LandUse

BUSHFIRE STRATEGIC STUDY
FOR A
PLANNING PROPOSAL

Lot 15/-/DP1236885,
40 The Tunnell Road, Billinudgel

PREPARED BY: LANDUSE

A.B.N.: 95 020 786 142

ADDRESS: PO Box 204 The Channon, NSW 2480.
PHONE & FAX: 02) 66886453
MOBILE: 0419 420362
EMAIL: landusebushfire@gmail.com

TECHNICAL STAFF: JJ Bruce B.App.Sc. (Hons.). Grad.Dip. Bushfire Protection
Tait Bedlington B.Env.Sc., Grad.Dip. Bushfire Protection

PREPARED FOR: Lisa Joel.

INSPECTION DATE: January 23, 2024.
REPORT DATE: April 10, 2024.
REPORT ID: Joel_BPP_240123

SUMMARY

- The planning proposal is to modify an area of the land zoning of Lot 15/-/DP1236885, 40 The Tunnell Road, Billinudgel from RU2: Rural Landscape to E4: General Industrial. The subject area is approximately 4220m^2 in size and the land on which the development occurs is within the buffer to bushfire prone vegetation.

- Bushfire Attack Level (BAL) assessment detailed in Section 2 of this report indicates the APZ required for a potential development arising from the planning proposal to acheve the heat exposure benchmark of 29 kW/m^2.

- The planning proposal and subsequent development can meet bushfire planning and approval requirements in accordance with this report.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ACCRONYMS

AS	Australian Standard
APZ	Asset Protection Zone
BAL	Bushfire Attack Level
BCA	Building Code of Australia
BFPL	Bush Fire Prone Land
BPM	Bushfire Protection measure
IPA	Inner Protection Area
NCC	National Construction Code
NSW	New South Wales
PBP	Planning for Bushfire Protection

1 INTRODIUCTON

This Bushfire Strategic Study has been undertaken at the behest of Lisa Joel to support a planning proposal to modify an area of the land zoning of Lot 15/-/DP1236885, 40 The Tunnell Road, Billinudgel from RU2: Rural Landscape to E4: General Industrial.
Under the Environmental Planning and Assessment Act 1979 (EP&A Act), when considering a planning proposal on Bushfire Prone Land, consent authorities must have regard to s.9.1(2) Direction 4.4 – 'Planning for Bushfire Protection' of the EP&A Act.

The objectives of Direction 4.4 are:

- To protect life, property and the environment from bushfire hazards, by discouraging the establishment of incompatible land uses in bush fire prone areas; and
- To encourage sound management of bush fire prone areas.

Direction 4.4 instructs the consent authority on bushfire matters to be addressed including:

- Consultation with the Commissioner of the NSW Rural Fire Service (RFS), and consider any comments made;
- Draft LEPs shall have regard to Planning for Bushfire Protection; and,
- Comply with bushfire protection provisions where development is proposed.

As part of the consultation process with the NSW RFS, a strategic bushfire study is required to be submitted to inform planning decisions to ensure that future land uses are in appropriate locations to minimise the risk to life and property from bush fire. By considering bushfire protection in changes in permissible land use under a LEP the consent authority can ensure that future compliance with the s9.1(2) Directions Planning for Bushfire Protection 2019 is achievable and future development will be able to comply with PBP at the DA stage.

1.1 Background

The area subject to the planning proposal has been identified by the Byron Shire Council in the Byron Shire Business and Industrial Lands Strategy 2020 as investigation area 1 - potential Billinudgel Industrial Estate minor expansion area (figure1), which is immediately adjoining the Billinudgel Industrial Estate with connection to existing infrastructure.

Figure 1. *showing investigation area 1: Billinudgel Industrial Estate minor expansion area -which is part of Lot15/-/DP1236885(blue outline left) and the land zoning of the allotment and surrounds (white outline) (right) showing the current RU2: Rural Landscape zoning of the planning proposal area (pink).*

1.2 Aims and Objectives

The aim of this study is to review the planning proposal to modify the zoning of part of Lot 15/-/DP1236885 under the strategic planning requirements of Planning for Bushfire Protection:2019.
The objective for the strategic planning study is to:

i) Undertake a Bush Fire Strategic Study as per the strategic planning principles and assessment considerations outlined in Chapter 4 of PBP to investigate whether potential future development associated with the planning proposal is appropriate at the location, commensurate with the identified bush fire risk on a landscape scale.

