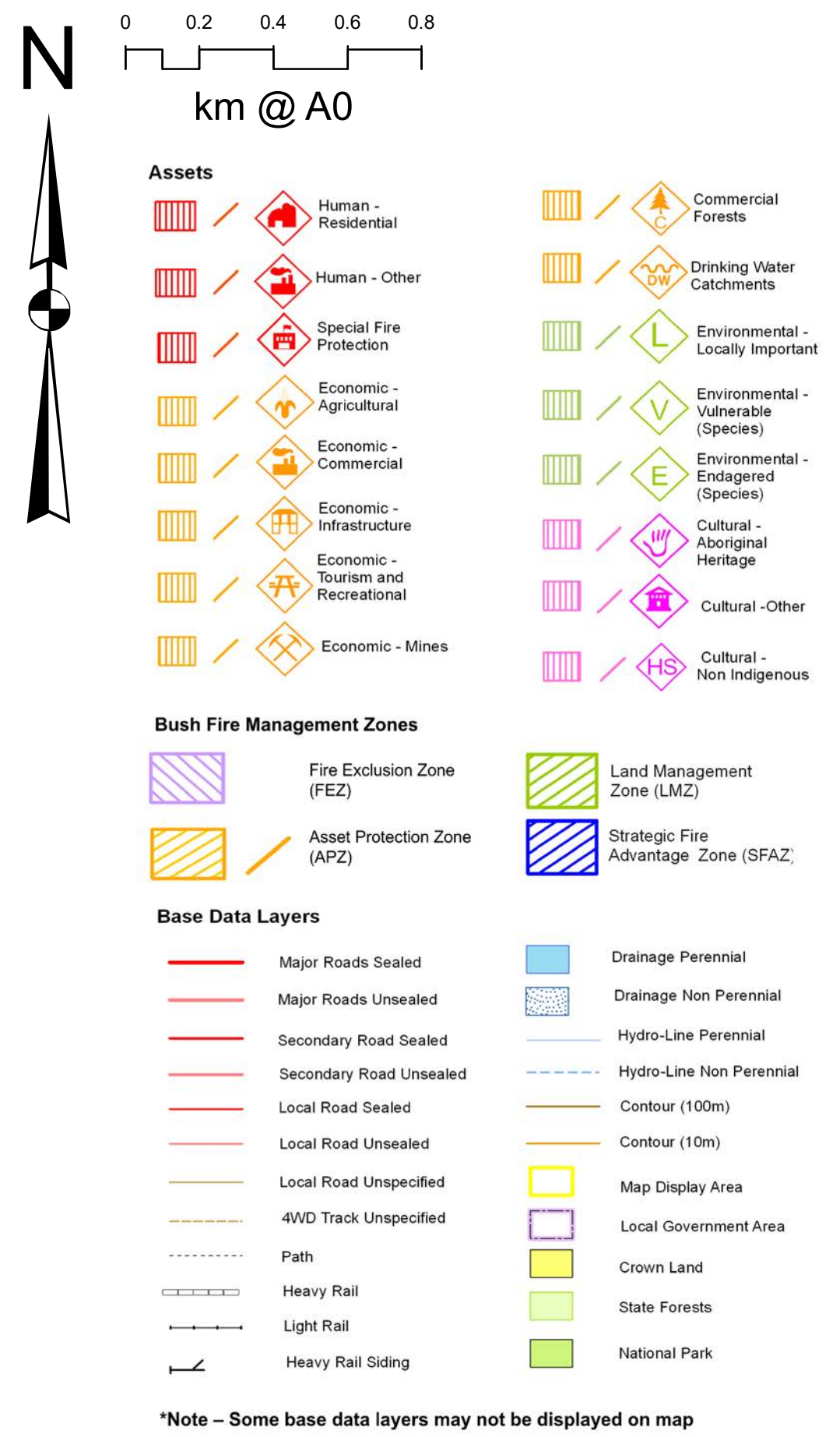
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ID	Treatment strategy	Action	Agencies (Support)
T1	Hazard Reduction	Maintain APZ	LGA
T2	Preparedness	Inspect and Maintain Fire Trail	LGA
T4	Community Education	Conduct Community Engagement Activity	RFS
T5	Property Planning	Develop/Implement Bushfire Emergency	Private (RFS)
T6	Hazard Reduction	Undertake Hazard Reduction Burning	RFS (LGA)
T7	Preparedness	Inspect and Maintain Fire Trail	RFS
T8	Preparedness	Inspect and Maintain Fire Trail	DPI
T9	Hazard Reduction	Undertake Hazard Reduction Burning	RFS
T10	Preparedness	Inspect and Maintain Fire Trail	RFS, DPI
T11	Preparedness	Inspect and Maintain Fire Trail	LGA, RFS, DPI
T12	Preparedness	Inspect and Maintain Fire Trail	LGA, RFS
T22	Hazard Reduction	Undertake Vegetation Maintenance	TransGrid
T27	Property Planning	Develop/Implement Bushfire Emergency	NSW Department of Education
T31	Hazard Reduction	Maintain APZ	DPI
T32	Hazard Reduction	Maintain APZ	TransGrid
T33	Hazard Reduction	Maintain APZ	Telstra
T34	Hazard Reduction	Undertake Vegetation Maintenance	Endeavour Energy
T36	Other	Manage Neighbourhood Safer Place	LGA, RFS
T38	Other	Manage Neighbourhood Safer Place	Private, RFS



*Note - Some base data layers may not be displayed on map



ID	Treatment strategy	Action	Agencies (Support)
T1	Hazard Reduction	Maintain APZ	LGA
T2	Preparedness	Inspect and Maintain Fire Trail	LGA
T4	Community Education	Conduct Community Engagement Activity	RFS
T5	Property Planning	Develop/Implement Bushfire Emergency	Private (RFS)
T6	Hazard Reduction	Undertake Hazard Reduction Burning	RFS
T17	Community Education	Conduct Community Engagement Activity	FRNSW
T25	Hazard Reduction	Undertake Hazard Reduction Burning	FRNSW (LGA)
T27	Property Planning	Develop/Implement Bushfire Emergency	NSW Department of Education
T29	Hazard Reduction	Maintain APZ	LGA, Sydney Water
T33	Hazard Reduction	Maintain APZ	Telstra
T34	Hazard Reduction	Undertake Vegetation Maintenance	Endeavour Energy
T36	Other	Manage Neighbourhood Safer Place	LGA, RFS
T38	Other	Manage Neighbourhood Safer Place	Private, RFS

Map Ref	Asset name	Asset type	Subtype	Risk level	Priority	Treatment
NA	Telstra Infrastructure/Communications	Economic	Infrastructure	Very High	2A	T33
NA	Endeavour Energy Network	Economic	Infrastructure	Very High	2A	T34
79	Glenhaven Private Preschool	Human	Special Fire	Very High	2A	T5
80	Rainbow Haven Kindergarten	Human	Special Fire	Very High	2A	T5
83	Glenhaven Gardens/Carinya House	Human	Special Fire	Very High	2A	T5
84	Living Choice Glenhaven Retirement	Human	Special Fire	Very High	2A	T5
85	Marian College / St Madeline's Primary	Human	Special Fire	Very High	2A	T27
104	Castle Hill (Fred Calerson Reserve)	Human	Residential	Very High	2A	T1;17
105	Castle Hill (Fred Calerson Reserve)	Human	Residential	Very High	2A	T29;25;17;2
106	Castle Hill (Cameo Place/Fullers Road)	Human	Residential	Very High	2A	T1;25;17
107	Castle Hill (Fullers Road/Citadel)	Human	Residential	Very High	2A	T1;25;17
108	Kellyville (Cattai Creek Conservation)	Human	Residential	Very High	2A	T1;7;25
109	Kellyville (Jack McNamee to Georgia)	Human	Residential	Very High	2A	T1;25;17
110	Kellyville (Cattai Creek Conservation)	Human	Residential	Very High	2A	T1;17
111	Glenhaven (Glenhaven to Bannerman)	Human	Residential	Very High	2A	T4;9
112	Glenhaven (Mills to Glenhaven)	Human	Residential	Very High	2A	T4;9
113	Glenhaven (Fullers Road Reserve Adam)	Human	Residential	Very High	2A	T25;17
114	Glenhaven (Hyde Avenue Reserve)	Human	Residential	Very High	2A	T2;25;17
115	Glenhaven (Fullers Road Reserve)	Human	Residential	Very High	2A	T17
116	Glenhaven (Citadel Crescent Reserve)	Human	Residential	Very High	2A	T1;17
117	Glenhaven (Linksley Avenue Reserve)	Human	Residential	Very High	2A	T1;17
119	Annangrove (Bannerman to Robson)	Human	Residential	Very High	2A	T4;9
120	Glenhaven (Bannerman to Holland)	Human	Residential	Very High	2A	T4;9
121	Kenthurst (Holland Road Reserve)	Human	Residential	Very High	2A	T4;1;9
122	Dural (Annangrove to Sagars)	Human	Residential	Very High	2A	T4;9
123	Glenhaven (Edgcliff to Sagars)	Human	Residential	Very High	2A	T4;9
124	Glenhaven (Gilmour to Haven)	Human	Residential	Very High	2A	T4;9
125	Dural (Gilmour to Yuruga)	Human	Residential	Very High	2A	T4;9
126	Kellyville (Ross to Nest Hill)	Human	Residential	Very High	2A	T4;9
128	Rouse Hill (Maria Iori Reserve Harvard)	Human	Residential	Very High	2A	T1
154	Castle Hill (Heritage Park)	Human	Residential	Very High	2A	T1;17
328	Dural Mail Open Space NSP	Human	Other	Low	NA	T36
329	Glenhaven Community Centre Building	Human	Other	Low	NA	T36
331	Castle Hill Showground Open Space	Human	Other	Low	NA	T36
332	Bernie Mullane Sporting Complex Car	Human	Other	Low	NA	T36
333	The Hills Centenary Park Open Space	Human	Other	Low	NA	T36

The Hills BFMC Bush Fire Risk Management Plan 2019

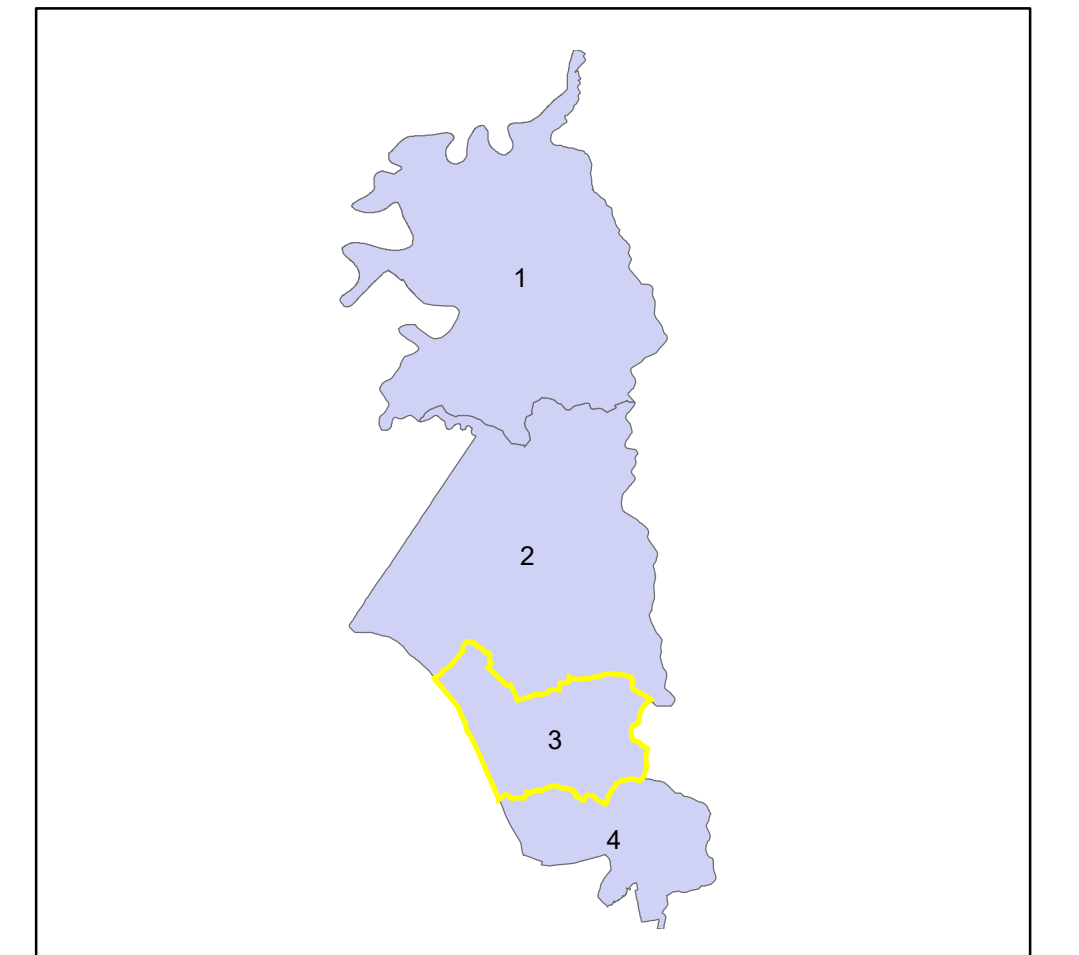
Glenhaven - Map Display Area
Map 3 of 4

This Bush Fire Risk Management Plan (BFRMP) has been prepared by the The Hills Bush Fire Management Committee (BFMC) pursuant to section 52 of the Rural Fires Act 1997.

The aim of this BFRMP is to reduce the adverse impact of bush fires on life, property and the environment.

- The objectives of this BFRMP are to:
- reduce the number of human-induced bush fire ignitions that cause damage to life, property or the environment;
 - manage fuel to reduce the spread and intensity of bush fires while minimising environmental/ecological impacts;
 - reduce the community's vulnerability to bush fires by improving its preparedness; and
 - effectively contain fires with a potential to cause damage to life, property and the environment.

This map forms part of the BFRMP for the The Hills BFMC, covering the local government area(s) of The Hills. It should be viewed in conjunction with the accompanying BFRMP document which provides further details on the BFMC area, the assets assessed and the risk assessment process used.



Review
Under the Rural Fires Act 1997 this plan must be reviewed and updated within each successive five year period following the constitution of the BFMC. The The Hills BFMC will also review this plan as necessary. This may be triggered by a range of circumstances, including but not limited to:

- changes to the BFMC area, organisational responsibilities or legislation;
- changes to the bush fire risk in the area; or
- following a major fire event.

Assets
This BFRMP identifies the assets that are considered by the The Hills BFMC and community to be at risk from bush fires. It assesses the bush fire risk to each asset and assigns treatments designed to mitigate the risk. Assets in the BFMC area identified as requiring treatments are listed in the assets table. Other assets within the BFMC area that were assessed as not requiring treatments within the life of this plan are listed in the appendix to the BFRMP document. The Map Ref number "NA" denotes non-spatial assets.

- Treatments**
Specific treatments assigned to assets in the The Hills area are listed in the treatments table and linked to the assets which they are designed to protect. Standard BFMC wide treatments (i.e. not linked to a specific asset) which occur on an ongoing basis within the BFMC area are:
- reviewing the bush fire prone land map;
 - ensuring developments in the bush fire prone land comply with Planning for Bush Fire Protection;
 - using the Local Environment Plan's (LEPs) to control development in areas with a bush fire risk;
 - varying the standard bush fire danger period as required;
 - requiring permits during bush fire danger periods;
 - prosecution of arsonists/offenders;
 - investigation of bush fire causes;
 - normal fire suppression activities;
 - assessing and managing compliance with strategic fire-fighting resource allocation management systems;
 - preparation of a S2 Operations Coordination Plan;

Note on LMZ: All areas not specifically mapped as an APZ, SFAZ or FEZ are considered as LMZ for this risk management plan. For areas identified by an LMZ polygon on the map, please refer to the BFRMP document for the specific land management objectives.

Zone	Purpose	Suppression	Zone
Asset Protection Zone	To protect human life, property and highly valued public assets and values.	To enable the safe use of Direct Attack suppression strategies within the zone. To minimise bush fire impacts on undefended assets.	As per RFS document Standards for Asset Protection Zones .
Strategic Fire Advantage Zone	To provide strategic areas of fire protection advantage which will reduce the speed and intensity of bush fires, and reduce the potential for spot fire development. To aid containment of wildfires to existing management boundaries.	To improve the likelihood and safe use of Parallel Attack suppression strategies within the zone. Indirect Attack (back burning) in high to very high fire weather conditions within the zone. To reduce the likelihood of: Crown fire development within the zone; and/or Spot fire ignition potential from the zone.	Zone width related to suppression objectives and dependant upon: - Topography - Aspect - Spotting propensity - Location of adjacent fire breaks - Mosaic pattern of treatment Assess Overall Fuel Hazard (OFH) once vegetation communities reach minimum fire thresholds within this plan. Management practices should aim to achieve mosaic fuel reduction patterns so that the majority of the SFAZ has an OFH of less than high.
Land Management Zone	To meet relevant land management objectives in area where APZs or SFAZs are not appropriate.	To reduce the likelihood of spread of fires. To undertake mosaic burning.	As appropriate to achieve land management and fire protection objectives of the responsible land management agency. e.g. broad scale mosaic burning objectives.
Fire Exclusion Zone	To exclude bush fires.	NA	Variable dependant on size of fire sensitive area requiring protection.

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Date created: Friday, 10 May 2019
BFRMP version 2.1.26.0

The Hills BFMC Bush Fire Risk Management Plan 2019

North Rocks - Map Display Area Map 4 of 4

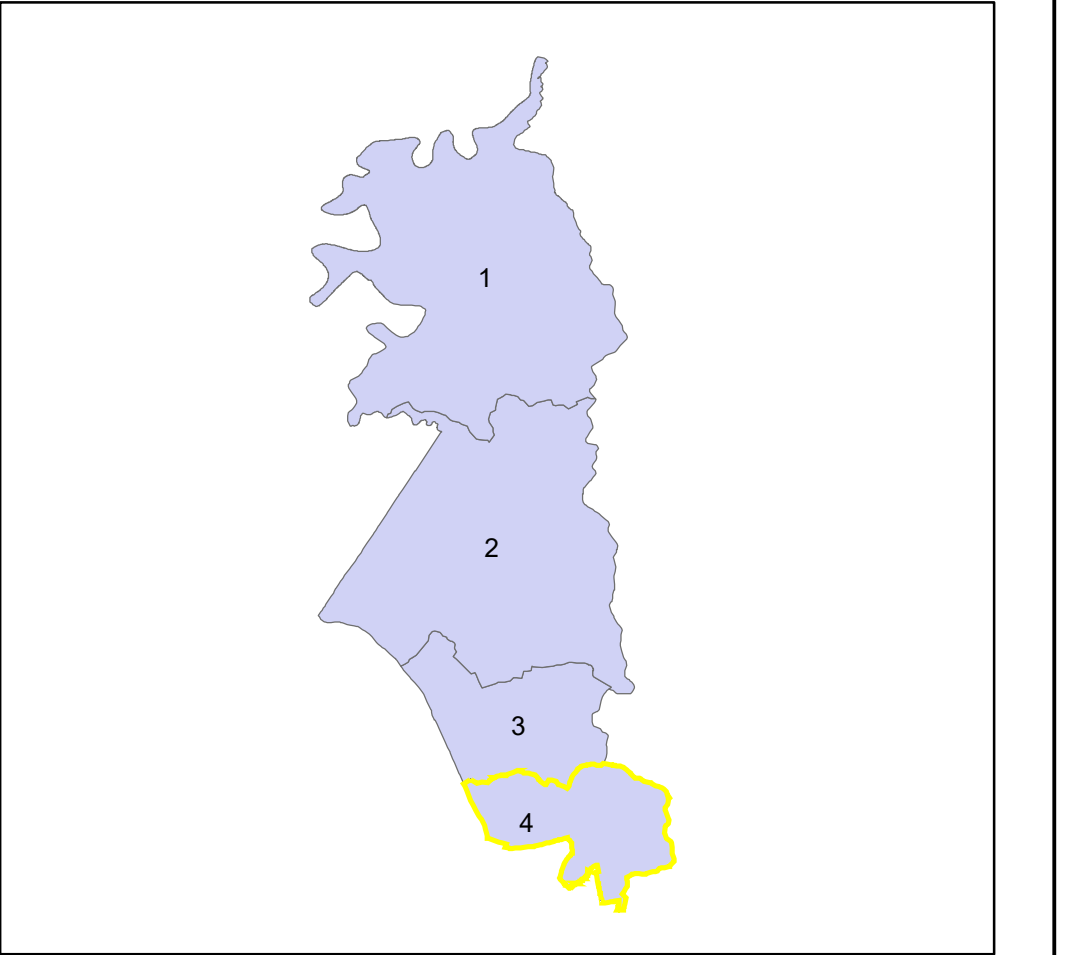
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- using the Local Environment Plan's (LEPs) to control development in areas with a bush fire risk;
- varying the standard bush fire danger period as required;
- requiring permits during bush fire danger periods;
- prosecution of arsonists/offenders;
- investigation of bush fire causes;
- normal fire suppression activities;
- assessing and managing compliance with strategic fire-fighting resource allocation management systems;
- preparation of a S&S Operations Coordination Plan;

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Land Management Zone	To meet relevant land management objectives in area where APZs or SFAZs are not appropriate.	To reduce the likelihood of spread of fires. To undertake mosaic burning.	As appropriate to achieve land protection objectives of the responsible land management agency. To reduce the likelihood of spread of fires. To undertake mosaic burning.
Fire Exclusion Zone	To exclude bush fires.	NA	Variable dependant on size of fire sensitive area requiring protection.

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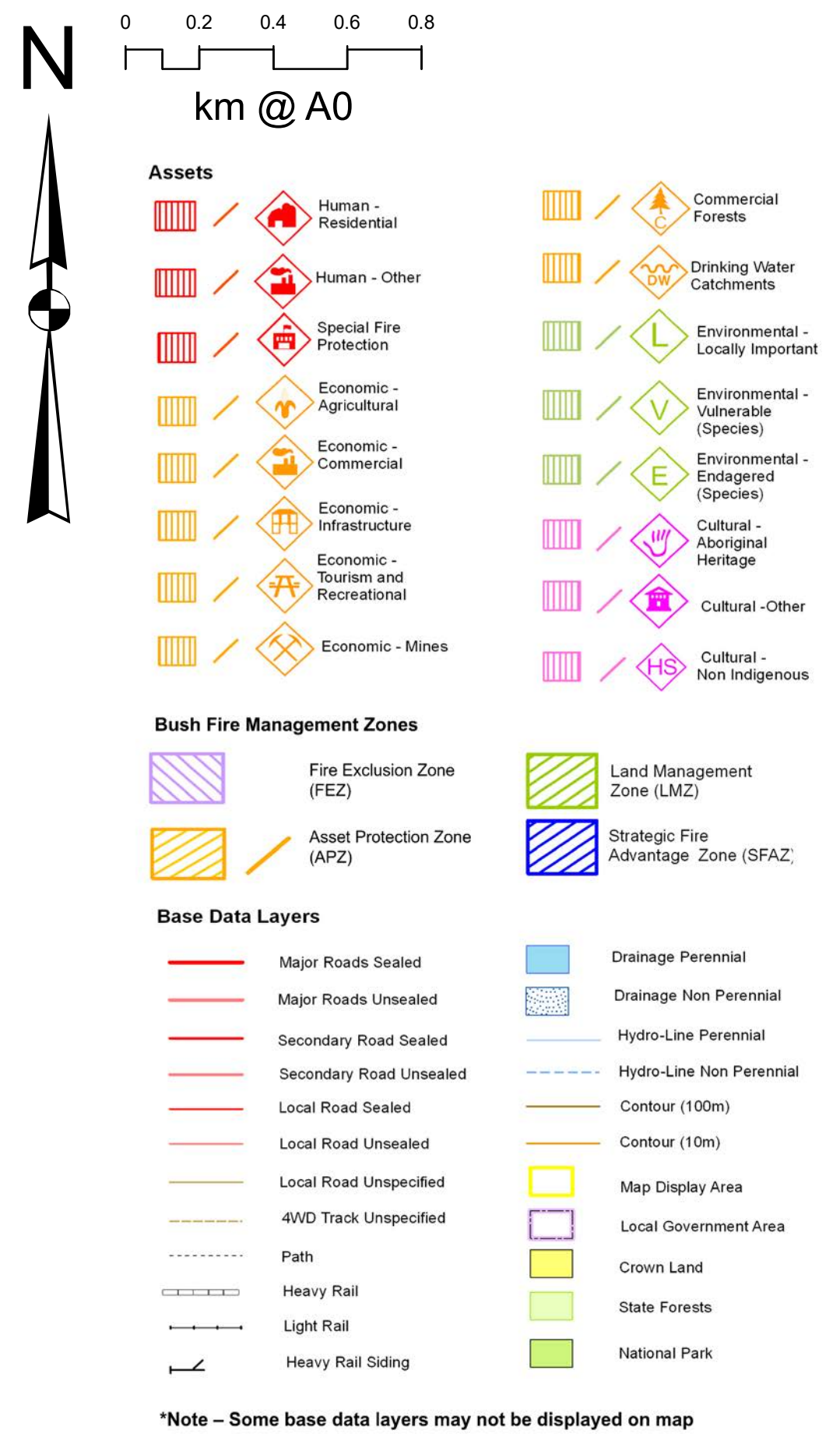
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Date created: Friday, 10 May 2019

BFRMP version 2.1.26.0



Map Ref	Asset name	Asset type	Subtype	Risk level	Priority	Treatment
NA	Telstra Infrastructure/Communications	Economic	Infrastructure	Very High	2A	T33
NA	Endeavour Energy Network	Economic	Infrastructure	Very High	2A	T34
88	Baulkham Hills (Sophia Doyle Reserve)	Human	Residential	Very High	2A	T1;17;30
92	Fern Gully Child Care Centre	Human	Special Fire	Very High	2A	T26
93	West Pennant Hills (Excelsior/Bidjagal)	Human	Residential	Very High	2A	T16;17;19;2
94	West Pennant Hills (Excelsior Reserve)	Human	Residential	Very High	2A	T1;17
95	West Pennant Hills (Excelsior Reserve)	Human	Residential	Very High	2A	T1;16;17;18
96	West Pennant Hills (Sanctuary Point to)	Human	Residential	Very High	2A	(1)
98	West Pennant Hills (Excelsior/Bidjagal)	Human	Residential	Very High	2A	T19;16;17
99	West Pennant Hills (Bidjagal Reserve)	Human	Residential	Very High	2A	(2)
100	West Pennant Hills (Excelsior/Bidjagal)	Human	Residential	Very High	2A	T19;17;16
101	West Pennant Hills (Excelsior/Bidjagal)	Human	Residential	Very High	2A	(3)
102	West Pennant Hills (Richard Webb)	Human	Residential	Very High	2A	T1;17
103	West Pennant Hills (Cumberland State)	Human	Residential	Very High	2A	T28;1;17;15
155	West Pennant Hills (Russell)	Human	Residential	Very High	2A	T17;25;1;24
156	West Pennant Hills (The Glade)	Human	Residential	Very High	2A	T14;15;17
314	FRNSW CFU	Economic	Infrastructure	Medium	4	T35
315	FRNSW CFU	Economic	Infrastructure	Medium	4	T35
316	FRNSW CFU	Economic	Infrastructure	Medium	4	T35
317	FRNSW CFU	Economic	Infrastructure	Medium	4	T35
318	FRNSW CFU	Economic	Infrastructure	Medium	4	T35
334	Hills Community Care Building NSP	Human	Other	Low	NA	T38
335	George Thomson Reserve Open Space	Human	Other	Low	NA	T36

- (1) T25;24;17;19
- (2) T20;21;23;17
- (3) T24;19;16;17



ID	Treatment strategy	Action	Agencies (Support)
T1	Hazard Reduction	Maintain APZ	LGA
T2	Preparedness	Inspect and Maintain Fire Trail	LGA
T14	Hazard Reduction	Maintain APZ	Private
T15	Preparedness	Inspect and Maintain Fire Trail	FCNSW
T16	Hazard Reduction	Undertake Hazard Reduction Burning	FRNSW (LGA, Bidjagal Reserve)
T17	Community Education	Conduct Community Engagement Activity	FRNSW
T18	Preparedness	Inspect and Maintain Fire Trail	LGA (FRNSW, RFS)
T19	Hazard Reduction	Maintain APZ	LGA, DPI, Bidjagal Reserve Trust
T20	Hazard Reduction	Maintain APZ	DPI, Bidjagal Reserve Trust Board
T21	Hazard Reduction	Undertake Hazard Reduction Burning	FRNSW (Bidjagal Reserve Trust)
T23	Preparedness	Inspect and Maintain Fire Trail	DPI, Bidjagal Reserve Trust Board
T24	Preparedness	Inspect and Maintain Fire Trail	LGA, DPI, Bidjagal Reserve Trust
T25	Hazard Reduction	Undertake Hazard Reduction Burning	FRNSW (LGA)
T26	Property Planning	Develop/Implement Bushfire Emergency	Private (FRNSW)
T28	Hazard Reduction	Undertake Hazard Reduction Burning	FCNSW
T30	Hazard Reduction	Undertake Hazard Reduction Burning	LGA (FRNSW)
T33	Hazard Reduction	Maintain APZ	Telstra
T34	Hazard Reduction	Undertake Vegetation Maintenance	Endeavour Energy
T35	Preparedness	Maintain Community Fire Units	FRNSW
T38	Other	Manage Neighbourhood Safer Place	LGA, RFS
T38	Other	Manage Neighbourhood Safer Place	Private, RFS

*Note - Some base data layers may not be displayed on map

Appendix VII

Heritage Database Searches

Search Results

No results found.

Enter at least one search criterion.

[Search Hints](#)

<input type="button" value="Search"/> <input type="button" value="Reset form"/>	
Place name <input type="text"/>	
Street name Knightsbridge Avenue	
Town or suburb Glenwood	State New South Wales ▼
Country <input type="text"/>	

Advanced search options

List All Lists ▼ <i>Different lists will provide different status and class options</i>	
Local Government Area <input type="text"/>	Place ID number <input type="text"/>
Legal status --All-- ▼	Class --All-- ▼
Keyword Search <input type="text"/>	
<input checked="" type="checkbox"/> Description <input checked="" type="checkbox"/> Statement of Significance <input checked="" type="checkbox"/> Place history	
<p>Latitude/Longitude</p> <p style="text-align: center;">N</p> <p style="text-align: center;">Latitude 1</p> <p>Longitude 1 <input type="text"/> S Longitude 2 <input type="text"/></p> <p>W <input type="text"/> E Latitude 2 <input type="text"/> E E</p> <p style="text-align: center;"><input type="text"/> S</p> <p style="text-align: center;">S</p> <p> <input type="radio"/> Wholly within region <input checked="" type="radio"/> Wholly or partially within region </p> <p><i>Longitude coordinates should be entered as ddd.mm.ss</i> <i>Latitude coordinates should be entered as dd.mm.ss</i></p>	
Map Ref No <input type="text"/>	
<i>1:100,000 eg 2357</i> <i>1:250,000 eg SF-50-01</i>	

Search Hints

- Not all fields need to be filled in. The fewer you fill in the more results you will get.
- If you cannot find a place, check spelling and try alternative names. Reduce the number of words that you include and use fewer fields.
- The Local Government field used on its own will provide a comprehensive list of places in an area.

Report Produced: Thu Nov 7 14:13:05 2019

Search Results

No results found.

Enter at least one search criterion.

[Search Hints](#)

		Search	Reset form
Place name <input type="text"/>			
Street name Montview way			
Town or suburb Glenwood		State New South Wales ▼	
Country <input type="text"/>			

Advanced search options

List All Lists ▼ <i>Different lists will provide different status and class options</i>	
Local Government Area <input type="text"/>	Place ID number <input type="text"/>
Legal status --All-- ▼	Class --All-- ▼
Keyword Search <input type="text"/>	
<input checked="" type="checkbox"/> Description	<input checked="" type="checkbox"/> Statement of Significance
<input checked="" type="checkbox"/> Place history	
Latitude/Longitude	
<p>N</p> <p>Latitude 1</p> <p>Longitude 1 <input type="text"/> S Longitude 2</p> <p>W <input type="text"/> E Latitude 2 <input type="text"/> E E</p> <p> <input type="text"/> S</p> <p>S</p>	
<input type="radio"/> Wholly within region <input checked="" type="radio"/> Wholly or partially within region <i>Longitude coordinates should be entered as ddd.mm.ss</i> <i>Latitude coordinates should be entered as dd.mm.ss</i>	
Map Ref No <input type="text"/>	
<i>1:100,000 eg 2357</i> <i>1:250,000 eg SF-50-01</i>	

Search Hints

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- If you cannot find a place, check spelling and try alternative names. Reduce the number of words that you include and use fewer fields.
- The Local Government field used on its own will provide a comprehensive list of places in an area.

Report Produced: Thu Nov 7 14:12:25 2019

Search Results

No results found.

Enter at least one search criterion.

[Search Hints](#)

<input type="button" value="Search"/> <input type="button" value="Reset form"/>	
Place name <input type="text"/>	
Street name Sciarra Crescent <input type="text"/>	
Town or suburb Acacia Gardens <input type="text"/>	State New South Wales <input type="button" value="v"/>
Country <input type="text"/>	

Advanced search options

List All Lists <input type="button" value="v"/>	
<i>Different lists will provide different status and class options</i>	
Local Government Area <input type="text"/>	Place ID number <input type="text"/>
Legal status --All-- <input type="button" value="v"/>	Class --All-- <input type="button" value="v"/>
Keyword Search <input type="text"/>	
<input checked="" type="checkbox"/> Description <input checked="" type="checkbox"/> Statement of Significance <input checked="" type="checkbox"/> Place history	
<p>Latitude/Longitude</p> <p style="text-align: center;">N</p> <p style="text-align: center;">Latitude 1</p> <p>Longitude 1 <input type="text"/> <input type="button" value="S"/> Longitude 2</p> <p>W <input type="text"/> <input type="button" value="E"/> Latitude 2 <input type="text"/> <input type="button" value="E"/> <input type="button" value="E"/></p> <p style="text-align: center;"><input type="text"/> <input type="button" value="S"/></p> <p style="text-align: center;">S</p> <p> <input type="radio"/> Wholly within region <input checked="" type="radio"/> Wholly or partially within region </p> <p><i>Longitude coordinates should be entered as ddd.mm.ss</i> <i>Latitude coordinates should be entered as dd.mm.ss</i></p>	
Map Ref No <input type="text"/>	
1:100,000 eg 2357 1:250,000 eg SF-50-01	

Search Hints

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Report Produced: Thu Nov 7 14:13:51 2019



Search Results

No results found.

Enter at least one search criterion.

[Search Hints](#)

<input type="button" value="Search"/> <input type="button" value="Reset form"/>	
Place name <input type="text"/>	
Street name Valerie Avenue <input type="text"/>	
Town or suburb Baulkham Hills <input type="text"/>	State New South Wales <input type="button" value="v"/>
Country <input type="text"/>	

Advanced search options

List All Lists <input type="button" value="v"/>																									
<i>Different lists will provide different status and class options</i>																									
Local Government Area <input type="text"/>	Place ID number <input type="text"/>																								
Legal status --All-- <input type="button" value="v"/>	Class --All-- <input type="button" value="v"/>																								
Keyword Search <input type="text"/>																									
<input checked="" type="checkbox"/> Description <input checked="" type="checkbox"/> Statement of Significance <input checked="" type="checkbox"/> Place history																									
Latitude/Longitude <table style="width: 100%; text-align: center;"> <tr> <td></td> <td colspan="2">N</td> <td></td> </tr> <tr> <td></td> <td>Longitude 1</td> <td>Latitude 1</td> <td>Longitude 2</td> </tr> <tr> <td>W</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td></td> <td>E</td> <td>Latitude 2</td> <td>E</td> </tr> <tr> <td></td> <td></td> <td><input type="text"/></td> <td>E</td> </tr> <tr> <td></td> <td></td> <td>S</td> <td></td> </tr> </table> <p> <input type="radio"/> Wholly within region <input checked="" type="radio"/> Wholly or partially within region </p> <p><i>Longitude coordinates should be entered as ddd.mm.ss</i> <i>Latitude coordinates should be entered as dd.mm.ss</i></p>			N				Longitude 1	Latitude 1	Longitude 2	W	<input type="text"/>	<input type="text"/>	<input type="text"/>		E	Latitude 2	E			<input type="text"/>	E			S	
	N																								
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Search Hints

- Not all fields need to be filled in. The fewer you fill in the more results you will get.
- If you cannot find a place, check spelling and try alternative names. Reduce the number of words that you include and use fewer fields.
- The Local Government field used on its own will provide a comprehensive list of places in an area.

Report Produced: Thu Nov 7 14:10:01 2019

NSW Heritage Search:

Blacktown LGA :

Montview Way, Glenwood, Lot 2/ DP571812

Search for NSW heritage

Your search did not return any matching results. Please refine your search and try again.

Here you can search the State Heritage Inventory. The State Heritage Inventory is a database of heritage items in New South Wales which includes:

- declared Aboriginal Places
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- items listed of local heritage significance on a local council's Local Environmental Plan

NSW's maritime heritage, that is not a site listed on the State Heritage Register, is held in a separate database. You can search for shipwrecks, submerged aircraft and other maritime heritage sites in the **Maritime Heritage Database**.

For more information about Aboriginal Places and other sites of significance refer to **Aboriginal Heritage Information Management System**.

We work to keep the State Heritage Inventory up to date. We rely on State agencies and local councils to provide updated information when applicable. It's recommended that you check with the relevant State agency or local council for the most up-to-date information.

Basic search criteria

Item name/database ID:

Street name:

Suburb/town:

Local Government Area:

Local Aboriginal Land Council (LALC):

Heritage listings:

SHR number:

Additional search criteria

NOTE: For items listed by local councils, there may not be information in the additional search criteria fields.

Owner organisation:

Designer/builder:

Year of construction: from to:

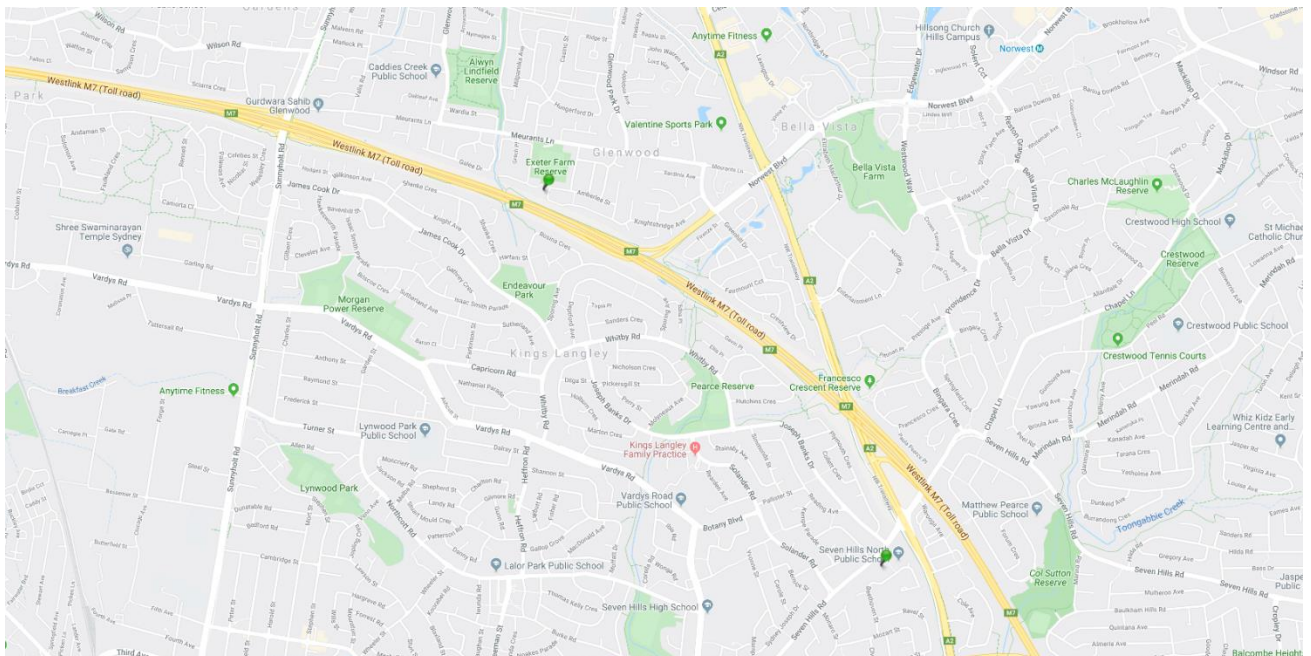
Item type:

Item group:

Item category:

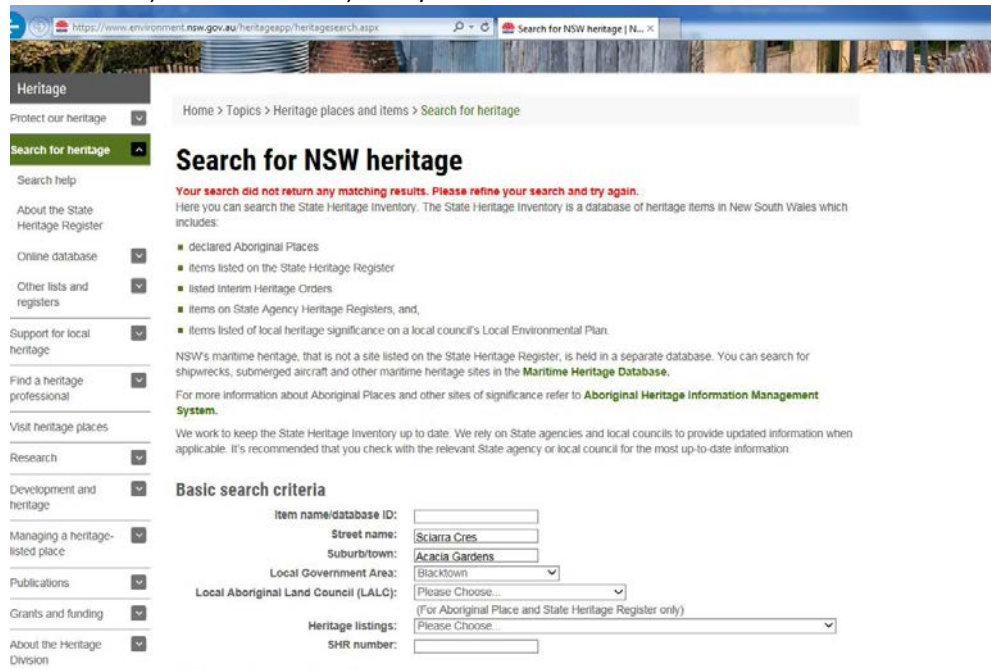
Australian historic theme:

NSW historic theme:



Blacktown LGA :

Sciarra Cres, Acacia Gardens, Lot 5/DP1132919



Heritage

Protect our heritage

Search for heritage

Search help

About the State Heritage Register

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Other lists and registers

Support for local heritage

Find a heritage professional

Visit heritage places

Research

Development and heritage

Managing a heritage-listed place

Publications

Grants and funding

About the Heritage Division

Home > Topics > Heritage places and items > Search for heritage

Search for NSW heritage

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Street name:

Suburb/town:

Local Government Area:

Local Aboriginal Land Council (LALC):

Heritage listings:

SHR number:

Additional search criteria

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Owner organisation*:

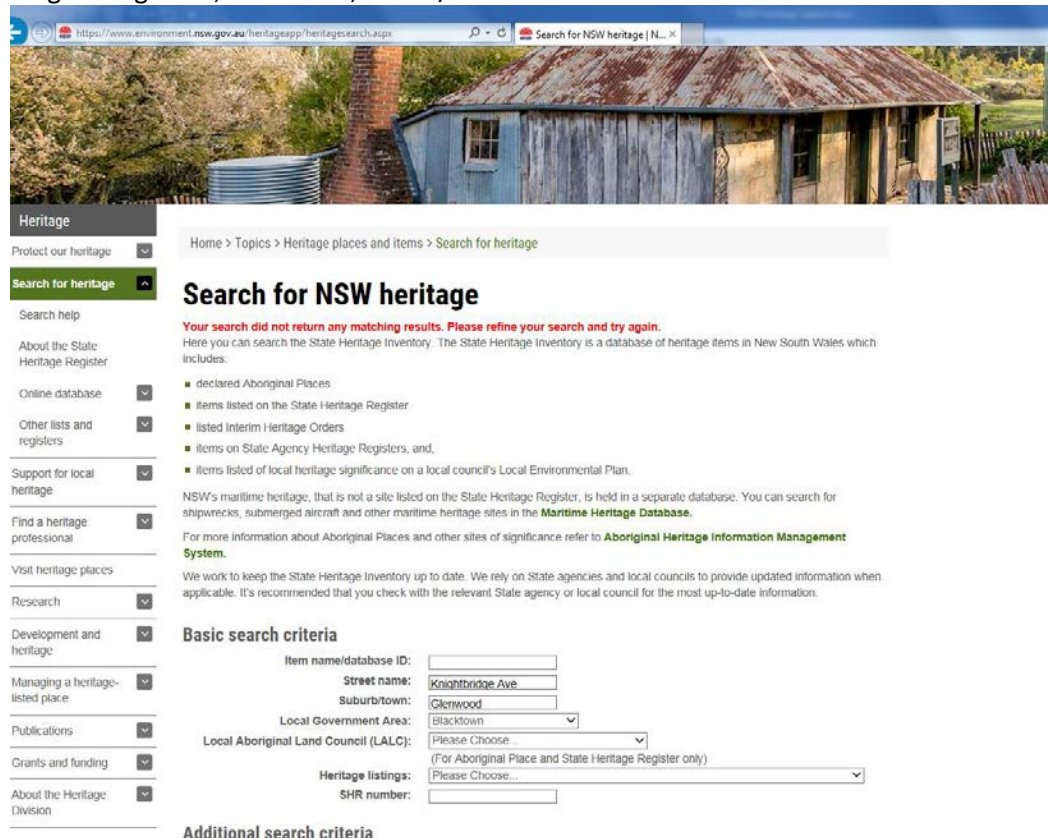
Designer/builder:

Year of construction: from to:

Item type:

Blacktown LGA :

Knightbridge Ave, Glenwood, Lot 51/DP792657



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Basic search criteria

Item name/database ID:

Street name:

Suburb/town:

Local Government Area:

Local Aboriginal Land Council (LALC):

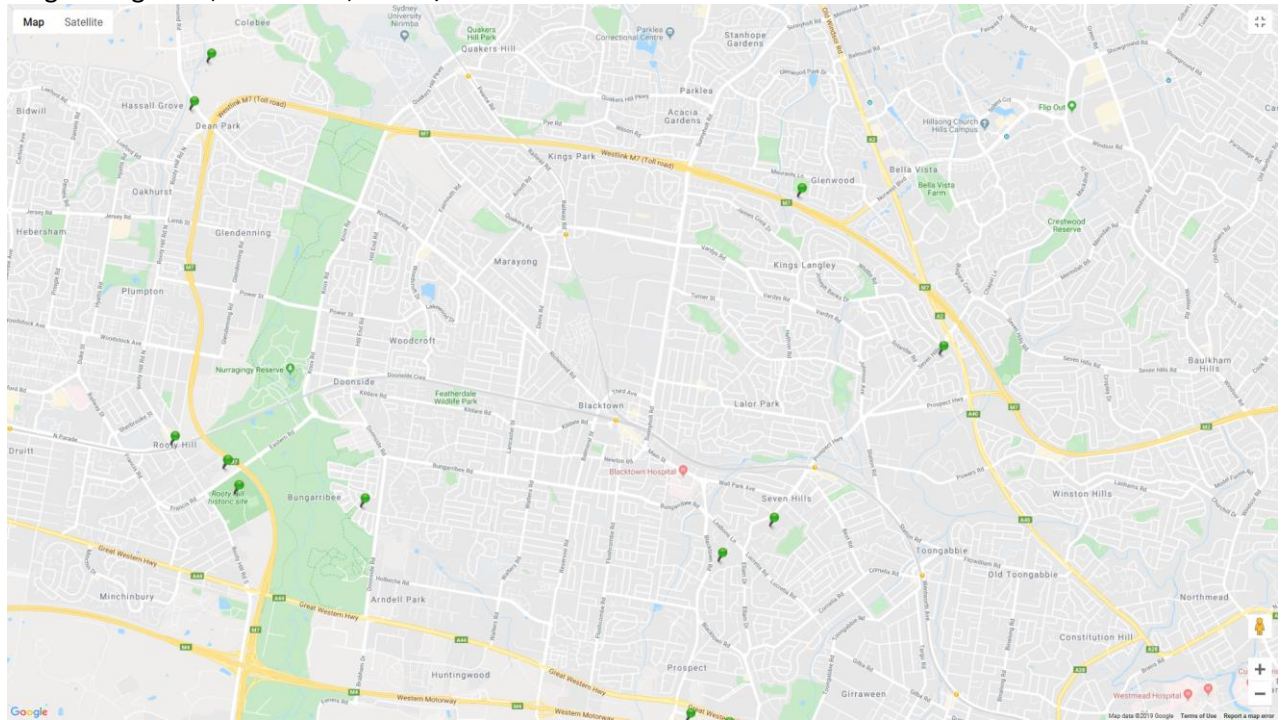
Heritage listings:

SHR number:

Additional search criteria

Blacktown LGA :

Sciarra Cres, Acacia Gardens, Lot 5/DP1132919
Knightbridge Ave, Glenwood, Lot 51/DP792657



The Hills LGA:
Valerie Ave, Baulkham Hills, Lot 3/DP873953

The screenshot shows a web browser window with the URL <https://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx>. The page title is "Search for NSW heritage". The breadcrumb trail is "Home > Topics > Heritage places and items > Search for heritage". The main heading is "Search for NSW heritage". Below this, there is a link: "Return to search page where you can refine/broaden your search." The page is divided into three sections: "Section 1. Aboriginal Places listed under the National Parks and Wildlife Act.", "Section 2. Items listed under the NSW Heritage Act.", and "Section 3. Items listed by Local Government and State Agencies." The search results under Section 3 show one record: "Joyce Farmhouse" at "15-15A Valerie Avenue" in "Baulkham Hills", listed by "The Hills" LGA, with the information source "LGOV".

