Bushfire Certifiers

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4/57 Ballina Street / PO Box 375
Lennox Head NSW 2478

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BCA Check Pty Ltd trading as Bushfire Certifiers

BUSHFIRE THREAT PERFORMANCE SOLUTION REPORT

Casuarina Town Centre

Prepared for: Clarence Properties

Prepared by:
Peter Thornton
BPAD-L3 ACCREDITED PRACTITIONER

Date: 09 April 2018

Ref: 18/110

BCA Check Pty Ltd
t/as Bushfire Certifiers
4/57 Ballina Street Lennox Head NSW 2478 Australia
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Peter Thornton MFireSafeEng
Principal
BPAD-L3 Accredited Practitioner No. 14867
Building Surveyor MAIBS

DOCUMENT CONTROL

Revision No.	Date	Description	Prepared	Checked	Authorised
A	09.04.2018	Final	Peter Thornton	SJT	Peter Thornton

Table of Contents

1.0 EXECUTIVE SUMMARY

This performance solution report has assessed NSW RFS advice REF D16/055, DA 16022300836 PC dated 16 January 2018 in relation to the General Advice of the Bush Fire Safety Authority (BFSA) that references the public reserve (Lot 13) as an Asset Protection Zone (APZ) which is understood to conflict with Tweed Shire Council's intention in relation to managing the public reserve to an APZ standard.

The report acknowledges the public reserve has a plan of management (*attached*) and will receive a reasonable level of management and maintenance due to the nature of the plan. Additional information has been provided by the consultant civil engineer in order to determine the correct design fire based on the likely hazard within Lot 13 based on the function of the stormwater detention area and the Tweed Shire plan of management. The report also acknowledges the NSW RFS condition for Lot 13 Public Reserve to be landscaped in accordance with Appendix 5 Planning for Bushfire Protection 2006.

Acknowledging Tweed Shire Council may not manage the reserve to the level required for an APZ i.e. grass not exceeding 10cm, the report has assessed the most likely hazard from the reserve as being a grassfire following an assessment of the civil engineer's comments and the Tweed Shire plan of management.

The property owner has requested the modelling take into account a 2m solid non-combustible fence along the east boundary of Lots 85-91 when determining whether the sites 85-91 can potential support a dwelling/s within the performance criteria of PBP2006 being a threshold of 29kW/m^2.

The performance solution report concludes that the subject allotments have a depth capable of supporting an asset protection zone established with an assessment pursuant to s4.14 of the Environmental Planning and Assessment Act 1979. In this regard a minimum 5.7m setback from the rear boundary of the subject allotments and the inclusion of a 2000mm radiant heat shield along the rear boundary of Lots 85-91 is one method demonstrated to comply with the APZ performance criteria of PBP2006.

It is noted that there may be a number of other meritorious performance solutions available and potentially amendments to PBP2006 which may provide alternate outcomes when an assessment is undertaken pursuant to the Environmental Planning and Assessment Act 1979. This study provides information establishing that a dwelling can be constructed on each of the subject sites however is considered limiting to put a specific restriction on these sites in relation to asset protection zones.

It is therefore recommended that a Bush Fire Safety Authority be re-issued with the same conditions as the BFSA dated 16th January 2018 (see *attached*) however without the inclusion of the ''General Advice – Consent Authority to Note'' associated with the BFSA.

2.0 REPORT DETAILS

Report Reference No.:	18/110
Property Address:	Casuarina Town Centre
Applicants Name:	Clarence Properties
Local Government Area:	Tweed Shire Council
Proposal:	Subdivision
Drawings:	Attached
Report Prepared By:	Peter Thornton MFireSafeEng Building Surveyor (MAIBS) BPAD – L3 Accredited Practitioner

3.0 PROPOSED DEVELOPMENT

This report relates to Lots 85-91 of the Casuarina Town Centre application MP 06_0258 (Mod 10) and specifically a demonstration that Lots 85-91 are capable of supporting an asset protection zone wholly within the property boundaries of these allotments. The report will model a 2000mm radiant heat shield proposed along the east boundary of the subject allotments.

4.0 BUSHFIRE THREAT ASSESSMENT

The bushfire threat is predominantly the unmanaged dune vegetation to the east of the Public Reserve Lot 13. The assessment however is also an acknowledgement of Tweed Shire Council comments that whilst the Public Reserve will have a Plan of Management and a level of landscaping, there will not necessarily be the level of management required for a defined asset protection zone.

The public reserve management practices may potentially allow the grassed areas to grow to a height greater than 10cm. In this regard further information was sought from the consulting civil engineer in relation to the function of the stormwater infiltration area in order to establish the most credible bushfire hazard emanating from Lot 13. The following

comments by the consultant civil engineer (see appendix, email dated 5th April 2018) were received in this regard, which states –

''In response to the bushfire certifiers query, BG&E can confirm in order for the infiltration basin to properly function within the foreshore in front of Lots 85-91, the basin will only be planted out with grass species. The batters to the basin will be grassed with occasional sparsely planted shrubs, whilst the 3m maintenance track surrounding the basin will need to be grassed only with no shrubs or trees for access reasons''.

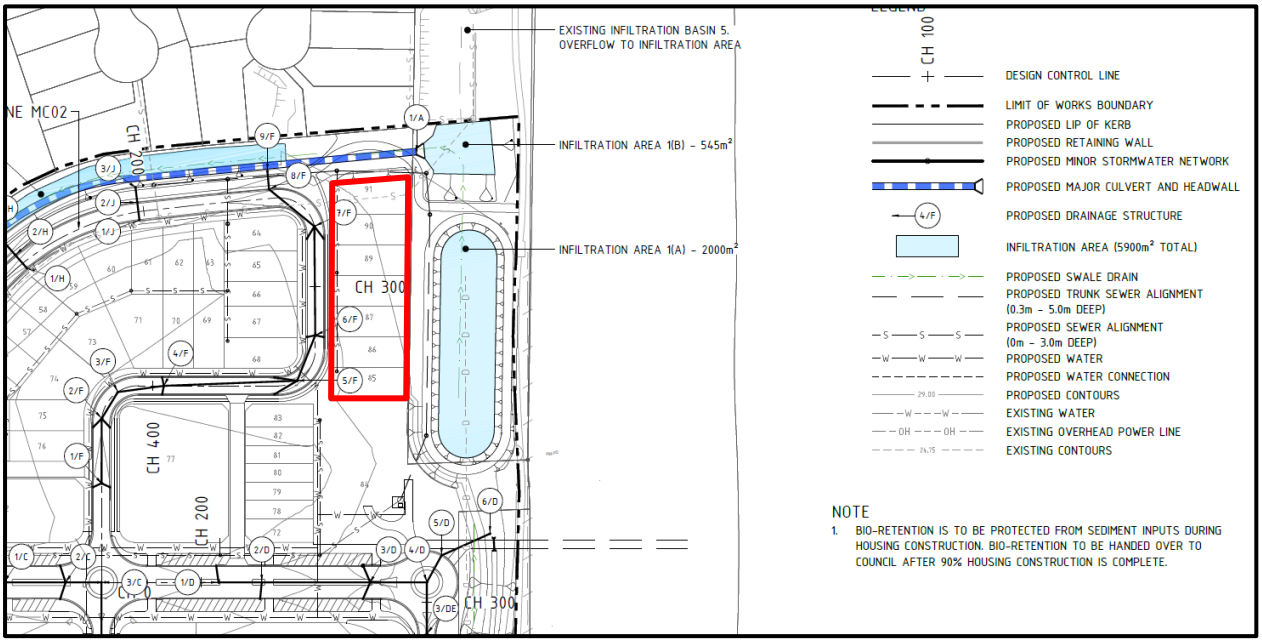


Figure 1: Location of stormwater infiltration area in relation to the subject properties (red).

As shown in Figure 1, the areas shaded blue form part of the infiltration area. As outlined in the advice received from the civil engineer, these areas will be planted with native grasses. There may be some sparsely planted shrubs however with the inclusion of a 3m wide obstruction free maintenance track around the basin, any planting will be minimal and will have very limited fire run potential. It is unlikely this area will be mapped as a bushfire hazard with any future mapping.

It is therefore considered, should the area to the east of Lots 85–91 have a lesser level of management than from an asset protection zone, a grassland hazard would be the most credible and likely hazard for modelling purposes. In turn, the modelling will be for grassland on a flat topography with a 2m high non-combustible fence located along the east boundary of Lots 85-91.

5.0 ASSET PROTECTION ZONES

Asset Protection Zones are areas established and maintained to ensure that bushfire fuels are progressively reduced between the development and the bushfire hazard. The asset protection zone incorporates an Inner Protection Area (IPA) having reduced fuel loadings of approximately 3t/ha.

At the commencement of works and in perpetuity the entire property is to be maintained as an Inner Protection Area (IPA) and managed and maintained to prevent the spread of a fire towards the buildings in accordance with the requirements of Standards for Asset Protection Zones (RFS 2005) (see *attached*).

Acceptable Solution	Performance Criteria	Compliance
An APZ is provided in accordance with the relevant tables/figures in Appendix 2 of Planning for Bushfire Protection 2006.	Radiant heat levels at any point on a future dwelling will not exceed 29kW/m^2.	Yes
APZ's are managed and maintained to prevent the spread of a fire towards the building.	In accordance with the requirements of Standards for Asset Protection Zones (RFS 2005)	Capable of compliance.
The APZ is located on lands with a slope less than 18 degrees.	APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is negated.	Capable of compliance.

6.0 PERFORMANCE SOLUTION

Whilst it is acknowledged Table A2.5 of Appendix 2 of Planning for Bushfire Protection 2006 does not have a specific APZ setback requirement from grassland, the performance solution acknowledges Tweed Shire Council's comments that the public reserve will not be managed specifically as an APZ. In turn, the report provides information to demonstrate the likely hazard from the Public Reserve Lot 13 on proposed Lots 85-91 with the scenario of irregular management of the non-landscaped areas (trees and scrubs).

The performance solution will demonstrate the subject residential allotments will be capable of supporting a dwelling/s in accordance with the relevant performance criteria of Planning for Bushfire Protection 2006 with the inclusion of a 2000mm radiant heat shield along the east boundary.

It is noted this performance solution is only one study to demonstrate compliance with the asset protection zone performance criteria of Planning for Bushfire Protection 2006, however there are likely to be a number of different methodologies available when an application for a dwelling is submitted to the consent authority for assessment pursuant to s4.14 Environmental

Planning and Assessment Act 1979. This study is solely to demonstrate one methodology for compliance. In turn, restricting the sites with an 88b instrument for rear building lines in relation to asset protection zones is not considered desirable.

The performance solution establishes compliance with the performance criteria of PBP2006 for asset protection zones to the east of Lots 85-91 based on Method 2 of AS 3959-2009 and the methodology of altering the view factor based on the inclusion of a 2000mm radiant heat shield along the rear (east) boundary of the subject residential allotments.

All other aspects of the development shall comply with the acceptable solution requirements of Planning for Bushfire Protection 2006 with exception to the performance solution in this report.

6.1 SCOPE AND ASSUMPTIONS

Scope

The scope of the performance solution is limited to the departure from the acceptable solution requirements identified in this report.

The report provides recommendations that will reduce the risk of ignition to the building while the fire front passes however as documented in AS 3959-2009:

> *"The goal of absolute safety during a bush fire event is not attainable and despite best effort there is the ever-present risk of personal injury or damage to property. Ultimately, it is the responsibility of the owner/occupier to comply with conditions of consent and to maintain systems designed to mitigate the impacts of bush fire."*

Should a change in proposed boundary occur then the development will be needed to verify consistency with the analysis contained within the report.

6.2 RELEVANT STAKEHOLDERS

- Tweed Shire Council (Public Reserve Manager)
- NSW Rural Fire Service (referral - BFSA)
- Clarence Properties (Owner)
- Bushfire Certifiers (Bushfire Consultants)
- Newton Denny Chapelle (Consultant Town Planners)
- Department of Planning (Consent Authority)

6.3 SITE DESCRIPTION

Identification of Vegetation Type, Slope and distance pursuant to Planning for Bushfire Protection 2006

The bushfire threat assessment in Section 4 and Section 5 of this report is provided for the performance solution.

6.4 METHODOLOGY

The assessment method for the performance solution is consistent with Part 1.0.5 – Assessment Methods in the Housing Provisions of the Building Code of Australia 2016. The report will be assessed in accordance with Part 1.0.5(b)(ii) by using a quantitative analysis consistent with Planning for Bushfire Protection 2006.

6.5 PERFORMANCE SOLUTION – METHOD 2 AS 3959-2009

The design fire acknowledges the vegetation classification as potentially being grassland given the Public Reserve will be landscaped to comply with the NSW RFS condition of Bush Fire Safety Authority and for the function of the stormwater infiltration basin in acknowledging the public reserve may not be regularly mown as required for an asset protection zone.

The methodology is to use the same method to determine the outcomes for the acceptable solutions pursuant to A2.2 of Planning for Bushfire Protection 2006 and AS 3959-2009.

The accepted method of establishing the reduced radiant heat flux due to proposed shielding by a 2m high non-combustible fence will be adopted. In this regard the view factor of the shielding calculation has been subtracted from the view factor when calculated without the radiant heat shield. The flame length is reduced by the height of the proposed radiant heat shield and this will also determine whether there will be any flame contact on the building.

All other aspects of the development shall comply with the acceptable solution requirements of Planning for Bushfire Protection 2006.

Acceptance Criteria

The report will demonstrate using quantification methods to determine compliance with the performance criteria which states:

"Radiant heat levels at any point on a proposed building will not exceed 29kW/m^2."

Assessment

The initial base modelling will assess a future dwelling located 5.7m from the east boundary. Further modelling will include a 2000mm radiant heat shield (solid non-combustible fence) located along the rear east boundary of Lots 85-91.

Site Street Address:	Casuarina Town Centre, Casuarina		
Assessor:	Peter Thornton; BCA Check Pty Ltd		
Local Government Area:	Tweed	**Alpine Area:**	No

Equations Used

Transmissivity: Fuss and Hammins, 2002
Flame Length: RFS PBP, 2001
Rate of Fire Spread: Noble et al., 1980
Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005
Peak Elevation of Receiver: Tan et al., 2005
Peak Flame Angle: Tan et al., 2005

Run Description:	Base design fire		
Vegetation Information			
Vegetation Type:	Grassland	**Vegetation Group:**	Grassland
Vegetation Slope:	0 Degrees	**Vegetation Slope Type:**	Downslope
Surface Fuel Load(t/ha):	4.5	**Overall Fuel Load(t/ha):**	4.5
Site Information			
Site Slope	0 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m)	Default	**APZ/Separation(m):**	5.7
Fire Inputs			
Veg./Flame Width(m):	100	**Flame Temp(K)**	1090
Calculation Parameters			
Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	110
Program Outputs			
Category of Attack:	FLAME ZONE	**Peak Elevation of Receiver(m):**	2.74
Level of Construction:	BAL FZ	**Fire Intensity(kW/m):**	33248
Radiant Heat(kW/m2):	40.75	**Flame Angle (degrees):**	53
Flame Length(m):	6.87	**Maximum View Factor:**	0.603
Rate Of Spread (km/h):	14.3	**Inner Protection Area(m):**	6
Transmissivity:	0.889	**Outer Protection Area(m):**	0

Figure 2: Base design fire.

The base design fire has established that without a radiant heat shield and based on the methodology outlined in this report and Appendix 2 of Planning for Bushfire Protection 2006 (PBP2006) the forecast radiant heat level with a 5.7m asset protection zone to the east is 40.75kW/m^2 and a flame length of 6.87m.

Site Street Address:	Casuarina Town Centre, Casuarina		
Assessor:	Peter Thornton; BCA Check Pty Ltd		
Local Government Area:	Tweed	**Alpine Area:**	No

Equations Used

Transmissivity: Fuss and Hammins, 2002
Flame Length: RFS PBP, 2001
Rate of Fire Spread: Noble et al., 1980
Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005
Peak Elevation of Receiver: Tan et al., 2005
Peak Flame Angle: Tan et al., 2005

Run Description:

Vegetation Information

Vegetation Type:	Grassland	**Vegetation Group:**	Grassland
Vegetation Slope:	0 Degrees	**Vegetation Slope Type:**	Downslope
Surface Fuel Load(t/ha):	0.38	**Overall Fuel Load(t/ha):**	0.38

Site Information

Site Slope	0 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m)	Default	**APZ/Separation(m):**	5.7

Fire Inputs

Veg./Flame Width(m):	100	**Flame Temp(K)**	1090

Calculation Parameters

Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	110

Program Outputs

Category of Attack:	LOW	**Peak Elevation of Receiver(m):**	0.98
Level of Construction:	BAL 12.5	**Fire Intensity(kW/m):**	2808
Radiant Heat(kW/m2):	11.73	**Flame Angle (degrees):**	80
Flame Length(m):	2	**Maximum View Factor:**	0.175
Rate Of Spread (km/h):	14.3	**Inner Protection Area(m):**	6
Transmissivity:	0.881	**Outer Protection Area(m):**	0

Figure 3: Shielding Impact Design Fire – 2000mm high non-combustible fence

The design fire to establish the maximum view factor that will be forecast should a 2.0m high non-combustible radiant heat shield be provided along the east (rear) boundary of Lots 85-91 has determined a view factor of .175.

Site Street Address:	Casuarina Town Centre, Casuarina		
Assessor:	Peter Thornton; BCA Check Pty Ltd		
Local Government Area:	Tweed	**Alpine Area:**	No

Equations Used

Transmissivity: Fuss and Hammins, 2002
Flame Length: RFS PBP, 2001
Rate of Fire Spread: Noble et al., 1980
Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005
Peak Elevation of Receiver: Tan et al., 2005
Peak Flame Angle: Tan et al., 2005

Run Description:	Base design fire		
Vegetation Information			
Vegetation Type:	Grassland	**Vegetation Group:**	Grassland
Vegetation Slope:	0 Degrees	**Vegetation Slope Type:**	Downslope
Surface Fuel Load(t/ha):	4.5	**Overall Fuel Load(t/ha):**	4.5
Site Information			
Site Slope	0 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m)	Default	**APZ/Separation(m):**	5.7
Fire Inputs			
Veg./Flame Width(m):	100	**Flame Temp(K)**	1090
Calculation Parameters			
Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	110
Program Outputs			
		Peak Elevation of Receiver(m):	2.74
		Fire Intensity(kW/m):	33248
Radiant Heat(kW/m2):	28.93	**Flame Angle (degrees):**	53
Flame Length(m):	6.87	**Maximum View Factor:**	0.428
Rate Of Spread (km/h):	14.3	**Inner Protection Area(m):**	6
Transmissivity:	0.889	**Outer Protection Area(m):**	0

Figure 4: Final Design Fire Calculation.

The final design fire calculation has determined that when a 2000mm high non-combustible radiant heat shield provided along the rear boundary the radiant heat received by the building is forecast to be 28.93kW/m^2. The flame length of 6.87m of the base design fire will be reduced to 4.87m when the height of the fence (2m) is factored in to the study.

The study demonstrates that a future building having a 5.7m Inner Protection Area setback from the east boundary and the inclusion of a 2000mm radiant heat shield will not receive radiant heat levels that exceed 29kW/m^2 and will comply with the acceptance criteria outlined in this report.

7.0 CONCLUSION

The subject allotments have a depth capable of supporting an asset protection zone established with an assessment pursuant to s4.14 of the Environmental Planning and Assessment Act 1979. In this regard a minimum 5.7m setback from the rear boundary of the subject allotments and the inclusion of a 2000mm radiant heat shield along the rear boundary of Lots 85-91 will be one method of complying with the APZ performance criteria of PBP2006.

It is therefore recommended that a Bush Fire Safety Authority be issued with the same conditions as the BFSA dated 16th January 2018 (see *attached* appendix) without the inclusion of the ''General Advice – Consent Authority to Note'' associated with the BFSA.

DISCLAIMER

This report was prepared for the purposes and exclusive use of the stated client to accompany a submission to amend the Bush Fire Safety Authority referenced in this report in relation to the General Advice for the proposed subdivision and is not to be used for any other purpose or by any other person or Corporation. BCA Check Pty Ltd accepts no responsibility for any loss or damage suffered howsoever arising to any person or Corporation who may use or rely on this report in contravention of the terms of this clause.

Reporting has been based on the relevant Council and Rural Fire Service Guidelines; however, recommendations given in this report are based on our site investigation at the time of reporting. In some cases site conditions may change dramatically within a few years due to rapid vegetation re-growth and invading weed species. The report is dependent on ongoing maintenance of building materials, asset protection zones, water supply and landscaping as recommended in the report. The content of the report is based on the assumption, as consistent with PBP2006, that all doors and windows will be closed during a bushfire event.

REFERENCES

NSW Rural Fire Service and Planning NSW (2006), *Planning for bushfire protection, A guide for councils planners fire authorities developers and homeowners.* Rural Fire Service NSW Australia.

Standards Australia, (2009), AS3959 *Construction of buildings in bushfire prone areas,* Australian Standards, Sydney.

LEGISLATION

Environmental Planning and Assessment Act 1979 and Regulations 2000. *New South Wales.* Parliamentary Counsel's Office, NSW Government Information Service.

Rural Fires Act 1997. *New South Wales.* Parliamentary Counsel's Office, NSW Government Information Service.

Rural Fires Regulation. *New South Wales.* Parliamentary Counsel's Office, NSW Government Information Service.

APPENDICES

- NSW Rural Fire Service – correspondence dated 16.01.2018
- Site Layout Plan – BG&E, Dwg. No. C-0003 Rev E dated 01.02.2018
- Plan of Management, Lot 13 in Deposited Plan 1014470 Casuarina Way Casuarina – Newton Denny Chapelle, dated 15.02.2018
- Email correspondence, BG&E dated 05.04.2018
- Standards for Asset Protections Zones (RFS 2005)

NSW RURAL FIRE SERVICE

The Secretary
NSW Planning & Environment
GPO Box 39
SYDNEY NSW 2001

Your Ref: MP 06_0258 MOD 10
Our Ref: D16/0555
DA16022300836 PC

ATTENTION: Emma Butcher

16 January 2018

Dear Ms Butcher

Casuarina Town Centre – MP 06_0258 (Mod 10)

I refer to your letter dated 17 November 2017 seeking comments from the NSW Rural Fire Service (RFS) with respect to the above application.

The NSW RFS has reviewed the plans and document available on the Department's website and understands the modification proposes to:

- modify the approved lot layout by replacing medium density lots with single dwellings lots. This would:
  - increase the total number of lots on the site from 97 to 178;
  - reduce the total number of dwellings across the site from approximately 663 to 447
- modify the built form controls to increase the height of buildings permitted along Grand Parade;
- delete the approved hotel use;
- revise the drainage concept to facilitate the filling of an existing drainage swale and its conversion to a 'green buffer';
- change the timing for the provision of additional beach access; and
- change the approved staging plan;

The NSW RFS does not raise any objection to the proposed modification and recommends inclusion of the following conditions in any approval of the proposed development.

Postal address
Records
NSW Rural Fire Service
Locked Bag 17
GRANVILLE NSW 2142

Street address
NSW Rural Fire Service
Planning and Environment Services (North)
Suite 1, 129 West High Street
COFFS HARBOUR NSW 2450

T (02) 6691 0400
F (02) 6691 0499
www.rfs.nsw.gov.au
Email: pes@rfs.nsw.gov.au

Asset Protection Zones
The intent of measures is to provide sufficient space and maintain reduced fuel loads so as to ensure radiant heat levels of buildings are below critical limits and to prevent direct flame contact with a building. To achieve this, the following conditions shall apply:

1. At the issue of subdivision certificate and in perpetuity the entire property shall be managed as an inner protection area (IPA) as outlined within section 4.1.3 and Appendix 5 of Planning for Bush Fire Protection 2006 and the NSW Rural Fire Service's document Standards for asset protection zones.

2. Landscaping to the site and within the public reserve to the east of Lots 85 – 91 is to comply with the principles of Appendix 5 of Planning for Bush Fire Protection 2006 and the NSW Rural Fire Service's document Standards for asset protection zones.

Access
The intent of measures for public roads is to provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area. To achieve this, the following conditions shall apply:

3. Public road access shall comply with section 4.1.3 (1) of Planning for Bush Fire Protection 2006.

Water and Utilities
The intent of measures is 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. To achieve this, the following conditions shall apply:

4. Water, electricity and gas are to comply with section 4.1.3 of Planning for Bush Fire Protection 2006.

General Advice – consent authority to note:

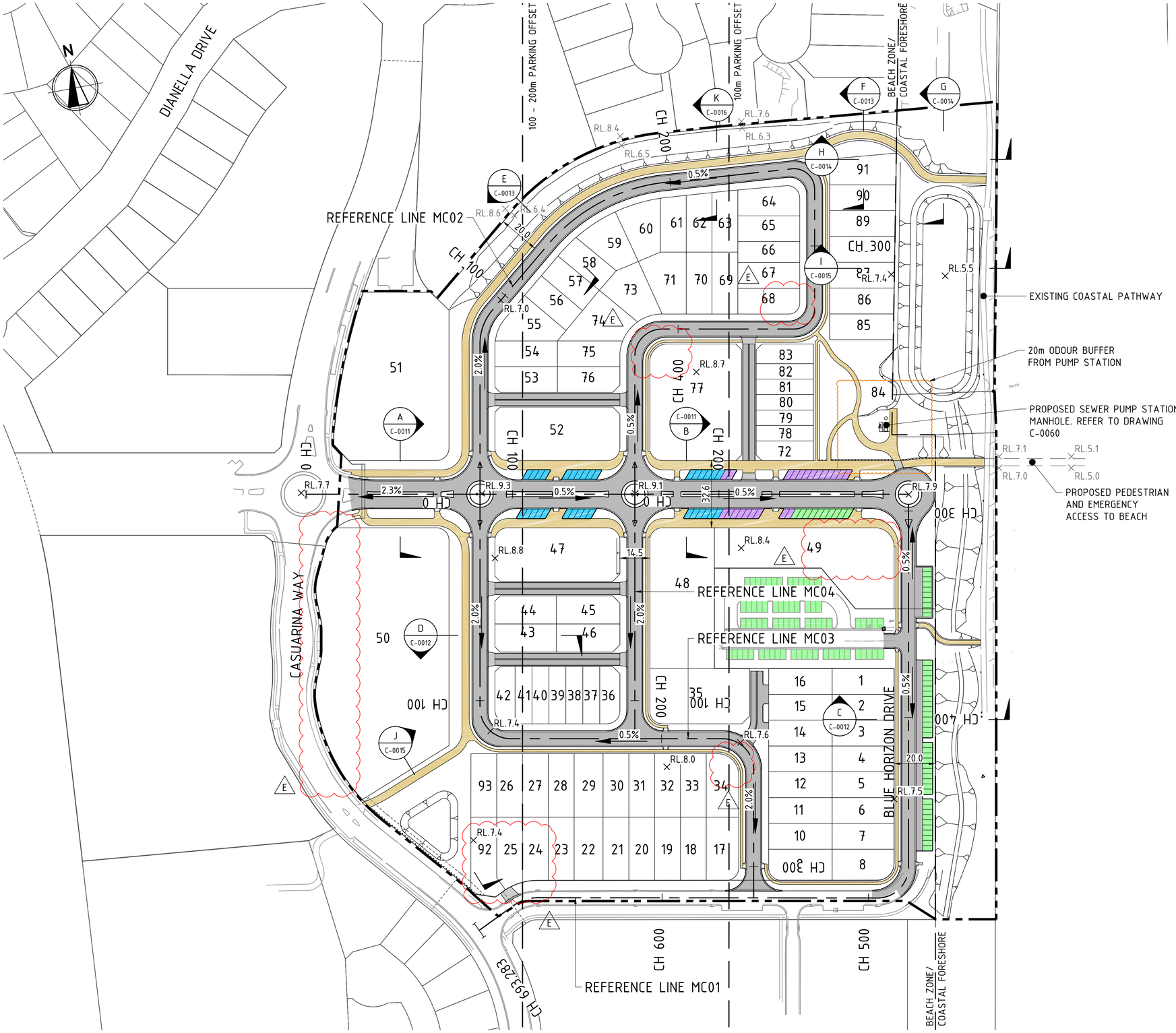
The NSW RFS recommendations assume that the area of Lot 13 DP 1014470 to the east of Lots 85-91 will be managed as an asset protection zone as indicted in the letter from Newton Denny Chapelle to the Department of Planning and Environment dated 15 December 2017 (ref: 13/054).

For any queries regarding this correspondence please contact Paul Creenaune on 6691 0400.

Yours Sincerely

Neil Pengilly
Acting Team Leader – Development Assessment & Planning

The RFS has made getting information easier. For general information on 'Planning for Bush Fire Protection, 2006' , visit the RFS web page at www.rfs.nsw.gov.au and search under 'Planning for Bush Fire Protection, 2006'.



LEGEND

- DESIGN CONTROL LINE
- LIMIT OF WORKS BOUNDARY
- PROPOSED ROAD GRADE (2%)
- PROPOSED LEVEL (RL.8.0)
- EXISTING LEVEL
- PROPOSED ROAD
- PROPOSED PATH
- PARKING BAYS - 0m TO 100m (134 TOTAL)
  - 71 EXISTING BLUE HORIZON DRIVE
  - 8 TRESTLES AVENUE
  - 55 PROPOSED BAYS
- PARKING BAYS - 100m TO 200m (32 TOTAL)
- PARKING BAYS - ADDITIONAL (24 TOTAL)

LOT AREA TABLE

LOT No.	AREA (m^2)
1	374.9
2	375.0
3	375.0
4	375.0
5	375.0
6	375.0
7	375.0
8	438.8
9	456.5
10	384.4
11	384.4
12	384.4
13	384.4
14	384.4
15	384.4
16	384.3
17	474.5
18	382.7
19	382.7
20	382.7
21	382.7
22	428.6
23	382.7
24	385.4
25	410.5
26	384.4
27	384.4
28	384.4
29	430.5
30	384.4
31	384.4
32	384.4
33	384.4
34	461.5
35	1270.3
36	256.7
37	227.6
38	227.5
39	227.5
40	227.5
41	227.5
42	257.7
43	401.8
44	401.8
45	412.4
46	412.4
47	1545.3

LOT AREA TABLE

LOT No.	AREA (m^2)	
48	2111.9	E
49	2219.3	
50	7354.4	
51	4084.7	
52	1545.3	
53	375.0	
54	378.0	
55	449.2	
56	327.8	
57	329.9	
58	323.1	
59	440.6	
60	451.6	
61	335.5	
62	352.3	
63	368.8	
64	405.6	
65	375.0	
66	302.9	E
67	375.0	
68	369.3	
69	375.0	
70	375.0	
71	524.0	
72	259.8	
73	471.8	
74	522.2	
75	381.6	E
76	372.0	
77	2481.0	
78	207.8	
79	207.8	
80	207.8	
81	207.8	
82	207.8	
83	259.6	
84	3500	
85	387.1	
86	389.6	
87	392.1	
88	394.6	
89	397.1	
90	399.5	E
91	448.4	
92	491.4	
93	384.4	

0 10 20 30 40 50 60m
SCALE 1:1000 AT A1 SIZE

REV	DATE	DESCRIPTION	RVD
E	01.02.18	LOT AREAS AMENDED	B.K
D	09.08.17	ISSUED FOR DA APPROVAL	B.K
C	08.06.17	ISSUED FOR DA APPROVAL	B.K
B	25.05.17	ISSUED FOR DA APPROVAL	B.K
A	09.05.17	ISSUED FOR DA APPROVAL	B.K

CLIENT: CLARENCE PROPERTY

Brisbane *Office*—
74-76 Bowen St, Spring Hill QLD 4000
P / +61 7 3167 3300
E / info@bgeeng.com
bgeeng.com—

PROJECT: CASUARINA BEACH
TOWN CENTRE - STAGE 2
CASUARINA WAY, NSW 2487

STATUS: ISSUED FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
C.K	B.J	M.W	B.K

DATUM	GRID	SCALE	SIZE
MGA94	AHD	1:1000	A1

TITLE: SITE LAYOUT PLAN

PROJECT No.	DRAWING No.	REV.
B16097	C-0003	E

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5/02/2018 4:38:23 PM

• JOHN NEWTON B. Surv; M.I.S. Aust. • TONY DENNY B. Surv; (Hons); M.I.S. Aust. • DAMIAN CHAPELLE BTP. CPP.

PLAN OF MANAGEMENT

LOT 13 IN DEPOSITED PLAN 1014470 CASUARINA WAY CASUARINA

Adopted 15 February 2018

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SURVEYORS PLANNERS ENGINEERS

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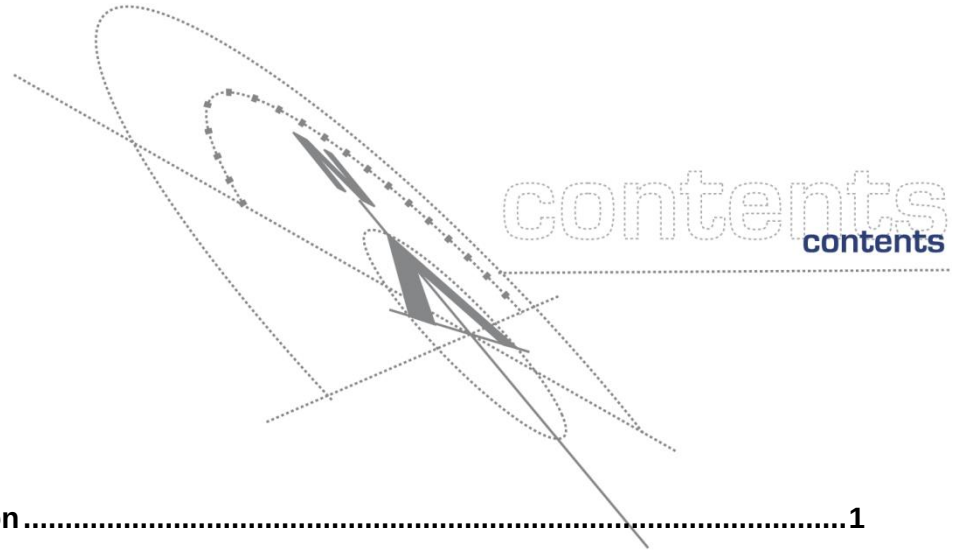

1.Introduction

1.1 Background

The provisions of the Local Government Act 1993 ('the Act') require that public land vested in or under the control of a local council must have a plan of management prepared for it.

To address this requirement Tweed Shire Council has prepared a Plan of Management to provide guidance for the management and development of Lot 13 DP 1014470 at Casuarina. Lot 13 is public land classified as Community land and categorised as Park.

By identifying management objectives and outcomes for the land it will also assist Council and the community in sourcing and allocating funding for on-going maintenance, improvement or development of these lands.

Public land is any land vested in or under the management of a council and its delegated authorities, and includes land managed under the Crown Lands Act 1989 (e.g. Crown lands managed by Council) or the Local Government Act 1993 (Council owned and managed land).

1.2 Plans of Management

1.2.1 What is a Plan of Management for Public Land?

The purpose of a Plan of Management is to provide a framework for the management and use (including development) of public land. Public Land can include Crown land, Community land or Operational land.

- Community land is owned by a council for the benefit of local residents and visitors.
- Operational land ordinarily comprises land held as a temporary asset or as an investment, land which facilitates the carrying out by a council of its

functions or land which may not be open to the general public, such as a works depot or a council garage.

- Crown land is owned by the State or Commonwealth for the benefit of all persons and is managed under the provisions of the Crown Lands Act 1989.

Community and Operational land is managed under the provisions of the NSW Local Government Act 1993 ('the Act1). The Act stipulates that all public land owned by a council needs to be classified as Community land or Operational land and that there must be a Plan of Management for all Community land to guide the effective operation and development of such lands.

This Plan of Management (the Plan) covers Lot 13 DP 1014470 which is identified as Community land under the administration of Tweed Shire Council. Given the inherent limitations in developing a generic plan of management, a site specific plan has been prepared.

This Plan for Lot 13 DP 1014470:

- is prepared by Council in consultation with the community and stakeholders with the Casuarina Town Centre;
- clarify how Council will manage the land; and in particular
- indicate how the land may be used or developed, e.g. leasing. Infrastructure services etc.

1.2.2 Community Consultation

In order to ensure that a Plan of Management meets the needs of the community and has their support, it is recognised that it is essential to obtain their input through effective community consultation.

To facilitate additional community input and in compliance with the Act, the draft Plan of Management for Lot 13 DP 1014470 as Community Land Categorised as Park will be placed on public exhibition for a period of 28 days.

2. Description of the Land

2.1 Description of the Land

The land subject to this Plan of Management comprises of a single unnamed parcel of Community Land is located east of residential land known as the Casuarina Town Centre, in Casuarina NSW. The property description is Lot 13 DP1014470. The total land area is 5.25 ha. This plan does not include the adjoining crown land to the east (Lot 500 DP1095235).

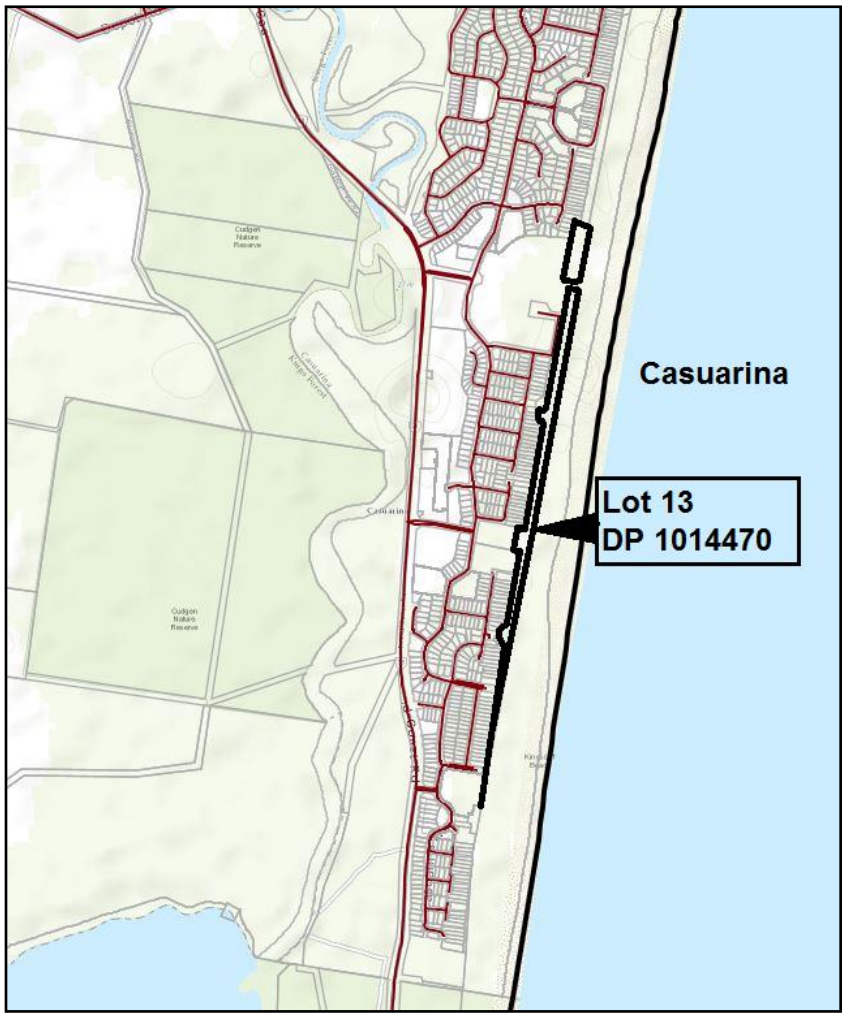

Figure 1: Locality Plan – Lot 13 DP 1014470, Casuarina

Figure 2 – Location of Lot 13 DP 1014470

2.2 Tenure, Zoning, Classification and Category of Land

Tweed Shire Council (TSC) owns the land parcel, gazetted in 2000, in fee simple. The land is zoned, pursuant to the provisions of the Tweed Local Environmental Plan (LEP) 2014 as Deferred Matter (DM) and RE1 – Public Recreation. The Deferred Matter zone under the Tweed Local Environmental Plan (LEP) 2000 is 7(f) Environmental Protection (Coastal Lands)

The land is classified 'Community Land' and categorised 'Park' pursuant to the provisions of the Local Government Act, 1993, and the Local Government (General) Regulation, 2005.

2.3 Conditions of the Site and Existing Use

The subject land consists of a single land portion severed by a piece of closed road within the Casuarina Town Centres (Lot 15 DP 1198266).

Lot 13 is around 1900m long and of variable width, and extends from Public Land (Lot 83 DP 1031933) in the north to Public Land (Lot 12 DP 1014470) to the south It includes most of the linear parkland buffer between the urban development of Casuarina and the coastal dunes (Lot 500).

The area comprises of mown turf with some landscape / native vegetation plantings and several stormwater infiltration basins. A shared pedestrian/cycleway runs the length of the land and forms part of the Tweed Coast Cycleway, extending north to Kingscliff, and following

completion of the final stage, south to Pottsville. There are several east west concrete paths and timber pedestrian bridges allowing access from residential and tourist areas to Casuarina Beach.

Several pocket parks are also found within Lot 13 and accessed from both the shared pedestrian/cycleway and east-west connecting pathways

2.4 Adjoining land use

Lot 13 is bordered to the east by coastal dunes extending around 60m to Casuarina Beach. These dunes have been regenerated since 2003 and are managed under the 'Lot 500 & 7(f) Zone Management Plan, Salt (July 2003).

Residential land lies along much of the western border of Lot 13 and is complimented by either existing or planned Tourist accommodation or commercial facilities. The planned Casuarina Town Centre is located adjoining the northern portion of Lot 13.

The Town Centre enjoys the benefit of a Concept Plan & Project Application approval (MP06_0258) issued by The Department of Planning & Environment. The plan provides for the development of a variety of residential dwellings (single & multi-dwellings) mixed use and shop-top housing, Coles supermarket and associated commercial/retail uses with public car parking. Currently the northern portion of the Casuarina Town Centre (Lot 15 DP 1198266) is vacant. Figure 3 illustrates the relationship of the Town Centre (Lot 15) site to Lot 13.

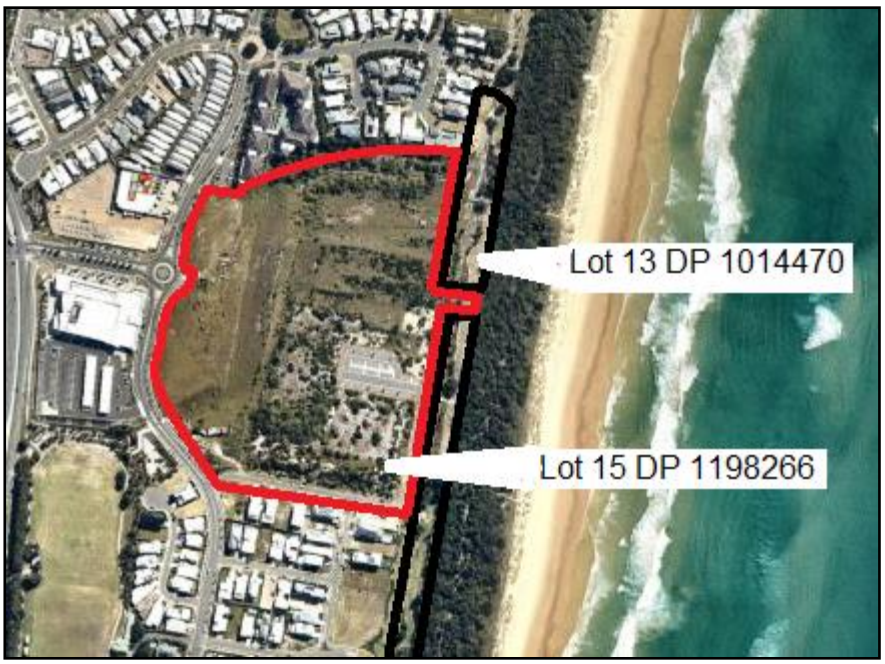

Figure 3 – Detail showing Lot 15 DP 1198266
(Undeveloped Portion of Casuarina Town Centre)

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3. Management Considerations

3.1 Current Management Considerations

No significant management issues have been identified in the area. The area operates well as a buffer between urban development and the coastal dunes, providing a linear pedestrian and cycling corridor, and offering access to the beach.

The management of the land must also take into account the following matters:-

- **Approvals**: The Concept Plan approved for the Casuarina Town Centre identifies the completion of civil infrastructure works associated with stormwater infiltration, sewage services and the construction of a beach access pathway.
- **Natural Areas and Risk Management**: It is unlikely that Council will install signage at all natural areas to remind users of the risks that may be inherent with recreating in these areas. There is an expectation that adults visiting a natural area, particularly when in charge of children or others, would provide or ensure that all parties have appropriate resources in line with the proposed activity and location, (e.g. sturdy footwear, long sleeved clothing, hats, sun protection, insect repellent, snake bandages, water, suitable food resources, etc.). Council will carry out regular inspections of natural areas to address risk management and maintenance concerns regarding the condition of any bushland, tracks, habitat or significant features, safety of built structures and access arrangements.
- **Environmental Impacts:** Council adheres to the principles of Ecologically Sustainable Development. Natural area management requires that we avoid the potentially adverse

impacts of inappropriate management practices. Passive recreation will often be preferable to active recreation as a result.

- **Maintenance:** Maintenance is an essential aspect of the management of Lot 13. In particular, the public enjoyment and function of Lot 13 are more likely to be impacted by external threats such as weed infestation, damage from storms and human activity. Council obligation with standards developed for the maintenance of all natural areas to ensure that the condition of the vegetation in these areas is maintained or enhanced. Costings to achieve a 'maintenance' state have been developed by Council for natural areas. They take into consideration variable environmental indicators including vegetation structure and composition, landscape connectivity, habitat features, weed presence and other threats to site integrity. Maintenance will be dependent on ongoing funding to keep Lot 13 as a usable and functional Park.

3.2 Future use and development of the site

It is envisaged that to achieve the objectives of this plan, the existing uses (or similar) will remain, with one exception:

- That provision be made for infrastructure services inclusive of such items as stormwater infiltration, sewage services and public access pathways/cycleways to be developed in association with approvals for development previously granted over the land adjacent to Lot 13, together with any subsequent iterations of such approvals granted by the relevant consent authority, and if such consent authority is not Council, then any applications for subsequent approvals must be reviewed and approved by Council, acting in the role of landowner.

4. Statutory Context

4.1 Leases, Licences or Other Estates

Leases, licenses or other estates will be permitted over Lot 13 for the purposes of achieving the objectives identified in this Plan. This may include construction and operation of facilities that support these objectives.

Such leases, licenses or other estates must be consistent with the management objectives identified in this plan, and the requirements of the Local Government Act, 1993 (Section 46). They must also be consistent with the requirements of Council's Local Environment Plan relating to permissible uses for the land adjacent to Lot 13.

Any lease, licence or other estate must not exceed 21 years (including any option for renewing the lease, licence or other estate).

It is an express provision of this Plan that Council may enter into legal agreements for, and charge for, the use of the area and may license operators of business undertakings which it determines will assist in achieving the objectives of this plan.

4.2 Community Land Easement Requirements

Council may permit the granting of easements from properties adjoining the Reserve for connection to Council facilities and/or other public utilities, or for crossing the Reserve, subject to the following conditions:

- Easements will be granted for the purposes described above, subject to a fee being paid by the applicant based on a valuation of the land. This valuation will consider the enhancement to the dominant tenement and impact upon the servient tenement;
- Council approval of the proposed location, design and engineering requirements;
- Cost of works and future maintenance be borne by the applicant;
- Compliance with relevant statutory requirements.

5. Management Objectives

This Plan will outline the values of Lot 13 DP 1014470 and ways that the land is best used, managed and developed in line with the objectives for its management and how priorities will be determined for the best use of available resources and funding.

The management objectives for Lot 13 DP 1014470 include:

Objective 1

Promote, encourage and provide for the use of the land, and to provide facilities on the land, to meet the current and future needs of the community in relation to:

- public recreation and the physical, cultural, social and intellectual welfare or development of individual members of the public.
- purposes for which a lease, licence or estate may be granted in respect of the land (other than provision of public utilities and works associated with or ancillary to public works).
- the construction and supply of infrastructure works which service the existing and planned community adjacent to Lot 13.

Objective 2

Provide a buffer between the natural coastal dunal vegetation in the contiguous Lot 500, and the commercial and residential development of the land adjacent to Lot 13.

Objective 3

Maintain and enhance Tweed's waterways and its catchments

- Manage water resources sustainably and minimise impact on the environment by achieving more integration of water supply, wastewater and stormwater services.
- Improve urban stormwater discharge through water sensitive urban design,
- Improve rural stormwater discharge quality and ecosystem health through best practice land management.

6. Management Strategies and Performance Measures

Strategies proposed to achieve the stated management objectives for Lot 13 DP1014470 include

Management Strategies	Performance Measures
1. Encourage use of the reserve consistent with established management objectives, category and classification of land	• Park infrastructure and landscape planting consistent with the reserve use provided. • Public access to the reserve and connection through to Lot 500 and the beach is available.
2. Ensure all existing and future uses are sustainable, and that facilities and activities are managed with regard to any adverse impact on nearby residences, the environment or community needs.	• Facilities developed and managed in accordance with this plan, development consent and other statutory approval/license requirements.
3. Develop infrastructure as required to provide for the desired use of land adjoining the reserve. Such use to comply with this plan, any lease or sublease agreements or other requirements.	• Provide for the delivery of approved development which requires works in the reserve. • Compliance with Concept Plan, Project Approval of development consent. • Compliance with this plan.
4. Maintain structures consistent with relevant lease and sub-lease or other appropriate agreements.	• System in place to monitor all structures and works implemented. • Repairs and general maintenance completed in a timely manner.

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7. Permitted Development

7.1 Activities, Works & Uses Permitted

Development Permissible Without Development Consent	Development Permissible with Development Consent
• Environmental Facilities (as defined in Tweed LEP 2014). • Recreation Areas (as defined in Tweed LEP 2014). • Landscape works, including construction of barbecue or picnic areas, park furniture such as seating, shade structures and minor shelters, playground facilities, footpaths, boardwalks, minor bridges and the like. • Minor earthworks, mounding, filling, levelling and the like. • Maintenance actions. • Drainage and storm water works (minor). • Fire hazard reduction activities. • Signage – compliance, directional, interpretive or identification (must be compliant with Tweed DCP, SEPP64 or temporary in nature i.e. no greater than seven days in duration). • Advertising (if associated with a use permitted on the site with or without consent) – must be temporary only, non structural and no more than seven continuous days. • Filming and still photography (in accordance with Tweed Shire's established filming protocol). • Community Events e.g. fundraising events,	• Drainage and stormwater works (major, such as infiltration basins). • Filling or cutting greater than 500mm in depth with the exception of ancillary mounding and landscaping works associated with the recreational use of the land. • Pedestrian & Cycleway access paths lining to the coastal footpath and beach access paths. • All other uses / works requiring development consent within the RE1 (Public Recreation) zone (Tweed LEP 2014). • All other uses / works requiring development consent within the 7(f) Environmental Protection (Coastal Lands) zone (Tweed LEP 2010). • All other uses/works approved under development approvals granted over land adjacent to Lot 13. • Infrastructure works inclusive of drainage, sewerage and pedestrian / cycleway access.

announcements, awareness campaigns, health campaigns, and temporary activities, developments or events that comply with Council's 'Community Events on Council Administered Land' guidelines. • School or community related activities. • Sporting events such as fun runs and the like. • All other uses / works that do not require development consent within the RE1 (Public Recreation) Zone (Tweed LEP 2014) & 7(f) Environmental Protection (Coastal Lands) zone (Tweed LEP 2010).	

From: Adam Kirk <adam.kirk@bgeeng.com>
Date: 5 April 2018 at 7:21:19 am AEST
To: James Webb <james.webb@clarenceproperty.com.au>
Cc: Ben Keith <ben.keith@bgeeng.com>
Subject: Casuarina Town Centre - Stage 2

Good morning James

In response to the bushfire certifiers query, BG&E can confirm in order for the infiltration basin to properly function within the foreshore in front of Lots 85-91, the basin will only be planted out with grass species. The batters to the basin will be grassed with occasional sparsely planted shrubs, whilst the 3m maintenance track surrounding the basin will need to be grassed only with no shrubs or trees for access reasons.

Regards

Adam *Kirk*—
Senior Civil Designer

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Opportunities Through Excellence—

standards

for asset protection zones

protection

NSW RURAL FIRE SERVICE

STANDARDS FOR ASSET PROTECTION ZONES

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.

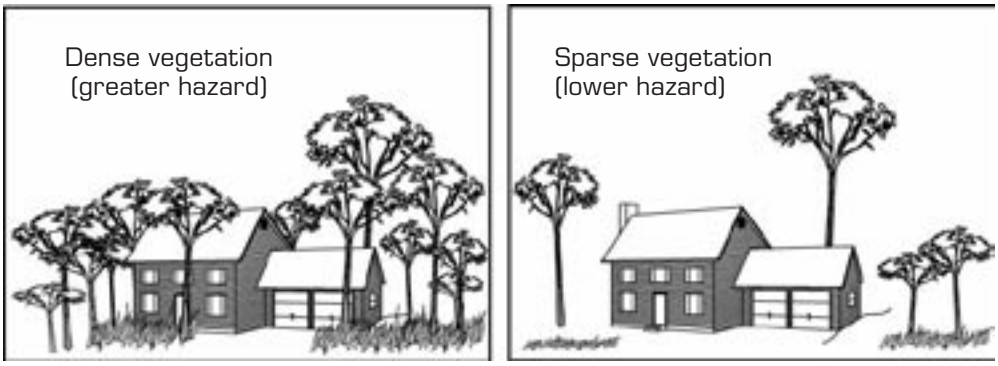
STEP 1. DETERMINE IF AN APZ IS REQUIRED

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.

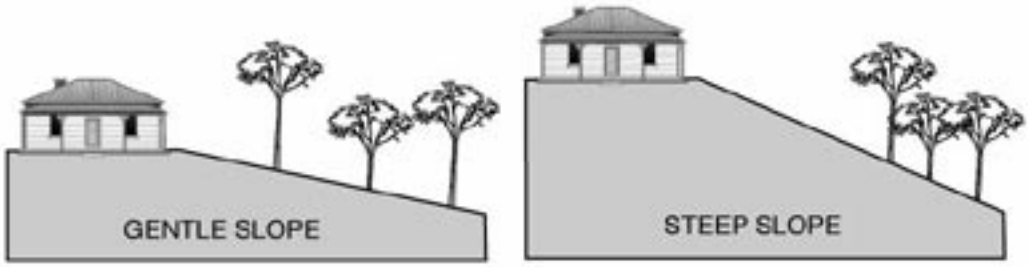
If your current development consent provides for an APZ, you do not need further approvals for works that are consistent with this consent.

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.

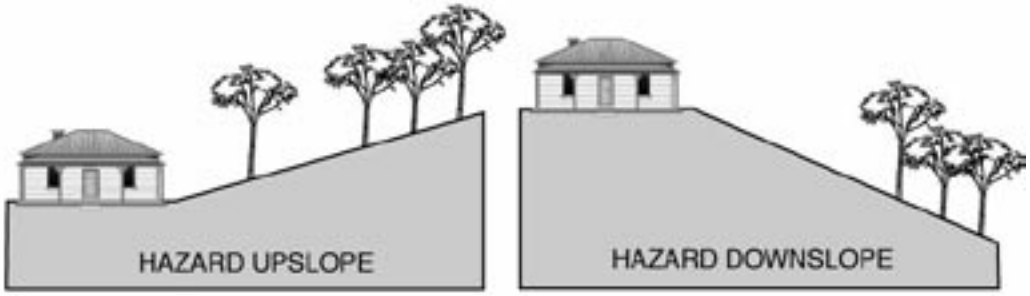
STEP 3. DETERMINE THE APZ WIDTH

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 then 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.

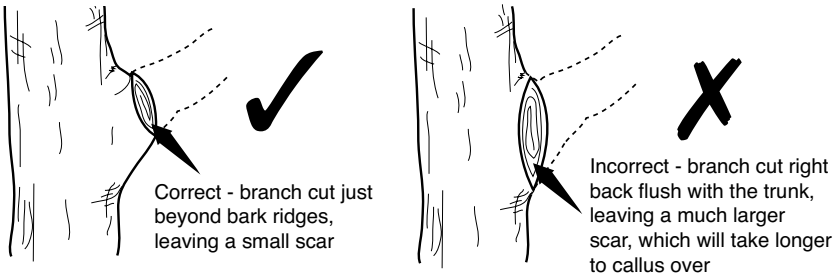
When choosing plants for removal, the following basic rules should be followed:

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 understorey plants, trees and shrubs less than three metres in height

The removal of significant native species should be avoided.

