



**Bushland Protection
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Specialising in
**BUSHFIRE HAZARD
PLANNING & MITIGATION**

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**SUB-PRECINCT SPECIFIC
BUSHFIRE HAZARD ASSESSMENT
AND MITIGATION PLAN**

FOR

**SUB-PRECINCT 3D
YARRABILBA**

PREPARED BY

BUSHLAND PROTECTION SYSTEMS PTY LTD

**PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL**

Approval no: DEV2018/922

Date: 03 July 2018



FOR

LEND LEASE

DATE: 1st March, 2018.

1. Background

A Bushfire Mitigation Plan is designed to identify and minimise the potential bushfire risk to a given property and to help property owners to minimise bushfire risk to themselves, their property and their neighbours. It will not completely eliminate that risk. Ultimately it is a community responsibility to protect the environmental values, life and property in their area.

This plan is a Sub-Precinct Specific Plan for Sub-Precinct 3D of Yarrabilba, produced in accordance with:

- Bushfire hazard assessment in accordance with the State Planning Policy 7/14, under the Queensland Sustainable Planning Act 2009, based on the Bushfire Assessment Methodology provided by the Public Safety Business Agency (PSBA) & Rural Fire Service Qld (RFSQ).
- Code assessment in accordance with the approved Conceptual Bushfire Risk Assessment and Mitigation Plan (BMP), being the agreed assessment code for the Yarrabilba Project, produced by Bushland Protection Systems, dated 18/7/2012, based on the State Planning Policy 1/03, *Mitigating the Adverse Impacts of Flood, Bushfire and Landslide*, under the Queensland Sustainable Planning Act 2009, the Logan City Council Planning Code Part 5 Bushfire Hazard Area.
- The Context Bushfire Hazard Assessment and Mitigation Plan for Precinct 3 of Yarrabilba produced by Bushland Protection Systems, dated 2/4/16.
- This report also takes into consideration the 'Pre-Development Bushfire Mitigation Concept' Plan prepared by Bushland Protection Systems, dated 30/1/12.

This plan is based on the following material supplied by Lend Lease, and a number of site visits.

- 1.1. A copy of the Yarrabilba Precinct 3 Context Plan, Supplied by Lend Lease, drawing no. YAR_P03_PCP160318, dated 23/3/16, is included as Appendix 1A in this report.
- 1.2. A copy of the Bushfire Plan, drawn by Lendlease, drawing no. YAR-PO3D_POD180227, dated 27/02/18, is included as Appendix 1B in this report.

2. Description

The overall Yarrabilba site has been used as a pine plantation in the past with operations ceasing some 19-20 years ago with minimal management since that time, creating considerable pine regrowth, grass and weed growth. Some areas have been hazard reduced by the local Rural Fire Brigade from time to time, although unauthorised ignitions have been responsible for the majority of fires on the site.

Sub-Precinct 3D consists of a retail/community/commercial infrastructure/mixed use area, which will be predominantly cleared for development, and open space areas including both managed and conservation. The predominant bushland exposures are the corridors to the northwest, north and east.

Running east-west to the north and northwest of the proposed allotments is a fauna corridor to be retained as bushland. This corridor is 200 metres in width and connects to the National Park (Plunkett Conservation Park) to the east of Precinct 3. The fauna corridor will eventually consist of grassy eucalypt vegetation over slopes of 5-10%.

The corridor would be assigned a Vegetation Hazard Class (VHC) of 9.2 with associated fuel loads of up to 17.2t/Ha, over slopes of up to 5 degrees with an FFDI of 54, providing for a potential fire line intensity of up to 13,985kw/m equating to a Medium hazard rating.

Running north-south to the east of the proposed allotments is an open space waterway corridor to be retained predominantly as bushland. The corridor will vary in width from 130 to 250 metres and follows a shallow water flow path, with relatively level slopes of approximately 1 degree. The eventual bushland would be assigned a Vegetation Hazard Class (VHC) of 16.1 with associated fuel loads of up to 15.9t/Ha, over relatively level land with an FFDI of 54, providing for a potential fire line intensity of up to 9,069kw/m equating to a Medium hazard rating.