Home > Topics > Heritage places and items > Search for heritage

Search for NSW heritage

[Return to search page where you can refine/broaden your search.](#)

Statutory listed items

Information and items listed in the State Heritage Inventory come from a number of sources. This means that there may be several entries for the same heritage item in the database. For clarity, the search results have been divided into three sections.

- **Section 1** - contains Aboriginal Places declared by the **Minister for the Environment** under the National Parks and Wildlife Act. This information is provided by the Heritage Division.
- **Section 2** - contains heritage items listed by the **Heritage Council of NSW** under the NSW Heritage Act. This includes listing on the State Heritage Register, an Interim Heritage Order or protected under section 136 of the NSW Heritage Act. This information is provided by the Heritage Division.
- **Section 3** - contains items listed by **local councils** on Local Environmental Plans under the Environmental Planning and Assessment Act, 1979 and **State government agencies** under s.170 of the Heritage Act. This information is provided by local councils and State government agencies.

Section 1. Aboriginal Places listed under the National Parks and Wildlife Act.

Your search did not return any matching results.

Section 2. Items listed under the NSW Heritage Act.

Your search did not return any matching results.

Section 3. Items listed by Local Government and State Agencies.

Your search returned 1 record.

Item name	Address	Suburb	LGA	Information source
Joyce Farmhouse	15-15A Valerie Avenue	Baulkham Hills	The Hills	LGOV

There was a total of 1 records matching your search criteria.

The Hills LGA:
Valerie Ave, Baulkham Hills, Lot 3/DP873953

The screenshot shows a web browser window with the URL <https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=1090084>. The page title is "Joyce Farmhouse | NSW Environment". The breadcrumb trail is "Home > Topics > Heritage places and items > Search for heritage".

Joyce Farmhouse

Item details

Name of item: Joyce Farmhouse
Type of item: Built
Group/Collection: Residential buildings (private)
Category: House
Primary address: 15-15A Valerie Avenue, Baulkham Hills, NSW 2153
Local govt. area: The Hills

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
15-15A Valerie Avenue	Baulkham Hills	The Hills			Primary Address

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Local Environmental Plan	Schedule 1		01 Mar 91		
Local Environmental Plan	The Hills LEP 2012	127	05 Oct 12		

References, internet links & images

None

Note: internet links may be to web pages, documents or images.

Data source

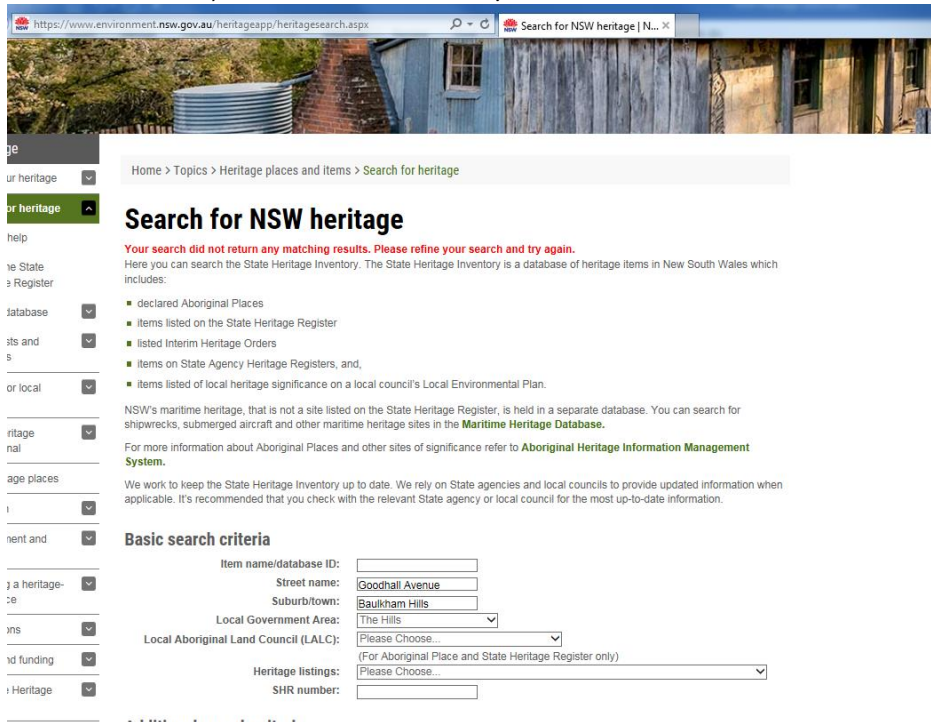
The information for this entry comes from the following source:

Name: Local Government
Database number: 1090084

Source:

<https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=1090084>

The Hills LGA: Goodhall Avenue, Baukham Hills Lot 200/DP540103



https://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx Search for NSW heritage | N...

Home > Topics > Heritage places and items > Search for heritage

Search for NSW heritage

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Basic search criteria

Item name/database ID:

Street name:

Suburb/town:

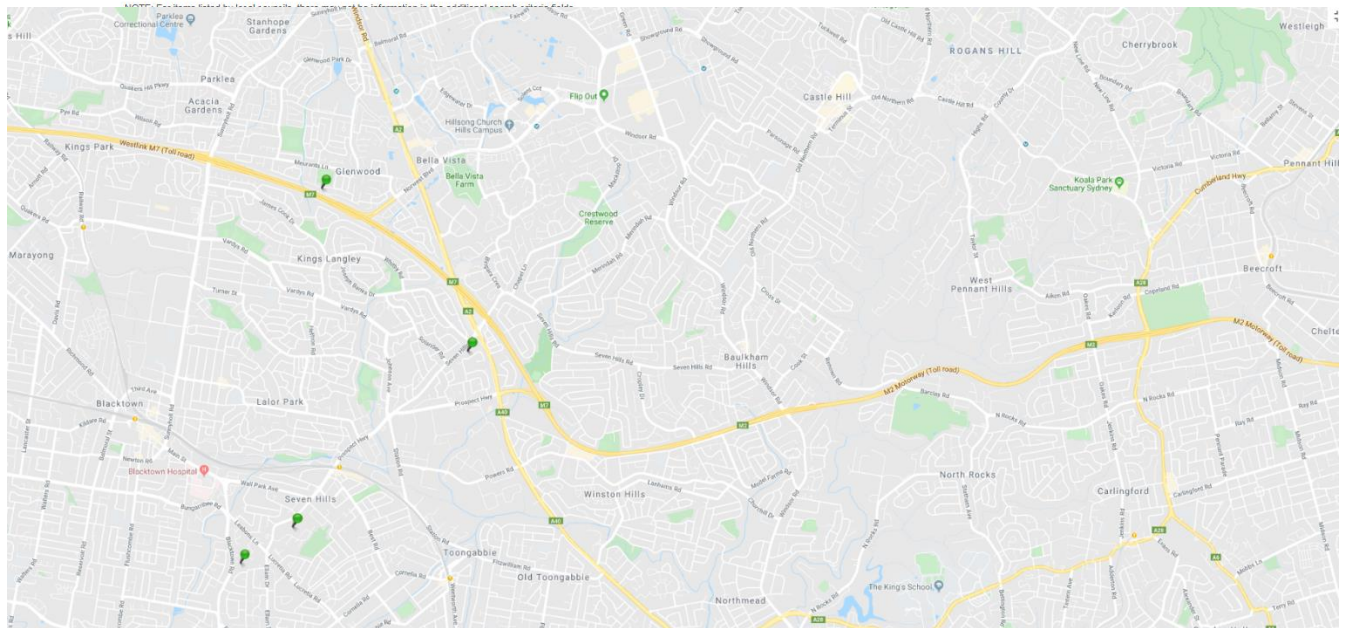
Local Government Area:

Local Aboriginal Land Council (LALC):

Heritage listings:

SHR number:

Additional search criteria



Appendix VIII

EPBC Protected Matters Search



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 07/11/19 15:51:39

[Summary](#)

[Details](#)

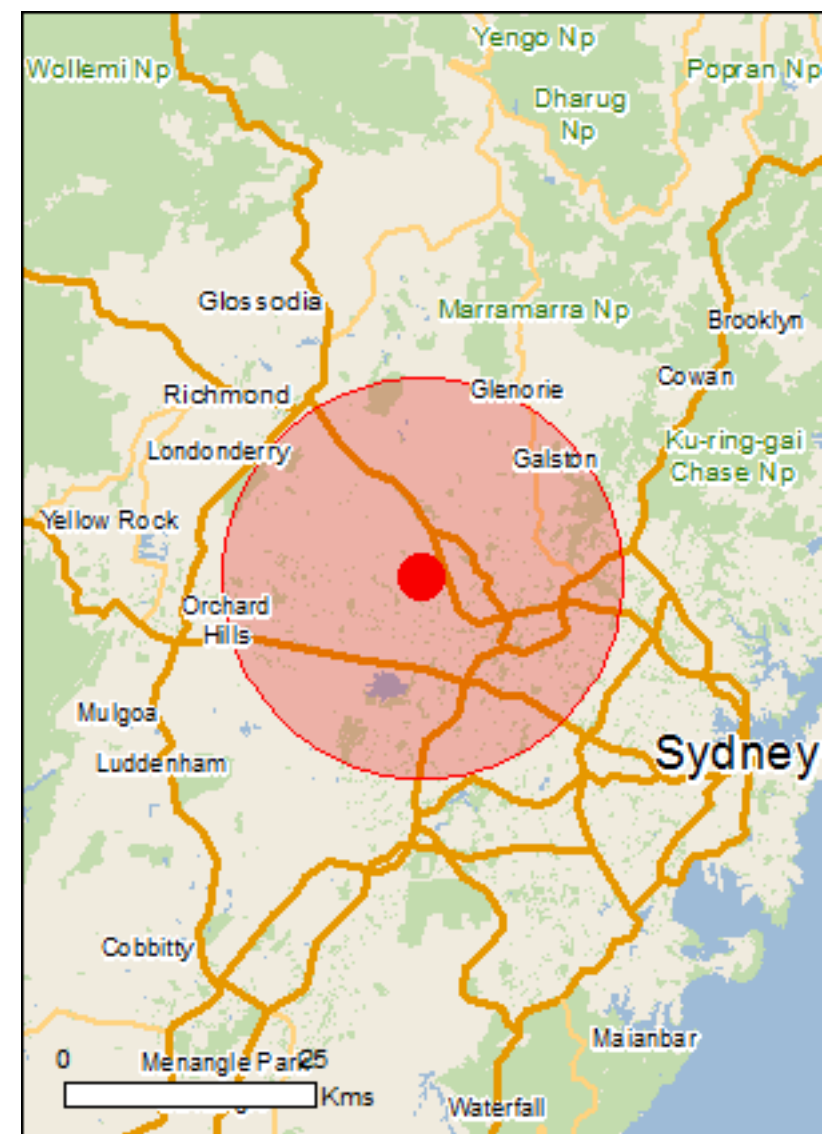
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

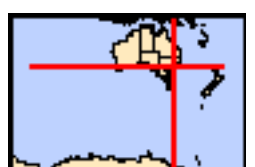
[Acknowledgements](#)



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

[Coordinates](#)

Buffer: 20.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	2
National Heritage Places:	2
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	10
Listed Threatened Species:	91
Listed Migratory Species:	58

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	35
Commonwealth Heritage Places:	4
Listed Marine Species:	69
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	13
Regional Forest Agreements:	None
Invasive Species:	53
Nationally Important Wetlands:	4
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

World Heritage Properties		[Resource Information]
Name	State	Status
Australian Convict Sites (Old Government House and Domain Buffer Zone)	NSW	Buffer zone
Australian Convict Sites (Old Government House and Domain)	NSW	Declared property

National Heritage Properties		[Resource Information]
Name	State	Status
Historic		
Old Government House and the Government Domain	NSW	Listed place
Parramatta Female Factory and Institutions Precinct	NSW	Listed place

Listed Threatened Ecological Communities

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Blue Gum High Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion	Endangered	Community likely to occur within area
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community likely to occur within area
Coastal Upland Swamps in the Sydney Basin Bioregion	Endangered	Community likely to occur within area
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	Critically Endangered	Community likely to occur within area
Shale Sandstone Transition Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Turpentine-Ironbark Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Western Sydney Dry Rainforest and Moist Woodland on Shale	Critically Endangered	Community likely to occur within area

Listed Threatened Species

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
Calidris tenuirostris Great Knot [862]	Critically Endangered	Foraging, feeding or related behaviour known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Foraging, feeding or related behaviour known to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat known to occur within area
Fish		
Epinephelus daemeli Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat known to occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat known to occur within area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area
Litoria littlejohni Littlejohn's Tree Frog, Heath Frog [64733]	Vulnerable	Species or species habitat may occur within area
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence area
Mixophyes balbus Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat likely to occur within area
Insects		
Synemon plana Golden Sun Moth [25234]	Critically Endangered	Species or species habitat known to occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat known to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat likely to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Other		
Pommerhelix duralensis Dural Land Snail [85268]	Endangered	Species or species habitat known to occur within area
Plants		
Acacia bynoeana Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat known to occur within area
Acacia gordonii [5031]	Endangered	Species or species habitat known to occur within area
Acacia pubescens Downy Wattle, Hairy Stemmed Wattle [18800]	Vulnerable	Species or species habitat known to occur within area
Allocasuarina glareicola [21932]	Endangered	Migration route known to occur within area
Asterolasia elegans [56780]	Endangered	Species or species habitat may occur within area
Caladenia tessellata Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat known to occur within area
Darwinia biflora [14619]	Vulnerable	Species or species habitat known to occur within area
Eucalyptus camfieldii Camfield's Stringybark [15460]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus sp. Cattai (Gregson s.n., 28 Aug 1954) [89499]	Critically Endangered	Species or species habitat known to occur within area
Genoplesium baueri Yellow Gnat-orchid [7528]	Endangered	Species or species habitat known to occur within area
Grevillea parviflora subsp. parviflora Small-flower Grevillea [64910]	Vulnerable	Species or species habitat likely to occur within area
Haloragis exalata subsp. exalata Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat may occur within area
Lasiopetalum joyceae [20311]	Vulnerable	Species or species habitat likely to occur within area
Leptospermum deanei Deane's Tea-tree [21777]	Vulnerable	Species or species habitat known to occur within area
Leucopogon exolasius Woronora Beard-heath [14251]	Vulnerable	Species or species habitat likely to occur within area
Melaleuca biconvexa Biconvex Paperbark [5583]	Vulnerable	Species or species habitat likely to occur within area
Melaleuca deanei Deane's Melaleuca [5818]	Vulnerable	Species or species habitat likely to occur within area
Micromyrtus minutiflora [11485]	Vulnerable	Species or species habitat likely to occur within area
Olearia cordata [6710]	Vulnerable	Species or species habitat likely to occur within area
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat likely to occur within area
Persoonia hirsuta Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat known to occur within area
Persoonia mollis subsp. maxima [56075]	Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
Persoonia nutans Nodding Geebung [18119]	Endangered	Species or species habitat known to occur within area
Pimelea curviflora var. curviflora [4182]	Vulnerable	Species or species habitat known to occur within area
Pimelea spicata Spiked Rice-flower [20834]	Endangered	Species or species habitat known to occur within area
Pomaderris brunnea Rufous Pomaderris [16845]	Vulnerable	Species or species habitat likely to occur within area
Pterostylis gibbosa Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat may occur within area
Pterostylis saxicola Sydney Plains Greenhood [64537]	Endangered	Species or species habitat likely to occur within area
Pultenaea parviflora [19380]	Vulnerable	Species or species habitat known to occur within area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat known to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Zieria involucrata [3087]	Vulnerable	Species or species habitat likely to occur within area

Reptiles

Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Hoplocephalus bungaroides Broad-headed Snake [1182]	Vulnerable	Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area

Listed Migratory Species

[[Resource Information](#)]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna grisea Sooty Shearwater [82651]		Species or species habitat likely to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur

Name	Threatened	Type of Presence within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Foraging, feeding or related behaviour known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Foraging, feeding or related behaviour known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	habitat known to occur within area Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Foraging, feeding or related behaviour known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Foraging, feeding or related behaviour known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Foraging, feeding or related behaviour known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Foraging, feeding or related behaviour known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Foraging, feeding or related behaviour known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known

Name	Threatened	Type of Presence
Tringa brevipes Grey-tailed Tattler [851]		to occur within area Foraging, feeding or related behaviour known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Foraging, feeding or related behaviour known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land

[\[Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Airservices Australia
Commonwealth Land - Australian & Overseas Telecommunications Corporation
Commonwealth Land - Australian Postal Commission
Commonwealth Land - Australian Postal Corporation
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Australian Telecommunications Corporation
Commonwealth Land - Australian Wool Testing Authority Limited
Commonwealth Land - Commonwealth Bank of Australia
Commonwealth Land - Commonwealth Scientific & Industrial Research Organisation
Commonwealth Land - Commonwealth Trading Bank of Australia
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Defence Service Homes Corporation
Commonwealth Land - Deputy Director of War Service Homes
Commonwealth Land - Director of Defence Service Homes
Commonwealth Land - Director of War Service Homes
Commonwealth Land - Reserve Bank of Australia
Commonwealth Land - Telstra Corporation Limited
Commonwealth Land - War Service Homes Commissioner
Defence - 1/15 RNSWL - LANCER BARRACKS - PARRAMATTA
Defence - ADFRU PARRAMATTA
Defence - AIRTC ST MARYS
Defence - BLACKTOWN TRAINING DEPOT
Defence - CHESTER HILL (NO 2 STORE DPT)
Defence - HMAS NIRIMBA
Defence - LIDCOMBE MULTI-USER DEPOT
Defence - MERRYLANDS
Defence - NEWINGTON
Defence - RAAF STORES DEPOT REGENTS PARK
Defence - RICHMOND - FUEL FARM, DENTAL, MEDICAL
Defence - RICHMOND - MIDDLE MARKER
Defence - RICHMOND - OUTER MARKER
Defence - RICHMOND RAAF BASE
Defence - TIMOR BARRACKS - DUNDAS
Defence - VILLAWOOD - MOTOR REPAIR W/SHP (VILLAWOOD GEMS BASE)

Commonwealth Heritage Places

[\[Resource Information \]](#)

Name	State	Status
Natural		

Name	State	Status
Shale Woodland Llandilo	NSW	Listed place
Historic		
Lancer Barracks	NSW	Listed place
Lancer Barracks Precinct	NSW	Listed place
Villawood Immigration Centre	NSW	Listed place

Listed Marine Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Foraging, feeding or related behaviour known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Foraging, feeding or related behaviour known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Foraging, feeding or related behaviour known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Foraging, feeding or related behaviour known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Foraging, feeding or

Name	Threatened	Type of Presence
Charadrius ruficapillus Red-capped Plover [881]		related behaviour known to occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Foraging, feeding or related behaviour known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Species or species habitat known to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Foraging, feeding or related behaviour likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour known to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Foraging, feeding or related behaviour likely to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Breeding known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Foraging, feeding or related behaviour known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Foraging, feeding or related behaviour known to occur within area

Name	Threatened	Type of Presence
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Foraging, feeding or related behaviour known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known to occur within area
Puffinus griseus Sooty Shearwater [1024]		Species or species habitat likely to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Foraging, feeding or related behaviour known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Foraging, feeding or related behaviour known to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area

Extra Information

State and Territory Reserves [\[Resource Information \]](#)

Name	State
Berowra Valley	NSW
Berowra Valley	NSW
Castlereagh	NSW
Cattai	NSW
Dural	NSW
Lane Cove	NSW
Newington	NSW
Pitt Town	NSW
Prospect	NSW
Rouse Hill	NSW
Scheyville	NSW
Wianamatta	NSW
Windsor Downs	NSW

Invasive Species [\[Resource Information \]](#)

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species

Name	Status	Type of Presence
Passer domesticus House Sparrow [405]		habitat likely to occur within area Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		

Name	Status	Type of Presence
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Reptiles

Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area
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Nationally Important Wetlands

[[Resource Information](#)]

Name	State
Bicentennial Park	NSW
Longneck Lagoon	NSW
Newington Wetlands	NSW
Pitt Town Lagoon	NSW

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-33.73953 150.92374

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

Appendix IX

DPIE Bionet Search

The Table below shows that the Bionet database search identified 94 threatened species with the potential to occur within the search area (10 km radius around the proposal sites).

Scientific	Common name	Status ¹		No. of records	Distance recorded from site ²				
		NSW	Com.		Sciarra Crescent	Knightbridge Avenue	Montview Avenue APZ3	Montview Avenue APZ2	Valerie Avenue
Amphibia									
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	1	4.25	10.81	11.96	12.28	14.31
<i>Litoria aurea</i>	Green and Golden Bell Frog	E	V	23	3.80	3.81	3.94	3.67	1.85
<i>Pseudophryne australis</i>	Red-crowned Toadlet	V		18	4.16	6.34	6.15	6.13	5.32
Aves									
<i>Anthochaera phrygia</i>	Regent Honeyeater	E	CE	13	5.45	2.47	2.32	2.40	3.94
<i>Apus pacificus</i>	Fork-tailed Swift		C,J,K	9	4.17	4.65	4.40	4.40	5.43
<i>Ardea ibis</i>	Cattle Egret		C,J	89	4.01	1.65	1.21	1.13	2.53
<i>Ardenna pacificus</i>	Wedge-tailed Shearwater		J	1	8.00	10.14	10.69	10.87	12.56
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V		73	2.92	6.50	6.35	6.36	7.34
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E	2	10.87	8.68	9.48	9.73	11.65
<i>Burhinus grallarius</i>	Bush Stone-curlew	E		1	10.87	8.90	8.34	8.19	6.95

Scientific	Common name	Status ¹		No. of records	Distance recorded from site ²				
		NSW	Com.		Sciarra Crescent	Knightbridge Avenue	Montview Avenue APZ3	Montview Avenue APZ2	Valerie Avenue
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		C,J,K	48	3.37	13.32	14.48	14.80	16.82
<i>Calidris ferruginea</i>	Curlew Sandpiper	E	CE	4	5.87	13.49	14.65	14.97	16.98
<i>Calidris melanotos</i>	Pectoral Sandpiper		J,K	10	6.59	13.32	14.48	14.80	16.82
<i>Calidris ruficollis</i>	Red-necked Stint		C,J,K	11	0.28	7.76	8.84	9.15	11.21
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V		10	5.67	7.24	6.36	6.14	5.65
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V		18	5.48	6.05	5.67	5.62	5.79
<i>Chthonicola sagittata</i>	Speckled Warbler	V		2	10.87	8.64	9.78	10.07	11.88
<i>Circus assimilis</i>	Spotted Harrier	V		3	10.66	13.32	14.48	14.80	16.82
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V		1	6.92	6.65	7.21	7.41	9.16
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V		48	1.96	6.65	6.85	6.80	5.76
<i>Falco subniger</i>	Black Falcon	V		2	10.87	4.27	3.95	3.90	3.63
<i>Gallinago hardwickii</i>	Latham's Snipe		C,J,K	14	0.65	5.88	6.93	7.23	9.28
<i>Glossopsitta pusilla</i>	Little Lorikeet	V		28	3.87	5.29	4.15	3.84	2.48

Scientific	Common name	Status ¹		No. of records	Distance recorded from site ²				
		NSW	Com.		Sciarra Crescent	Knightbridge Avenue	Montview Avenue APZ3	Montview Avenue APZ2	Valerie Avenue
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	C	7	10.66	5.88	6.58	6.28	4.23
<i>Hieraaetus morphnoides</i>	Little Eagle	V		21	5.48	7.59	7.54	7.54	7.27
<i>Hirundapus caudacutus</i>	White-throated Needletail		C,J,K	18	5.34	5.43	4.62	4.44	2.63
<i>Ixobrychus flavicollis</i>	Black Bittern	V		3	10.87	7.24	6.36	6.14	5.65
<i>Lathamus discolor</i>	Swift Parrot	E	CE	55	2.75	2.52	2.79	2.93	1.78
<i>Lophoictinia isura</i>	Square-tailed Kite	V		13	5.48	7.03	6.46	6.34	6.59
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	V		4	8.35	6.93	6.85	6.80	7.41
<i>Merops ornatus</i>	Rainbow Bee-eater		J	5	5.34	6.47	6.76	6.86	6.40
<i>Neophema pulchella</i>	Turquoise Parrot	V		4	8.34	4.44	3.70	3.43	2.71
<i>Ninox connivens</i>	Barking Owl	V		9	4.36	4.27	3.95	3.90	3.43
<i>Ninox strenua</i>	Powerful Owl	V		170	3.07	1.04	0.72	0.94	0.42
<i>Oxyura australis</i>	Blue-billed Duck	V		2	4.93	11.66	12.76	13.07	15.12
<i>Petroica boodang</i>	Scarlet Robin	V		5	6.97	7.46	7.27	6.97	4.93

Scientific	Common name	Status ¹		No. of records	Distance recorded from site ²				
		NSW	Com.		Sciarra Crescent	Knightbridge Avenue	Montview Avenue APZ3	Montview Avenue APZ2	Valerie Avenue
<i>Petroica phoenicea</i>	Flame Robin	V		3	1.02	3.95	3.58	3.56	4.56
<i>Petroica rodinogaster</i>	Pink Robin	V		1	8.44	7.24	6.36	6.14	5.65
<i>Plegadis falcinellus</i>	Glossy Ibis		C	7	10.87	5.90	5.81	5.84	6.95
<i>Pluvialis fulva</i>	Pacific Golden Plover		C,J,K	8	4.17	13.32	14.48	14.80	16.82
<i>Pluvialis squatarola</i>	Grey Plover		C,J,K	1	10.31	8.50	7.93	7.81	7.96
<i>Polytelis swainsonii</i>	Superb Parrot	V	V	2	6.43	5.79	4.62	4.30	2.57
<i>Rostratula australis</i>	Australian Painted Snipe	E	E	5	3.90	13.32	14.48	14.80	16.82
<i>Tringa glareola</i>	Wood Sandpiper		C,J,K	6	10.81	13.32	14.48	14.80	16.82
<i>Tringa nebularia</i>	Common Greenshank		C,J,K	1	10.87	13.32	14.48	14.80	16.82
<i>Tringa stagnatilis</i>	Marsh Sandpiper		C,J,K	3	7.80	13.49	14.65	14.97	16.98
<i>Tyto novaehollandiae</i>	Masked Owl	V		8	10.87	6.59	6.39	6.38	7.24
<i>Tyto tenebricosa</i>	Sooty Owl	V		1	10.87	7.56	6.42	6.11	4.06
Flora									
<i>Acacia bynoeana</i>	Bynoe's Wattle	E	V	11	8.26	6.40	5.89	5.80	6.22
<i>Acacia pubescens</i>	Downy Wattle	V	V	27	5.42	4.52	4.39	4.40	4.37

Scientific	Common name	Status ¹		No. of records	Distance recorded from site ²				
		NSW	Com.		Sciarra Crescent	Knightbridge Avenue	Montview Avenue APZ3	Montview Avenue APZ2	Valerie Avenue
<i>Callistemon linearifolius</i>	Netted Bottle Brush	V		4	7.67	3.74	4.07	4.23	5.92
<i>Darwinia biflora</i>		V	V	352	5.84	5.26	5.59	5.71	6.22
<i>Dillwynia tenuifolia</i>		V		77	6.34	7.10	8.11	8.39	8.00
<i>Epacris purpurascens</i> var. <i>purpurascens</i>		V		242	6.42	5.54	5.24	5.14	3.95
<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	V	V	8	7.63	2.58	2.24	2.26	3.64
<i>Eucalyptus scoparia</i>	Wallangarra White Gum	E	V	1	13.34	10.84	9.86	9.61	8.63
<i>Eucalyptus</i> sp. <i>Cattai</i>		E	CE	283	7.29	6.54	6.37	6.38	7.26
<i>Grammitis stenophylla</i>	Narrow-leaf Finger Fern	E		1	7.53	10.86	9.70	9.37	7.38
<i>Grevillea juniperina</i> subsp. <i>juniperina</i>	Juniper-leaved Grevillea	V		385	0.42	2.00	3.16	3.48	5.40
<i>Hibbertia superans</i>		E		99	1.94	6.45	5.96	5.87	4.87
<i>Isotoma fluviatilis</i> subsp. <i>fluviatilis</i>			X	4	7.67	3.73	4.85	5.17	3.58
<i>Lasiopetalum joyceae</i>		V	V	1	8.45	8.99	9.81	10.06	11.98

Scientific	Common name	Status ¹		No. of records	Distance recorded from site ²				
		NSW	Com.		Sciarra Crescent	Knightbridge Avenue	Montview Avenue APZ3	Montview Avenue APZ2	Valerie Avenue
<i>Leucopogon fletcheri</i> <i>subsp. fletcheri</i>		E		15	4.49	5.81	5.72	5.75	6.85
<i>Marsdenia viridiflora</i> <i>subsp. viridiflora</i>		E		8	8.21	11.09	11.48	11.51	9.74
<i>Melaleuca deanei</i>	Deane's Paperbark	V	V	1	11.56	9.25	9.36	9.43	10.62
<i>Micromyrtus minutiflora</i>		E	V	10	6.51	11.77	12.94	13.26	15.24
<i>Persoonia hirsuta</i>	Hairy Geebung	E	E	21	0.90	5.83	5.24	5.13	5.43
<i>Pilularia novae-hollandiae</i>	Austral Pillwort	E		1	8.03	8.09	8.95	9.20	10.43
<i>Pimelea curviflora</i> <i>var. curviflora</i>		V	V	48	3.38	6.19	5.93	5.84	4.01
<i>Pimelea spicata</i>	Spiked Rice-flower	E	E	214	1.30	3.05	4.16	4.48	6.29
<i>Pomaderris prunifolia</i>		E		6	5.02	5.56	4.48	4.18	2.17
<i>Pterostylis saxicola</i>	Sydney Plains Greenhood	E	E	3	7.54	5.46	4.38	4.09	2.07
<i>Pultenaea parviflora</i>		E	V	140	3.21	3.23	3.69	3.86	4.87
<i>Rhodamnia rubescens</i>	Scrub Turpentine	E		2	6.25	8.45	7.28	6.95	5.13

Scientific	Common name	Status ¹		No. of records	Distance recorded from site ²				
		NSW	Com.		Sciarra Crescent	Knightbridge Avenue	Montview Avenue APZ3	Montview Avenue APZ2	Valerie Avenue
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E	V	20	2.75	2.66	2.47	2.15	0.75
<i>Tetradlea glandulosa</i>		V		16	6.37	6.05	5.74	5.71	5.37
<i>Triplarina imbricata</i>	Creek Triplarina	E	E	4	13.63	10.86	9.70	9.37	7.38
<i>Wilsonia backhousei</i>	Narrow-leafed Wilsonia	V		1	13.45	14.20	13.04	12.72	10.72
Gastropoda									
<i>Meridolum corneovirens</i>	Cumberland Plain Land Snail	E		266	0.32	1.11	0.47	0.66	2.53
<i>Pommerhelix duralensis</i>	Dural Land Snail	E	E	64	2.85	6.02	5.69	5.56	3.98
Mammalia									
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	9	3.38	3.62	2.57	2.29	0.60
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	9	4.83	5.56	4.91	4.79	5.06
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V		50	1.22	0.36	1.46	1.79	2.93
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	V		103	1.16	1.28	1.21	1.13	1.34
<i>Miniopterus australis</i>	Little Bent-winged Bat	V		34	2.13	3.74	4.07	4.23	3.92

Scientific	Common name	Status ¹		No. of records	Distance recorded from site ²				
		NSW	Com.		Sciarra Crescent	Knightbridge Avenue	Montview Avenue APZ3	Montview Avenue APZ2	Valerie Avenue
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V		182	0.95	1.11	0.47	0.66	1.33
<i>Myotis macropus</i>	Southern Myotis	V		77	3.46	3.01	2.74	2.70	1.63
<i>Petaurus australis</i>	Yellow-bellied Glider	V		6	6.20	6.74	7.33	7.53	9.30
<i>Petaurus norfolcensis</i>	Squirrel Glider	V		1	8.83	5.78	6.95	7.27	9.18
<i>Phascolarctos cinereus</i>	Koala	V	V	8	8.02	4.31	3.18	2.87	0.82
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	1180	0.26	0.35	0.57	0.78	1.06
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V		40	1.46	3.01	2.92	2.99	1.63
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V		65	1.05	2.95	2.55	2.54	2.63
<i>Vespadelus troughtoni</i>	Eastern Cave Bat	V		2	4.80	8.22	8.03	7.99	8.63

¹ Status Abbreviations: V – Vulnerable, E – Endangered, CE – Critically Endangered, C,J -JAMBA, CAMBA (migratory species), X – extinct.

² Distance recorded in kilometres from the centre of each proposal site (calculated using GIS).

Appendix X

Assessment of Significance

Considerations under Section 7.3 of the BC Act 2016 (Five-Part Test)

Endangered Ecological Communities and threatened species that have the potential to be impacted by the proposed works have been assessed under the guidelines of Section 7.3 of the *Biodiversity Conservation Act* (2016) and this is provided below in the form of a five part test. The table below shows which entities Assessments of Significance (AoS) are provided. Combined AoS have been conducted for groups of species that have similar life history and habitat requirements.

Species/ Community	NSW status	EPBC status	Sites
<i>Anthochaera Phrygia</i> (Regent Honeyeater)	E	CE	All
<i>Glossopsitta pusilla</i> (Little Lorikeet)	V	-	All
<i>Lathamus discolor</i> (Swift Parrot)	E	CE	All
<i>Meridolum corneovirens</i> (Cumberland Plain Land Snail)	E	-	Montview Way APZ2, Valerie Avenue
<i>Pommerhelix duralensis</i> (Dural Land Snail)	E	E	Valerie Avenue
<i>Pteropus poliocephalus</i> (Grey-headed Flying-fox)	V	V	All
<i>Ninox strenua</i> (Powerful Owl)	V	-	Valerie Avenue
Cumberland Plain Woodland in the Sydney Basin Bioregion	CE	CE ¹	Montview Way APZ2
Shale Sandstone Transition Forest in the Sydney Basin Bioregion	CE	CE ¹	Valerie Avenue

¹ EPBC condition threshold not meet (no further consideration under the EPBC Act required)

- a) **In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Species/ group	Response
Nomadic pollinators: <i>Anthochaera Phrygia</i> (Regent Honeyeater), <i>Glossopsitta pusilla</i> (Little Lorikeet), <i>Lathamus discolor</i> (Swift Parrot), <i>Pteropus poliocephalus</i> (Grey-headed Flying-fox)	The proposal will result in the removal of 43 winter flowering trees (> 20 cm in stem diameter) across five APZs. These tree's provide potential foraging habitat for nomadic pollinators. These nomads (particularly <i>Lathamus discolor</i> and <i>Pteropus poliocephalus</i>) have been recorded across Western Sydney, including relatively close (< 3 km) of all proposal sites. The trees to be impacted represent a small amount of potential foraging habitat available in the local landscape. Furthermore, where possible, foraging trees are retained at all APZs. The proposal also targets the removal of co-dominant trees identified with a potential risk of failure, rather than healthy, larger-

Species/ group	Response
	<p>size mature trees which are known to provide a greater quantity of blossoms. In addition, no flying fox camps will be impacted (the nearest camps known in the local area occur at Wetherill Park and Parramatta). It is unlikely the proposal will have an adverse effect on the life cycle of nomadic pollinators such that a viable local population or intermittent seasonal population is likely to be placed at risk of extinction.</p>
<p><u>Snails:</u> <i>Meridolum corneovirens</i> (Cumberland Plain Land Snail), <i>Pommerhelix duralensis</i> (Dural Land Snail)</p>	<p>The proposal will result in the removal of 0.144 ha of habitat that may potentially support the Cumberland Plain Land Snail. This includes habitat available in the APZs at Montview Way (APZ 2) and Valerie Avenue. Both of these sites contain some remnant vegetation and adjoin fringing Cumberland Plain Woodland (at Montview Way) or River-flat Eucalypt Forest (at Valerie Avenue). Both of these vegetation communities are known to support populations of the species. Other APZ sites are significantly disturbed, subjected to previous earthworks and consist of a ground layer dominated by exotic forbs and grasses that is mown at least annually. Habitat features that are associated with the snail including debris (such as rubbish on the ground), deadwood, leaf and bark accumulations around the bases of trees, grass clumps or rocks are absent from these sites.</p> <p>The Cumberland Plain Land Snail has been recorded < 3 km of all APZs, including only 320 m from the Sciarra Crescent APZ. Records of the snail near Sciarra Crescent are from the year 2003. These snails were relocated to support the construction of the M7 motorway. There are no recent records of the species from the M7 corridor located near APZs.</p> <p>Records of the Dural Land Snail are not from the immediate vicinity of the APZs (recorded further north or north east of the APZs in habitat patches that do not adjoin the proposal areas). This snail has been recorded in the Hills Shire Local Government Area, and potential habitat (primarily exposed rocks) is available at Valerie Avenue APZ. The Dural Land Snail is less likely to occur at the proposal sites, given the species range does not significantly overlap with the Cumberland Plain Land Snail which has been recorded relatively closer at all APZs compared to the Dural Land Snail.</p> <p>Targeted searches for snails included looking at the base of trees under any debris/ tufts of grass or rocks. No snails or snail shells indicating potential or historic occupation were encountered in the proposed APZ corridors. In addition, native ground cover at the proposal sites was very low. Subsequently, the proposal is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.</p>
<p><i>Ninox strenua</i> (Powerful Owl)</p>	<p>The APZ at Valerie Avenue will result in the removal of 0.063 ha of potential roosting habitat. The Powerful Owl is known to roost in dense mid-canopy along riparian corridors. Weeds, including <i>Ligustrum lucidum</i> (dense along some sections of the APZ) form a part of this habitat component. The Powerful Owl has been recorded</p>

Species/ group	Response
	<p>approximately 400 m north east of the Valerie Avenue APZ along the Toongabbie Creek riparian corridor (Col Sutton/ William Joyce Reserve), including nesting in this vicinity (last Bionet record from 2014).</p> <p>Large, mature <i>Eucalyptus</i> trees will be retained in the APZ, in addition, no hollow bearing trees will be impacted. Encroachment on core riparian habitat is limited to disturbed edges along a 127 m residential boundary, a minimum distance of 20 m from Toongabbie Creek. Furthermore, works are scheduled to take place outside of the breeding season (May to October) preventing disturbance to any potential active nest site. It is unlikely the proposal will have an adverse effect on the life cycle of the Powerful Owl such that a viable local population of the species is likely to be placed at risk of extinction.</p>

- b) **In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:**
- i. **is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
 - ii. **is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Cumberland Plain Woodland in the Sydney Basin Bioregion

The proposed APZ clearing at Montview Way (APZ 2) would impact approximately 0.081 ha of poor condition vegetation. This includes removal of 13 trees, formative of the CEEC. The APZ is not mapped as *Cumberland Plain Woodland*, however occurs adjacent PCT 850, which was found to be consistent with the CEEC. The proposal is unlikely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

The 13 trees proposed for removal do not support other structural layers or species diversity representative of the CEEC. The APZ is disturbed, with the ground layer dominated by *Ehrharta erecta* (an introduced grass). Native ground species that form a part of the CEEC occurred in low density <5%. A mature (possibly remnant) *Eucalyptus tereticornis* tree will be retained. The proposal is unlikely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Shale Sandstone Transition Forest in the Sydney Basin Bioregion

The proposed APZ clearing at Valerie Avenue would impact approximately 0.063 ha of poor condition vegetation of this CEEC. This includes removal of 13 trees, formative of the CEEC. The majority of the APZ is mapped as *Shale Sandstone Transition Forest* and forms a part of a habitat patch that extends beyond the M7 corridor into Col Sutton/ William Joyce Reserve. The proposal is unlikely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

The 13 trees proposed for removal do not support other structural layers or species diversity representative of the CEEC. The APZ is disturbed, with composition dominated by introduced species including *Tradescantia fluminensis* and *Chlorophytum comosum* in the ground layer and *Ligustrum lucidum* in the mid storey (all listed as high threat exotics). Native ground species that

Shale Sandstone Transition Forest in the Sydney Basin Bioregion

form a part of the CEEC occurred in low density <5% while mid storey trees (including *Pittosporum undulatum* and *P. revolutum*) were sparse. Mature (remnant) *Eucalyptus* trees, including individuals > 80 cm in stem diameter will be retained. The proposal is unlikely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

- c) **In relation to the habitat of a threatened species, population or ecological community:**
- i. **the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and**
 - ii. **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and**
 - iii. **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**

Nomadic pollinators: *Anthochaera Phrygia* (Regent Honeyeater), *Glossopsitta pusilla* (Little Lorikeet), *Lathamus discolor* (Swift Parrot), *Pteropus poliocephalus* (Grey-headed Flying-fox)

The proposal will result in the removal of 43 winter flowering trees (> 20 cm in stem diameter) across five APZs. The proposal will not substantially impact the availability of foraging habitat in the local region. Foraging habitat that forms apart of large habitat patches will not be impacted by the proposal. In addition, large (remnant) trees which may provide a larger quantity of blossoms and more reliable flowering compared to smaller (immature) trees will not be impacted in APZs.

Habitat to be impacted in M7 corridors is limited to within 3.0 to 10.0 m of residential boundaries. The majority of trees growing along these boundaries are planted and regrowth (< 50 cm in stem diameter). Site habitat links will not be affected that facilitate the movement or dispersal or nomadic pollinators across the local landscape.

The proposal will impact 43 trees, necessary to meet APZ fuel management requirements. This extent represents a small proportion of habitat available within the local area and surrounding landscape. The habitat proposed to be removed is unlikely to be important for the long-term survival of nomadic pollinators in the locality. Furthermore, nomadic pollinators are highly mobile, the removal of 43 trees (between 5 sites) would not affect the dispersal or movement of these species or reduce the availability of foraging resources formative of large habitat patches important for the survival of these species.

Snails: *Meridolum corneovirens* (Cumberland Plain Land Snail), *Pommerhelix duralensis* (Dural Land Snail)

The proposal will result in the removal or modification of 0.144 ha of vegetation that may support threatened snails. This includes disturbance (but retention) of large surface rocks at Valerie Avenue APZ, which snails may use for shelter.

Habitat to be impacted in M7 corridors is limited to a 3.0 m width at Montview Way (APZ 2) and 10.0 m width at Valerie Avenue along the boundaries of residential areas. The proposal sites are significantly fragmented and isolated by roads/urban areas. It is unlikely the proposal will increase fragmentation that will impact any snail populations.

The proposal will only impact a small amount of potential habitat that may support threatened snails, necessary to meet APZ fuel management requirements. No known existing populations of snails will

Snails: *Meridolum corneovirens* (Cumberland Plain Land Snail), *Pommerhelix duralensis* (Dural Land Snail)

be affected by APZ works. This is supported by a site assessment that did not find any individuals along narrow clearance areas (ranging in width from 3 to 10 m). Only poor condition vegetation will be impacted, with limited native understory cover. Good condition habitat (that includes functional features such as dead wood, leaf litter and large trees) lack in the APZ. Where these habitat features do occur (including large trees and rocks at Valerie Avenue), they will be retained in APZs. The proposal is not likely to impact the long-term survival of snails in the locality.

***Ninox strenua* (Powerful Owl)**

The proposed APZ clearing at Valerie Avenue would impact approximately 0.063 ha of weed impacted *Shale Sandstone Transition Forest*. that provides potential foraging/roost habitat for the Powerful Owl. This includes removal of 13 trees, (none of which are hollow bearing). Mid and understory vegetation (primarily exotic) would be cleared to reduce fuel loads.

Habitat to be impacted is limited to within 10.0 m of a residential boundary. As such, the proposal would not fragment or isolate any habitat links. Large, mature trees will be retained in the APZ which may support the Powerful Owl to move into backyards/ the urban matrix to reach foraging habitat.

The proposal will only impact a small amount of potential foraging/ roosting habitat, necessary to meet APZ fuel management requirements. While the proposal contributes to the incremental loss of habitat, high conservation value large, mature trees (> 80 cm in stem diameter) will not be impacted in the APZ at Valerie Avenue. In addition, core habitat (which includes a mid storey dominated by *Ligustrum lucidum*) that may support Powerful Owl roost sites along the Toongabbie Creek riparian corridor will not be impacted. The proposal is not likely to impact the long-term survival of the Powerful Owl in the locality.

Cumberland Plain Woodland in the Sydney Basin Bioregion

The proposed APZ clearing at Montview Way (APZ 2) would impact approximately 0.081 ha of poor condition vegetation. This includes removal of 13 trees, formative of the CEEC (none of which are hollow bearing). Understory vegetation (primarily exotic) would be subject to modification (slashing) to reduce fuel loads.

Habitat to be impacted is limited to within 3.0 m of a residential boundary. As such, the proposal would not fragment or isolate any habitat links.

The proposal will only impact a small amount of vegetation, necessary to meet APZ fuel management requirements. Habitat to be impacted is in poor condition, with ground cover dominated by weeds. Moderate to potential high condition habitat (which includes a native shrub layer), adjacent the proposal site will not be impacted. The proposal is not likely to impact the long-term survival of the CEEC in the locality.

Shale Sandstone Transition Forest in the Sydney Basin Bioregion

The proposed APZ clearing at Valerie Avenue would impact approximately 0.063 ha of poor condition vegetation. This includes removal of 13 trees, formative of the CEEC (none of which are hollow bearing). Understory vegetation (primarily exotic) would be subject to modification (clearing or slashing) to reduce fuel loads.

Shale Sandstone Transition Forest in the Sydney Basin Bioregion

Habitat to be impacted is limited to within 10.0 m of a residential boundary. As such, the proposal would not fragment or isolate any habitat links. Large, mature trees will be retained which may support wildlife connectivity into backyards/ the urban matrix that adjoins the APZ.

The proposal will only impact a small amount of vegetation, necessary to meet APZ fuel management requirements. Habitat to be impacted is in poor condition, with understory vegetation dominated by weeds. Core riparian habitat adjacent the proposal site will not be impacted. The proposal is not likely to impact the long-term survival of the CEEC in the locality.

- d) Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).**

No declared area of outstanding biodiversity value would be impacted by the proposed works.

- e) Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.**

The 'Key Threatening Processes' currently listed under Schedule 3 of the BC Act which are relevant to the project are listed below:

- Clearing of native vegetation;
- Removal of dead wood and dead trees;
- Infection of native plants by *Phytophthora cinnamomi*; and
- Invasion of native plant communities by exotic perennial grasses.

Where relevant, mitigation measures for the proposed works will be implemented to minimise the impact of these key threatening processes. The proposed development is unlikely to significantly exacerbate the impact of these KTPs in the local area.

Conclusion

Based on the considerations above, the proposed works are unlikely to have a significant impact on any threatened species, population or CEEC such that a local population is placed at risk of extinction.

Considerations under the EPBC Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires approval of the Commonwealth Minister representing the Department of the Environment, for actions that may have a significant impact on Matters of National Environmental Significance (MNES). The EPBC Act also requires Commonwealth approval for certain actions on Commonwealth land. MNES protected under the EPBC Act include:

- World Heritage properties;
- National Heritage places;
- RAMSAR wetlands of international importance;
- Threatened species or ecological communities listed in the EPBC Act;
- Migratory species listed in the EPBC Act;
- The Great Barrier Reef Marine Park;
- Commonwealth marine environment; and
- Nuclear actions.

With regard to flora and fauna, the only MNES relevant to the study area are nationally listed threatened species and migratory species. The DoEE protected matters search for the site is provided in **Appendix III**. An assessment has been made to determine whether or not the proposal will have, or is likely to have, a significant impact on these MNES and is provided below.

