

BUSH FIRE ASSESSMENT REPORT

North Tuncurry Urban Release Area



147855

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10 November 2020

BUSH FIRE ASSESSMENT REPORT – NORTH TUNCURRY URBAN RELEASE AREA

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EXECUTIVE SUMMARY

RPS Australia East Pty Ltd (RPS) was engaged by Landcom to prepare a Bush Fire Assessment Report for the North Tuncurry Urban Release Area (NTURA). The land the subject of NTURA is located on the eastern side of The Lakes Way, North Tuncurry, directly to the north of, and adjoining, the Tuncurry town centre. The land is identified as bush fire prone land and has been subjected to bush fire in the past.

Landcom is seeking to rezone the North Tuncurry Urban Release Area to enable the development of a low-medium density coastal community ultimately containing in excess of 2,100 dwellings centred around a new commercial centre, reconfigured golf course and new open space areas.

This Bush Fire Assessment Report reviews the Master Plan that underpins the current rezoning study (in preparation) with due consideration of s4.14 of the *Environmental Planning and Assessment Act 1979*, the *Rural Fires Act 1997* and associated regulations, *Planning for Bush Fire Protection 2019*, and *Australian Standard 3959-2018* (AS 3959-2018).

The Bush Fire Assessment Report concludes that the indicative subdivision design within the Master Plan will enable future subdivision development to comply with the above legislative requirements and standards. The recommendations of this Bush Fire Threat Assessment do not preclude the progression of the rezoning study / planning proposal through to gazettal.

The Bush Fire Assessment Report makes recommendations that should be considered and incorporated into the layout and design of future development applications for subdivision (post-rezoning), that will reduce the risk of damage and/or harm in the event of a bushfire event to acceptable levels.

Contents

EXECUTIVE SUMMARY	ii
1 INTRODUCTION	1
1.1 Preamble	1
1.2 The NTURA Site	1
1.2.1 NTURA vision and Master Plan	1
1.2.2 Future development control regime for NTURA	5
1.3 Bush fire prone areas of NTURA	6
1.4 Objective of assessment	6
1.5 Specific objectives of subdivisions	6
1.6 Urban release areas	7
1.7 Method 2 calculations	7
2 BUSH FIRE STRATEGIC STUDY	8
2.1 Adjoining land	8
2.2 Surrounding infrastructure	8
2.3 Emergency services	8
2.4 Access and egress	8
2.5 Land-use assessment	9
3 BUSH FIRE HAZARD ASSESSMENT	10
3.1 Fire danger index	10
3.2 Assessment methodology	10
3.3 Vegetation assessment	10
3.3.1 Vegetation classification, exclusion and downgrades	10
3.3.2 Predominant vegetation classification	17
3.4 Separation assessment	18
3.5 Effective and site slope assessment	18
3.6 Short fire run	18
3.7 Shielding	19
3.8 Other Method 2 inputs	19
4 SIGNIFICANT ENVIRONMENTAL FEATURES	24
4.1 Threatened species, populations and communities	24
4.2 Cultural heritage	24
5 BUSH FIRE ASSESSMENT	25
5.1 Subdivision and dwelling siting, design and layout	25
5.2 Setbacks and asset protection zones	27
5.2.1 Staged developments	28
5.3 Construction standards	29
5.3.1 Subdivision construction works and sub-structure construction phase	29
5.3.2 Ongoing operations	29
5.4 Access	30
5.5 Water supply	31
5.6 Electricity service	31
5.7 Gas services	31
5.8 Landscaping and vegetation management	31
5.9 Emergency management and bush fire survival plans	32
5.10 Adequacy of other fire protection measures	32
6 CONCLUSIONS	34
7 REFERENCES	35

Tables

Table 1	Bushfire Hazard Assessment Map.....	20
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Plates

Plate 1	Vegetation throughout the existing golf course.....	21
Plate 2	Coastal Dune DSF vegetation along the North of The Lakes Way.....	21
Plate 3	Wallum Sand Heath and patches of Coastal Dune DSF west of the site	22
Plate 4	Wallum Sand Heath and patches of Coastal Dune DSF north of the site	22
Plate 5	Bushfire burnt Wallum Sand Heath vegetation along the western edge of the site.....	23

Figures

Figure 1: Location map	2
Figure 2: North Tuncurry Master Plan (Roberts Day, 2020).....	4
Figure 3: The NTURA Landscape Master Plan (2019), Context.....	11
Figure 4: Landscape impression of the Centre Green (Landscape Master Plan Report, 2019)	12
Figure 5: Landscape impression of the Heritage Green (Landscape Master Plan Report, 2019)	12
Figure 6: Landscape impression of the Orchid Park (Landscape Master Plan Report, 2015).....	13
Figure 7: Landscape impression of the Gateway Park (Landscape Master Plan Report, 2019)	13
Figure 8: Landscape impression of the Community Dune Park (Landscape Master Plan Report, 2019).....	14
Figure 9: Landscape impression of Mt Talawah Park. (Landscape Master Plan Report, 2019)	14
Figure 10: Landscape impression of the Eco-green. (Landscape Master Plan Report, 2019)	15
Figure 11: Landscape impression of the Water Edge Park. (Landscape Master Plan Report, 2019)	15
Figure 12: Landscaping and dimensions of Avenue 1 (Landscape Master Plan Report, 2019)	16
Figure 13: Landscaping and dimensions of Avenue 2 (Landscape Master Plan Report, 2019)	16
Figure 14: Landscaping impression of street planting within the north-west employment precinct (Landscape Master Plan Report, 2019)	17
Figure 15: Bush Fire Hazard Assessment map.....	26
Figure 16: Asset Protection Zone signage	28
Figure 17: Example of bollards delineating cleared areas	28

Appendices

Appendix A Background Data
Appendix B PBP Compliance Tables
Appendix C Method 2 Radiant Heat Exposure Calculations
Appendix D BAL 29 building line: North-west employment precinct
Appendix E BAL 29 building line: North-west subdivision
Appendix F BAL 29 building line: North-east subdivision
Appendix G BAL 29 building line: Western and Mt Talawah Park
Appendix H BAL 29 building line: Western subdivision including Heritage Green
Appendix I BAL 29 building line: South-eastern subdivision

1 INTRODUCTION

1.1 Preamble

The NSW Government's *Hunter Regional Plan 2036* (HRP 2036) identifies North Tuncurry as a potential urban release area to address the housing needs of the MidCoast area. Landcom (the proponent) is therefore seeking to rezone approximately 615ha of land for conservation and urban purposes. The rezoning, referred to as the North Tuncurry Urban Release Area or NTURA, seeks to formalise the Project Delivery Agreement (PDA) entered into between the NSW Department of Industry - Crown Lands and Water and Landcom. A Native Title Agreement signed in late 2010 between the NSW Government and the traditional owners of the land, the Worimi and Birpai People of Forster Tuncurry recognises that development of the NTURA site can proceed subject to certain conditions.

The Minister for Planning and Public Spaces endorsed the preparation of a self-repealing State Environmental Planning Policy (SEPP) Amendment to *Great Lakes Local Environmental Plan 2014* (GL LEP 2014) on the 18 March 2020. The Rezoning Study submitted to the Minister for Planning and Public Spaces sets the vision for the NTURA and outlines the extent and scope of the new land uses and development control framework proposed to apply to the NTURA site.

In August 2019, Landcom submitted the draft Rezoning Study, including a Bush Fire Threat Assessment prepared by RPS, to the Department of Planning, Industry and Environment (DPIE) for review and to determine whether the draft documentation is fit for public exhibition purposes. The DPIE referred the Rezoning Study (and supporting studies) to MidCoast Council and relevant state agencies inviting feedback from those stakeholders.

Landcom has engaged RPS to prepare this Bush Fire Threat Assessment in order to address the NSW Rural Fire Service's submission and to update the assessment based upon *Planning for Bushfire Protection 2019* (PBP 2019) which is the current version of the guidelines.

1.2 The NTURA Site

Tuncurry is located in the MidCoast LGA on the entrance to Wallis Lake, approximately 320 kilometres north of Sydney. The land the subject of NTURA is a 615ha parcel of land located on the eastern side of The Lakes Way, directly to the north of, and adjoining, the Tuncurry town centre. It is an irregular shaped waterfront parcel of land situated on a peninsula that has been created by the Wallamba River.

The NTURA site enjoys an ocean beach frontage of more than 4.5 kilometres and has a frontage to The Lakes Way and Northern Parkway. It is located within the coastal zone and is low lying and undulating as a result of the presence of a dunal system. A location map of NTURA is provided in **Figure 1**.

The NTURA site was formerly used as a commercial pine plantation established to productively use prison labour, prior to being destroyed by bush fire in 1939. It was subsequently bulldozed in the 1950's and has generally been left unutilised. An 18-hole golf course is currently operational on part of the NTURA site.

The site is relatively flat with a lower lying dune system running generally north-south.

The site lies within a geographical area with a Fire Danger Index (FDI) rating of 80. Extreme bush fire weather is therefore associated with long periods of drought, high temperatures, low humidity and gusty often north-westerly winds.

1.2.1 NTURA vision and Master Plan

The overall vision for the NTURA is a low-medium density coastal community with approximately 2,123 dwellings centred around a new centre, reconfigured golf course and new open space areas. Providing new housing and neighbourhood supermarket and specialty stores to support local residents, future development will integrate with the existing Tuncurry-Forster urban area.

Environmentally sensitive urban design is a prominent feature of the Master Plan that underpins the NTURA with the creation of new conservation lands and incorporation of best practice coastal design.

Legend

- Project Area
- Cadastre
- Nature Reserve
- Master Plan Layout
- 2m Contours
- Roads and Tracks
- Drainage



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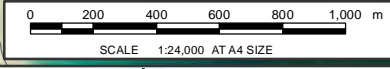


FIGURE 1: SITE LOCATION

LOCATION: NORTHTUNCURRY	DATUM: GDA94
JOB NO.: PR 147855	PROJECTION: MGA Zone 56
PURPOSE: BUSHFIRE	Data Sources: RPS, Client Land and Property 2015
Technician: Natalie Wood	Date: 9/10/2020

CLIENT: LANDCOM

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The objectives for the NTURA is that it will:

- Be the destination of choice for the NSW 'sea change' market and the aspirational goal for the regional housing market.
- Enhance Forster-Tuncurry as a coastal tourism destination.
- Be an innovative and authentic coastal community with a genuine sense of place that can enhance and expand the existing Tuncurry community.
- Be a new coastal community that reflects local lifestyle, offers housing diversity that is not available elsewhere in the Mid North Coast.
- Provide a unique offering where the beach, golf course and proximity to amenity and services are delivered as an integrated lifestyle package.
- Facilitate the conservation of 327 ha of land for ecological conservation within the NTURA site and provide the opportunity to register this land as BioBank Sites ensuring long term conservation outcomes.
- Strengthen connections to Nine Mile Beach and the foreshore.
- Celebrate and interpret local culture and heritage.
- Attract employment, tourists, sea- changers and a younger generation.
- Accelerate the growth and activation of a 'heart' at the B2 Local Centre Zone by co- locating daily convenience services and needs with the beach, a new golf clubhouse, community centre, cultural centre, mobile surf club and public gathering places.
- Accommodate a diverse range of residents with shared values as to how they choose to live, move around and recreate.
- Facilitate healthy living through a connected loop of destinations that encourage walking and cycling as a convenient and desirable mode of transport.
- Promote social equity and interaction by rethinking streets, open space and retail as places to meet and gather.