Between the allotments and the two corridors outlined above is an open space area which will be predominantly bushland with some managed areas as outlined further in this report. The retained bushland will also be assigned a Medium hazard rating unless otherwise managed as a buffer area as outlined in the report.

The power line easement area to the southwest is to be cleared and managed by regular slashing in accordance with the approved Concept BMP.

Table 1

POTENTIAL HAZARD CLASS	POTENTIAL FIRELINE INTENSITY
Not Bushfire Prone Area (Low)	<4,000 kw/m
Medium	4,000 to 20,000 kw/m
High	20,000 to 40,000 kw/m
Very High	>40,000 kw/m

The Bushfire Hazard Mapping also incorporates a 100 metre Potential Impact Buffer meaning that any land within 100 metres of a Potential Bushfire Hazard is also assigned the same rating as that bushland and triggers the Bushfire Code if Medium, High or Very High. Whilst having the same distance for all three levels of hazard is not considered a fit for purpose application, it is unfortunately what is legislated at this current time. Therefore proposed Lots 2-13 would be subject to a bushfire hazard rating being within the potential impact buffer zone, while Lot 1 would be assigned a Low hazard rating.

Appendix 1B provides a visual representation of the Potential Impact Zone for allotments requiring bushfire measures.

3. Appropriate Building Location & Managed Buffers

As the site is relatively level to undulating topography, there are no significant steep slopes causing buildings to be located along ridgelines or the like. The developable area is on the lower slopes, where future buildings will not be exposed to significant upslope bushfire approach.

In accordance with the approved Concept Bushfire Risk Assessment and Mitigation Plan, buildings are to have a minimum bushfire buffer of 20 metres or the distance required to achieve a Bushfire Attack Level BAL-29 (as identified under AS3959), whichever is the greater, from large bushland areas and corridors over 100 metres in width. This includes the east-west fauna corridor and the north-south waterway corridor.

Buildings on Lots 4-9 are to have a minimum 10 metre setback from the rear northwest boundary as shown in Appendix 1B. This area is to be managed to provide the equivalent to an inner radiation zone/buffer. Acceptable uses in this area includes driveway, car parking & hard stand areas. Flammable materials are not to be stored in this area. Lot 900 is to be managed as an outer radiation zone/buffer as outlined in Section 6 of this report. Combined these measures will provide a minimum 20 metre separation from the unmanaged bushland for Lots 4-9.

Lot 13 is to have a 20 metre managed buffer along the eastern boundary, within the open space area immediately adjoining the lot, as outlined in Section 6 of this report.

All other exposures have separation by roadway or managed powerline easement. All buildings have been provided their minimum separation distances from hazardous bushland in accordance with the approved Concept Bushfire Risk Assessment and Mitigation Plan.

4. Roads and Access

As with any proposed development of this size, it will have a substantial road network. Roads in the area will provide for multiple access/egress options for the proposed development. It is considered that access/egress is highly unlikely to be restricted by bushfire.

The main road (Yarrabilba Drive) along the northeast side of Lots 9-12 provides access to the north, with access also provided to the east, and also future access to the south. The internal road is a loop road, sheltered from bushland exposure.

Access within Lot 900 for fire suppression would be by foot with access from both ends at Yarrabilba Drive and the powerline easement. Additionally a pedestrian gate is to be provided in the rear fence of Lot 7 and Lot 4 with a clear 1 metre wide pedestrian access along the northern lot boundary back to the roadway. The pedestrian access points in Lots 4 & 7 provide interval access to the rear of the lots and the 10 metre defendable space within the lots in the event of a defensive firefighting strategy being used. Also with the rear gates it provides additional escape routes for firefighters working within Lot 900 in the event of an offensive firefighting strategy being used (either direct or indirect tactics). With the proposed management of Lot 900 as outlined in Section 6 of this report, access from each end and the interval access points, suitable access is considered to be achieved without the need for a fire trail that would lead to additional vegetation and ground level disturbance.

5. Appropriate Building Construction

The bushfire provisions of the Building Code of Australia (BCA) are applied to Class 1, 2 & 3 buildings and associated Class 10a buildings, located in designated bushfire prone areas. “Designated bushfire prone area means land which has been designated under a power in legislation as being subject, or likely to be subject, to bushfires” (*BCA 1.1.1 Definitions*).