EPBC Act Assessment of Significance – *Critically endangered and endangered species*

- **Lead to a long-term decrease in the size of an important population of a species**

Species/ group	Response
<p><u>Nomadic pollinators:</u> <i>Anthochaera Phrygia</i> (Regent Honeyeater) and <i>Lathamus discolour</i> (Swift Parrot)</p>	<p>The proposal would impact 0.7 ha of potential foraging habitat for the Regent Honeyeater and Swift Parrot, this includes removal of 43 winter-flowering trees. These nomadic pollinators migrate through the coast and western slopes of NSW (including Western Sydney) during autumn-winter to reach flowering eucalyptus. The proposal would remove a limited amount of potential foraging habitat available in this species extensive range. In addition, large eucalyptus trees (including <i>Eucalyptus tereticornis</i>), found in APZs are retained. Given these considerations, the action is not considered likely to significantly lead to a long-term decrease in the size of an important population of these species.</p>
<p><i>Pommerhelix duralensis</i> (Dural Land Snail)</p>	<p>The Dural Land Snail is a shale influenced habitat specialist, which occurs in low densities along the northwest fringes of the Cumberland Plain on shale-sandstone transitional landscapes. 0.1 ha of marginal habitat (which includes large surface rocks), which fringes a mapped River-flat Eucalypt Forest occurs for this species at Valerie Avenue. All populations of this species are considered to be important (Commonwealth of Australia, 2015).</p> <p>The Dural Land Snail has not previously been recorded in the habitat patch apart of the APZ clearing. In addition, this species was not detected during targeted searches for this species in the APZ. Thus, it is unlikely the action would lead to a long-term</p>

Species/ group	Response
	decrease in the size of an important population of the Dural Land Snail.

- **Reduce the area of occupancy of an important population**

Species/ group	Response
<u>Nomadic pollinators:</u> <i>Anthochaera Phrygia</i> (Regent Honeyeater) and <i>Lathamus discolour</i> (Swift Parrot)	The proposal will impact linear stretches of habitat and will not remove all vegetation growing in these areas (including retention of trees outside of APZs or inside where fuel management guidelines are met). No large swaths of habitat will be impacted, potential foraging habitat proposed to be removed represents a small amount of locally foraging resources accessible to these species. As such, the action is unlikely to reduce the area of occupancy of an important population.
<i>Pommerhelix duralensis</i> (Dural Land Snail)	Habitat to be impacted is limited to a 10.0 m width at Valerie Avenue, along a boundary of residential area. No snails were recorded in the APZ. Key habitat features that the snail is associated with (including large trees and surface rocks) will be retained. It is not likely the action will reduce the area of occupancy of an important population.

- **Fragment an existing important population into two or more populations**

Species/ group	Response
<u>Nomadic pollinators:</u> <i>Anthochaera Phrygia</i> (Regent Honeyeater) and <i>Lathamus discolour</i> (Swift Parrot)	The Regent Honeyeater and Swift Parrot are highly mobile species that migrate north from Tasmania during autumn to winter. Given the scale of habitat fragmentation in the APZs is small (in total 0.7 ha of vegetation may be cleared/ modified), the species are unlikely to be affected by this action. Hence, the proposal is unlikely to fragment an existing important population into two or more populations.
<i>Pommerhelix duralensis</i> (Dural Land Snail)	Habitat to be impacted is limited to a 10.0 m width at Valerie Avenue, along a boundary of residential area. The action will not fragment an existing important population into two or more populations

- **Adversely affect habitat critical to the survival of a species**

Species/ group	Response
<u>Nomadic pollinators:</u> <i>Anthochaera Phrygia</i> (Regent Honeyeater) and <i>Lathamus discolour</i> (Swift Parrot)	The proposal is unlikely to adversely affect habitat critical to the survival of these species. Although the APZ includes foraging areas where the species could potentially occur, these areas are unlikely to be used for nesting (breeding habitat is only found in Tasmania), or make up a significant quantity of foraging resources

Species/ group	Response
	available in the local area. The APZs are not formative of large habitat patches and given only 43 winter flowering trees are proposed to be removed between five sites, it is unlikely any important foraging areas will be impacted.
<i>Pommerhelix duralensis</i> (Dural Land Snail)	The proposal will only impact a small amount of potential habitat (0.1 ha) that may support the Dural Land Snail, necessary to meet APZ fuel management requirements. No known existing populations of snails will be affected. This is supported by a site assessment that did not find any individuals along a narrow area (10.0 m in width) where vegetation is subjected to being cleared or modified. Vegetation condition in this area poor, with limited native understory cover. Good condition habitat (that includes functional features such as dead wood, leaf litter and large trees) lack in the APZ. Where these habitat features do occur (including large trees and rocks at Valerie Avenue), they will be retained in APZs. The proposal is not likely to adversely affect habitat critical to the survival of a species.

- **Disrupt the breeding cycle of an important population**

Species/ group	Response
<u>Nomadic pollinators:</u> <i>Anthochaera Phrygia</i> (Regent Honeyeater) and <i>Lathamus discolour</i> (Swift Parrot)	Breeding habitat for the Swift Parrot and Regent Honeyeater does not include areas from the Cumberland Plain/ Western Sydney. Swift Parrots breed in Tasmania during spring and summer, while there are four known key breeding areas where the Regent Honeyeater is regularly recorded, including Bundarra-Barraba, Capertee Valley and the Hunter Valley districts in New South Wales, and the Chiltern area in north-east Victoria. As such, the proposal is unlikely to disrupt the breeding cycle of an important population.
<i>Pommerhelix duralensis</i> (Dural Land Snail)	Given that no snails (or signs thereof) were recorded in the APZ at Valerie Avenue and the area to be impacted is small < 0.1 ha, it is unlikely the action will disrupt the breeding cycle of an important population.

- **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

Species/ group	Response
<u>Nomadic pollinators:</u> <i>Anthochaera Phrygia</i> (Regent Honeyeater) and <i>Lathamus discolour</i> (Swift Parrot)	The proposed action is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the Swift Parrot or Regent Honeyeater is likely to decline. Vegetation clearance/ modification is restricted to narrow APZs along the M7 corridor, bordering residential areas. Only 0.7 ha of habitat will be affected. It is unlikely the nomadic pollinators are reliant on these trees as foraging resources given the availability

Species/ group	Response
	of habitat in these species' geographical extent, including in the local area. The quality of habitat is not significant, given it is not formative of large habitat patches and located in a highly disturbed urban area.
<i>Pommerhelix duralensis</i> (Dural Land Snail)	The proposed action is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the Dural Land Snail is likely to decline. Vegetation clearance/ modification is restricted to a narrow APZ (10.0 m in width), substantially disturbed (dominated by weeds) bordering a residential area. Only 0.1 ha of habitat will be affected. It is unlikely the Dural Land Snail is present, yet alone reliant on habitat in the APZ. High quality habitat features (including large trees and surface rocks) will be retained in the APZ.

- **Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat**

Species/ group	Response
<u>Nomadic pollinators:</u> <i>Anthochaera Phrygia</i> (Regent Honeyeater) and <i>Lathamus discolour</i> (Swift Parrot)	It is not likely that invasive species (including predators or weeds) that are harmful to the Regent Honeyeater or Swift Parrot habitat would become established as a result of the action.
<i>Pommerhelix duralensis</i> (Dural Land Snail)	It is not likely that invasive species (including predators or weeds) that are harmful to the Dural Land Snail habitat would become established as a result of the action.

- **Introduce disease that may cause the species to decline, or**

Species/ group	Response
<u>Nomadic pollinators:</u> <i>Anthochaera Phrygia</i> (Regent Honeyeater) and <i>Lathamus discolour</i> (Swift Parrot)	It is not likely that disease would be increased by the action.
<i>Pommerhelix duralensis</i> (Dural Land Snail)	It is not likely that disease would be increased by the action.

- **Interfere substantially with the recovery of the species.**

Species/ group	Response
<u>Nomadic pollinators:</u> <i>Anthochaera Phrygia</i> (Regent	The proposed works are unlikely to substantially interfere with the recovery of this species (Commonwealth of Australia 2016, 2019).

Species/ group	Response
Honeyeater) and <i>Lathamus discolor</i> (Swift Parrot)	
<i>Pommerhelix duralensis</i> (Dural Land Snail)	There is no recovery plan for this species available Commonwealth of Australia, 2015). The proposed works are unlikely impact any population of the Dural Land Snail, thus interfere substantially with the recovery of the species.

EPBC Act Assessment of Significance – Vulnerable species: *Pteropus poliocephalus* (Grey-headed Flying-fox)

- **Lead to a long-term decrease in the size of an important population of a species**

The national population of the Grey-headed Flying-fox is considered to be a single, mobile population and occurs along the coastal belt from Rockhampton in central Queensland to Melbourne in Victoria (Commonwealth of Australia, 2017). The Grey-headed Flying-fox may forage in suitable habitat throughout the study area (as indicated by Bionet sighting records). The APZs (linear and highly disturbed) do not contain suitable habitat for roosting camps. The nearest camps known in the local area occur in isolated habitat patches away from the proposal sites at Wetherill Park and Parramatta (Commonwealth of Australia, 2019b). Therefore, a population of Grey-headed Flying-fox in the study area is not considered to be important, as no roost sites would be affected by the project.

- **Reduce the area of occupancy of an important population**

Not applicable. Grey-headed Flying-fox occurring in the in the study area is not part of an important population.

- **Fragment an existing important population into two or more populations**

Not applicable. Grey-headed Flying-fox occurring in the in the study area is not part of an important population.

- **Adversely affect habitat critical to the survival of a species**

Critical habitat for the Grey-headed Flying-fox includes all foraging habitat that has the potential to be productive during general food shortages and therefore provide a critical resource. Important winter habitats include vegetation communities that contain *Eucalyptus tereticornis* and *Corymbia maculata*. (Commonwealth of Australia, 2017). In total 43 of these tree species (across five sites) are proposed to be removed to reduce fuel loads in APZs. This action is not likely to adversely affect habitat critical to the survival of a species, due to retention of potential foraging trees in the proposal areas and general availability of habitat, including in larger habitat patches in the study area.

- **Disrupt the breeding cycle of an important population**

Not applicable. Grey-headed Flying-fox occurring in the in the study area is not part of an important population.

- **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

The proposed action is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the Grey-headed Flying-fox is likely to decline. The Grey-headed

Flying-foxes forage over extensive areas and have been known to fly as far as 40 km to feed, before returning to their roost the same night (Commonwealth of Australia, 2017). Vegetation clearance/ modification is restricted to narrow APZs along the M7 corridor, bordering residential areas. Only 0.7 ha of habitat will be affected. It is unlikely the Grey-headed Flying-fox are reliant on up to 80 trees that are proposed to be cleared (43 of which are winter flowering). The quality of habitat is not significant, given it is not formative of large habitat patches, a part of a roost site, or likely to be utilised as a potential roost site.

- **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat**

It is not likely that invasive species (including predators or weeds) that are harmful to Grey-headed Flying-fox habitat would become established as a result of the action.

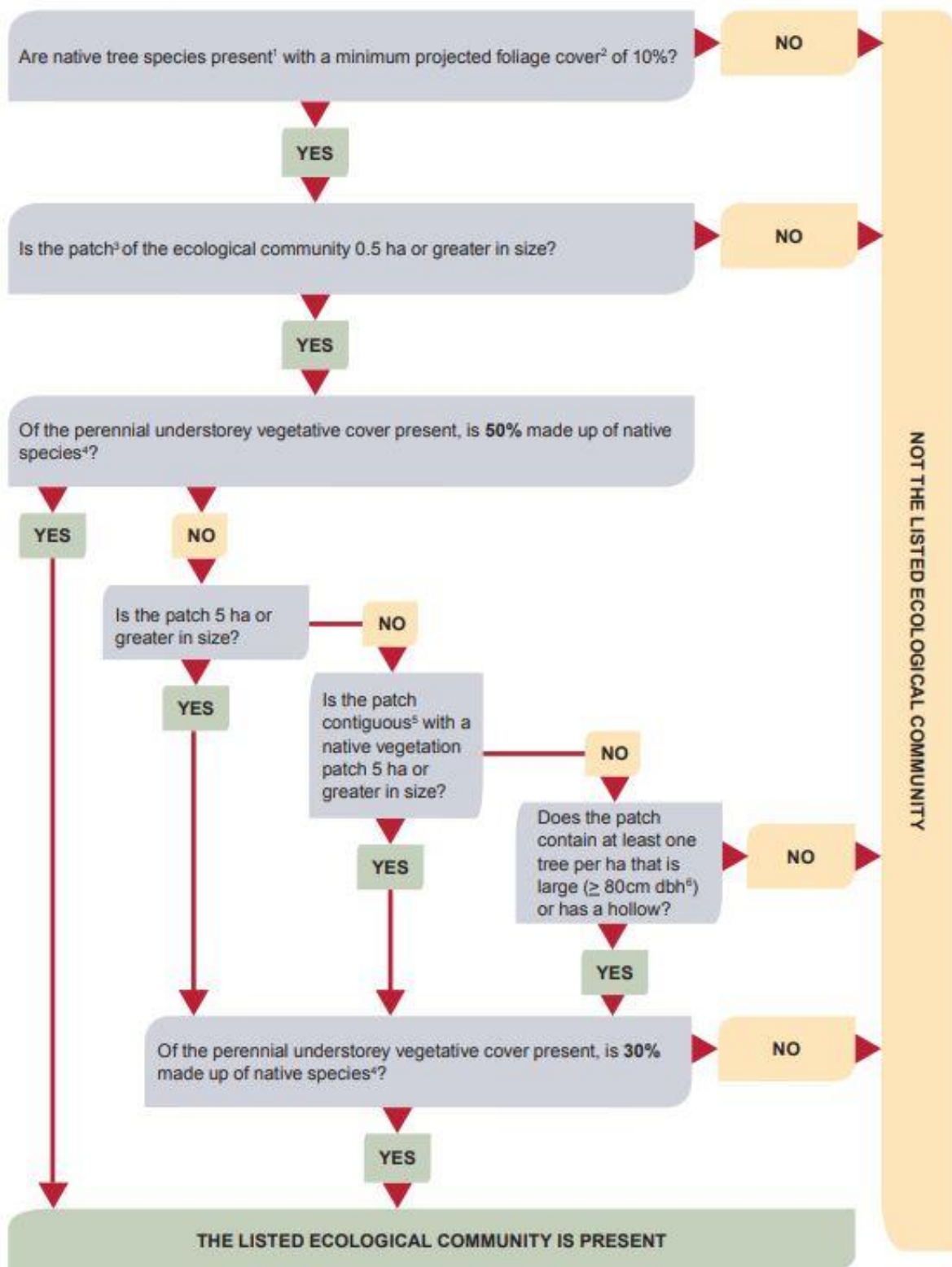
- **Introduce disease that may cause the species to decline, or • interfere substantially with the recovery of the species.**

It is not likely that disease would be increased by the action.

EPBC Act Assessment of Significance – Critically endangered and endangered ecological communities

Vegetation at Montview Way (consistent with *Cumberland Plain Woodland*) and Valerie Avenue (consistent with *Shale Sandstone Transition Forest*) does not meet the condition thresholds for the CEEC under the EPBC Act. The flowchart below demonstrates that both communities do not meet the EPBC determination of the CEEC because perennial understory vegetation cover is < 30% (Commonwealth of Australia, 2010,2014).

Flowchart of key diagnostic features and condition thresholds to identify the Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest ecological community



Migratory Species

According to the MNES in **Appendix III**, 58 migratory species have the potential to occur in the local area.

None of the above migratory species were recorded on site during the field survey. The proposed works are unlikely to impact on any area considered to be 'important habitat' for the above migratory species, or likely to impact a significant proportion of a migratory population.

References

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- Department of Environment, Climate Change and Water (NSW) (2010). *Cumberland Plain Recovery Plan*. Department of Environment, Climate Change and Water (NSW), Sydney.

Appendix XI

Tree List and Maps

The following is a list of features recorded on a GPS, including tree species. A map is provided of each APZ showing the location of trees proposed for removal.

Site Name	GPS Point Name	Latitude	Longitude	Species	DBH (cm)	Tree Impact (Y/N)	Comment
Sciarra Crescent	516	-33.737158	150.914759				Start of site
Sciarra Crescent	517	-33.73704501	150.913624	<i>Eucalyptus spp.</i>	30-49	N	
Sciarra Crescent	518	-33.73701601	150.91341				
Sciarra Crescent	519	-33.73696396	150.913139	<i>Melaleuca linariifolia</i>	30-49	N	
Sciarra Crescent	520	-33.73697603	150.91308	<i>Melaleuca linariifolia</i>	30-49	N	
Sciarra Crescent	521	-33.73693597	150.912955	<i>Melaleuca linariifolia</i>	30-49	N	
Sciarra Crescent	522	-33.73692398	150.912845	<i>Melaleuca linariifolia</i>	30-49	N	
Sciarra Crescent	523	-33.73687604	150.912587	<i>Melaleuca linariifolia</i>	30-49	N	
Sciarra Crescent	524	-33.73685902	150.912465	<i>Eucalyptus tereticornis</i>	50-79	N	
Sciarra Crescent	525	-33.736856	150.912415	<i>Eucalyptus tereticornis</i>	30-49	N	
Sciarra Crescent	526	-33.73684502	150.912351	<i>Melaleuca linariifolia</i>		N	
Sciarra Crescent	527	-33.73683404	150.912301	<i>Eucalyptus tereticornis</i>	30-49	Y	
Sciarra Crescent	528	-33.73681996	150.911988	<i>Eucalyptus tereticornis</i>	30-49	N	

Site Name	GPS Point Name	Latitude	Longitude	Species	DBH (cm)	Tree Impact (Y/N)	Comment
Sciarras Crescent	529	-33.73668903	150.910737	<i>Eucalyptus tereticornis</i>	30-49	N	
Sciarras Crescent	530	-33.73657898	150.910475				End of site
Sciarras Crescent	531	-33.73660798	150.910698	<i>Eucalyptus tereticornis</i>	50-79	N	
Sciarras Crescent	532	-33.73681904	150.912191	<i>Eucalyptus tereticornis</i>	30-49	Y	
Sciarras Crescent	533	-33.73689397	150.912694	<i>Melaleuca Stypheliodes</i>	30-49	Y	
Sciarras Crescent	534	-33.73691401	150.912818	<i>Melaleuca Stypheliodes</i>	30-49	Y	
Sciarras Crescent	535	-33.73690202	150.912823	<i>Melaleuca Stypheliodes</i>	30-49	Y	
Sciarras Crescent	536	-33.73694099	150.913026	<i>Melaleuca Stypheliodes</i>	30-49	Y	
Sciarras Crescent	537	-33.73697	150.913309	<i>Melaleuca decora</i>	30-49	Y	
Sciarras Crescent	538	-33.73701199	150.913646	<i>Eucalyptus tereticornis</i>	30-49	Y	
Knightbridge Avenue	539	-33.74439502	150.939077				Start of site

Site Name	GPS Point Name	Latitude	Longitude	Species	DBH (cm)	Tree Impact (Y/N)	Comment
Knightbridge Avenue	540	-33.74437197	150.938994	<i>Eucalyptus tereticornis</i>	50-79	Y	
Knightbridge Avenue	541	-33.74422302	150.938708	<i>Eucalyptus tereticornis</i>	50-79	Y	
Knightbridge Avenue	542	-33.74419704	150.938677	<i>Eucalyptus tereticornis</i>	30-49	Y	
Knightbridge Avenue	543	-33.74418799	150.938628	<i>Eucalyptus tereticornis</i>	30-49	Y	
Knightbridge Avenue	544	-33.744146	150.938546	<i>Eucalyptus tereticornis</i>	30-49	Y	
Knightbridge Avenue	545	-33.744132	150.938517	<i>Eucalyptus tereticornis</i>	30-49	Y	
Knightbridge Avenue	546	-33.74411599	150.938481	<i>Eucalyptus amplifolia</i>	30-49	Y	
Knightbridge Avenue	547	-33.74407902	150.938413	<i>Eucalyptus tereticornis</i>	50-79	Y	
Knightbridge Avenue	548	-33.74405304	150.93837	<i>Eucalyptus tereticornis</i>	50-79	Y	
Knightbridge Avenue	549	-33.744046	150.938342	<i>Eucalyptus amplifolia</i>	30-49	Y	
Knightbridge Avenue	550	-33.74400602	150.938287	<i>Eucalyptus tereticornis</i>	30-49	Y	
Knightbridge Avenue	551	-33.74398297	150.938249	<i>Eucalyptus amplifolia</i>	50-79	Y	

Site Name	GPS Point Name	Latitude	Longitude	Species	DBH (cm)	Tree Impact (Y/N)	Comment
Knightbridge Avenue	552	-33.74395103	150.938188	<i>Eucalyptus amplifolia</i>	50-79	Y	
Knightbridge Avenue	553	-33.74389898	150.938053	<i>Eucalyptus tereticornis</i>	50-79	Y	
Knightbridge Avenue	554	-33.743816	150.937963	<i>Eucalyptus tereticornis</i>	30-49	Y	Gap from next tree
Knightbridge Avenue	555	-33.74370603	150.937718	<i>Eucalyptus amplifolia</i>	10-19.	Y	listed as 10-30cm
Knightbridge Avenue	556	-33.74368901	150.93765	<i>Eucalyptus tereticornis</i>	50-79	Y	
Knightbridge Avenue	557	-33.74367401	150.937637	<i>Eucalyptus amplifolia</i>	10-19.	Y	
Knightbridge Avenue	558	-33.74365197	150.937601	<i>Eucalyptus amplifolia</i>	30-49	Y	
Knightbridge Avenue	559	-33.74365096	150.937553	<i>Eucalyptus amplifolia</i>	10-19.	Y	Listed as 10-10cm
Knightbridge Avenue	560	-33.74360603	150.937436	<i>Eucalyptus tereticornis</i>	50-75	Y	listed as 30-75cm
Knightbridge Avenue	561	-33.74357603	150.937404	<i>Eucalyptus tereticornis</i>	50-79	Y	Listed as 30-75cm. Encroachment vegetable garden pic listed between s60 and s61
Knightbridge Avenue	562	-33.74351199	150.937337	<i>Melaleuca armillaris</i>	10-19.	Y	Listed as 10-30. Stem to be Pruned

Site Name	GPS Point Name	Latitude	Longitude	Species	DBH (cm)	Tree Impact (Y/N)	Comment
Knightbridge Avenue	563	-33.74349598	150.937285	<i>Trachelospermum jasminoides</i>		y	Weed. Gap at this point
Knightbridge Avenue	564	-33.74348802	150.937203	<i>Acacia spp.</i>		y	dead wattle - fire risk dead logs / standing stags
Knightbridge Avenue	565	-33.74329104	150.936582	<i>Melaleuca decora</i>	30-49	y	
Knightbridge Avenue	566	-33.74323798	150.936447	<i>Melaleuca decora</i>	30-49	y	
Knightbridge Avenue	567	-33.74270699	150.934898	<i>Eucalyptus tereticornis</i>	50-79	N	Tree outside of impact area
Knightbridge Avenue	569	-33.74275904	150.93514				End of site.
Montview Way APZ 3	570	-33.75050199	150.950227				Start of site
Montview Way APZ 3	571	-33.75046402	150.950186	<i>Casuarina glauca</i>	30-49	Y	
Montview Way APZ 3	572	-33.750446	150.950158	<i>Casuarina glauca</i>	30-49	Y	
Montview Way APZ 3	573	-33.75042404	150.950079	<i>Casuarina glauca</i>	30-49	Y	
Montview Way APZ 3	574	-33.75039898	150.950042	<i>Casuarina glauca</i>	30-49	Y	
Montview Way APZ 3	575	-33.75038699	150.950028	<i>Corymbia maculata</i>	50-79	Y	
Montview Way APZ 3	576	-33.75034299	150.949979	<i>Casuarina glauca</i>	30-49	Y	
Montview Way APZ 3	577	-33.75032396	150.949946	<i>Casuarina glauca</i>	30-49	Y	

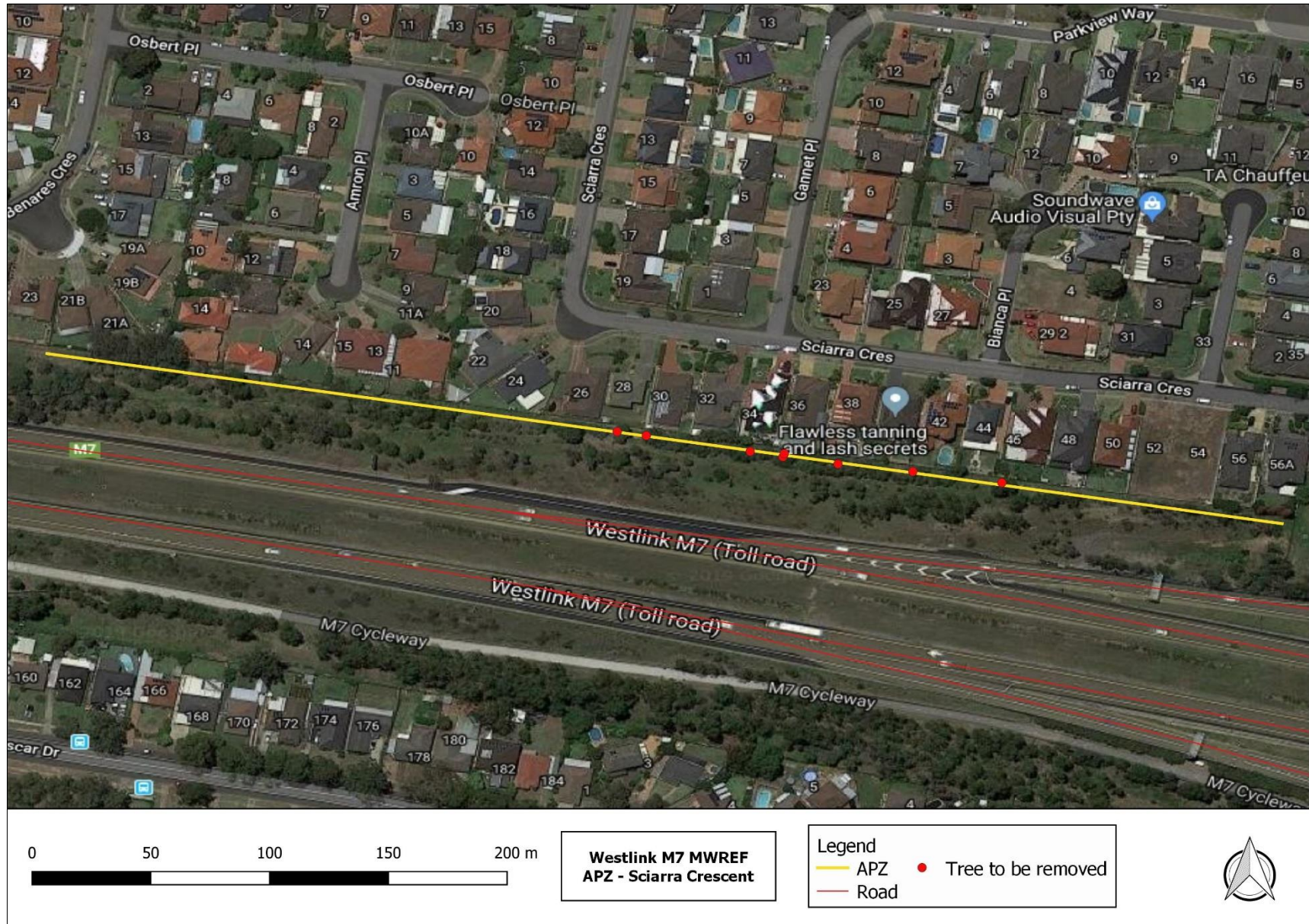
Site Name	GPS Point Name	Latitude	Longitude	Species	DBH (cm)	Tree Impact (Y/N)	Comment
Montview Way APZ 3	578	-33.750331	150.949921	<i>Casuarina glauca</i>	30-49	Y	
Montview Way APZ 3	579	-33.75032002	150.949914	<i>Corymbia maculata</i>	80+	Y	
Montview Way APZ 3	580	-33.74915804	150.947847				End of site
Montview Way APZ 3	581	-33.74921001	150.947977	<i>Casuarina glauca</i>	20-29	Y	
Montview Way APZ 3	582	-33.74920104	150.947956	<i>Casuarina glauca</i>	20-29	Y	
Montview Way APZ 3	583	-33.749195	150.94795	<i>Casuarina glauca</i>	20-29	Y	
Montview Way APZ 3	584	-33.749209	150.947966	<i>Corymbia maculata</i>	20-29	Y	
Montview Way APZ 3	585	-33.74923398	150.948	<i>Corymbia maculata</i>	50-79	Y	Community consultation advised - resident
Montview Way APZ 3	586	-33.74923297	150.948005	<i>Corymbia maculata</i>	80+	Y	Community consultation advised - resident
Montview Way APZ 3	587	-33.74922702	150.947964	<i>Casuarina glauca</i>	50-79	Y	
Montview Way APZ 3	588	-33.74922803	150.947967	<i>Casuarina glauca</i>	50-79	Y	
Montview Way APZ 3	589	-33.74918	150.947904	<i>Corymbia maculata</i>	50-79	Y	Borer active - tree unhealthy
Montview Way APZ 3	590	-33.74913499	150.947846	<i>Casuarina glauca</i>	20-29	Y	
Montview Way APZ 3	591	-33.74912996	150.947839	<i>Casuarina glauca</i>	20-29	Y	
Montview Way APZ 3	592	-33.74912904	150.947837	<i>Casuarina glauca</i>	20-29	Y	
Montview Way APZ 3	593	-33.74913096	150.947836	<i>Casuarina glauca</i>	20-29	Y	

Site Name	GPS Point Name	Latitude	Longitude	Species	DBH (cm)	Tree Impact (Y/N)	Comment
Montview Way APZ 3	594	-33.74913499	150.947841	<i>Casuarina glauca</i>	20-29	Y	
Montview Way APZ 3	595	-33.74882402	150.947324				Bamboo infestation
Montview Way APZ 3	596	-33.74871799	150.947114				Wandering jew
Montview Way APZ 3	597	-33.74857198	150.946865				Bridal creeper/mother of millions
Monview Way APZ 2	598	-33.74846402	150.946622				Start of site
Monview Way APZ 2	599	-33.74833996	150.946405				End of site
Monview Way APZ 2	600	-33.74834801	150.946422	<i>Eucalyptus tereticornis</i>	20-29	Y	
Monview Way APZ 2	601	-33.74835497	150.946424	<i>Allocasuarina spp</i>		Y	
Monview Way APZ 2	602	-33.74833804	150.946417	Stump		Y	dead stump 3m tall
Monview Way APZ 2	603	-33.74835304	150.946424	<i>Corymbia maculata</i>	20-29	Y	
Monview Way APZ 2	604	-33.74835698	150.94643	<i>Corymbia maculata</i>	20-29	Y	
Monview Way APZ 2	605	-33.74835497	150.94643	<i>Corymbia maculata</i>	20-29	Y	
Monview Way APZ 2	606	-33.74835597	150.946431	<i>Corymbia maculata</i>	20-29	Y	
Monview Way APZ 2	607	-33.74835497	150.946431	<i>Corymbia maculata</i>	20-29	Y	
Monview Way APZ 2	608	-33.74835497	150.946439	<i>Corymbia maculata</i>	20-29	Y	

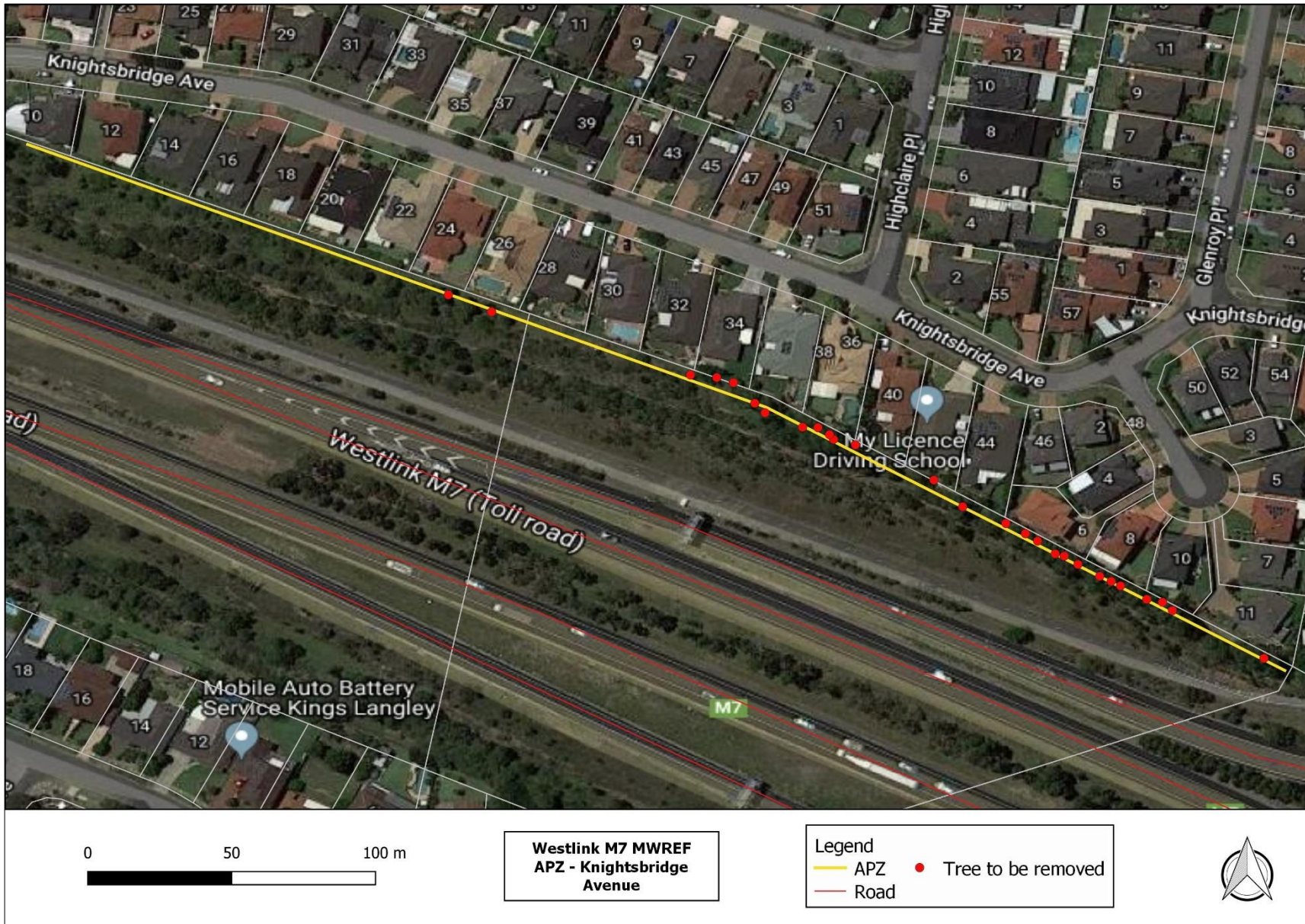
Site Name	GPS Point Name	Latitude	Longitude	Species	DBH (cm)	Tree Impact (Y/N)	Comment
Monview Way APZ 2	609	-33.74836301	150.946468	<i>Casuarina glauca</i>	30-49	Y	
Monview Way APZ 2	610	-33.74845002	150.946618	<i>Casuarina glauca</i>	50-79	Y	
Monview Way APZ 2	611	-33.74845203	150.946614	<i>Corymbia maculata</i>	80+	Y	
Monview Way APZ 2	612	-33.74843602	150.946527	<i>Eucalyptus eugenioides</i>	50-79	Y	Cut dead stem (co-dominant tree)
Monview Way APZ 2	613	-33.748432	150.946529	<i>Eucalyptus eugenioides</i>	30-49	Y	Cut limb
Monview Way APZ 2	614	-33.74844398	150.94665	<i>Corymbia maculata</i>	20-29	Y	
Valerie Avenue	615	-33.76389502	150.961309	<i>Jacaranda spp.</i>	20-29	Y	Site start
Valerie Avenue	616	-33.76379301	150.96144	<i>Jacaranda spp.</i>	20-29	Y	
Valerie Avenue	617	-33.76378798	150.961454	<i>Jacaranda spp.</i>	20-29	Y	
Valerie Avenue	618	-33.76372403	150.961435	<i>Jacaranda spp.</i>	20-29	Y	
Valerie Avenue	619	-33.76371204	150.961436	<i>Jacaranda spp.</i>	20-29	Y	
Valerie Avenue	620	-33.76368899	150.961475	<i>Jacaranda spp.</i>	20-29	Y	
Valerie Avenue	621	-33.763647	150.961522	<i>Jacaranda spp.</i>	20-29	Y	
Valerie Avenue	622	-33.76350802	150.961548	<i>Ligustrum lucidum</i>	10-19.	Y	

Site Name	GPS Point Name	Latitude	Longitude	Species	DBH (cm)	Tree Impact (Y/N)	Comment
Valerie Avenue	623	-33.76351599	150.96153	<i>Ligustrum lucidum</i>	10-19.	Y	multiple small clumps
Valerie Avenue	624	-33.76346502	150.961558	<i>Jacaranda spp.</i>	20-29	Y	
Valerie Avenue	625	-33.76344399	150.961578	<i>Jacaranda spp.</i>	20-29	Y	
Valerie Avenue	626	-33.763404	150.961584	<i>Jacaranda spp.</i>	20-29	Y	
Valerie Avenue	627	-33.76339797	150.96159	<i>Jacaranda spp.</i>	20-29	Y	
Valerie Avenue	628	-33.76337601	150.961563	Stag	20-29	Y	Dead eucalypt
Valerie Avenue	629	-33.76325103	150.961555	Stag	30-49	Y	Dead eucalypt
Valerie Avenue	630	-33.76326797	150.961492	<i>Grevillea robusta</i>	20-29	Y	
Valerie Avenue	631	-33.76326696	150.961462	Stag		Y	Dead
Valerie Avenue	632	-33.76325003	150.961463	<i>Melaleuca spp.</i>	20-29	Y	
Valerie Avenue	633	-33.76324299	150.961451	<i>Eucalyptus tereticornis</i>	30-49	Y	
Valerie Avenue	634	-33.76323503	150.961448	<i>Eucalyptus tereticornis</i>	30-49	Y	Stump 3m high
Valerie Avenue	635	-33.76327802	150.961448	<i>Corymbia maculata</i>	20-29	Y	
Valerie Avenue	636	-33.76325699	150.96147	<i>Corymbia maculata</i>	20-29	Y	
Valerie Avenue	637	-33.76325103	150.961443	<i>Eucalyptus tereticornis</i>	30-49	Y	

Site Name	GPS Point Name	Latitude	Longitude	Species	DBH (cm)	Tree Impact (Y/N)	Comment
Valerie Avenue	638	-33.76324198	150.961434	<i>Eucalyptus tereticornis</i>	30-49	Y	
Valerie Avenue	639	-33.76323402	150.961429	<i>Eucalyptus tereticornis</i>	30-49	Y	
Valerie Avenue	640	-33.76323704	150.961425	<i>Eucalyptus tereticornis</i>	20-29	Y	
Valerie Avenue	641	-33.76319999	150.961406	<i>Corymbia maculata</i>	20-29	Y	
Valerie Avenue	642	-33.76319404	150.961413	<i>Corymbia maculata</i>	20-29	Y	
Valerie Avenue	643	-33.76319001	150.961418	<i>Corymbia maculata</i>	20-29	Y	
Valerie Avenue	644	-33.76317199	150.961422	<i>Corymbia maculata</i>	20-29	Y	
Valerie Avenue	645	-33.76316797	150.961432	<i>Corymbia maculata</i>	20-29	Y	
Valerie Avenue	646	-33.76309304	150.961377				Site end
Valerie Avenue	647	-33.76309404	150.961354	<i>Angophora floribunda</i>	30-49	N	
Valerie Avenue	648	-33.76313101	150.961388	<i>Angophora floribunda</i>	30-49	N	Small blind hollow
Valerie Avenue	649	-33.76341297	150.961546	<i>Grevillea robusta</i>	30-49	Y	
Valerie Avenue	650	-33.76382302	150.961625				Old steps (potential heritage - picture taken)



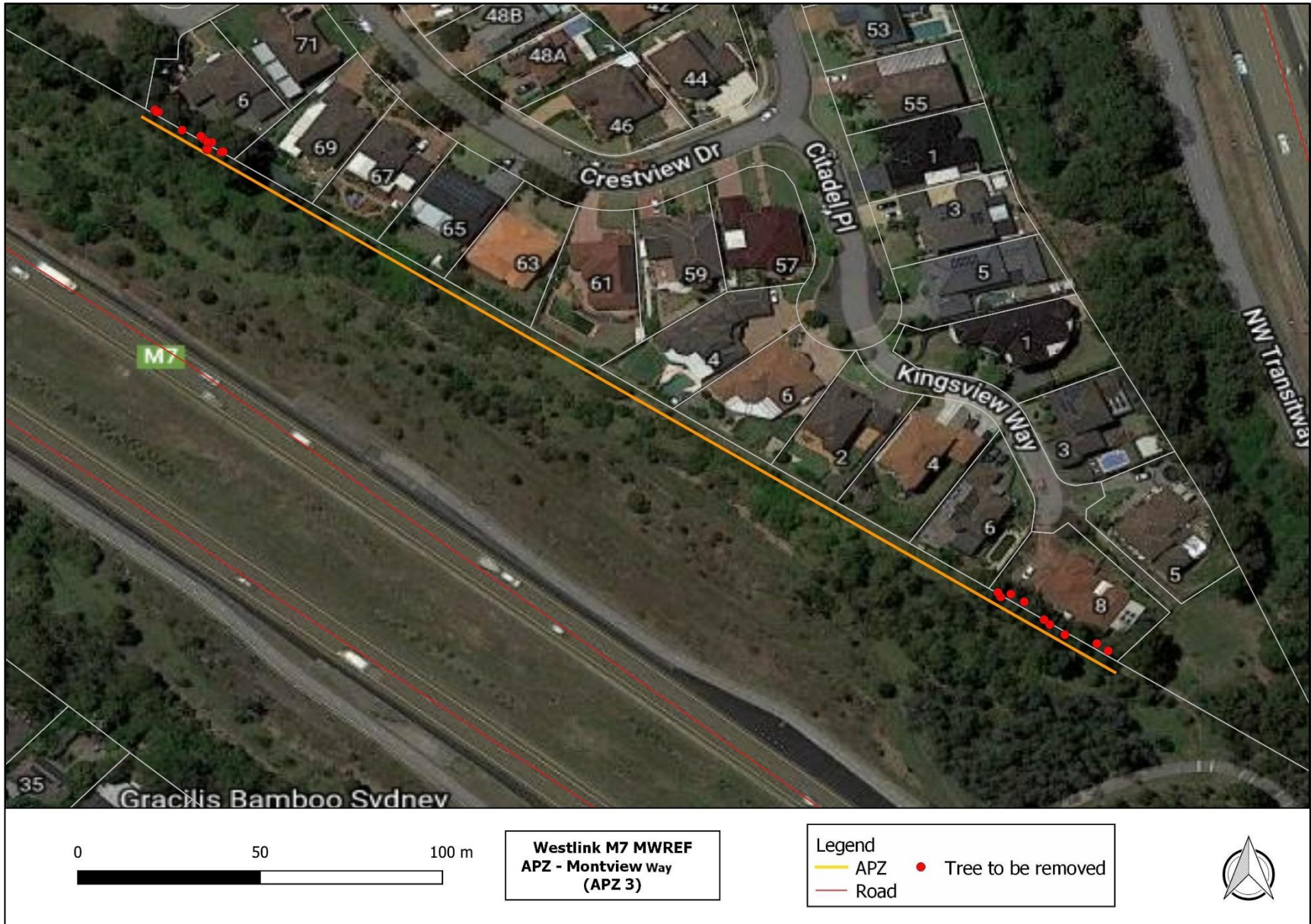
Trees to be removed at Sciarra Crescent



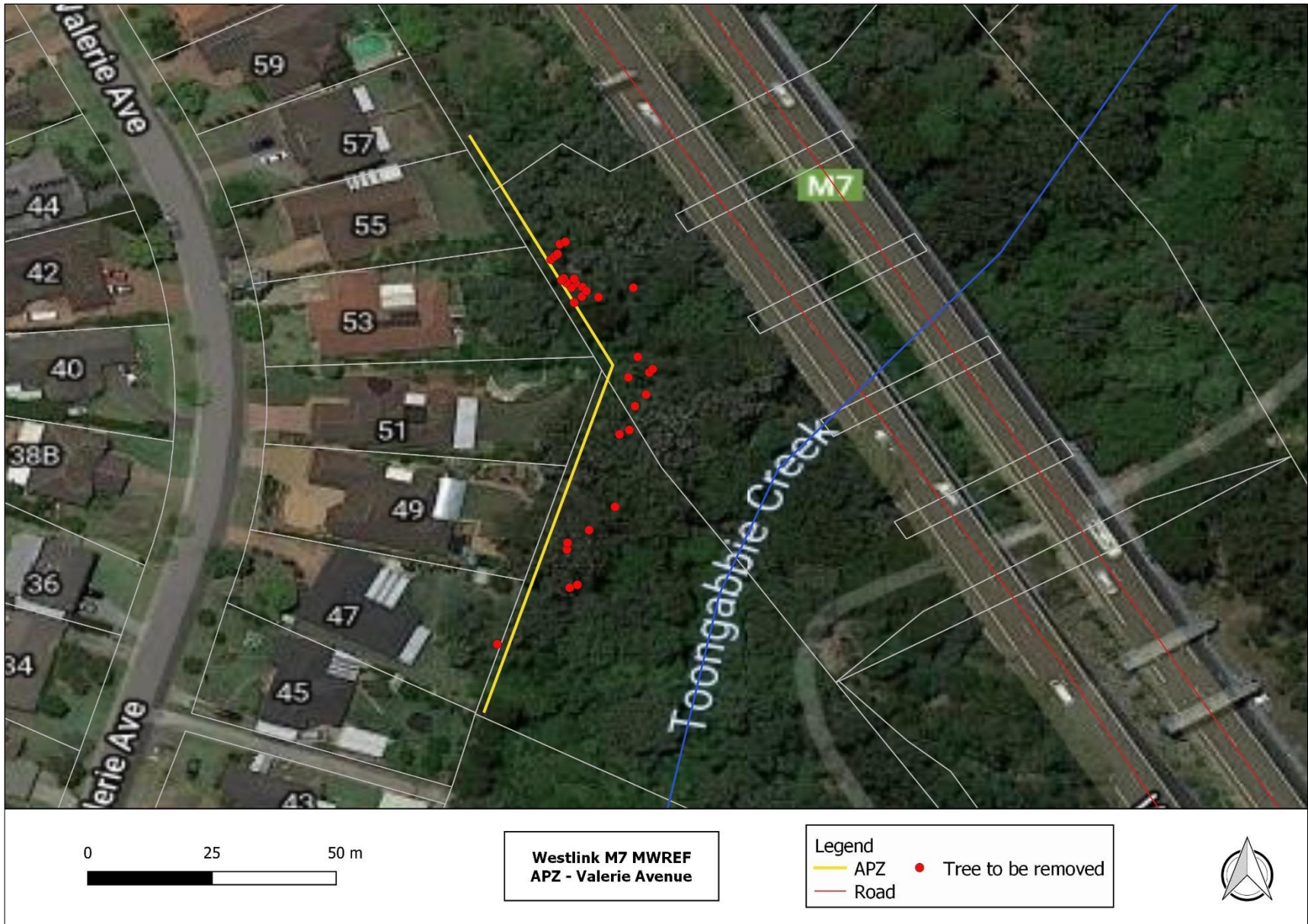
Trees to be removed at Sciarra Crescent



Trees to be removed at Montview Avenue (APZ 2)



Trees to be removed at Montview Avenue (APZ 3)



Trees to be removed at Valerie Avenue

Appendix XII

Species List

The following is a list of all flora species recorded within the proposal sites. It should be noted that such a list cannot be considered comprehensive, but rather indicative of the flora. A period of some years is often required to identify all species present in an area, particularly for cryptic or seasonally detectable species (such as orchids, some grasses and grass like herbs).

Note: weeds are listed as 'EXOTIC or HTE (High Threat Exotic)' under the column BAM Growth Form Group.

