

BUSHFIRE MANAGEMENT PLAN

FOR PROPOSED

RESIDENTIAL / COMMERCIAL DEVELOPMENT

KINGS FOREST STAGE 1

PREPARED BY

BUSHFIRE SAFE

(AUST) PTY LTD

AUGUST 2012

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BUSHFIRESAFE (AUST) PTY LTD

BUSHFIRE RISK MANAGEMENT & ENVIRONMENTAL CONSULTANTS

20 McLachlan Street
Ph (02) 66451088

Maclean, NSW 2463
Fax (02) 66451099

A.B.N 89 114 025 820

A.C.N 114 025 820



Gold Coast
Sunshine Coast
Armidale

30 Adam Street
3 Herford Drive
3/94 Beardy Street

Oxenford QLD 4322
Kureelpa QLD 4560
Armidale NSW 2350

Ph/Fax: 07 38209992
Ph/Fax: 07 54764265
PH: 02 67732619

Mobile: 0432515569
Mobile: 0408538529
Mobile: 0429139894

EXECUTIVE SUMMARY

Bushfiresafe (Aust) P/L has been engaged by Project 28 P/L to undertake a complete Bushfire Assessment for Stage One of the Kings Forest Development. The assessment was conducted in accordance with

- *Item 6.3 of the NSW Department of Planning Director General's Environmental Assessment Requirements dated 10 September 2010, which states:*

"In order to ensure the protection of property and assets, a detailed bushfire assessment and management plan prepared by a suitably qualified person must be submitted. The assessment must, at a minimum, demonstrate consistency with the requirements of Planning for Bushfire Protection 2006. All asset protection zones must be clearly specified on the Plan of Development and all affected lots are to be encumbered with a Section 88B instrument under the NSW Conveyancing Act 1919."

Note: Correspondence received from NSW Rural Fire Service indicates that the lots affected by Asset Protection Zones are not required to be encumbered with a Section 88B instrument under the NSW Conveyancing Act 1919; a meeting between the developers representative and DOPI officers on the 19 July 2012 supported the NSW Rural Fire Service position, therefore, implementation of Section 88B instruments for lots affected by Asset Protection Zones are not required.

- *Part 3A of the Environmental Planning & Assessment Act (1979), and*
- *section 100B of the Rural Fires Act (1997).*

PROPERTY DESCRIPTION

The Kings Forest site is located immediately west of Tweed Coast Road, between Casuarina Town Centre and Kingscliff on the north coast of NSW and covers an area of 880Ha comprising the following land uses (Table 1). The property has previously been sand mined; utilised for turf production, dairying, small cropping, livestock grazing, sugar-cane production; and for pine plantations. Current activities include livestock grazing and harvesting of the mature pine forests growing on the subject land. It is the intention of the proponents to continue with the livestock grazing activity until urban development commences.

The Kings Forest Stage 1 Project Application No. MP 08_0194 was lodged in November 2011. The Application and Environmental Assessment Report was advertised from December 2011 to January 2012 following which 302 public submissions and 10 agency submissions were received.

As a result of the submissions, amendments to the project have been made. The amended project contains the following key elements (NB: these elements will be revised and updated as the amended project is finalised).

- *Subdivision to create new lots for future development;*

- Bulk earthworks across the site;
- Road works comprising:
 - construction of the entrance road into the site and associated intersection works on Tweed Coast Road;
 - alignment and construction of the proposed Kings Forest Parkway from Tweed Coast Road via Precincts 4 and 5 through to the western precincts; and
 - alignment and part construction of two proposed roads through SEPP 14 areas to access the southern precincts;
- Development of 2,036 m² of floor space for rural retail supplies development and access arrangements within Precinct 1;
- Construction of subdivision and infrastructure works along the Kings Forest Parkway and within Precincts 1 and 5;
- The Plan of Development for Precinct 5.

This Bushfire Risk Assessment was conducted through an on-site inspection undertaken on 25th May, 2012 using the methodology set out in Planning for Bushfire Protection manual (RFS,2006). The on-site assessment included traversing the subject property and all lands within 140 metres from the proposed subdivision.

PRECINCT 1 - COMMERCIAL DEVELOPMENT

A rural retail development is proposed for the parcel of land on the east side of Tweed Coast Road (Lot 7, DP 875447). The proposal involves 1 building, public and staff car parking areas, separate car and truck entries and a designated truck manoeuvring area incorporating a drive-through pickup facility (Plan 2).

The public car park is located at the rear of the building towards the bushfire hazard.

Asset Protection Zones (APZ)

The dominant bushfire prone vegetation was assessed as being the Subtropical Floodplain Forest to the south and east of the development. This vegetation is separated from the development by a 50m ecological buffer. Using this information, this bushfire risk assessment concluded that the following asset protection zone should be established, after reference to Table A2.5 Minimum Specifications for Asset Protection Zones (m) for Residential and Rural Residential Subdivision Purposes (for Class 1 and 2 buildings) in FDI 80 Fire Areas, of the Planning for Bushfire Protection manual (RFS, 2006);

Aspect	Vegetation	APZ (m)	IPA (m)	OPA (m)	Compliance with PBP
South	Forest	21	21	0	Yes, achieved by the carpark area
East	Forest	21	21	0	Yes, achieved by the carpark area

Bush Fire Attack Categories

An assessment of the bushfire attack categories applicable to the proposed development in Precinct 1 was carried out using the methodology detailed in Planning for Bushfire Protection (Addendum Appendix 3 2010). This bushfire risk management assessment concluded that commercial Building A will be in the **BAL - 29** Bushfire Attack Category according to Table A 3.4 Determination of Category of Bush Fire Attack FDI 80 (FRS, 2006) with the following site attributes:

- Forest as the Bushfire prone vegetation to the east and south
- This vegetation occurs on a flat slope
- A minimum separation of 21m is achievable from this vegetation

PRECINCT 5 - RESIDENTIAL DEVELOPMENT

Residential development is proposed for the parcel of land located to the south of Kings Forest Parkway and east of the future Town Centre Precinct (Part Lot 1, DP 781633 and Part Lot 40, DP 7482). The area is presently cleared of all over-storey vegetation and managed as grazing land. Precinct 5 is bordered by Kings Forest Parkway, vegetated buffer and Cudgen Nature Reserve to the east, a vegetated buffer to a creek line along the southern boundary; open forest to the northeast; proposed Precinct 3 to the north; and the proposed Town centre (Precinct 4) to the west. The vegetated buffer along the creek line to the south is zoned 7(l) Environmental Protection 'Wetlands and Littoral Rainforest'; the developable land is zone 2(c) Urban Expansion.

Asset Protection Zones (APZ)

Based on the assessment of the vegetation communities and slopes present on and adjacent to Precinct 5, and in accordance with Appendix 2 Table A2.5, Planning for Bushfire Protection (RFS 2006), this bushfire risk assessment recommends that Asset Protection Zones (APZ), Inner Protection Area (IPA) and Outer Protection Area (OPA) should be established as listed below.

Aspect	Vegetation	APZ (m)	IPA (m)	OPA (m)	Compliance with PBP
East	Tall Heath/Forest	21	21	0	Yes, achieved by the proposed perimeter road & grassed swale area
North, West	Grassland	10	10	0	Yes, achieved by the proposed Kings Forest Parkway
South/East	Forest	27	27	0	Yes, included within the 20m outer buffer to zone and adjoining allotments
South	Forest	21	21	0	Yes, included within the 20m outer buffer to zone and adjoining allotments
South/West	Forest	21	21	0	Yes, achieved by the proposed perimeter road & grassed swale area

The prescribed Asset Protection Zones are provided by the following features of the concept Plan for Precinct 5 as illustrated in Plan 3.

To the east, a perimeter road a grassed swale drainage corridor provides a managed buffer along the eastern perimeter that exceeds that required for the APZ. The perimeter road is located within the development footprint while the grassed swale area shall be located within the 20m outer margin of the ecological buffer from Cudgen Nature Reserve. Additionally, a drainage detention basin to be constructed in the northeast corner of the development will contribute to the required APZ. The APZ has been measured from the property boundary

and consists of the entire perimeter road and a small portion of the outer ecological buffer zone.

Along the south eastern limit of Precinct 5, a 50m ecological buffer is required from the zone 7(l) Environmental Protection 'habitat' lands. The 20m outer margin of this buffer will include a grassed swale area which will be utilised for part of the required APZ with the remaining 7 metres contained within the residential lots.

For the south western limit, a 50m ecological buffer is required from the zone 7(l) Environmental Protection 'habitat' and zone 7(a) 'Wetlands and Littoral Rainforest' lands. A perimeter road, and a grassed swale drainage corridor provides a managed buffer that exceeds that required for the APZ. The perimeter road is located within the development footprint while the grassed swale shall be located within the 20m outer margin of the ecological buffer. The APZ has been measured from the property boundary and consists of the entire perimeter road and a small portion of the outer ecological buffer zone.

To the west and north, the prescribed APZ is provided by the perimeter roads.

Bush Fire Attack Categories

An assessment of the bushfire attack categories applicable to the proposed development in Precinct 5 was carried out using the methodology detailed in Planning for Bushfire Protection (Addendum Appendix 3 2010). This bushfire risk management assessment concluded the following bushfire attack categories are applicable for the proposed development, depending on the separation distance from the assessed bushfire prone vegetation.