More specifically, the Master Plan for NTURA comprises:

- The type and location of land uses within the NTURA site;
- Dwelling yield / density (approximately 2,123 dwellings);
- Proposed location of retail / commercial / community floor space within the NTURA site;
- A landscape strategy including identification and location of open space and drainage, environmental conservation lands, and local active and passive recreation facilities;
- Transport network layout;
- Servicing and infrastructure strategy;
- Location and dimensions of Bush Fire Asset Protection Zones; and
- Appropriate conservation of European and Aboriginal heritage located on the NTURA site.

An extract plan of the NTURA Master Plan prepared by Roberts Day in 2020, is provided in **Figure 2**.



Figure 2: North Tuncurry Master Plan (Roberts Day, 2020)

1.2.2 Future development control regime for NTURA

To facilitate realisation of the NTURA Master Plan, Landcom is seeking the Minister for Planning and Public Spaces to introduce a new planning framework for the NTURA site that will amend (GL LEP 2014). The future amendment will:

- Introduce new land use zones and objectives, including:
 - R2 Low Density Residential
 - R3 Medium Density Residential
 - B2 Local Centre
 - B5 Business Development
 - IN1 General Industrial
 - SP3 Tourist
 - RE2 Public Recreation
 - E2 Environmental Conservation
 - E3 Environmental Management
- Identify principal development standards to broadly guide yield, density and built form outcomes, such as:
 - Minimum lot size controls to facilitate dwelling typologies on a range of lots from 200-1,000m²
 - Maximum floor space ratio for development within the future B2 Local Centre Zone
 - Maximum building height controls between 8.5m (2 storeys) and 20m (5 storeys)
- Identify matters for consideration that future development must address;
- Identify those portions of the NTURA Site to be set aside for conservation purposes; and
- Implement a number of other minor changes to local clauses within the LEP to facilitate the proposed development.

In addition, the Rezoning Study justifying the amendment to GL LEP 2014 is supported by:

- An Amending Development Control Plan (DCP) to guide future built form on the NTURA site; and
- An outline offer to enter into a Voluntary Planning Agreement with MidCoast Council to establish a developer contributions framework and governance arrangement for the delivery of infrastructure and community facilities.

The Amending DCP has been prepared on behalf of Landcom and is appended to the Rezoning Study. The Amending DCP includes further design controls for the NTURA site including:

- Detailed design controls for residential dwellings, commercial/retail development and the public domain;
- Concept layout of retail / commercial / community floor space within the B2 Local Centre Zone and proposed location for additional employment lands within a separate northern precinct of the NTURA site;
- Road network layout;
- Identification and location of open space and drainage, environmental conservation lands, and local active and passive recreation facilities;
- Servicing and infrastructure strategy;
- Location and dimensions of Bush Fire Asset Protection Zones; and
- Appropriate conservation of Aboriginal heritage located on the NTURA site.

Following gazettal of the rezoning (approval of the amendment to GL LEP 2014), and adoption of the amending DCP, detailed development applications for subdivision and infrastructure works, buildings and other development will be submitted to the relevant planning authority for approval consistent with the overall rezoning and development control framework established for the NTURA site.

1.3 Bush fire prone areas of NTURA

The NTURA is identified as bush fire prone land. Future development within the NTURA is likely to be listed under s100B of the *Rural Fires Act 1997* (RF Act) that identifies this development as integrated which requires the adherence to the requirements of cl. 44 of the RF Act Regulations and the requirement to obtain a Bush Fire Safety Authority (BFSA).

In order to determine likely setbacks and other relevant Bush Fire Protection Measures (BFPM) for future development that will be appropriate, this assessment adheres to the methodology and procedures outlined in Appendix 1 of PBP 2019 and cl. 44 of the RF Regulations. Background bush fire data is contained in **Appendix A** and PBP 2019 subdivision compliance tables are provided in **Appendix B**.

1.4 Objective of assessment

This assessment reviews the Master Plan that underpins the current Rezoning Study with due consideration of s4.14 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), RF Act Regulations, PBP 2019 and *Australian Standard 3959-2018* (AS 3959-2018). It is noted that the Master Plan for NTURA is indicative in nature. Once rezoning of NTURA occurs subdivision and development will occur in stages and each stage will be the subject of individual development applications requiring consideration of s4.14 of the EP&A Act, RF Act Regulations, PBP 2019 and AS 3959-2018. Hence the primary objective of this Bush Fire Threat Assessment is to review the Master Plan and verify that future subdivision development, if based upon the Master Plan and subject to site-specific bush fire threat assessments, is likely to meet the requirements s4.14 of the EP&A Act, RF Act Regulations, PBP 2019 and AS 3959-2018.

The report assesses the requirements of the development to meet the six objectives listed in section 1.1 of PBP 2019, which provide for the protection of human life and minimise impacts on property.

- Afford buildings and their occupants protection from exposure to a bush fire.
- Provide for a defensible space to be located around buildings.
- Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings.
- Ensure appropriate operation access and egress for emergency services personnel and residents is available.
- Provide for ongoing management and maintenance of Bush fire Protection Measures (bush fire protection measures); and
- Ensure the utility services are adequate to meet the needs of firefighters.

1.5 Specific objectives of subdivisions

The aims and objectives listed in section 1.1 of PBP 2019 remain applicable to residential and rural residential development, however further consideration has been given to these types of developments to ensure bush fire protection measures are fully incorporated at the design stage of the development. The specific objectives of residential and rural residential development outlined in section 5.2 of PBP 2019 are:

- Minimise perimeters of the subdivision exposed to the bush fire hazard (hourglass shapes, which maximise perimeters and create bottlenecks should be avoided).
- Minimise vegetated corridors that permit the passage of bush fire towards buildings.
- Provide for the siting of future dwellings away from ridge-tops and steep slopes, within saddles and narrow ridge crests.
- Ensure that APZs between a bush fire hazard and future dwellings are effectively designed to address the relevant bush fire attack mechanisms; ensure the ongoing maintenance of APZs.
- Provide adequate access from all properties to the wider road network for residents and emergency services.
- Provide access to hazard vegetation to facilitate bush fire mitigation works and fire suppression; and

- Ensure the provision of an adequate supply of water and other services to facilitate effective firefighting.

1.6 Urban release areas

Clause 273 of the *Environmental Planning and Assessment Regulation 2000* allows NSW RFS to endorse a Bush Fire Attack Level (BAL) contour map for urban release areas. This removes the need for homebuilders to do an assessment of bush fire risk when they lodge their development application (DA) to build if the Rural Fire Service has already completed an upfront assessment at the subdivision stage.

Once the NTURA is rezoned Landcom may wish to consider preparing BAL contour maps for each future DA for subdivision in order to facilitate the easy recognition of BAL requirements for future dwellings.

1.7 Method 2 calculations

Method 2 fire design model consists of accurately determining input into nested calculations within the modelling that provide increased accuracy in determining radiant heat flux and flame length. Method 2 calculations are used within this assessment.

Furthermore, Method 2 can consider the impact that Kataburn rate of spread, radiant heat shielding, and short fire runs will have on the radiant heat exposure of a proposed development.

Understanding the knowledge gaps for bush fire prediction is required to enable accurate interpretation of bush fire modelling and fire engineering calculations used through the detailed assessment (Method 2). The gaps in knowledge include:

- Duration of the initial fire growth phase.
- Fire spread on slopes, in complex terrain and extreme conditions.
- Fire spread around the entire perimeter.
- Short-distance (wind-driven) spotting.
- Characteristics of flames in different fuel types.

When interpreting the results of the detailed method, each of these elements should be analysed to determine its effect on the outputs for the calculations. Method 2 Radiant heat exposure calculations for NTURA are contained in **Appendix C**.

2 BUSH FIRE STRATEGIC STUDY

A Bush Fire Strategic Study (BFSS) informs the context of the assessment of the Bush Fire Assessment Report (BFAR) to support the issuing of a Bush Fire Safety Authority. The level of information gathered and analysis within the BFSS depends upon the nature of development, scale of the proposal, the bush fire risk, and potential impact on the wider community and emergency management arrangements. This process provides an opportunity to assess the Master Plan in the bush fire hazard context.

The site has a history of bush fire, refer to figures contained in **Appendix A**, spreading from the west to the east. In the past bush fires on the western side of Wallamba River have spotted across to the east and continued to run, although with limited severity. It can be anticipated that bush fire events will occur into the future and master planning and future development/stages will need to consider the planning, preparation, response and recovery from a bush fire event.

2.1 Adjoining land

The site is located immediately adjacent to the Pacific Ocean to the east. Tuncurry and Forster residential areas are immediately to the south and south-east. Contiguous forested and heath vegetation exists to the west, north-west and north including land in the vicinity of the Wallamba River and land within Darawank Nature Reserve.

The perimeter road system identified within the Master Plan will provide adequate access and containment for prescribed burning hazard reduction activities into the future.

The site is located to the north of Tuncurry and will remove bush fire hazard from the current urban interface, which includes TAFE and high school infrastructure. The development within NTURA will provide a buffer between these vulnerable developments and the bush fire threat.

The Master Plan, if implemented, will assist adjoining landowners undertaking Bush Fire Protection Measures due to increased access around the perimeter of the residential development.

2.2 Surrounding infrastructure

Future subdivision of the site, if implemented in accordance with the Master Plan, will provide new infrastructure on the edge of existing suburban development. The Master Plan illustrates that existing access routes will not be impeded, and it will improve access to the bush fire threat through the provision of non-perimeter and perimeter road systems.

Future development will increase the traffic from the north of the site, moving south in the event of a bush fire, although this increased traffic will affect existing residential areas to the south-east of NTURA with Tulloch and Chapmans Roads. The Master Plan illustrates a proposed access to The Lakes Way north of Tulloch Road which will spread the flow of traffic south, away from a bush fire threat.

2.3 Emergency services

Land use and subdivision planning should facilitate the response capacity of civilians and emergency services. However, unsuitable layouts can constrain and limit the response actions, and the efficacy of emergency responders. Layouts may hinder the efficacy of emergency responders by not considering responders' protection; their capacity to efficiently access and egress; or that civilian evacuation might occur simultaneously to responders' actions (Gonzalez-Mathiesen & March, 2014).

When developed the NTURA will increase the Tuncurry population and increase the perimeter of urban wildland interface. Post rezoning, Landcom and NSW RFS should undertake a targeted community engagement program and establish a Community Protection Plan for the precinct. NSW Fire and Rescue should consider an engagement program and the establishment of Community Fire Unit prior to the commencement of construction.

2.4 Access and egress

Future development will increase the traffic from the north of the NTURA, moving south in the event of a bush fire. The Master Plan illustrates an appropriate layout of perimeter and non-perimeter roads facilitating

future traffic flow from north and providing multiple access points to The Lakes Way. The indicative design of the Master Plan indicates that street layout will accommodate the ingress of emergency services.

2.5 Land-use assessment

Bush fire can spread from the vegetated areas to the north and west directly towards the NTURA. Future residential dwellings on the north and western boundaries will be impacted by a bush fire event. At the development application stage for subdivision appropriate separations, access, water provisions and lots sizes will need to be considered to mitigate bush fire risk for the properties along the western and northern boundary of the NTURA. At this stage of the process, there are no factors that would suggest compliance/satisfaction of the applicable requirements would be precluded.

