

BUSHFIRE RISK MANAGEMENT PLAN

FOR PROPOSED

200 ALLOTMENT SUBDIVISION

OF LOT 1 DP592173, LOT 2 DP226560,

LOTS 3, 4 & 5 DP820652 AND

LOT 23 DP716144

WEST KORORA, COFFS HARBOUR

PREPARED BY

BUSHFIRESAFE

(AUST) PTY LTD

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EXECUTIVE SUMMARY

Bushfiresafe (Aust) P/L has been engaged by Thakral P/L to complete a Bushfire Risk Assessment for a proposed subdivision on Lot 1 DP592173, Lot 2 DP 226560, Lots 3, 4 & 5 DP 820652 and Lot 23 DP716144, West Korora, Coffs Harbour. The assessment was conducted in accordance with section 91A of the Environmental Planning and Assessment Act (1979) and section 100B of the Rural Fires Act (1997), and followed the guidelines recommended in Planning for Bushfire Protection (RFS, 2006).

The area subject to the proposed development is located on the western side of the Pacific Highway in West Korora, approximately 4.5km north of Coffs Harbour Central Business District, within the Coffs Harbour Local Government Area, north coast of NSW. The property is bounded by Bruxner Park Road (northern boundary), Pacific Highway (eastern boundary) West Korora Road (southern boundary) and private land to the west. The majority of the site consists of vacant land. A rugby playing field with associated amenities and a gym building are located in the middle of Lot 5 DP820652. There is also a small shed located in the far north western corner of Lot 2 DP226560. The above mentioned infrastructure shall be removed for the proposed development. A Transgrid power line traverses the property in a north-south direction on Lot 3 DP820652 and the Roads and Traffic Authority have recently advised that a proposed future realignment of the Pacific Highway will traverse Lot 2 DP226560.

The subject property consists of moderately to steeply, undulating topography, the steeper areas are located in the northern and north-western portions of the subject property near Bruxner Park Road, and near level areas along the terraces of Jordan's Creek. The property is mostly cleared grasslands, a remanent of a prior agricultural land use (banana plantation). There is a large stand of sclerophyllous vegetation in the western portion of the subject property located on all of Lot 4 DP820652 and part of Lot 5 DP820652, a secondary, isolated and smaller area of similar vegetation is present in the extreme northwest corner of the subject property (Lot 2 DP226560) and riparian vegetation occurs along the immediate banks of Jordan's Creek.

This Bushfire Risk Assessment was conducted through an on-site inspection undertaken in February, 2008 and 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. The Property inspection identified areas of Forest, Rainforest and Grassland as bushfire prone vegetation within 140m of the proposed development. The terrain over most of the subject property is undulating, rising steeply away from the creek (>18° from the Jordan's Creek floodplain to the upper hill slopes).

Asset Protection Zones

The bushfire prone vegetation occurring over the subject property was identified as being Forest or Rainforest. Using this information, this bushfire risk assessment concluded that the following asset protection zones 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);

Bushfire Prone Vegetation	Aspect	APZ (m)	IPA (m)	OPA (m)	Compliance with PBP
<i>Eastern Precinct</i>					
Forest	W	20	15	5	Yes
Riparian Rainforest	S	10	10	0	Yes
<i>Western Precinct</i>					
Forest (main area)	E	20	15	5	Yes
Forest (isolated)	W	20	15	5	Yes
	N	20	10	10	Yes
Forest (Jordan's Creek)	S	20	10	10	Yes
Bushfire Prone Vegetation	Aspect	APZ (m)	IPA (m)	OPA (m)	Compliance with PBP
<i>Southern Precinct</i>					
Riparian Rainforest	N	10	10	0	Yes
	E	10	10	0	Yes
	S	10	10	0	Yes

The required Asset Protection Zones from: the Riparian Rainforest community; and the Coastal Wetland Lagoon are exceeded by the development buffer zones required from these ecologically significant areas and hence, portions of the required APZs are incorporated within the required environmental set back.

Bush Fire Attack Categories

Using the above designated APZs, it is recommended that the proposed dwellings are assessed as being within the following Bushfire Attack categories, after considering Table 3.4 Determination of Category of Bushfire Attack FDI 80 in the Planning for Bushfire Protection manual (RFS, 2006) with the following site attributes:

Eastern Precinct

- Forest as the assessed bushfire prone vegetation (depending upon aspect);
- 0 - <5° down slope as the effective slope having the most impact of any bushfire behaviour.

Dwelling distance from Forest Vegetation

20 – 31m
31 – 42m
42 – 100m
> 100m

Bush Fire Attack Category

Extreme
High
Medium
Low

Dwelling distance from Rainforest Vegetation

10 – 14m
14 – 20m
20 – 50m
> 50m

Bush Fire Attack Category

Extreme
High
Medium
Low

Western Precinct

- Forest as the assessed bushfire prone vegetation (depending upon aspect);
- 0 - <5° down slope as the effective slope having the most impact of any bushfire behaviour.