Vegetation	Aspect	Separation distance (m)	Bushfire Attack category
Forest	East/South Southwest	21-<31	BAL - 29
		31-<42	BAL - 19
		42-<100	BAL - 12.5
		>100	N/A
Forest	Southeast	27-37	BAL - 29
		37-<50	BAL - 19
		50-<100	BAL - 12.5
		>100	N/A
Grassland	North, West	>100m	Low

Fire Trail

With the exception of the south/eastern and southern elevations of the precinct the subdivision has been designed with a perimeter roads which separates the majority of the proposed allotments from the vegetation which will allow access to the bushland interface without the need for a fire trail; the bushfire assessment concluded fire trails would not be required for the south/eastern and southern elevations of the precinct due to the short distances between the three lots (621-623) are connected by the grassed swale area and relatively short lot boundaries which will allow access to the bushland interface in these areas.

ACCESS

Access to the proposed Precincts will be via Kings Forest Parkway and internal interconnecting roads. All interconnecting roads have been designed less than 200m in length without intersections, the development's roads will be dedicated to Tweed Shire Council and shall comply with the requirements in PBP 2006.

SERVICES

There will be a reticulated water supply to the property. The water supply to this subdivision must use a ring main system with the perimeter road. The fire hydrant spacing, sizing and pressure of this reticulated water supply must comply with AS 2419.1 (2005). Fire hydrants are not located on any carriage way and shall be delineated with blue pavement markers. All above ground water and gas service pipes are metal, including and up to any outside taps. Electrical transmission lines will be underground.

CONSTRUCTION STANDARDS

The Bushfire Risk Management assessment undertaken in relation to the proposed subdivision concluded that the construction standard in accordance with AS 3959 (1999) Construction of Buildings in Bushfire Prone Areas (Standards Australia, 2009) will be assessed and nominated when development applications are submitted for the construction of dwellings on the approved allotments.

CONCLUSION

The proposed development will comply with the minimum requirements for:

- 1). Asset Protection Zones detailed in Table A2.5 Minimum Specifications for Asset Protection Zones for Residential and Rural Residential Subdivision Purposes (for class 1 & 2 buildings) in FDI 80 Fire Areas in the Planning for Bushfire Protection manual (RFS, 2006);*
- 2) Access in accordance with section 4.1.3-2 (Property Access) in the Planning for Bushfire Protection manual (RFS, 2006); and*
- 3) Development of the Commercial Precinct, Education Precinct and Residential Precinct satisfies the aims of PBP 2006 and will therefore comply with the provisions for Fire Safety under the Building Code of Australia.*

BUSH FIRE MANAGEMENT PLAN

1.0 SCOPE OF THE PLAN

The Bushfire Management Plan (BFMP) is a strategic document which identifies: the level of bush fire risk for human habitation; strategies which will be implemented to manage the bush fire risk identified; and those persons responsible for implementing and maintaining this Bushfire Management Plan.

1.1 Area

This Plan covers the proposed education, residential and commercial development of Stage One of Kings Forest. Kings Forest is situated immediately to the west of Tweed Coast Road, between Casuarina Town Centre and Kingscliff, within Tweed Shire Council Local Government Area.

1.2 Period of Operation

Once a Bush Fire Safety Authority has been issued by the NSW Rural Fire Service and approved by the Local Authority, this Plan will have a period of operation of the life of the development or until such time that further development of the allotments is proposed.

1.3 Aim and objectives of the Plan

The aim of this Plan is to provide for the mitigation of bush fires for the protection of life and property for the habitants, visitors and emergency personnel in bush fire situations. Secondly, the Plan aims to reduce the threat to ecological and environmental assets. To achieve this aim, the Bushfire Management Plan must address a number of specific objectives.

- i. Identify the area most at risk from bush fire attack;
- ii. Reduce the risk of bush fire damage to life and property;
- iii. Ensure that the developer/owner/occupier understands their bush fire management responsibilities;
- iv. Reduce the impact of bush fire on the development;
- v. Develop sustainable Asset Protection Zones (APZ) surrounding the proposed building

1.4 Bushfire Management Strategies

This Plan contains a number of strategies, which are directed at addressing the risk to the commercial, retail, school and residential developments from bushfire emergencies. This is achieved through addressing and managing fuel loads, separation distances from the assessed dominant bushfire vegetation, and recommending appropriate bushfire building

standards.

1.5 Implementation

Implementation of the strategies in this Plan is the responsibility of the developer and shall be undertaken as part of the development infrastructure. The ongoing maintenance of the strategies in this Plan shall be the responsibility of the owner/occupiers of each proposed residential allotments to the limit of their property boundaries

2.0 LEGISLATIVE BUSHFIRE HAZARD MANAGEMENT RESPONSIBILITIES

2.1 Tweed Shire Council

The Tweed Shire Council has responsibility, under Section 66 of the Rural Fires Act, to issue a notice in writing requiring an owner / occupier of any land within the LGA to carry out bushfire hazard reduction works on that land. Section 100E of the Rural Fires Act requires the council to issue bushfire hazard reduction certificates for hazard reduction to be undertaken on private lands.

2.2 New South Wales Rural Fire Service

The NSW Rural Fire Service (RFS) has the responsibility for undertaking fire suppression activities, hazard management activities and other functions relative to emergency management, within its areas of operation. Section 73 of the Rural Fires Act (1997) enables the Commissioner to carry out bush fire hazard reduction works on any land as required by a bush fire risk management plan if the work has not been carried out satisfactorily. Incurred costs can be recovered as a debt owed to the Crown.

2.3 NSW Fire Brigade

The NSW Fire Brigade has the responsibility for undertaking fire suppression activities, and other functions relative to emergency management, within its area of operation. Through mutual aid agreements, the NSW Fire Brigade can provide assistance to the NSW Rural Fire Service, particularly for structural fire operations within the NSW Rural Fire Brigade Districts. Furthermore, Hazmat operations within New South Wales are the responsibility of the NSW Fire Brigade.

2.4 Far North Coast Bush Fire Management Committee

The Far North Coast Bushfire Management Committee has the responsibility for planning for co-ordinated fire fighting activities / hazard management activities on a local government level. It is not an operational organisation, a fire fighting organisation or a funding source for fire management activities. The Bush Fire Management Committee is supported by the following provisions of the Rural Fires Act (1997).

Section 50 of the Act requires the Bush Fire Co-ordinating Committee to constitute a Bush Fire Management Committee for the whole of the area of any local Council area for which a rural fire district is constituted.

Section 51(1A) requires a Bush Fire Management Committee to report to the Bush Fire Coordinating Committee on the implementation of the requirements of the Bushfire Risk Management Plan.

Section 52 requires each Bush Fire Management Committee to prepare a draft bush fire management plan for their local areas which includes a plan of operations and a bush fire risk management plan.

Section 54 of the Act specifies that a draft bush fire risk management plan is to 'set out schemes for the reduction of bush fire hazards in the rural fire district or other part of the State'. A draft bush fire risk management plan may also restrict or prohibit the use of fire or other fire hazard reduction activities in all or specified circumstances or places to which the plan applies.

2.5 Private Land Owners / Occupiers

The Rural Fires Act, 1997 provides several legislative opportunities to require land owners and occupiers to manage hazardous fuels. These are listed below:

Section 63(2) states that 'it is the duty of the owner or occupier of land to take the notified steps (if any) and any other practicable steps to prevent the occurrence of fires on, and to minimise the danger of the spread of fires on or from that land'. In this section; 'notified steps' means any steps that:

- (a) a bushfire risk management plan (or the Co-ordinating Committee) advises a person to take;
- (b) are included in a bush fire risk management plan that applies to that land.

Section 87 allows the removal of hazards in the bush fire danger period by the provision of a permit system. The permits are valid for 21 days, excluding total fire ban (TOBAN) days. Section 10 permits are not required to adhere to Part V provisions of the Environmental Planning & Assessment Act (1979) (EP&A Act) in any assessment of impact, except for public authorities. An owner/occupier of private land must obtain from the NSW Rural Fire Service, a bushfire hazard reduction certificate before undertaking hazard reduction works on that land (see Section 100E of the Rural Fires Act (1997)).

2.6 NSW Rural Fire District BFRMP

The Tweed Shire Council's Bushfire Management Options are to:

- (a) **Reduce the hazard** - encourages the development of asset protection zones along the settlement area - bushland interface.
- (b) **Reduce vulnerability** - maintain development and building controls and standards appropriate to the level of hazard.

3.0 INTRODUCTION

Development application on bushfire prone land must be accompanied by a Bush Fire Safety Authority (BFSA) provided by the Rural Fire Service. Application for a BFSA should follow the requirements of Clause 46, Rural Fires Act, listed as Appendix 4 of the Planning for Bushfire Protection 2006 guidelines (RFS, 2006). In particular, this shall include:

- a) A statement that the site is bush fire prone land, where applicable;
- b) The location, extent and vegetation formation of any bushland on or within 100m of the site;
- c) The slope and aspect of the site and of any bush fire prone land within 100m of the site, which may determine the likely path of any bush fire;
- d) Any features on or adjoining the site that may mitigate the impact of a high intensity bush fire on the proposed development;
- e) A statement of the likely environmental impact of any proposed bush fire protection measures; and
- f) Whether any building complies with AS 3959/1999 in relation to the construction level for bush fire protection.

The Kings Forest Community Concept Plan (06-0318) was approved by the Minister of Planning on 19 August 2010 under SEPP (Major Projects), 2005. This concept plan caters for residential community (including subdivision), educational facility, a town centre, commercial zones; a golf course and club house; a neighbourhood centre and a regional community facility.

For Stage 1 of the Kings Forest development (08-0194), to which this Bushfire Management Plan relates, the Director General's environmental assessment requirements state at Item 6.3:

"In order to ensure the protection of property and assets, a detailed bushfire assessment and management plan prepared by a suitably qualified person must be submitted. The assessment must, at a minimum, demonstrate consistency with the requirements of Planning for Bushfire Protection 2006. All asset protection zones must be clearly specified on the Plan of Development and all affected lots are to be encumbered with a Section 88B instrument under the NSW Conveyancing Act 1919."