There are no vulnerable (Special Fire Protection Purpose) developments identified within the Master Plan and the location of mixed-use and community gathering areas are centralised to the east, away from the bush fire threat along the northern and western boundaries.

This Bush Fire Strategic Study identifies a bush fire event will impact future development within the NTURA. The Master Plan meets the broad aims, objectives and the specific objectives of residential and rural residential development by providing:

- Appropriate separations, access, water provisions and lots sizes to the residential areas along the western and northern boundaries; and
- Perimeter and non-perimeter roads that have the capacity to facilitate traffic movement during a bush fire event.

3 BUSH FIRE HAZARD ASSESSMENT

This section details the site assessment methodology in Appendix 1 of PBP 2019 and includes the requirements of s44 of the RF Act Regulations. It provides detailed analysis of the vegetation, slope, vegetation exclusions and downgrades to quantify the required bush fire protection measures.

3.1 Fire danger index

Method 2 assessment considers the worst-case scenario for bush fire impacts and calculates fire behaviour determined from specific inputs. PBP 2019 delegates the MidCoast Council area a FFDI of 80. This assessment utilises Douglas (2017) FFDI for Coffs Harbour weather station of 96, which is greater than the standard FFDI 80 utilised within the simplified method. This provides an accurate assessment of radiant heat and required separations.

3.2 Assessment methodology

Vegetation classification over the site has been carried out as follows:

- Aerial Photograph Interpretation to map the vegetation classification and extent.
- Kogan 6*25 Laser distance finder.
- Photo Theodolite application supported by contour and terrain profiles.
- On site vegetation assessment (September 2020) and
- Reference to regional vegetation community mapping.

Plates 1 – 5 depict the elements in and around the site that are considered within the bush fire hazard assessment. The classified vegetation, separations, effective and site slope, and any vegetation exclusions and downgrades short fire run and shielding are identified in **Table 2** and displayed in **Figure 19**.

3.3 Vegetation assessment

An assessment of the vegetation over 140m in all directions from the NTURA development boundary was undertaken. Vegetation that may be considered a bush fire hazard was identified and classification based on available fuel loads for sub-formations are provided through vegetation fuel monitoring project administered by the University of Wollongong, University of Melbourne and CSIRO Ecosystems Science and Bush Fire Dynamics and Applications. The results of this research are commonly referred to as the 'NSW Comprehensive Fuel Loads'.

3.3.1 Vegetation classification, exclusion and downgrades

The size and shape of small areas of vegetation influences the behaviour of bush fires and the associated risk to the built environment. Small or narrow parcels of vegetation have less opportunity to support fully developed bush fires because of their limited size. Modified landscapes, coastal wetlands and riparian areas vary significantly in structure and composition, but are generally considered as bush fire hazards, except for saline wetlands. Non-hazard and non-vegetated area are not required to be considered for the purposes of PBP 2019.

Anecdotal evidence obtained from previous fire events indicates that exotic vegetation species (weed species) support intense surface fires. Under adverse fire weather conditions these plants can contribute to the intensity of bush fires due to additional fuel loads. Exotic vegetation species display similar fire behaviour characteristics to some native vegetation classifications with lower fuel loads. Table A1.9 of PBP 2019 can be used to convert the exotic vegetation to native vegetation formations and fuel loads. Where a mixture of exotic and native vegetation exists, the native vegetation fuel loads will apply.

Within the NTURA Landscape Master Plan prepared by Context for Landcom there are several 'open spaces' proposed as illustrated in **Figure 3**. This includes the golf course, Centre Green, Gateway Park, Community Dune Park, Orchid Park, Eco-Green, Waters Edge Park, Mt Talawahl Park and associated green space, Heritage Green, 9 Mile Beach foreshore area and Avenues within the north-west.

It is important to qualify that the open spaces proposed within the NTURA Landscape Master Plan are conceptual only and have been developed for illustrative purposes only. For the purposes of this Bushfire Threat Assessment, RPS has considered the proposed open spaces and their conceptual layouts/function to determine whether they pose a bushfire risk and should form part of this or further bushfire assessment. As outlined below, the majority of proposed open spaces are intended to be managed “urban” spaces and are sufficiently large enough to accommodate appropriately wide Asset Protection Zones. On this basis, most proposed open spaces can be excluded from further bushfire assessment. Each individual open space is discussed below.



Figure 3: The NTURA Landscape Master Plan (2019), Context

The golf course is surrounded by 5th Hole Park and water bodies to the east, west and north and residential development along the eastern boundary. Separation is provided between the tree lined fairways and ground and shrub growth is managed throughout the course. Any unmanaged ground and shrub vegetation in the area of Gateway Park which is south-west of the golf course shall be maintained to a maximum width of 20m and can be excluded from further bush fire assessment.

The Centre Green is to be designed as an urban park, with managed lawns and separated trees as indicated in **Figure 4**. As managed urban land the Centre Green can be excluded from the bush fire assessment.



Figure 4: Landscape impression of the Centre Green (Landscape Master Plan Report, 2019)

The eastern portion of the Heritage Green, as illustrated in **Figure 5**, is proposed to be designed as an urban park interpreting aboriginal culture. The western portion of the Heritage Green will be vegetated and separated from the heath land vegetation to the west by a perimeter road. Due to its proximity to vegetation to the west, the western portion of Heritage Green is included in the bush fire assessment, refer to Section 5 for further detail.



Figure 5: Landscape impression of the Heritage Green (Landscape Master Plan Report, 2019)

The Orchid Park is located along the western boundary of the NTURA site south of the access to The Lake Way. The main tree lined entry avenue from The Lakes Way passes through the landscaped park before turning north-east to connect to Mt Talawahl Park. This park is to be designed as urban park, with managed lawns and separated trees as indicated in **Figure 6** and can be excluded from the bush fire assessment.



Figure 6: Landscape impression of the Orchid Park (Landscape Master Plan Report, 2015)

The Gateway Park is located to the south-west of the golf course and separated by a water body. This park is to be designed as an urban park, with managed lawns and separated trees as indicated in **Figure 7**. The landscaping plan indicates vegetation along the western and eastern boundary consists of forested vegetation and potentially unmanaged understorey. Any unmanaged ground and shrub vegetation in this area of Gateway Park shall be maintained to a maximum width of 20m and based upon the assumption that this maintenance will occur. Gateway Park can be excluded from further bush fire assessment.



Figure 7: Landscape impression of the Gateway Park (Landscape Master Plan Report, 2019)

Community Dune Park is located on the east side of the NTURA site, has a water body on its western boundary, separated from 9 Mile Beach foreshore by a road, and is contiguous with the golf course. Community Dune Park is proposed to be designed as an urban park, with managed lawns and separated trees as indicated in **Figure 8**. The landscaping plan indicates vegetation along the northern boundary with the golf course consisting of forested vegetation and potentially unmanaged understorey. Any unmanaged ground and shrub vegetation in this area of Community Dune Park shall be maintained to a maximum width of 20m and based upon the assumption that this maintenance will occur, the Community Dune Park can be excluded from further bush fire assessment.



Figure 8: Landscape impression of the Community Dune Park (Landscape Master Plan Report, 2019)

Mt Talawahl Park provides hydrological function for future development within the northern area of the NTURA site, refer to **Figure 9**. Open recreational areas (managed grasslands) and separated low density Blackbutt forests are proposed to be planted within the northern portion of Mt Talawahl Park. The southern portion of Mt Talawahl Park is included in the bushfire assessment in Section 5 due to its proximity to vegetation to the south..



Figure 9: Landscape impression of Mt Talawahl Park. (Landscape Master Plan Report, 2019)

The Eco-green is a small pocket park located within the north east residential precinct of NTURA, refer to **Figure 10**. Simple directional paths link the park to the surrounding streets. Street trees, augmented with smaller trees within the park, act as structural shade elements. This park is to be designed as an urban park, with managed lawns and separated trees and can be excluded from the bush fire assessment.



Figure 10: Landscape impression of the Eco-green. (Landscape Master Plan Report, 2019)

The Waters Edge Park is located on the west side of the foredune close to an existing track indicating a desire line to the beach, refer to **Figure 11**. The western edge of the paved plaza is a shallow water feature with showers for swimmers and a potential for a water play area for children. A generous central lawn is surrounded by a path of varying widths and some structural tree planting. Picnic shelters are located within the shade of coastal feature trees. This park is to be designed as an urban park, with managed lawns and separated trees and can be excluded from the bush fire assessment.



Figure 11: Landscape impression of the Water Edge Park. (Landscape Master Plan Report, 2019)

9 Mile Beach foreshore area is immediately east of 9 Mile Beach Foreshore Precinct and occupies the sand dune area between the development and Pacific Ocean. This coastal dune vegetation can be excluded from bush fire assessment as low-threat due to low soil moistures and low flammability. Short fire run assessment has been completed for the small sections of Wallum Sand Heath that occurs to the west of the coastal dune vegetation. These vegetation types have low ground fuels, and any ground fuels are typically succulent and have high moisture content. Furthermore, any potential fire towards future development within this vegetation will be influenced by the Pacific Ocean and exposed to high relative humidity. The Master Plan indicates access is provided along the eastern boundary between the development and this vegetation that will aid in responding to low intensity ignitions.

There are two avenues (otherwise known as “finger drains”) proposed within the north-western portion of the NTURA as indicated in **Figure 3**. The objective of this land use is to provide drainage functions within a scenic landscape street linking open spaces to the conservation area to the north and west. These avenues have been considered in this assessment due to their connectivity between bushland to the north and west of the NTURA site and the Mt Talawah Park area and their function to provide for access and egress options during a bushfire event.

Avenue 1, refer to cross-section illustrated in **Figure 12**, is narrow and provides for a 3m to 7m vegetated strip between 5.8m carriageways on either side. Avenue 2, refer to cross-section illustrated in **Figure 13**, is wider than Avenue 1 and provides for a 20m to 24m vegetated strip between 5.8m carriageways.



Figure 12: Landscaping and dimensions of Avenue 1 (Landscape Master Plan Report, 2019)



Figure 13: Landscaping and dimensions of Avenue 2 (Landscape Master Plan Report, 2019)

The north-west employment precinct comprises of 6.6 ha of land for industrial uses and is located adjacent to the Tuncurry Waste Management Centre. 6.7 ha of land used for business development will be located within the south-west corner in the vicinity of Northern parkway. In both locations street tree planting will be provided, refer to **Figure 14**.



Figure 14: Landscaping impression of street planting within the north-west employment precinct (Landscape Master Plan Report, 2019)

3.3.2 Predominant vegetation classification

The site is located within consistent geology (coastal sand dunes) which provides for consistent vegetation structure in and surrounding the site.

Dry Heathland, also referred to as Wallum sand heaths consist of *Aotus ericoides*, *Banksia aemula* (wallum banksia), *Bossiaea ensata*, *Dillwynia glaberrima* and *D. retorta* (egg and bacon peas), *Gompholobium virgatum* var. *virgatum* (leafy wedge pea), *Isopogon anemonifolius* (broad-leaved drumsticks), *Kunzea capitata*, *Lambertia formosa* (mountain devil), *Leptospermum trinervium* (flaky-barked teatree), *Leucopogon leptospermoides*, *Melaleuca nodosa*, *Monotoca scoparia* (prickly broom-heath), *Ochrosperma lineare*, *Phyllota phyllicoides* (heath phyllota), *Pseudanthus orientalis*, *Ricinocarpos pinifolius* (wedding bush), *Styphelia viridis* (green five-corners).