1.3 Assessment Approach

The consideration of PBP for planning proposals is required under Section 9.1 (2) of the EP&A Act. Chapter 4 of PBP (RFS 2019) contains the broad principles and minimum assessment considerations required for strategic planning proposals. The strategic planning principles are:

- ensuring land is suitable for development in the context of bush fire risk;
- ensuring new development on BFPL will comply with PBP;
- minimising reliance on performance-based solutions;
- providing adequate infrastructure associated with emergency evacuation and firefighting operations; and,
- facilitating appropriate ongoing land management practices.

These principles require the consideration of the bushfire protection measures for potential development subsequent to the planning proposal stage, and to consider the suitability of future land uses within the landscape scale bushfire context so that future land uses can meet the aim and objectives of PBP.

The aim of PBP is to provide for the protection of human life and minimise impacts on property from the threat of bush fire, while having due regard to development potential, site characteristics and protection of the environment.

The objectives of PBP are to:

- afford buildings and their occupants protection from exposure to a bush fire;
- provide for a defendable space to be located around buildings;
- provide appropriate separation between a hazard and buildings which, in combination with other measures, minimises material ignition;
- ensure that appropriate operational access and egress for emergency service personnel and residents is available;
- provide for ongoing management and maintenance of bush fire protection measures; and,
- ensure that utility services are adequate to meet the needs of firefighters.

In addition, Chapter 4 of PBP prescribes that strategic planning should exclude “inappropriate development” in bush fire prone areas, where:

- the development area is exposed to a high bush fire risk and should be avoided;
- the development is likely to be difficult to evacuate during a bush fire due to its siting in the landscape, access limitations, fire history and/or size and scale;
- the development will adversely effect other bush fire protection strategies or place existing development at increased risk;
- the development is within an area of high bush fire risk where density of existing development may cause evacuation issues for both existing and new occupants; and,
- the development has environmental constraints to the area which cannot be overcome.

2 BUSHFIRE LANDSCAPE RISK ASSESSMENT

2.1 Study Area

The subject land of the planning proposal is approximately 4220m^2 consisting of the north east corner of current Lot 15/-/DP1236885, which is a bare levelled site, accessed at 27 Lucky Lane, Billinudgel. The subject land is immediately adjoining the south eastern corner of the Billinudgel Industrial Precinct, zoned E4 - General Industrial, and has access to existing services.

The Billinudgel industrial area is approximately 8 hectares in size and located to the south east of Billinudgel Village adjacent to the Pacific Motorway M1which separates it from the coastal town of Ocean Shores.

The subject land is situated on the low elevation (approximately 3m ASL) margin between low rolling hills and the Billinudgel flood plain associated with Marshalls Creek and Lacks Creek that drain the higher and steeper elevations of the Burringbar Hills within the eroded landscapes of the Wollumbin Shield Volcano.

The property is situated on the northern side of The Tunnell Road, bounded on the east by the Pacific Motorway and the village of Billinudgel to the north. The proposed allotment occupies the slopes of low rolling hills on the edges of the Burringbar Hill. The southern upslope parts of the property is largely cleared land managed as grazing land with patches of Wet Sclerophyll Forest. The remaining northern half of the property adjoining the Billinudgel Industrial area consists of Coastal Swamp Forest.

2.2 Bushfire Hazard

2.2.1 Vegetation and slope

The landscape surrounding the subject land has been partially to extensively cleared on shallower slopes for grazing by beef and dairy cattle. Banana plantations were common on steeper slopes and volcanic soils. Camphor laurel (*Cinnamomum camphora*) and sally wattle (*Acacia melanoxylon*) commonly dominate the regrowth.

There is a distinct west to east gradient in reducing elevation where the eroded volcanic land formations and soils of the Wollumbin Shield Volcano grade into the narrow coastal sand plain surrounding Ocean Shores. The elevated topography supports very tall open forest dominated by brush box (*Lophostemon confertus*) and blackbutt (*Eucalyptus pilularis*) while dryer aspects or soil limitations are characterised by the presence of broad-leaved white mahogany, (E. carnea), narrow-leaved white mahogany (*E. acmenoides*) and grey ironbark (*E. siderophloia*) tall open forest.

The tall open forests grade into swamp sclerophyll communities on floodplain areas with poor drainage dominated by broad-leaved paperbark (*Melaleuca quinquenervia*) with Swamp mahogany (*Eucalyptus robusta*) also occurring.

The area immediately to the west of the subject land and adjoining the Billinudgel Industrial area consists of Coastal Swamp Forest and constitutes the primary bushfire threat to the site.

Broad-leaved Paperbark-Brush Box-Swamp Box swamp sclerophyll forest on clays of coastal plains (PCT_1933) is a Threatened Ecological Community Coastal Swamp Sclerophyll Forest under the EPBC Act (*Cwth*) and a as a Swamp sclerophyll forest on coastal floodplains under the Biodiversity Conservation Act (*NSW*).