Sciarra Crescent

FAMILY	Scientific Name	Common Name	BAM Growth Form Group ¹
APOCYNACEAE	<i>Araujia sericifera</i>	Moth Vine	HTE
	<i>Parsonia straminea</i>	Common Silkpod	Other (OG)
ASPHODELACEAE	<i>Asphodelus fistulosus</i>	Onion Weed	EXOTIC
ASTERACEAE	<i>Bidens pilosa</i>	Cobbler's Pegs	HTE
	<i>Onopordum acanthium subsp. acanthium</i>	Scotch Thistle	EXOTIC
	<i>Senecio madagascariensis</i>	Fireweed	EXOTIC
	<i>Sonchus oleraceus</i>	Common Sowthistle	EXOTIC
BRASSICACEAE	<i>Brassica spp.</i>	Brassica	EXOTIC
CAMPANULACEAE	<i>Wahlenbergia spp.</i>	Bluebell	Forb (FG)
CASUARINACEAE	<i>Casuarina glauca</i>	Swamp Oak	Tree (TG)
CHENOPODIACEAE	<i>Einadia nutans</i>	Climbing Saltbush	Forb (FG)
COMMELINACEAE	<i>Commelina cyanea</i>	Native Wandering Jew	Forb (FG)
CONVOLVULACEAE	<i>Dichondra repens</i>	Kidney Weed	Forb (FG)
FABACEAE (FABOIDEAE)	<i>Trifolium repens</i>	White Clover	EXOTIC
	<i>Desmodium varians</i>	Slender Tick-trefoil	Other (OG)
FABACEAE (MIMOSOIDEAE)	<i>Acacia decurrens</i>	Black Wattle	Tree (TG)
	<i>Acacia implexa</i>	Hickory Wattle	Shrub (SG)
LOMANDRACEAE	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	Grass & grasslike (GG)

FAMILY	Scientific Name	Common Name	BAM Growth Form Group¹
MALVACEAE	<i>Sida rhombifolia</i>	Paddy's Lucerne	EXOTIC
MYRTACEAE	<i>Callistemon linearis</i>	Narrow-leaved Bottlebrush	Shrub (SG)
	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Tree (TG)
	<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark	Tree (TG)
	<i>Eucalyptus paniculata</i>	Grey Ironbark	Tree (TG)
	<i>Eucalyptus tereticornis</i>	Forest Red Gum	Tree (TG)
	<i>Leptospermum spp.</i>	Tea-tree	Shrub (SG)
	<i>Melaleuca armillaris</i>	Bracelet Honey-myrtle	Shrub (SG)
	<i>Melaleuca decora</i>		Shrub (SG)
	<i>Melaleuca linariifolia</i>	Flax-leaved Paperbark	Shrub (SG)
	<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	Tree (TG)
	<i>Melaleuca styphelioides</i>	Prickly-leaved Tea Tree	Shrub (SG)
OXALIDACEAE	<i>Oxalis perennans</i>		Forb (FG)
PASSIFLORACEAE	<i>Passiflora spp.</i>		Other (OG)
PHORMIACEAE	<i>Dianella caerulea</i>	Blue Flax-lily	Forb (FG)
PLANTAGINACEAE	<i>Plantago lanceolata</i>	Lamb's Tongues	EXOTIC
POACEAE	<i>Bromus catharticus</i>	Praire Grass	EXOTIC
	<i>Cenchrus clandestinus</i>	Kikuyu Grass	EXOTIC
	<i>Ehrharta erecta</i>	Panic Veldtgrass	HTE
	<i>Lolium spp.</i>	A Ryegrass	EXOTIC
	<i>Microlaena stipoides</i>	Weeping Grass	Grass & grasslike (GG)
	<i>Stenotaphrum secundatum</i>	Buffalo Grass	HTE
	<i>Themeda triandra</i>		Grass & grasslike (GG)

FAMILY	Scientific Name	Common Name	BAM Growth Form Group¹
POLYGONACEAE	<i>Rumex brownii</i>	Swamp Dock	Forb (FG)
PROTEACEAE	<i>Grevillea robusta</i>	Silky Oak	Tree (TG)
	<i>Grevillea spp.</i>		Shrub (SG)
	<i>Hakea spp.</i>		Shrub (SG)
SAPINDACEAE	<i>Dodonaea viscosa</i>	Sticky Hop-bush	Shrub (SG)
SOLANACEAE	<i>Solanum nigrum</i>	Black-berry Nightshade	EXOTIC
VERBENACEAE	<i>Lantana camara</i>	Lantana	HTE
	<i>Verbena bonariensis</i>	Purpletop	EXOTIC

¹ Biodiversity Assessment Method Growth Form Group - according to the Native Species by Growth Form Spreadsheet, available at: <https://www.lmbc.nsw.gov.au/bamcalc>

Knightsbridge Avenue

FAMILY	Scientific Name	Common Name	BAM Growth Form Group¹
APOCYNACEAE	<i>Araujia sericifera</i>	Moth Vine	HTE
ASTERACEAE	<i>Onopordum acanthium subsp. acanthium</i>	Scotch Thistle	EXOTIC
	<i>Senecio madagascariensis</i>	Fireweed	EXOTIC
	<i>Sonchus oleraceus</i>	Common Sowthistle	EXOTIC
BRASSICACEAE	<i>Brassica spp.</i>	Brassica	EXOTIC
CASUARINACEAE	<i>Casuarina glauca</i>	Swamp Oak	Tree (TG)
COMMELINACEAE	<i>Commelina cyanea</i>	Native Wandering Jew	Forb (FG)
CONVOLVULACEAE	<i>Dichondra repens</i>	Kidney Weed	Forb (FG)
FABACEAE (FABOIDEAE)	<i>Trifolium repens</i>	White Clover	EXOTIC
FABACEAE (MIMOSOIDEAE)	<i>Acacia decurrens</i>	Black Wattle	Tree (TG)
LOMANDRACEAE	<i>Lomandra longifolia</i>	Spiny-headed rush	Mat- Grass & grasslike (GG)

FAMILY	Scientific Name	Common Name	BAM Growth Form Group¹
MALVACEAE	<i>Sida rhombifolia</i>	Paddy's Lucerne	EXOTIC
MORACEAE	<i>Ficus pumila</i>	Creeping Fig	EXOTIC
MYRTACEAE	<i>Callistemon linearis</i>	Narrow-leaved Bottlebrush	Shrub (SG)
	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Tree (TG)
	<i>Eucalyptus tereticornis</i>	Forest Red Gum	Tree (TG)
	<i>Melaleuca decora</i>		Shrub (SG)
	<i>Melaleuca linariifolia</i>	Flax-leaved Paperbark	Shrub (SG)
	<i>Melaleuca styphelioides</i>	Prickly-leaved Tree	Tea Shrub (SG)
PLANTAGINACEAE	<i>Plantago lanceolata</i>	Lamb's Tongues	EXOTIC
POACEAE	<i>Bromus catharticus</i>	Prairie Grass	EXOTIC
	<i>Cenchrus clandestinus</i>	Kikuyu Grass	EXOTIC
	<i>Ehrharta erecta</i>	Panic Veldtgrass	HTE
	<i>Lolium spp.</i>	A Ryegrass	EXOTIC
	<i>Microlaena stipoides</i>	Weeping Grass	Grass & grasslike (GG)
	<i>Stenotaphrum secundatum</i>	Buffalo Grass	HTE
POLYGONACEAE	<i>Rumex brownii</i>	Swamp Dock	Forb (FG)
PROTEACEAE	<i>Grevillea robusta</i>	Silky Oak	Tree (TG)
	<i>Grevillea spp.</i>		Shrub (SG)
SAPINDACEAE	<i>Dodonaea viscosa</i>	Sticky Hop-bush	Shrub (SG)
SOLANACEAE	<i>Solanum nigrum</i>	Black-berry Nightshade	EXOTIC
VERBENACEAE	<i>Lantana camara</i>	Lantana	HTE
	<i>Verbena bonariensis</i>	Purpletop	EXOTIC

¹ Biodiversity Assessment Method Growth Form Group - according to the Native Species by Growth Form Spreadsheet, available at: <https://www.lmbc.nsw.gov.au/bamcalc>

Montview Way (APZ 2,3)

FAMILY	Scientific Name	Common Name	BAM Growth Form Group ¹
APOCYNACEAE	<i>Araujia sericifera</i>	Moth Vine	HTE
APOCYNACEAE	<i>Trachelospermum jasminoides</i>		EXOTIC
ARECACEAE	<i>Syagrus romanzoffiana</i>	Cocos Palm	EXOTIC
ASPARAGACEAE	<i>Asparagus asparagoides</i>	Bridal Creeper	HTE
	<i>Asparagus virgatus</i>	Asparagus Fern	EXOTIC
ASTERACEAE	<i>Bidens pilosa</i>	Cobbler's Pegs	HTE
	<i>Sonchus oleraceus</i>	Common Sowthistle	EXOTIC
BRASSICACEAE	<i>Brassica spp.</i>	Brassica	EXOTIC
CASUARINACEAE	<i>Allocasuarina spp.</i>		Tree (TG)
	<i>Casuarina glauca</i>	Swamp Oak	Tree (TG)
COMMELINACEAE	<i>Tradescantia fluminensis</i>	Wandering Jew	HTE
CRASSULACEAE	<i>Bryophyllum spp.</i>		EXOTIC
FABACEAE (MIMOSOIDEAE)	<i>Acacia decurrens</i>	Black Wattle	Tree (TG)
	<i>Acacia implexa</i>	Hickory Wattle	Shrub (SG)
FUMARIACEAE	<i>Fumaria densiflora</i>	Narrow-leaved Fumitory	EXOTIC
MALVACEAE	<i>Sida rhombifolia</i>	Paddy's Lucerne	EXOTIC
	<i>Callistemon linearis</i>	Narrow-leaved Bottlebrush	Shrub (SG)
	<i>Corymbia maculata</i>	Spotted Gum	Tree (TG)
	<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark	Tree (TG)
	<i>Eucalyptus eugenioides</i>	Thin-leaved Stringybark	Tree (TG)
	<i>Eucalyptus tereticornis</i>	Forest Red Gum	Tree (TG)

FAMILY	Scientific Name	Common Name	BAM Growth Form Group¹
OLEACEAE	<i>Ligustrum sinense</i>	Small-leaved Privet	HTE
PLANTAGINACEAE	<i>Plantago lanceolata</i>	Lamb's Tongues	EXOTIC
POACEAE	<i>Bromus catharticus</i>	Praire Grass	EXOTIC
	<i>Cenchrus clandestinus</i>	Kikuyu Grass	EXOTIC
	<i>Ehrharta erecta</i>	Panic Veldtgrass	HTE
	<i>Microlaena stipoides</i>	Weeping Grass	Grass & grasslike (GG)
	<i>Oplismenus aemulus</i>		Grass & grasslike (GG)
	<i>Stenotaphrum secundatum</i>	Buffalo Grass	HTE
PROTEACEAE	<i>Grevillea spp.</i>		Shrub (SG)
SOLANACEAE	<i>Solanum nigrum</i>	Black-berry Nightshade	EXOTIC
	<i>Cestrum spp.</i>		EXOTIC
	<i>Solanum mauritianum</i>	Wild Tobacco Bush	EXOTIC
	<i>Solanum spp.</i>		Forb (FG)
VERBENACEAE	<i>Lantana camara</i>	Lantana	HTE

¹ Biodiversity Assessment Method Growth Form Group - according to the Native Species by Growth Form Spreadsheet, available at: <https://www.lmbc.nsw.gov.au/bamcalc>

Valerie Avenue

FAMILY	Scientific Name	Common Name	BAM Growth Form Group¹
ANTHERICACEAE	<i>Chlorophytum comosum</i>	Spider Plant	HTE
APOCYNACEAE	<i>Araujia sericifera</i>	Moth Vine	HTE
ARACEAE	<i>Monstera deliciosa</i>	Fruit Salad Plant	EXOTIC
BIGNONIACEAE	<i>Jacaranda spp.</i>		EXOTIC
COMMELINACEAE	<i>Tradescantia fluminensis</i>	Wandering Jew	HTE

FAMILY	Scientific Name	Common Name	BAM Growth Form Group¹
CONVOLVULACEAE	<i>Dichondra repens</i>	Kidney Weed	Forb (FG)
DAVALLIACEAE	<i>Nephrolepis cordifolia</i>	Fishbone Fern	Fern (EG)
LOMANDRACEAE	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	Grass & grasslike (GG)
LUZURIAGACEAE	<i>Eustrephus latifolius</i>	Wombat Berry	Other (OG)
MUSACEAE	<i>Musa acuminata</i>	Edible banana	EXOTIC
MYRTACEAE	<i>Angophora floribunda</i>	Rough-barked Apple	Tree (TG)
	<i>Corymbia maculata</i>	Spotted Gum	Tree (TG)
	<i>Eucalyptus tereticornis</i>	Forest Red Gum	Tree (TG)
	<i>Melaleuca spp.</i>		Shrub (SG)
OLEACEAE	<i>Ligustrum lucidum</i>	Large-leaved Privet	HTE
PHORMIACEAE	<i>Dianella caerulea</i>	Blue Flax-lily	Forb (FG)
PHYLLANTHACEAE	<i>Breynia oblongifolia</i>	Coffee Bush	Shrub (SG)
PITTOSPORACEAE	<i>Pittosporum revolutum</i>	Rough Pittosporum Fruit	Shrub (SG)
	<i>Pittosporum undulatum</i>	Sweet Pittosporum	Shrub (SG)
POACEAE	<i>Ehrharta erecta</i>	Panic Veldtgrass	HTE
	<i>Entolasia stricta</i>	Wiry Panic	Grass & grasslike (GG)
	<i>Microlaena stipoides</i>	Weeping Grass	Grass & grasslike (GG)
	<i>Oplismenus aemulus</i>		Grass & grasslike (GG)
PROTEACEAE	<i>Grevillea robusta</i>	Silky Oak	Tree (TG)
VERBENACEAE	<i>Lantana camara</i>	Lantana	HTE

¹ Biodiversity Assessment Method Growth Form Group - according to the Native Species by Growth Form Spreadsheet, available at: <https://www.lmhc.nsw.gov.au/bamcalc>

List of Fauna Observed

Group	Family	Scientific Name	Common Name	BC Act	EPBC Act	Comments
AVES	Alcedinidae	<i>Dacelo novaeguineae</i>	Laughing Kookaburra			
AVES	Artamidae	<i>Cracticus tibicen</i>	Australian Magpie			
	Artamidae	<i>Strepera graculina</i>	Pied Currawong			
	Cacatuidae	<i>Cacatua galerita</i>	Sulphur-crested Cockatoo			
	Cacatuidae	<i>Eolophus roseicapillus</i>	Galah			
	Meliphagidae	<i>Manorina melanocephala</i>	Noisy Miner			
	Monarchidae	<i>Grallina cyanoleuca</i>	Magpie-lark			
	Psittacidae	<i>Platycercus eximius</i>	Eastern Rosella			
	Rhipiduridae	<i>Rhipidura leucophrys</i>	Willie Wagtail			
REPTILIA	Scincidae	<i>Eulamprus quoyii</i>	Eastern Water Skink			Common at Valerie Avenue

Appendix XIII

Planning for Bushfire Protection



NSW RURAL FIRE SERVICE



PLANNING FOR BUSH FIRE PROTECTION

A guide for councils, planners,
fire authorities and developers

NOVEMBER 2019



PREPARE. ACT. SURVIVE.

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Ministerial Foreword

I like many believe in the age-old adage, *'if you fail to plan, you plan to fail'* and for this reason I am delighted to know that communities across NSW will have access to this resource to help foster greater resilience.

Planning for Bush Fire Protection 2019 is a fantastic resource, particularly as we live in one of the most bush fire prone places in the world.

Over time, as our population increases, the issue of preparing for and mitigating against the risk of bush fire has become increasingly complex.

One of our most important assets during a bush fire is a well prepared community.

Since 2001, *Planning for Bush Fire Protection* has been considered industry best practice in the provision of bush fire protection standards. A pre-release version of *Planning for Bush Fire Protection 2018* was published on the NSW Rural Fire Service website in August 2018 which has been developed based on extensive industry and public consultation. *Planning for Bush Fire Protection 2019* is a refined version of the pre-release.

Improved government policy, industry standards, technology and research following significant fire events now sees *Planning for Bush Fire Protection 2019* continue to evolve, and provide improved protection for people and their properties in bush fire prone areas.

The NSW Rural Fire Service has a statutory obligation to protect life, property and the environment. The National Disaster Resilience Strategy (COAG 2011) emphasises the importance of the strategic planning system in contributing to the creation of safer and sustainable communities. The National Disaster Resilience Strategy identifies risk-based land management and planning arrangements as a vital component in building disaster resilient communities.

The NSW Office of Emergency Management 2017 State Level Emergency Risk Assessment listed land use planning as a top priority for NSW over the next 5 years.

Planning for Bush Fire Protection 2019 builds on the outcomes and lessons of bush fire events experienced over the past decade including the 2009 Black Saturday bush fires in Victoria.

It also draws upon the better understanding and experience of fire events in NSW, including those which impacted areas like the Blue Mountains, Coonabarabran and Southern Highlands in 2013, and Tathra 2018.

With lessons learned from major bush fire events, along with changes to building code and construction standards, this substantially revised 2019 edition of *Planning for Bush Fire Protection* is intended for use by councils, town planners, fire authorities, developers, planning and bush fire consultants, surveyors, building practitioners and approval authorities.

While the updated *Planning for Bush Fire Protection 2019* focuses on ensuring developments are provided with appropriate bush fire protection measures, it also aims to streamline processes for people building in bush fire prone areas.

The principles in this edition of *Planning for Bush Fire Protection 2019* will significantly assist those involved in building safe communities within bush fire prone areas, and help to increase resilience and public confidence through the NSW land use planning process. This revised version strikes an appropriate balance of flexibility, the environment, community safety and housing affordability.

I commend the work of the NSW Rural Fire Service in putting this enhanced resource together and encourage its use as widely as possible.



Minister for Police and Emergency Services,
the Honourable David Elliott MP

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1 INTRODUCTION



***Planning for Bush Fire Protection 2019 (PBP)* provides development standards for designing and building on bush fire prone land in New South Wales. PBP provides standards and guidance for:**

- strategic land use planning to ensure that new development is not exposed to high bush fire risk;
- creating new residential and rural residential subdivision allotments;
- special fire protection purpose (SFPP) development taking account of occupant vulnerability;
- bush fire protection measures (BPMs) for new buildings; and
- upgrading and maintaining existing development.

PBP is applicable to all development on bush fire prone land (BFPL) in NSW. The general principles underlying this document are that:

- a suite of BPMs are required to reduce the impact of a bush fire;
- protection measures are governed by the degree of threat posed to a development and the vulnerability of occupants;
- minimising the interface of a development to the hazard reduces the bush fire risk to the development; and
- good practice in planning, building and management reduces the risk to developments and their occupants, and increases their resilience.

1.1 Aim and objectives

All development on BFPL must satisfy the aim and objectives of Planning for Bush Fire Protection (PBP).

The aim of PBP is to provide for the protection of human life and minimise impacts on property from the threat of bush fire, while having due regard to development potential, site characteristics and protection of the environment.

The objectives are to:

- afford buildings and their occupants protection from exposure to a bush fire;
- provide for a defensible space to be located around buildings;
- provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;
- ensure that appropriate operational access and egress for emergency service personnel and occupants is available;
- provide for ongoing management and maintenance of BPMs; and
- ensure that utility services are adequate to meet the needs of firefighters.

1.2 Bush fire protection principles

Bush fire protection can be achieved through a combination of strategies which are based on the following principles:

- control the types of development permissible in bush fire prone areas;
- minimise the impact of radiant heat and direct flame contact by separating development from bush fire hazards;
- minimise the vulnerability of buildings to ignition and fire spread from flames, radiation and embers;
- enable appropriate access and egress for the public and firefighters;
- provide adequate water supplies for bush fire suppression operations;
- focus on property preparedness, including emergency planning and property maintenance requirements; and
- facilitate the maintenance of Asset Protection Zones (APZs), fire trails, access for firefighting and on site equipment for fire suppression.

1.3 Limitations of this document

Due to a range of limitations, the measures contained in this document do not guarantee that loss of life, injury and/or property damage will not occur during a bush fire event. Limitations of this document include, but are not limited to uncertainties in the following areas:

- Fire Danger Index;
- fuel loads;
- existing developments;
- human behaviour; and
- maintenance.

1.3.1 Fire Danger Index

It may be possible that days of higher Fire Danger Index (FDI) may be experienced than the FDI levels used in this document. This may result in fire situations where conditions challenge survivability of buildings and their occupants.

1.3.2 Fuel loads

Fuel loads and vegetation classes used in this document are specific to NSW.

PBP has adopted a system of assessing fuel accumulation rates based on vegetation formations and time since last fire (Forestry Commission of NSW, 1991). This has also been supported by published literature on fuel loads (i.e. Good, 1994, Watson, 2005, Cheney and Sullivan, 1997).

In some instances fuel loads in an area may be higher than those used in this document. This can influence bush fire behaviour and the potential impact on property.

1.3.3 Existing developments

The requirement to consider BPMs for development in bush fire prone areas was introduced on 1 August 2002. Existing developments that were built prior to August 2002, may have limited or no BPMs incorporated into the design of the building. This also presents major challenges for the design of alterations and additions to existing buildings.

1.3.4 Human behaviour

A person's behaviour in times of bush fire may be unpredictable. A person may have good intentions to stay and defend their property from bush fire, but may change their mind once they experience the stress and anxiety associated with the heat, noise, flames and burning embers. Even where a development can comply with PBP, unpredictable human behaviour can be a limiting factor and may result in injury, death or loss of property.

All occupants in a bush fire prone area are advised to prepare a Bush Fire Survival Plan, available to download at NSW RFS website www.rfs.nsw.gov.au.

1.3.5 Maintenance

An unprepared property is not only a risk to the building owner/occupant, but may also present an increased danger to neighbouring buildings and firefighters. Even buildings which are built to comply with PBP are placed at risk through poor maintenance.

Post bush fire research recorded by the New South Wales Rural Fire Service (NSW RFS) indicates that proper maintenance of dwellings and their curtilage significantly improves the survivability of structures.

Advice regarding the maintenance and protection of existing buildings can be found on the NSW RFS website at www.rfs.nsw.gov.au.

1.4 How to use this document

Applications for development on BFPL should include a bush fire assessment report. This report must demonstrate that the proposal satisfies the requirements of PBP. All applications must meet the Aim and Objectives of PBP.

PBP uses a performance based approach, and identifies objectives and detailed performance criteria to satisfy desired outcomes and meet the Aim and Objectives. Ultimately, any performance based approach must demonstrate that bush fire protection is afforded to a proposed development commensurate with the assessed level of bush fire risk and the characteristics of the occupants.

This can be achieved by either applying the identified acceptable solutions, or by preparing a performance based solution.

A performance based solution must be designed to achieve the appropriate level of protection by tailoring a package of measures which meet the intent and performance criteria relevant to the proposed development.

BPMs are set out in Chapter 3. Performance criteria and acceptable solutions are shown for each specified development type in Chapters 5-8.

Refer to Figure 1.5 for further information on how to use PBP.

1.4.1 Bush fire protection measures

BPM's are the relevant specifications and requirements that need to be satisfied to improve life safety, property protection and community resilience to bush fire attack.

They include:

- APZs;
- Access;
- Construction, siting and design;
- Landscaping;
- Services; and
- Emergency and evacuation planning.

1.4.2 Intent

For each BPM, a broad intent is outlined. The ensuing performance criteria and acceptable solutions are designed to ensure that the general intent for each BPM is met.

1.4.3 Performance criteria

Performance criteria are the outcomes that need to be achieved to satisfy the intent. The performance criteria can be satisfied in one of the following ways:

- acceptable solutions; or
- performance based solution; or
- the combination of the above.

1.4.4 Acceptable solutions

Chapters 5-8 identify acceptable solutions which are considered by the NSW RFS as meeting the performance criteria.

1.4.5 Performance based solutions

Performance based solutions allow flexibility and innovation in responding to site-specific opportunities and constraints while still meeting the identified performance criteria. They also allow the consideration of a broad range of issues and information, including bush fire risk, community expectations, environmental protection and the application of new science, processes and technologies.

Performance based solutions must provide substantiated evidence and clearly demonstrate how the specific objectives and performance criteria are to be satisfied.

When performance based solutions are proposed, they will be assessed on their merits and individual circumstances. In these circumstances, a Bush Fire Design Brief (BFDB) process can be undertaken which would involve early agreement on the key elements and acceptance criteria from all stakeholders including the NSW RFS.

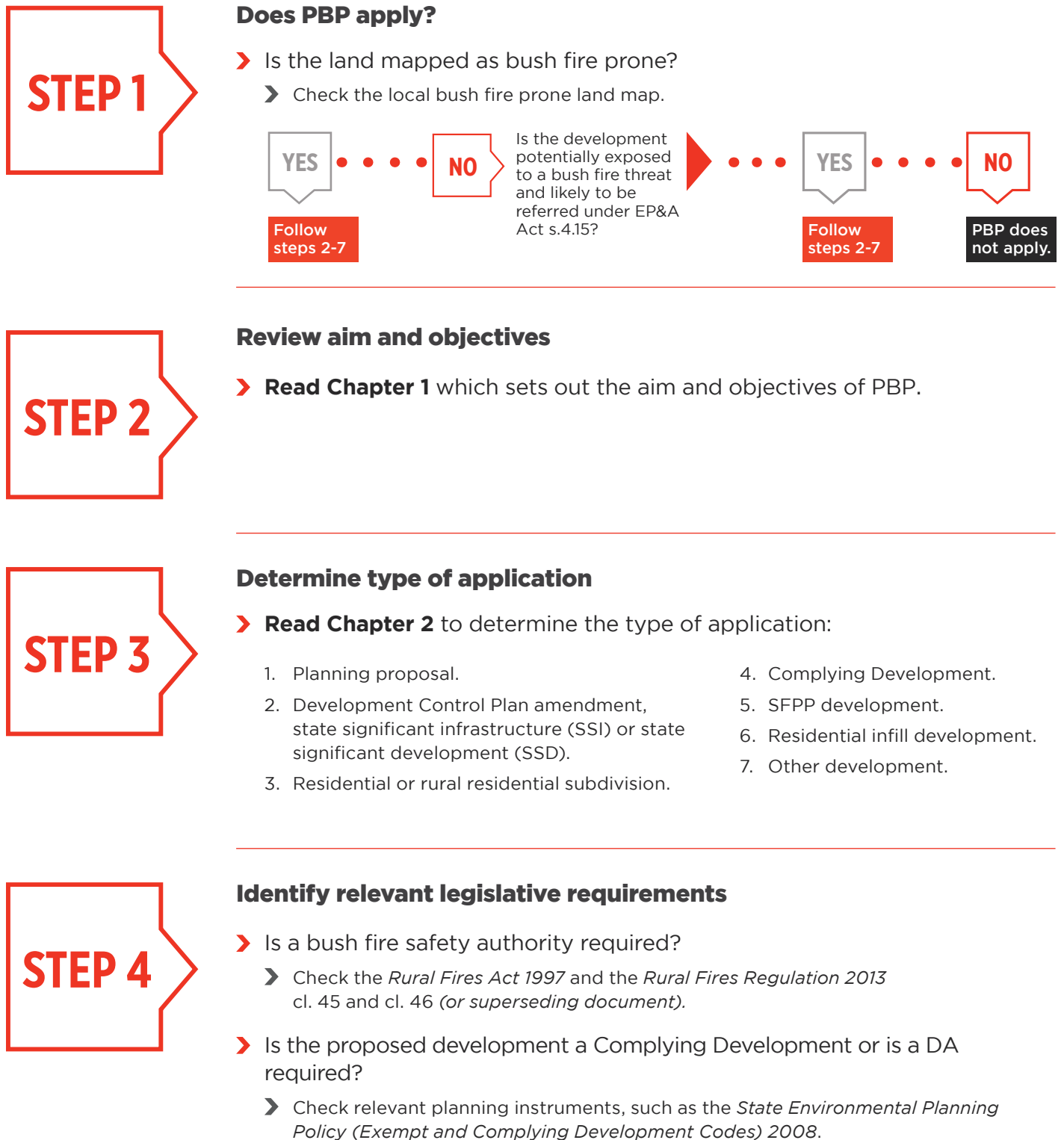
Performance based solutions may be undertaken for any of the BPMs detailed in Chapter 3 and supported in accordance with the submission requirements in Appendix 2.

1.4.6 PBP guidance materials

PBP guidance materials are prepared and published by the NSW RFS in order to support and clarify matters within PBP. Guidance materials (i.e. fact sheets and practice notes) should be reviewed in the preparation of bush fire assessment reports and can be found on the NSW RFS website at www.rfs.nsw.gov.au.

Figure 1.5

Step-by-step guide on how to use PBP





STEP 5

Identify the relevant BPMs

- **Read Chapter 3** which explains the BPMs.
 - Read the detailed specifications and requirements for your relevant development type.
 - Residential - **Read Chapter 5 and 7.**
 - SFPP - **Read Chapter 6.**
 - Other - **Read Chapter 8.**
 - Grasslands - **Read relevant chapters.**
-

STEP 6

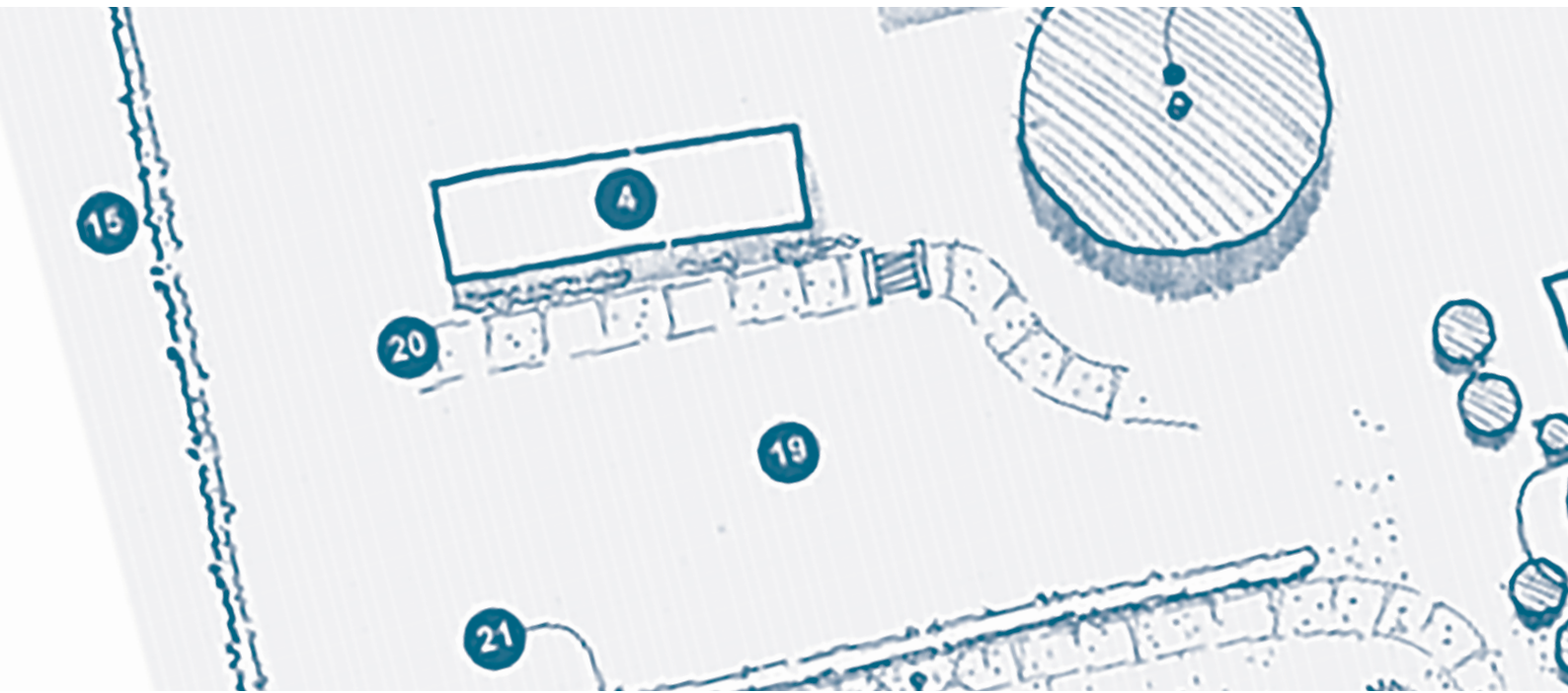
Determine solutions

- Determine the acceptable solutions required for each measure. Can they all be complied with?
 - Adopt the acceptable solutions that have been set out.
 - Alternatively prepare a performance based solution.
-

STEP 7

Demonstrate compliance

- Prepare a package of measures for submission with the development application, demonstrating compliance with the performance criteria either through acceptable solutions or performance based solutions.



2 FRAMEWORK



PBP is intended to enhance community resilience to bush fires. Bush fire should be considered in every phase of development, from regional plans, land-use zoning, Masterplans, subdivisions to individual building applications.

Comprehensive consideration of bush fire in the planning system requires a sound understanding of the hazards and risks, as well as consideration of strategic planning and development controls that will adequately mitigate these identified risks, as outlined in the *National Disaster Resilience Strategy*, (COAG 2011).

2.1 Legal framework

The Environmental Planning and Assessment Act 1979 (EP&A Act) and the *Rural Fires Act 1997* (RF Act) were amended on 1 August 2002 to enhance bush fire protection in the development assessment process.

The NSW land use planning framework provides, in broad terms, two main phases: strategic planning and development assessment.

PBP provides the foundation for the application of bush fire protection during both of these phases of development. Appropriate consideration of bush fire hazards at the strategic planning phase is required by the EP&A Act s.9.1(2) and PBP should be considered in applying the Section 9.1 Direction.

At the development assessment phase, development on land that is identified as being bush fire prone must comply with PBP. Some types of development on BFPL can be undertaken as Complying Development and must also comply with PBP.

A bush fire safety authority (BFSA) is required from the NSW RFS for residential and rural residential subdivision and SFPP developments on BFPL. An application for a BFSA must address the extent to which the development complies with PBP.

Building work on BFPL must also comply with the requirements of the National Construction Code (NCC). The NCC contains the technical provisions for the design and construction of buildings. Under the Deemed to Satisfy provisions of the NCC, building work on BFPL must comply with *Australian Standard 3959:2018 Construction of buildings in bushfire-prone areas* (AS 3959) or the *National Association of Steel Framed Housing (2014) Steel Framed Construction in Bush Fire Areas* (NASH Standard). This does not apply however in Bush Fire Attack Level - Flame Zone (BAL-FZ), or where modified by the specific conditions of the relevant development consent.

2.2 Bush fire prone land mapping

The identification of BFPL in NSW is required under the EP&A Act s.10.3.

BFPL Maps provide the trigger for the various development assessment provisions.

The Commissioner of the NSW RFS designates what constitutes BFPL and how it is to be mapped. Each council prepares a map in accordance with the guidelines and submits the map to the NSW RFS for certification by the Commissioner. These maps are required to be recertified at least every five years and the Commissioner may make direct changes to a BFPL Map at any time.

Guidelines for the mapping of BFPL can be found on the NSW RFS website at www.rfs.nsw.gov.au.

You can determine whether a site is mapped as being bush fire prone by referring to the BFPL Map which is held by the local council, or on the NSW RFS website.

The BFPL Map is a trigger for the consideration of BFPL Maps for new development. It is not intended as a detailed measure of risk. The map does not form part of the site assessment process, which must be carried out in accordance with Appendix 1.

A consent authority can refer a development application (DA) to the NSW RFS under the provisions of EP&A Act s.4.15, even where it is not mapped as BFPL.

2.3 Strategic planning

Strategic planning is the preparation of planning instruments and policies and includes the making of Local Environmental Plans (LEPs), Development Control Plans (DCPs), housing strategies and other planning instruments that identify proposed uses and land zonings. This also includes any associated strategic proposals and studies.

The strategic planning phase of development is particularly important in contributing to the creation of safer and sustainable communities (COAG 2011). It is an effective way of achieving bush fire protection objectives in new developments.

Strategic bush fire planning and studies are needed to avoid high risk areas, ensure that zoning is appropriate to allow for adequate emergency access, egress, and water supplies, and to ensure that future compliance with this document is achievable.

The most important objective for strategic planning is to identify whether new development is appropriate subject to the identified bush fire risk on a landscape scale. An assessment of proposed land uses and potential for development to impact on existing infrastructure is also a key element of the strategic planning process in bush fire prone areas. Land use planning policies can be introduced to limit the number of people exposed to unacceptable risk.

Planning instruments and policies can ensure bush fire management principles are given appropriate consideration at all stages of the planning and development process.

Once development has been assessed as being appropriate in its bush fire prone context, it will need to be capable of complying with PBP. The ability of proposed land uses and associated future developments to comply with PBP will be assessed at the strategic planning stage. The expectation will be that the development will be able to comply with PBP at the DA stage.

2.4 Development assessment

The provisions of this document apply to all development on land which is bush fire prone (see section 2.2 of this document). This document may also apply where proposals are referred to the NSW RFS under other referral instruments such as EP&A Act s.4.15.

If a development of a type not specifically addressed in this document is proposed on BFPL, the development must meet the Aim and Objectives of PBP and the consent authority can refer the proposal to the NSW RFS for advice. The NSW RFS will advise which specific standards apply to that development. In these circumstances, the development proposal will be a performance based solution and in more complex cases, this may be achieved collaboratively through the BFDB process.

The vast majority of DAs in NSW are assessed by local councils. Councils may assess DAs for certain developments on BFPL that are compliant with this document without the need to refer the proposal to the NSW RFS.

In certain cases building work may not require development consent and can proceed through the Exempt or Complying Development process if the development type is covered by a State Environmental Planning Policy (SEPP) or the relevant LEP.

For further information on development types, please contact the local council or the NSW Department of Planning, Industry and Environment (DPIE).

See Figure 2.4 for a flow chart showing the development assessment process for developments on BFPL.

2.4.1 Development requiring a BFSA

Proposals for subdivision and SFPP development on BFPL require an approval from the NSW RFS in the form of a BFSA under RF Act s.100B.

Development requiring a BFSA is considered Integrated Development under EP&A Act s.4.46.

The BFSA is critical in ensuring these key developments are designed and located in a manner that is suitable to protect human life and facilitate appropriate operational firefighting arrangements. This is a means by which the NSW RFS Commissioner fulfills their statutory obligation to ensure the protection of the community, including firefighters from the impacts of bush fire.

2.4.2 State significant development and infrastructure

In September 2011, EP&A Act pt. 3A was repealed, leading to the creation of two new major project development categories: state significant infrastructure (SSI) and state significant development (SSD).

Because of their size, complexity, importance and/or potential impact, DPIE is predominantly responsible for assessing these DAs. The Minister for Planning and Public Spaces is the consent authority for SSI and SSD applications.

Applications under the now-repealed Part 3A of the EP&A Act and state significant projects are exempt from requiring a BFSA and are not required to be assessed under EP&A Act s4.14.

Given the scale of SSI and SSD projects, the requirements of this document should still be applied, and seeking advice from the NSW RFS is encouraged. Even where comments have been provided by the NSW RFS at the strategic planning stage, future DAs may benefit from further advice from the NSW RFS.

2.4.3 Streamlining development assessment

The NSW Government has provided a pathway for streamlined assessment to occur under the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) cl.273 for new lots in Urban Release Areas (URAs) that are located on BFPL.

The streamlining process allows the assessment of bush fire provisions at subdivision stage within URAs and may exempt the lots from reassessment of bush fire issues when land owners are ready to develop their lots. Post-Subdivision Bush Fire Attack Level Certificates may be issued assigning BALs to all individual lots within the subdivision. An applicant can rely on this Post-Subdivision BAL Certificate for Complying Development up to and including BAL-29.

The option to use Complying Development also allows for a streamlined process for developing on BFPL.

2.4.4 Infill and other development

The EP&A Act s.4.14 requires that the consent authority be satisfied that the relevant specifications and requirements of this document are complied with for development on BFPL. This applies to any development other than subdivision of land that could lawfully be used for residential purposes or development for a SFPP. This can be achieved by the following means:

- a. the consent authority is satisfied that the development conforms to the specifications and requirements of PBP; or
- b. the consent authority has been provided with a certificate by a person who is recognised by the NSW RFS as a qualified consultant in bush fire risk assessment stating that the development conforms to the relevant specifications and requirements; or
- c. If the consent authority is satisfied that the development does not conform to the relevant requirements of PBP, it may still grant consent to the development but only after it has consulted with the Commissioner of the NSW RFS concerning measures to be taken with respect to the development to protect persons, property and the environment from danger that may arise from a bush fire.

2.4.5 Exempt and Complying Development

Some straightforward residential, commercial and industrial development can be undertaken as Exempt or Complying Development under various SEPPs and LEPs.

Exempt Development is minor building works that can be carried out without development approval, such as decks, garden sheds, carports and fences.

Complying Development can be undertaken on lower risk BFPL up to and including BAL-29 where the appropriate construction requirements and all other relevant development standards have been met. Complying Development is not permitted on higher risk BFPL (BAL-40 or BAL-FZ) and a DA is required in these circumstances.

Specified development requirements and standards apply to new development, including alterations and additions, to ensure the relevant provisions of this document are met. This allows for Complying Development on BFPL, while maintaining an appropriate assessment regime for managing bush fire risk.

In certain circumstances, a BAL Certificate must be obtained from the local council or a person recognised by the NSW RFS as a suitably qualified consultant in bush fire assessment, stating that the development is not located in BAL-40 or BAL-FZ.

The development must also meet the identified development standards within the relevant SEPP or LEPs.

2.5 Construction provisions: the National Construction Code (NCC) and bush fire standards

The NCC is a performance based code which comprises the Building Code of Australia (BCA) as Volumes 1 and 2 and the Plumbing Code of Australia as Volume 3.

The NCC contains Performance Requirements and Deemed-to-Satisfy provisions relating to the construction of buildings in bush fire prone areas. In NSW, these provisions apply to Class 1, 2 and 3 buildings, Class 4 parts of a building, Class 9 buildings that are SFPPs, and associated class 10a buildings and decks.

The construction requirements of AS 3959 and the National Association of Steel-framed Housing (NASH) Standard are a Deemed-to-Satisfy solutions in the NCC, as varied in NSW, for buildings in designated bush fire prone areas.

2.6 Other NSW RFS bush fire safety programs

The following NSW RFS programs provide a number of strategies designed to address bush fire protection for the community at a local government or regional level. These provisions are not considered as BPMs for proposed development.

2.6.1 Bush Fire Risk Management Plan

The preparation of a Bush Fire Risk Management Plan (BFRMP) is the responsibility of the Bush Fire Management Committee (BFMC).

The objectives of the local BFRMP are to:

- reduce the number of human-induced bush fire ignitions that cause damage to life, property and the environment;
- manage fuel to reduce the rate of spread and intensity of bush fires while minimising environmental/ecological impacts;
- reduce the community's vulnerability to bush fires by improving its preparedness; and
- effectively contain fires with the potential to cause damage to life, property or the environment.

Enquiries concerning BFRMPs can be directed to the appropriate NSW RFS Fire Control Centre.

2.6.2 Hazard Reduction Certificates

A Bush Fire Hazard Reduction Certificate (HRC) provides environmental approval to carry out bush fire hazard reduction works. The HRC must be consistent with the Bush Fire Environmental Assessment Code and the BFRMP. The HRC details the conditions that are to be adhered to when implementing the bush fire hazard reduction works.

Enquiries on HRCs can be directed to the appropriate NSW RFS Fire Control Centre.

2.6.3 Community Protection Plans

The aim of the Community Protection Plan (CPP) program is to improve the community and firefighters' capacity to prepare for, act during, and survive bush fires. A CPP requires a detailed analysis of communities considered to be exposed to a significant bush fire risk, and ensures that the bush fire risks can be fully understood and adequately treated.

Enquiries on CPPs can be directed to a NSW RFS Planning and Environment Service Centre on 1300 679 737.

2.6.4 Neighbourhood Safer Places

A Neighbourhood Safer Place (NSP) is a location where people facing an immediate threat to their personal safety or property can gather and seek shelter from the impact of a bush fire. They are the last resort option for those in bush fire situations.

Enquiries on NSPs can be directed to the NSW RFS Planning and Environment Service Centres on 1300 679 737.

2.6.5 10/50 Vegetation Clearing Scheme

People living in a bush fire prone area may be eligible to undertake certain clearing practices around an existing dwelling and other specified structures under the 10/50 Vegetation Clearing Scheme. The scheme may only be applied to existing buildings and may not be used in the development assessment process.

The scheme allows people in a 10/50 Vegetation Clearing Entitlement Area to:

- remove, destroy or prune trees on their property within 10 metres of a home, without seeking approval; and
- remove, destroy or prune any vegetation such as shrubs (but not trees) on their property within 50 metres of a home, without seeking approval, if the clearing is carried out in accordance with the 10/50 Vegetation Clearing Code of Practice.

The 10/50 Vegetation Clearing Scheme does not permit you to clear trees or other vegetation contrary to conditions in your development consent or other approvals under the EP&A Act.

You can find out more, including if your property is in a 10/50 Vegetation Clearing Entitlement Area on the NSW RFS website: www.rfs.nsw.gov.au.

2.7 Bush Fire Survival Plans

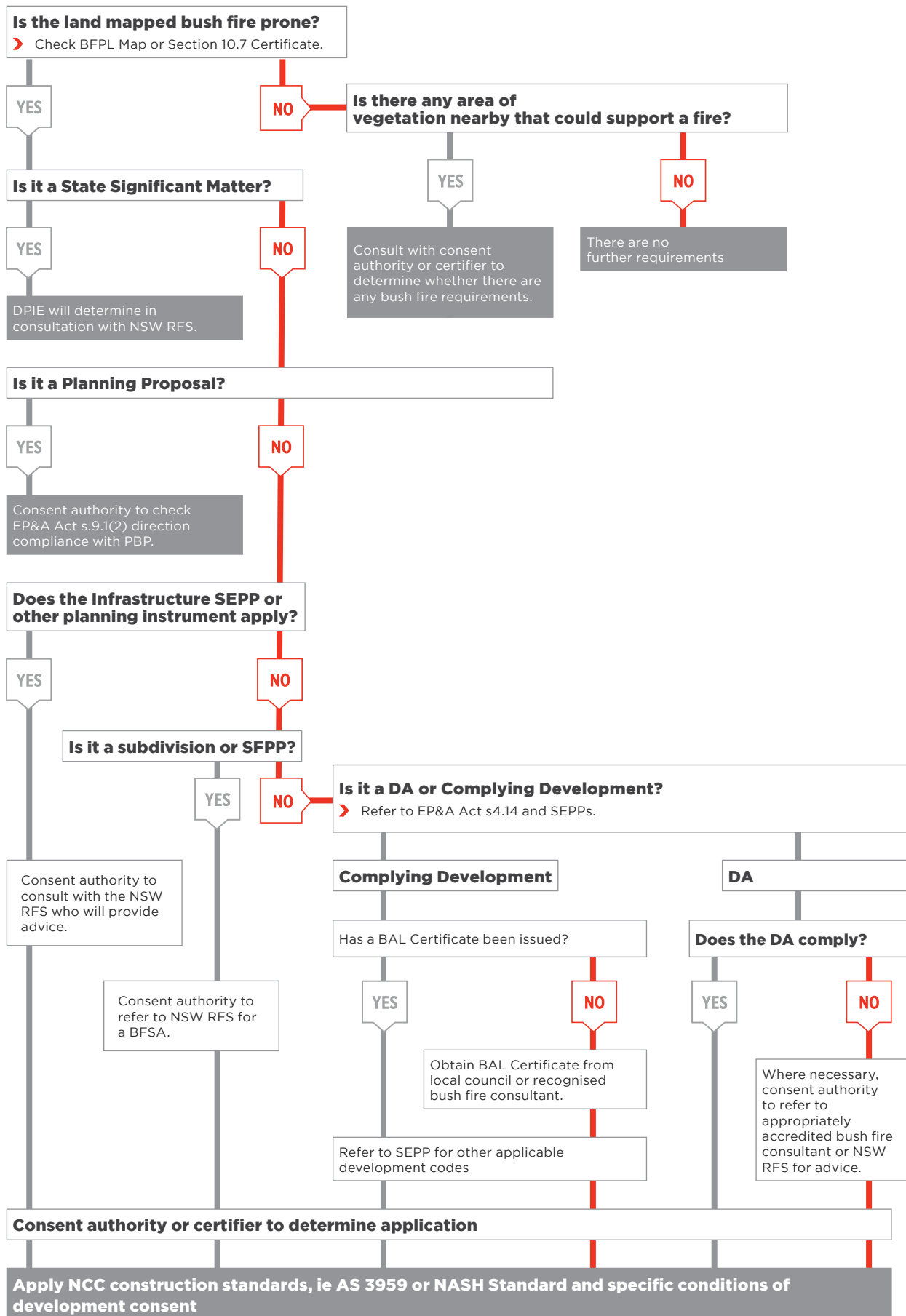
People living in a Bush Fire Prone Area should prepare a Bush Fire Survival Plan which is revised annually prior to the bush fire season.

A *Guide to Making a Bush Fire Survival Plan* has been developed by the NSW RFS to assist residents in the preparation of their plan and can be found at the NSW RFS website.

The Guide provides information on bush fire risk and suggests simple steps as to how individuals and families can protect themselves and their property in the event of a bush fire. On days of catastrophic fire weather, the NSW RFS recommends leaving early as the only safe option.

Figure 2.4

Assessment process for developments in bush fire prone areas





3 BUSH FIRE PROTECTION MEASURES



BPMs can mitigate the impact of bush fire attack on people and assets.

The types of protection measures include APZs, access, landscaping, water supply, building design and construction and emergency management arrangements. These measures assist building survival during a bush fire. They also contribute to the safety of firefighters and members of the community occupying buildings during the passage of a bush fire front.