Sub-Precinct 3D is a retail/community/commercial infrastructure/mixed use area, therefore it is not expected that there will be any Class 1, 2, 3 or associated 10a buildings in Sub-Precinct 3D and as such the bushfire provisions of the BCA, including AS3959-2009 are not applicable to the future buildings in Sub-Precinct 3D.

In the event that there is a residential component within a building, the building would require assessment under AS3959-2009, at the time of building application, and would be assigned a BAL-19 or less Bushfire Attack Level when assessed under AS3959-2009.

6. Appropriate Clearing and Landscaping

Lots 1-13 and the Balance Management Lot 7012 are to be maintained with low ground fuel levels at all times and may include domestic gardens/landscaping, lawns with grass kept under 100mm in height and scattered trees with discontinuous canopy.

The retained bushland along the fauna corridor and waterway corridor are to be managed by the removal of weed species and control of non-endemic grass growth. All slash pine is to be removed from the site including within the retained bushland areas and future regrowth slash pine is also to be removed.

The first 10 metres of the bushfire buffer adjoining the eastern side of Lot 13 is to be managed as an inner radiation zone as outlined in Appendix 2 of this report. The additional 10 metres adjacent to Lot 13 and all of Lot 900 are to be managed as an outer radiation zone consisting of tall canopy tree species and mowed grass under 300mm high and be managed by removal of tree limbs less than 2 metres high on trees over 4 metre tall, removal of weed growth & slash pine, prevention of significant mid-storey vegetation (except the juvenile tall canopy tree species) to prevent ladder fuel structure, removal of fallen timber and by restricting leaf litter build-up to 5t/Ha (approx. 10mm deep).

As a guide to landscaping and gardening in a bushfire prone area, the document 'Landscaping for Bushfire' produced by the CFA Victoria, is a useful guide on plant selection, garden design and ongoing maintenance. It can be found at <http://www.cfa.vic.gov.au/plan-prepare/landscaping-for-bushfire/>.

The power line easement area to the south is to be cleared and managed by regular slashing in accordance with the approved Concept BMP.

In bushland areas, the areas around the fringes of the bushland and along fire trails have a tendency to have increased ground fuel loading, as a result of increased sunlight penetration producing better growing conditions for grass and weeds (known as 'Edge Effects'), which can have an adverse impact on the local ecosystem and safety issues for fire suppression personnel during unplanned fire events. These non-endemic grasses penetrate into the edges of the retained bushland, creating conditions for high intensity fire which damages the edges of the bushland, opening up the canopy which then allows more sunlight in and promotes grass and weed intrusion further into the bushland. This cyclic process has the effect of decreasing the size of quality bushland and increasing grass and weed dominated areas. The most cost effective way to control grass and weed growth is to create a good closed in canopy cover, which will shade out the undesirable species. The control of fuel loads along the edges by regular mowing, brush cutting or in some cases poisoning may be suitable. Areas with a

build-up of volatile fuel levels along the open edges of bushland, where full sunlight is available, can be where the most damage is inflicted on the bushland during a bushfire. Added protection from bushfire can be achieved by establishing green fire breaks which include green lawns, trees arranged to create a shield to catch sparks or fire brands or the expanding of rainforest species. Trees and shrubs not subject to drought stress will cope better during bushfires. The higher the moisture content in the plant the slower it burns. Therefore by keeping the surrounding area green and low in dry ground fuel, the intensity of an approaching fire will be reduced and the risk of spot fires minimised.

For optimal bushfire safety and best practise, the required vegetation management practises for allotments must be established during operational works and maintained by the developer until sold.

All land under the control of the developer is to be managed to control ground fuel levels and prevent uncontrolled regrowth, in areas identified as developable in accordance with the Pre-development Bushfire Mitigation Concept plan dated 30/1/12.

7. Provision of Adequate Water Supplies

The area of the proposed development is to be serviced by reticulated water supplies with the inclusion of fire hydrants for firefighting purposes. These services are to comply with the relevant standards as required by the local authorities, including a minimum pressure and flow of 10 litres per second at 200kPa.

8. Provision of Fire Fighting Infrastructure

Buildings are to have external taps and hoses (or hose reels) that are positioned so water supply is capable of reaching to all parts of the building. All water lines are to be covered by at least 300mm of soil or be of metal above ground. Occupants should maintain good access around their buildings for fire suppression activities by fire authorities.