2.2.2 Bushfire Attack Level (BAL) assessment

Table 1 shows classified vegetation and slope out to 140m from the site and required APZ to acheve BAL-29 threshold in accordance with PBP.

Table 1. Planning proposal change of zoning boundary BAL Assessment

Direction (transect)	Veg. Class. (current distance)	Effective Slope	Required APZ	Bushfire Attack Level (BAL)
N (0°)	Low Threat† (100m)	NA	NA	BAL-Low
NE (45º)	Rainforest* (0m)	Upslope	9m	BAL-29
E (90°)	Rainforest* (0m)	Upslope	9m	BAL-29
SE (135°)	Rainforest* (0m)	Upslope	9m	BAL-29
S (180°)	Rainforest* (0m)	Upslope	9m	BAL-29
SW (225°)	Forest (0m)	Upslope	20m	BAL-29
W (270°)	Forest (20m)	Flat/Upslope	20m	BAL-29
NW (315°)	Low Threat† (100m)	NA	NA	BAL-Low

† In accordance with A1.10 Low threat vegetation – exclusions, PBP, being Non-vegetated areas, including roads, footpaths, buildings.
*In accordance with A1.11.1 Simplified approach, PBP, as a narrow strip of vegetation with a shape that provides a potential fire run that could threaten buildings not exceeding 50m.

2.3 Bushfire Risk Context

2.3.1 Wildfire history and frequency

Across the Far North Coast BFMC area, fire agencies attend an average of approximately 460 bush, grass and/or scrub fires per year.

The main sources of ignition in the Far North Coast BFMC area are fire escape from legal or illegal fires (mainly prior to the introduction of the bush fire danger period), arson, and lightning strikes.
The 'NPWS Fire History - Wildfires and Prescribed Burns' spatial dataset provides a record of fire history on the National Parks estate which represents the majority of the forested vegetation within 5km of the site (NSW Department of Planning & Environment, 2024). This dataset only includes NPWS land for both prescribed burns and wildfires from 1968-2023 (Figure 2).

Since 1968, the area of fire for the Tweed Shire that has exceeded the threshold of $\geq$10km^2 on nine occasions. The period of 1991 to 1995 recorded 5 years in a row with significant fire activity, with 1991 having the highest bushfire area of 37km^2, followed by 2019 with 25km^2. These periods of increased bushfire activity coincided with very dry conditions.

Figure 2. *Showing the fire history for the area surrounding the subject land (yellow dot) and 5km radius (green circle).*

2.3.2 Fire Catchment

The northern catchment is dominated by the Billinudgel and Marshalls Creek Nature Reserves located approximately 470m to the north of the site. The northern catchment has hilly topography supporting wet sclerophyll tall open forest (*E. pilularis*) and swamp forest with a high level of continuity over a potential fire run of 5km.

The north western and western catchment is dominated by the Billinudgel flood plain which has been predominantly cleared with introduced grassland for grazing on the flood plain and gentler slopes with Camphor laurel (*Cinnamomum camphora*) as a common exotic woody weed. Poorly drained areas commonly support Broad-leaved paperbark (*Melaleuca quinquenervia),* swamp oak (*Casuarina glauca*) and swamp mahogany (*Eucalyptus robusta*).

The southwestern and southern catchments are dominated by the Jinangong Nature Reserve located approximately 400m to the south of the site.

The south western catchment has hilly topography supporting wet sclerophyll tall open forest (*E. pilularis*) and broad-leaved white mahogany (E. carnea) and grey ironbark (E. siderophloia) tall open forest on dryer sites. Camphor laurel (*Cinnamomum camphora*) and sally wattle (*Acacia melanoxylon*) dominate the areas of disturbed regrowth. There is a high level of continuity over a potential fire run of 2.5km. The southern part of the catchment is more fragmented in the ratio and distribution of forest, rainforest and grassland vegetation formations and the moderate level of continuity of fuels to support a significant and sustained fire run.

2.3.3 Bushfire Weather

The climate in the Far North Coast area is influenced by both a warm temperate climate in winter and a subtropical climate in summer. Summers are hot and winters warm with an annual mean maximum temperature of 26°C, annual mean minimum 10°C and mean summer maximum of 31°C (BOM).

The dominant driver of the region's alternating seasonal climate influences is the annual north-south oscillation of a global latitudinal band of high-pressure systems called the subtropical ridge (STR). The STR separates the influences of: the low latitude easterly/south-easterly trade winds and monsoonal trough to the north; and, the influences of the strong westerly winds and associated frontal systems that dominate the middle to higher latitudes of the Southern Hemisphere.