In slightly elevated locations, tree species can survive and together with a coastal heath understorey provide an added structural element to the vegetation. Canopy species such as *Eucalyptus pilularis*, *Corymbia gummifera* (red bloodwood) and small tree forms of *Banksia aemula* emerge above the shrubs in some areas.

The vegetation to the east is dominated by frontal dune vegetation, with patches of Wallum sand heaths. This coastal dune vegetation can be excluded from bush fire assessment as low-threat due to low soil moistures and low flammability. These vegetation types have low ground fuels, and any ground fuels are typically succulent and have high moisture content. Furthermore, any potential fire towards future development within this vegetation will be influenced by the Pacific Ocean and exposed to high relative humidity. High intensity fires from the east will not persist and create a significant fire threat. A short fire run scenario has been modelled for fires to the east of the NTURA.

The dominant vegetation in and around the site is classified as Wallum sand heaths, transitioning into patches of Coastal Dune forests and Coastal swamp forests in slight changes to the elevation. In consideration of *NSW Rural Fire Services – Ref S11/0015 DA14102294322AB - Agency comment: Test for adequacy North Tuncurry Development Precinct (NTDP) State Significant Site report, Great Lakes Local Government Area, dated 12 November 2014*, although the current dominant vegetation is Wallum sand heaths, this assessment will take a conservative approach and consider a future change toward Coastal Dune forests as an appropriate risk mitigation processes and all vegetation surrounding the proposed subdivision development will be assessed as Coastal Dune forests in accordance with the *NSW Comprehensive Fuel Loads*”.

3.4 Separation assessment

Measuring the distance between proposed building envelopes and bush fire threat (vegetation) provides one of the bush fire protection measures to reduce the risk from bush fire attack. The land within the separation must conform to the standards of Asset Protection Zones to be accepted within the separation areas.

NSW Rural Fire Services – Ref S11/0015 DA14102294322AB - Agency comment: Test for adequacy North Tuncurry Development Precinct (NTDP) State Significant Site report, Great Lakes Local Government Area, dated 12 November 2014 indicates that the separations shall be measured from the dripline of the canopy of the classified vegetation. This position has been refined since 2014, and the industry standard to measure separation is from the bush fire threat which is the ground and elevated fuels, although the canopy of any trees remaining within the APZ shall strictly comply with NSW Rural Fire Service (2005). *Standards for Asset Protection Zones. NSW Rural Fire Service, Sydney.*

The Master Plan illustrates that future development will be able to comply with the relevant separation requirements.

3.5 Effective and site slope assessment

The slope of the land under the classified vegetation has a direct influence on the rate of fire spread, the intensity of the fire and the ultimate level of radiant heat flux.

The effective slope is the slope of the ground under the hazard (vegetation). The slope between the vegetation and the proposed building envelope is the site slope. When identifying the effective and site slopes, it may be found that there are a variety of slopes covering different distances. The effective slope is the slope under the vegetation which will most significantly influence the bush fire behaviour for each aspect.

The topography of the site and surrounds has been assessed to identify the maximum slope present under the classified vegetation (hazard). These values help determine the vegetation that possess bush fire threat and significantly influence fire behaviour.

An analysis of the Master Plan identified flat landscape with short slope undulating sand dunes will be removed and the site made flat. The slopes under the classifiable vegetation are flat, although an effective slope of 1° downslope will be implemented to ensure a consistent and worst-case scenario a has been implemented for the northern and western perimeter.

The vegetation to the east of the site is frontal dune vegetation and is excluded from assessment.

3.6 Short fire run

The size and shape of a bush fire hazard will influence the behaviour of bush fire and the associated risk to the built environment. Small or narrow parcels of vegetation have less opportunity to support fully developed bush fires because of their limited size. These areas are referred to in this document as a short fire run (SFR).

The SFR fire calculates the head width and flame length to determine the radiant heat likely to impact a building. The proposed SFR model relies on several assumptions to calculate the modified fire shape and flame height, these are:

- Wind direction and speed is constant in the direction of fire spread.
- Slope is considered relatively flat and uniform throughout the length of the fire run.
- Fuel load is distributed equally and is continuous for the entire fire run length.
- The shape of the fire is based on a uniform slope.
- The fire develops from a single ignition point and does not consider time of ignition or fire growth.
- Flaming is restricted to surface, near surface and elevated fuels.
- The fire does not become a crown fire (scorching and intermittent involvement of the canopy fuels permitted, no sustained crown fire). A nominal fire run of 150 metres has been assumed as is measured on the effective slope.
- Fire run is measured perpendicular to contours, and

- No allowance for ember showers has been considered.

Short fire run assessment has been included on the small patches of Wallum sand heaths vegetation immediately behind and west of the frontal dune vegetation. A short fire run distance of 50m has been used to model the potential fire behaviour with increased relative humidity of 60%.

3.7 Shielding

Where an elevation is shielded from direct radiant heat arising from bush fire attack, then the construction requirements for that elevation can be reduced to the next lower BAL. An elevation is deemed to be not exposed to the source of bush fire attack if all the straight lines between that elevation and the source of bush fire attack are obstructed by another part of the building.

The shielding of an elevation shall apply to all the elements of the wall but shall not apply to subfloors or roofs. The construction requirements for a shielded elevation shall be not less than that required for BAL-12.5 unless the building has been assessed as being BAL-LOW. The reduced construction requirements do not apply where any elevation is BAL-FZ.

There are no shielding elements considered within this assessment, although the potential future establishment of colour-bond fencing (if it was to be proposed) between the bush fire threat and dwellings will slightly reduce the radiant heat flux and ember attack towards the proposed residential dwellings.

3.8 Other Method 2 inputs

Heat of Combustion

Heat of Combustion (HoC) is an important characteristic for the simulation of bushfires. It is frequently used in the assessment of fuel flammability and a key input to calculate fire-line intensity which provides for flame length calculations. Despite the variability of natural fuels, HoC being considered a constant, research since the development of the method 2 calculations illustrate that fuel moisture content has a significant impact of HoC and argue that lowering the current default heat of combustion of 18600 kJ/kg in bushfire behaviour models.

Flame Emissivity

AS3959:2018 indicates a nominal flame emissivity of 0.95 is justified as the bush fire flames under design fire weather scenarios are generally optically thick ($\epsilon \approx 1$). The predicted flame emissive power is very sensitive to flame temperature. The selection of the nominal flame temperature for calculation is critical to make sure that the construction standard determined with this flame temperature together with other input parameters can provide an adequate bush fire construction level.

Moisture Factor

Fuel moisture factor is only used in Marsden–Smedley *et al*, (1995) fire model for Tussock Moorland, and is default to 5. This input has no effect on fire modelling calculations in other vegetation.

Ambient temperature and Relative Humidity

The default value for ambient air temperature during worst-case scenario fire weather conditions defaults to 35°, converted to Kelvin is 308K. The default value for Relative Humidity is 25%. Worst case scenario fire weather conditions in NSW are generally from the North-west which have high temperatures and low relative humidity. For bush fire threats a from directions other than the north, north-west, and west the ambient temperature and relative humidity can significantly change, especially in coast environments.

A summary of the bush fire hazard assessment for the site is provided in **Table 1**.

BUSH FIRE ASSESSMENT REPORT – NORTH TUNCURRY URBAN RELEASE AREA

Table 1 Bushfire Hazard Assessment Map

		North, South, Western Boundary and Talawah Park	Eastern boundary
Vegetation	NSW Comprehensive Fuel Loads	Coastal Dune forests	Wallum sand heaths
Site slope	Site visit – Theodolite (°)	flat	flat
Effective slope	Site visit – Theodolite (°)	1° down	1° up
Shielding Width	Site Plans / Site Visit (m)	N/A	N/A
Shielding height	Site Plans / Site Visit (m)	N/A	N/A
Elevation of receiver	Site Plans (m)	default	default
Flame temperature	1090 / 1200 Kelvin	1090	1090
Upslope fire	Kataburn correction	No	Yes
Fire Danger Index	Douglas Graham (2017)	96	96
Heat of Combustion	Default at 18600 kJ/kg	18600	18600
Flame Emissivity	Default at 0.95	0.95	0.95
Moisture Factor	Default at 5	5	5
Ambient temperature	BoM (Default at 308 Kelvin)	308	308
Relative Humidity	BoM (Default at 25%)	25	60
SFR Fire Model	Vesta / McArthur	N/A	Vesta
SFR length	Bush Fire Safety Study	N/A	50m
OUTPUTS			
	Flame Length	20.2m	14.5m
	Separation to Achieve BALFZ/40	<22m	<13m
	Separation to Achieve BAL29	22-31m	13-16m
	Separation to Achieve BAL19	31-43m	16-20m
	Separation to Achieve BAL12.5	43-100mm	20-100m

NBC Bush fire Attack Calculator applied – Outputs provided in Appendix C



Plate 1 Vegetation throughout the existing golf course



Plate 2 Coastal Dune DSF vegetation along the North of The Lakes Way



Plate 3 Wallum Sand Heath and patches of Coastal Dune DSF west of the site



Plate 4 Wallum Sand Heath and patches of Coastal Dune DSF north of the site



Plate 5 Bushfire burnt Wallum Sand Heath vegetation along the western edge of the site

4 SIGNIFICANT ENVIRONMENTAL FEATURES

This section details the significant environmental features as required by s44 of the RF Act Regulations. It provides an indication of the location and extent of environmental values to mitigate the potential for proposing bush fire protection measures over the same location as significant environmental features.

4.1 Threatened species, populations and communities

The *Biodiversity Certification Assessment Report & Biodiversity Certification Strategy* completed by EcoLogical in July 2019 indicates a number of threatened fauna species that have been recorded in the study area, with only two species recorded on site, being the Brush-tailed Phascogale and the Eastern Pygmy Possum. Both are considered vulnerable species and require specific assessment under the Biocertification Methodology as 'species credit species'. The Koala has also been 'assumed' to be present on site on the basis of recent records north of the site and suitable habitat within the site. Koala was not recorded during extensive surveys of the site. One critically endangered plant species, the Tuncurry Midge Orchid has also been recorded and will be directly impacted.

The disturbance areas created by bush fire protection measures, such as Asset Protection Zones have been included in the area that has been assessed by the *Biodiversity Certification Assessment Report & Biodiversity Certification Strategy*.

4.2 Cultural heritage

The Aboriginal Cultural Heritage of North Tuncurry by Doo-wa-kee, Rob Yettica Cultural Heritage, Elvina Jean Paulson - Indigenous Cultural Resource Management Services in 2011 identified one new Aboriginal site was identified, NTSHL-3 (AHIMS number pending at time of report). The site comprises non-Aboriginal artefacts of glass bottles, building foundation structures, vehicle and machinery. The recorded early European materials conceal substrates of shell deposits (cockle and oyster) lying beneath. Two registered Aboriginal sites are located within the study area, 38-20025 & 38-20026.