Dwelling distance from Forest Vegetation

20 – 31m
31 – 42m
42 – 100m
> 100m

Bush Fire Attack Category

Extreme
High
Medium
Low

Southern Precinct

Table 3.4 Determination of Category of Bushfire Attack FDI 80 in the Planning for Bushfire Protection manual (RFS, 2006) was considered using the site attributes below:

- Rainforest as the assessed bushfire prone vegetation; and
- 0 - <5° down slope as the effective slope influencing bushfire behaviour towards the development.

Dwelling distance from Rainforest	Bush Fire Attack Category
Vegetation	
10 – 14m	Extreme
14 – 20m	High
20 – 50m	Medium
> 50m	Low

Access

Access to the development is proposed to be via a two-way, bitumen-surfaced perimeter road connecting the Eastern Precinct of the development with Bruxner Park Road to the north. The Coffs Harbour City Council has requested that a through road be incorporated into concept plan for the development. This through road would assist in handling increased traffic volumes and public transport (buses); connected to both West Korora Road and Bruxner Park Roads, and will provide a route to the Pacific Highway for future residents of developments to the west of the subject property should the present access from West Korora Road be closed by the RTA.

For the Western Precinct, access will via a two-way bitumen-surfaced road connecting with a proposed future road to the north of the subject site. This future road will connect with Bruxner Park Road.

A secondary emergency access is provided by the 6m gravel track linking the Western Precinct with the road network of the Eastern Precinct. This track will be maintained by the Pacific Bay Resort Corporate Body and complies with the Planning for Bushfire Protection requirements for access roads.

A perimeter road is proposed in the Concept Plan for the allotments within the Southern Precinct. This perimeter road will connect with West Korora Road to the south. A future possible link will be created with the Eastern Precinct using a crossing over Jordan's Creek. Access to individual allotments will be via constructed driveways from either the perimeter road or internal, interconnecting roads. All driveways will be short (<10m) in length, hard (all weather) surfaced and will provide sufficient access for fire fighting vehicles. 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).

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. All above ground water and gas service pipes are metal, including and up to any outside taps.

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.

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, 2001) 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); and
- 2) Access in accordance with section 4.1.3-2 (Property Access) in the Planning for Bushfire Protection manual (RFS, 2006).

BUSH FIRE RISK MANAGEMENT PLAN

1.0 SCOPE OF THE PLAN

The Bushfire Risk Management Plan (BFRMP) 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 Risk Management Plan.

1.1 Area

This Plan covers the proposed subdivision on Lot 1 DP592173, Lot 2 DP 226560, Lots 3, 4 & 5 DP 820652 and Lot 23 DP716144, West Korora, Coffs Harbour, within Coffs Harbour City Council Local Government Area.

1.2 Period of Operation

Once approved by the Local Authority and the NSW Rural Fire Service, this plan will have a period of operation of the life of the development.

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 treat to ecological and environmental assets. To achieve this aim, the Bushfire Risk 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 Risk Management Strategies

This plan contains a number of strategies, which are directed at addressing the risk to the rural residential development 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. Finally, the local authority or their delegated authority, for the life of the development shall monitor this Plan.

2.0 LEGISLATIVE BUSHFIRE HAZARD MANAGEMENT RESPONSIBILITIES

2.1 Coffs Harbour City Council

The Coffs Harbour City 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 Coffs Harbour City Council Bush Fire Management Committee

The Coffs Harbour City Council 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)).

3.0 INTRODUCTION

Development applications on bush fire prone land must be accompanied by a bush fire assessment report that demonstrates compliance with the aim and objectives of the Planning for Bushfire Protection (PBP) guidelines. In particular, the following matters must be addressed:

- 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.

3.1 Background

Bushfiresafe (Aust) P/L has been engaged by Thakral P/L to undertake a complete Bushfire Risk Assessment for the proposed subdivision on Lot 1 DP592173, Lot 2 DP 226560, Lots 3, 4 & 5 DP 820652 and Lot 23 DP716144, West Korora, Coffs Harbour. The assessment was conducted in accordance with section 91A of the Environmental Planning & Assessment Act (1979) and section 100B of the Rural Fires Act (1997), and followed the guidelines recommended in the Planning for Bushfire Protection guidelines (RFS, 2006).

The assessment has 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.

3.2 Description of property

The area subject to the proposed development is located on the western side of the Pacific Highway in West Korora, approximately 4.5km north of Coffs Harbour Central Business District, within the Coffs Harbour Local Government Area, north coast of NSW. The property is bounded by Bruxner Park Road (northern boundary), Pacific Highway (eastern boundary) West Korora Road (southern boundary) and private land to the west. A map outlining the location of the land subject to the proposed development is presented as Figure 1.

The subject land has multiple zonings under the Coffs Harbour Local Environment Plan (LEP) (Coffs Harbour City Council, 2000). The majority of the site is zoned 1(a) Rural Agricultural and is mostly cleared to grassland. Vegetated areas including the riparian margin of Jordan's Creek are zoned 7(a) Environmental Protection 'Habitat and Catchment'. A strip of land bordering the Pacific Highway along the eastern margin is zoned 7(b) Environmental Protection 'Scenic Buffer'.