There are a range of different BPMs which should be applied in combination based upon the development type and the level of bush fire risk.

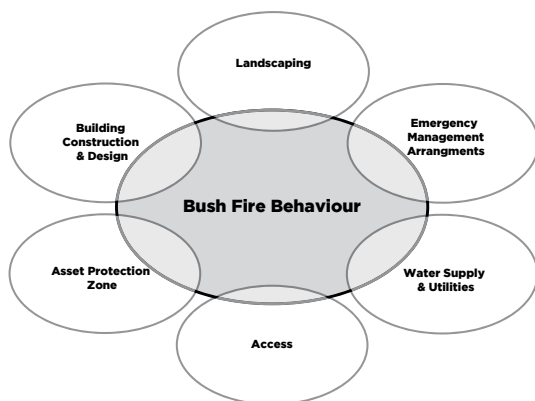
All requirements for BPMs that relate to the development must be provided, as required by this document.

3.1 Introduction

A significant part of NSW is classified as BFPL and local circumstances vary widely as do potential land uses. PBP recognises this and promotes detailed site analysis and the application of a combination of BPMs to achieve an acceptable outcome.

Figure 3.1

BPMs in combination



3.1.1 Applying the BPMs in combination

The design of BPMs should be incorporated at the earliest stages of development. Acceptable bush fire protection proposals will involve a combination of different BPMs depending on their suitability and importance to the particular type of development and different levels of potential bush fire attack.

Appropriate combinations of BPMs not only depend on geographic location and site circumstances but also on the nature of the proposed use, distinguishing between the following development types:

- residential and rural-residential subdivision with a dwelling entitlement;
- SFPP development;
- infill development; and
- other developments (i.e. commercial community and other uses which are not classified as residential or SFPP).

These development types are required to achieve specific objectives which relate to particular circumstances. The acceptable solutions and performance criteria in this document acknowledge that the measures work in combination to improve the capacity for bush fire protection.

Research on bush fire behaviour under a range of location, weather, vegetation and slope conditions has demonstrated the significance of reduced fuel loads and separation distance in limiting the bush fire threat from ember attack through to direct flame contact.

3.2 Asset Protection Zones (APZ)

An APZ is a buffer zone between a bush fire hazard and buildings. The APZ is managed to minimise fuel loads and reduce potential radiant heat levels, flame, localised smoke and ember attack. The appropriate APZ distance is based on vegetation type, slope and the nature of the development.

The APZ can include roads or properties managed to be consistent with APZ standards set out in Appendix 4 and the NSW RFS document *Standards for Asset Protection Zones*. A fuel-reduced, physical separation between buildings and bush fire hazards is a key element in the suite of bush fire measures and has a major influence on the type of construction necessary to mitigate bush fire attack.

Appendix 1 provides the required methodology for determining the APZ based on vegetation type, slope and FFDI.

For new residential development, APZ requirements are based on radiant heat level exposure to buildings not exceeding 29kW/m^2 (calculated on a flame temperature of 1090 Kelvin).

For many SFPPs, larger APZs are required because of the characteristics of occupants. This means a lower radiant heat threshold is required in order to allow for evacuation of occupants and emergency services to operate in support of the most at-risk members of the community.

For most SFPP developments, 10kW/m^2 (calculated on a flame temperature of 1200 Kelvin) is the maximum exposure at any point of the building wall or façade and where emergency services may be supporting or evacuating occupants from the building.

This is to ensure there is an area for firefighters to defend the property and allow access to and from the building. Chapter 6 identifies the performance criteria and acceptable solutions for APZs for SFPP developments.

Information relating to the creation and management of APZs is detailed in Appendix 4 of this document and in the NSW RFS document “*Standards for Asset Protection Zones*” which is available on the NSW RFS website www.rfs.nsw.gov.au.

A fundamental premise for APZs is that they are provided within the property in such a way that the owner/occupant will be able to maintain the area in perpetuity.

Where possible, buildings should be sited so as to reduce exposure to bush fire attack and provide suitable defensible space around a building.

3.2.1 Staged developments

Often an indefinite time lag can occur between one or more stages of development which can result in persons and property being unprotected in the event of a bush fire. A development site that is vegetated but is to be developed and sold in stages will require the creation of APZs that need to be maintained sequentially until the final phase of development is completed to afford each stage of the development the appropriate level of bush fire protection.

Therefore, in staged developments, APZs need to be provided during all stages, and provisions included that ensure ongoing maintenance is undertaken until such time as land is developed. If an easement or covenant is established for the purpose of an APZ it can be extinguished when a bush fire hazard is permanently removed (i.e. when development occurs).

The responsibility for the maintenance of APZs at each stage of development must be clearly defined within the easement or covenant.

3.2.2 APZs on slopes over 18 degrees

APZs on slopes greater than 18 degrees present ongoing maintenance difficulties and may have reduced effectiveness. Challenges in these circumstances may include the following:

- management practices may be difficult;
- the environmental consequences of ground clearing (destabilisation of the slope resulting in landslip, slump, erosion or landslide) may not be acceptable; and
- vegetation is more readily available to a fire, significantly reducing the advantage of having an APZ.

Where it can be demonstrated that these issues can be effectively managed, APZs on steeper slopes may be considered. Where there are effective slopes in excess of 18 degrees it must be demonstrated that

management can occur. A management plan must be submitted with the DA to provide details on how the APZ will be implemented and maintained. The management plan should include, but not be limited to:

- The mechanical means necessary to complete the management required;
- A schedule for maintenance to occur to ensure the APZ is regularly managed; and
- The relevant body responsible for maintaining the APZ.

3.2.3 APZs on environmentally protected lands

Where environmentally sensitive vegetation such as endangered ecological communities are to be cleared for the purposes of an APZ, the proposals will need to be carefully considered.

In some cases, a development may be proposed on land with a split zoning (i.e. part residential and part environment protection zone). BPMs may not necessarily be compatible with all zones. It should not be assumed that an APZ can extend into an adjoining non-compatible area, therefore any environmental constraints should be assessed by the appropriate authority.

3.2.4 Defendable space

Defendable space is an area within the Inner Protection Area (IPA) of an APZ adjoining a building. This space provides a safe working environment in which efforts can be undertaken to defend the structure, before and after the passage of a bush fire.

The physical size of the development will determine whether the defendable space is provided as pedestrian access or will require sufficient space for vehicular movements. Vegetation within the defendable space should be kept to an absolute minimum and the area should be free from combustible items and obstructions.

3.2.5 APZs on adjoining land

An APZ imposed by a development consent condition must be maintained for the lifetime of the development, unless modified by a subsequent consent. In order to guarantee that an APZ can be managed in perpetuity, APZs should be contained within the overall development site and not on adjoining lands.

APZs on adjoining land are not encouraged. Where an APZ is proposed on adjoining land, a guarantee must be provided that the land will be managed in perpetuity. In order to achieve this, the land should have an easement under the *Conveyancing Act 1919* s.88B to ensure:

- surety of APZ and the correct management prescriptions; and
- that management occurs in a binding legal agreement in perpetuity.

These situations shall be assessed on their merits.

In such circumstances, the proponent will need to obtain written confirmation from the relevant parties that the easement will continue in perpetuity and that the land subject to the easement will be maintained in a suitable manner. In all cases, the owner of adjoining land must provide written consent for the easement, which shall be lodged with the DA.

Generally the owner/occupier of the land who has benefited from the easement shall be responsible for maintaining the APZ. Where an APZ easement has been established to the benefit of a community title, it shall be maintained in accordance with a Plan of Management.

Neither the NSW RFS nor a council has the power to impose an APZ on an adjoining landowner for new development. It is therefore the developer's responsibility to negotiate with adjoining land owner/s as part of the DA process. Easements should not be considered where the adjoining land is used for a public purpose and where vegetation management is not likely or cannot be legally granted (eg, National Park, bushland reserve, critical habitat, 'coastal wetlands' or 'littoral rainforests' mapped in the Coastal Management SEPP).

In circumstances where an APZ is proposed on adjoining land, it will be considered as a performance based solution. In addition, the NSW RFS cannot be considered a party to the easement.

3.2.6 Plans of Management

Plans of Management (PoM) are required where developments propose to establish APZs off site on lands belonging to council or government where there is no guaranteed commitment to future management. The adopted PoM provides the assurance that an APZ will be managed in perpetuity.

PoMs are also required where APZs are proposed off site, on lands which may have periodic management but may not meet the ongoing requirements of an APZ. Such lands include council bushland reserves, Crown Lands, Open Space and easements for drainage and services.

Before APZs can be accepted for these types of situations, it must be demonstrated that a management regime is in place to ensure ongoing compliance with APZ requirements. The content of a PoM should include:

- the prescribed APZ requirements and its treatment details (e.g. IPA and OPA widths and fuel loads);
- the predicted timing intervals of the management options;
- notification of any transition arrangements for management or ownership alterations which occur as a result of land dedication or acquisition;
- demonstration that the relevant authority has the necessary experience, resources and funds to undertake the directions; and
- acknowledgement of responsibility from the adjoining landholder that the APZ will be managed in perpetuity.

Any proposed dedication of land which requires council maintenance should include a written approval from that council and a PoM to comply with PBP.

3.3 Building construction, siting and design

The appropriate design and construction of buildings enhance their survivability from bush fires. Construction measures should not be applied as a stand-alone mitigation solution, but should form part of a suite of BPMs. This should also include APZs, appropriate access, water supply and landscaping.

Building design needs to ensure adequate protection of vulnerable building elements. Construction standards are outlined in AS 3959 and the NASH Standard to provide various levels of protection for different building elements.

The level of building construction standard required is based on the FFDI, type of vegetation, the effective slope and the size of APZ. Appendix 1 provides the required methodology for assessing the building construction standards referred to in AS 3959 and the NASH Standard as BALs.

The construction requirements of the NCC are applied in addition to variations to these standards which are discussed in Chapter 7.

3.4 Access arrangements

Design of access roads shall enable safe access and egress for residents attempting to leave the area at the same time that emergency service personnel are arriving to undertake firefighting operations.

Chapters 5-8 detail performance criteria and acceptable solutions for access arrangements, relevant to the development type. Specific access design principles are included in Appendix 3.

In a bush fire prone area, the purpose of the road system is to:

- provide firefighters with access to structures, allowing more efficient use of firefighting resources;
- provide evacuation routes for firefighters and the public; and
- provide access to areas of bush fire hazard for firefighting and hazard mitigation purposes.

Roads shall provide sufficient width and other dimensions to ensure safe unobstructed access and allow firefighting crews to operate equipment around the vehicle. Road width is defined as the trafficable width from kerb to kerb or the inside edge of the table drain.

Dead-end roads should be avoided. However, where they are present, they must incorporate a sufficient turn-around area to minimise the need for vehicles to make multipoint turns.

3.4.1 Perimeter roads

A perimeter road should be provided to separate bush land from urban areas, allowing more efficient use of firefighting resources. A perimeter road is located on the outer extremity of a local area or subdivision and usually runs parallel to the bush land interface.

The perimeter road provides space to conduct active firefighting operations and hazard reduction activities. In developments where no perimeter road exists, property defence in a bush fire event may be more difficult.

3.4.2 Non-perimeter roads

Non-perimeter roads are the interconnecting roads between the perimeter roads and the existing and/or broader road network. These roads form a link for firefighting operations by providing access for emergency vehicles, a safe space for conducting property protection, and a suitable road network for egress of residents.

3.4.3 Property access roads


Property access is any access from private land onto the public road system. In rural areas, in particular isolated rural properties, operational difficulties can be experienced in accessing buildings. Examples include water crossings and roads which may be cut off by fire or other hazardous conditions. As a result, the location and standards of property access roads should be carefully considered.

3.4.4 Fire trails

Fire trails are used as access for firefighters in operational situations, as fire containment lines and for APZ maintenance.

Fire trails are not required for compliance with PBP. A fire trail is not a substitute for a road, nor is it considered an appropriate trade-off for the provision of perimeter, non-perimeter or property road access requirements.

The RF Act pt.3B provides for the establishment, maintenance, protection, certification and registration of fire trails by the NSW RFS Commissioner outside of the DA process.



Where fire trails are incorporated into a development, they must be designed, constructed and maintained in accordance with the NSW RFS *Fire Trail Standards* and the NSW RFS *Fire Trail Design, Construction and Maintenance Manual* to ensure that firefighter safety is not compromised. The responsibility and mechanism for the ongoing management of the fire trail must be clearly identified within the DA. Where the responsibility for fire trail maintenance is placed on a third party, this must be subject to a written agreement from the third party in question.

Where a Registered Fire Trail exists on a property, the function and overall access through the landscape must be carefully considered. These trails have been identified by the local BFMC and are considered of strategic importance for fire access in the area. At the time of development, the NSW RFS will need to consider any impacts the proposed development will have on the current and/or proposed fire trail network.

Importantly, if a fire trail is adopted as part of a development design, it may not necessarily mean that it is a Strategic Fire Trail for the purposes of the NSW RFS *Fire Trail Standards*.

3.5 Water supply and utilities

An adequate supply of water is essential for firefighting purposes. In addition, gas and electricity should be located so as not to contribute to the risk of fire or impede the firefighting effort.

Suitable water supply arrangements shall be provided for firefighting that meet the NSW RFS requirements. It is essential to ensure that any water sources are maintained at the appropriate capacity (see Chapters 5-7).

Where a non-reticulated water supply is provided or the reticulated water supply is deemed inadequate, an additional on site stored supply of water for firefighting will be required. Non-reticulated water is a supply that is not piped by council or a water authority and includes rainwater, ground water or surface water.

From a firefighting point of view, any source of available water may be used during a bush fire event and tanks are not always the most practical option. In light of the above, and the increasing demand for sustainable and efficient use of our water resources, the NSW RFS prefers that water is solely dedicated for firefighting purposes. As such, water holding structures such as tanks, swimming pools and dams can be considered as long as they are accessible, reliable and adequate. Nevertheless, where a water supply is provided it must be available for the life time of the development.

Water capacities, access for firefighters (tanker or pedestrian) and the provision of appropriate connections must also be considered when determining if a proposed water source is suitable.

Where a Static Water Supply (SWS) is provided, a SWS sign should be installed in a visible location on the street front. Regular testing of firefighting equipment should also occur to ensure that it is maintained in working order.

3.6 Emergency management arrangements

SFPP developments are identified as being more vulnerable to the effects of bush fire. This is because the occupants may have a mental or physical impairment, may experience language difficulties, may be unaware of their surroundings or the bush fire risk and may be unable to self-evacuate.

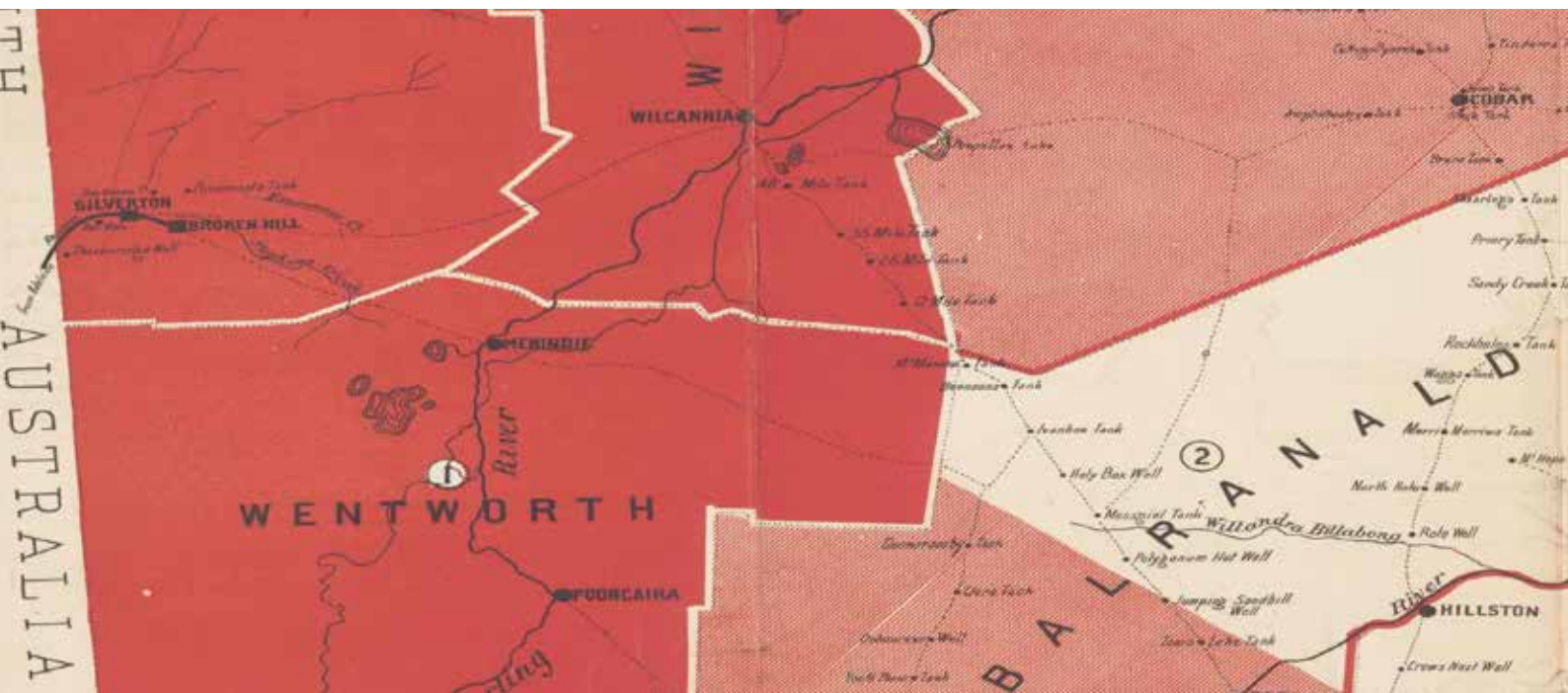
Due to their vulnerability, a higher degree of planning and emphasis on emergency management is required for all SFPP developments. It is imperative that emergency management arrangements are identified at the development planning phase for these developments. An indication of proposed emergency management arrangements should be provided with the DA. A Bush Fire Emergency Evacuation and Management Plan must be prepared for any SFPP development.

Emergency planning arrangements are not required for residential developments. However, anyone living in a bush fire prone area should prepare a Bush Fire Survival Plan, which is available on the NSW RFS website: www.rfs.nsw.gov.au.

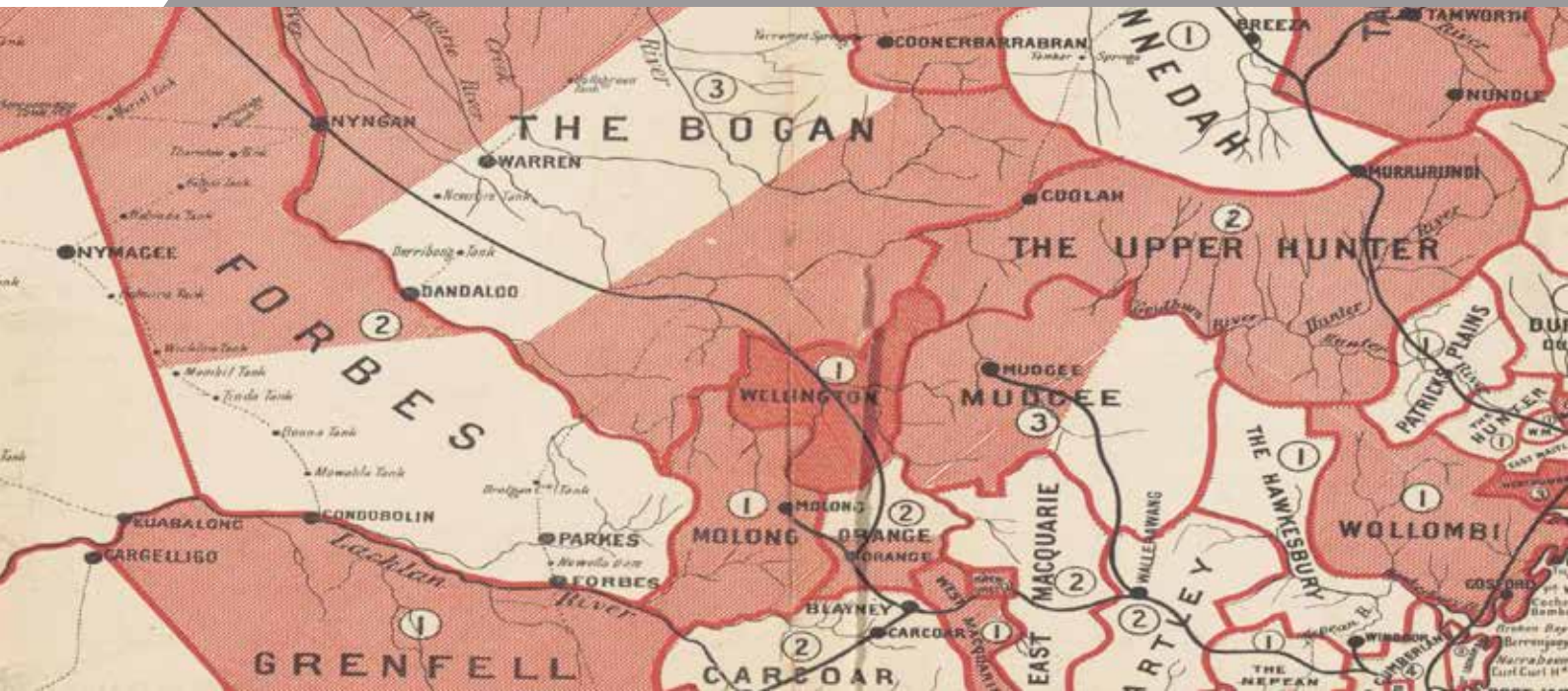
3.7 Landscaping

The type, location and ongoing maintenance of landscaping is considered a necessary BPM.

For information about appropriate landscaping, refer to the NSW RFS document *Standards for Asset Protection Zones*, from the NSW RFS website: www.rfs.nsw.gov.au. and Appendix 4 of this document.



4 STRATEGIC PLANNING



Strategic planning is the first stage in the planning process. It is needed to ensure that businesses and future development are not exposed to an unacceptable risk of bush fire.

The strategic planning phase includes state-level planning, regional planning, LEPs, DCPs and Masterplans or Precinct Plans.

4.1 Strategic principles

Strategic planning occurs at a state, regional and local government level. It often covers a large area, can include a number of different land uses, and establishes longer term development options.

Land use planning can be an effective tool in minimising or avoiding the impact of natural hazards such as bush fire. From a risk management perspective, the safest approach is always to avoid high risk areas. Local land use strategies and LEPs should consider and identify land affected by natural hazards and direct development away from inappropriate and constrained lands.

In a bush fire context, strategic planning must ensure that future land uses are in appropriate locations to minimise the risk to life and property from bush fire attack. Services and infrastructure that facilitate effective suppression of bush fires also need to be provided for at the earliest stages of planning.

The bush fire risk is considered at the macro-scale, looking at fire runs, steep slopes and any areas of isolation. The amount of proposed development interfacing vegetation will also be considered.

Firefighting access and evacuation potential must be considered and an assessment of traffic volumes and evacuation routes will be required. The potential for these evacuation routes to be non-trafficable during a bush fire event will be factored into the assessment.

Some specific locations have significant fire history and are recognised as known fire paths. These areas may require detailed analysis. The broad principles which apply to this analysis are:

- ensuring land is suitable for development in the context of bush fire risk;
- ensuring new development on BFPL will comply with PBP;
- minimising reliance on performance-based solutions;
- providing adequate infrastructure associated with emergency evacuation and firefighting operations; and
- facilitating appropriate ongoing land management practices.

Strategic planning should provide for the exclusion of inappropriate development in bush fire prone areas as follows:

- the development area is exposed to a high bush fire risk and should be avoided;
- the development is likely to be difficult to evacuate during a bush fire due to its siting in the landscape, access limitations, fire history and/or size and scale;
- the development will adversely effect other bush fire protection strategies or place existing development at increased risk;
- the development is within an area of high bush fire risk where density of existing development may cause evacuation issues for both existing and new occupants; and
- the development has environmental constraints to the area which cannot be overcome.

The relevant BPMs in Chapters 5-8 of this document are to be considered at the strategic planning stage to ensure that future development can comply with PBP.

4.2 Strategic planning in bush fire prone areas

Strategic development proposals in bush fire prone areas require the preparation of a Strategic Bush Fire Study. The level of information required for such a study will be dependent upon the nature of any planning instrument changes, scale of the proposal, the bush fire risk and its potential impact upon the wider infrastructure network. The Strategic Bush Fire Study provides the opportunity to assess whether new development is appropriate in the bush fire hazard context. It also provides the ability to assess the strategic implications of future development for bush fire mitigation and management.

A Strategic Bush Fire Study must include, as a minimum, the components in Table 4.2.1.

Once these strategic issues have been addressed, an assessment of whether the proposal can comply with this document should be carried out. If the strategic issues cannot be resolved then the proposal cannot comply with PBP and will not be supported by the NSW RFS.

Table 4.2.1

Bush Fire Strategic Study

ISSUE	DETAIL	ASSESSMENT CONSIDERATIONS
<p>Bush fire landscape assessment</p>	<p>A bush fire landscape assessment considers the likelihood of a bush fire, its potential severity and intensity and the potential impact on life and property in the context of the broader surrounding landscape.</p>	<ul style="list-style-type: none"> ➤ The bush fire hazard in the surrounding area, including: <ul style="list-style-type: none"> ➤ Vegetation ➤ Topography ➤ Weather ➤ The potential fire behaviour that might be generated based on the above; ➤ Any history of bush fire in the area; ➤ Potential fire runs into the site and the intensity of such fire runs; and ➤ The difficulty in accessing and suppressing a fire, the continuity of bush fire hazards or the fragmentation of landscape fuels and the complexity of the associated terrain.
<p>Land use assessment</p>	<p>The land use assessment will identify the most appropriate locations within the masterplan area or site layout for the proposed land uses.</p>	<ul style="list-style-type: none"> ➤ The risk profile of different areas of the development layout based on the above landscape study; ➤ The proposed land use zones and permitted uses; ➤ The most appropriate siting of different land uses based on risk profiles within the site (i.e. not locating development on ridge tops, SFPP development to be located in lower risk areas of the site); and ➤ The impact of the siting of these uses on APZ provision.
<p>Access and egress</p>	<p>A study of the existing and proposed road networks both within and external to the masterplan area or site layout.</p>	<ul style="list-style-type: none"> ➤ The capacity for the proposed road network to deal with evacuating residents and responding emergency services, based on the existing and proposed community profile; ➤ The location of key access routes and direction of travel; and ➤ The potential for development to be isolated in the event of a bush fire.
<p>Emergency services</p>	<p>An assessment of the future impact of new development on emergency services.</p>	<ul style="list-style-type: none"> ➤ Consideration of the increase in demand for emergency services responding to a bush fire emergency including the need for new stations/brigades; and ➤ Impact on the ability of emergency services to carry out fire suppression in a bush fire emergency.
<p>Infrastructure</p>	<p>An assessment of the issues associated with infrastructure and utilities.</p>	<ul style="list-style-type: none"> ➤ The ability of the reticulated water system to deal with a major bush fire event in terms of pressures, flows, and spacing of hydrants; and ➤ Life safety issues associated with fire and proximity to high voltage power lines, natural gas supply lines etc.
<p>Adjoining land</p>	<p>The impact of new development on adjoining landowners and their ability to undertake bush fire management.</p>	<ul style="list-style-type: none"> ➤ Consideration of the implications of a change in land use on adjoining land including increased pressure on BPMs through the implementation of Bush Fire Management Plans.

4.3 Regional strategies and plans

Regional strategies and plans are for specific areas or regions across NSW. They are prepared in partnership with state and local governments, communities and business. Regional strategies and plans set a clear direction for these future growth areas over the longer term.

These strategies and plans should incorporate the bush fire strategic planning principles set out in section 4.1 while having regard for the priorities of state and local governments in identifying appropriate areas for growth.

The NSW RFS is a key stakeholder and should be consulted in the development of regional strategies and plans to ensure that appropriate strategies are developed and future conflicts do not occur.

4.4 Local Environmental Plans (LEPs)

LEPs are legal planning documents that inform planning decisions for local government areas. Through land use zoning and development controls, they impose standards to control development. The planning controls within the LEP are updated and reviewed through the Gateway process, which includes the following steps:

- the preparation of a planning proposal;
- the issuing of a Gateway determination;
- community and other consultation on the planning proposal (as required);
- finalising the planning proposal;
- drafting of the LEP (legal instrument);
- making the plan; and
- notification of the LEP on the NSW Government Legislation website.

The planning controls within an LEP may be updated and reviewed through a planning proposal. A planning proposal explains the intended effect of an amendment to a LEP and provides the justification for making it. The level of information required in a planning proposal is proportionate to the complexity.

4.4.1 Consideration of bush fire Issues

When preparing a draft LEP or planning proposal, local councils are required to apply the EP&A Act s.9.1(2). Direction 4.4 *Planning for Bush Fire Protection* applies to planning proposals that affect, or are in close proximity to, land mapped as BFPL. Under these directions, draft LEPs should follow the below objectives:

- i. to protect life, property and the environment from bush fire, by discouraging the establishment of incompatible land uses in bush fire prone areas; and
- ii. to encourage sound management of bush fire prone areas.

Under Direction 4.4, a relevant authority must consult with the Commissioner of the NSW RFS during the preparation of a draft LEP and take into account any comments made. The draft LEP shall also have regard to PBP.

As part of the consultation process with the NSW RFS, a bush fire assessment is required to be submitted to demonstrate compliance with the s9.1(2) Directions and PBP. Where the proposal is of a strategic nature, this should take the form of a Strategic Bush Fire Study as outlined in section 4.2.

It is encouraged that key bush fire issues are identified early in the LEP process through consultation with the NSW RFS. Wherever possible, this should take place prior to the proposal being submitted to the Gateway process in order to identify key bush fire issues upfront.

Where an application for rezoning is for residential or SFPP development on BFPL, it shall include an indicative development layout. This enables an assessment of the suitability of the land for the proposed development given the bush fire risk and existing land uses. The proposal must demonstrate that the required APZs can be met on the development site and that the road network can support evacuation demands numbers in the event of an emergency. It is important that new development does not increase the level of bush fire risk to the existing community. A traffic report prepared by a suitably qualified traffic consultant may be required in circumstances where issues relating to access/ egress are identified.

In addition to the review of any layout designs, consideration must also be given to the LEP provisions relating to minimum lot sizes to ensure appropriate APZs can be accommodated within future subdivisions.

Careful consideration should be given to other critical infrastructure development, that may impact on or be effected by bush fire events.

4.5 Development Control Plans (DCP)

DCPs, prepared in accordance with the EP&A Act, are used to help achieve the objectives of the LEP by providing specific, comprehensive requirements for certain types of development or locations (e.g. for urban design or heritage precincts and properties).

Some DCP requirements may have implications for the provision of BPMs.

These items could include, but are not limited to:

- environmentally protected lands;
- landscaping;
- open space;
- vehicle access;
- parking;
- building design;
- secondary dwellings;
- dual and multiple occupancy; and
- site specific Masterplans.

When amendments are proposed to a DCP, an assessment of whether the amendments comply with, or may conflict with the requirements of PBP should be carried out. Consultation with the NSW RFS is recommended.

4.6 Masterplans and Precinct Plans

Masterplans and Precinct Plans combine written information, maps and diagrams to outline strategic plans or broad guideline for future development. Masterplanning provides an opportunity to undertake constraint mapping and identify BPMs in accordance with PBP at a larger regional level. Consultation with the NSW RFS should occur during the development of any Masterplan or Precinct Plan on BFPL with consideration given to fire history and the potential impacts from bush fire.



5 RESIDENTIAL AND RURAL RESIDENTIAL SUBDIVISIONS



For the purposes of this document, subdivision of land is the creation of lots for residential or rural residential purposes.

Where a new dwelling entitlement is created, it is important to ensure that appropriate BPMs are provided within the new allotment. This allows for protection measures to be fully incorporated at the design stage of development.

5.1 Background

Under the EP&A Act, subdivision is defined as the division of land into two or more parts that, after the division, would be adapted for separate occupation, use or disposition. The definition of the term subdivision in the EP&A Act also includes boundary adjustments.

A BFSA is required from the NSW RFS for subdivision on BFPL under RF Act. The RF Reg identifies certain subdivision types that are excluded from the requirement for a BFSA.

Subdivision can occur across a range of different forms such as residential, rural-residential and rural. Certain subdivisions may pose significant challenges from a planning and/or bush fire risk perspective and may require additional considerations.

The subdivision stage of land development provides an opportunity for early consideration of siting and access and for the incorporation of the appropriate combination of BPMs.

Re-vegetation or creation of riparian corridors as part of a subdivision development needs to be addressed in subdivision proposals. DCPs, Plans of Management and Vegetation Management Plans need to recognise the creation of potential future and unmapped BFPL. Vegetation regrowth or vegetation corridors may create issues for future development if bush fire risks are not assessed appropriately.

5.1.1 Isolated subdivision

Subdivision for the creation of isolated developments, particularly in rugged, heavily timbered country, poses significant challenges from a planning and/or bush fire risk perspective. Additional considerations for isolated subdivisions are provided in this section.

Where developments are located in isolated areas, occupants may need to travel large distances through bush fire prone vegetation, and firefighters may be hindered from providing assistance. For this reason, the conditions placed upon isolated developments reflect the need for occupants to be more self-sufficient in regards defending their properties.

Consideration should be given, where practical, to grouping of rural-residential buildings into clusters which allow for the establishment of APZs around a group of dwellings rather than having to ensure individual protection for a large number of scattered dwellings. The clustering of dwellings provides for better protection through consolidated vegetation management practices.

The NSW RFS has seen an increase in developments involving the subdivision of large rural blocks into smaller rural-residential allotments. In these circumstances, developers, designers and Consent Authorities need to be made aware that additional BPMs, such as those set out below, will be a requirement to allow for safer and appropriate outcomes for future occupants.

On days of catastrophic fire weather, the NSW RFS recommends leaving early as the only safe option.

Any proposal for this type of development that does not meet the acceptable solutions for subdivision will require the applicant to complete a performance based solution, which may include a BFDB.

To demonstrate the suitability of the proposed subdivision, the following provisions will need to be considered:

- access and egress within the developable land and along the adjoining public road system shall include safety provisions for attending emergency service vehicles and evacuating residents, including road widths and management of vegetation along road verges. Clearing or modifying vegetation in roadside verges of existing road reserves may not be permitted;
- subdivision design shall include perimeter roads separating developable lots from hazardous bushland areas. The objective of perimeter roads is to not only provide a fuel free area adjacent to the hazard but to also ensure suitable unrestricted access for firefighting and fire management purposes. Maintenance of perimeter roads shall be the responsibility of the cluster community;
- access for maintenance of APZ and other fuel management activities;
- larger APZs outside of the range prescribed in PBP and increased Bush Fire Attack Level (BAL) to proposed buildings to create a safer area for occupants and firefighters remaining on site; and
- firefighting water supply and associated firefighting equipment (i.e. pump and hose) for each dwelling in addition to any reticulated water supplies.

There are circumstances where increasing density on the site is just not acceptable given the bush fire risk.

5.1.2 Strata subdivision of existing buildings

A BFSA is required for the strata subdivision of a building except where a development consent has been granted in accordance with EP&A Act s. 4.14.

Consideration should be given as to whether the arrangement will lead to increased densities (see 8.2.1) and vulnerability of future residents.

Emergency planning is critical and should be implemented prior to formal adoption of the strata arrangements. The performance criteria within Chapter 5 of this document must be applied to the building. A property management plan should be prepared and upgrading for ember protection should be considered. Arrangements must be established in a Community Management Statement (e.g. body corporate by-laws) that addresses fire management strategies for the development and takes into account the following:

- continued management of APZs, water supplies and fire trails;
- a right of carriageway for fire management purposes;
- approved hazard reduction proposals that involve the land;
- consultation between the Strata Executive and the appropriate fire agency to confirm contact details and legalities involved with permissions for fire management works on the land together with any other community engagement advice for the occupants; and
- preparation of a Bush Fire Survival Plan for each household.

5.1.3 Existing dwellings

While all new dwellings within a subdivision must comply with PBP, there may be existing dwellings located on the land that would benefit from BPMs.

Conditions may therefore be applied to the subdivision consent requiring the existing structure to be upgraded to provide ember protection and water supplies for fire fighting.

Advice regarding the maintenance, upgrading and protection of existing buildings can be found on the NSW RFS website www.rfs.nsw.gov.au.

5.1.4 Subdivision in grassland hazard areas

The risk posed by grass fires is different to that of fires in other vegetation types. Grass fires burn at a higher intensity and spread more rapidly with a shorter residence time. Embers produced by grass fires are smaller and fewer in number than those produced from forest fires.

At residential subdivision stage, an assessment must be carried out to determine whether an APZ can be provided around the proposed development to avoid flame contact. Subdivision will not be supported where the development would be BAL-40 or BAL-FZ. The APZ distances identified in Tables A1.12.2 and A1.12.3 provide the acceptable solutions for meeting this threshold.

All of the other performance criteria and acceptable solutions within Tables 5.3a to 5.3d apply to residential and rural residential proposals in grassland hazard areas. Table 5.1.4a (see over) provides the relevant FFDI to utilise for grassland hazard areas.

5.1.5 Performance based subdivisions

Where subdivisions are proposed via performance based solutions, a legal mechanism must be created to ensure that further development is consistent with the approved subdivision.

Conditions of consent may require legal easements, BAL Plans and/or Plans of Management and specific bush fire requirements recorded on Section 10.7 Certificates. These issues will need to be addressed as part of the BFDB process for the subdivision.

Table 5.1.4a

Equivalent values for FFDI and GFDI

FOREST FIRE DANGER INDEX (FFDI)	GRASSLAND FIRE DANGER INDEX (GFDI)
50	70
80	110
100	130

5.2 Specific objectives

The specific objectives for residential and rural residential subdivisions with a dwelling entitlement are as follows:

- minimise perimeters of the subdivision exposed to the bush fire hazard (hourglass shapes, which maximise perimeters and create bottlenecks should be avoided);
- minimise vegetated corridors that permit the passage of bush fire towards buildings;
- provide for the siting of future dwellings away from ridge-tops and steep slopes, within saddles and narrow ridge crests;
- ensure that APZs between a bush fire hazard and future dwellings are effectively designed to address the relevant bush fire attack mechanisms;
- ensure the ongoing maintenance of APZs;
- provide adequate access from all properties to the wider road network for residents and emergency services;
- provide access to hazard vegetation to facilitate bush fire mitigation works and fire suppression; and
- ensure the provision of an adequate supply of water and other services to facilitate effective firefighting.

5.3 Bush fire protection measures

The BPMs for residential and rural residential subdivisions include measures relating to APZs, access to structures and water supply, fire trail access, and provision of water. Electricity and gas services should be provided so that they don't add to the bush fire risk to buildings.

All requirements for BPMs that relate to the development must be provided, unless where specific circumstances apply to render a BPM irrelevant (i.e. no landscaping required).

5.3.1 APZs

Intent of measures: to provide sufficient space and maintain reduced fuel loads to ensure radiant heat levels at the buildings are below critical limits and prevent direct flame contact.

Table 5.3a

Performance criteria and acceptable solutions for APZs for residential and rural residential subdivisions.

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
ASSET PROTECTION ZONES	<ul style="list-style-type: none"> potential building footprints must not be exposed to radiant heat levels exceeding 29 kW/m² on each proposed lot. 	<ul style="list-style-type: none"> APZs are provided in accordance with Tables A1.12.2 and A1.12.3 based on the FFDI.
	<ul style="list-style-type: none"> APZs are managed and maintained to prevent the spread of a fire towards the building. 	<ul style="list-style-type: none"> APZs are managed in accordance with the requirements of Appendix 4.
	<ul style="list-style-type: none"> the APZs is provided in perpetuity. 	<ul style="list-style-type: none"> APZs are wholly within the boundaries of the development site
	<ul style="list-style-type: none"> APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised. 	<ul style="list-style-type: none"> APZs are located on lands with a slope less than 18 degrees.
LANDSCAPING	<ul style="list-style-type: none"> landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions. 	<ul style="list-style-type: none"> landscaping is in accordance with Appendix 4; and fencing is constructed in accordance with section 7.6.

5.3.2 Access

Intent of measures: to provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area.

Table 5.3b

Performance criteria and acceptable solutions for access for residential and rural residential subdivisions.

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
The intent may be achieved where:	
<p>➤ firefighting vehicles are provided with safe, all-weather access to structures.</p>	<p>➤ property access roads are two-wheel drive, all-weather roads;</p> <p>➤ perimeter roads are provided for residential subdivisions of three or more allotments;</p> <p>➤ subdivisions of three or more allotments have more than one access in and out of the development;</p> <p>➤ traffic management devices are constructed to not prohibit access by emergency services vehicles;</p> <p>➤ maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient;</p> <p>➤ all roads are through roads;</p> <p>➤ dead end roads are not recommended, but if unavoidable, are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end;</p> <p>➤ where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road;</p> <p>➤ where access/egress can only be achieved through forest, woodland and heath vegetation, secondary access shall be provided to an alternate point on the existing public road system; and</p> <p>➤ one way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression.</p>
➤ the capacity of access roads is adequate for firefighting vehicles.	➤ the capacity of perimeter and non-perimeter road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges/causeways are to clearly indicate load rating.
➤ there is appropriate access to water supply.	<p>➤ hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression;</p> <p>➤ hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005 - <i>Fire hydrant installations System design, installation and commissioning</i>; and</p> <p>➤ there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.</p>

ACCESS (GENERAL REQUIREMENTS)

Table 5.3b *Continued*

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
PERIMETER ROADS	<ul style="list-style-type: none"> ➤ access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface. 	<ul style="list-style-type: none"> ➤ are two-way sealed roads; ➤ minimum 8m carriageway width kerb to kerb; ➤ parking is provided outside of the carriageway width; ➤ hydrants are located clear of parking areas; ➤ are through roads, and these are linked to the internal road system at an interval of no greater than 500m; ➤ curves of roads have a minimum inner radius of 6m; ➤ the maximum grade road is 15 degrees and average grade of not more than 10 degrees; ➤ the road crossfall does not exceed 3 degrees; and ➤ a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.
NON-PERIMETER ROADS	<ul style="list-style-type: none"> ➤ access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating. 	<ul style="list-style-type: none"> ➤ minimum 5.5m carriageway width kerb to kerb; ➤ parking is provided outside of the carriageway width; ➤ hydrants are located clear of parking areas; ➤ roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m; ➤ curves of roads have a minimum inner radius of 6m; ➤ the road crossfall does not exceed 3 degrees; and ➤ a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.

Table 5.3b *Continued*

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
<p>The intent may be achieved where:</p> <p>PROPERTY ACCESS</p> <ul style="list-style-type: none"> ➤ firefighting vehicles can access the dwelling and exit the property safely. 	<ul style="list-style-type: none"> ➤ There are no specific access requirements in an urban area where an unobstructed path (no greater than 70m) is provided between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles. <p>In circumstances where this cannot occur, the following requirements apply:</p> <ul style="list-style-type: none"> ➤ minimum 4m carriageway width; ➤ in forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m at the passing bay; ➤ a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; ➤ provide a suitable turning area in accordance with Appendix 3; ➤ curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress; ➤ the minimum distance between inner and outer curves is 6m; ➤ the crossfall is not more than 10 degrees; ➤ maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads; and ➤ a development comprising more than three dwellings has access by dedication of a road and not by right of way. <p>Note: Some short constrictions in the access may be accepted where they are not less than 3.5m wide, extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also apply to community style development property access roads in addition to the above.</p>

5.3.3 Services – Water, electricity and gas

Intent of measures: to provide adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building.

Table 5.3c

Performance criteria and acceptable solutions for water, electricity and gas services for residential and rural residential subdivisions.

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
WATER SUPPLIES	<ul style="list-style-type: none"> ➤ adequate water supplies is provided for firefighting purposes. 	<ul style="list-style-type: none"> ➤ reticulated water is to be provided to the development where available; ➤ a static water and hydrant supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed; and ➤ static water supplies shall comply with Table 5.3d.
	<ul style="list-style-type: none"> ➤ water supplies are located at regular intervals; and ➤ the water supply is accessible and reliable for firefighting operations. 	<ul style="list-style-type: none"> ➤ fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2005; ➤ hydrants are not located within any road carriageway; and ➤ reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.
	<ul style="list-style-type: none"> ➤ flows and pressure are appropriate. 	<ul style="list-style-type: none"> ➤ fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005.
	<ul style="list-style-type: none"> ➤ the integrity of the water supply is maintained. 	<ul style="list-style-type: none"> ➤ all above-ground water service pipes are metal, including and up to any taps; and ➤ above-ground water storage tanks shall be of concrete or metal.
ELECTRICITY SERVICES	<ul style="list-style-type: none"> ➤ location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings. 	<ul style="list-style-type: none"> ➤ where practicable, electrical transmission lines are underground; ➤ where overhead, electrical transmission lines are proposed as follows: <ul style="list-style-type: none"> ➤ lines are installed with short pole spacing of 30m, unless crossing gullies, gorges or riparian areas; and ➤ no part of a tree is closer to a power line than the distance set out in <i>ISSC3 Guideline for Managing Vegetation Near Power Lines</i>.
GAS SERVICES	<ul style="list-style-type: none"> ➤ location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings. 	<ul style="list-style-type: none"> ➤ reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 - <i>The storage and handling of LP Gas</i>, the requirements of relevant authorities, and metal piping is used; ➤ all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side; ➤ connections to and from gas cylinders are metal; ➤ polymer-sheathed flexible gas supply lines are not used; and ➤ above-ground gas service pipes are metal, including and up to any outlets.

Table 5.3d

Water supply requirements for non-reticulated developments or where reticulated water supply cannot be guaranteed.

DEVELOPMENT TYPE	WATER REQUIREMENTS
Residential lots (<1,000m ²)	5,000L/lot
Rural-residential lots (1,000-10,000m ²)	10,000L/lot
Large rural/lifestyle lots (>10,000m ²)	20,000L/lot
Multi-dwelling housing (including dual occupancies)	5,000L/dwelling

6 SPECIAL FIRE PROTECTION PURPOSE DEVELOPMENTS



An SFPP development is one which is occupied by people who are considered to be at-risk members of the community. In a bush fire event, these occupants may be more susceptible to the impacts of bush fire.

Evacuating at-risk members of the community is more challenging because they may be physically or psychologically less able to relocate themselves or are unfamiliar with their surroundings.

Examples of SFPP developments are schools, hospitals, nursing homes and tourist accommodation.

6.1 Introduction

Under RF Act s.100B, a BFSA from the NSW RFS is required for SFPP development. As such, an Integrated Development approval may be required under of the EP&A Act s.4.46.

The specific development types which are considered as SFPP development are listed within the RF Act. The RF Reg also details specific development types which are either excluded from the requirement for a BFSA or are considered as additional SFPP developments for which a BFSA is required.

The nature of SFPP developments means that occupants may be more vulnerable to bush fire attack for one or more of the following reasons:

- they may be less aware in relation to bush fire impacts;
- they may have reduced capacity to evaluate risk and respond adequately to the bush fire threat;
- they may present operational difficulties for evacuation and or management;
- they may be more vulnerable to stress and anxiety arising from bush fire threat and smoke;
- there may be significant communication barriers;
- supervision during a bush fire may be difficult; and
- they may be unfamiliar with the area.

The specific objectives, performance criteria and acceptable solutions for SFPP developments as defined by the RF Act and RF Reg are given in sections 6.2 to 6.8 of this document.

Different vulnerability characteristics have been identified for certain developments which are classified as SFPP under the RF Act and RF Reg. Varied performance criteria and acceptable solutions are identified for these particular uses in section 6.3. These SFPP developments may not be provided for in Table A1.12.1 and will need to be assessed on a performance basis on their own merits.

6.2 Specific objectives

Due to the vulnerable nature of the occupants of SFPP developments, there is more reliance on the provision of an APZ and emergency management.

The specific objectives for SFPP developments are to:

- minimise levels of radiant heat, localised smoke and ember attack through increased APZ, building design and siting;
- provide an appropriate operational environment for emergency service personnel during firefighting and emergency management;
- ensure the capacity of existing infrastructure (such as roads and utilities) can accommodate the increase in demand during emergencies as a result of the development; and
- ensure emergency evacuation procedures and management which provides for the special characteristics and needs of occupants.

The intent and performance criteria within the tables in section 6.8 must be satisfied for SFPP development.

6.3 Objectives for specific uses

Particular SFPP developments demonstrate different characteristics and may require different levels of protection. As such, tailored objectives are specified for these development types, though a BFSAs is still required under RF Act s.100B.

Typically, reasons for setting tailored objectives include, but are not limited to:

- lower occupancy levels;
- the presence of a resident/manager on site, thereby improving the potential for informed emergency evacuation decisions; and
- construction under AS 3959 or NASH Standard may be impractical (i.e. tents and caravans).