The design and layout of the Master Plan has considered the location of the heritage values.

An updated Aboriginal Cultural Heritage Assessment has been prepared by RPS and has concluded that the earlier Aboriginal Cultural Heritage assessment findings remain valid for the purposes of this bushfire threat assessment.

5 BUSH FIRE ASSESSMENT

This section assesses the bush fire protection measures for the Master Plan in consideration of the acceptable solutions required for each performance criteria within PBP 2019 and assessment requirements within s44 RF Act Regulations. The Bush Fire Assessment outcomes are illustrated in **Figure 15** and further detailed mapping at a finer scale for the relevant areas within the Master Plan is provided in **Appendix D to I**.

5.1 Subdivision and dwelling siting, design and layout

The design and siting of a building can be of critical importance during bush fire attack event. The appropriate design and siting can reduce the impact of bush fire attack mechanisms of direct flame, radiant heat, ember attack, smoke, and wind. The following principles should be considered when providing lot sizes and shapes to enable the residential dwelling to be appropriately located and designed to improve bush fire survivability. These recommendations are not performance criteria in PBP 2019 but facilitate meeting the aims and objectives of PBP 2019.

- Avoid building on ridges, saddles and build on level ground wherever possible.
- Utilise cut-in benches, rather than elevating the building when building on sloping land.
- Avoid raised floors and protect the sub-floor areas by enclosing or screening.
- Provide an appropriate shelter room that is located on the lowest non-bush fire hazard side of the building, near building exits and provides the occupant views of the outside environment.
- Use non-combustible fencing.
- Reduce bulk of building, limit re-entrant corners, and incorporate simplified roof that are able to self-clean of debris.
- No gutters on second or consecutive storeys of building and avoid box gutters.
- If gutters are installed, and if trees are within 10m of building, incorporate gutter guards with a flammability index more than 5 when tested to AS1530.2, or aluminium, bronze, or stainless steel with maximum aperture of 5mm.
- Limit glazing elements on the sides of the building exposed to the bush fire threat and use shutters to protect glazing elements.
- Positioning of courtyards, gardens, and grassed areas in location to facilitate the protection of the building.
- Garage doors are ember proof when garages are attached to main building.
- Carparking provided in a location that does not contribute to transmission of fire and interfere with escape routes.
- Establish a path immediately around the external wall of the building. Do not place garden beds adjacent to the external fabric of the building and under windows; and
- Any proposed vegetation windbreaks are located on the side of the bush fire hazard.

Hazardous materials are any materials that can fuel the fire, such as leaf litter, grass, garden mulch and woodpiles. They can also be made up of solid combustibles or flammable liquids and gases such as petrol, kerosene, alcohol, LPG, natural gas, and acetylene. Vehicle, machinery, and other mechanical equipment that utilise fuels for operations can also be considered hazardous. The incorrect design and placement of carport and garages in residential developments could propagate fire towards the residential dwelling. Any liquids or fuels that are considered hazardous should be positioned away from the dominant bush fire threat. If located in a building/structure, it should be a minimum of 6m away from any other building. Vegetation surrounding these locations shall be maintained to IPA standards and the construction standards shall minimise the impact of ember attack to ignite the structure. Fencing should be of non-combustible materials.

S44 of the RF Regulations requires an assessment of the extent to which the development is to provide for setbacks, including asset protection zones and the siting and adequacy of water supplies for firefighting. The Master Plan has ample locations where separation from vegetation and building envelopes can be achieved to obtain the required BAL 29 construction level for a future dwelling proposal.



Legend

- Project Area
- Cadastre
- Master Plan Layout
- Roads and Tracks
- BAL - 29



NOTE: FOR MORE DETAILS REFER TO APPENDICES

IMPORTANT NOTE

1. This plan was prepared for the sole purposes of the client for the specific purpose of providing a photographic overlay plan. This plan is strictly limited to the Purpose and does not apply directly or indirectly and will not be used for any other application, purpose, use or matter. The plan is presented without the assumption of a duty of care to any other person (other than the Client) ("Third Party") and may not be relied on by Third Party.
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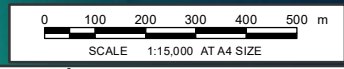


FIGURE 15: BUSH FIRE HAZARD ASSESSMENT

LOCATION: NORTHTUNCURRY	DATUM: GDA94
JOB NO.: PR 147855	PROJECTION: MGA Zone 56
PURPOSE: BUSHFIRE	Data Sources: RPS, Client Nearmap 29/04/2020
Technician: Natalie Wood	Date: 28/10/2020

CLIENT: LANDCOM

RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762)
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 T: 02 4940 4200 F: 02 4940 4299 www.rpsgroup.com.au



In some locations (refer to **Appendix E, F, G, H and I**) the lot boundaries are impacted by BAL 29 building line. Street and rear set-back will be required to ensure the building envelopes within the lot boundaries are positioned adequately to accommodate BAL 29 construction standards. These requirements can be addressed through the proposed DCP amendment and subsequently future development applications for individual stages.

5.2 Setbacks and asset protection zones

The performance criteria within PBP 2019 are:

- Potential building footprints must not be exposed to radiant heat levels exceeding 29 kW/m² on each proposed lot.
- APZs are managed and maintained to prevent the spread of a fire towards the building.
- The APZ is provided in perpetuity, and
- APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.

S44 of the RF Regulations requires an assessment of proposed setback of any buildings that are, or may in future, be erected on the property, including asset protection zones.

An APZ is an area surrounding a development that is managed to reduce the bush fire hazard to an acceptable level to mitigate the risk to life and property. The required width of the APZ varies with slope and the type of hazard. An APZ should be maintained in perpetuity, not on slopes >18° to ensure ongoing protection from the impact of bush fires. Section 3.2 within PBP 2019 indicates the APZ on adjoining lands is not encouraged, although road and properties managed to be consistent with APZ standards set out in Appendix 4 of PBP2019 and NSW RFS document Standards for Asset Protection Zones are appropriate to be included within a APZ. Maintenance of APZ should be undertaken on an annual basis, in advance of the fire season, as a minimum.

Asset protection zones for the proposed NTURA site and the north west employment precinct have been calculated in **Appendix C** and are shown in **Table 1** and **Appendices D, E, F, G, H and I**. The APZ for the north, south, western boundary and Talawah Park is required to be at least 22m, while the APZ for the eastern boundary is to be at least 13m. The Master Plan indicates that these required APZ's can be accommodated on the site. It is suggested that future setbacks (APZ) surrounding the north-west employment precinct (setbacks to be established during the development application process for subdivision post-rezoning) are to be secured through a legally binding instrument (i.e. section 88B of the *Conveyancing Act, 1919*) to ensure these separations are maintained into perpetuity.

To delineate APZs (once the development application process for subdivision has occurred), signage as indicated in **Figure 16** below shall be installed to ensure community are aware of the land-use and metal bollards, refer to **Figure 17** shall be installed along the edge of the APZ and vegetation that forms the bush fire threat to ensure maintenance of the prescribed separations in undertaken removing the opportunity of vegetation creep into the APZ over time.



Figure 16: Asset Protection Zone signage



Figure 17: Example of bollards delineating cleared areas

BCA P2.3.1 indicates that the class 1 buildings should be protected from other building fires and provides a minimum 900mm separation between the boundary and dwelling.

The ongoing maintenance of APZs are recognised under 100C of the *Rural Fires Act 1997* and is supported in 2.8(1)(d) of the *Biodiversity Conservation Act 2016*. Any clearing of vegetation within the site to allow the development to occur may require assessment under the *Biodiversity Conservation Act 2016* and has been separately addressed in the Biodiversity Certification Assessment Report and Biodiversity Certification Strategy.

5.2.1 Staged developments

The development of NTURA is likely to occur in stages. APZs are essential through the staging of a development and throughout the entire construction period. With large subdivisions, such as the NTURA, indefinite time lag can occur between one or more stages of subdivision development and this can result in persons and property being unprotected in the event of a bush fire.

Consequently, the provisions of PBP are to be applied throughout all stages of future subdivision development. A development site that is vegetated and is to be developed and sold in stages shall require the creation of APZs to protect existing properties.

The APZ must be contained wholly within each stage and be managed by the developer until each individual allotment is sold, at which time the APZs must also be maintained in the interim until the final phase of subdivision development is completed.

A minimum 22m APZ from the closest lot boundary to the bush fire hazard will need to be maintained throughout stages within the NTURA. Where an APZ is proposed outside the current stage (off site) then the management of the APZ is to be secured through a legally binding instrument (i.e. section 88B of the *Conveyancing Act, 1919*) which identifies the management outcomes and the party responsible for the management.

The Master Plan displays ample locations where separation from the vegetation that creates the bush fire threat and residential development can be achieved to obtain the required BAL 29 construction level throughout NTURA.

5.3 Construction standards

There are no specific construction performance criteria for subdivision, although within the performance criteria of APZs radiant heat exposure to any proposed lot shall not exceed 29kW/m². The general principles that will allow future residential dwellings to meet the following performance criteria within PBP 2019 are below:

- The proposed building can withstand bush fire attack in the form of embers, radiant heat, and flame contact
- Proposed fences and gates are designed to minimise the spread of bush fire
- Proposed Class 10a buildings are designed to minimise the spread of bush fire.

Bush fire mitigation activities during the construction phase and ongoing operations of the site are also recommended, although if not implemented will not result in non-compliance in consideration of PBP 2019. These matters can be appropriately addressed through future development control plan provisions and future development proposals.

5.3.1 Subdivision construction works and sub-structure construction phase

During the construction phase of subdivision potential ignition sources may include hot works, incorrect disposal of cigarette butts and hot exhausts from vehicles, electrical failures, and sparks from metal contact.

For the construction phase of each future subdivision stage a fire management plan should be developed. Preparation of the site should include mitigating fire ignition sources. This should include vegetation management such as slashing and mowing long grasses in and around the development site, car parking and any access tracks. This is especially important during summer months where rates of spread of fire can significantly increase due to the prevailing weather condition.

Handheld fire extinguishers should be provided on site for quick access and suppression of fires. Where reticulated water is not available a temporary 10,000 litre Static Water Supply may be established before the commencement within proximity of the development site. The temporary supply may be removed when the prescribed fire-fighting water supply is installed.

These are matters of detail and are most appropriately addressed through future development applications. Resolution of these matters is not required as part of the rezoning proposal.

5.3.2 Ongoing operations

The routine inspection intervals of bush fire safety systems and equipment general occur annually and are supported by a bush fire plan. Ideally these inspections should occur moving out of the colder months in preparation for the bush fire season. The most common types of inspections that are required are surface, near surface (grasses and debris) and elevated (shrub) fire fuel level accumulation in APZs, canopy separation requirements in APZs, and maintaining building fire hygiene around assets.

Furthermore, maintaining temporary APZs throughout stage development is critical to the continued protection of the community.

These are matters of detail and are most appropriately addressed through future development application. Resolution of these matters is not required as part of the rezoning proposal.

5.4 Access

In the event of a serious bush fire threat to NTURA, it will be essential to ensure that access is adequate for ingress of emergency services at the same time as occupants egress from the bush fire attack. Residential development is proposed throughout the NTURA. The assessment has considered the ability of the concept design of the Master Plan to effectively provide for a dwelling proposal that will meet the performance criteria of PBP.