The current 1(a) Rural Agricultural zoning of the site does not permit the development concepts presented in the development application. However, the Coffs Harbour City Council has formally resolved to commence the preparation of an amendment to the Coffs Harbour LEP 2000 for the North Coffs area. The subject land will be included in this area and it is anticipated that the site will be rezoned to permit low to medium density residential development.

The site is surrounded by a mix of land uses. To the east of the property is a caravan park and beyond the Pacific Highway is the Pacific Bay Resort that includes: a golf course; recreational facilities; resort and permanent residential accommodation. To the north of the subject property are low-density rural residential developments with open space and grazing lands dominating, whilst to the south and west, rural / agricultural enterprises (banana plantations) exist with low-density rural residential housing.

The subject property consists of moderately to steeply, undulating topography, the steeper areas are located in the northern and north-western portions of the subject property near Bruxner Park Road, and near level areas along the terraces of Jordan's Creek. The property is mostly cleared grasslands, a remnant of a prior agricultural land use (banana plantation). There is a large stand of sclerophyllous vegetation in the western portion of the subject property located on all of Lot 4 DP820652 and part of Lot 5 DP820652, a secondary, isolated and smaller area of similar vegetation is present in the extreme northwest corner of the subject property (Lot 2 DP226560) and riparian vegetation occurs along the immediate banks of Jordan's Creek.

The majority of the site consists of vacant land. A rugby playing field with associated amenities and a gym building are located in the middle of Lot 5 DP820652. There is also a small shed located in the far north western corner of Lot 2 DP226560. The above mentioned infrastructure shall be removed for the proposed development. A Transgrid power line traverses the property in a north-south direction on Lot 3 DP820652 and the Roads and Traffic Authority have recently advised that a proposed future realignment of the Pacific Highway will traverse Lot 2 DP226560.

3.3 Proposal

This development proposal seeks to subdivide the existing rural agricultural land for the construction of approximately 200 residential allotments. The proposed concept plan provides for a mix of low and medium density dwellings, connected by a road network consistent with the terrain aspects of the subject site, and including open space, constructed landscaping and vegetation regeneration to provide linkages between this development and adjacent or nearby habitat or 'green' corridors within the wider Korora Basin (PTW planning, 2006). The proposed development will focus on three separate areas of the property, the Eastern Precinct comprising the majority of the proposed dwellings, a Western Precinct separated by a large extent of Tall Open Forest vegetation on Lot 4 DP820652, and a Southern Precinct located to the south and east of Jordan's Creek. In the following assessment, these areas will be discussed separately. Approval for this development is requested under Part 3A of the Environmental Planning and Assessment (EP&A) Act (1979) as a major project.

3.4 NSW Rural Fire District BFRMP

The Coffs Harbour City 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.

4.0 VEGETATION CLASSIFICATION

The vegetation of the subject property and adjacent properties up to 140m (where practicable) from the proposed and existing building envelope were assessed during a site visit on 19th of February, 2008. 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) <i>Forests [wet & dry sclerophyll forests];</i> | (e) <i>Tall Heath lands;</i> |
| (b) <i>Woodlands;</i> | (f) <i>Short Heath lands;</i> |
| (c) <i>Plantations – being pine plantations not native plantations;</i> | (g) <i>Freshwater Wetlands;</i> |
| (d) <i>Forested Wetlands;</i> | (h) <i>Saline Wetlands</i> |
| | (i) <i>Alpine Complex;</i> |

(j) *Semi – arid Woodlands;*
(k) *Arid Woodlands; and*

(l) *Rainforests*

4.1 Vegetation communities present on the Property

Community 1 Wet Sclerophyll Tall Open Forest: This community occurs on the higher south-facing slopes of the subject land in two locations, the largest extent comprises all of the land detailed as Lot 4 DP820652. A second area exists in the north-western corner of the subject land on Lot 2 DP226560. The steep slopes upon which this Community has developed, has dictated a zonation in the species present with the lower slopes dominated by mature trees of Flooded Gum, Tallowwood, Blackbutt, Brushbox, a middle storey of Turpentine, Bangalow Palm, Red Bean, Creek Sandpaper Fig and tree ferns with an understorey of native vines, Bracken Fern and Lantana.

On the higher slopes, the dominant over storey comprises Tallowwood, Grey Gum, Northern Grey Ironbark and Forest She-Oak indicative of less moisture availability within the shallower soils present near the ridgeline (Figure 1). The middle storey comprises Brushbox, Winter Senna and Tamarind and understorey of Bracken Fern, Lomandra, Tobacco Bush and Lantana.



Figure 1. Wet Sclerophyll Tall Open Forest (main area of vegetation) and managed grassland in the foreground.

An isolated population of mature, multiple-stemmed Rusty Plum trees (*Amorphaespermum whitei*) occur along the western edge of a small south flowing tributary of Jordan's Creek (see

Attachment 1). This plant is listed as Vulnerable in the NSW Flora Atlas (NPWS, 2002). This population's mature age, habit and location towards the western margin of Community 1 is possibly the result of a previous bushfire (Bushfiresafe (Aust), 2008).