9. Local Fire Brigades

The subject property is currently in the Tamborine Rural Fire Brigade district and they would be responded on a 000 emergency call, with back-up from Logan Village Rural Fire Brigade. If further back-up is required, additional units would be engaged by the Beaudesert/Logan Rural Fire Brigades Group. Urban fire appliances would be responded in the event of a structural fire or specialised structural protection being required.

In time as urban development progresses in this area it will most likely become the responsibility of the Urban Fire Service.

10. Improved Community Awareness

Managing ground fuel in small pockets of bushland at the interface between urban development and bushland (Izone) is the easiest way of reducing bushfire hazard, particularly the removal of non-endemic grass and weeds.

Hazardous materials, including fuels, explosives and flammable chemicals are not to be manufactured or stored above ground within 100 metres of Medium hazard rated bushland.

The Bushland open space is a very sensitive ecosystem and could be altered drastically if not cared for properly. The community can assist in maintaining this fragile ecosystem by preventing unwanted fires from encroaching into the parkland, ensure that dumping of rubbish does not degrade the area and that exotic plant species do not invade the bushland. Hot fires on a regular basis will degrade the bushlands biodiversity.

11. Conclusion

This plan is a Sub-Precinct Specific Plan for Sub-Precincts 3D of Yarrabilba, produced in accordance with:

- Bushfire hazard assessment in accordance with the State Planning Policy 7/14, under the Queensland Sustainable Planning Act 2009, based on the Bushfire Assessment Methodology provided by the Public Safety Business Agency (PSBA) & Rural Fire Service Qld (RFSQ).
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- The Context Bushfire Hazard Assessment and Mitigation Plan for Precinct 3 of Yarrabilba produced by Bushland Protections Systems, dated 2/4/16.
- This report also takes into consideration the 'Pre-Development Bushfire Mitigation Concept' Plan prepared by Bushland Protection Systems, dated 30/1/12.

With the appropriate management of the passive open space areas, adequate water supply, good access provisions and minimising of ground fuels, the risk of bushfire damage can be managed and improve the safety of the community and fire services in attending to a bushfire threat, as well as maintaining the localised ecosystems.