The performance criteria within PBP 2019 are:

- Firefighting vehicles are provided with safe, all-weather access to structures.
- The capacity of access roads is adequate for firefighting vehicles.
- There is appropriate access to water supply.
- Perimeter road access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface.
- Non-perimeter road access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating, and
- Firefighting vehicles can access the dwelling and exit the property safely.

S44 of the RF Regulations requires an assessment of:

- The capacity of public roads in the vicinity to handle increased volumes of traffic in the event of a bush fire emergency.
- Whether or not public roads in the vicinity that link with the fire trail network have two-way access.
- The adequacy of arrangements for access to and egress from the development site for the purposes of an emergency response, and
- Any registered fire trails on the property.

All roads shall be constructed in accordance with the following requirements:

- Minimum 5.5m carriageway width kerb to kerb for non-perimeter roads and 8m carriageway for perimeter roads.
- Parking is provided outside of the carriageway width.
- Hydrants are located clear of parking areas.
- Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m.
- Curves of roads have a minimum inner radius of 6m.
- The road crossfall does not exceed 3 degrees; and
- A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.

A perimeter road is proposed around the NTURA, with two vehicle access points to the area. All roads are sealed with suitable grades and crossfalls. Future subdivision applications will need to consider the management of roadside vegetation to ensure that vertical clearances of 4m are maintained in the future.

As provided with the Master Plan, non-perimeter roads, such as Avenue 1 and 2 have a total of 7m carriageway and Collector Streets have a 7m carriageway; local roads and shared streets have a carriage way of 5.5m, all with parking outside the carriageway. These street designs satisfy the non-perimeter road requirements. Yield streets have only 3m carriageway with parking outside the carriageway. Given that these Yield Streets are intended as one-way roads, where these are within bushfire prone lands (within 100m from the bushfire threat), these should be no less than 3.5 metres wide to facilitate emergency vehicle access.

This is achievable within the footprint proposed under the master plan. These details can be addressed through future development control plan provisions and future development applications.

Access across the avenues to the north-west of the development shall be provided to ensure adequate ingress and escape options are available to reduce traffic congestion to the west of Mt Talawahl Park during a bush fire event.

Meeting the acceptable solutions 'Access' within table 7.4a of PBP2019 likely to be a condition of consent for future development applications for subdivision.

5.5 Water supply

The performance criteria within PBP 2019 are:

- A water supply is provided for firefighting purposes.
- Water supplies are located at regular intervals.
- The water supply is accessible and reliable for firefighting operations.
- Flows and pressure are appropriate, and
- The integrity of the water supply is maintained.

It is likely that future development applications for subdivision will need to meet the following requirements:

- Fire hydrant, spacing, design, sizing, flows and pressures complies with the relevant clauses of Australian Standard AS 2419.1:2017.
- Hydrants are not located within any road carriageway.
- Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.
- Within bush fire prone lands all above-ground water service pipes are metal, including and up to any tap.

These are matters of detail and are most appropriately addressed through future development application. Resolution of these matters is not required as part of the rezoning proposal.

5.6 Electricity service

The performance criteria within PBP 2019 are:

- Location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.

Electricity services have been found to contribute to bush fire ignition and spread, as well as impeding access during bush fire events. Where possible electricity should be placed underground. It is expected that future development applications for subdivision will meet acceptable solutions 'Electricity' within table 7.4a of PBP2019.

These are matters of detail and are most appropriately addressed through future development applications. Resolution of these matters is not required as part of the rezoning proposal.

5.7 Gas services

There are no reticulated gas services available to NTURA, and therefore this matter is not relevant.

5.8 Landscaping and vegetation management

The performance criteria within PBP 2019 are:

- Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions.

There are several areas within the Master Plan illustrated as 'Green' areas. This includes the golf course, Centre Green, Gateway Park, Community Dune Park, Orchid Park, Eco-Green, Waters Edge Park, Mt Talawahl Park and associated green space, Heritage Green, 9 Mile Beach foreshore area and Avenues within the north-west. The Landscape Master Plan prepared for the Rezoning Study has been reviewed and it is concluded that future subdivision development is likely to meet the performance criteria with respect to landscaping.

These are matters of detail and are most appropriately addressed through future development applications. Resolution of these matters is not required as part of the rezoning proposal.

5.9 Emergency management and bush fire survival plans

Section 44 of the RF Act Regulations requires an assessment of the adequacy of bush fire emergency procedures. Currently the NTURA is subject of a Rezoning Study and hence there are no bush fire emergency procedures for the site at this point but are likely to be prepared once rezoning has occurred.

There are currently no designated Neighbourhood Safer Place (NSP) identified in the Forster or Tuncurry area. Once rezoning of NTURA occurs, NSW RFS should designate an appropriate NSP in the anticipation of population growth in the Tuncurry area.

Furthermore, it is recommend that NSW RFS should engage with the new residential owners (once future development applications for subdivision occurs and dwelling construction begins) through a targeted community engagement strategy that incorporates scenarios of bush fires, the fire behaviour that can be expected and the decision triggers that the community shall implement, which include evacuation to the NSP. The objective of the targeted engagement shall be to increase the resilience of the community to disasters, specifically:

- Suburb emergency management plan should be developed that is resilience-based, to build disaster resilience within communities over time.
- People understand the risks and their vulnerability that may affect them and others in their community targeting the requirements for home fire hygiene, landscaping and inadequate vegetation management.
- People have taken steps to anticipate disasters and to protect themselves, their assets and their livelihoods, including their homes and possessions, cultural heritage and economic capital.
- People work together with local leaders using their knowledge and resources to prepare for and deal with disasters.
- People work in partnership with emergency services, their local authorities and other relevant organisations before, during and after emergencies.
- Businesses and other service providers undertake wide-reaching business continuity planning that links with their security and emergency management arrangements.

In the absence of NSW RFS undertaking targeted engagement, kits have been established to help residential and small property owners to develop appropriate plans to plan and prepare for bush fire events. In NSW Bush Fire Survival Plans can be accessed from <https://www.rfs.nsw.gov.au/plan-and-prepare/bush-fire-survival-plan>.

It is suggested that future property owner and occupants familiarise themselves with relevant bush fire planning, protection, preparation and survival information and consider implementation of the 'NSW RFS Best Practise Guidelines – Dwelling upgrades' for the upgrade of existing buildings to ensure compliance with the intent of the PBP 2018 and *AS3959 Construction of buildings in Bushfire Prone Areas*.

These are matters of detail and are most appropriately addressed through future development applications. Resolution of these matters is not required as part of the rezoning proposal.

5.10 Adequacy of other fire protection measures

Section 44 of the RF Regulations requires an assessment of the adequacy of sprinkler systems and other fire protection measures to be incorporated into the development. There are no specific fire protection measures identified within the planning framework, although a series of strategic documents will require updating to identify the new development. This includes:

- NSW RFS require the existing Fire Mitigation Plan-Tuncurry (2007) be updated by MidCoast Council to illustrate the bush fire protection measures and any section 88B of the Conveyancing Act 1919 easements to ensure separations are managed into perpetuity, and amendment to the Great Lake DCP is required to reflect changes in access and road conditions.
- The MidCoast District Bush fire Risk Management Plan be updated to reflect the assets and treatments for the proposed subdivision.
- Mid Coast Council will be required to update the bush fire prone area mapping for authorisation from NSW RFS Commissioner.
- These are matters of detail and are most appropriately addressed through future development applications. Resolution of these matters is not required as part of the rezoning proposal.

6 CONCLUSIONS

The primary objective of this Bush Fire Threat Assessment is to review the Master Plan of NTURA and verify that future subdivision development, if based upon the Master Plan and subject to site-specific bush fire threat assessment, is likely to meet the requirements of s4.14 of the EP&A Act, RF Regulations, PBP 2019 and AS 3959-2018. To this end it is concluded that the indicative subdivision design within the Master Plan will enable future subdivision development to comply with the above requirements and standards. The recommendations of this Bush Fire Threat Assessment do not preclude the progression of the rezoning proposal through to gazettal.

An assessment of the provisions of PBP 2019 has occurred and the recommendations below, when incorporated into the layout and design of future development applications for subdivision, will reduce the risk of damage and/or harm in the event of a bush fire event to acceptable levels.

Asset Protection Zones and Landscaping

- All APZ's identified within the Master Plan should be incorporated into future subdivision designs - including the establishment of a 22m APZ to the west, south and north of NTURA and around the Mt Talawahl Park regeneration area.
- Temporary 22m APZ's shall be established around the north and west of the NTURA. The temporary APZ's shall be secured through a legally binding instrument (i.e. section 88B of the *Conveyancing Act, 1919*) to ensure these separations are maintained during the staged subdivision process.
- The APZ's surrounding the north-west employment precinct are to be secured through a legally binding instrument (i.e. section 88B of the *Conveyancing Act, 1919*) to ensure these separations are maintained into perpetuity.
- Landscaping of all APZ's shall be in accordance with Appendix 4 of PBP 2019.
- Reduced fire fuel loads (fire breaks) of not less than 20m wide are provided along the Avenues to mitigate fire spread from north and west into residential areas.

Access

Ensure all future development applications for subdivision are designed so that perimeter and non-perimeter roads have the capacity to facilitate traffic movement during a bush fire event and conform with the provisions of PBP 2019.

Water Supply

- Acceptable solutions within Table 5.3c of PBP 2019 shall be applied at the time of future development applications.
- Providing street hydrants on both side of the perimeter roads to the north and western boundaries is advisable to assist responding fire agencies while maintaining the integrity of the road system to facilitate evacuation.

Emergency Management

It is recommended that NSW RFS and NSW F&R undertake a co-ordinated targeted community engagement be undertaken that includes that development of Community Protection Plan, Community Fire Units and designation of a Neighbourhood Safer Place for the residences.

On balance, the Master Plan raises no significant issues for the current stage of the planning process. This BTA demonstrates that bushfire impacts can be mitigated and managed. The development control plan for the site should seek to include appropriately worded provisions to ensure implementation of the recommendations in this BTA. A number of detailed matters will only be able to be addressed at development application stage. There are no impacts or issues with respect to bushfire management measures that preclude progression of the rezoning proposal.