A number of the tree species identified within this Community are listed as being of significant value to koala populations under State Environmental Planning Policy (SEPP) 44. Both areas of vegetation relating to Community 1 are listed as Primary Koala Habitat in the Coffs Harbour City Council Koala Plan of Management (Lunney *et al.*, 1999).

Community 2: Riparian Lowland Rainforest / Wet sclerophyll Tall Closed Forest Along the margins of Jordan's Creek is an example of the Lowland Rainforest endangered ecological community (EEC). Brushbox and emergent Hoop Pine trees dominate with isolated mature Flooded Gum indicative of a riparian community that may be undergoing rainforest regeneration (Figure 2). Species present include Camphor Laurel, Red Bean, Turpentine, Red Ash, Doughwood, Tamarind and Creek Sandpaper Fig. Whilst no species recorded are listed in the NSW Flora Atlas (Bushfiresafe (Aust), 2008) a number of species are recorded as being within 50km of their southern most recorded locations.



Figure 2 Left: Bangalow palms within the Riparian rainforest vegetation and Right: Jordan's Creek (Photographs, S. Cotter).

This community has developed upon the lower terraces and toe-slopes adjacent to Jordan's Creek. The greatest lateral extend of the riparian vegetation occurs downstream of a culvert crossing and in a region characterised by the inflow of numerous tributary streams. The streams, and associated sediment input have lead to the development of a wide (c. 20m) near-horizontal alluvial terrace. Further downstream, and in the absence of the steep hill slope along the northern edge of Jordan's Creek, this community is confined to the immediate margins (c. <5m in width) of the creek line. Past land-use practises in the eastern region of the subject land (grazing, sporting fields, etc.) have removed much of this vegetation community in this downstream region.

Flooded Gum (*E. grandis*) is a preferred tree species for koala populations as listed in SEPP 44. The presence of Flooded Gum both within, and along the margins of this Community (Figure 3) has been the catalyst for the classification of this riparian community as Secondary Koala Habitat in the Coffs Harbour City Council Koala Plan of Management (Lunney *et al.*, 1999).



Figure 3. Emergent Flooded gum (*E. Grandis*) within the riparian rainforest vegetation along Jordan's Creek (Photograph, S. Cotter).

Community 3 Coastal freshwater lagoon: The margins of the freshwater lagoon comprise Swamp Oak, Saw sedge, Lomandra, Ferns, Lantana and exotic grass species (Figure 4). This lagoon has developed in response to the construction of an elevated culvert to provide a wet-weather crossing of Jordan's Creek. Downstream of the culvert there is a c. 5m drop to the creek bed (creating a waterfall scenario for fish migration). Upstream, the present water

surface of the lagoon is <1m below the culvert surface with the level controlled by the provision of 2 drainage pipes. The lagoon therefore can be regarded as an example of an artificially-constructed wetland. The mix of native and exotic species occurring along the margins of this lagoon, represent a range of colonising plants that have exploited this niche environment. Hence, the ecological significance of this lagoon is not on the plants species present, but rather as a habitat for a population of the endangered Giant Barred Frog recorded from this environment (Bushfiresafe (Aust), 2008).



Figure 4. Freshwater Lagoon exists upstream of the culvert crossing in the western portion of the subject property (Photograph, S. Cotter).

Community 4 Grassy woodland: This community comprises the majority of the subject land and is the result of past agricultural practises. It is dominated by exotic grass species and invasive herbs and has little conservation value, its primary roll at present being to maintain a cover for the skeletal soils and hence preventing excessive sediment erosion from the steep slopes present (Figure 5).



Figure 5. Managed grassland covers the majority of the site, including all areas to be developed. Banana plantations surround the property to the south (Photograph, S. Cotter).

4.2 Vegetation within 140m from the subject land boundary

To the east of the subject land, managed lawns and open space are present and associated with the neighbouring caravan park, Pacific Highway, and Pacific Bay Resort. Banana plantations are present in the south and west directions, whilst to the north of the subject property managed agricultural grasslands and rural residential developments occur. In all directions the vegetation present within 140m of the subject property is not regarded as being bush fire prone.

4.3 Assessed Bushfire Vegetation in Relation to the Proposed Subdivision

The Tall Open Forest in the central portion and in the northwest corner of the subject land is identified as Category 1 bushfire prone vegetation, according to the Coffs Harbour Fire Prone Lands (CHFPL) map (Coffs Harbour City Council, n.d.). The Riparian Lowland Rainforest community along Jordan's Creek is also Category 1 bushfire prone lands. The remainder of the subject property (grassland vegetation) is identified as being within the bushfire prone vegetation buffer zone. The assessed bushfire prone vegetation most influencing fire behaviour for each of the identified development precincts are:

Western precinct The Tall Open Forest vegetation to the east (central area) and northwest (isolated) is assessed as the bushfire prone vegetation for this precinct. For this assessment, the ecological buffer to Jordan's Creek and Rainforest community is assumed that it will evolve over time and without management, to approach a Forested community structure. Consequently, any bushfire protection measures from this community will reflect this interpretation.