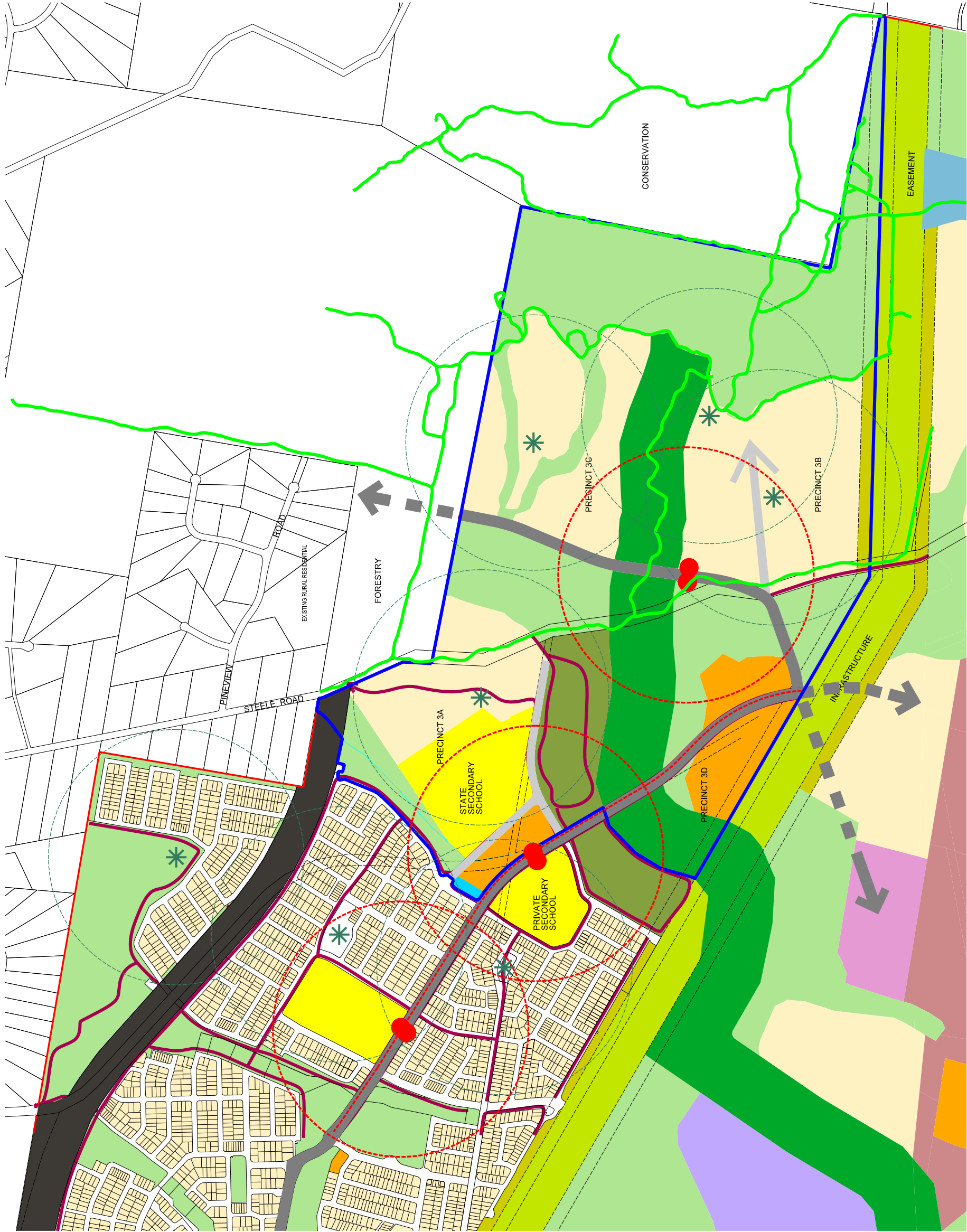
This plan should remain current for a period of 5 years, until 2023, at which time it should be subject to review to take account of changing land use and vegetation patterns. Any major bush fire event affecting the subject site should also trigger a review in order to determine effectiveness of protection measures and annual hazard reduction initiatives.

Ultimately, persons living in a bushfire prone area must take the precautions necessary to protect themselves, their families and their homes if Brigades are stretched and are unable to attend immediately.

If you require any further assistance please do not hesitate to contact this office.



C. L. Bain
Principal Consultant.



- LEGEND**
- YARRABILBA SITE BOUNDARY
 - PRECINCT THREE BOUNDARY
 - ROAD TO BE CLOSED
 - NEIGHBOURHOOD CENTRE
 - RESIDENTIAL
 - URBAN RESIDENTIAL
 - EDUCATIONAL ESTABLISHMENT
 - RETAIL/COMMUNITY/COMMERCIAL INFRASTRUCTURE/MIXED USE
 - FORNA CORRIDOR
 - OPEN SPACE
 - MAJOR SPORTS PARK
 - NEIGHBOURHOOD RECREATION PARK & 400m RADIUS LOOP
 - ELECTRICITY EASEMENT
 - LANDSCAPE BUFFER
 - SOUTHERN INFRASTRUCTURE CORRIDOR
 - PRIMARY MOVEMENT NETWORK
 - SECONDARY MOVEMENT NETWORK
 - BUS ROUTE
 - BUS STOP/PROPOSED BUS STOP & 400M RADIUS LOOP
 - EXISTING TRAILS

TOTAL PRECINCT AREA	254 ha
GROSS RESIDENTIAL AREA	67ha
Approx 950 lots at an average density of 15dw/ha	
NEIGHBOURHOOD CENTRE	0.5
COMMUNITY CENTRE	11.0ha
STATE SECONDARY SCHOOL	12.0ha
OPEN SPACE	157.0ha
ROAD	7.0ha

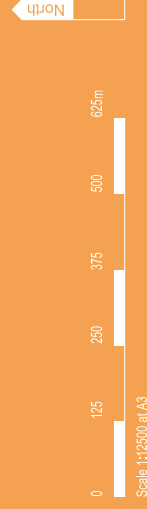
DISCLAIMER
The context plan is intended to guide development within the Yarrabilba Precinct. Two areas and show the preferred land use designations and structural elements. The context plan does not prescribe these designations and structural elements with complete accuracy and the final location will be determined through further detailed design and development applications.