Note: Correspondence received from NSW Rural Fire Service indicates that the lots affected by Asset Protection Zones are not required to be encumbered with a Section 88B instrument under the NSW Conveyancing Act 1919; a meeting between the developers representative and DOPI officers on the 19 July 2012 supported the NSW Rural Fire Service position,

therefore, implementation of Section 88B instruments for lots affected by Asset Protection Zones are not required.

Whilst Part 3A development applications are assessed differently, there is still the need, through the Director General's environmental assessment requirements listed above, to fully consider the bushfire risk to the proposed development. This is best achieved through reference to the methodology outlined in Appendix 4 of the Planning for Bushfire Protection 2006 guideline (RFS, 2006); this assessment involved the following activities:

- i. Verifying of terrain attributes in relation to the assessed bushfire vegetation.
- ii. Identification of the appropriate bushfire protection for any identified environmental assets.
- iii. Determination of the location of adequate water supplies for fire fighting purposes.
- iv. Identifying the capacity of public roads to handle increased volumes of traffic in a bushfire situation.
- v. Identification of adequacies for implementation of fire trails which link to Public roads in the vicinity.
- vi. Identification of adequacy of arrangements for access and egress from the development for the purposes of an emergency response.
- vii. Identification of construction standards to be used for building elements in the development.
- viii. Identification of adequacy of bushfire maintenance plans and fire emergency procedures for the development.
- ix. Identification of additional bushfire protection measures.

3.1 Description of property

The Kings Forest site is located immediately west of Tweed Coast Road, between Casuarina Town Centre and Kingscliff on the north coast of NSW and covers an area of 880Ha. The property has previously been sand mined; utilised for turf production, dairying, small cropping, livestock grazing, sugar-cane production; and for pine plantations. Current activities include livestock grazing and harvesting of the mature pine forests growing on the subject land. It is the intention of the proponents to continue with the livestock grazing activity until urban development commences.

Within the zone 2(c) Urban Expansion areas, most of the vegetation has been cleared and managed as grassland for livestock grazing. Substantial areas of native vegetation occur within the low-lying flood-prone areas and along the small creeks and gullies that intersect the property; these areas being protected under the zone 7(a) and 7(l) Environmental Protection classifications.

The subject land is bordered to the north and west of rural grazing land and/or tropical fruit orchards. The disused refuse facility immediately to the north of the subject site has been remediated to playing fields by Tweed Shire Council. Cudgen Nature Reserve, including Cudgen Lake (State Environmental Planning Policy No. 14 Coastal Wetlands), occurs to the south and east of the property.

3.2 Proposal

The Kings Forest Stage 1 Project Application No. MP 08_0194 was lodged in November 2011. The Application and Environmental Assessment Report was advertised from December 2011 to January 2012 following which 302 public submissions and 10 agency submissions were received.

As a result of the submissions, amendments to the project have been made. The amended project contains the following key elements (NB: these elements will be revised and updated as the amended project is finalised).

- Subdivision to create new lots for future development;
 - Bulk earthworks across the site;
 - Road works comprising:
 - construction of the entrance road into the site and associated intersection works on Tweed Coast Road;
 - alignment and construction of the proposed Kings Forest Parkway from Tweed Coast Road via Precincts 4 and 5 through to the western precincts; and
 - alignment and part construction of two proposed roads through SEPP 14 areas to access the southern precincts;
- Development of 2,036 m² of floor space for rural retail supplies development and access arrangements within Precinct 1;
- Construction of subdivision and infrastructure works along the Kings Forest Parkway and within Precincts 1 and 5;
- The Plan of Development for Precinct 5.

The land subject to this proposal is the north east portion of the Property and comprises the following precincts as illustrated on the concept plan (Plan 1).

Precinct 1 - Commercial development situated to the east of Tweed Coast Rd
Precinct 5 - Residential development

Each precinct is assessed according to the methodology outlined in Appendix 4, Planning for Bushfire Protection 2006 and presented in the following sections.

3.3 Ecological buffers

As part of SEPP (Major Development) 2005 Amendment No. 10, gazetted in November, 2006 (Government Gazette No. 135, p. 9515) 50m wide ecological buffers are required from any lands designated as zone 7(a) or zone 7(l) Environmental Protection. Development within any ecological buffer must meet the objectives outlined in clause 7(2) and 7(3) of Part 6 Kings Forest Site, Schedule 3 State Significant Sites of SEPP (Major Development) 2005 as listed below:

- a) To protect wetlands or areas of particular habitat significance;
- b) To restrict development so that, as far as practicable, it does not occur within ecological buffers;
- c) To help ensure that development is designed, sited and managed so as to minimise its impact on the ecological and hydrological functions of the ecological buffers; and
- d) To encourage the restoration and maintenance of the native vegetation and ecological processes of the land within and adjacent to wetlands or areas of particular habitat significance.

Vegetation management to achieve the standard for an Asset Protection Zone requested by the Rural Fire Service (RFS, 2006) shall utilise the perimeter road and the grassed swale area within the 20m wide outer zone to any ecological buffer adjacent to any proposed development. This will satisfy the objectives of an ecological buffer in protecting the environmentally sensitive areas.

4.0 PRECINCT 1 COMMERCIAL DEVELOPMENT

A commercial development is proposed for the parcel of land on the east side of Tweed Coast Road (Lot 7, DP 875447). The proposal involves 1 building, public and staff car parking areas, separate car and truck entries and a designated truck manoeuvring area incorporating a drive-through pickup facility (Plan 2). The public car park is located rear of the building towards the bushfire hazard. This Precinct adjoins State Environmental Planning Policy (SEPP) 14 'Coastal Wetlands' to the south and east that is protected as Zone 7(a) Environmental Protection "Wetland and Littoral Rainforest". There is a 50m ecological buffer to be established along the southern and eastern margins of the developable area of this Precinct between the 7(a) zone and any development. This is a requirement of the SEPP (Major Projects) Amendment No. 10 as illustrated in Attachment 2.

4.1 Vegetation classification

The vegetation for this precinct and adjacent properties up to 140m (where practicable) from the proposed development were assessed during a site visit on 25th of May, 2012. The

vegetation communities present were identified and classified into formations as described in Keith (2004). Appendix A2.3 of Planning for Bushfire Protection (PBP) manual (RFS, 2006) outlines the methodology for determining the predominant bushfire prone vegetation to the distance of at least 140 metres in all directions from the future development on the site. Vegetation is classified using Table A2.1 of Planning for Bushfire Protection 2006, which classifies vegetation types into the following groups:

- | | |
|--|----------------------------|
| (a) Forests [wet & dry sclerophyll forests]; | (g) Freshwater Wetlands; |
| (b) Woodlands; | (h) Saline Wetlands |
| (c) Plantations – being pine plantations not native plantations; | (i) Alpine Complex; |
| (d) Forested Wetlands; | (j) Semi – arid Woodlands; |
| (e) Tall Heath lands; | (k) Arid Woodlands; and |
| (f) Short Heath lands; | (l) Rainforests |

4.2 Vegetation communities present on Precinct 1

Community 1 Managed Grassland: The northern portion of the land is cleared of all over-storey vegetation and maintained as grassland.

Community 2 Forest: A narrow (c. 20m wide) area of Subtropical Lowland Forest is present to the south and east towards Cudgen Creek (boundary to Precinct) merging into Littoral Rainforest near Cudgen Creek. This vegetation is within the 7(a) Environmental Protection (Wetland and Littoral Rainforest) LEP zone. Subtropical Floodplain Forest and Littoral Rainforest are endangered ecological communities and protected under the NSW Threatened Species Conservation Act (1995). The Concept Plan provides for a 50m ecological buffer from this vegetation, consisting of a 30m vegetated inner zone as a barrier to weed invasion and a 20m outer zone.

4.3 Vegetation within 140m from Precinct 1

Existing exotic pine plantations (*Pinus elliottii*) in the process of being harvested are present immediately to the north and northeast of the subject land. Cleared grazing / lifestyle residences are present beyond the Pine Plantations. Cudgen Creek and riparian vegetation (Subtropical Floodplain Forest and Littoral Rainforest) is present to the east and southeast. Cudgen Nature Reserve, comprising a Banksia-dominated Tall Heath community occurs to the south; whilst to the west is the Tweed Coast Road reserve and developed residences.

4.4 Assessed Dominant Bushfire Vegetation in Relation to the Precinct

The Subtropical Floodplain Forest / Littoral Rainforest area is assessed as Category 1 Bushfire prone vegetation, according to the Tweed Shire Bush Fire Prone Lands (TSBPL) map (Tweed Shire Council, 2004) with the remainder of the subject land within the 100m buffer to this vegetation.

The onsite bushfire hazard assessment identified the Subtropical Floodplain Forest and Littoral Rainforest to the south and east of the subject land as the dominant bushfire prone vegetation in relation to the development of Precinct 1.

4.5 Landform assessment

Inspection of published topographic maps and an on-site assessment using a clinometer verified the following land forms were present over this Precinct. The land comprises alluvial flats that are generally flat towards the banks of Cudgen Creek.

4.6 Assessed Dominant Slope in relation to identified bushfire prone vegetation

Appendix 2 of Planning for Bushfire Protection (RFS, 2006) recommends that slopes should be assessed, over a distance of at least 100m from a development site and that the dominant gradient of the land should be determined on the basis of which will most significantly influence the fire behaviour at the site. The terrain is flat for the vegetation to the east and south; flat towards Tweed Coast Road and the residential development to the west; and upslope to the north.