Eastern Precinct The Tall Open Forest vegetation to the west (main Forest area) is assessed as the bushfire prone vegetation for this precinct. Any setbacks required from the Riparian

Rainforest vegetation along Jordan's Creek will be included within the ecological buffer zone already required for this community.

Southern Precinct The Riparian Rainforest vegetation along Jordan's Creek is assessed as the bushfire prone vegetation for this precinct. However, portions of the bushfire setbacks required from the vegetation will be included within the ecological buffer zone already required for this community.

5.0 LANDFORM ASSESSMENT

Inspection of published topographic maps (Coffs Harbour 9537) and an on-site assessment using an inclinometer verified the following land forms were present over the subject land.

Steep terrain (slopes in places $> 18^\circ$) is present over most of the north and north-western portions subject land. These slopes are currently forested (Community 1) with skeletal soils often exhibiting outcroppings of the underlying highly fractured metashale and greywacke rocks of the Coramba Beds (Coffs Harbour Association), a faulted block of metasedimentary units of Early Palaeozoic age (Pogson and Hitchins, 1973). These rocks weather to provide the yellow and red earth soils typical of the Coffs Harbour region.

Towards the lower foot slopes and terraces associated with the riparian zone of Jordan's Creek, soil development have achieved the greatest thickness, typically consisting the deep humic layer overlying alluvial silt and clay sediments. For most of the reaches observed, Jordan's Creek possessed an armoured bed of metasedimentary rocks that have been transported from outcrops located higher in the landscape. The only location where any pool (temporary or permanent) has developed along this watercourse is immediately upstream of the temporary causeway previously constructed in the western area that provides access to an adjoining property. The elevation of this causeway above the permanent level of Jordan's Creek, has resulted in the extensive accumulation of alluvial sediments upstream and has enhanced the establishment of a freshwater lagoon identified on the subject land.

The alluvial terraces of Jordan's Creek have developed to a greater extent in the eastern portion of the subject land providing a large relatively flat area of land. The implications of this are however, that flooding may become an issue for development in this area. Furthermore, the north bank of Jordan's Creek in this area has been modified by the construction of a rugby playing field and associated change rooms, gymnasium and equipment storage. To the north, the slopes in this area are generally gentle ($5-10^\circ$) rising to moderately steep ($10-15^\circ$) upslope.

5.1 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.

Table 1 summarises the slope assessments for each vegetation community observed over the subject land. This information will be used as the basis for determining those aspects of the proposed development that may require provisions for, and implementation of appropriate Asset Protection Zones.

Table 1 Site Assessment Summary – vegetation communities

Vegetation	Classification (PBP)	Slope	Comments
On-Site			
Tall Open Forest (Wet Sclerophyll)	Forest	15 - <18° down slope	Main veg. in central area of property
Tall Open Forest (Wet Sclerophyll)	Forest	15 - <18° down slope	Isolated veg. in NW area of property
Riparian Lowland Rainforest	Rainforest	0-<5° down slope	Less than 20m in width
Managed Grassland	Grassland	Flat rising to <18° up slope towards north	
Adjacent lands to 140m			
Managed agricultural lands	Grassland	0-<5° up slope rising to >5-10°	not classified as bushfire prone vegetation

The slope characteristics between the main area of bushfire prone (Forest) vegetation and the adjacent land that is designated for the proposed allotments in the concept plan are contiguous, *i.e.* for the eastern section, both slopes are 10-<15° downwards towards the south. A fire within the vegetation will generally run up slope, any lateral spread of the fire will be across the slope. Consequently, for this assessment, the effective slope is deemed to be 0-<5° down slope between a bushfire hazard and the adjacent proposed development, where ever the terrain is similar. The effective slopes that are applied in this assessment for the areas of proposed development adjacent to bushfire prone vegetation having similar terrain attributes are listed in Table 2.

Table 2 Site Effective slopes adjacent to Bushfire prone vegetation

Proposed Lot #	Aspect	Vegetation	Effective Slope	Comment
Eastern Precinct	E	Forest	0-<5° down	
	S	Rainforest	Flat	
Western Precinct	W	Forest	0-<5° down	
	E	Forest (isolated patch)	0-<5° down	
	N	Forest (isolated)	Upslope	
	S	Freshwater Lagoon	0-<5° down	
	S	Rainforest / Forest	Flat	
Southern Precinct	N	Rainforest	0-<5° down	
	E	Rainforest (regeneration)	Flat	

6. ENVIRONMENTAL CONSIDERATIONS

The areas of Tall Open Forest (Community 1) are zoned 7(a) Environmental Protection 'Habitat and Catchment'. A number of tree species present in both areas of Community 1 are listed under SEPP 44 as preferred Koala habitat, the area is identified as being Primary Koala Habitat (Lunney *et al.*, 1999). The Riparian rainforest community along Jordan's Creek is also zoned 7(a) Environmental Protection 'Habitat and Catchment' and is an example of an Endangered Ecological Community. This community also contains preferred koala habitat trees (Flooded Gum) and is identified as being Secondary Koala Habitat (Lunney *et al.*, 1999).