Varied performance criteria and acceptable solutions are given for specific types of SFPP development in Tables 6.8a to 6.8d.

Although construction levels or APZ requirements differ, it is imperative that water provision, emergency management and access provisions are provided commensurate with occupancy levels, assessed level of risk and characteristics of occupants.

The following commentary outlines particular matters for consideration for specific types of lower risk SFPP developments.

6.3.1 Specific tourism uses

Some SFPP development is occupied on a short-term basis by people who are unaware of their surroundings and the appropriate procedure to follow in the event of a bush fire. Short-term accommodation (six weeks or less) must meet the varied performance criteria in Tables 6.8a to 6.8d.

The NSW RFS defines long-term accommodation as exceeding six weeks in duration and considers that long-term occupants will be familiar with their surrounds, safe refuge areas and evacuation routes. As such, long-term accommodation may be treated as standard residential development and therefore needs to meet a radiant heat threshold of 29kW/m².

- **Caravan parks** – Standard type caravans and motor homes used for short-term tourist accommodation generally cannot achieve any level of construction under AS 3959 or NASH Standard. The emphasis is therefore placed on APZs and emergency management, with consideration given to leaving early and non-operation on days of elevated bush fire danger.

- **Camping** – No construction requirements for tents are provided in AS 3959 or NASH Standard. Camping is permissible within the APZ of a caravan or tourist park, provided the other relevant BPMs (e.g. emergency management arrangements) are in place. Careful consideration should be given to the suitability of camping in bush fire prone areas on days of elevated bush fire danger.

- **Primitive camping** – Primitive camping is generally more remote from urban areas, and is defined as having only a limited range of facilities. This is covered by the *Local Government (Manufactured Home Estates, Caravan Parks, Camping Grounds and Moveable Dwellings) Regulation 2005*. The NSW RFS discourages the use of primitive camp grounds in high risk and isolated bush fire prone areas during periods of elevated bush fire danger.

- **Bed and breakfast and farmstay accommodation** It is assumed that there is a manager on site who is aware of the bush fire risk and appropriate emergency response procedures and due to the low occupancy rates, the resources and time required for emergency evacuation are reduced. The potential for informed emergency evacuation decisions is therefore improved. As such, the setback and construction requirements of BAL-29 can be applied.

- **Holiday Lets** - Where a building is proposed to be used as a holiday let in an area with reticulated water, it does not back onto public reserves, and the setback and construction requirements of BAL-29 can be applied, they should be treated as a residential infill arrangement. Alternatively, a performance based solution will be required demonstrating adequate levels of bush fire safety before such a proposal can be supported by the NSW RFS.

- **Ecotourism** – Due to its focus on the natural environment and creating minimal impact, the principles of ecotourism and the establishment of APZs for bush fire mitigation are often in conflict. All relevant parties must accept that there is an increase for the potential for loss of structures due to the competing objectives to reduce the environmental footprints of these types of developments. The emphasis is therefore placed on emergency management, leaving early and non-operation on days of extreme or catastrophic fire weather.

At least one building must be provided on site that can be used as a refuge for the maximum number of occupants on site. The building must have a minimum 10kW/m² APZ, be constructed to BAL-12.5 and have vehicular access. Cabins must be within a 100m walking distance of the refuge building.

6.3.2 Specific residential-based SFPP

- **Manufactured home estates** – Manufactured housing can be built to achieve all levels of construction required under the NCC. However, SEPP 36—*Manufactured Home Estates* does not require a separate development consent for each manufactured home after development consent is given for the estate.

Due to the nature of manufactured home estates, there is no mechanism within the development consent process to ensure that the dwellings will be constructed to the standards applied within AS 3959 or NASH Standard. Therefore, the acceptable solution for manufactured housing is the provision of an APZ which achieves 10kW/m² commensurate with SFPP development in line with Table A1.12.1.

Where evidence can be provided which confirms that dwellings within the manufactured home estate will be constructed to the appropriate construction standards under AS 3959 or NASH Standard, an APZ can be provided which meets 29kW/m² in line with Tables A1.12.2 - A1.12.3.

- **Home based child care** - Due to their residential setting and lower occupant numbers, this use is not considered to be a SFPP. The specific standards for home-based child care can be found in Chapter 7. It should be noted that there are other forms of child care which are considered to be SFPP development, including centre based child care and school based child care.
- **Tertiary institutions** - Tertiary institutions such as universities and TAFEs may accommodate large numbers of people with various physical capabilities.

Where the university or TAFE includes accommodation, the residential component is SFPP.

Other uses in tertiary institutions may not be defined as SFPP by the RF Reg but require approval under the EP&A Act s4.14. This may include assembly occupancies (see Chapter 8).

6.4 Development of existing SFPP facilities

In circumstances where new building projects within existing SFPP developments are proposed, an appropriate combination of BPMs are required.

This will involve the BFDB process where relevant stakeholders agree on the basis for any assessment and measures that will result in a better bush fire

outcome for the proposal. The NSW RFS should be consulted early in the design stage. Refer to Appendix 2 for more detailed information on the BFDB process.

The intention for any building work occurring within an existing SFPP development is to achieve a better bush fire outcome than if the development did not proceed. Achieving this may require a combination of measures including improved construction standards, APZs and evacuation management. This may result in a level of retrofitting of existing buildings and managing other portions of the site (i.e. APZs) to ensure an improved level of bush fire protection.

Intensification of the use or increase in occupancy must consider the risk to occupants and firefighters. Where practically achievable, full compliance should be provided before variations to the required BPMs are considered. Proposals that involve internal alterations only, are not subject to any specific requirements unless the proposal results in a change of use, re-purpose and/or involves an increase in occupants.

Existing SFPP facilities constructed without the benefit of current bush fire requirements need to consider providing a designated safe refuge building to accommodate all occupants. The safe refuge shall provide a radiant heat threshold of no greater than 10kW/m² and a minimum BAL-12.5 construction.

Existing services such as water supplies and access may also require upgrading.

Existing structures located within an APZ may be problematic for a new building due to the potential risk of building to building fire spread. Where this occurs, a performance based solution will be required to provide a safer outcome.

A Bush Fire Emergency Management Plan that is consistent with the NSW RFS publication: *A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan*, and the Australian Standard AS 3745:2010 *Planning for emergencies in facilities* will be required to be prepared for the existing facility.

The objectives that apply to existing SFPP development are as follows:

- provide an appropriate defensible space;
- site the building in a location which ensures appropriate separation from the hazard to minimise potential for material ignition;
- provide a better bush fire protection outcome for existing buildings;

- new buildings should be located as far from the hazard as possible and should not be extended towards or situated closer to the hazard than the existing buildings (unless they can comply with section 6.8);
- ensure there is no increase in bush fire management and maintenance responsibility on adjoining land owners without their written confirmation;
- ensure building design and construction enhances the chances of occupant and building survival; and
- provide for safe emergency evacuation procedures including capacity of existing infrastructure (such as roads).

6.5 Minor development in SFPP facilities

Minor development includes the following:

- Internal works;
- Flag poles;
- Aerials and antennas;
- Satellite dishes;
- Paved areas;
- Earth works and draining;
- Class 10a structures located further than 6m from a habitable building; and
- Minor non-structural building alterations (external) such as the following:
 - painting, plastering, cement rendering, cladding, attaching fittings or decorative work;
 - the replacement of an external window, glazing areas or a door (however, the opening and/or external glazed area of the window or door must not be increased in size);
 - the repair to or replacement of a non-structural wall or roof cladding;
 - the installation of a security screen or grill to a door or window or a security door;
 - the repair to or replacement of a balustrade; and
 - re-stumping or repairing structure foundations without increasing the height of the structure.

The development types listed above do not have any influence on potential bush fire impacts and the bush fire protection of the building. For this reason, the NSW RFS does not consider that a BFSAs is necessary for the development types listed above. Wherever applicable, the building elements concerned will need to comply with the requirements of AS 3959 or NASH Standard under the NCC.

6.6 Alpine resorts

Alpine resorts are located within the Kosciuszko National Park and include:

- Thredbo;
- Perisher – including Perisher, Smiggin Holes, Mount Blue Cow and Guthega;
- Charlotte Pass;
- Selwyn Snow Resort;
- Ski Rider Hotel;
- Kosciuszko Tourist Park;
- Sponars Chalet; and
- Bullocks Flat Terminal.

The alpine resorts are located within the environmentally significant setting of the Kosciuszko National Park. The alpine resort areas are predominantly used for short-term tourist accommodation and are considered to be SFPP development. Much of the existing building stock has not been constructed to current requirements for development in a bush fire prone area.

Leasehold arrangements combined with conflicting land management objectives present challenges in achieving APZs for SFPP developments in the alpine areas.

The specific objectives that apply to SFPP infill development in the alpine resort areas are as follows:

- provide an appropriate defensible space;
- provide a better bush fire protection outcome for existing structures (e.g. via ember protection measures);
- ensure new building work complies with the construction standards set out in AS 3959;
- to ensure ongoing management and maintenance responsibilities are in place where APZs are proposed outside of the sub lease or leasehold area;
- written consent from the land managers is provided for all proposed works outside of the sub lease or leasehold area;
- proposed APZs outside of the sub lease or leasehold area are supported by a suitable legal mechanism to ensure APZs are managed under a binding legal agreement in perpetuity;
- ensure building design and construction standards enhance the chances of occupant and building survival; and

- 
- provide safe emergency evacuation procedures.

Any additional construction requirements should be commensurate with the following:

- the scope of the proposed works, including any increase in size and footprint of the building;
- any additional capacity for the accommodation of guests and/or staff on site; and
- the cost associated with the proposed upgrade of any building.

The NSW RFS has an expectation that a better bush fire outcome is achieved where new development is proposed in association with existing facilities.

As the bulk of existing structures in alpine areas are not constructed to appropriate bush fire standards, longer term plans should be developed to pro-actively enhance the overall bush fire protection.

6.7 SFPP developments in grassland areas

A Grassland Fire Danger Index (GFDI) is one of the factors used to calculate APZ distances for SFPP development in grassland hazard areas. The APZ values for SFPP development in grassland hazard areas are shown in Table A1.12.1 in Appendix 1.

6.8 Bush fire protection measures

The BPMs for SFPP developments should be provided to minimise the risk of fire spread to buildings and take into account the increased vulnerability of the occupants.

6.8.1 APZs and building construction

Intent of measures: to provide suitable building design, construction and sufficient space to ensure that radiant heat levels do not exceed critical limits for firefighters and other emergency services personnel undertaking operations, including supporting or evacuating occupants.

Table 6.8a

Performance criteria and acceptable solutions for APZs and construction for SFPP development.

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
ASSET PROTECTION ZONES	<ul style="list-style-type: none"> radiant heat levels of greater than 10kW/m² (calculated at 1200K) will not be experienced on any part of the building. 	<ul style="list-style-type: none"> the building is provided with an APZ in accordance with Table A1.12.1 in Appendix 1.
	<ul style="list-style-type: none"> APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised. 	<ul style="list-style-type: none"> APZs are located on lands with a slope less than 18 degrees.
	<ul style="list-style-type: none"> APZs are managed and maintained to prevent the spread of fire to the building. 	<ul style="list-style-type: none"> the APZ is managed in accordance with the requirements of Appendix 4 of this document, and is wholly within the boundaries of the development site;
	<ul style="list-style-type: none"> the APZ is provided in perpetuity. 	<ul style="list-style-type: none"> APZ are wholly within the boundaries of the development site; and other structures located within the APZ need to be located further than 6m from the refuge building.
	VARIATIONS	
	<p>Camping and primitive camping: no performance criteria applicable.</p>	<ul style="list-style-type: none"> N/A.
	<p>Bed and breakfast and farmstay: the building will not be exposed to radiant heat levels exceeding 29kW/m² (1090K).</p>	<ul style="list-style-type: none"> an APZ is provided in accordance with Tables A1.12.2 or A1.12.3 in Appendix 1 of this document around the entire building or structure.
	<p>Ecotourism: radiant heat levels of greater than 10kW/m² (1200K) are not experienced by emergency service personnel and occupants during firefighting and emergency management around a building on site that can be used as a refuge.</p>	<ul style="list-style-type: none"> an APZ is provided in accordance with Table A1.12.1 in Appendix 1 of this document around the entire refuge building or structure.
	<p>Manufactured home estates: APZs achieve radiant heat levels that are commensurate with the construction standard for the proposed dwellings.</p>	<ul style="list-style-type: none"> an APZ in accordance with Table A1.12.1 in Appendix 1 of this document is provided to all new dwellings; or an APZ in accordance with Table A1.12.2 or A1.12.3 in Appendix 1 of this document is provided where it is demonstrated that all new dwellings will be constructed in accordance with BAL-29.

Table 6.8a *Continued*

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
LANDSCAPING	<ul style="list-style-type: none"> ➤ landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions. 	<ul style="list-style-type: none"> ➤ landscaping is in accordance with Appendix 4; and ➤ fencing is constructed in accordance with section 7.6.
	<ul style="list-style-type: none"> ➤ the proposed building can withstand bush fire attack in the form of wind, embers, radiant heat and flame contact. 	<ul style="list-style-type: none"> ➤ a construction level of BAL-12.5 under AS 3959 or NASH Standard and section 7.5 of PBP is applied.
	VARIATIONS	
CONSTRUCTION STANDARDS	<p>Camping and primitive camping: no performance criteria applicable.</p>	<ul style="list-style-type: none"> ➤ N/A.
	<p>Bed and breakfast and farmstay: the proposed building can withstand bush fire attack in the form of wind, embers, radiant heat and flame contact.</p>	<ul style="list-style-type: none"> ➤ construction is applied in accordance with Appendix 1 of PBP.
	<p>Ecotourism: the proposed refuge building can withstand bush fire attack in the form of wind, embers, radiant heat and flame contact.</p>	<ul style="list-style-type: none"> ➤ a construction level of BAL-12.5 or greater is applied to the refuge building in accordance with AS 3959 or NASH Standard and 7.5 of PBP.
	<p>Manufactured home estates: the proposed manufactured home can withstand bush fire attack in the form of wind, embers, radiant heat and flame contact.</p>	<ul style="list-style-type: none"> ➤ Where an APZ is provided in accordance with Table A1.12.1 in Appendix 1 of this document the construction standards for BAL-12.5 shall apply; or ➤ Where an APZ is provided in accordance with Table A1.12.2 or A1.12.3 in Appendix 1 of this document the construction standards for BAL-29 shall apply.
	<p>Ecotourism</p> <p>occupants of the ecotourism facility are provided with appropriate shelter in the event of a bush fire.</p>	<ul style="list-style-type: none"> ➤ a refuge building is provided; ➤ the refuge building must have sufficient space for all occupants and comply with the occupancy levels permissible for that structure; and ➤ the refuge building must be constructed to BAL-12.5 or greater in accordance with AS 3959 or NASH Standard and 7.5 of PBP.

All APZ modelling for the purposes of SFPP development is based on a flame temperature of 1200 Kelvin (K).

6.8.2 Access

Intent of measures: to provide safe operational access for emergency services personnel in suppressing a bush fire, while residents are accessing or egressing an area.

Table 6.8b

Performance criteria and acceptable solutions for access for SFPP development.

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
ACCESS	<ul style="list-style-type: none"> ➤ firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation. 	<ul style="list-style-type: none"> ➤ SFPP access roads are two-wheel drive, all-weather roads; ➤ access is provided to all structures; ➤ traffic management devices are constructed to not prohibit access by emergency services vehicles; ➤ access roads must provide suitable turning areas in accordance with Appendix 3; and ➤ one way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression.
	VARIATIONS	
	<p>Primitive camping: Firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation.</p>	<ul style="list-style-type: none"> ➤ access is provided in accordance with the property access requirements of Table 5.3b.
	<p>Bed and breakfast and farmstay: Firefighting vehicles are provided with safe, all-weather access to structures.</p>	<ul style="list-style-type: none"> ➤ access is provided in accordance with the property access requirements of Table 5.3b.
	<p>Ecotourism: fire fighting vehicles are provided with safe, all-weather access to the proposed refuge building.</p>	<ul style="list-style-type: none"> ➤ vehicular access is provided to the refuge building from a public road in accordance with property access requirements of Table 5.3b; ➤ accommodation is within 100m of the refuge building; and ➤ pedestrian paths from accommodation to the refuge building/s are provided and clearly signposted.
<ul style="list-style-type: none"> ➤ the capacity of access roads is adequate for firefighting vehicles. 	<ul style="list-style-type: none"> ➤ the capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges and causeways are to clearly indicate load rating. 	
<ul style="list-style-type: none"> ➤ there is appropriate access to water supply. 	<ul style="list-style-type: none"> ➤ hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression; ➤ hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005; and ➤ there is suitable access for a Category 1 fire appliances to within 4m of the static water supply where no reticulated supply is available. 	

Table 6.8b *Continued*

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
PERIMETER ROADS	<ul style="list-style-type: none"> ➤ perimeter access roads are designed to allow safe access and egress for firefighting vehicles while occupants are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface. 	<ul style="list-style-type: none"> ➤ there are two-way sealed roads; ➤ minimum 8m carriageway width kerb to kerb; ➤ parking is provided outside of the carriageway width; ➤ hydrants are to be located clear of parking areas; ➤ there are through roads, and these are linked to the internal road system at an interval of no greater than 500m; ➤ curves of roads have a minimum inner radius of 6m; ➤ the maximum grade road is 15 degrees and average grade of not more than 10 degrees; ➤ the road crossfall does not exceed 3 degrees; and ➤ a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.
NON-PERIMETER ROADS	<ul style="list-style-type: none"> ➤ non-perimeter access roads are designed to allow safe access and egress for firefighting vehicles while occupants are evacuating. 	<ul style="list-style-type: none"> ➤ minimum 5.5m carriageway width kerb to kerb; ➤ parking is provided outside of the carriageway width; ➤ hydrants are located clear of parking areas; ➤ there are through roads, and these are linked to the internal road system at an interval of no greater than 500m; ➤ curves of roads have a minimum inner radius of 6m; ➤ the maximum grade road is 15 degrees and average grade of not more than 10 degrees; ➤ the road crossfall does not exceed 3 degrees; and ➤ a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.

6.8.3 Services – Water, gas and electricity

Intent of measures: to provide adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building.

Table 6.8c

Performance criteria and acceptable solutions for water, electricity and gas services for SFPP development.

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
	<ul style="list-style-type: none"> ➤ an adequate water supply for firefighting purposes is installed and maintained. 	<ul style="list-style-type: none"> ➤ reticulated water is to be provided to the development, where available; or ➤ a 10,000 litres minimum static water supply for firefighting purposes is provided for each occupied building where no reticulated water is available.
	VARIATIONS	
	<p>Caravan and camping grounds: an adequate water supply for firefighting purposes is installed and maintained.</p> <p>Primitive camping: an adequate water supply for firefighting purposes is installed and maintained.</p>	<ul style="list-style-type: none"> ➤ either a reticulated water supply is provided or a 10,000 litres minimum water supply on site.
	<ul style="list-style-type: none"> ➤ water supplies are located at regular intervals. ➤ the water supply is accessible and reliable for firefighting operations. 	<ul style="list-style-type: none"> ➤ fire hydrant spacing, design and sizing comply with the relevant clauses of AS 2419.1:2005; ➤ hydrants are not located within any road carriageway; and ➤ reticulated water supply to SFPPs uses a ring main system for areas with perimeter roads.
WATER SUPPLY	<ul style="list-style-type: none"> ➤ flows and pressure are appropriate. 	<ul style="list-style-type: none"> ➤ fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005.
	<ul style="list-style-type: none"> ➤ the integrity of the water supply is maintained. 	<ul style="list-style-type: none"> ➤ all above-ground water service pipes external to the building are metal, including and up to any taps.
	<ul style="list-style-type: none"> ➤ water supplies are adequate in areas where reticulated water is not available. 	<ul style="list-style-type: none"> ➤ a connection for firefighting purposes is located within the IPA or non hazard side and away from the structure; a 65mm Storz outlet with a ball valve is fitted to the outlet; ➤ ball valve and pipes are adequate for water flow and are metal; ➤ supply pipes from tank to ball valve have the same bore size to ensure flow volume; ➤ underground tanks have an access hole of 200mm to allow tankers to refill direct from the tank; ➤ a hardened ground surface for truck access is supplied within 4m of the access hole; ➤ above-ground tanks are manufactured from concrete or metal; ➤ raised tanks have their stands constructed from non-combustible material or bush fire-resisting timber (see Appendix F AS 3959); ➤ unobstructed access is provided at all times; ➤ tanks on the hazard side of a building are provided with adequate shielding for the protection of firefighters; and ➤ underground tanks are clearly marked,

Table 6.8c *Continued*

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
	<i>(continued from previous page)</i>	
WATER SUPPLIES	<ul style="list-style-type: none"> ➤ water supplies are adequate in areas where reticulated water is not available. 	<ul style="list-style-type: none"> ➤ all exposed water pipes external to the building are metal, including any fittings; ➤ where pumps are provided, they are a minimum 5hp or 3kW petrol or diesel-powered pump, and are shielded against bush fire attack; Any hose and reel for firefighting connected to the pump shall be 19mm internal diameter; and ➤ fire hose reels are constructed in accordance with AS/NZS 1221:1997 <i>Fire hose reels</i>, and installed in accordance with the relevant clauses of AS 2441:2005 <i>Installation of fire hose reels</i>.
ELECTRICITY SERVICES	<ul style="list-style-type: none"> ➤ location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings. 	<ul style="list-style-type: none"> ➤ where practicable, electrical transmission lines are underground; ➤ where overhead, electrical transmission lines are proposed as follow: <ul style="list-style-type: none"> ➤ lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas; and ➤ no part of a tree is closer to a power line than the distance set out in accordance with the specifications in ISSC3 <i>Guideline for Managing Vegetation Near Power Lines</i>.
GAS SERVICES	<ul style="list-style-type: none"> ➤ location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings. 	<ul style="list-style-type: none"> ➤ reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used; ➤ all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side; ➤ connections to and from gas cylinders are metal; ➤ if gas cylinders need to be kept close to the building, safety valves are directed away from the building and at least 2m away from any combustible material, so they do not act as a catalyst to combustion; ➤ polymer-sheathed flexible gas supply lines to gas meters adjacent to buildings are not to be used; and ➤ above-ground gas service pipes external to the building are metal, including and up to any outlets.

6.8.4 Emergency management planning

Intent of measures: to provide suitable emergency and evacuation arrangements for occupants of SFPP developments.

Table 6.8d

Performance criteria and acceptable solutions for emergency management plans for SFPP development.

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
<p>The intent may be achieved where:</p> <ul style="list-style-type: none"> ➤ a Bush Fire Emergency Management and Evacuation Plan is prepared. 	<ul style="list-style-type: none"> ➤ Bush Fire Emergency Management and Evacuation Plan is prepared consistent with the: <ul style="list-style-type: none"> ➤ The NSW RFS document: <i>A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan</i>; ➤ <i>NSW RFS Schools Program Guide</i>; ➤ Australian Standard AS 3745:2010 <i>Planning for emergencies in facilities</i>; and ➤ Australian Standard AS 4083:2010 <i>Planning for emergencies - Health care facilities</i> (where applicable). ➤ the Bush Fire Emergency Management and Evacuation Plan should include planning for the early relocation of occupants. <p>Note: A copy of the Bush Fire Emergency Management and Evacuation Plan should be provided to the Local Emergency Management Committee for its information prior to occupation of the development.</p>
<p>VARIATIONS</p>	
<p>EMERGENCY MANAGEMENT</p> <p>Caravan and camping grounds: a Bush Fire Emergency Management and Evacuation Plan is prepared.</p> <p>Primitive camping: a Bush Fire Emergency Management and Evacuation Plan is prepared.</p> <p>Ecotourism: a Bush Fire Emergency Management and Evacuation Plan is prepared.</p>	<ul style="list-style-type: none"> ➤ a Bush Fire Emergency Management and Evacuation Plan is prepared consistent with the NSW RFS document: <i>A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan</i>, and AS 3745:2010; ➤ for proposals in isolated or remote areas which involve large travel distances through bush fire prone vegetation, the following issues should be determined and addressed: <ul style="list-style-type: none"> ➤ the amount of travel likely to be generated during an emergency evacuation; ➤ the capacity of the broader road network to facilitate safe emergency evacuation; ➤ limitations/constraints inherent in the road system; and ➤ management of potential traffic conflicts (such as emergency vehicles versus evacuating members of the public). ➤ the Bush Fire Emergency Management and Evacuation Plan must consider a mechanism for the early relocation of occupants on days when adverse fire weather is notified or adverse fire activity occurs in the local government area in which the development operates. <p>Note: A copy of the Bush Fire Emergency Management and Evacuation Plan shall be provided to the Local Emergency Management Committee for its information prior to occupation of the development.</p>
<ul style="list-style-type: none"> ➤ appropriate and adequate management arrangements are established for consultation and implementation of the Bush Fire Emergency Management and Evacuation Plan. 	<ul style="list-style-type: none"> ➤ an Emergency Planning Committee is established to consult with residents (and their families in the case of aged care accommodation and schools) and staff in developing and implementing an Emergency Procedures Manual; and ➤ detailed plans of all emergency assembly areas including on site and off-site arrangements as stated in AS 3745:2010 are clearly displayed, and an annually emergency evacuation is conducted.



7 RESIDENTIAL INFILL DEVELOPMENT



Residential infill development refers to the development of land by the erection of, alteration or addition to, a dwelling which does not require the spatial extension of services including public roads, electricity, water or sewerage and is within an existing lot.

7.1 Introduction

The requirement to address BPMs for new development was introduced on 1 August 2002. Development approved before this time may not provide BPMs in accordance with this document.

Under EP&A Act s4.14, all development on BFPL must comply with PBP. The consent authority must be satisfied that the development conforms to PBP, if not it must consult with the Commissioner of the NSW RFS. Infill developments will be considered in accordance with the acceptable solutions and performance criteria specified in section 7.4.

For other types of residential development, including dual occupancy, granny flats and multi-unit residential developments, please refer to Chapter 8.

In most cases, infill development proposals will be constrained by:

- existing lot size;
- existing subdivision patterns;
- existing access and water provisions; and
- existing built forms surrounding the subject site.

Where a development expectation arises from the zoning of the land to build, rebuild, alter or add to a dwelling in pre-existing subdivisions, attempts should be made to find a solution taking into account the level of risk present. The expectation of building or altering a house is recognised even though the ability to provide for APZs or access requirements now required for residential development may not be possible.

7.2 Home-based occupations

Home-based occupations may occur within existing dwellings. Some home-based occupations include more occupants that are less familiar with their surroundings and may require increased protection.

7.2.1 Home-based child care

Home-based child care is excluded from the definition of a child care facility under the *Standard Instrument—Principal LEP*. These facilities have specific requirements, as they have some distinct differences to SFPP developments:

- they have an established limit to the number of occupants;
- they are required to submit evacuation information prior to licensing, which details the procedures for safe evacuation of all occupants during an emergency;
- At least one person on site is a resident and should therefore be aware of the bush fire risk and evacuation procedure;
- there is a different ratio of staff to occupants than other SFPPs; and
- they are covered under clause 30 of *SEPP (Educational Establishments and Child Care Facilities) 2017* which requires them to meet certain standards including the submission of an Emergency Management and Evacuation Plan, access to a public road and access to water supply in order to be Complying Development.

7.3 Specific objectives

Proposals for infill development are to:

- provide a defensible space to enable unimpeded access for firefighting around the building;
- provide better bush fire outcomes on a redevelopment site than currently exists, commensurate with the scale of works proposed;
- design and construct buildings commensurate with the bush fire risk;
- provide access, services and landscaping to aid firefighting operations;
- not impose an increased bush fire management and maintenance responsibility on adjoining land owners; and
- increase the level of bush fire protection to existing dwellings based on the scale of the proposed work and level of bush fire risk.

7.4 Bush fire protection measures

The BPMs for residential infill development include provisions relating to APZs, access, water supply, electricity and gas services, construction standards, landscaping and emergency evacuation. In order to create appropriate separation between a dwelling and the bush fire

hazard, APZs commensurate with those specified for new subdivision must be provided. The acceptable solutions for residential development proposals need to comply with Tables A1.12.2 and A1.12.3. Applications proposing BAL-40 and BAL-FZ construction are performance based.

Intent of measures: to minimise the risk of bush fire attack and provide protection for emergency services personnel, residents and others assisting firefighting activities.

Table 7.4a

Performance criteria and acceptable solutions for residential infill development.

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
ASSET PROTECTION ZONES	<ul style="list-style-type: none"> ➤ APZs are provided commensurate with the construction of the building; and ➤ A defensible space is provided. 	<ul style="list-style-type: none"> ➤ an APZ is provided in accordance with Table A1.12.2 or A1.12.3 in Appendix 1.
	<ul style="list-style-type: none"> ➤ APZs are managed and maintained to prevent the spread of a fire to the building. 	<ul style="list-style-type: none"> ➤ APZs are managed in accordance with the requirements of Appendix 4 of PBP.
	<ul style="list-style-type: none"> ➤ the APZ is provided in perpetuity. ➤ APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised. 	<ul style="list-style-type: none"> ➤ APZs are wholly within the boundaries of the development site. ➤ APZ are located on lands with a slope less than 18 degrees.
	<p>Home-based child care: the building must not be exposed to radiant heat levels exceeding 29kW/m² (1090K).</p>	<ul style="list-style-type: none"> ➤ an APZ is provided in accordance with Table A1.12.2 or A1.12.3 in Appendix 1.

Table 7.4a *Continued*

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
ACCESS	The intent may be achieved where:	
	<ul style="list-style-type: none"> ➤ firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation. 	<ul style="list-style-type: none"> ➤ property access roads are two-wheel drive, all-weather roads.
	<ul style="list-style-type: none"> ➤ the capacity of access roads is adequate for firefighting vehicles. 	<ul style="list-style-type: none"> ➤ the capacity of road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes), bridges and causeways are to clearly indicate load rating.
	<ul style="list-style-type: none"> ➤ there is appropriate access to water supply. 	<ul style="list-style-type: none"> ➤ hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005; ➤ There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.
<ul style="list-style-type: none"> ➤ firefighting vehicles can access the dwelling and exit the property safely. 	<ul style="list-style-type: none"> ➤ at least one alternative property access road is provided for individual dwellings or groups of dwellings that are located more than 200 metres from a public through road; ➤ There are no specific access requirements in an urban area where an unobstructed path (no greater than 70m) is provided between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles. <p>In circumstances where this cannot occur, the following requirements apply:</p> <ul style="list-style-type: none"> ➤ minimum 4m carriageway width; ➤ in forest, woodland and heath situations, rural property roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m, at the passing bay; ➤ a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; ➤ property access must provide a suitable turning area in accordance with Appendix 3; ➤ curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress; ➤ the minimum distance between inner and outer curves is 6m; ➤ the crossfall is not more than 10 degrees; ➤ maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads; and ➤ a development comprising more than three dwellings has formalised access by dedication of a road and not by right of way. <p>Note: Some short constrictions in the access may be accepted where they are not less than 3.5m wide, extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also apply to community style development property access roads in addition to the above.</p>	

Table 7.4a *Continued*

WATER SUPPLIES	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
<ul style="list-style-type: none"> ➤ an adequate water supply is provided for firefighting purposes. 	<ul style="list-style-type: none"> ➤ reticulated water is to be provided to the development, where available; and ➤ a static water supply is provided where no reticulated water is available. 	
<ul style="list-style-type: none"> ➤ water supplies are located at regular intervals; and ➤ the water supply is accessible and reliable for firefighting operations. 	<ul style="list-style-type: none"> ➤ fire hydrant spacing, design and sizing comply with the relevant clauses of AS 2419.1:2005; ➤ hydrants are not located within any road carriageway; and ➤ reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads. 	
<ul style="list-style-type: none"> ➤ flows and pressure are appropriate. 	<ul style="list-style-type: none"> ➤ fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005. 	
<ul style="list-style-type: none"> ➤ the integrity of the water supply is maintained. 	<ul style="list-style-type: none"> ➤ all above-ground water service pipes external to the building are metal, including and up to any taps. 	
<ul style="list-style-type: none"> ➤ a static water supply is provided for firefighting purposes in areas where reticulated water is not available. 	<ul style="list-style-type: none"> ➤ where no reticulated water supply is available, water for firefighting purposes is provided in accordance with Table 5.3d; ➤ a connection for firefighting purposes is located within the IPA or non-hazard side and away from the structure; 65mm Storz outlet with a ball valve is fitted to the outlet; ➤ ball valve and pipes are adequate for water flow and are metal; ➤ supply pipes from tank to ball valve have the same bore size to ensure flow volume; ➤ underground tanks have an access hole of 200mm to allow tankers to refill direct from the tank; ➤ a hardened ground surface for truck access is supplied within 4m; ➤ above-ground tanks are manufactured from concrete or metal; ➤ raised tanks have their stands constructed from non-combustible material or bush fire-resisting timber (see Appendix F of AS 3959); ➤ unobstructed access can be provided at all times; ➤ underground tanks are clearly marked; ➤ tanks on the hazard side of a building are provided with adequate shielding for the protection of firefighters; ➤ all exposed water pipes external to the building are metal, including any fittings; ➤ where pumps are provided, they are a minimum 5hp or 3kW petrol or diesel-powered pump, and are shielded against bush fire attack; any hose and reel for firefighting connected to the pump shall be 19mm internal diameter; and ➤ fire hose reels are constructed in accordance with AS/NZS 1221:1997, and installed in accordance with the relevant clauses of AS 2441:2005. 	

Table 7.4a *Continued*

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
ELECTRICITY SERVICES	<ul style="list-style-type: none"> location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings. 	<ul style="list-style-type: none"> where practicable, electrical transmission lines are underground; and where overhead, electrical transmission lines are proposed as follows: <ul style="list-style-type: none"> lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas; and no part of a tree is closer to a power line than the distance set out in accordance with the specifications in <i>ISSC3 Guideline for Managing Vegetation Near Power Lines</i>.
GAS SERVICES	<ul style="list-style-type: none"> location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings. 	<ul style="list-style-type: none"> reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used; all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side; connections to and from gas cylinders are metal; polymer-sheathed flexible gas supply lines are not used; and above-ground gas service pipes are metal, including and up to any outlets.
CONSTRUCTION STANDARDS	<ul style="list-style-type: none"> the proposed building can withstand bush fire attack in the form of embers, radiant heat and flame contact. 	<ul style="list-style-type: none"> BAL is determined in accordance with Tables A1.12.5 to A1.12.7; and construction provided in accordance with the NCC and as modified by section 7.5 (please see advice on construction in the flame zone).
	<ul style="list-style-type: none"> proposed fences and gates are designed to minimise the spread of bush fire. 	<ul style="list-style-type: none"> fencing and gates are constructed in accordance with section 7.6.
	<ul style="list-style-type: none"> proposed Class 10a buildings are designed to minimise the spread of bush fire. 	<ul style="list-style-type: none"> Class 10a buildings are constructed in accordance with section 8.3.2.
	<p>Home-based child care: the proposed building can withstand bush fire attack in the form of wind, localised smoke, embers and expected levels of radiant heat.</p>	<ul style="list-style-type: none"> an APZ is provided in accordance with Table A1.12.2 or A1.12.3 in Appendix 1 of this document around the entire building or structure; and the existing dwelling is required to be upgraded to improve ember protection. This is to be achieved by enclosing or covering openings with a corrosion-resistant steel, bronze or aluminium mesh with a maximum aperture of 2mm. Where applicable this includes the openable portion of the windows, vents, weepholes and eaves, but does not include roof tile spaces. Weather strips, draught excluders or draught seals shall be installed at the base of side hung external doors as per AS 3959. The subfloor space must be enclosed.

Table 7.4a *Continued*

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	The intent may be achieved where:	
LANDSCAPING	<ul style="list-style-type: none"> ➤ landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions. 	<ul style="list-style-type: none"> ➤ compliance with the NSW RFS 'Asset protection zone standards' (see Appendix 4); ➤ a clear area of low-cut lawn or pavement is maintained adjacent to the house; ➤ fencing is constructed in accordance with section 7.6; and ➤ trees and shrubs are located so that: <ul style="list-style-type: none"> ➤ the branches will not overhang the roof; ➤ the tree canopy is not continuous; and ➤ any proposed windbreak is located on the elevation from which fires are likely to approach.
EMERGENCY MANAGEMENT	<p>Home-based child care: a bush fire emergency and evacuation management plan is prepared.</p>	<ul style="list-style-type: none"> ➤ a Bush Fire Emergency Management and Evacuation Plan is prepared by the operator consistent with the NSW RFS publication: <i>A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan</i>, and the AS 3745:2010.

Note: the above specifications and requirements apply in relation to residential infill developments but may be used to guide the application of BPMs for 'other' developments (see Chapter 8).

7.5 Additional construction requirements

To ensure the performance criteria for construction standards given in section 7.4 can be met, PBP adopts additional measures over and above AS 3959 and NASH Standard as follows:

- construction measures for ember protection at BAL-12.5 and BAL-19 provided by AS 3959;
- construction measures for development in BAL-FZ; and
- requirements over and above the performance criteria contained within AS 1530.8.1 and AS 1530.8.2 apply in regards to flaming.

7.5.1 Ember protection

Based on the findings from the 2009 Victorian Bush Fires Royal Commission, PBP aims to maintain the safety levels previously provided by AS 3959:1999 in relation to ember protection at lower Bush Fire Attack Levels.

In particular, the areas addressed are in relation to:

- sarking;
- subfloor screening;
- floors;
- verandas, decks, steps, ramps and landings;
- timber support posts and beams; and
- fascias and bargeboards.

7.5.2 NSW State Variations under G5.2(a)(i) and 3.10.5.0(c)(i) of the NCC

Certain provisions of AS 3959 are varied in NSW based on the findings of the Victorian Bush Fires Royal Commission and bush fire industry research.

The following variations to AS 3959 apply in NSW for the purposes of NSW G5.2(a)(i) of Volume One and NSW 3.10.5.0(c)(i) of Volume Two of the NCC;

- clause 3.10 of AS 3959 is deleted and any sarking used for BAL-12.5, BAL-19, BAL-29 or BAL-40 shall:
 - be non-combustible; or
 - comply with AS/NZS 4200.1, be installed on the outside of the frame and have a flammability index of not more than 5 as determined by AS 1530.2; and
- clause 5.2 and 6.2 of AS 3959 is replaced by clause 7.2 of AS 3959, except that any wall enclosing the subfloor space need only comply with the wall requirements for the respective BAL; and
- clause 5.7 and 6.7 of AS 3959 is replaced by clause 7.7 of AS 3959, except that any wall enclosing the subfloor space need only comply with the wall requirements for the respective BAL; and
- fascias and bargeboards, in BAL-40, shall comply with:
 - clause 8.4.1(b) of AS 3959; or
 - clause 8.6.6 of AS 3959.

7.5.3 Construction in the flame zone

The flame zone is the area that has significant potential for sustained flame contact during a bush fire. The flame zone is determined by the calculated distance at which the radiant heat of the design fire exceeds 40kW/m².

The NCC references AS 3959 and the NASH Standard. The NSW variation to the NCC excludes both AS 3959 and the NASH Standard as a Deemed to Satisfy solution for buildings that are required to be constructed to BAL-FZ as defined in AS 3959.

Although Chapter 9 of AS 3959 and the NASH Standard has not been adopted, they should still be used as a basis for a performance based solution demonstrating compliance with the performance requirements of the NCC and PBP for construction in the flame zone.

All flame zone developments should be sited and designed to minimise the risk of bush fire attack. Buildings should be designed and sited in accordance with appropriate siting and design principles to ensure the safest protection from bush fire impacts.

7.5.4 Flaming

Materials that allow flaming can be problematic and are not supported by the NSW RFS for the following reasons:

- flaming materials increase the exposure of other elements of construction and the adjoining structure to flame contact after a bush fire front has passed; and
- flaming materials will potentially increase the exposure of occupants of the building to radiant heat, direct flame contact, smoke after a bush fire front has passed.

This increase in exposure can contribute to the risk of loss of life and compromise the ability of residents to defend their property and egress from the building once the bush fire front has passed.

In addition, it can reduce the ability of occupants to make safe and effective decisions about their safety.

Where there is potential for materials of construction to ignite as a result of bush fire attack, the proposed building solution generally fails the construction performance criteria for residential infill development.

For development which may be subject to flame contact (BAL-40 and BAL-FZ), systems tested in accordance with AS 1530.8.1 and AS 1530.8.2 respectively will be considered, except that there is to be no flaming of the specimen except for:

- window frames that have passed the criteria of AS 1530.8.1 and AS 1530.8.2, may be approved provided their flaming is not considered to compromise the safety of other elements of the building; and
- use of other minor elements which allow flaming may be considered provided they do not compromise the integrity of the fire safety of the building (examples include address numbers, house names, decorative artwork, etc).

Flaming of other more significant elements of the building (such as aesthetic wall cladding) is considered to pose an unacceptable risk and will not be supported.

7.6 Fences and gates

Fences and gates in bush fire prone areas may play a significant role in the vulnerability of structures during bush fires. In this regard, all fences in bush fire prone areas should be made of either hardwood or non-combustible material.

However, in circumstances where the fence is within 6m of a building or in areas of BAL-29 or greater, they should be made of non-combustible material only.

7.7 Determination of the BAL

The modelling procedure for the assessment of the BAL in PBP uses the input values and the Detailed Method for Determining the BAL - Method 2 in AS 3959.

The BAL tables in Appendix 1 replace the tables in AS 3959 in NSW.

7.8 Better bush fire outcomes

Where an alteration and addition is proposed to a dwelling built prior to 2002 and the existing building has little or no BPMs incorporated into its design, consideration must be given to upgrading the existing structure.

The new works are required to comply with the NCC. Consideration should be given to whether strict compliance with the NCC is the best outcome for the property or whether a more balanced holistic outcome that addresses the entire building is more appropriate.

Where it is determined that strict compliance with the NCC for the alterations and additions is not the best outcome for the site, a full performance based solution should be prepared. The performance based solution should address the best bush fire protection solution for the entire site and seek to apply BPMs in combination. The BFDB process may be the most appropriate way of determining the criteria for this kind of proposal (refer to Appendix 2).

Where it is not demonstrated and agreed that the proposal is the best outcome for the site as a whole, strict compliance with the NCC will be required.

Table 7.9a

Grassland Deeming Provisions

BUSH FIRE PROTECTION MEASURE	GRASSLAND DEEMING PROVISIONS
APZ	<ul style="list-style-type: none"> ➤ limited to a maximum of 15 degrees downslope; ➤ minimum APZ of 20m is provided between the building and the hazard; ➤ the APZ is wholly within the boundaries of the development site; and ➤ the APZ is maintained as a mown area with grass heights less than 100mm.
Construction	➤ construction in accordance with BAL-12.5 of AS 3959 and section 7.5 of PBP.
Access	➤ comply with the property access provisions in Table 5.3b.
Water supply	➤ comply with the water supply provisions in Table 7.4a.
Landscaping	➤ comply with the relevant provisions in Appendix 4, noting that other vegetation bush fire hazards cannot be present if these provisions are to apply.

7.9 Grassland Deeming Provisions

The risk posed by grass fires is different to that of fires in other vegetation types. Grass fires burn at a higher intensity and spread more rapidly with a shorter residence time. Embers produced by grass fires are smaller and fewer in number than those produced from forest fires.

In recognition of the characteristics of grassland fire behaviour, the NSW RFS has developed a simplified set of Deeming Provisions for residential infill development. This process provides another acceptable set of simple requirements for infill development located in a grassland hazard area. A site assessment as detailed in Appendix 1 is not required, nor is referral to the NSW RFS.

Where an APZ of 50m can be provided, no further BPMs are required. Where an APZ of 20-49m can be provided, the set of provisions shown in Table 7.9a apply. However where the Grassland Deeming Provisions cannot be achieved or a merit based approach is desired, the standard assessment process outlined in Appendix 1 must be adopted. The maximum slope for the Deeming Provisions is restricted to 15 degrees downslope.

Note: Please note that GFDI and not FFDI values apply to grassland areas. The GFDI values shown in Table 5.1.4a have been used to calculate the APZ distances for grassland areas in Appendix 1 and shall also be used for relevant performance based solutions.

For developments in grassland hazard areas where the deeming provisions are applied, compliance with Table 7.9a is prescribed as a variation for the purposes of NSW G5.2(a)(i) of Volume One and NSW 3.10.5.0(c)(i) of Volume Two of the NCC.

The deeming provisions and the residential infill development APZ tables are derived from different methodologies, however both are considered compliant outcomes.



8 OTHER DEVELOPMENT



Other development refers to any type of development that is not covered by Chapters 5 to 7 of this document. This includes commercial uses, industrial uses, infrastructure and development which involves large numbers of people.

8.1 Introduction

There are other developments where bush fire provisions or requirements need to be applied, that align with the unique features of the development type.

In order to comply with PBP the following conditions must be met:

- satisfy the aim and objectives of PBP outlined in Chapter 1;
- consider any issues listed for the specific purpose for the development set out in this chapter; and
- propose an appropriate combination of BPMs.

It is important to ensure that a defensible space is provided for the size and scale of the development. Proposed measures must operate in combination to minimise the impact of bush fire and ensure that access and services are adequate.

8.2 Other residential development

Residential development, other than single dwellings and subdivisions, covered in this section must also meet the requirements of Chapter 7.

8.2.1 Increased residential densities

In some situations increased densities may not be appropriate having regard to the strategic principles (see section 4.1), even though zoning has been approved for the proposed use. A Bush Fire Strategic Study may be required for these proposals as part of the broader BFDB process.

Increased resident densities of existing lots that are bush fire prone may heighten the level of risk to the occupants. The presence of additional dwellings can impact on the evacuation and sheltering of residents during a bush fire.

Where a new dwelling or dwellings are proposed on existing lots which already contain one or more dwellings, this is considered to be an increase in residential density and can include the following:

- dual occupancy;
- multi-dwelling housing;
- secondary dwellings;
- rural workers dwellings; and
- boarding houses.

This increase in residential density does not necessarily require a subdivision approval. However, the same principles and criteria associated with subdivisions in bush fire prone areas will apply. This includes ensuring an APZ based on a radiant heat threshold of 29kW/m² for any new dwellings, along with suitable provision for construction, access, water and landscaping.

Where there is an existing dwelling within the subject site and a second building can otherwise comply with the provisions of this document, it may be necessary to upgrade the existing dwelling to provide:

- ember protection;
- improved water availability;
- suitable access; and
- APZs.

8.2.2 Multi-storey residential development

Buildings exceeding three storeys in height are considered to be multi-storey buildings. The rise in storeys shall be calculated as per the definition in Volume 1 of the NCC 2019. A residential flat building under the meaning within the Standard Instrument LEP is a multi-storey building in the context of PBP.

Multi-storey buildings are required to comply with the performance criteria within Chapter 5, including the requirement for an APZ which meets a threshold of 29kW/m². There are additional considerations associated with multi-storey residential buildings and the key issues are as follows:

- **Population** - higher resident densities can pose issues for emergency management;
- **Location** - bush fire impacts can be increased where high rise buildings are located in higher elevations or on ridge tops;
- **Egress** - is more challenging and places an increased demand on road infrastructure during evacuation;
- **Construction** - there is a higher external façade surface area that may be exposed to bush fire attack and:
 - car and storage facilities on the ground level can provide an additional fuel loading;
 - balconies and external features can easily trap embers which can ignite combustible materials.
- **Height** - the height can result in increased exposure to convective heat.

In addition to the requirements in Chapter 5, the following table provides the considerations for multi-storey buildings in bush fire prone areas to ensure that the design of a building and its warning and suppression system adequately address bush fire risk.

Table 8.2.2

Issues and considerations specific to multi-storey residential development.

ISSUE	SPECIFIC CONCERN	TECHNICAL CONSIDERATIONS
Population	<ul style="list-style-type: none"> ➤ Impact on existing community and infrastructure. 	<ul style="list-style-type: none"> ➤ What capacity does the existing infrastructure have to allow evacuation of existing and proposed residents in the event of a bush fire?
Location of Building	<ul style="list-style-type: none"> ➤ Locating on ridge tops emphasises the risk of convective plume interaction and wind related impacts. 	<ul style="list-style-type: none"> ➤ Can the building be located away from ridge tops to areas that have a reduced bush fire exposure? ➤ If unavoidable, what is the impact on the risk to the building? ➤ Is this risk appropriate for the building and occupant numbers?
Design Fire	<ul style="list-style-type: none"> ➤ Different elements of the flame could have different impacts on different levels of the building; and ➤ The whole building could be impacted by ember attack and multiple floors could be alight simultaneously. 	<ul style="list-style-type: none"> ➤ What are the flame dimensions, including the flame angle? ➤ Where is the hottest part of the flame located? How would this impact on the proposed building? ➤ How would the warning and suppression systems in the building cope with this?
Egress	<ul style="list-style-type: none"> ➤ Elevations exposed to bush fire risk. 	<ul style="list-style-type: none"> ➤ How does the emergency evacuation procedure take account of the location of bush fire prone vegetation?
Building construction	<ul style="list-style-type: none"> ➤ Performance of the building façade in a bush fire scenario. ➤ Balconies may contain external features which could ignite and contribute to building ignition and fuel loads. 	<ul style="list-style-type: none"> ➤ What wall and cladding materials are proposed and what is proposed for the openings/penetrations (i.e. windows and doors)? ➤ How does the proposed building construction deal with fire spread from the vegetation to the inside of the building? ➤ Is compliance with AS 3959 sufficient to ensure that the bush fire risk is mitigated? ➤ Is this appropriate for the design fire scenario? ➤ Are there balconies proposed? ➤ What may be stored on the balconies? ➤ Can there be restrictions on what is stored on the balconies due to fire risk?
Car Parking	<ul style="list-style-type: none"> ➤ Lower storey car park could be subject to ember attack and high radiant heat loads. 	<ul style="list-style-type: none"> ➤ Is the warning and suppression system designed to take account of bush fire impact? ➤ Where are exits located? Are they guiding occupants away from the car park?
Other Considerations	<ul style="list-style-type: none"> ➤ Access for fire fighters may be restricted or challenging; and ➤ Risk implications of floor to floor fire spread. 	<ul style="list-style-type: none"> ➤ What would this mean for fire suppression? ➤ How would warning and suppression systems take account of this? ➤ What would this mean for evacuation?