The driest months on average being August to October and wettest occurring in late summer and autumn. The bush fire season generally runs from September through November although statutorily extends to March most seasons due to hot summer temperatures and strong coastal winds.

Prevailing weather conditions associated with the bush fire season in the Far North Coast BFMC area are strong north to north westerly winds, with high temperatures and low humidity usually in association with a high pressure system situated over the interior of the continent. The worst fire seasons occur after prolonged periods of drought. The season can often start "early" in July or August if drought conditions prevail.

The Forest Fire Danger Index (FFDI) is used in NSW to quantify fire weather. The FFDI combines observations of temperature, humidity and windspeed. Fire weather is classified as extreme when the FFDI is between 50-99. Property loss from major fires in Australia increasing starts rising steeply when the FFDI is >50. Fire weather conditions are projected to increase during summer and spring in the region. These increases are already being seen during the peak prescribed burning season in early spring and into the peak bushfire risk season in summer.

The mean annual number of days with maximum temperatures greater than 30°C is currently 30 days and the average of longest run of days in each year with a maximum temperature >30°C is currently 6 days. Annually, the average number of days with FFDI >50 for Lismore (closest weather station) is 0.3 days.

Global warming is expected to increase the frequency of extreme El Niño events (dryer) and extreme La Niña (wetter) events. Future projections under a high emission scenario, predict that the number of days with maximum temperatures >30°C, the longest run of consecutive days of temperature >30°C and the average number of days with an FFDI >50 are likely to double by 2050.

2.3.4 Fire Intensity

The bushfire scenario is applied through the parameters of the bushfire design fire to determine the predicted bushfire impact on the site. The model bushfire (Table 2) is applied to the site (Table 3) to assess the potential intensity of the bushfire impact at the site boundary.

Table 1. Parameters for the design fire.

Design Fire

Model	Inputs	Output for Analysis
Design fire as per Planning for Bushfire Protection:2019 utilising Method 2 AS 3959:2018	Upper values of nominal FFDI 80, Forest vegetation type fuel loads, flat/upslope and separation distance.	kW/m^2 categorised to BAL levels

Table 2. Showing the outputs for the design fire applied to the western boundary of the site

Design Fire Outputs	At Western Boundary
Adjusted Forward Rate of Spread	R_{slope}= 2.4km/h
Flame Length	L_f= 19.8m
Flame Emissive Power	E= 76 kW/m^2
Flame Angle	α= 58.7 deg
Maximum View Factor	ϕmax= 1
Elevation of Receiver	h= 8.46m
Atmospheric Transmissivity	τ= 1
Radiant Heat Flux	q= 76 kW/m^2
Bushfire Attack Level	BAL-FZ

2.4 Summary of Landscape Bushfire Risk Assessment

The landscape bushfire risk analysis indicates the potential for bushfire impact upon the subject land of the planning proposal is mitigated by the following land use and landscape features:

- The existing industrial estate immediately to the north and the urban landscape of Ocean Shores to the east of the site are likely to reduce the intensity of the bushfire attack from the north, north east and east due to the sheltering effects of large areas of reduced fuel in the form of managed gardens and lawns within curtilage of buildings and non-vegetated areas, including waterways, roads, footpaths and buildings.
- The north western exposure is predominantly: cleared of forest vegetation; consisting of managed grazing land; and, colonised by exotic rainforest formation vegetation in the form of the dominant woody weed Camphor laurel (*Cinnamomum camphora*).
- The site occupies low elevations on the edge of the flood plain with the south western, southern and south eastern exposures of the site being upslope i.e. the bushfire approaches downslope towards the site.
- The north-south running Pacific Motorway (M1) forms the site's western boundary and provides a fuel reduced and non-vegetated area.

The direction of primary landscape bushfire risk is from the south-western catchment from the Billinudgel flood plain to the 3.6 ha patch of Swamp Forest adjoining the existing south western corner of the Billinudgel Industrial Precinct and the western boundary of the site.

The connectivity of this patch of Swamp Forest to the broader landscape is predominantly across a matrix of grazing land and peri-urban development.

Some connectivity with Jinangong Nature reserve exists via the disused Murwillumbah-Casino railway easement on the upslope southern exposure.