4.7. Environmental considerations

The Subtropical Floodplain Forest and Littoral Rainforest areas are protected as endangered ecological communities. No removal of this vegetation is permitted under the Tweed LEP or proposed in the Concept Plan for the development. A 50m ecological buffer is proposed to separate any development from this vegetation.

4.8 Asset Protection Zones

Based on the assessment of the vegetation communities and slopes present on and adjacent to Precinct 1, and in accordance with Appendix 2 Table A2.5, Planning for Bushfire Protection (RFS 2006), this bushfire risk assessment recommends that Asset Protection Zones (APZ), Inner Protection Area (IPA) and Outer Protection Area (OPA) should be established as listed in Table 2.

There is no requirement to establish an Asset Protection Zone for bushfire protection for this development for the north and west aspects since there will be no bushfire prone vegetation

within 100m in the Precinct boundary in these directions once the Pine Plantations have been removed. A 21m Asset Protection Zone is recommended for bushfire protection to the east and south; comprising a 21m Inner Protection Area. This APZ is obtained by utilising the proposed car park area. All available land to the east of the proposed Building shall be incorporated in the APZ; this area is proposed to be developed as delivery vehicle unloading and manoeuvring areas and meets the requirements for an APZ. The required APZ are illustrated on Plan 2.

Table 2 Asset Protection Zones for Precinct 1

Aspect	Vegetation	APZ (m)	IPA (m)	OPA (m)	Compliance with PBP
South	Forest	21	21	0	Yes, achieved by the carpark area
East	Forest	21	21	0	Yes, achieved by the carpark area

4.9 Assessed Bushfire Attack Category

An assessment of the bushfire attack categories applicable to the proposed development in Precinct 1 was carried out using the methodology detailed in Planning for Bushfire Protection (Addendum Appendix 3 (2010)). This bushfire risk management assessment concluded that the commercial Building will be in a **BAL - 29** Bushfire Attack Category according to Table A 3.4 Determination of Category of Bush Fire Attack FDI 80 (RFS, 2006) with the following site attributes:

- Forest as the Bushfire prone vegetation to the east and south
- This vegetation occurs on a flat slope
- A minimum separation of 21m is achievable from this vegetation

4.10 Services (Electricity Supply, Water, Gas)

Where possible electrical transmission lines should be underground; where overhead electrical transmission lines are installed, lines should be installed with short pole spacing, unless crossing gullies, gorges or riparian areas. No part of a tree should be closer to a power line than the distance set by the appropriate authority. Regular inspection of lines is required to ensure they are not fouled by branches.

Reticulated water is available to the development and will be supplied to each allotment through the town mains system in accordance with local water authority, council development control plans (DCPs) or any other policies and procedures.

- a) External fire hydrants will be installed and located in accordance with Australian Standard 2419-1, the hydrants shall be installed so as a clear unobstructed path to each designated building envelope, and
- b) The fire hydrants shall be installed at a maximum distance of 80m from the furthest extremity of the building/s, and

- c) The location of fire hydrants shall be delineated by blue pavement markers in the centre of the road, and
- d) All delivery water lines shall be installed underground to a minimum depth of three hundred millimetres (300mm), with all points above ground using metal pipes or raisers with a minimum internal diameter of nineteen millimetres (19mm).

4.11 Public Road Capacity to Handle Increased Volumes of Traffic in a Bushfire Emergency

The public road (Tweed Coast Road) in the vicinity of the subject property is adequate to handle increased volumes of traffic in a bushfire emergency. This road;

- has a bitumen surface;
- is two-way, allowing traffic to pass in opposite directions; and
- has the capacity to carry fully loaded fire fighting vehicles

Access to the proposed Precinct will be via constructed driveways from Tweed Coast Road. This will involve separate car and truck entries. There is also provision for vehicles to gain access to the rear storage areas via a driveway along the northern margin and where required, to enter the drive-through pickup area and return to Tweed Coast Road via the public car park.

Fire Trails are not required since the bushfire hazard can be accessed from the proposed access roads and car park areas. The Delivery / Pickup vehicle entry along the northern boundary and the public car park serve as a perimeter road providing adequate access to the bushland interface.

5.0 PRECINCT 5 RESIDENTIAL DEVELOPMENT

Residential development is proposed for the parcel of land located to the south of the proposed Kings Forest Parkway and east of the future Town Centre Precinct (Part Lot 1, DP 781633 and Part Lot 40, DP 7482). The area is presently cleared of all over-storey vegetation and managed as grazing land. Precinct 5 is surrounded by the Cudgen Nature Reserve to the east, a vegetated buffer to a creek line along the southern; open forest to the northeast; and proposed Precinct 3 to the north. The vegetated buffer along the creek line to the south is zoned 7(a) Environmental Protection 'Littoral Rainforest and Wetland', whereas the developable land is zone 2(c) Urban Expansion.

The residential development will comprise a range of dwelling types (mews, plexes, zero-lot, conventional, terrace homes, SOHO and medium density dwellings), generally serviced by a perimeter road, interconnecting roads and cul-de-sacs. A central open space / park is

proposed with a drainage detention basin located in the northeast portion of the development.

5.1 Vegetation classification

The vegetation for this precinct and adjacent properties up to 140m (where practicable) from the proposed development were assessed during a site visit on 25th of May, 2012. The vegetation communities present were identified and classified into formations as described in Keith (2004).

Community 1 Managed Grassland: All of the developable area of Precinct 5 has been cleared of all over-storey vegetation and maintained as grassland.

5.2 Vegetation within 140m from Precinct 5

Community 2 Tall Heath: Cudgen Nature Reserve to the east of the subject land comprises a Tall Heath community dominated by Coast Banksia (*Banksia serrata*), with Tea trees (*Leptospermum* sp.), Rough-barked Apple (*Angophora subvelutina x robur*) and Slash Pine (*Pinus elliotii*) escapes with occasional Scribbly Gum (*Eucalyptus signata*) as emergent trees (Figure 10). Due to the occurrence of emergent Scribbly Gum this vegetation shall be classed as forest vegetation to adequately address the requirements for asset protection zones.



Figure 1: Tall Heath vegetation within Cudgen Nature Reserve (Photograph, S. Cotter).

Community 3 Open Forest: To the south of Kings Forest Parkway, on land designated an zone 7(l) Environmental Protection 'habitat' is an open forest (Figure 13) dominated by Broad-leaved Paperbark (*Melaleuca quinquenervia*), Scribbly Gum (*Eucalyptus signata*), Swamp Turpentine (*Lophostemon sauveolens*) Rough-barked Apple (*Angophora subvelutina* x *robur*) and Slash Pine (*Pinus elliotii*) escapes with a heathy understorey of Black She-Oak (*Allocasurina littoralis*), Coast Banksia (*Banksia serrata*) and Tea trees (*Leptospermum* sp.).



Figure 2: Tall Open Forest to the south of Kings Forest parkway Photograph, S. Cotter).

Community 4 Subtropical Floodplain Forest: Regenerating Floodplain Forest forms the vegetated buffer with the creek line along the southern boundary of this Precinct. This vegetation is protected as part of the zone 7(l) Environmental Protection 'habitat'.

5.3 Assessed Dominant Bushfire Vegetation in Relation to the Proposed Precinct,

The eastern and southern margins of this Precinct are assessed as within the 100m buffer to Category 1 Bushfire prone vegetation, according to the Tweed Shire Bush Fire Prone Lands (TSBPL) map (Tweed Shire Council, 2011) with the remaining land not classified as being bushfire prone land. The Subtropical Floodplain Forest and Littoral Rainforest along a tributary to Cudgen Creek to the south and the Tall Heath (Cudgen Nature Reserve) to the east were assessed as the bushfire prone vegetation most influencing development within this Precinct.



Figure 3: Subtropical Floodplain Forest vegetation – zone 7(l) along the southern margin of the Precinct (photograph, S. Cotter).

5.4 Landform assessment

Inspection of published topographic maps and an on-site assessment using an inclinometer verified that the land is generally flat to slight upslope and is surrounded by level ground for greater than 100m to the north, west and east. To the south/east the ground surface slopes downwards at between 0 and 5° towards the tributary to Cudgen Creek.

5.5. Environmental considerations

The Subtropical floodplain Forest and Littoral Rainforest areas are protected as endangered ecological communities. No removal of the vegetation is permitted under the Tweed LEP or proposed in the Concept Plan for the development. This vegetation represents Primary Koala Habitat and hence the majority of the Koala-preferred tree species shall be retained for the development (Figure 13).

Cudgen Nature Reserve adjoins the eastern, southern and south/eastern aspects of the precinct with fire protection of the reserve being the responsibility of NPWS and managed through the implementation of their Fire Management Strategy which is reviewed and updated on a regular basis. A meeting held on the 18 June 2012 with Damian Hoffmeyer, Manager of Bushfire Planning, Northern District NPWS, Murwillumbah and Wayne Hadaway (Bushfiresafe (Aust) Pty Ltd, Mr Hoffmeyer advised that he will be recommending inclusion in the existing Cudgen Nature Reserve and land to be dedicated adjacent to Depot Road adjoining the north eastern part of Precinct 5 a “*Strategic Fire Advantage Zone*” (ie. fuel reduced area) which will be included in the Cudgen Nature Reserve Management Plan.