Bushfiresafe (2008) conducted a flora and fauna survey of the subject property identifying a number of plant species occurring within the limits of their known range. One plant, Rusty Plum (*Amorphospermum whitei*) was listed by NPWS (2002) as vulnerable. A population of the endangered Giant Barred Frog was also identified as present within the Coastal Freshwater Lagoon (Community 3). This freshwater lagoon is also zoned 7(a) Environmental Protection 'Habitat and Catchment'.

To address flooding on adjoining lands as a result of the proposed development, a bypass channel must be excavated within the northern bank of Jordan's Creek. This channel is approximately 130m in length, commencing near a natural constriction in the existing channel upstream of the sporting field and will require the removal of 125 trees, many of which were either planted during a revegetation programme c. 15 years ago or consist of mature Camphor Laurel trees. This channel will be revegetated as outlined in the accompanying Vegetation Management Plan.

The Environmental Assessment Guidelines pertaining to this development require the implementation of buffer zones protecting the ecologically significant areas from development. A 30m buffer zone is required from Jordan's Creek comprising a 20m Core Riparian Zone and 10m Vegetated Buffer. Discussions with DWE Officers regarding the Vegetated Buffer have proposed that the Vegetated Buffer can include roads, paths and managed open space / Asset Protection Zones given that the Bypass Channel will also be vegetated. A 30m buffer zone is also required from the Coastal Freshwater Lagoon. No buffer zones are explicitly requested from the identified Koala Habitat vegetation, but rather, the bushfire protection measures listed below will provide adequate protection for these areas.

7.0 BUSHFIRE ASSESSMENT FOR PROPOSED DEVELOPMENT

7.1 Asset Protection Zones

Based on the assessment of the vegetation communities and slopes present on and adjacent to the subject property, 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 Areas (IPA) and Outer Protection Areas (OPA) should be established as listed below. To simplify the presentation of this information, the three areas of development will be treated separately (Table 3).

Table 3 Asset Protection Zones for each proposed building

Bushfire Prone Vegetation	Aspect	APZ (m)	IPA (m)	OPA (m)	Compliance with PBP
<i>Eastern Precinct</i>					
Forest	W	20	15	5	Yes
Riparian Rainforest	S	10	10	0	Yes
<i>Western Precinct</i>					
Forest (main area)	E	20	15	5	Yes
Forest (isolated)	W	20	15	5	Yes
	N	20	10	10	Yes
Forest (Jordan's Creek)	S	20	10	10	Yes
<i>Southern Precinct</i>					
Riparian Rainforest	N	10	10	0	Yes
	E	10	10	0	Yes
	S	10	10	0	Yes

The Asset Protection Zones for all aspects of the development shall be measured from the gutter or fascia (if a gutterless roof is used) of an existing, or proposed dwelling, to the foliage drip line, and shall be implemented and maintained to the specifications as outlined below.

Inner Protection Area (IPA) shall be maintained in such a manner that;

- minimal fire fuel that could be set alight by bushfire (e.g. long grass, tree branches *etc.*) is present at ground level;
- vegetation does not provide a path for the transfer of fire to the development;
- trees are a minimum of 5 metres away from any building, measured from the edge of the foliage to the roof line or any open balconies;
- bark chips and the like are not present within 5 metres of any building;
- any trees present have a minimum canopy separation of 2 metres; and
- any trees present are not species that retain dead material or deposit excessive amounts of ground fuel in a short time.

An Outer Protection Area (OPA) serves to reduce the potential length of flames by slowing the rate of spread of a fire, filtering embers and reducing the likelihood of crown fires. This zone may be reduced with a corresponding increase in the IPA. Where the vegetation type comprises heath communities, rainforests and woodlands, it is not possible to distinguish between an IPA and an OPA, and hence all such APZs should be managed as an IPA. However, where an OPA can be established, it should comprise:

- a tree canopy cover of less than 30%;
- a managed understorey (lawn); and
- shrubs that have been pruned prior to the commencement of the fire season.

The APZ required for each allotment within either the Western or Eastern Precincts that is adjacent to the Forest vegetation, will be satisfied by including the perimeter road (12m), erosion-control swale and managed verge (8m) within the recommended set back. For the Riparian Rainforest / Freshwater Lagoon community, the recommended APZ should be incorporated within the development buffer zone required from this ecologically significant area. Similarly, the APZ recommended for development adjacent to the Riparian Rainforest community (Eastern and Southern Precincts) should include any perimeter roads, landscaping and walking trails and be included within the development buffer zone required from this ecological area.

7.2 Assessed Bushfire Attack Category

An assessment of the bushfire attack categories applicable to the proposed development was carried out using the methodology detailed in Appendix 3 of Planning for Bushfire Protection (RFS, 2006). To simplify the presentation of this information, the three areas of development will be treated separately below.

Eastern Precinct

Table 3.4 Determination of Category of Bushfire Attack FDI 80 in the Planning for Bushfire Protection manual (RFS, 2006) was considered using the site attributes below:

- Forest as the assessed bushfire prone vegetation; and
- 0 - <5° down slope as the effective slope influencing bushfire behaviour towards the development.

The bushfire risk management assessment concluded the following bushfire attack categories for the proposed development.

Dwelling distance from Forest Vegetation	Bush Fire Attack Category
20 – 31m	Extreme
31 – 42m	High
42 – 100m	Medium
> 100m	Low
Dwelling distance from Rainforest Vegetation	Bush Fire Attack Category
10 – 14m	Extreme
14 – 20m	High
20 – 50m	Medium
> 50m	Low

Western Precinct

Table 3.4 Determination of Category of Bushfire Attack FDI 80 in the Planning for Bushfire Protection manual (RFS, 2006) was considered using the site attributes below:

- Forest as the assessed bushfire prone vegetation; and
- 0° - <5° down slope as the effective slope influencing bushfire behaviour towards the development.

The bushfire risk management assessment concluded the following bushfire attack categories for proposed development.

Dwelling distance from Forest Vegetation	Bush Fire Attack Category
20 – 31m	Extreme
31 – 42m	High
42 – 100m	Medium
> 100m	Low

Southern Precinct

Table 3.4 Determination of Category of Bushfire Attack FDI 80 in the Planning for Bushfire Protection manual (RFS, 2006) was considered using the site attributes below:

- Rainforest as the assessed bushfire prone vegetation; and
- 0° - <5° down slope as the effective slope influencing bushfire behaviour towards the development.

The bushfire risk management assessment concluded the following bushfire attack categories for proposed development.

Dwelling distance from Rainforest Vegetation	Bush Fire Attack Category
10 – 14m	Extreme
14 – 20m	High
20 – 50m	Medium
> 50m	Low

7.3 Electricity Supply

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.

7.4 Adequacy of Water Supply

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. Finally, all above ground water and gas service pipes are metal, including and up to any outside taps.

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

The public roads (Pacific Highway, Bruxner Park Road, West Korora Road) 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.

7.6 Adequacy of Access and Egress in Bushfire Situations

Access to the development is proposed to be via a two-way, bitumen-surfaced perimeter road connecting the Eastern Precinct of the development with Bruxner Park Road to the north. The Coffs Harbour City Council has requested that a through road be incorporated into the concept plan for the development. The proposed future road will be capable of handling increased traffic volumes and public transport (buses); connected to both West Korora Road and Bruxner Park Roads; and will provide a route to the Pacific Highway for future residents of developments to the west of the subject property should the present access from West Korora Road be closed by the RTA.

For the Western Precinct, access will via a two-way bitumen-surfaced road connecting with a proposed future road to the north of the subject site. This future road will connect with Bruxner Park Road. A secondary emergency access is provided by the 6m gravel track linking the Western Precinct with the road network of the Eastern Precinct. This track is existing and will be maintained by the Pacific Bay Resort Corporate Body and complies with the Planning for Bushfire Protection requirements for access roads listed below.

A perimeter road is proposed in the Concept Plan for the allotments within the Southern Precinct. This perimeter road will connect with West Korora Road to the south of the subject site. A future possible link will be created with the Eastern Precinct using a crossing over Jordan's Creek. Any crossing should not impinge upon the bank stability and riparian vegetation next to the creek, and should be constructed using piers located at a distance either side of the creek bed with the road spanning the interval.

Access to individual allotments will be via constructed driveways from either the perimeter road or internal, interconnecting roads. All driveways will be short (<10m) in length, hard (all weather) surfaced and will provide sufficient access for fire fighting vehicles. 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 be clearly sign-posted (with easily distinguished names) and buildings should be clearly numbered. Bridges should clearly indicate load rating;

8.0 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 (1999) Construction of Buildings in Bushfire Prone Areas (Standards Australia, 2001) will be assessed and nominated as part of the development application process for the construction of dwellings on the approved allotments.

9.0 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).

10.0 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).

The area of vegetation (central portion of property) that will not be developed and will be dedicated to the Coffs Harbour City Council for environmental protection; the vegetation should be managed in accordance with their Plan of Management for environmentally sensitive areas. All perimeter roads will be included within any required Asset Protection Zone and will be the responsibility of the Coffs Harbour City Council for on-going

maintenance. The existing oval and secondary emergency access to the Western Precinct shall be maintained by the Pacific Bay Resort Body Corporate. Where an APZ also encroaches upon an allotment, the maintenance of the APZ in accordance with the Planning for Bushfire Protection guidelines (RFS, 2006) rests with the owner.