Because of the challenges that multi-storey buildings pose when located in bush fire prone areas, a performance based solution should be prepared which will include a BFDB. Heads of consideration for the performance based solution include the following:

- **Location** – multi-storey buildings should not be located along ridges or slopes with significant fire runs.
- **Existing infrastructure** – when multi-storey developments are proposed, the fire protection provided during potential bush fire emergencies needs to be considered, particularly in terms of evacuating occupants along the road network and the availability of water supplies for firefighting.
- **External facades** – these may be subject to an increased exposure to radiant heat and also convection columns. Modelling may be needed and APZs may need to be increased over and above those specified to account for this.
- **Egress** – the risk associated with occupant egress is higher in multi-storey buildings than for lower-rise structures and therefore adequate emergency egress during a bush fire emergency should be addressed.

Such developments should only be considered on BFPL if an analysis based on the requirements of Chapter 5, can demonstrate that the above issues do not pose an unacceptable risk.

8.2.3 Historic buildings

In relation to buildings identified as having heritage significance, the usual requirements for bush fire protection may conflict with the conservation of significant heritage fabric and/or its setting. Development affecting heritage issues and related requirements, should be considered on an individual basis.

The application of PBP is to be considered in the context of the conservation principles, processes and practices of the Illustrated Burra Charter (Australia ICOMOS, 2013).

The development of a suitable bush fire safety proposal that considers constraints of heritage issues may require a performance based solution and therefore may require a BFDB.

8.3 Other non-residential development

Other non-residential development includes development that is not used for residential purposes or may have a dual usage.

8.3.1 Buildings of Class 5 to 8 under the NCC

Under the building classification system within the NCC, Class 5 to 8 buildings include offices, shops, factories, warehouses, public car parks and other commercial and industrial facilities.

The NCC does not provide for any bush fire specific performance requirements for these particular classes of buildings. As such AS 3959 and the NASH Standard are not considered as a set of Deemed to Satisfy provisions, however compliance with AS 3959 and the NASH Standard must be considered when meeting the aims and objectives of PBP.

Whilst bush fire is not captured in the NCC for Class 5-8 buildings, the following objectives will be applied in relation to access, water supply and services, and emergency and evacuation planning:

- to provide safe access to/from the public road system for firefighters providing property protection during a bush fire and for occupant egress for evacuation;
- to provide suitable emergency and evacuation (and relocation) arrangements for occupants of the development;
- to provide adequate services of water for the protection of buildings during and after the passage of bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building; and
- provide for the storage of hazardous materials away from the hazard wherever possible.

The general fire safety construction provisions of the NCC are taken as acceptable solutions however construction requirements for bush fire protection will need to be considered on a case-by-case basis.

Where a mixed use development is proposed to have a SFPP component, an appropriate mix of BPMs should be applied consistent with the SFPP provisions in Chapter 6.

8.3.2 Class 10 structures

The NCC defines a Class 10 building as a non-habitable building or structure such as a:

- a. Class 10a – a non-habitable building being a private garage, carport, shed or the like; or
- b. Class 10b – a structure being a fence, mast, antenna, retaining or free-standing wall, swimming pool, or the like; or
- c. Class 10c – a private bush fire shelter

There is no bush fire protection requirements for Class 10a buildings located more than 6m from a dwelling in bush fire prone areas. Where a Class 10a building is located within 6m of a dwelling it must be constructed in accordance with the NCC.

8.3.3 Private bush fire shelters

Under the NCC, a private bush fire shelter is a Class 10c structure “associated with, but not attached to, or part of a Class 1a dwelling that may, as a last resort, provide shelter for occupants from immediate life threatening effects of a bush fire” (NCC 2019).

In NSW, any proposal to construct a private bush fire shelter on BFPL will be subject to the provisions of EP&A Act s4.14. For applications on land that is not identified as bush fire prone, the consent authority can consider bush fire matters under EP&A Act s4.15.

Regardless of the level of bush fire attack, all private bush fire shelters need to comply with Performance Requirement P2.7.6 of the NCC. *The Performance Standard for Private Bushfire Shelters* published by the Australian Building Codes Board (ABCB) in 2014 provides guidance in demonstrating compliance with the Performance Requirement. Where it is proposed to construct a private bush fire shelter compliance is required with Table 2.4 – *Acceptance Criteria* of the *Performance Standard for Private Bushfire Shelters 2014*.

In addition, design and construction of a private bush fire shelter must be informed by appropriately qualified and experienced practitioners. Given the life safety risks that an inadequately designed and poorly maintained private bush fire shelter can present to occupants, a conservative approach to this matter is required.

Although the *Performance Standard for Private Bushfire Shelters 2014* allows for the design and construction of private bush fire shelters based on the calculated BAL using the methodology contained in AS 3959, the NSW RFS requires that in all cases private bush fire shelters be designed for BAL-FZ. Private bush fire shelters need to be designed on a performance basis. However, private bush fire shelters are not accepted as an offset for compliance of the dwelling with AS 3959 or the NASH Standard and the BPMs outlined in PBP.

It must be emphasised that private bush fire shelters should not be relied on as the sole answer to reducing the risk to residents in bush fire prone areas. For existing development, consideration should be given to upgrading existing buildings, increasing the separation of dwellings from bush fire hazards and implementing other BPMs before contemplating a private bush fire shelter.

The preparation of a well thought out bush fire survival plan is pivotal to reducing the risk of loss of life during a bush fire.

8.3.4 Community bush fire refuges

Community bush fire refuges need to comply with the design and *Construction of Community Bush Fire Refuges Handbook* published by the ABCB.

In NSW, any proposal to construct a community bush fire refuge should be referred to the NSW RFS.

8.3.5 Wind and solar farms

Wind and solar farms require special consideration and should be provided with adequate clearances to combustible vegetation as well as firefighting access and water.

The following should be provided for wind and solar farms:

- a minimum 10m APZ for the structures and associated buildings/infrastructure; and
- the APZ must be maintained to the standard of an IPA for the life of the development.

Infrastructure for the purposes of requiring APZ excludes:

- road access to the site; and
- power or other services to the site and associated fencing.

Essential equipment should be designed and housed in such a way as to minimise the impact of bush fires on the capabilities of the infrastructure during bush fire emergencies. It should also be designed and maintained so that it will not serve as a bush fire risk to surrounding bush.

A Bush Fire Emergency Management and Operations Plan should identify all relevant risks and mitigation measures associated with the construction and operation of the wind or solar farm. This should include:

- detailed measures to prevent or mitigate fires igniting;
- work that should not be carried out during total fire bans;
- availability of fire-suppression equipment, access and water;
- storage and maintenance of fuels and other flammable materials;
- notification of the local NSW RFS Fire Control Centre for any works that have the potential to ignite surrounding vegetation, proposed to be carried out during a bush-fire fire danger period to ensure weather conditions are appropriate; and
- appropriate bush fire emergency management planning.

It is important to be aware of operations that may be carried out on days of Total Fire Ban and any prohibited activities or exemptions that are notified by the Commissioner of the NSW RFS under the RF Act s.99.

8.3.6 Mining (underground and open cut) and petroleum production

Where mining and associated activities are carried out on BFPL, consideration should be given to any hazards and risks associated with bush fire. It may be necessary to implement measures to control and manage any identified hazards and risks.

Petroleum exploration and production may also be a consideration in bush fire prone areas. Petroleum includes coal seam gas (CSG). As a minimum, a 10m APZ should be provided around any infrastructure associated with mining and petroleum production.

Given the potential hazard and risks, a Bush Fire Emergency Management and Operations Plan should be prepared to cover any mining activities and petroleum production undertaken on BFPL, with consideration to the same provisions detailed in section 8.3.5 for wind and solar farms.

8.3.7 Telecommunications towers

Telecommunication sites are sites that hold infrastructure associated with mobile phones, internet, microwave radio links, trunk mobile radio or private mobile radio.

Essential telecommunication infrastructure should be designed in such a way as to minimise the impact of bush fires and ensure that communications capabilities are not compromised during bush fire emergencies. BPMs should be commensurate with the bush fire risk and criticality of the infrastructure.

In order to determine the level of bush fire risk and to develop a suitable suite of protection measures, the NSW RFS should be consulted.

There should be a minimum APZ around the tower/buildings/associated infrastructure which will increase based on the assessed level of risk and criticality.

Telecommunication towers should be constructed from non-combustible materials, and designed to mitigate the risk of flame damage, ember attack and radiant heat.

The APZ is only concerned with the underlying infrastructure required to support telecommunication services. These are predominately structures and buildings. Infrastructure requiring APZs does not include:

- road access to the site;
- power to the site; and
- associated fencing.

The APZ must be managed to the standard of an IPA. The IPA must be free from surface fuel and elevated fuel with minimum canopy cover.

An access strategy should be prepared that details the access arrangements for firefighting and APZ maintenance.

Generally, critical telecommunications infrastructure will be identified in a Bush Fire Risk Management Plan. Other operational planning should be undertaken for critical infrastructure associated with telecommunications.

8.3.8 Outdoor events in bush fire prone areas

Outdoor events often cater for large numbers of people in isolated locations, can continue over a number of days and may include on site accommodation. They include music festivals, cultural festivals, sporting events, and regional shows. Events that involve overnight camping, multiple days, or attract large numbers of people in high risk or isolated bush fire prone areas during the bush fire danger period require careful consideration. Such events create a number of logistical and operational issues if evacuation is required due to a bush fire.

Crowd control and operational access at the venue during bush fire events can prove to be challenging especially if they are held in remote locations.

Other considerations for outdoor events on BFPL are outlined below:

- holding events outside the gazetted bush fire danger period for the area;
- areas of accommodation should be strategically located to ensure maximum time to warn and evacuate people who may be sleeping and slow to respond. This also ensures that highly flammable and combustible materials, such as tent fabric, vehicle fuels and gas cookers are in areas that will not facilitate the spread of fire;
- a Bush Fire Emergency Management and Evacuation Plan must be prepared that is acceptable to relevant stakeholders, including crowd management and security. It should be consistent with the NSW RFS document: *A guide to developing a bush fire emergency management and evacuation plan*;
- access and egress routes for emergency services and patrons in the event that evacuation is required;
- a refuge building of suitable capacity to contain all participants and staff that complies with the NSW RFS Neighborhood Safer Place Guidelines ([see www.rfs.nsw.gov.au](http://www.rfs.nsw.gov.au));
- an open air bush fire emergency assembly area capable of accommodating all participants and staff that complies with the NSW RFS Neighborhood Safer Place Guidelines ([see www.rfs.nsw.gov.au](http://www.rfs.nsw.gov.au));
- a suitable method of staging evacuation, ensuring that evacuation flow is directed through different stages/areas of the site, moving from areas of higher risk to lower risk;
- expected evacuation timeframes;
- on severe or higher fire danger rating days the event will not proceed;

- advance warning to patrons identifying that the event is located on BFPL and giving advice on any fire restrictions;
- ability to cease and override P.A. and audio systems throughout the site to announce emergency warnings, alerts or safety information, which can be clearly heard from all areas of the site; and
- a prescribed ratio of trained fire wardens to participants.

A suitable package of other protection measures should be proposed based on individual event characteristics which considers the following:

- bulk water supplies on site that are specifically allocated to firefighting purposes;
- unobstructed APZs of suitable width surrounding the site along the boundaries adjacent to the bush fire threat. Slashing of grassed areas needs to occur in the lead-up to the event and maintained throughout its duration;
- emergency management planning during the event organisation stage to be undertaken in consultation with the NSW RFS and all other relevant stakeholders; and
- fires for cooking and heating in approved fire places only and addressed by a Fire Management Plan.

8.3.9 Hazardous industry

Some developments are considered by their very nature to be hazardous, as much for their ability to start bush fires as their susceptibility to bush fire impacts. New developments of this nature should be avoided on BFPL. However, where hazardous industries are proposed, prior consultation with the NSW RFS and preparation of a performance based solution, potentially including a BFDB, will be required.

In preparation of a performance based solution or BFDB, the Fire Safety Study prepared under the DPIE *Hazardous Industry Planning and Assessment Papers* (HIPAPs) should be considered. This study provides details of all credible fire hazards and the associated fire prevention and mitigation measures for the development. The BFDB must address the appropriate protection measures to be provided commensurate with the bush fire hazards and associated risks. Care should also be taken to ensure that such facilities do not impact on existing developments.

Hazardous industries include but are not limited to:

- power generating works;
- sawmills;
- junk yards;
- liquid fuel depots;
- hazardous industries/storage;
- chemical industries/storage;
- service stations;
- ammunition storage/manufacture; and
- fireworks manufacture/storage.

8.3.10 Commercial and industrial development

Commercial and industrial development on BFPL is captured by EP&A Act s.4.14 where a manager's residence is included in the proposal. Where no residential component is included, commercial and industrial development is addressed through the aim and objectives of PBP (see Chapter 1 of this document).

A suitable package of BPMs should be proposed commensurate with the assessed level of risk to the development. The scale of the development and numbers of people likely to be occupying the building will be directly relevant to the BPMs proposed.

The provisions within Chapter 7 of this document should be used as a base for the development of a package of measures. Each development will be assessed on its own individual merits.

8.3.11 Public assembly buildings

Public assembly buildings are not defined as SFPP by the RF Reg but require referral under EP&A Act s.4.14 to the NSW RFS. Buildings used for public assembly with a floor space area of greater than 500m² are required to consider bush fire. These developments will be treated technically as SFPP due to the evacuation challenges presented by large numbers of occupants.

Assembly buildings can accommodate large numbers of persons of various physical capabilities. Emergency management planning for these developments must account for the total number of occupants and be commensurate with the level of risk. These developments must not experience radiant heat levels of greater than 10kW/m² on any part of the building. Assembly buildings include places of public worship.

Due to the variation in risk associated with the occupants of assembly buildings, a variety of bush fire safety solutions may apply based on the merits of the situation.

APPENDIX 1

SITE ASSESSMENT METHODOLOGY

This appendix sets out the methodology to undertake a site bush fire attack assessment in relation to the application of appropriate APZs and associated construction levels.

A1.1 Application

The following methodology must be used to determine BALs and appropriate APZs. It is the acceptable solutions methodology applicable in NSW.

For further details on each of the steps below, see the related sections or tables in this document.

This Appendix replaces Section 2 of AS 3959 for the purposes of NSW G5.2(a)(i) of Volume One and NSW 3.10.5.0(c)(i) of Volume Two of the NCC. It must also be used to determine the relevant BAL for the purposes of the NASH Standard under NSW 3.10.5.0(d)(i) of Volume Two of the NCC.

Identify APZs

- Step 1:** Determine vegetation formation in all directions around the building to a distance of 140 metres (refer to A1.2);
- Step 2:** Determine the effective slope of the land from the building for a distance of 100 metres (refer to A1.4 and A1.5);
- Step 3:** Determine the relevant FFDI for the council area in which the development is to be undertaken (refer to A1.6); and
- Step 4:** Match the relevant FFDI, vegetation formation and effective slope to determine the APZ required from the appropriate table of this Appendix (refer to A1.7).

Identify construction requirements

- Step 1:** Follow steps 1 - 3 above;
- Step 2:** Determine the separation distance by measuring from the edge of the unmanaged vegetation to the closest external wall;
- Step 3:** Match the relevant FFDI, appropriate vegetation, distance and effective slope to determine the appropriate BAL using the relevant tables at the end of this section (A1.12.5, A1.12.6 and A1.12.7); and
- Step 4:** Refer to Section 3 in AS 3959 and NASH Standard to identify appropriate construction requirements for the calculated BAL.

A1.2 Determine vegetation formation

Identify all the vegetation formations for each aspect of the development within 140 metres of the development site or asset as per Keith (2004). This includes vegetation both within and external to the site boundaries.

Where mixes of vegetation formations are located together, the vegetation formation providing the greater hazard shall be used for the purpose of assessment. The combination of vegetation and slope that yields the worst case scenario shall be used.

The determination of the BALs is based on a worst case scenario and a calculation derived from maximum fuel loads. Consideration should also be given to any clearing, re-vegetation or landscaping likely to occur.

A1.2.1 About the classification system

The vegetation classification system used within this document is based on the Keith (2004) framework. Available fuel loads are based on recent information provided by:

- The University of Wollongong's (UoW) Fuels Modelling Project;
- The University of Melbourne (UoM) which reference the fuel classifications found in Keith (2004); and
- CSIRO Ecosystems Sciences and Bushfire Dynamics and Applications.

For the purposes of bush fire assessment in NSW, vegetation formations are as per Keith (2004) (excepting heathlands which includes two sub-formations rather than one, and are based largely on vegetation height).

All references to 'Keith (2004)' within this Appendix is a reference to the publication '*Ocean Shores to Desert Dunes*' - David Keith (2004).

Figure A1.2

Description of vegetation formations.



Photo courtesy Ross Peacock

Rainforest

Closed and continuous complex tree canopy composed of relatively soft, horizontal-held leaves. Generally lacking in eucalypts. Understorey is typically ferns and herbs. Vines often present in canopy and/or understorey.

Occurs mainly in areas that are reliably moist, less prone to fires than sclerophyll forests and have soils of moderate to high fertility. Typically coastal and escarpment locations.



Photo courtesy Ken Turner

Wet Sclerophyll Forest

High open tree canopy dominated by tall (typically >30m), straight trunked eucalypt species. Luxuriant understorey composed of soft leaved shrubs, ferns and herbs. Many understorey plants are rainforest species. Found on moderately fertile soils in areas of high (>900mm) rainfall.



Photo courtesy Ross Peacock

Dry Sclerophyll Forest

Open tree canopy dominated by eucalypt species (typically 10-30m in height) with crowns that touch and overlap. Canopy allows most sunlight to penetrate supporting growth of a prominent understorey layer varying between hard-leaved shrubs to luxuriant soft leaved shrubs, ferns and herbs.



Photo courtesy Catherine Ryland

Woodland

Dominated by an open to sparse layer of eucalypts with the crowns rarely touching. Typically 15-35m high (may be shorter at sub-alpine altitudes). Diverse ground cover of grasses and herbs. Shrubs are sparsely distributed. Usually found on flat or undulating ground.



Photo courtesy Waminda Parker

Tall Heath

Shrubby vegetation greater than 2 metres tall. Principal plant species include banksias, spider flowers, wattles, legumes, eucalypts, tea trees, paperbarks, she oaks, grass trees, cord rushes and sedges. Grasses are scarce.

Not found in arid and semi arid locations.

Includes Hawkesbury Sandstone vegetation with scattered overstorey trees and predominately healthy understorey and coastal heath. May include some mallee eucalypts in coastal locations.



Photo courtesy Corey Shackleton

Short Heath

Shrubby vegetation less than 2 metres in height. Often more open in canopy. Principal plant species include banksias, spider flowers, wattles, legumes, eucalypts, tea trees, paperbarks, she oaks, grass trees, cord rushes and sedges. Grasses are scarce.

Not found in arid and semi arid locations.



Photo courtesy Mark Hawkins

Grassland

Maritime Grasslands, Temperate Montane Grasslands, Western Slopes Grassland, Riverine Plain Grasslands and Semi-arid Floodplain Grasslands.

Dominated by perennial grasses and the presence of broad-leaved herbs on flat topography. Lack of woody plants.

Plants include grasses, daisies, legumes, geraniums, saltbushes and copperburrs.

A1.3 Grassland assessment

Where the vegetation formation is determined to be grassland the following applies. For all other vegetation formations please refer to A1.4-A1.7 below.

If the vegetation formation is grassland and a 20m-49m APZ can be provided, the Grassland Deeming Provisions may be applicable. There would be no need for further assessment (please refer to section 7.9).

Where a 20m APZ cannot be provided or a full site assessment methodology is required please refer to A1.4-A1.7 below.

Where 50m APZ can be provided, there are no further requirements.

A1.4 Determine slope

Slope assessment is derived from the most detailed contour data available, such as topographic maps displaying contour intervals determined when land is surveyed.

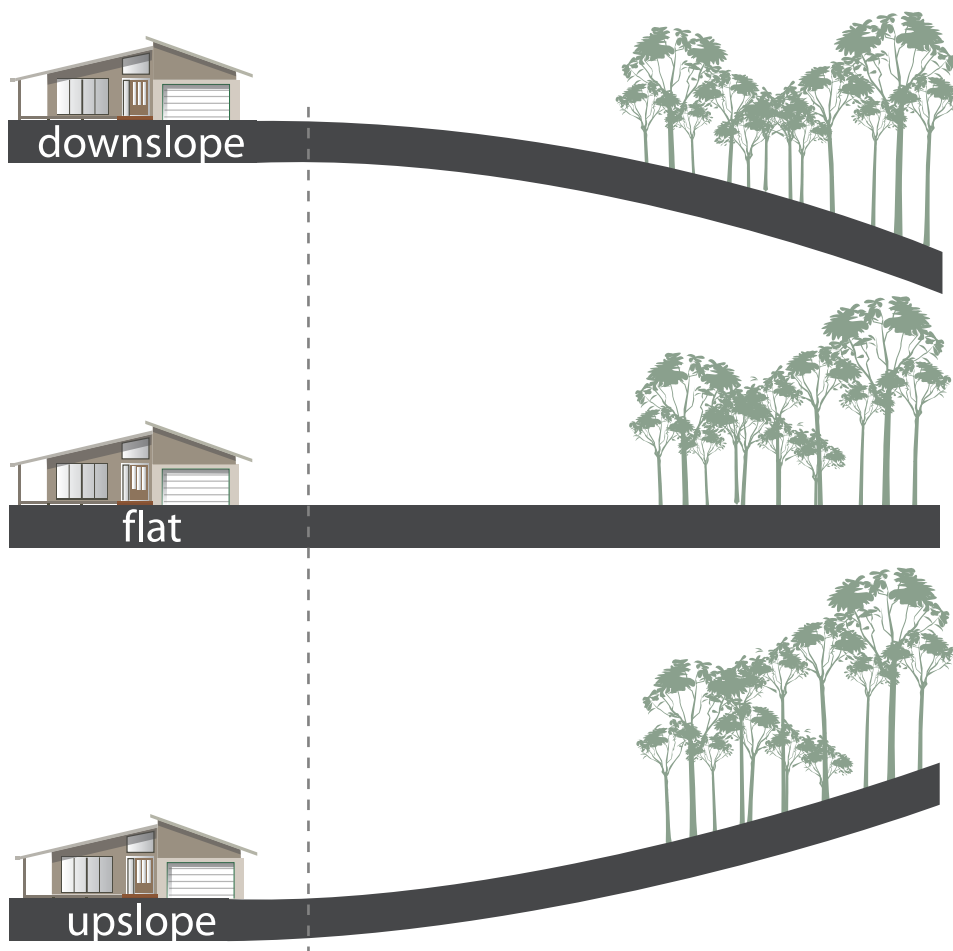
The slope is to be categorised into one of following classes, relative to the location of the hazard:

- all upslope vegetation (considered 0 degrees);
- >0 to 5 degrees downslope vegetation;
- >5 degrees to 10 degrees downslope vegetation;
- >10 degrees to 15 degrees downslope vegetation; and
- >15 degrees to 20 degrees downslope vegetation.

APZ tables within PBP are provided for acceptable solutions with slopes of up to 20 degrees. Effective slopes are to be assessed with hazards on slopes in excess of 20 degrees will require a detailed performance assessment. This may include a consideration of the potential flame length and its impact on the proposed development. Please see section A1.5 for information on determining the effective slope.

Figure A1.4

Determining slope.



A1.5 Determine effective slope

The slope of the land under the classified vegetation has a direct influence on the rate of fire spread, the intensity of the fire and the ultimate level of radiant heat flux.

The effective slope is the slope of the ground under the hazard (vegetation). It is not the slope between the vegetation and the building (slope located between the asset and vegetation is the site slope).

In identifying the effective slope, it may be found that there are a variety of slopes covering different distances within the vegetation. The effective slope is considered to be the slope under the vegetation which will most significantly influence the bush fire behaviour for each aspect (see Figure A1.5 below).

This is usually the steepest slope. In situations where this is not the case, the proposed approach must be fully justified.

Vegetation located closest to an asset may not necessarily be located on the effective slope.

A1.6 Determine appropriate fire (weather) areas

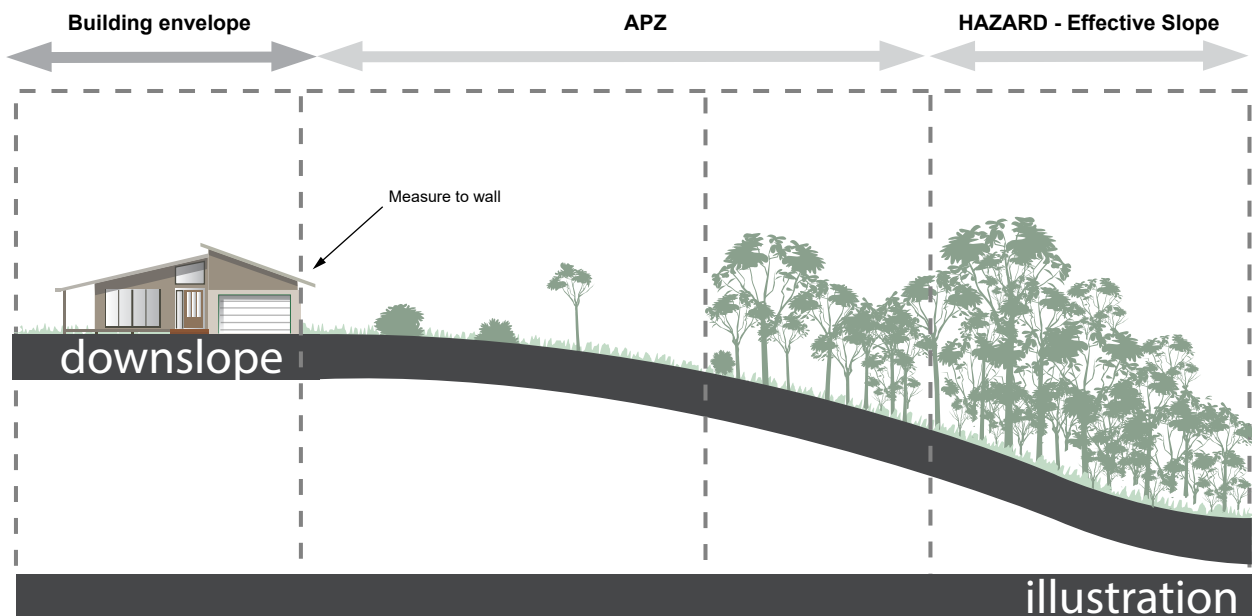
For all development requiring an APZ, the relevant FFDI must be identified. The FFDI measures the degree of danger of fire in Australian vegetation. For the purposes of PBP, the FFDI required to be used for development assessment purposes is based on local government boundaries.

The 1:50 year fire weather scenario for most of the state was determined as FFDI 80, however, a number of areas including the Greater Sydney, Greater Hunter, Illawarra, Far South Coast and Southern Ranges Fire Areas have higher FFDIs which are set at 100.

To assist in identifying your LGA and the appropriate FFDI, please consult the NSW RFS website which provides information on LGAs and their appropriate FFDIs.

Figure A1.5

Effective slope.



A1.7 Determine Bush Fire Attack Level

Once steps A1.2-A1.6 have been completed, the APZ or Bush Fire Attack Level can be determined in Tables A1.12.5, A1.12.6 and A1.12.7 below. Table A1.7 provides a description of each Bush Fire Attack Level.

Table A1.7

Radiant heat flux exposure and appropriate Bush Fire Attack Level (BAL).

Heat flux exposure	Description	AS 3959 construction level
N/A	Minimal attack from radiant heat and flame due to the distance of the building from the vegetation, although some attack by burning debris is possible. There is insufficient threat to warrant specific construction requirements.	BAL-LOW
≤12.5	Attack by burning debris is significant with radiant heat (not greater than 12.5kW/m ²). Radiant heat is unlikely to threaten building elements (such as unscreened glass). Specific construction requirements for ember protection and accumulation of debris are warranted.	BAL-12.5
>12.5 ≤19	Attack by burning debris is significant with radiant heat flux (not greater than 19kW/m ²) threatening some building elements (such as screened glass). Specific construction requirements for embers and radiant heat are warranted.	BAL-19
>19 ≤29	Attack by burning debris is significant and radiant heat flux (not greater than 29kW/m ²) threatens building integrity. Specific construction requirements for ember and higher levels of radiant heat are warranted. Some flame contact is possible.	BAL-29
>29 ≤40	Radiant heat flux and potential flame contact could threaten building integrity.	BAL-40
>40	Significant radiant heat and significantly higher likelihood of flame contact from the fire front will threaten building integrity and result in significant risk to residents.	BAL-FZ

Note: Attack from burning debris increases with the Bush Fire Attack Level. Source AS 3959.

A1.8 Shielding

Where an elevation is shielded from direct radiant heat arising from bush fire attack, then the construction requirements for that elevation can be reduced to the next lower BAL.

Proposals to apply radiant heat shielding from another structure must be accompanied by a detailed performance based solution addressing siting, view factor exposure and consideration of the potential fire spread from adjoining structures.

An elevation is considered to not be exposed to the source of bush fire attack if the line of sight between that elevation and the source of bush fire attack are obstructed by another part of the building.

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

The construction requirements for a shielded elevation shall not be less than that required for BAL-12.5.

Reduced construction requirements do not apply where any elevation is BAL-FZ unless justified with an appropriate performance based demonstration of the shielding.

Figure A1.8a

Radiant heat impact and shielding.

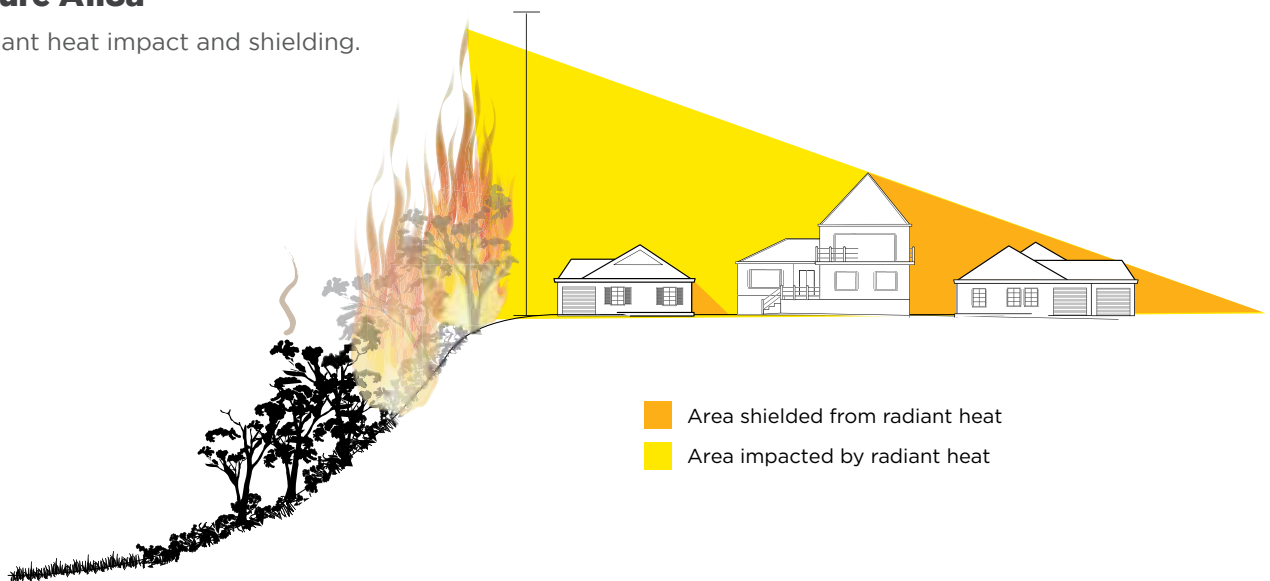
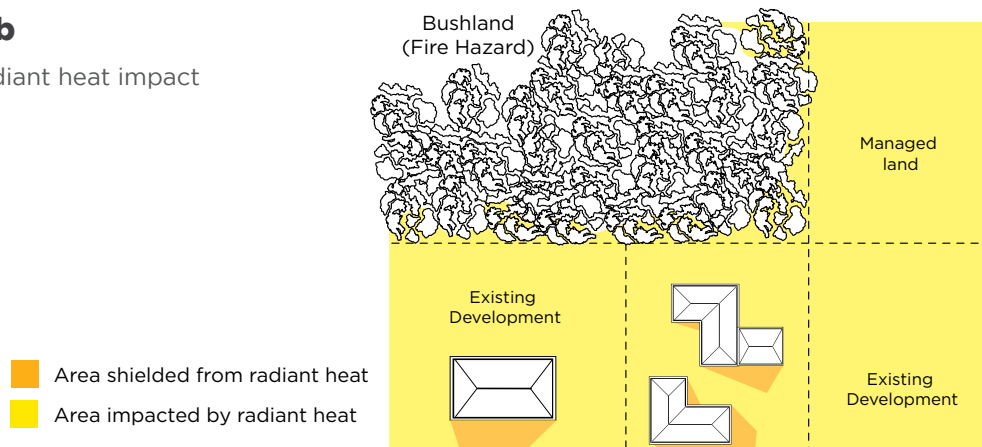


Figure A1.8b

Plan view of radiant heat impact and shielding.



A1.9 Exotic vegetation

In certain parts of NSW there are many communities of exotic vegetations that may cover large areas.

The four main exotic species include:

- **Camphor Laurel** *Cinnamomum camphora*: (large tree);
- **Privet** *Ligustrum sinense*, *Ligustrum lucidum*: (large shrub);
- **Lantana** *Lantana camara*, *Lantana montevidensis*: (woody vine); and
- **Running Bamboo** *Phyllostachys spp*: (large grass).

Check with the local Council for additional weed and exotic vegetation information for your area.

These plant species have been declared environmental weeds as their control is significantly challenging. They generally occupy rich alluvial and volcanic soils. Under adverse fire weather conditions these plants can contribute to the intensity of bush fires.

Camphor Laurel trees have a significant amount of leaf fall, especially when stressed by drought or frost.

Anecdotal evidence obtained from previous fire events indicates that although these trees generally do not carry a canopy fire, they commonly support intense surface fires.

Exotic species display similar fire behaviour characteristics to some of the native vegetation classifications with lower fuel loads. Table A1.9 can be used to convert the vegetation formations and fuel loads where the predominant vegetation formation is demonstrated over a distance of 140 metres to be an exotic species. Where a mixture of exotic and native vegetation exists, the vegetation fuel loads having the most influence on fire behaviour will apply.

For other exotic vegetation types not identified in Table A1.9, an assessment should be undertaken to determine the most appropriate appropriate fuel loads to apply. This should take into account the structure and fuel loads and may require consultation with the NSW RFS.

Table A1.9

Exotic vegetation conversions

PREDOMINANT VEGETATION TYPE	< or equal to 70% canopy cover	>70% canopy cover
	Vegetation formation in AS 3959	
Exotic vegetation (Camphor Laurel, Privet) or woody weeds (such as Lantana) mix	Woodland	Rainforest
Rainforest or woody weeds (such as Lantana) mix	Woodland	Rainforest
Bamboo mixed with exotic vegetation	Tall heath	Woodland
Bamboo mixed with rainforest vegetation	Woodland	Rainforest

A1.10 Low threat vegetation – exclusions

Modified landscapes, coastal wetlands and riparian areas vary significantly in structure and composition, but are generally considered as bush fire hazards, with the exception of saline wetlands. The following exclusions of AS 3959 apply, and are not required to be considered for the purposes of PBP, as detailed below:

- Single areas of vegetation less than 1 hectare in area and greater than 100 metres separation from other areas of Category 1 or 2 vegetation.
- Multiple areas of vegetation less than 0.25 hectares in area and not within 20m of the site, or each other or of other areas of vegetation being classified vegetation.
- Strips of vegetation less than 20 metres in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20m of the site or 2 each other, or other areas of vegetation being Category 1, 2 or 3 vegetation.
- Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load, including 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, arboretums, commercial nurseries, nature strips and windbreaks.
Note: 1. Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bush fire attack (recognizable as short cropped grass for example, to a nominal height of 100 mm). 2. A windbreak is considered a single row of planted trees located on a boundary and used as a screen or to reduce the effect of wind on the leeward side of the trees.
- Existing areas of managed gardens and lawns within curtilage of buildings.
- Non-vegetated areas, including waterways, roads, footpaths, buildings and rocky outcrops.

A1.11 Assessing remnant bushland and narrow vegetation corridors

The size and shape of small areas of vegetation influences the behaviour of bush fires and the associated risk to the built environment. Small or narrow parcels of vegetation have less opportunity to support fully developed bush fires because of their limited size.

There are two recognized pathways for assessing remnant bushland or narrow vegetated corridors. An assessment can either follow the simplified approach or the short fire run approach. The two approaches should not normally be used simultaneously to assess a patch of vegetation.

A1.11.1 Simplified approach

The simplified approach provides an acceptable method for assessing remnant vegetation. Remnant vegetation is a parcel of vegetation with a size of less than 1 Ha or a shape that provides a potential fire run that could threaten buildings not exceeding 50m. These remnants are considered a low hazard and APZ setbacks and building construction standards for these may be the same as for rainforests.

The effective slope is to be determined under the remnant that provides the most significant bush fire behavior.

A1.11.2 Short fire run

Small or narrow parcels of vegetation that are less likely to support fully developed bush fires are referred to as a short fire run (SFR).

Before any SFR proposal is developed, the NSW RFS should be consulted for their agreement that the SFR approach is appropriate for the parcels being considered.

Assessment of SFRs is undertaken by determining the reduced head fire width and flame length of the SFR, as appropriate, then calculating the amount of radiant heat impacting the site. From this modelling, APZs may be calculated which are less than those required for larger bushland parcels.

The SFR method is based on AS 3959 Method 2.

Proposals for the SFR methodology need to be prepared as a performance based solution and should go through the BFDB process.

A1.12 Comprehensive APZ, BAL and vegetation class tables

The following pages contain detailed tables for determining BALs, minimum distances for APZs, and vegetation fuel loads, as listed below.

TABLE INDEX

SFPP developments

A1.12.1	Minimum distances for APZs - SFPP developments	≤10kW/m ² @ 1200K
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Residential subdivision

A1.12.2	Minimum distances for APZs - residential development FFDI 100 areas	≤29kW/m ² @ 1090K
A1.12.3	Minimum distances for APZs - residential development FFDI 80 areas	≤29kW/m ² @ 1090K
A1.12.4	Allowable Outer Protection Area distances (m), within an APZ for forest vegetation	

Residential development

A1.12.5	Determination of BALs - FFDI 100 - residential developments	
A1.12.6	Determination of BALs - FFDI 80 - residential developments	
A1.12.7	Determination of BALs - FFDI 50 - residential developments	

A1.12.8	Vegetation formation details	
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Table A1.12.1

Minimum distances for APZs - SFPP developments (≤10kW/m², 1200K)

KEITH VEGETATION FORMATION	EFFECTIVE SLOPE				
	Up slopes and flat	>0°-5°	>5°-10°	>10°-15°	>15°-20°
	Distance (m) from the asset to the predominant vegetation formation				
Rainforest	38	47	57	69	81
Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	67	79	93	100	100
Grassy and Semi-Arid Woodland (including Mallee)	42	50	60	72	85
Forested Wetland (excluding Coastal Swamp Forest)	34	42	51	62	73
Tall Heath	50	56	61	67	72
Short Heath	33	37	41	45	49
Arid-Shrublands (acacia and chenopod)	24	27	30	34	37
Freshwater Wetlands	19	22	25	28	30
Grassland	36	40	45	50	55

Table A1.12.2Minimum distances for APZs – residential development, FFDI 100 areas ($\leq 29\text{kW/m}^2$, 1090K)

KEITH VEGETATION FORMATION	EFFECTIVE SLOPE				
	Up slopes and flat	>0°-5°	>5°-10°	>10°-15°	>15°-20°
	Distance (m) from the asset to the predominant vegetation formation				
Rainforest	11	14	18	23	30
Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	24	29	36	45	56
Grassy and Semi-Arid Woodland (including Mallee)	12	16	20	25	32
Forested Wetland (excluding Coastal Swamp Forest)	10	12	16	20	26
Tall Heath	16	18	20	22	25
Short Heath	9	10	12	13	15
Arid-Shrublands (acacia and chenopod)	6	7	8	9	10
Freshwater Wetlands	5	6	6	7	8
Grassland	10	12	13	15	17

Table A1.12.3Minimum distances for APZs – residential development, FFDI 80 areas ($\leq 29\text{kW/m}^2$, 1090K)

KEITH VEGETATION FORMATION	EFFECTIVE SLOPE				
	Up slopes and flat	>0°-5°	>5°-10°	>10°-15°	>15°-20°
	Distance (m) from the asset to the predominant vegetation formation				
Rainforest	9	12	15	20	25
Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	20	25	31	39	48
Grassy and Semi-Arid Woodland (including Mallee)	11	13	17	21	27
Forested Wetland (excluding Coastal Swamp Forest)	8	10	13	17	22
Tall Heath	16	18	20	22	25
Short Heath	9	10	12	13	15
Arid-Shrublands (acacia and chenopod)	6	7	8	9	10
Freshwater Wetlands	5	6	6	7	8
Grassland	10	11	12	14	16

Table A1.12.4

Allowable Outer Protection Area distances (m), within an APZ for forest vegetation

VEGETATION	UPSLOPE/FLAT	>0°-5°	>5°-10°	>10°-15°	>15°-20°
Forests FFDI 100 - subdivision	10	10	15	20	25
Forests FFDI 80 - subdivision	10	10	15	15	20
Forests SFPP	20	25	25	25	15

Table A1.12.5

Determination of BAL, FFDI 100 – residential developments

KEITH VEGETATION FORMATION		BUSH FIRE ATTACK LEVEL (BAL)				
		BAL-FZ	BAL-40	BAL-29	BAL-19	BAL-12.5
		Distance (m) asset to predominant vegetation class				
ALL UPSLOPE AND FLAT LAND	Rainforest	< 8	8 -< 11	11 -< 16	16 -< 23	23 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 18	18 -< 24	24 -< 33	33 -< 45	45 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 9	9 -< 12	12 -< 18	18 -< 26	26 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 7	7 -< 10	10 -< 14	14 -< 21	21 -< 100
	Tall Heath	< 12	12 -< 16	16 -< 23	23 -< 32	32 -< 100
	Short Heath	< 7	7 -< 9	9 -< 14	14 -< 20	20 -< 100
	Arid-Shrublands (acacia and chenopod)	< 5	5 -< 6	6 -< 9	9 -< 14	14 -< 100
	Freshwater Wetlands	< 4	4 -< 5	5 -< 7	7 -< 11	11 -< 100
	Grassland	< 8	8 -< 10	10 -< 15	15 -< 22	22 -< 50
> 0 > 5 DEGREES – DOWNSLOPE	Rainforest	< 11	11 -< 14	14 -< 21	21 -< 29	29 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 22	22 -< 29	29 -< 40	40 -< 54	54 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 12	12 -< 16	16 -< 23	23 -< 32	32 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 9	9 -< 12	12 -< 18	18 -< 26	26 -< 100
	Tall Heath	< 13	13 -< 18	18 -< 26	26 -< 36	36 -< 100
	Short Heath	< 8	8 -< 10	10 -< 15	15 -< 22	22 -< 100
	Arid-Shrublands (acacia and chenopod)	< 5	5 -< 7	7 -< 11	11 -< 16	16 -< 100
	Freshwater Wetlands	< 4	4 -< 6	6 -< 8	8 -< 12	12 -< 100
	Grassland	< 9	9 -< 12	12 -< 17	17 -< 25	25 -< 50
> 5 > 10 DEGREES – DOWNSLOPE	Rainforest	< 14	14 -< 18	18 -< 26	26 -< 37	37 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 28	28 -< 36	36 -< 49	49 -< 65	65 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 15	15 -< 20	20 -< 28	28 -< 39	39 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 12	12 -< 16	16 -< 23	23 -< 33	33 -< 100
	Tall Heath	< 15	15 -< 20	20 -< 29	29 -< 40	40 -< 100
	Short Heath	< 9	9 -< 12	12 -< 18	18 -< 25	25 -< 100
	Arid-Shrublands (acacia and chenopod)	< 6	6 -< 8	8 -< 12	12 -< 18	18 -< 100
	Freshwater Wetlands	< 5	5 -< 6	6 -< 10	10 -< 14	14 -< 100
	Grassland	< 10	10 -< 13	13 -< 20	20 -< 28	28 -< 50
> 10 > 15 DEGREES – DOWNSLOPE	Rainforest	< 17	17 -< 23	23 -< 34	34 -< 46	46 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 36	36 -< 45	45 -< 60	60 -< 77	77 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 19	19 -< 25	25 -< 36	36 -< 49	49 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 15	15 -< 20	20 -< 29	29 -< 41	41 -< 100
	Tall Heath	< 17	17 -< 22	22 -< 32	32 -< 44	44 -< 100
	Short Heath	< 10	10 -< 13	13 -< 20	20 -< 29	29 -< 100
	Arid-Shrublands (acacia and chenopod)	< 7	7 -< 9	9 -< 14	14 -< 20	20 -< 100
	Freshwater Wetlands	< 5	5 -< 7	7 -< 11	11 -< 16	16 -< 100
	Grassland	< 11	11 -< 15	15 -< 23	23 -< 32	32 -< 50
> 15 > 20 DEGREES – DOWNSLOPE	Rainforest	< 23	23 -< 30	30 -< 42	42 -< 56	56 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 46	46 -< 56	56 -< 73	73 -< 92	92 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 24	24 -< 32	32 -< 44	44 -< 59	59 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 19	19 -< 26	26 -< 37	37 -< 50	50 -< 100
	Tall Heath	< 19	19 -< 25	25 -< 36	36 -< 49	49 -< 100
	Short Heath	< 11	11 -< 15	15 -< 23	23 -< 32	32 -< 100
	Arid-Shrublands (acacia and chenopod)	< 7	7 -< 10	10 -< 16	16 -< 23	23 -< 100
	Freshwater Wetlands	< 6	6 -< 8	8 -< 13	13 -< 18	18 -< 100
	Grassland	< 13	13 -< 17	17 -< 26	26 -< 36	36 -< 50