The Cudgen Nature Reserve is identified as a Core Koala habitat, the protection of koalas from the impact of bushfires is the responsibility of the NPWS; however, as part of the development of precinct 5 a koala fence is proposed within the 20 metre outer buffer area to prevent koalas entering the residential area, also a Koala Plan of Management (KPoM) has been prepared for the development which identifies strategies for the protection of Koalas from bushfires within the development area. At the meeting held on the 18 June 2012 with Damian Hoffmeyer, Manager of Bushfire Planning, Northern District NPWS, Murwillumbah, Mr Hoffmeyer advised that the Koala fence shall be located within the outer ecological buffer separated from the inner ecological buffer zone so all ongoing maintenance of the fence falls outside the responsibility of the NPWS.

Note: refer to the Bushfire Koala Addendum attached to this report.



Figure 4: Koala-preferred Swamp Mahogany trees within a small gully, marked with flagging tape (arrow) to be retained (Photograph, S. Cotter).

5.6 Asset Protection Zones

Based on the assessment of the vegetation communities and slopes present on and adjacent to Precinct 5, and in accordance with Appendix 2 Table A2.5, Planning for Bushfire Protection (RFS 2006), this bushfire risk assessment recommends that Asset Protection Zones (APZ), Inner Protection Area (IPA) and Outer Protection Area (OPA) should be established as listed in Table 8.

Table 8: Asset Protection Zones for Precinct 5

Aspect	Vegetation	APZ (m)	IPA (m)	OPA (m)	Compliance with PBP
East	Tall Heath/Forest	21	21	0	Yes, achieved by the proposed perimeter road & grassed swale area
North, West	Grassland	10	10	0	Yes, achieved by the proposed kings Forest Parkway
South/East	Forest	27	27	0	Yes, included within the 20m outer buffer to zone and adjoining allotments
South	Forest	21	21	0	Yes, included within the 20m outer buffer to zone and adjoining allotments
South/West	Forest	21	21	0	Yes, achieved by the proposed perimeter road & grassed swale area

The prescribed Asset Protection Zones are provided by the following features of the concept Plan for Precinct 5 as illustrated in Plan 3.

To the east, a perimeter road a grassed swale drainage corridor provides a managed buffer along the eastern perimeter that exceeds that required for the APZ. The perimeter road is located within the development footprint while the grassed swale area shall be located within the 20m outer margin of the ecological buffer from Cudgen Nature Reserve. Additionally, a drainage detention basin to be constructed in the northeast corner of the development will contribute to the required APZ. The APZ has been measured from the property boundary and consists of the entire perimeter road and a small portion of the outer ecological buffer zone.

Along the south eastern limit of Precinct 5, a 50m ecological buffer is required from the zone 7(l) Environmental Protection 'habitat' lands. The 20m outer margin of this buffer will include a grassed swale area which will be utilised for part of the required APZ with the remaining 7 metres contained within the residential lots.

For the south western limit, a 50m ecological buffer is required from the zone 7(l) Environmental Protection 'habitat' and zone 7(a) 'Wetlands and Littoral Rainforest' lands. A perimeter road and a grassed swale drainage corridor provides a managed buffer that exceeds that required for the APZ. The perimeter road is located within the development footprint while the grassed swale shall be located within the 20m outer margin of the ecological buffer. The APZ has been measured from the property boundary and consists of the entire perimeter road and a small portion of the outer ecological buffer zone.

To the west and north, the prescribed APZ is provided by perimeter roads (Kings Forest Parkway and un-named future roads).

5.7 Assessed Bushfire Attack Category

An assessment of the bushfire attack categories applicable to the proposed development in Precinct 5 was carried out using the methodology detailed in Planning for Bushfire Protection (Addendum Appendix 3 (2010)). This bushfire risk management assessment concluded the following bushfire attack categories are applicable for the proposed development, depending on the separation distance from the assessed bushfire prone vegetation. (Table 9).

Table 9: Bushfire Attack categories applicable to Precinct 5

Vegetation	Aspect	Separation distance (m)	Bushfire Attack category
Forest	East/South	21-<31	BAL - 29
		31-<42	BAL – 19
	Southwest	42-<100	BAL – 12.5
		>100	N/A
Forest	Southeast	27-37	BAL - 29
		37-<50	BAL – 19
		50-<100	BAL – 12.5
		>100	N/A
Grassland	North, West	>100m	Low

5.8 Services (Electricity Supply, Water, Gas)

Where possible electrical transmission lines should be underground; where overhead electrical transmission lines are installed, lines should be installed with short pole spacing, unless crossing gullies, gorges or riparian areas. No part of a tree should be closer to a power line than the distance set by the appropriate authority. Regular inspection of lines is required to ensure they are not fouled by branches.

Reticulated water is available to the development and will be supplied to each allotment through the town mains system in accordance with local water authority, council development control plans (DCPs) or any other policies and procedures.

- a) External fire hydrants will be installed and located in accordance with Australian Standard 2419-1, the hydrants shall be installed so as a clear unobstructed path to each designated building envelope, and
- b) The fire hydrants shall be installed at a maximum distance of 80m from the furthest extremity of the building/s, and

- c) The location of fire hydrants shall be delineated by blue pavement markers in the centre of the road, and
- d) All delivery water lines shall be installed underground to a minimum depth of three hundred millimetres (300mm), with all points above ground using metal pipes or raisers with a minimum internal diameter of nineteen millimetres (19mm).

Note: Once completed a copy of the hydrant location plan shall be supplied to the NPWS for addition into their Cudgen Nature Reserve Fire Management Strategy.

5.9 Public Road Capacity to Handle Increased Volumes of Traffic in a Bushfire Emergency

The public roads (Tweed Coast Road, Kings Forest Parkway) in the vicinity of the subject property are adequate to handle increased volumes of traffic in a bushfire emergency. These roads;

- have a bitumen surface;
- are two-way, allowing traffic to pass in opposite directions; and
- have the capacity to carry fully loaded fire fighting vehicles

Access to the proposed Precinct will be via a dual carriageway from the un-named road along the western boundary of this Precinct with linkage to Kings Forest Parkway. All internal roads for the Precinct are either interconnecting or form a perimeter road ensuring unimpeded traffic flows within the Precinct. All roads are less than 200m in length and shall be dedicated to Tweed Shire Council as part of the proposed development.

5.10 Fire Trail

With the exception of the south/eastern and southern elevations of the precinct the subdivision has been designed with a perimeter roads which separates the majority of the proposed allotments from the vegetation which will allow access to the bushland interface without the need for a fire trail; the bushfire assessment concluded fire trails would not be required for the south/eastern and southern elevations of the precinct due to the short distances between the three lots (621-623) are connected by the grassed swale area and relatively short lot boundaries which will allow access to the bushland interface in these areas.

6.0 ACCESS REQUIREMENTS

Consideration should be given to the following requirements for access to the proposed development as outlined in the Planning for Bushfire Protection manual (RFS, 2006).

- (a) Access roads should have a minimum trafficable width of 4 metres with a metre on each side, maintained as a bushfire fuel free area;
- (b) Roads should be through roads. Dead end roads are not recommended, but if unavoidable, dead ends should not be more than 200m in length, incorporate a minimum 12m radius turning circle, and should be clearly sign posted as dead end;
- (c) The capacity of road surfaces and bridges should be sufficient to carry fully loaded fire-fighting vehicles (approximately 27 tonnes or 9 tonnes per axle);
- (d) Curves should have a minimum inner radius of 6m and be minimal in number to allow for rapid access and escape;
- (e) The minimum distance between inner and outer curves should be 6m;
- (f) Maximum grades should not exceed 15° and preferably not more than 10° or gradient specified by road design standards, whichever is the lesser gradient;
- (g) There must be a minimum vertical clearance to a height of 4 metres above the road at all times;
- (h) Roads should not traverse a wetland or other land potentially subject to periodic inundation (other than flood or storm surge);
- (i) Roads should be clearly sign-posted (with easily distinguished names) and buildings should be clearly numbered. Bridges should clearly indicate load rating;

7.0 BUSHFIRE CONSTRUCTION STANDARDS

The bushfire risk management assessment undertaken in relation to the proposed subdivision concluded that the construction standard in accordance with AS 3959 Construction of Buildings in Bushfire Prone Areas (Standards Australia, 2009) will be assessed and nominated when development applications are submitted for the construction of dwellings on the approved allotments.

8.0 LANDSCAPING AND PROPERTY MAINTENANCE – BUSHFIRE PROVISIONS

According to the PBP manual, the principles of landscaping for bush fire protection are to: prevent flame impingement on the dwelling; provide a defensible space for property protection; reduce fire spread; deflect and filter embers; provide shelter from radiant heat; and reduce wind speed. Careful consideration of the species selection, their location relative to their flammability, and on-going maintenance to readily remove flammable fuels (leaf litter, twigs and debris) is critical to providing for bushfire protection (RFS, 2006).

9.0 EXTENT OF COMPLIANCE AND/OR DEVIATION FROM SPECIFICATIONS

The proposed development will comply with the minimum requirements for:

- 1). Asset Protection Zones detailed in Table A2.5 (Minimum Specifications for Asset Protection Zones (APZ) for Residential and Rural Residential Subdivision Purposes (for class 1 & 2 buildings) in FDI 80 Fire Areas); and
- 2) Access in accordance with section 4.1.3-2 (Property Access) in the manual for Planning for Bushfire Protection (RFS, 2006).
- 3) Development of the Commercial Precinct and Residential Precinct satisfies the aims of PBP 2006 and will therefore comply with the provisions for Fire Safety under the Building Code of Australia.