NOTES
The contents of this plan are conceptual only. All areas are approximate only and subject to relevant studies, survey, engineering and relevant authority approvals.

YARRABILBA - PRECINCT THREE CONTEXT PLAN

NOTE: This plan is indicative only, and specific uses, road alignment, boundaries, setbacks, and building layout shown may vary due to detailed design consideration. ©2015 Land Lease Communities (Australia). All rights reserved. Except as permitted by Land Lease, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the permission of Land Lease.

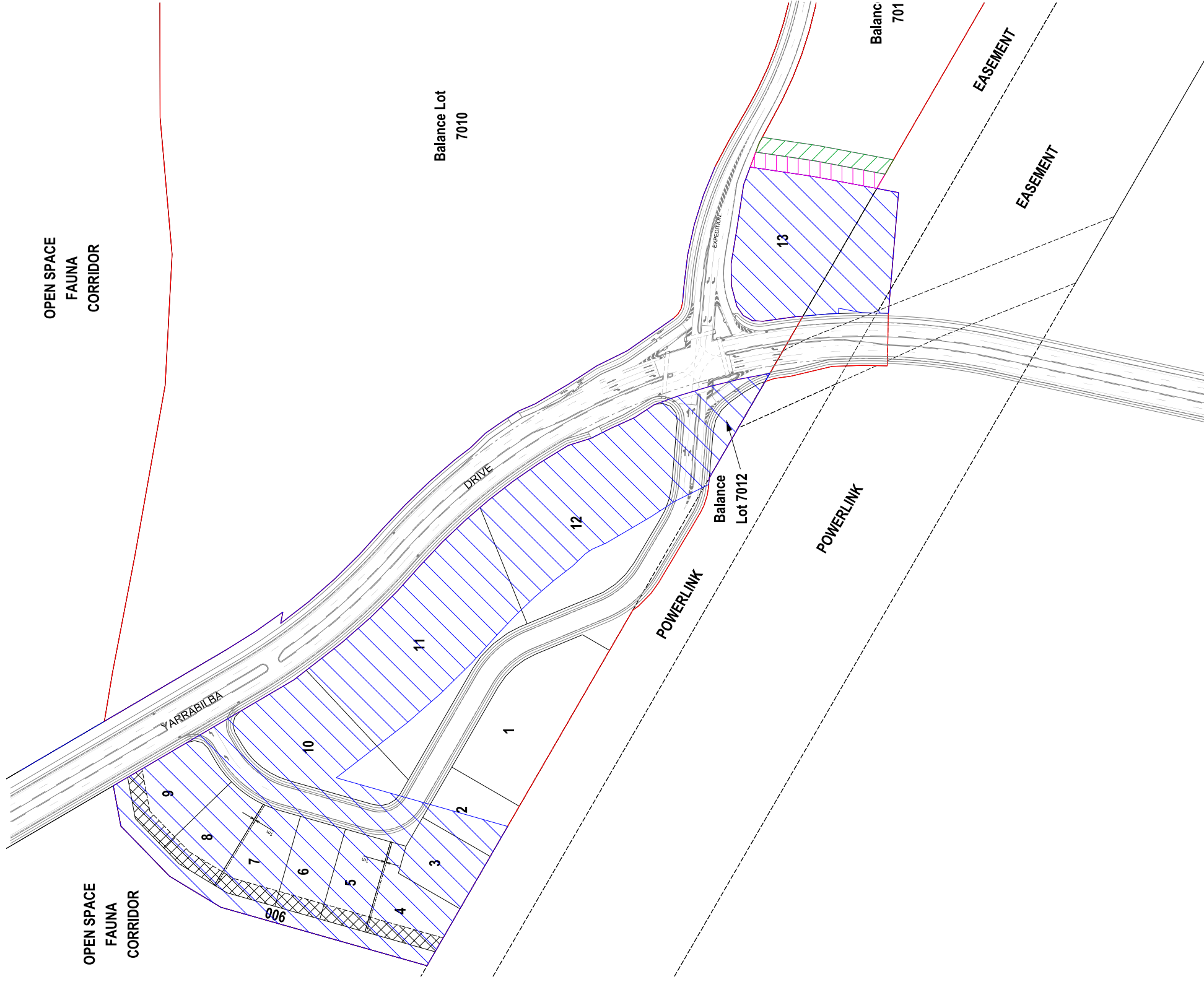
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Date 23rd MARCH 2016