3 LAND USE ASSESSMENT

The planning proposal is for a change in land use through the rezoning of land to Zone E4 - General Industrial. The Byron Local Environmental Plan 2014 outlines the development which is permissible with consent on zone E4:

Depots; Freight transport facilities; Garden centres; General industries; Goods repair and reuse premises; Hardware and building supplies; Industrial retail outlets; Industrial training facilities; Landscaping material supplies; Light industries; Liquid fuel depots; Local distribution premises; Markets; Neighbourhood shops; Oyster aquaculture; Plant nurseries; Rural supplies; Specialised retail premises; Take away food and drink premises; Tank-based aquaculture; Timber yards; Vehicle sales or hire premises; Warehouse or distribution centres.

While the NCC does not require APZs and construction under AS 3959, Planning for Bushfire Protection outlines the following objectives to be applied in relation to access, water supply and services, and emergency and evacuation planning:

- to provide safe access to/from the public road system for firefighters providing property protection during a bush fire and for occupant egress for evacuation;
- to provide suitable emergency and evacuation (and relocation) arrangements for occupants of the development;
- to provide adequate services of water for the protection of buildings during and after the passage of bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building; and
- provide for the storage of hazardous materials away from the hazard wherever possible.

The general fire safety construction provisions of the NCC are taken as acceptable solutions however construction requirements for bush fire protection will need to be considered on a case-by-case basis.

Using the threshold of BAL-29 for the building as the benchmark to satisfy the safety of evacuations and the protection of firefighters the ability of the site to provide an APZ was assessed.

3.1 Feasibility of Asset Protection Zones

The site is approximately 30-43m wide (east to west) and 64m long (north to south). As an APZ must be wholly within a proposed property boundary. The APZ depicted in Figure 3 will acheve the benchmark radiant heat exposure of 29kW/m^2 in accordance with Table 1.

Figure 3. *Showing the subject area of the planning proposal (yellow outline) and APZ / BAL-29 contour (green outline)*

4 ACCESS AND EGRESS

4.1 Evacuation

Access and egress for the site is via Lucky Lane off Bonanza Drive. Bonanza Drive passes under the M1 connecting to Brunswick Valley Way and Ocean Shores to the east and connects to Wilfred Street to the north which provides direct access to the north bound lanes of the Pacific Highway M1. South bound lanes of the M1 can be accessed via interchanges at Yelgun to the north and Brunswick Heads to the south. The size of any potential development of the site is likely to have negligible impact on traffic flows on the immediate road network during an evacuation. The cul-de-sac of Lucky Lane which provides access to the site meets the access requirements for PBP.

4.1.1 Access and egress findings

The existing road network is adequate to deal with evacuating people from the area and responding emergency services, based on the existing and proposed community profile with immediate access to Ocean Shores the potential for isolation during a bushfire is minimal.

5 EMERGENCY SERVICES

The site is readily serviced by existing appliances from:

- NSWRFS Billinudgel/Ocean Shores Fire Station, 2 Wilfred Street Billinudgel, 450m approximately 1 mins away; and,
- Fire&Rescue NSW Brunswick Heads Fire Station, Fingal Street, Brunswick Heads, 5.9km approximately 8 mins away.

6 INFRASTRUCTURE

6.1 Water

The Billinudgel Industrial Precinct has reticulated water and there is a hydrant located at the corner of Lucky Lane and Bonanza Drive, 50m away from the site entry.

6.2 Electricity and gas

Electrical services are underground.

7 CONCLUSION

This Study has demonstrated that adequate bushfire protection measures can be afforded to a potential development as a result of the adoption of the planning proposal to change the zoning of the subject land to E4 – General Industrial, such that potential development:

- is not subject to a high bush fire risk;
- will not be difficult to evacuate;
- management of adjoining lands will not be adversely impacted by potential development or the implementation of Bushfire Protection Measures;
- any new development arising from the adoption of the planning proposal will be able to meet the acceptable solutions of PBP; and,
- can achieve an appropriate level of bushfire safety without any reliance on performance solutions or fuel reduction measures on adjoining lands.

This study has not found any triggers for the exclusion of this planning proposal as inappropriate development in bush fire prone areas in accordance with the Strategic Planning Principles or exclusion criteria within section 4 of PBP.

8 REFERENCES

ABCB. (2020) National Construction Code, Building Code Of Australia. Volume 2; Class 1 and 10 Buildings. Amendmemt 1. Australian Building Codes Board. Canberra, ACT.

AS3959. (2018) AS 3959:2018. Construction of buildings in bushfire-prone areas. Standards Australia International Ltd. Sydney. NSW.

EP&A. (2010) Environmental Protection and Assessment Act 1979 No 203. NSW Consolidated Acts. NSW.

NSWPP. (2022) New South Wales Government Planning Portal. https://www.planningportal.nsw.gov.au.

PBP. (2019) Planning for Bushfire Protection 2019. NSW Rural Fire Service.