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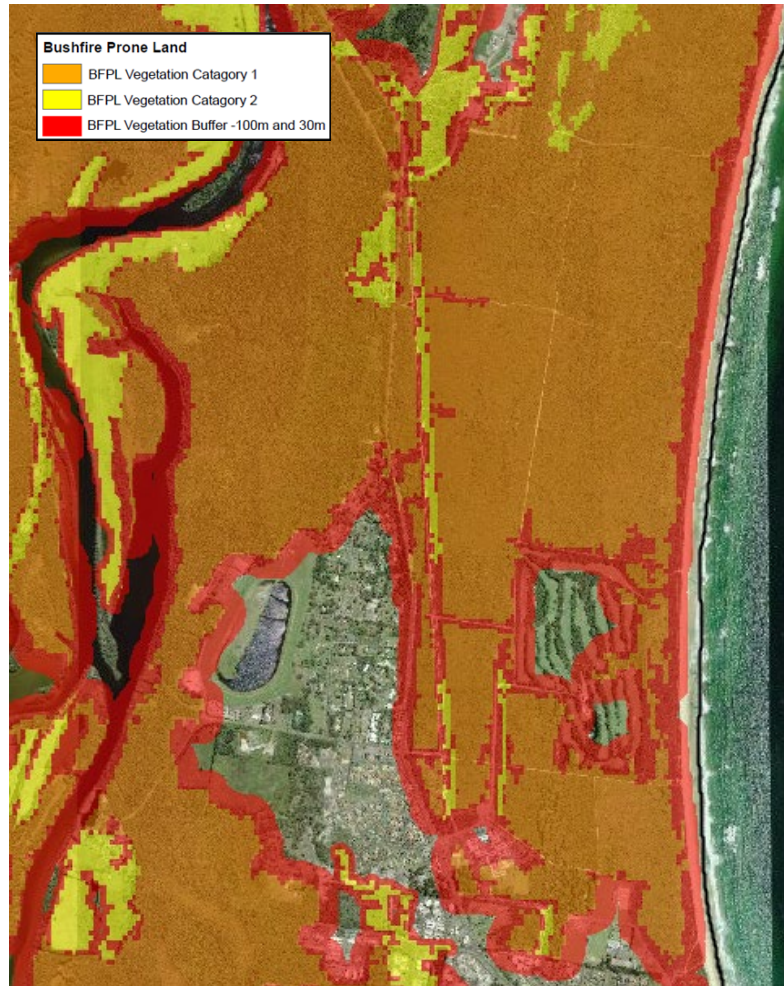
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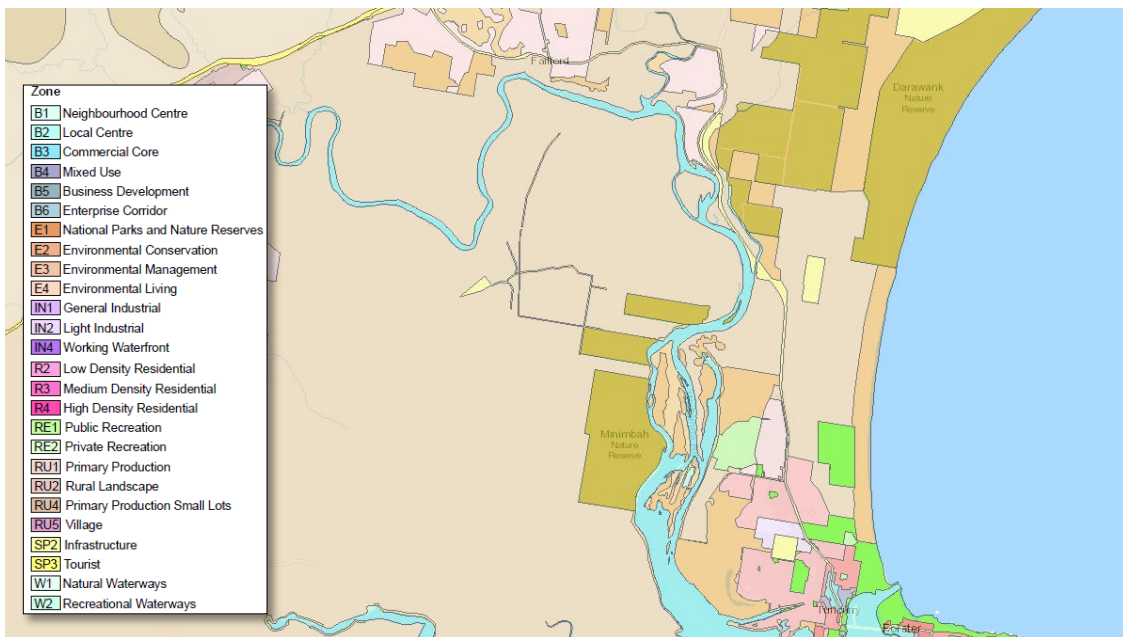
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Appendix A

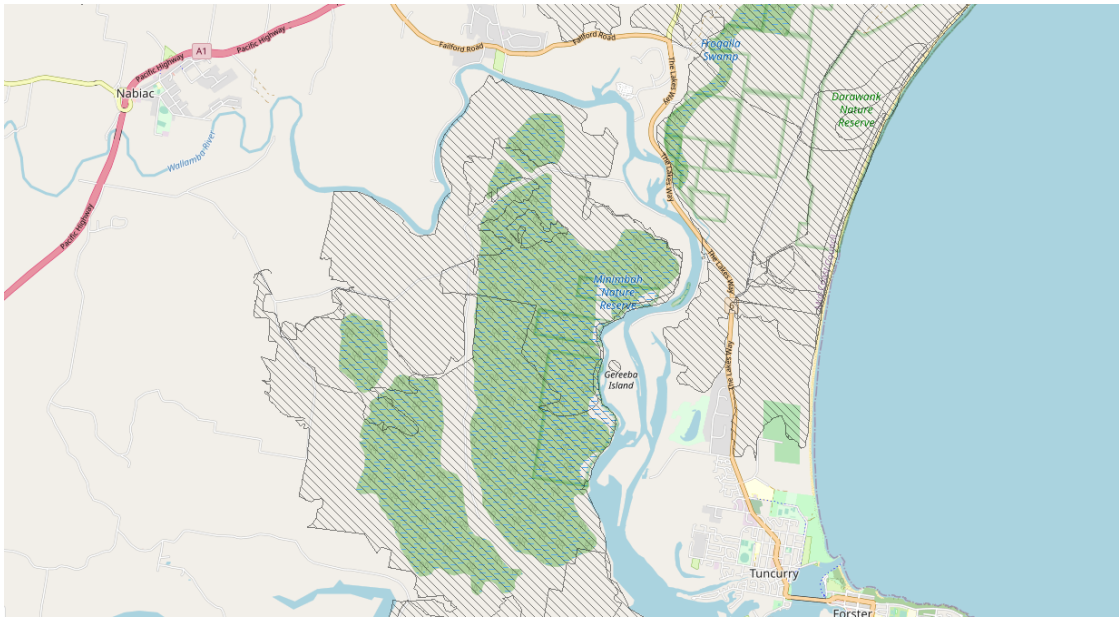
Background Data



Bush fire Prone land Map (MidCoast Council online Mapping, 2020)



Land use Zoning (ePlanning Portal, 2020)



NSW NPWS Fire History (SEED portal, 2020)



Bushfire Severity mapping (SEED portal, 2020)

Appendix B

PBP Compliance Tables

BUSH FIRE ASSESSMENT REPORT – NORTH TUNCURRY URBAN RELEASE AREA

Chapter 5 PBP 2019 – Rural and Residential subdivisions developments on bushfire prone lands

	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTION	COMPLIANCE
APZs	potential building footprints must not be exposed to radiant heat levels exceeding 29 kW/m ² on each proposed lot.	<ul style="list-style-type: none"> • APZs are provided in accordance with Tables A1.12.2 and A1.12.3 based on the FFDI. 	YES - Acceptable Solution – BAL 29 building line has been determined throughout the subdivision S88B easements established
	APZs are managed and maintained to prevent the spread of a fire towards the building.	<ul style="list-style-type: none"> • APZs are managed in accordance with the requirements of Appendix 4. 	
	the APZs is provided in perpetuity	<ul style="list-style-type: none"> • APZs are wholly within the boundaries of the development site 	
	APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	<ul style="list-style-type: none"> • APZs are located on lands with a slope less than 18 degrees. 	
ELECTRICITY	Location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.	<ul style="list-style-type: none"> • Where practicable, electrical transmission lines are underground; and • Where overhead, electrical transmission lines are proposed as follows: <ul style="list-style-type: none"> ○ Lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas; and ○ No part of a tree is closer to a power line than the distance set out in accordance with the specifications in ISSC3 Guideline for Managing Vegetation Near Power Lines. 	YES – acceptable solutions - All electricity is under ground
GAS	Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	<ul style="list-style-type: none"> • Reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used. • All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side. • Connections to and from gas cylinders are metal. • Polymer-sheathed flexible gas supply lines are not used; and • Above-ground gas service pipes are metal, including and up to any outlets 	N/A – Gas services are not provided within the subdivision. Individual residential houses will need to comply approval.
LANDS		<ul style="list-style-type: none"> • Landscaping is in accordance with Appendix 4; and • Fencing is constructed in accordance with section 7.6. 	Shall be a condition of consent in accordance with Appendix 4 of PBP 2019

BUSH FIRE ASSESSMENT REPORT – NORTH TUNCURRY URBAN RELEASE AREA

	Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions		
ACCESS (GENERAL REQUIREMENTS)	Firefighting vehicles are provided with safe, all-weather access to structures.	<ul style="list-style-type: none"> • Property access roads are two-wheel drive, all-weather roads. • Perimeter roads are provided for residential subdivisions of three or more allotments. • Subdivisions of three or more allotments have more than one access in and out of the development. • Traffic management devices are constructed to not prohibit access by emergency services vehicles. • Maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient. • All roads are through roads. • Dead end roads are not recommended, but if unavoidable, are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end; • Where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road. • Where access/egress can only be achieved through forest, woodland and heath vegetation, secondary access shall be provided to an alternate point on the existing public road system; and • One way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression 	YES – Acceptable solutions
	The capacity of access roads is adequate for firefighting vehicles	<ul style="list-style-type: none"> • The capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges and causeways are to clearly indicate load rating. 	YES – Acceptable solutions
	There is appropriate access to water supply	<ul style="list-style-type: none"> • hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression. 	

BUSH FIRE ASSESSMENT REPORT – NORTH TUNCURRY URBAN RELEASE AREA

		<ul style="list-style-type: none"> • Hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005 - Fire hydrant installations System design, installation and commissioning; and • There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available. 	
PERIMETER ROADS	<p>Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface.</p>	<ul style="list-style-type: none"> • Are two-way sealed roads. • Minimum 8m carriageway width kerb to kerb. • Parking is provided outside of the carriageway width. • Hydrants are located clear of parking areas. • Are through roads, and these are linked to the internal road system at an interval of no greater than 500m. • Curves of roads have a minimum inner radius of 6m. • The maximum grade road is 15 degrees and average grade of not more than 10 degrees. • The road crossfall does not exceed 3 degrees; and • A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided. 	<p>YES – Acceptable solutions</p>
NON-PERIMETER ROADS	<p>Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.</p>	<ul style="list-style-type: none"> • Minimum 5.5m carriageway width kerb to kerb. • Parking is provided outside of the carriageway width. • Hydrants are located clear of parking areas. • Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m. • Curves of roads have a minimum inner radius of 6m. • The road crossfall does not exceed 3 degrees; and • A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided. 	<p>YES – Acceptable solutions – Clarification of any Yields Streets within bushfire prone lands is required.</p>

<p>PROPERTY ACCESS</p>	<p>Firefighting vehicles can access the dwelling and exit the property safely.</p>	<ul style="list-style-type: none"> • There are no specific access requirements in an urban area where an unobstructed path (no greater than 70m) is provided between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles. <p>In circumstances where this cannot occur, the following requirements apply:</p> <ul style="list-style-type: none"> • Minimum 4m carriageway width. • In forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m at the passing bay. • A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches. • Provide a suitable turning area in accordance with Appendix 3. • Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress. • The minimum distance between inner and outer curves is 6m. • The crossfall is not more than 10 degrees. • Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads; and • A development comprising more than three dwellings has access by dedication of a road and not by right of way. <p><i>Note: Some short constrictions in the access may be accepted where they are not less than 3.5m wide, extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also apply to community style development property access roads in addition to the above.</i></p>	<p>YES – Acceptable solutions</p>
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BUSH FIRE ASSESSMENT REPORT – NORTH TUNCURRY URBAN RELEASE AREA