GLOSSARY

APZ	Asset Protection Zone
BFMP	Bushfire Management Plan
EEC	Endangered Ecological Community
EP&A	Environmental Planning and Assessment Act
IPA	Inner Protection Area
KPoM	Koala Plan of Management
LEP	Local Environment Plan
LGA	Local Government Area
OPA	Outer Protection Area
PBP	Planning for Bushfire Protection manual
RFS	Rural Fire Service of New South Wales
SEPP	State Environmental Planning Policy
TOBAN	Total Fire Ban
TSBPL	Tweed Shire Bush Fire Prone Lands map
TSC Act	Threatened Species Conservation Act (1995)
TSCA Act	Threatened Species Conservation Amendment Act (2002)

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Tweed Shire Council, 2004. Bush Fire Prone Lands Map

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KOALA BUSHFIRE ADDENDUM

KOALA BUSHFIRE ADDENDUM

This Addendum provides clarification of the bushfire management strategies to address the protection of the koalas within the Kings Forest Stage 1 development for a period of 5 years or until ownership is transferred. During this period the proponent will be responsible for bushfire management in the conserved bushland and wetland areas.

Condition 34 of the MP 08_0194 requires that Project 28 engage with OEH, Council and the Rural Fire Service to amend the Bushfire Management Plan so as to ensure that a cooperative effort to minimise the potential for wildfires and fire frequencies, that impact on Koalas, occurs. The revised Bushfire Management Plan should adopt (where relevant) the management approaches contained in:

- the Tweed Coast Koala Fire Management Plan (Baker 2016);
- the Hazard Reduction Burn Guidelines for Koala Habitat on the Tweed Coast (Baker 2016); and
- the Far North Coast Bushfire Risk Management Plan.
- Kings Forest – Koala Plan of Management (KPoM) (JWA PTY LTD)

Condition 34 of the MP 08_0194 requires co-operative relations between neighbours to minimise the potential for wildfires and work towards fire frequencies and intensities that do not impact on Koala populations. A meeting held on the 18 June 2012 with Damian Hoffmeyer, Manager of Bushfire Planning, Northern District NPWS, Murwillumbah and myself (Wayne Hadaway “Bushfiresafe Aust Pty Ltd”), Mr Hoffmeyer advised that the NPWS has a Fire Management Strategy for the Cudgen Nature Reserve and once the retained vegetation within the Kings Forest property to accommodate the additional area of vegetation and this would be the responsibility of the NPWS.

An additional meeting was arranged for Wednesday the 27th February 2019, invites were sent on Tuesday the 5th of February 2019 to Damian Hoffmeyer (NPWS) Jenny Atkins (NPWS) Reg Van Rij (Leda Developments), Matt Ingwood (RFS Tweed), Lloyd Vanderwallen (RFS Sydney) and myself (Wayne Hadaway “Bushfiresafe Aust Pty Ltd”). Both Matt Ingwood (RFS Tweed), Lloyd Vanderwallen (RFS Sydney) both declined to attend the meeting stating that the Rural Fire service were fire managers and not land managers, therefore would not be able to provide any constructive management decisions. The meeting went ahead with Damian Hoffmeyer (NPWS)

Jenny Atkins (NPWS) Reg Van Rij (Leda Developments and myself (Wayne Hadaway “Bushfiresafe Aust Pty Ltd”), however the meeting was postponed until Reg Van Rij clarified whether we needed to address the entire site or just precinct 5.

A third meeting was scheduled for Wednesday the 25th March 2020 with Damian Hoffmeyer (NPWS) Jenny Atkins (NPWS) Michael Geale (Leda Developments), Alan Bawden (RFS Coffs Harbour), James Warren (JWA Pty Ltd) and myself (Wayne Hadaway “Bushfiresafe Aust Pty Ltd”), however due to the Covid 19 virus this meeting had to be cancelled.

It is further noted that the design of proposed exclusion fencing adjacent to Koala habitat areas has been devised with consideration to fire management issues (i.e. will funnel Koalas towards underpasses).

The Kings Forest Stage 1 Bushfire Management Plan (BMP) (BushfireSafe 2012) outlines risk management strategies that aim to protect property and life and to reduce the threat to ecological and environmental assets. A fundamental strategy of the BMP is to assess and manage fuel loads within the Kings Forest site.

A targeted strategy for managing Koalas has been developed under the Saving Our Species program. One of the activities identified to assist Koalas in the Endangered population between the Tweed and Brunswick Rivers is implementing low intensity, mosaic pattern fuel reduction burns in or adjacent to koala habitat. The risk of high intensity fires should be reduced within Koala habitat areas through controlled low intensity burns or mechanical means if and where appropriate.

High-intensity hazard reduction burns and wildfires that result in crown scorch or crown fires should be avoided. The control of Slash pine regrowth at the Kings Forest site is also a major component for the control of any future wildfires as they can lead to high intensity wildfires due to the highly flammable nature of pine trees and accumulated leaf litter (Skull 1995, 1998).

Within Kings Forest, mapped Koala habitat is proposed to be crossed by roads in three (3) places. These roads will constitute a valuable asset for the control of both prescribed burns as well as any wildfires in these areas, and vegetation adjacent to these roads should be managed with this in mind.

Adjacent to Kings Forest, the particular area of concern in terms of bushfire threat is the Cudgen Nature Reserve, including the lands currently forming part of the Kings Forest site to be added to the Reserve. The Cudgen Nature Reserve Fire Management Plan should be amended to include these additional areas. Furthermore, Koalas and Koala habitat should be particularly considered in a review of the Fire Management Plan in light of information provided by Phillips *et al.* (2011) regarding fire and Koalas within the Tweed Coast strip.

The proposed development may potentially result to increase the risk of wildfires through accidental ignitions and/or inappropriate or inadequate bushfire hazard management which allows fire to reach the canopy and either kill koalas or remove forage resources and habitat.

As previously noted, continued infestation of native vegetation with Slash pine regrowth is continually occurring over the Kings Forest site.

Hazard reduction burning is the primary tool for reducing the risk of high intensity wildfires, providing an invaluable tool for reducing the likelihood of wildfires, including high intensity wildfires and peat fires.

The overriding premise of hazard reduction burning is to reduce fuels under controlled conditions (e.g. mild weather and coordinated deployment of fire suppression resources), rather than allowing accumulated fuels to ignite under extreme or catastrophic fire weather and resulting in severe crown fires that are beyond fire suppression capabilities. By reducing the overall fuel hazard, HR burning reduces the rate of spread, flame height and intensity of wildfires, as well as the number and distance of spot fires (Gould *et al.* 2007). If a bush fire burns through an area where a hazard reduction burn has been carried out it will reduce the intensity of the fire, improve the likelihood of koala survival and make it easier for firefighters to control.

Hazard Reduction (HR) burns in koala habitat can achieve a range of complimentary outcomes, including to reduce the risk of wildfires i) killing koala individuals, ii) causing long-term koala habitat decline, and iii) threatening human life and property. However, it is essential that HR burns themselves, also avoid harming koala

individuals and habitat. Additionally, HR burns should also avoid damaging other conservation values such as fire-sensitive vegetation and cultural heritage sites which should ideally be done in a way to ensure the maintenance and restoration of koala habitat.

The main purpose of this guide is to assist land managers to undertake hazard reduction burning within koala habitat with minimal impact on:

- koala individuals, canopy food resources and long-term habitat condition, and
- other values such as fire-sensitive vegetation and items of cultural heritage.

It is acknowledged that not all koala habitat can be assessed and protected during a hazard reduction burn, and that despite the best planning, procedures and intentions, koalas may still be at risk from injury during hazard reduction burns. However, through implementing appropriate guidelines, Project 28 aims to reduce the likelihood of koala injury during hazard reduction burns.

High-intensity canopy fires pose a serious threat to koalas, particularly in areas of fragmented habitat. Being a slow-moving arboreal animal, high intensity canopy fires can cause death or injury of koalas (Lunney *et al.* 2004). Koalas which survive the initial canopy fire may still succumb to starvation following widespread canopy scorch (Melzer *et al.* 2000), or dog attack and road mortality as animals move in search of unburnt habitat (Lunney *et al.* 2007).

Long-term fire exclusion is recognised to have several potentially severe consequences for koala conservation. Firstly, fires consume fuel, and the exclusion of fire is widely recognised to allow fuel accumulation, thereby increasing habitat flammability and maximising the likelihood of large, high intensity bush fires and high koala mortality. Conversely, on sites where fire exclusion allows rainforest expansion into the understorey, the developing rainforest strata can *reduce* community flammability through suppression of flammable understorey vegetation and accelerated litter decomposition. While reduced flammability may potentially reduce koala losses from bush fires, ongoing rainforest expansion could ultimately lead to the progressive decline and eventual displacement of koala habitat over large areas of the Kings Forest area.

The likelihood of these divergent consequences depends largely on the availability of surface and understorey layer fuels which fundamentally influence the ignitability and

rate of spread of fires (Sullivan *et al.* 2012). With increasing time since fire, fuels in all layers continue to accumulate. However, a developing rainforest midstorey can suppress understorey fuel layers leading to reduced overall community flammability. The threat of high intensity bush fires is exacerbated when bush fires frequently return to the same area of habitat. The continuing decline of koala habitat populations is expected wherever recurrent bush fires remove a proportion of the breeding population at a rate faster than the time required for the loss to be replaced by successive koala generations and inflow from the wider metapopulation (Phillips *et al.* 2011). High frequency fire is also listed as a key threatening process under the TSC Act and is specifically identified as having the potential to suppress regeneration of preferred food trees in the NSW *Recovery Plan for the koala* (DECC 2008).

On the Tweed Coast, the Habitat Study identified *high frequency* fires as a major contributor to recent decline of the Tweed Coast koala populations. While high fire frequency likely contributes to the attrition of local koala populations, fire history analysis reveals that high frequency fire is relatively limited in koala habitat on the Tweed Coast, which is likely to be a relatively minor factor compared to bush fire intensity and extent.