Table A1.12.6

Determination of BAL, FFDI 80 – residential development

KEITH VEGETATION FORMATION		BUSH FIRE ATTACK LEVEL (BAL)				
		BAL-FZ	BAL-40	BAL-29	BAL-19	BAL-12.5
		Distance (m) asset to predominant vegetation class				
ALL UPSLOPE AND FLAT LAND	Rainforest	< 7	7 -< 9	9 -< 14	14 -< 20	20 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 15	15 -< 20	20 -< 29	29 -< 40	40 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 8	8 -< 11	11 -< 16	16 -< 22	22 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 6	6 -< 8	8 -< 12	12 -< 18	18 -< 100
	Tall Heath	< 12	12 -< 16	16 -< 23	23 -< 32	32 -< 100
	Short Heath	< 7	7 -< 9	9 -< 14	14 -< 20	20 -< 100
	Arid-Shrublands (acacia and chenopod)	< 5	5 -< 6	6 -< 9	9 -< 14	14 -< 100
	Freshwater Wetlands	< 4	4 -< 5	5 -< 7	7 -< 11	11 -< 100
	Grassland	< 7	7 -< 10	10 -< 14	14 -< 20	20 -< 50
> 0 > 5 DEGREES – DOWNSLOPE	Rainforest	< 9	9 -< 12	12 -< 17	17 -< 25	25 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 19	19 -< 25	25 -< 35	35 -< 47	47 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 10	10 -< 13	13 -< 19	19 -< 28	28 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 8	8 -< 10	10 -< 15	15 -< 22	22 -< 100
	Tall Heath	< 13	13 -< 18	18 -< 26	26 -< 36	36 -< 100
	Short Heath	< 8	8 -< 10	10 -< 15	15 -< 22	22 -< 100
	Arid-Shrublands (acacia and chenopod)	< 5	5 -< 7	7 -< 11	11 -< 16	16 -< 100
	Freshwater Wetlands	< 4	4 -< 6	6 -< 8	8 -< 12	12 -< 100
	Grassland	< 8	8 -< 11	11 -< 16	16 -< 23	23 -< 50
> 5 > 10 DEGREES – DOWNSLOPE	Rainforest	< 11	11 -< 15	15 -< 22	22 -< 32	32 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 24	24 -< 31	31 -< 43	43 -< 57	57 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 12	12 -< 17	17 -< 24	24 -< 34	34 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 10	10 -< 13	13 -< 20	20 -< 28	28 -< 100
	Tall Heath	< 15	15 -< 20	20 -< 29	29 -< 40	40 -< 100
	Short Heath	< 9	9 -< 12	12 -< 18	18 -< 25	25 -< 100
	Arid-Shrublands (acacia and chenopod)	< 6	6 -< 8	8 -< 12	12 -< 18	18 -< 100
	Freshwater Wetlands	< 5	5 -< 6	6 -< 10	10 -< 14	14 -< 100
	Grassland	< 9	9 -< 12	12 -< 18	18 -< 26	26 -< 50
> 10 > 15 DEGREES – DOWNSLOPE	Rainforest	< 14	14 -< 20	20 -< 29	29 -< 40	40 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 30	30 -< 39	39 -< 52	52 -< 68	68 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 16	16 -< 21	21 -< 31	31 -< 42	42 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 12	12 -< 17	17 -< 25	25 -< 35	35 -< 100
	Tall Heath	< 17	17 -< 22	22 -< 32	32 -< 44	44 -< 100
	Short Heath	< 10	10 -< 13	13 -< 20	20 -< 29	29 -< 100
	Arid-Shrublands (acacia and chenopod)	< 7	7 -< 9	9 -< 14	14 -< 20	20 -< 100
	Freshwater Wetlands	< 5	5 -< 7	7 -< 11	11 -< 16	16 -< 100
	Grassland	< 10	10 -< 14	14 -< 21	21 -< 30	30 -< 50
> 15 > 20 DEGREES – DOWNSLOPE	Rainforest	< 19	19 -< 25	25 -< 36	36 -< 49	49 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 38	38 -< 48	48 -< 63	63 -< 81	81 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 20	20 -< 27	27 -< 38	38 -< 52	52 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 16	16 -< 22	22 -< 32	32 -< 43	43 -< 100
	Tall Heath	< 19	19 -< 25	25 -< 36	36 -< 49	49 -< 100
	Short Heath	< 11	11 -< 15	15 -< 23	23 -< 32	32 -< 100
	Arid-Shrublands (acacia and chenopod)	< 7	7 -< 10	10 -< 16	16 -< 23	23 -< 100
	Freshwater Wetlands	< 6	6 -< 8	8 -< 13	13 -< 18	18 -< 100
	Grassland	< 12	12 -< 16	16 -< 24	24 -< 34	34 -< 50

Table A1.12.7

Determination of BAL, FFDI 50 – alpine areas

KEITH VEGETATION FORMATION		BUSH FIRE ATTACK LEVEL (BAL)				
		BAL-FZ	BAL-40	BAL-29	BAL-19	BAL-12.5
		Distance (m) asset to predominant vegetation class				
ALL UPSLOPE AND FLAT LAND	Rainforest	< 5	5 -< 7	7 -< 10	10 -< 15	15 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 11	11 -< 15	15 -< 22	22 -< 30	30 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 6	6 -< 8	8 -< 12	12 -< 17	17 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 5	5 -< 6	6 -< 9	9 -< 13	13 -< 100
	Tall Heath	< 12	12 -< 16	16 -< 23	23 -< 32	32 -< 100
	Short Heath	< 7	7 -< 9	9 -< 14	14 -< 20	20 -< 100
	Arid-Shrublands (acacia and chenopod)	< 5	5 -< 6	6 -< 9	9 -< 14	14 -< 100
	Freshwater Wetlands	< 4	4 -< 5	5 -< 7	7 -< 11	11 -< 100
	Alpine Complex	< 4	4 -< 6	6 -< 8	8 -< 12	12 -< 100
	Grassland	< 6	6 -< 8	8 -< 11	11 -< 17	17 -< 50
> 0 > 5 DEGREES – DOWNSLOPE	Rainforest	< 6	6 -< 8	8 -< 12	12 -< 18	18 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 14	14 -< 18	18 -< 26	26 -< 36	36 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 7	7 -< 10	10 -< 14	14 -< 21	21 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 6	6 -< 8	8 -< 11	11 -< 16	16 -< 100
	Tall Heath	< 13	13 -< 18	18 -< 26	26 -< 36	36 -< 100
	Short Heath	< 8	8 -< 10	10 -< 15	15 -< 22	22 -< 100
	Arid-Shrublands (acacia and chenopod)	< 5	5 -< 7	7 -< 11	11 -< 16	16 -< 100
	Freshwater Wetlands	< 4	4 -< 6	6 -< 8	8 -< 12	12 -< 100
	Alpine Complex	< 5	5 -< 6	6 -< 10	10 -< 14	14 -< 100
	Grassland	< 7	7 -< 9	9 -< 13	13 -< 19	19 -< 50
> 5 > 10 DEGREES – DOWNSLOPE	Rainforest	< 8	8 -< 11	11 -< 16	16 -< 23	23 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 17	17 -< 22	22 -< 32	32 -< 43	43 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 9	9 -< 12	12 -< 17	17 -< 25	25 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 7	7 -< 9	9 -< 14	14 -< 20	20 -< 100
	Tall Heath	< 15	15 -< 20	20 -< 29	29 -< 40	40 -< 100
	Short Heath	< 9	9 -< 12	12 -< 18	18 -< 25	25 -< 100
	Arid-Shrublands (acacia and chenopod)	< 6	6 -< 8	8 -< 12	12 -< 18	18 -< 100
	Freshwater Wetlands	< 5	5 -< 6	6 -< 10	10 -< 14	14 -< 100
	Alpine Complex	< 5	5 -< 7	7 -< 11	11 -< 16	16 -< 100
	Grassland	< 7	7 -< 10	10 -< 15	15 -< 22	22 -< 50
> 10 > 15 DEGREES – DOWNSLOPE	Rainforest	< 10	10 -< 13	13 -< 20	20 -< 29	29 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 21	21 -< 28	28 -< 39	39 -< 52	52 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 11	11 -< 15	15 -< 22	22 -< 31	31 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 9	9 -< 12	12 -< 18	18 -< 26	26 -< 100
	Tall Heath	< 17	17 -< 22	22 -< 32	32 -< 44	44 -< 100
	Short Heath	< 10	10 -< 13	13 -< 20	20 -< 29	29 -< 100
	Arid-Shrublands (acacia and chenopod)	< 7	7 -< 9	9 -< 14	14 -< 20	20 -< 100
	Freshwater Wetlands	< 5	5 -< 7	7 -< 11	11 -< 16	16 -< 100
	Alpine Complex	< 6	6 -< 8	8 -< 12	12 -< 18	18 -< 100
	Grassland	< 8	8 -< 12	12 -< 17	17 -< 25	25 -< 50
> 15 > 20 DEGREES – DOWNSLOPE	Rainforest	< 13	13 -< 17	17 -< 26	26 -< 36	36 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 26	26 -< 34	34 -< 47	47 -< 63	63 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 14	14 -< 19	19 -< 28	28 -< 38	38 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 7	7 -< 15	15 -< 23	23 -< 32	32 -< 100
	Tall Heath	< 19	19 -< 25	25 -< 36	36 -< 49	49 -< 100
	Short Heath	< 11	11 -< 15	15 -< 23	23 -< 32	32 -< 100
	Arid-Shrublands (acacia and chenopod)	< 7	7 -< 10	10 -< 16	16 -< 23	23 -< 100
	Freshwater Wetlands	< 6	6 -< 8	8 -< 13	13 -< 18	18 -< 100
	Alpine Complex	< 7	7 -< 9	9 -< 14	14 -< 21	21 -< 100
	Grassland	< 10	10 -< 13	13 -< 20	20 -< 28	28 -< 50

Table A1.12.8

Vegetation formation details.

VEGETATION	SURFACE AND ELEVATED (t/ha)	OVERALL FUEL LOAD INCLUDING BARK AND CANOPY (t/ha)	VEGETATION HEIGHT (m)
Rainforest	10	13.2	NA
Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	22	36.1	NA
Grassy and Semi-Arid Woodland (including Mallee)	10.5	20.2	NA
Forested Wetland (excluding Coastal Swamp Forest)	8.2	15.1	NA
Tall Heath	36.9	36.9	3
Short Heath	15	15	1.5
Arid-Shrublands (acacia and chenopod)	6.2	6.2	1.5
Freshwater Wetlands	4.4	4.4	1
Alpine Complex	5.8	5.8	1
Grassland	6	6	NA

APPENDIX 2

SUBMISSION REQUIREMENTS, PERFORMANCE BASED SOLUTIONS AND BUSH FIRE DESIGN BRIEFS

This appendix details the information requirements for the range of DAs on BFPL and the submission requirements where a performance based solution is proposed.

A2.1 Submission requirements for a BFSA

The detailed information to be contained within a Bush Fire Assessment Report submitted to the NSW RFS as outlined in RF Reg cl.44 is:

- (a) a description (including the address) of the property on which the development the subject of the application is proposed to be carried out;
- (b) a classification of the vegetation on and surrounding the property (out to a distance of 140 metres from the boundaries of the property) in accordance with the system for classification of vegetation contained in Planning for Bush Fire Protection;
- (c) an assessment of the slope of the land on and surrounding the property (out to a distance of 100 metres from the boundaries of the property);
- (d) identification of any significant environmental features on the property;
- (e) the details of any threatened species, population or ecological community identified under the *Threatened Species Conservation Act 1995* that is known to the applicant to exist on the property;
- (f) the details and location of any Aboriginal object (within the meaning of the *National Parks and Wildlife Act 1974*) or Aboriginal place (within the meaning of that Act) that is known to the applicant to be situated on the property;
- (g) a bush fire assessment for the proposed development (including the methodology used in the assessment) that addresses the following matters:
 - (i) the extent to which the development is to provide for setbacks, including Asset Protection Zones;
 - (ii) the siting and adequacy of water supplies for fire fighting;
 - (iii) the capacity of public roads in the vicinity to handle increased volumes of traffic in the event of a bush fire emergency;
 - (iv) whether or not public roads in the vicinity that link with the fire trail network have two-way access;
 - (v) the adequacy of arrangements for access to and egress from the development site for the purposes of an emergency response;
 - (vi) the adequacy of bush fire maintenance plans and fire emergency procedures for the development site;
 - (vii) the construction standards to be used for building elements in the development;
 - (viii) the adequacy of sprinkler systems and other fire protection measures to be incorporated into the development;
 - (h) an assessment of the extent to which the proposed development conforms with or deviates from the standards, specific objectives, performance criteria and acceptable solutions set out in Chapters 5-8 of PBP; and
 - (i) identify any fire trails that exist on the property that are on the Register of Certified Fire Trails under RF Act s.62O.

A2.1.1 Subdivisions

The submission requirements given above for a BFSA are applicable to subdivision on BFPL. Additional considerations for subdivision are outlined below.

In order to allow for flexibility at the building design stage of development, building envelopes are not always identified at the subdivision stage. A conceptual plan drawn to scale identifying building envelopes may be requested to demonstrate that individual lots are capable of providing a suitable APZ and compliant BALs. Unless otherwise specified, a building envelope of 15m by 15m will be assumed.

Where staged development is proposed, the bush fire assessment report must explain how the provisions of this document will be satisfied for each stage of the development. This is particularly important to ensure that appropriate APZs will be provided at all stages of development. Special attention must also be given to the provision of emergency access and egress and the provision of water supplies.

In relation to significant environmental features, threatened species, endangered populations, endangered ecological communities and Aboriginal heritage issues, sufficient information is required to ascertain that environmental issues are not a constraint to development. Approval for the loss or removal of environmental assets is the role of the consent authority.

A2.2 Submission requirements for infill development

Infill development proposals on BFPL must be accompanied by bush fire assessments and reports demonstrating compliance with PBP.

In particular, the following must be addressed:

- a statement that the site is BFPL;
- the location, extent and vegetation formation of any bushland on or within 140 metres of the site;
- the slope and aspect of the site and of any BFPL within 100 metres of the site;
- any features on or adjoining the site that may mitigate the impact of a bush fire on the proposed development;
- a statement assessing the likely environmental impact of any proposed BPMs;
- a site plan showing access, water supplies, APZs, BAL requirements and building footprint in relation to the bush fire hazards; and
- calculated BAL construction levels.

For smaller proposals, this can be done relatively simply using the NSW RFS *Single Dwelling Application Kit* which can be found on the NSW RFS website www.rfs.nsw.gov.au and is to be accompanied by a diagram identifying the requirements detailed above.

For more complex applications or performance based solutions, a recognised consultant should be engaged to prepare a bush fire assessment report and a Bush Fire Management Plan. (see A2.6).

A2.3 Submission requirements for Complying Development

Some SEPPs and LEPs permit certain development on BFPL where the appropriate standards are met.

Complying Development may be undertaken on lower risk BFPL where the appropriate construction requirements for BFPL and all other relevant development standards have been met. It should however be noted that the NSW RFS is not a participant in any part of this approval process.

For Complying Development, a BAL Certificate from the local council or a recognised consultant stating that the BAL of the development is not BAL-40 or BAL-FZ as applicable must be obtained prior to the issue of a Complying Development Certificate (CDC). Although not required, the NSW RFS encourages BAL Certificates to state the relevant BAL that applies to the Complying Development in question.

Complying Development is not permitted on BAL-40 or BAL-FZ. If a development is assessed as being in BAL-40 or BAL-FZ then a DA will need to be lodged with the local council.

Specific development requirements and development standards have been added to the relevant SEPPs and LEPs that apply to new development, including alterations and additions, on lower risk BFPL.

A2.4 Submission requirements and assessment methods for performance based solutions

To achieve compliance with PBP, proposals must comply with either the acceptable solutions or a performance criteria.

For performance based applications, it must be demonstrated how the product, design or material can meet the performance criteria of this document including the intent of measures and also, the aim and objectives. All performance based solutions should be accompanied by a Bush Fire Management Plan (see A2.6).

A performance based solution will only comply with PBP when the assessment methods used satisfactorily demonstrate compliance with the performance criteria.

Performance based solutions must be assessed using one or more of the assessment methods. In some cases, the development of a performance based solution will include the BFDB process.

Assessment methods

Assessment methods are the means by which a proponent demonstrates that a solution achieves the performance criteria.

The assessment methods described below are applicable to the assessment of performance based solutions to determine that they comply with the relevant performance criteria, as appropriate.

- a. Evidence to support that the use of a material, form of construction or design meets the performance criteria as described in PBP;
- b. Verification methods such as a test, inspection, calculation or other method that determines whether a performance-based solution complies with the relevant performance criteria; and
- c. Comparison with the acceptable solutions.

All Verification Methods must be acceptable to the appropriate authority. NCC 2019 contains new Verification Methods that can be used to demonstrate compliance with the relevant NCC Performance Requirements for buildings in bush fire prone areas.

Where Verification Methods GV5 of Volume One or V2.7.2 of Volume Two of the NCC are used to demonstrate compliance with NSW GP5.1 (Volume One) or NSW P2.7.5 (Volume Two), this is considered to be a performance solution for the purposes of PBP and the proposal must be referred to the NSW RFS.

A2.5 Bush Fire Design Brief (BFDB)

A BFDB is the first step in a performance based solution and forms the basis of the ensuing analysis.

It is the process that defines the scope of work for the bush fire analysis and report. One of the main reasons for the BFDB is to translate performance criteria into objective parameters and criteria that can then be evaluated in the bush fire analysis.

The BFDB requires involvement of all relevant stakeholders and their agreement on the ground rules for the ensuing bush fire analysis. It is important to note that the BFDB usually precedes the detailed analysis and report, but may occur after the analysis has been completed as long as all relevant stakeholders agree on the parameters and criteria used. However, in order to minimise design risk, the BFDB should be undertaken before detailed analysis and documentation occurs.

The BFDB is an important part of the performance based design process, as it allows the objectives, proposed design, analysis methods, assumptions and acceptance criteria to be agreed on in order to validate the bush fire analysis. The compliance approach needs to be agreed on as part of the BFDB. The approach may be based on equivalency to the acceptable solutions, direct compliance with the performance criteria, or a combination.

The complexity of the BFDB will vary depending on the complexity of the bush fire issues being considered.

The process by which the BFDB is undertaken shall be documented as part of the bush fire analysis report.

The BFDB is not in itself an agreement as to the acceptability of the proposed solution. Rather, it focuses on the methods of analysis which will be used in evaluating whether the proposed design is adequate and appropriate.

The process undertaken for a BFDB should follow that for a Fire Engineering Brief described in the *International Fire Engineering Guidelines (2005)*

A2.6 Bush Fire Management Plan

Preparation of a Bush Fire Management Plan (BFMP) is recommended for developments in bush fire prone areas.

A BFMP should detail all bush fire safety aspects of the proposed development including:

- APZ locations and management details;
- Landscaping requirements including indicative design layout and vegetation density thresholds;
- Access provisions such as locations, passing bays and alternate emergency access;
- Water supplies and bush fire suppression systems (including drenching systems, static water supply, natural water sources etc.);
- Schedule of the BAL requirements and building footprints as well as any specific construction details (i.e. bush fire shutter operating instructions);
- Details regarding the Bush Fire Emergency Management and Evacuation Plan; and
- Any other essential bush fire safety requirements.

A2.7 Qualified consultants

EP&A Act 1979 s.4.14 and certain SEPPs allow councils and certifiers to utilise persons recognised by the NSW RFS as a qualified consultant in bush fire risk assessment.

Given the complexity of performance based solutions, it is recommended that they are undertaken and fully justified by qualified consultants.

In order for a consultant to be recognised by the NSW RFS as being qualified, they must demonstrate a number of requirements as part of a recognised accreditation scheme.

A2.8 Pre-DA advice

The NSW RFS provides a pre-DA advice service as a means for proponents of development to seek information and obtain clarity about the NSW RFS position on a proposal before a formal DA is lodged with the consent authority.

The pre-DA advice service is intended for more complex proposals which raise issues in relation to compliance with this document. This may involve instances where a performance based solution is proposed or where bush fire protection issues are raised in strategic or rezoning planning processes.

Further information on the pre-DA advice service can be found online at NSW RFS website www.rfs.nsw.gov.au.

APPENDIX 3

ACCESS

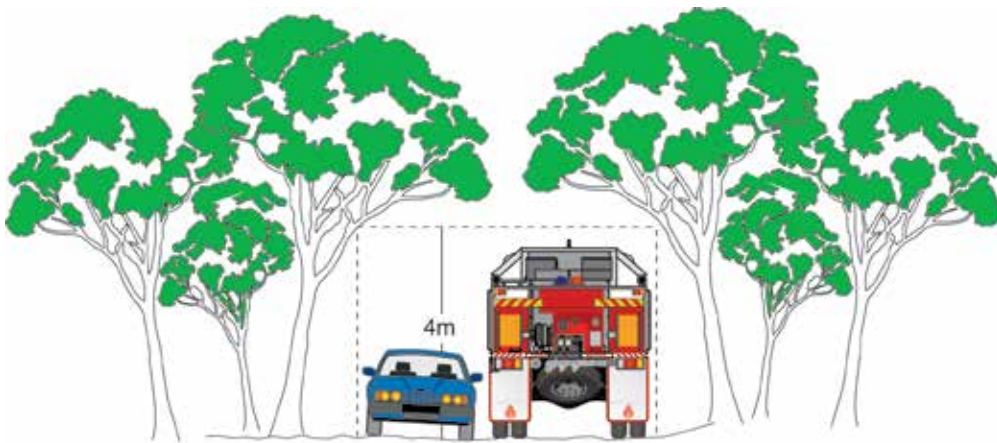
This appendix provides design principles for emergency service vehicle access.

A3.1 Vertical clearance

An unobstructed clearance height of 4 metres should be maintained above all access ways including clearance from building construction, archways, gateways and overhanging structures (e.g. ducts, pipes, sprinklers, walkways, signs and beams). This also applies to vegetation overhanging roads.

Figure A3.1

Vertical clearance.



A3.2 Vehicle turning requirements

Curved carriageways should be constructed using the minimum swept path as outlined in Table A3.2.

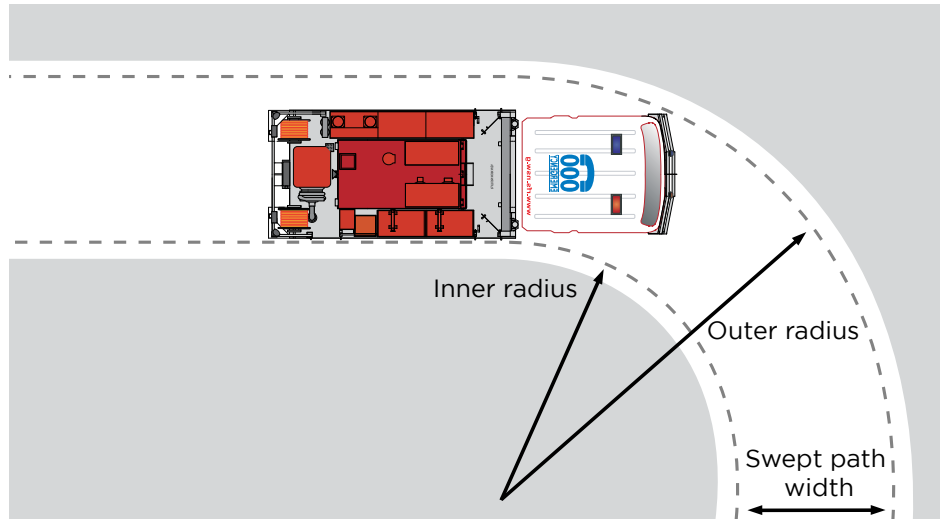
Table A3.2

Minimum curve radius for turning vehicles.

Curve radius (inside edge in metres)	Swept path (metres width)
< 40	4.0
40 - 69	3.0
70 - 100	2.7
> 100	2.5

Figure A3.2a

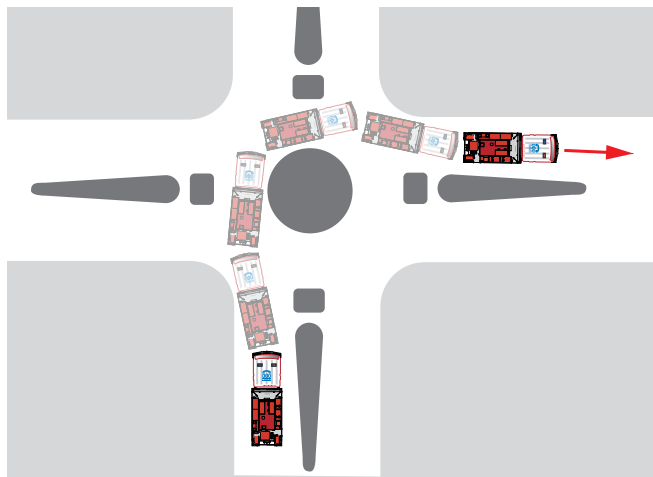
Swept path width for turning vehicles.



The radius dimensions given are for wall to wall clearance where body overhangs travel a wider arc than the wheel tracks (vehicle swept path). The swept path shall include an additional 500mm clearance either side of the vehicle.

Figure A3.2b

Roundabout swept path.



Example of a swept path as applied to a roundabout. The distance between inner and outer turning arcs allows for expected vehicle body swing of front and rear overhanging sections (the swept path).

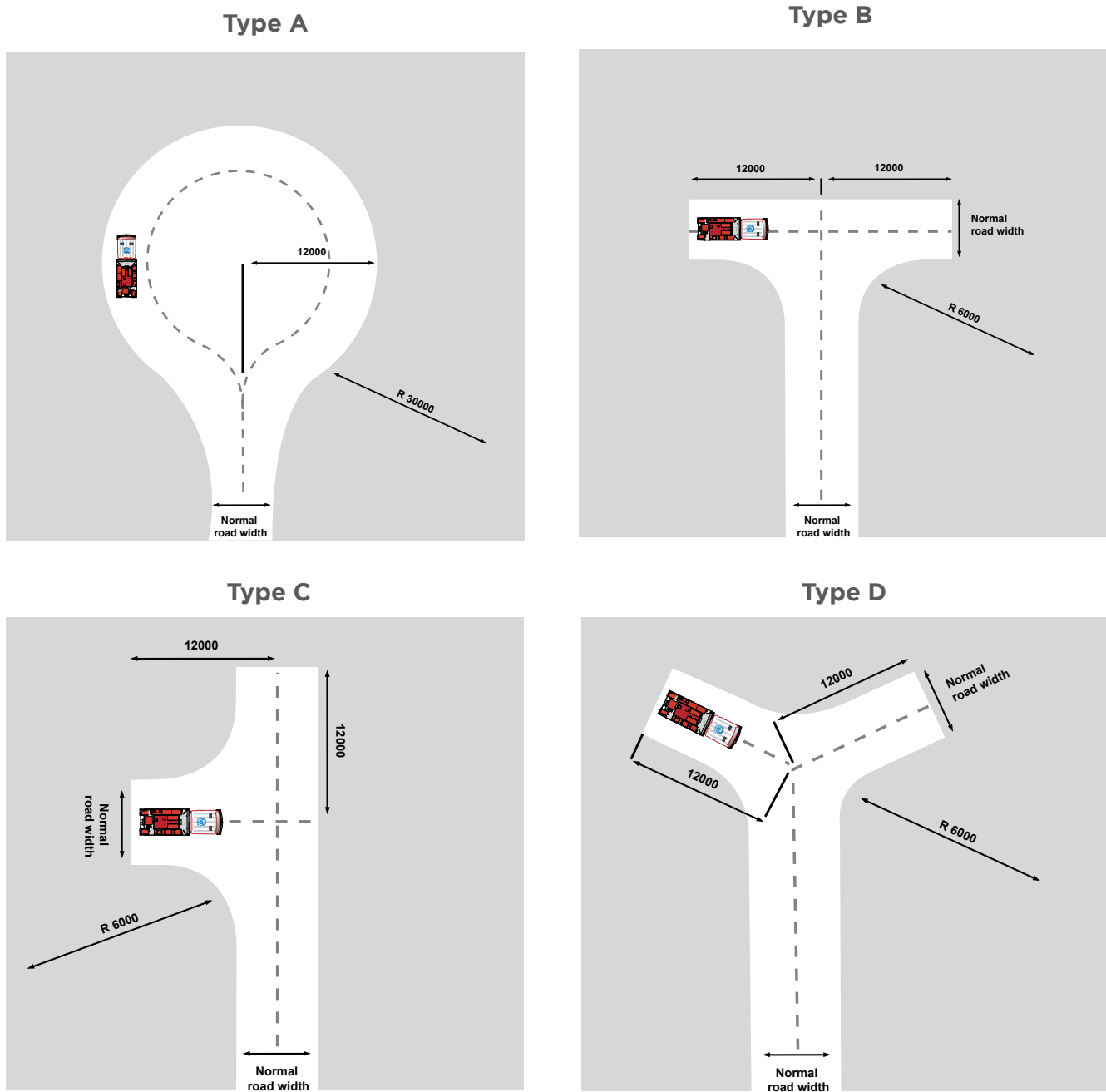
A3.3 Vehicle turning head requirements

Dead ends that are longer than 200m must be provided with a turning head area that avoids multipoint turns. "No parking" signs are to be erected within the turning head.

The minimum turning radius shall be in accordance with Table A3.2. Where multipoint turning is proposed the NSW RFS will consider the following options:

Figure A3.3

Multipoint turning options.



A3.4 Passing bays

The construction of passing bays, where required, shall be 20m in length and provide a minimum trafficable width at the passing point of 6m.

Figure A3.4

Passing bays can provide advantages when designed correctly. Poor design can and does severely impede access.



A3.5 Parking

Parking can create a pinch point in required access. The location of parking should be carefully considered to ensure fire appliance access is unimpeded. Hydrants shall be located outside of access ways and any parking areas to ensure that access is available at all times.

Figure A3.5

Hydrants and parking bays.

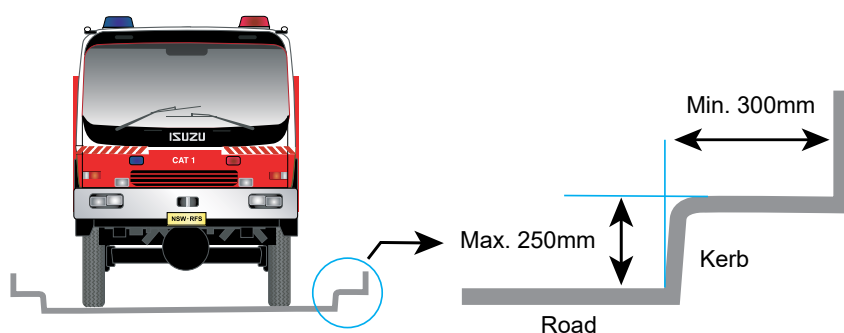


A3.6 Kerb dimensions

All kerbs constructed around access roads should be no higher than 250mm and free of vertical obstructions at least 300mm back from the kerb face to allow clearance for front and rear body overhang.

Figure A3.6

Carriageway kerb clearance dimensions.



A3.7 Services

Hydrant services should be located outside the carriageway and parking bays to permit traffic flow and access. Setup of standpipes within the carriageway may stop traffic flow. Hydrant services shall be located on the side of the road away from the bush fire threat where possible.

A3.8 Local Area Traffic Management (LATM)

The objective of LATM is to regulate traffic an acceptable level of speed and traffic volume within a local area.

Traffic engineers and planners should consider LATM devices when planning for local traffic control and their likely impact on emergency services. LATM devices by their nature are designed to restrict and impede the movement of traffic, especially large vehicles.

Where LATM devices are provided they are to be designed so that they do not impede fire vehicle access.

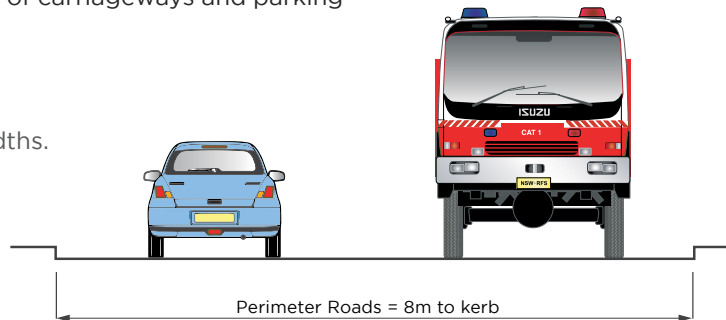
A3.9 Road types

A3.9.1 Perimeter Roads

Perimeter roads are to be provided with a minimum clear width of 8m. Parking and hydrants are to be provided outside of carriageways. Hydrants are to be located outside of carriageways and parking areas.

Figure A3.9a

Perimeter road widths.

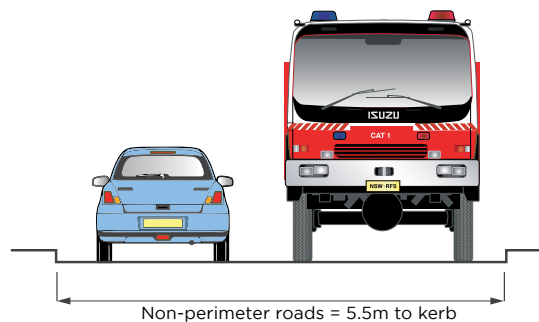


A3.9.2 Non-perimeter Roads

Non-perimeter roads shall be provided with a minimum clear width of 5.5m. Parking is to be provided outside of the carriageway and hydrants are not to be located in carriageways or parking areas.

Figure A3.9b

Non-perimeter road widths.



A3.9.3 Property access

Property access roads are to be a minimum of 4m wide.

Figure A3.9c

Property access road widths.



APPENDIX 4

ASSET PROTECTION ZONE REQUIREMENTS

In combination with other BPMS, a bush fire hazard can be reduced by implementing simple steps to reduce vegetation levels. This can be done by designing and managing landscaping to implement an APZ around the property.

Careful attention should be paid to species selection, their location relative to their flammability, minimising continuity of vegetation (horizontally and vertically), and ongoing maintenance to remove flammable fuels (leaf litter, twigs and debris).

This Appendix sets the standards which need to be met within an APZ.

A4.1 Asset Protection Zones

An APZ is a fuel-reduced area surrounding a building or structure. It is located between the building or structure and the bush fire hazard.

For a complete guide to APZs and landscaping, download the NSW RFS document *Standards for Asset Protection Zones* at the NSW RFS Website www.rfs.nsw.gov.au.

An APZ provides:

- a buffer zone between a bush fire hazard and an asset;
- an area of reduced bush fire fuel that allows for suppression of fire;
- an area from which backburning or hazard reduction can be conducted; and
- an area which allows emergency services access and provides a relatively safe area for firefighters and home owners to defend their property.

Bush fire fuels should be minimised within an APZ. This is so that the vegetation within the zone does not provide a path for the spread of fire to the building, either from the ground level or through the tree canopy.

An APZ, if designed correctly and maintained regularly, will reduce the risk of:

- direct flame contact on the building;
- damage to the building asset from intense radiant heat; and
- ember attack.

The methodology for calculating the required APZ distance is contained within Appendix 1. The width of the APZ required will depend upon the development type and bush fire threat. APZs for new development are set out within Chapters 5, 6 and 7 of this document.

In forest vegetation, the APZ can be made up of an Inner Protection Area (IPA) and an Outer Protection Area (OPA).

A4.1.1 Inner Protection Areas (IPAs)

The IPA is the area closest to the building and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and act as a defensible space. Vegetation within the IPA should be kept to a minimum level. Litter fuels within the IPA should be kept below 1cm in height and be discontinuous.

In practical terms the IPA is typically the curtilage around the building, consisting of a mown lawn and well maintained gardens.

When establishing and maintaining an IPA the following requirements apply:

Trees

- tree canopy cover should be less than 15% at maturity;
- trees at maturity should not touch or overhang the building;
- lower limbs should be removed up to a height of 2m above the ground;
- tree canopies should be separated by 2 to 5m; and
- preference should be given to smooth barked and evergreen trees.

Shrubs

- create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided;
- shrubs should not be located under trees;
- shrubs should not form more than 10% ground cover; and
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

Grass

- grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and
- leaves and vegetation debris should be removed.

A4.1.2 Outer Protection Areas (OPAs)

An OPA is located between the IPA and the unmanaged vegetation. It is an area where there is maintenance of the understorey and some separation in the canopy. The reduction of fuel in this area aims to decrease the intensity of an approaching fire and restricts the potential for fire spread from crowns; reducing the level of direct flame, radiant heat and ember attack on the IPA.

Because of the nature of an OPA, they are only applicable in forest vegetation.

When establishing and maintaining an OPA the following requirements apply:

Trees

- tree canopy cover should be less than 30%; and
- canopies should be separated by 2 to 5m.

Shrubs

- shrubs should not form a continuous canopy; and
- shrubs should form no more than 20% of ground cover.

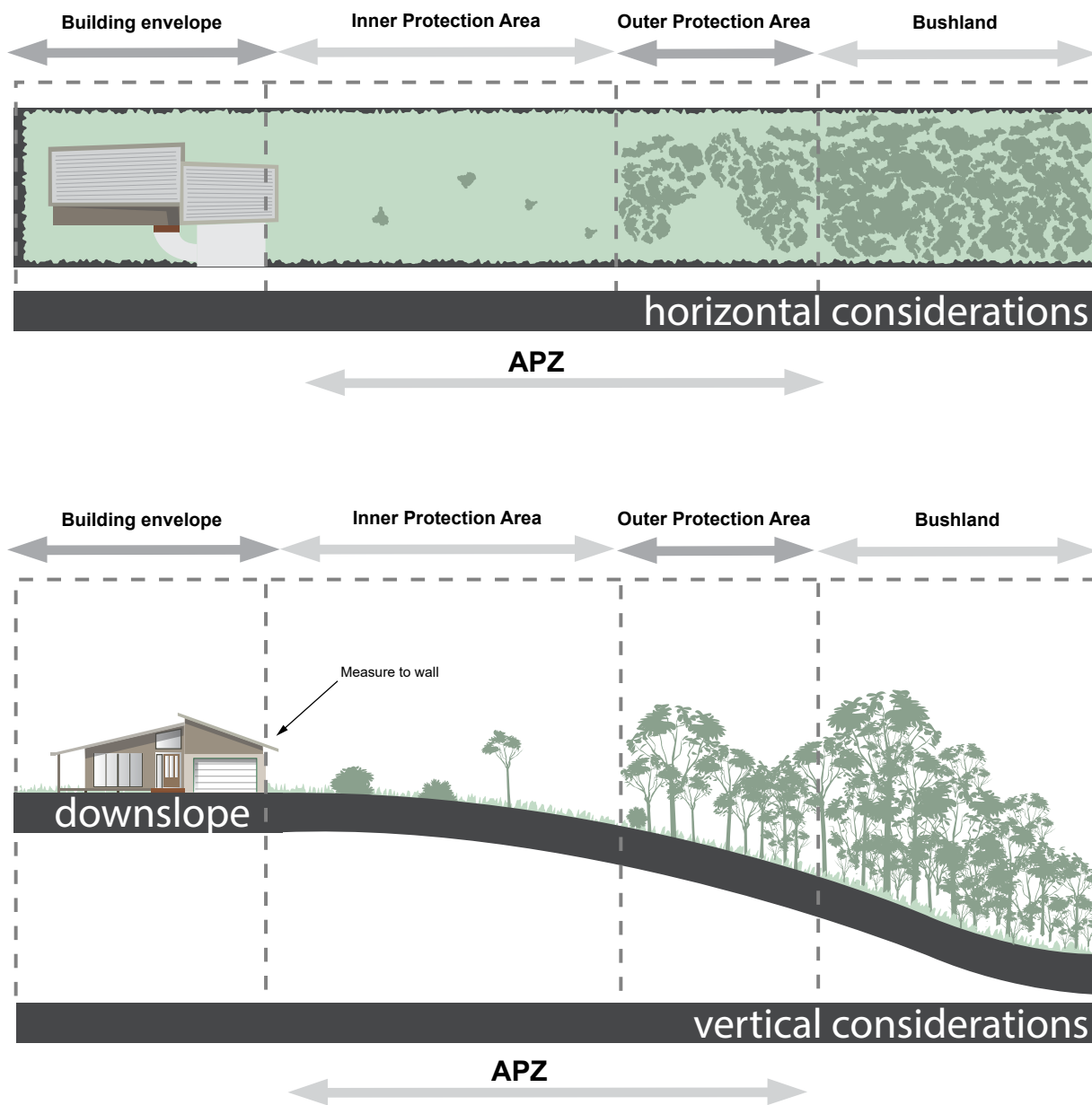
Grass

- grass should be kept mown to a height of less than 100mm; and
- leaf and other debris should be removed.

An APZ should be maintained in perpetuity to ensure ongoing protection from the impact of bush fires. Maintenance of the IPA and OPA as described above should be undertaken regularly, particularly in advance of the bush fire season.

Figure A4.1

Typical Inner and Outer Protection Areas.



ABBREVIATIONS, DEFINITIONS AND REFERENCES

Abbreviations

AS 3959

Australian Standard AS 3959:2018 *Construction of buildings in bush fire-prone areas*

AS 2419.1:2005

Australian Standard AS 2419.1:2005 *Fire hydrant installations System design, installation and commissioning*

AS/NZS 1221:1997

Australian Standard AS/NZS 1221:1997 *Fire hose reels*

AS 2441:2005

Australian Standard AS 2441:2005 *Installation of fire hose reels*

AS 3745:2010

Australian Standard AS 3745:2010 *Planning for emergencies in facilities*

AS/NZS 1530.8.1

Australian Standard AS 1530.8.1:2018 *Methods for fire tests on building materials, components and structures - Tests on elements of construction for buildings exposed to simulated bush fire attack - Radiant heat and small flaming sources*

AS/NZS 1530.8.2

Australian Standard AS 1530.8.2:2018 *Methods for fire tests on building materials, components and structures - Tests on elements of construction for buildings exposed to simulated bush fire attack - Large flaming sources*

AS/NZS 1596:2014

Australian Standard AS/NZS 1596:2014 *The storage and handling of LP Gas*

APZ Asset Protection Zone

BAL Bush Fire Attack Level

BCA Building Code of Australia

BFPL Bush fire prone land

BFPL Map Bush fire prone land map

BFDB Bush Fire Design Brief

BPM Bush fire protection measure

BFSA Bush fire safety authority

DA Development application

DCP Development Control Plan

DPIE NSW Department of Planning, Industry and Environment

EP&A Act *Environmental Planning and Assessment Act 1979*

FDI Fire Danger Index

FFDI Forest Fire Danger Index

GFDI Grassland Fire Danger Index

IPA Inner Protection Area

kW/m² Kilowatts per metre squared

LEP Local Environmental Plan

NASH National Association of Steel Framed Housing (2014) Steel Framed Construction in Bush Fire Areas

NCC National Construction Code

OPA Outer Protection Area

PBP *Planning for Bush Fire Protection 2019*

RF Act *Rural Fires Act 1997*

RF Reg *Rural Fires Regulation 2013*

NSW RFS NSW Rural Fire Service

SEPP State Environmental Planning Policy

SFPP Special fire protection purpose

SFR Short fire run

SSD State significant development

SSI State significant infrastructure

URA Urban Release Area

Definitions

A word or expression used in this document has the same meaning as it has in the *EP&A Act* or the Standard Instrument – Principal Local Environmental Plan, unless otherwise defined in this document.

References in this document to legislation or a policy, guideline or standard are taken to be references to that legislation or a policy, guideline or standard as amended from time to time.

Acceptable solution

Measures which have been deemed to meet the specified performance criteria.

Assembly point

An area or building or structure that is used to assemble people or that have evacuated from a site in an emergency situation.

Asset Protection Zone (APZ)

A fuel-reduced area surrounding a built asset or structure which provides a buffer zone between a bush fire hazard and an asset. The APZ includes a defensible space within which firefighting operations can be carried out. The size of the required APZ varies with slope, vegetation and FFDI.

Australian Standard AS 3959 (AS 3959)

AS 3959:2018 *Construction of buildings in bush fire-prone areas*, Standards Australia, 2018.

BAL certificate

A certificate issued to identify the BAL of a proposed development in the complying development process.

Bush fire assessment report

A report submitted with the DA which establishes compliance with PBP. The report determines the extent of bush fire attack and the proposed mitigation measures. See also RF Reg cl.44.

Bush Fire Attack Level (BAL)

A means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact. In the NCC, the BAL is used as the basis for establishing the requirements for construction to improve protection of building elements.

Bush fire

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

Bush fire attack

Attack by burning embers, radiant heat or flame generated by a bush fire.

Bush fire hazard

Any vegetation that has the potential to threaten lives, property or the environment.

Bush fire prone land (BFPL)

An area of land that can support a bush fire or is likely to be subject to bush fire attack, as designated on a bush fire prone land map.

Bush fire prone land map (BFPL)

A map prepared in accordance with NSW RFS requirements and certified by the Commissioner of the NSW RFS under EP&A Act 1979 s.10.3(2).

Bush fire protection measures (BPMs)

A range of measures used to minimise the risk from a bush fire that need to be complied with. BPMs include APZs, construction provisions, suitable access, water and utility services, emergency management and landscaping.

Bush fire risk

Is the likelihood and consequence of a bush fire igniting, spreading and causing life loss or damage to buildings of value to the community.

Bush fire safety authority (BFSA)

An approval by the Commissioner of the NSW RFS that is required for a subdivision for residential or rural residential purpose or for a SFPP development listed under section 100B of the RF Act.

Certifier

As defined in the *EP&A Act 1979*, those with authority to issue Part 6 certificates and Complying Development Certificates (CDCs).

Complying development

Complying Development is a combined planning and construction approval for specified development that can be determined through a assessment by a council or private accredited certifier.

Consent authority

As defined in the *EP&A Act 1979*, in relation to development consents, usually the local council.

Defendable space

An area adjoining a building that is managed to reduce combustible elements free from constructed impediments. It is a safe working environment in which efforts can be undertaken to defend the structure, before and after the passage of a bush fire.

Development

As defined in the *EP&A Act 1979*.

Development application (DA)

An application for consent to carry out development such as building, subdivision, or the use of a building or land.

Applications are normally made to the local council.

Development footprint

The building envelope or area shown on a plan on which buildings and associated APZs are proposed to be located.

Ecologically sustainable development

As defined in Section 6 of the *Protection of the Environment Administration Act (NSW) 1991*.

Effective slope

The land beneath the vegetation which most significantly effects fire behaviour, having regard to the vegetation present.

Exit

A doorway opening to a road or open space, as defined in the NCC.

Fire Danger Index (FDI)

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

PBP 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.

Grassland Fire Danger Index (GFDI) values are calculated by the McArthur Mk 4 Grassland Fire Danger Meter using the equations published by Purton, C.M., 1982.

Flame zone

The distance from a bush fire at which there is considered to be significant potential for sustained flame contact to a building. The flame zone is determined by the calculated distance at which the radiant heat from the design fire exceeds 40kW/m².

Grasslands

Grassed areas capable of sustaining a fire. Under AS 3959, this is identified as low open shrubland, hummock grassland, closed tussock grassland, tussock grassland, open tussock, sparse open tussock, dense sown pasture, sown pasture, open herbfield, and sparse open herb field.

Grass, whether exotic or native, which is regularly maintained at or below 10cm in height (including maintained lawns, golf courses, maintained public reserves, parklands, nature strips and commercial nurseries) is regarded as managed land.

Grassland Deeming Provisions

An acceptable solution applying to properties in grassland hazard areas which can be used instead of the site assessment procedure in AS 3959.

Infill development

Refers to the development of land by the erection of or addition to a building, which is within an existing allotment and does not require the spatial extension of services. Existing services may include public roads, electricity, water or sewerage.

Inner Protection Area (IPA)

The component of an APZ which is closest to the asset (measured from unmanaged vegetation). It consists of an area maintained to minimal fuel loads so that a fire path is not created between the hazard and the building.

Integrated development

As referred to under EP& A Act s.4.46 (formerly s.91), an integrated development is one that requires development consent and approval from one or more government agencies, and is not a State Significant Development (SSD) or Complying Development.

Isolated development

Development which is located predominantly in native bushland or is considered to be within a remote area. Access and evacuation may be challenging due to distances that are required to be travelled through bush fire prone areas.

Local Environmental Plan (LEP)

An environmental planning instrument prepared under Part 3 of the *LEPs* guide planning decisions and the ways in which land is used through zoning and development controls.

Managed land

Land that has vegetation removed or maintained to a level that limits the spread and impact of bush fire. This may include developed land (residential, commercial or industrial), roads, golf course fairways, playgrounds, sports fields, vineyards, orchards, cultivated ornamental gardens and commercial nurseries. Most common will be gardens and lawns within curtilage of buildings. These areas are managed to meet the requirements of an APZ.

Multi-storey buildings

Buildings exceeding three storeys in height are considered to be multi-storey buildings. The rise in storeys should be calculated as per the definition within Volume 1 of the NCC 2019.

National Construction Code (NCC)

The National Construction Code, published by the Australian Building Codes Board, comprising the Building Code of Australia as Volumes One and Two, and the Plumbing Code of Australia as Volume Three.

Outer Protection Area (OPA)

The outer component of an APZ, where fuel loads are maintained at a level where the intensity of an approaching bush fire would be significantly reduced. Applies to forest vegetation only.

Performance based solution

A method of complying with the performance criteria other than by an acceptable solutions.

Primitive camping

A site which is part of a commercially operated venture where there may already be a site for a tent and a fire pit.

Setback

The distance required by planning provisions to separate a building from the bush fire hazard, street frontage or from adjacent buildings or property boundaries.

Short fire run

A parcel or area of vegetation which is considered to be of lower risk than the design fire associated with that in AS 3959 due to its size, shape, and orientation to buildings. This has a design fire head width of less than 100m.

Special fire protection purpose (SFPP) developments

Developments where the vulnerable nature of the occupants means that a lower radiant heat threshold needs to be accommodated for in order to allow for the evacuation of occupants and emergency services.

State Environmental Planning Policy (SEPP)

An environmental planning instrument prepared under Part 3 of the *EP&A Act 1979*.

Subdivision

As defined in the *EP&A Act 1979*.

Suitably qualified consultant

A consultant providing bush fire assessments and BAL Certificates who has been accredited by a recognised accreditation scheme.

Tourist accommodation

A building or place that provides temporary or short-term accommodation on a commercial basis including backpackers accommodation, bed and breakfast accommodation, farmstay accommodation, hotel or motel accommodation and serviced apartments.

Vegetation classification

Vegetation types identified using the formations and classifications within *Ocean Shores to Desert Dunes: The Native Vegetation of New South Wales and the ACT* (Keith, 2004).

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