WATER SUPPLIES	Adequate water supplies is provided for firefighting purposes.	<ul style="list-style-type: none"> • Reticulated water is to be provided to the development where available. • A static water and hydrant supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed; and static water supplies shall comply with Table 5.3d. 	Shall be a condition of consent in accordance with - Fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2017.
	Water supplies are located at regular intervals, and The water supply is accessible and reliable for firefighting operations.	<ul style="list-style-type: none"> • Fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2017. • Hydrants are not located within any road carriageway; and • Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads. 	
	Flows and pressure are appropriate	<ul style="list-style-type: none"> • Fire hydrant flows and pressures comply with Table 2.2 of AS 2419.1:2005. 	Flows and pressures have not been tested
	The integrity of the water supply is maintained	<ul style="list-style-type: none"> • All above-ground water service pipes are metal, including and up to any taps; and • Above-ground water storage tanks shall be of concrete or metal. 	YES - Acceptable Solution - Future residential development can meet acceptable solutions

Appendix C

Method 2 Radiant Heat Exposure Calculations



NBC Bushfire Attack Assessment Report V4.1

A S3959 (2018) Appendix B - Detailed Method 2

Print Date: 8/09/2020

Assessment Date: 22/04/2020

Site Street Address: North Tuncurry Development Project, Tuncurry

Assessor: ;

Local Government Area: Mid-Coast

Alpine Area:

No

Equations Used

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

Run Description: North and West

Vegetation Information

Vegetation Type: Coastal Dune DSF

Vegetation Group: Dry Sclerophyll Forests (Shrubby)

Vegetation Slope: 1 Degrees

Vegetation Slope Type: Downslope

Surface Fuel Load(t/ha): 20.5

Overall Fuel Load(t/ha): 31.1

Vegetation Height(m): 2

Only Applicable to Shrub/Scrub and Vesta

Site Information

Site Slope: 0 Degrees

Site Slope Type: Level

Elevation of Receiver(m): default

APZ/Separation(m): 0

Fire Inputs

Veg./Flame Width(m): 100

Flame Temp(K): 1090

Calculation Parameters

Flame Emissivity: 95

Relative Humidity(%): 25

Heat of Combustion(kJ/kg): 18600

Ambient Temp(K): 308

Moisture Factor: 5

FDI: 96

Program Outputs

Level of Construction: BAL FZ

Peak Elevation of Receiver(m): 0

Radiant Heat(kW/m²): 76.03

Flame Angle (degrees): 0

Flame Length(m): 20.18

Maximum View Factor: 1

Rate Of Spread (km/h): 2.53

Inner Protection Area(m): 0

Transmissivity: 1

Outer Protection Area(m): 0

Fire Intensity(kW/m): 40658

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m ² :	Elevation of Receiver:
Asset Protection Zone(m):	17	22	31	43	64	6



NBC Bushfire Attack Assessment Report V4.1

A\$3959 (2018) Appendix B - Detailed Method 2

Print Date: 7/10/2020

Assessment Date: 22/04/2020

Site Street Address: North Tuncurry Development Project, Tuncurry

Assessor: ;

Local Government Area: Mid-Coast

Alpine Area: No

Equations Used

Transmissivity: Fuss and Hammins, 2002

Flame Length: RFS PBP, 2001/Vesta/Catchpole

Rate of Fire Spread: Noble et al., 1980

Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005

Peak Elevation of Receiver: Tan et al., 2005

Peak Flame Angle: Tan et al., 2005

Short Fire Run - Methodology for Assessing Bush Fire Risk for Low Risk Vegetation May 2019; NSW RFS

Run Description: East

Vegetation Information

Vegetation Type: Wallum Sand Heath (Tall Heath)

Vegetation Group: Heathlands (Tall Heath)

Vegetation Slope: 1 Degrees

Vegetation Slope Type: Upslope

Surface Fuel Load(t/ha): 36.9

Overall Fuel Load(t/ha): 36.9

Vegetation Height(m): 4

Only Applicable to Shrub/Scrub and Vesta

Site Information

Site Slope: 0 Degrees

Site Slope Type: Level

Elevation of Receiver(m): 2.4

APZ/Separation(m): 0

Fire Inputs

Veg./Flame Width(m): 18.3

Flame Temp(K): 1090

Calculation Parameters

Flame Emissivity: 95

Relative Humidity(%): 60

Heat of Combustion(kJ/kg): 18600

Ambient Temp(K): 308

Moisture Factor: 5

FDI: 96

Program Outputs

Level of Construction: BAL FZ

Peak Elevation of Receiver(m): 0

Radiant Heat(kW/m2): 76.03

Flame Angle (degrees): 0

Flame Length(m): 14.47

Maximum View Factor: 1

Rate Of Spread (km/h): 4.54

Inner Protection Area(m): 0

Transmissivity: 1

Outer Protection Area(m): 0

Fire Intensity(kW/m): 86596

Short Fire Run Calculations

Fire Run(m): 50

Length to Breadth Ratio: 2.82

Full Ellipse Length(m): 152.14

Headfire Backfire Ratio: 29.85

Travel Duration (mins): 0.66

Total Ellipse Length(m): 51.67

RO S and H/B Ratio: 78.24

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	11	13	16	20	27	2.4

Appendix D

BAL 29 building line: North-west employment precinct

Legend

- Project Area
- Master Plan Layout
- BAL - 29



IMPORTANT NOTE

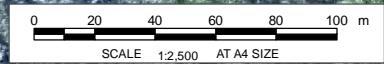
1. This plan was prepared for the sole purposes of the client for the specific purpose of producing a photographic overlay plan. This plan is strictly limited to the Purpose and does not apply directly or indirectly and will not be used for any other application, purpose, use or matter. The plan is presented without the assumption of a duty of care to any other person (other than the Client / Third Party) and may not be relied on by Third Party.

2. RPS Australia East Pty Ltd will not be liable (in negligence or otherwise) for any direct or indirect loss, damage, liability or claim arising out of or incidental to:

- a. a Third Party publishing, using or relying on the plan;
- b. RPS Australia East Pty Ltd relying on information provided to it by the Client or a Third Party where the information is incorrect, incomplete, inaccurate, out-of-date or unreliable;
- c. any inaccuracies or other faults with information or data sourced from a Third Party;
- d. RPS Australia East Pty Ltd relying on surface indicators that are incorrect or inaccurate;
- e. the Client or any Third Party not verifying information in this plan where recommended by RPS Australia East Pty Ltd;
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Appendix D: Bush Fire Hazard Assessment

LOCATION: NORTHTUNCURRY	Path: J:\JOBS\1147k1147855 North Tuncurry\10 - Drafting\Arcgis Map Documents\Bushfire\1147855 App C Bushfire Hazard A A4 20201009.mxd	DATUM: GDA94 PROJECTION: MGA Zone 56
PURPOSE: BUSH FIRE Technician: Natalie.Wood Date: 9/10/2020	VERSION (PLAN BY):	Data Sources: RPS Nearmap 29/04/2020

CLIENT: LANDCOM
 JOB REF: PR147855

RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762)
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Appendix E

BAL 29 building line: North-west subdivision

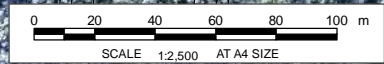
Legend

- Master Plan Layout
- BAL - 29



IMPORTANT NOTE

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Appendix E: Bush Fire Hazard Assessment

LOCATION: NORTHTUNCURRY	Path: J:\JOBS\1147K\147855 North Tuncurry\10 - Drafting\ArcGIS Map Documents\Bushfire\147855 App D Bushfire Hazard A A4 20201009.mxd	DATUM: GDA94 PROJECTION: MGA Zone 56
PURPOSE: BUSH FIRE Technician: Natalie.Wood Date: 9/10/2020	VERSION (PLAN BY):	Data Sources: RPS Nearmap 29/04/2020

CLIENT: LANDCOM
JOB REF: PR147855

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Appendix F

BAL 29 building line: North-east subdivision

Legend

- Master Plan Layout
- BAL - 29



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Appendix F: Bush Fire Hazard Assessment

LOCATION: NORTHTUNCURRY	Path: J:\OBS\147k147855 North Tuncurry\10 - Drafting\Arcgis Map Documents\Bushfire\147855 App E Bushfire Hazard A A4 20201009.mxd	DATUM: GDA94 PROJECTION: MGA Zone 56
PURPOSE: BUSH FIRE Technician: Natalie.Wood Date: 9/10/2020	VERSION (PLAN BY):	Data Sources: RPS Nearmap 29/04/2020

CLIENT: LANDCOM
JOB REF: PR147855



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Appendix G

BAL 29 building line: Western and Mt Talawahl Park

Legend

-  Master Plan Layout
-  BAL - 29



IMPORTANT NOTE

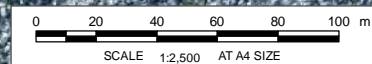
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4.5m

10.6m

2.5m

5.6m



Appendix G: Bush Fire Hazard Assessment

LOCATION:
NORTHTUNCURRY

PURPOSE: BUSH FIRE
Technician: Natalie.Wood Date: 9/10/2020

Path: J:\OBS\147K147855 North Tuncurry\10 - Drafting\Arcgis Map Documents\Bushfire\147855 App F Bushfire Hazard A A4 20201009.mxd

VERSION (PLAN BY):

DATUM: GDA94
PROJECTION: MGA Zone 56

Data Sources:
RPS
Nearmap 29/04/2020





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Appendix H

BAL 29 building line: Western subdivision including Heritage Green

Legend

-  Master Plan Layout
-  BAL - 29



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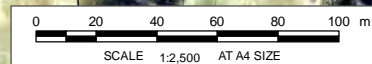
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2.2m

8.3m

2.2m



Appendix H: Bush Fire Hazard Assessment

LOCATION: NORTHTUNCURRY	Path: J:\OBS\147K\147855 North Tuncurry\10 - Drafting\Arcgis Map Documents\Bushfire\147855 App G Bushfire Hazard A A4 20201009.mxd	DATUM: GDA94 PROJECTION: MGA Zone 56
PURPOSE: BUSH FIRE Technician: Natalie.Wood Date: 9/10/2020	VERSION (PLAN BY):	Data Sources: RPS Nearmap 29/04/2020

Appendix I

BAL 29 building line: South-eastern subdivision

Legend

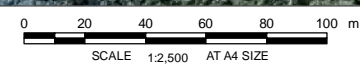
— Master Plan Layout

■ BAL - 29



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Appendix I : Bush Fire Hazard Assessment

LOCATION: NORTHTUNCURRY	Path: J:\JOBS\147855 North Tuncurry\10 - Drafting\Arcgis Map Documents\Bushfire\147855 App H Bushfire Hazard A A4 20201009.mxd	DATUM: GDA94 PROJECTION: MGA Zone 56
PURPOSE: BUSH FIRE Technician: Natalie.Wood Date: 9/10/2020	VERSION (PLAN BY):	Data Sources: RPS Nearmap 29/04/2020

CLIENT: LANDCOM
JOB REF: PR147855

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