GLOSSARY

APZ	Asset Protection Zone
BFRMP	Bushfire Risk Management Plan
CHFPL	Coffs Harbour Fire Prone Lands map
EEC	Endangered Ecological Community
EP&A	Environmental Planning and Assessment Act
FDI	Fire Danger Index (forest fuels)
IPA	Inner Protection Area
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
TSC Act	Threatened Species Conservation Act (1995)
TSCA Act	Threatened Species Conservation Amendment Act (2002)

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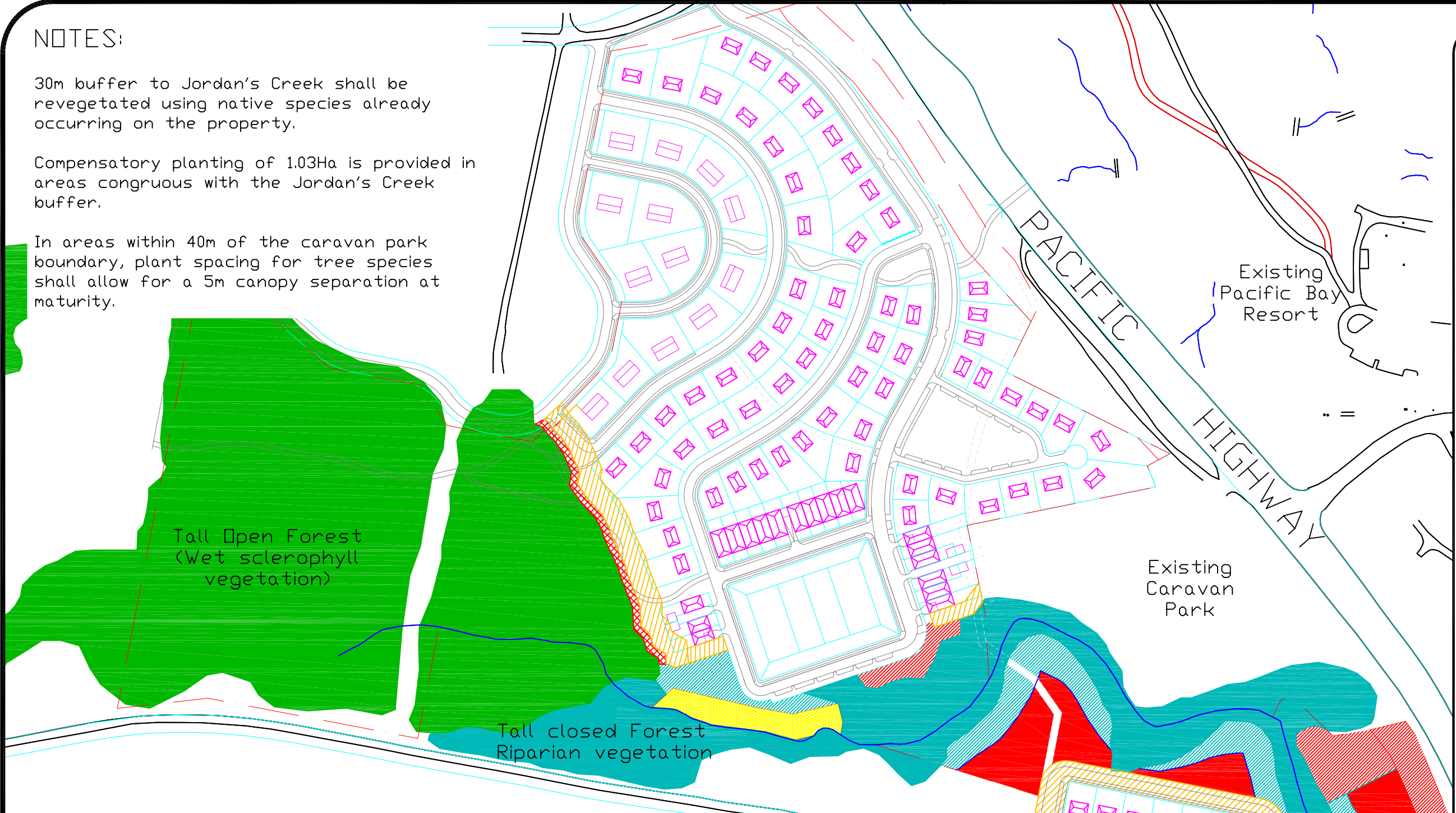
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NOTES:

30m buffer to Jordan's Creek shall be revegetated using native species already occurring on the property.

Compensatory planting of 1.03Ha is provided in areas congruous with the Jordan's Creek buffer.

In areas within 40m of the caravan park boundary, plant spacing for tree species shall allow for a 5m canopy separation at maturity.



LEGEND

- | | |
|-------------------------------|---|
| — Subject Property Boundaries | ■ Wet Sclerophyll Forest vegetation |
| — Allotment Boundary | ■ Riparian (rainforest) vegetation |
| — Access Roads | ▨ 30m Buffer to Jordan's Creek to be revegetated as per VMP |
| — Jordan's Creek | ■ Compensatory Planting Area |
| — Building Envelope | ▨ Compensatory Planting Area canopy separation > 5m at maturity |
| ▨ Flood By-pass channel | |
| ▨ APZ Inner Protection Area | |
| ▨ APZ Outer Protection Area | |

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

ATTACHMENT 1

ASSET PROTECTION ZONES

Bushfiresafe (Aust)
20 Maclehan St
Maclean NSW 2463
(02) 6645 1099



CLIENT:
Thakral Holdings P/L
George Street
Sydney 2000

Project
Bushfire Assessment
Pacific Bay West
residential subdivision
West Korora Road,
Coffs Harbour

Date: MARCH 2010

Scale:

Ref# 7017