Koalas are sedentary animals and not especially mobile and, therefore, stand little chance of surviving large-scale bushfires. Throughout the east coast of NSW, fire continues to threaten Koala populations and is increasingly being recognised as a key factor influencing long-term population viability (Phillips and Pereoglou 2005, Phillips and Hopkins 2010). Bushfire is highlighted by Phillips *et al.* (2011) as one of, if not, the dominant factor responsible for recent declines in koala numbers on the Tweed Coast. Wildfire has the potential to exacerbate Koala population decline by removing animals in a breeding population at a rate faster than the time required for the loss to be replaced by successive Koala generations (Starr 1990; Melzer *et al.* 2000). Regeneration of fire-affected areas is typically slow, so the food resource is reduced for the remaining Koalas not killed by fire. Widespread canopy scorch presumably results in starvation for the remaining animals (Melzer *et al.* 2000).

The largest area of natural vegetation, and potential Koala habitat, remaining in the Tweed coastal lowlands occurs around Cudgen Lake/Round Mountain (Phillips *et al.* 2011). Much of this area has been burnt multiple times in the last 15 years with time

between fires being as short as three years. The 2004 and 2009 fires were of high-intensity and much of the area burnt by these fires is currently unoccupied by Koalas, despite containing areas mapped as high-quality Koala habitat (Phillips *et al.* 2011). More recently (i.e. January 2018) a large portion of the northern SEPP 14 wetland on the Kings Forest site, including areas of Secondary Koala habitat proposed to be retained, were burnt by a high-intensity fire. These areas, despite being mapped as Koala habitat (Phillips *et al.* 2011) are currently not considered to be suitable as habitat and are not considered likely to regenerate as habitat without considerable intervention.

Apart from Project 28, Tweed Shire Council, the NSW Rural Fire Service and the OEH (NPWS) having a cooperative effort to minimise the potential for wildfires and fire frequencies, that impact on Koalas within the Kings Forest development, private landowners that adjoin the Kings Forest development also have an obligation to minimise the potential for wildfires and fire frequencies within their property boundaries, these adjoining landowners will be encouraged to be part of the ongoing Koala management planning within the Kings Forest development and encouraged to participate in the joint cooperative effort minimise the potential for wildfires and fire frequencies.

There are two methods of hazard reduction methods that could be used to reduce and maintain fuel loads to an acceptable level for the protection of Koalas, the first method would be to undertake hazard reduction burns. Although this is an effective tool for reducing fuel loads there are many issues/constraints when undertaking fuel reduction burns. The constraints regarding carrying out control burn are as follows;

- 1) Containment lines need to be identified and implemented which highly likely will require the removal of native vegetation to construct fire trails for firefighting control lines;
- 2) Prepare an application and acquire approval for Hazard Reduction Certificate from the NSW Rural Fire Service prior to doing any control burns;
- 3) Hazard reduction prescribed burn plan will require approval from the NPWS manager officer of the Cudgen Creek Nature Reserve which may delay the hazard reduction burn process;
- 4) Inter-agency cooperation between OEH, RFS and adjoining landowner needs to be in place prior to any hazard reduction burns are commenced, this may not be possible if an early fire season is declared;

- 5) The window of opportunity for carrying out control burns is very limited as the fuel requires a frost so the ground fuel is dry enough to carry a fire but must be undertaken before temperatures get to high and humidity gets to low which may produce a canopy fire that may impact on Koalas;
- 6) The vegetation communities present onsite have particular fire thresholds so therefore frequent hazard reduction burns should not be considered.

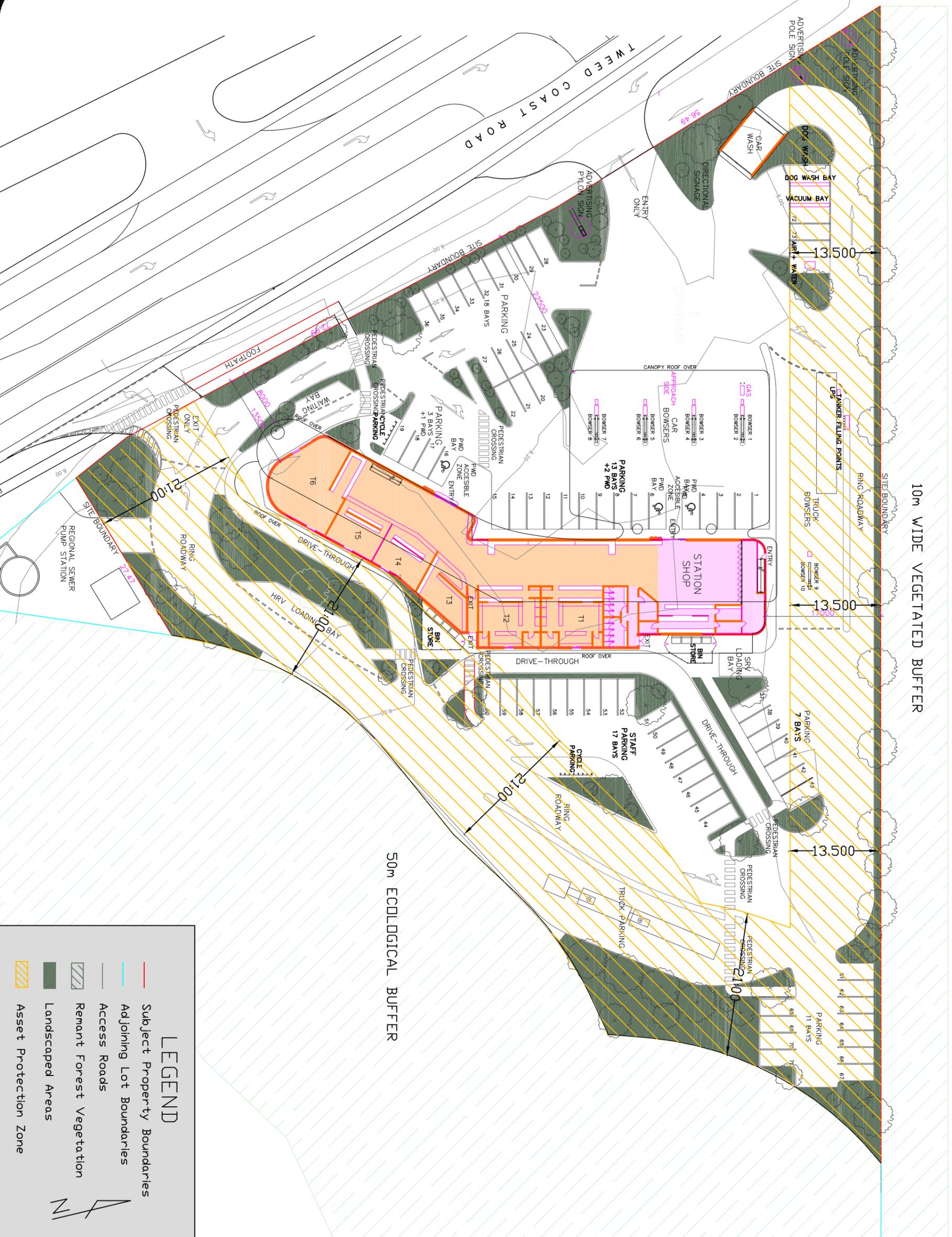
Although a hazard reduction burn program may at times be required for the promotion of vegetation characteristics, however in consideration with the above points hazard reduction burn is not recommended as the main hazard reduction tool to be used within the retained vegetation within the Kings Forest stage 1 development.

Mechanical Hazard Reduction such as slashing of undergrowth and/or reducing the ground fuel by hand,

- 1) although this is more labour intensive it can be carried out anytime throughout the year;
- 2) is not reliant on inter-agency assistance;
- 3) less chance of impact on fauna species such as Koalas;
- 4) Removal of native vegetation to construct containment lines is not required for mechanical hazard reduction operations.

It is a recommendation of this report that the majority of hazard reduction of native vegetation of the retained vegetation within the Kings Forest estate (stage 1) be undertaken using mechanical hazard reduction techniques.

Assessment of the vegetation hazard and planning of any proposed hazard reduction activities should be undertaken through the year with the hazard reduction activities carried out prior to the annual fire season declaration.



10m WIDE VEGETATED BUFFER

50m ECOLOGICAL BUFFER

LEGEND

- Subject Property Boundaries
- Adjoining Lot Boundaries
- Access Roads
- Remnant Forest Vegetation
- Landscaped Areas
- ▨ Asset Protection Zone

General Notes

This drawing was prepared by Bushfiresafe (Aust) P/L to demonstrate the identified vegetation communities present within and adjacent to the development property and should not be used for any other purpose.