Prune in acordance 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

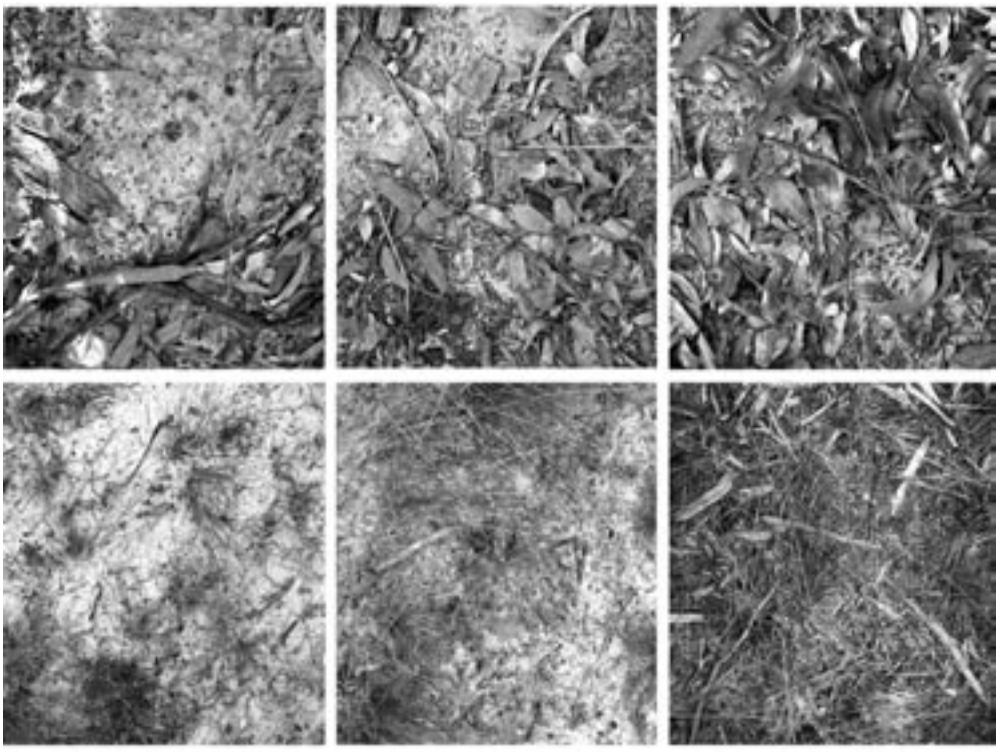
While the removal of fuel is necessary to reduce a bush fire hazard, you also need to consider soil stability, particularly on sloping areas.

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.

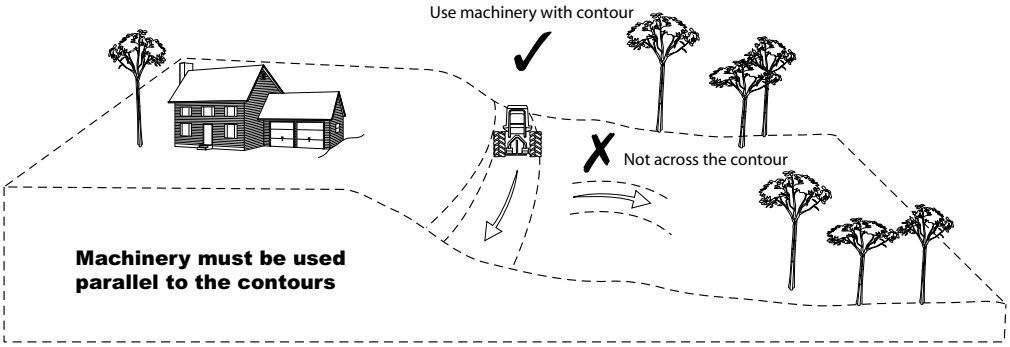
When using mechanical hazard reduction methods, you should retain a ground cover of at least 75% to prevent soil erosion. However, if your area is particularly susceptible to soil erosion, your Hazard Reduction Certificate may require that 90% ground cover be retained.



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.

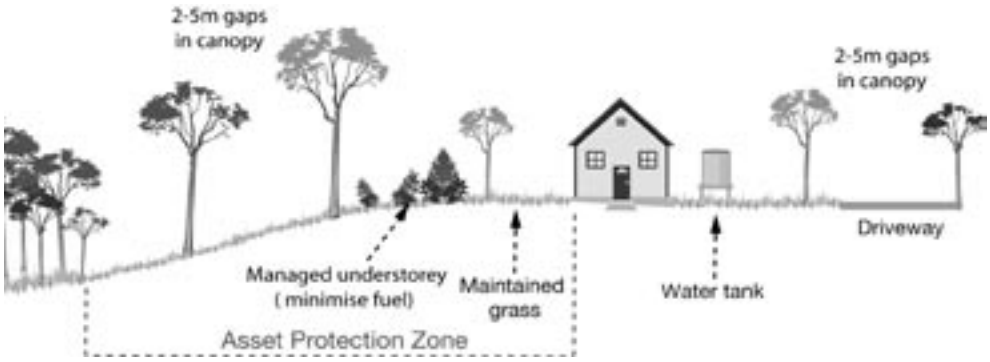


STEP 6. ONGOING MANAGEMENT AND LANDSCAPING

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.*

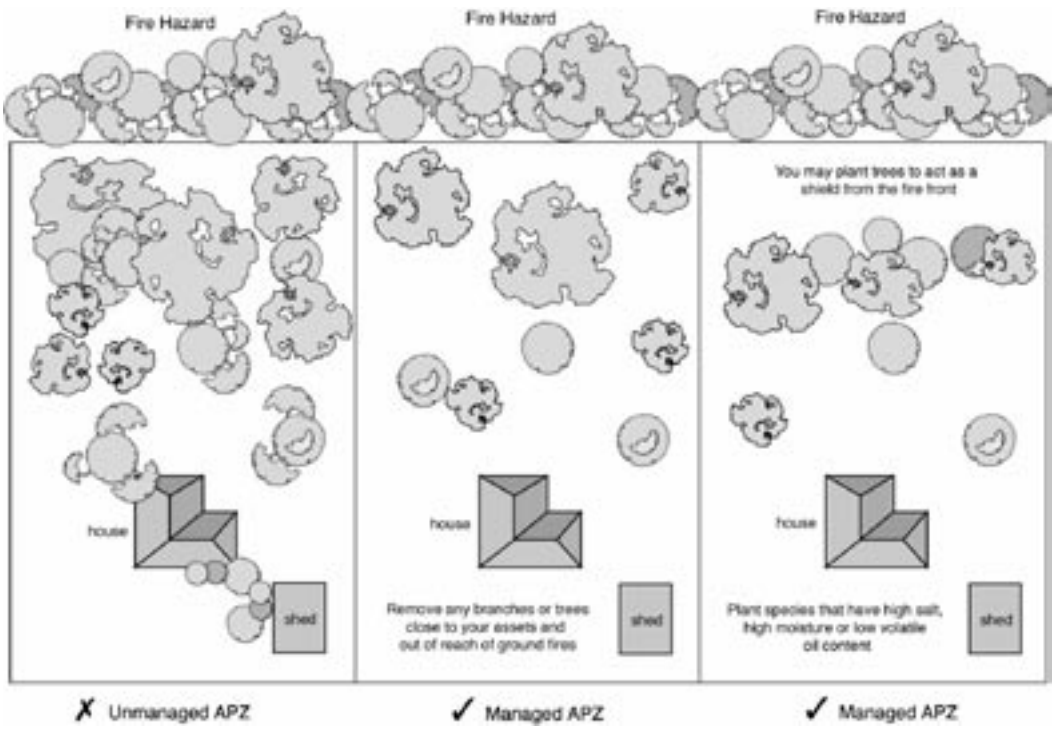
WIND BREAKS

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.**

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