PREPARED BY LENDLEASE ON BEHALF OF
BUSHLAND PROTECTION SYSTEMS



APPENDIX 2

Fire Radiation Zones

Appendix 2 on Radiation Zones is included in this report as a guide for owners on how to implement and maintain radiation zones, however the dimensions required for these zones are those stipulated in the report, not the generalised examples stated in this appendix.

Buildings located in medium and high Potential Bushfire Hazard Areas would require the establishment of an inner and outer fire radiation zones around the buildings.

Radiation Zones is the terminology that has been applied to the recommended area separating a building from an area of identified potential bushfire hazard.

A building's Radiation Zone is generally separated into two sections 'Inner Fire Radiation Zone' & 'Outer Fire Radiation Zone'.

The management of fuel levels within these zones is designed to reduce the intensity of wild fires before they impact on assets such as buildings and property. The correct and continued maintenance of fuel levels within a buildings radiation zones may result (depending on factors such as terrain, fuel types and climatic conditions) in reduced flame height, a slowing of the rate of spread of the fire and a reduced risk of direct or radiant heat attack on building and other property assets.

The accepted methods of fuel level reduction within a property's radiation zones are;

- hand or mechanical removal of fuel and litter,
- slashing and mulching of under-growth,
- selective clearing of the tree understorey and saplings,
- strategic removal of selected hazardous trees.

The dimensions of a property's Radiation Zones are the result of the property's aspect (compass direction), and the slope of the surrounding terrain keeping the building as a central point.

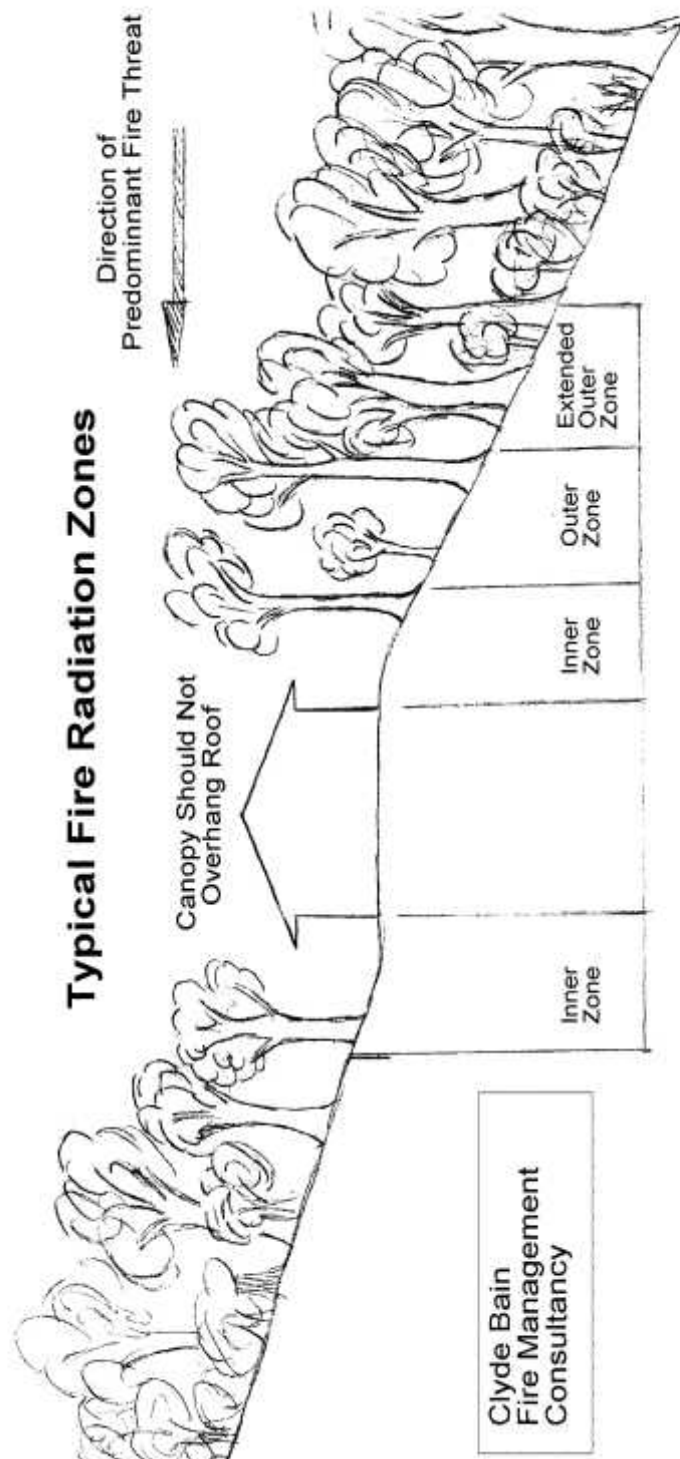
A general rule of thumb is a 10metre wide Inner Radiation Zone, where ground fuel levels are kept low so as not to be able to support a ground fire. Mature quality canopy trees may be retained within the inner radiation zone provided they do not form continuous canopy coverage. Low branches should be removed to a height of 2 metres above ground level and hanging bark and accumulated debris should be removed prior to fire season. Dead or hazardous trees that may pose a threat to life and property or could trap and accumulate air-borne embers should be removed.

The establishment of lawns and the use of fire retardant species in landscaping are recommended within inner radiation zones.

Outer Radiation Zones should be a further 10metres in width where low ground fuel levels are maintained and mid-storey saplings are thinned-out. A property's outer radiation zone should be increased an extra metre of width for every degree of down-slope of the property.

The area recommended for a buildings radiation zones may vary with regard to the direction of the perceived potential bushfire hazard.

For example : A building may require a 10metre inner radiation zone completely around the structure however the outer radiation zone may only be required in a semi-circular direction with respect to the potential bushfire hazard from that direction. This outer radiation zone may also be extended in width taking into consideration the slope of the subject property.





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Fire is a part of nature. Its effects can be catastrophic and fire can never be totally eliminated, however there are steps that can be taken to reduce the chances of uncontrolled fires occurring and the risk to life, property and the environment, in the event of uncontrolled fires. This is what we concentrate on, how the threats from bushfire can be minimised. There are many methods to do so, however deciding which method/s is best to use can be a complex decision to make. There are so many factors to consider such as ecological values, biodiversity, fire history, availability of resources, cost effectiveness and public awareness just to name a few. No guarantees can ever be given when dealing with Mother Nature, with ever increasing complexities it has now become a specialist field to be able to create plans to try and minimise the risk from bushfire. Ultimately it is a community responsibility to protect the environmental values, life and property in their area

COMPANY PROFILE

Bushland Protection Systems Pty Ltd (BPS) is a leading Bushfire Management Consultancy firm in Queensland, with many clients, ranging from private landowners to multi-national companies and government bodies.

BPS consultants began operating as Bushfire Management Consultants with the introduction of the Gold Coast Bushfire Management Strategy in 1998 and spread their operations across the state with the implementation in 2003 of the State Planning Policy for mitigating the adverse impacts of flood, bushfire and landslide.

During that time over 3000 projects have been successfully completed, including large residential estates such as Coomera Waters, Spring Mountain, Pacific Pines, Coomera Springs, Observatory, Highland Reserve, Delfin Woodlands & Yarrabilba as well as commercial or Government project sites such as Paradise Country, Wacol Police Academy, Numinbah Correctional Facility, Silkwood Steiner School, Canon Hill Community Links Project & Griffith University. Clyde Bain, the Principal Consultant, is also one of the two most highly sought after expert witnesses for Land and Environment Court Appeals, in Queensland, having worked as the Bushfire Expert for several Regional and City Councils throughout the state on a number of various projects before the Land and Environment Court.

With a strong background in bush fire fighting and involvement with numerous industry bodies, Bushland Protection Systems continues to deliver realistic and cost effective advice, solutions to provide higher levels of safety for the community, improve wildfire suppression and mitigation options for emergency services and land managers, while maintaining and improving environmental values for the future. All our Consultants are members of the Rural Fire Association of Queensland.