Written dimensions shall take precedence over scale

**PLAN 1
PRECINCT 1
VEGETATION
COMMUNITIES/
ASSET
PROTECTION
ZONES**

Bushfiresafe (Aust) P/L
20 McLachlan St
Maclean NSW 2463
(02) 6645 1088



CLIENT:
Project 28 P/L

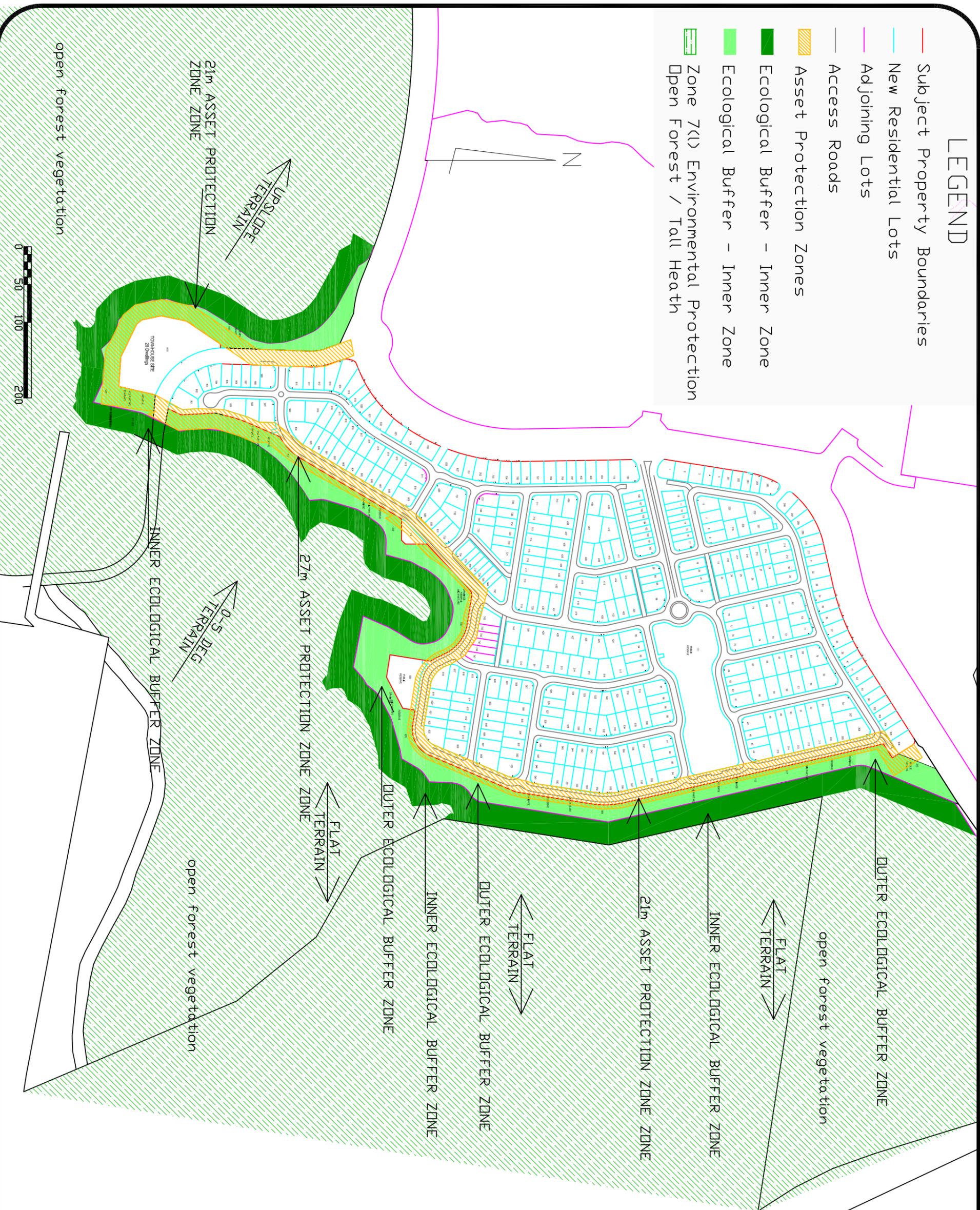
Project
Bushfire Risk
Management Plan
for
Service Station, Kings
Forest

Date: April, 2020
Scale: 1:2000
Ref# 20022



LEGEND

-  Subject Property Boundaries
-  New Residential Lots
-  Adjoining Lots
-  Access Roads
-  Asset Protection Zones
-  Ecological Buffer - Inner Zone
-  Ecological Buffer - Inner Zone
-  Zone 7(L) Environmental Protection
-  Open Forest / Tall Heath



General Notes

This drawing was prepared by Bushfiresafe (Aust) P/L to demonstrate the identified vegetation communities present within and adjacent to the development property and should not be used for any other purpose.

Vegetation line has not been surveyed and has been assumed for demonstration purposes

PLAN 2

PRECINCT 5
SITE LAYOUT/
VEGETATION
COMMUNITIES/
ASSET
PROTECTION
ZONES

Bushfiresafe
(Aust) P/L
20 Macleachlan St
Macleon NSW 2463
(02) 6645 1099



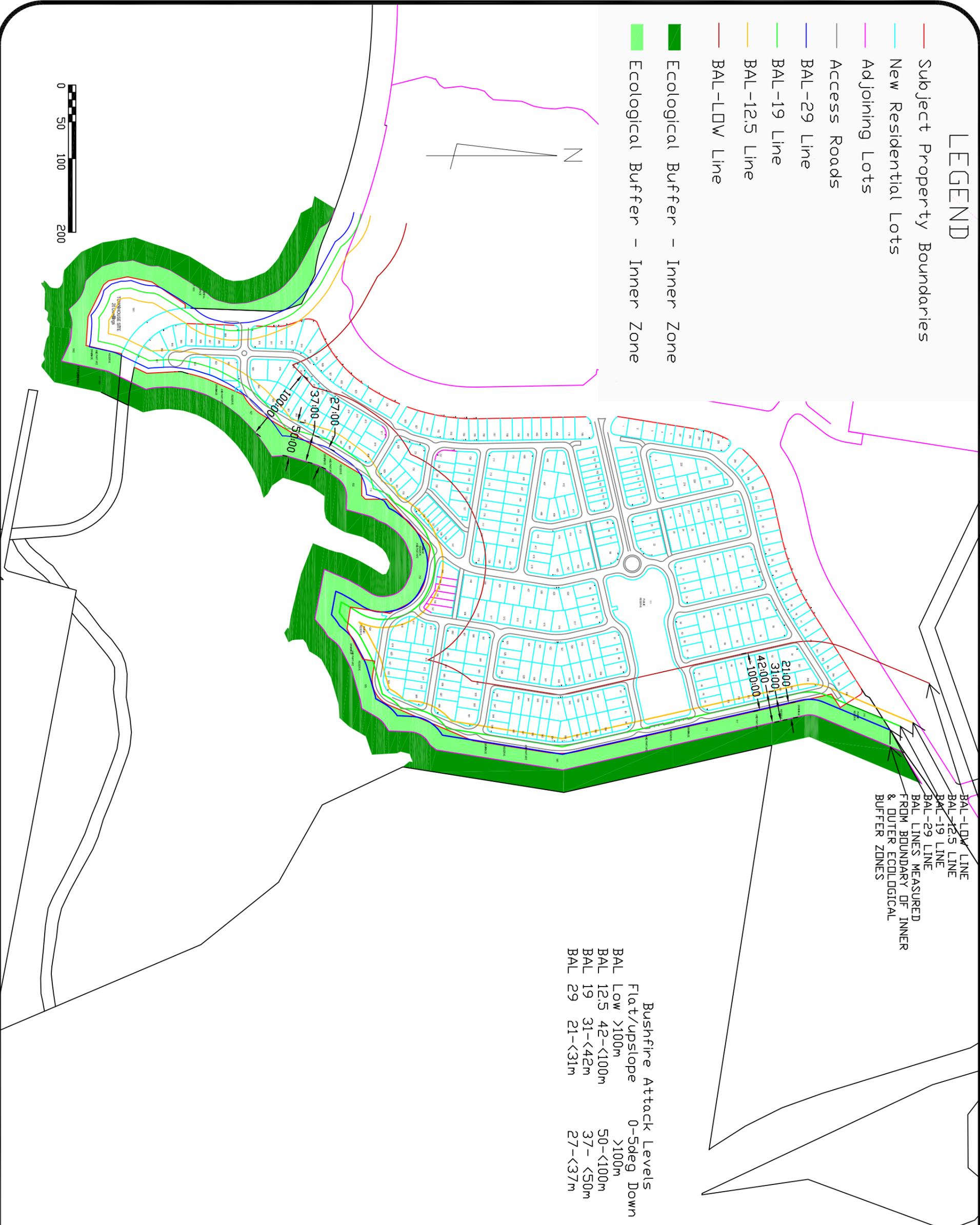
CLIENT:
Project 28 P/L

Project
Bushfire Risk
Management Plan
for
Residential Subdivision,
Kings Forest

Date: Aug, 2012 Ref# 12034
Scale:

LEGEND

- Subject Property Boundaries
- New Residential Lots
- Adjoining Lots
- Access Roads
- BAL-29 Line
- BAL-19 Line
- BAL-12.5 Line
- BAL-LDW Line
- █ Ecological Buffer - Inner Zone
- █ Ecological Buffer - Inner Zone



BAL-LDW LINE
 BAL-12.5 LINE
 BAL-19 LINE
 BAL-29 LINE
 BAL LINES MEASURED
 FROM BOUNDARY OF INNER
 & OUTER ECOLOGICAL
 BUFFER ZONES

Bushfire Attack Levels

Bushfire Attack Levels	0-5deg Down
BAL Low >100m	>100m
BAL 12.5 42-<100m	50-<100m
BAL 19 31-<42m	37-<50m
BAL 29 21-<31m	27-<37m

General Notes

This drawing was prepared by Bushfiresafe (Aust) P/L to demonstrate the Identified Bushfire Attack Levels within the development property and should not be used for any other purpose.

PLAN 3

PRECINCT 5

Bushfire
 Attack
 Levels

Bushfiresafe
 (Aust) P/L
 20 Macleachlan St
 Maclean NSW 2463
 (02) 6645 1099



CLIENT:
 Project 28 P/L

Project
 Bushfire Risk
 Management Plan
 for
 Residential Subdivision,
 Kings Forest

Date: Aug. 2012 Ref# 12034
 Scale: