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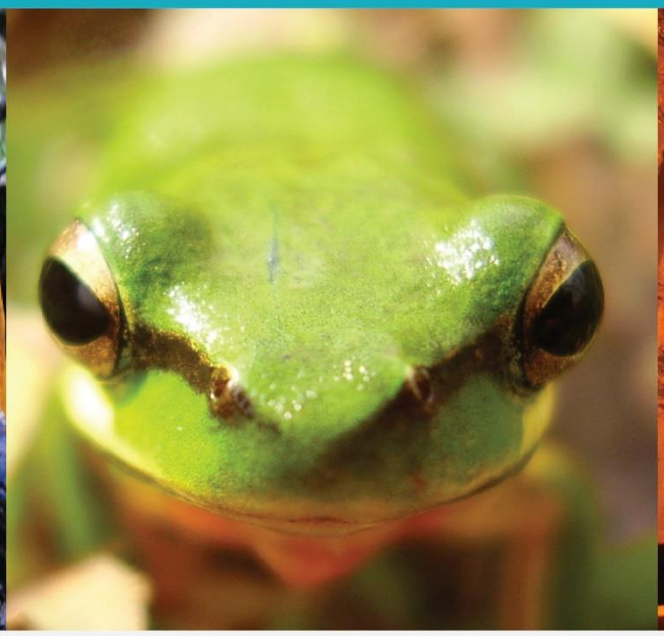

BUSH FIRE STRATEGIC STUDY

Proposed Development

Lots 3 & 4 DP 26902

10-12 Boondah Rd, Warriewood

8 June 2022

(REF: 18HEN03.3)

BUSH FIRE STRATEGIC STUDY

Proposed Residential Development

Lots 3 & 4 DP 26902

10-12 Boondah Rd, Warriewood

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File:	18HEN03.3

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

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The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features is to be confirmed by a registered surveyor.

EXECUTIVE SUMMARY

Travers bushfire & ecology has been engaged to undertake a bush fire strategic study for the development proposal located at No. 10-12 Boondah Road, Warriewood. The proposal will involve a rezoning of the site to support future medium density residential housing.

This report identifies matters for consideration for the planning proposal and highlights the required bushfire protection measures (including asset protection zones (APZs)) required for the future development of the site against Planning for Bush Fire Protection (PBP) 2019.

A strategic bush fire study (SBFS) has been conducted in conjunction with a bushfire protection assessment (BPA). The SBFS has analysed the potential and historic threats to the site, the current and projected access provisions and any adverse impacts on the existing and projected infrastructure serving the community.

Our assessment found that bushfire attack can potentially affect the development site from the Coastal Floodplain Wetland and Coastal Swamp Forest (endangered ecological community (EEC)) located within Warriewood Wetlands to the west, the retained Coastal Swamp Forest to the south and to a lesser extent the Coastal Swamp Forest associated with the creek line beyond Boondah Road to the east, resulting in possible ember and radiant heat attack.

The SBFS concludes that infrastructure is suitable for the expansion of residential development in the area. Demand on services is not considered to exceed the current provisions and will, in the future, be improved by natural growth, in response to projected increases in demand.

In recognition of the bushfire risk posed to the site by the surrounding bushland, Travers bushfire & ecology propose the following combination of bushfire measures;

- APZs in accordance with the acceptable solutions outlined within PBP 2019;
- Provision of access in accordance with the performance requirements outlined in PBP 2019;
- Water, electricity and gas supply in compliance with the acceptable solutions outlined in PBP 2019;
- Future dwelling construction in compliance with the appropriate construction sections of AS3959-2018, and PBP 2019.

GLOSSARY OF TERMS

AHIMS	Aboriginal Heritage Information System
APZ	asset protection zone
AS1596	*Australian Standard – The storage and handling of LP Gas*
AS2419	*Australian Standard – Fire hydrant installations*
AS3745	*Australian Standard – Planning for emergencies in facilities*
AS3959	*Australian Standard – Construction of buildings in bushfire-prone areas 2018*
BAL	*bushfire attack level*
BCA	*Building Code of Australia*
BSA	bushfire safety authority
DA	development application
DLUP	Development Land Use Plan
EEC	Endangered ecological community
EP&A Act	*Environmental Planning & Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
FFDI	forest fire danger index
IPA	inner protection area
LEP	Local Environmental Plan
LGA	local government area
m	metres
NCC	*National Construction Code*
OPA	outer protection area
PBP 2019	*Planning for Bush Fire Protection 2019*
PSBC	Post Subdivision Bush Fire Attack Level Certificate
RF Act	*Rural Fires Act 1997*
RFS	NSW Rural Fire Service
SFR	short fire run
SFPP	special fire protection purpose
TBE	*Travers bushfire & ecology*

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2. INTRODUCTION

Travers bushfire & ecology has been requested to undertake a bushfire protection assessment for the planning proposal associated with Lots 3 & 4 DP 26902, 10-12 Boondah Road, Warriewood.

The proposal is located on land mapped by *Northern Beaches Council* as being bushfire prone.

As such, the proposal is subject to the requirements of Section 9.1(2) of *the Environmental Planning and Assessment Act 1979 (EP&A Act)* which requires Council to consult with the Commissioner of the NSW Rural Fire Service and to take into account any comments by the Commissioner.

2.1 Aims of the assessment

The aims of the bushfire protection assessment are to:

- review the bushfire threat to the landscape
- undertake a bushfire attack assessment in accordance with *PBP 2019*
- provide advice on planning principles, including the provision of perimeter roads, asset protection zones (APZs) and other specific fire management issues
- review the potential to carry out hazard management over the landscape, taking into consideration the proposed retention of trees within the final development plans.

1.2 Project synopsis

The proposed rezoning aims to facilitate medium density residential development.

The site is currently zoned RU2 – Rural Landscape. The proposal seeks a rezoning of the site to R3 – Medium Density Residential and C2 Environmental Conservation (Figure 1.1).

Figure 1- 1 – Current zoning

(Source: Planning Portal 2022)

This report has been prepared for the proposed R3 zone portion of the site.

The bushfire constraints have been highlighted and asset protection zones (APZs) have been recommended, based on the concept plan. Recommendations have also been made for future road design, building construction and water supply.

Figure 1- 2 – Site layout

(Source: *Client supplied*)

2.2 Information collation

To achieve the aims of this report, a review of the information relevant to the property was undertaken prior to the initiation of field surveys. Information sources reviewed include the following:

- Biodiversity Constraints Assessment Report application prepared by *Travers bushfire & ecology* May 2022
- Pittwater Local Environmental Plan 2014
- *NearMap* aerial photography
- Topographical maps *DLPI of NSW* 1:25,000
- *Australian Standard 3959* – 2018 *Construction of buildings in bushfire-prone areas*
- *Planning for Bush Fire Protection 2019 – RFS*
- *Community Resilience Practice Notes 2/12 Planning Instruments and Policies.*

An inspection of the proposed development site and surrounds was undertaken by Tony Hawkins in April 2022 to assess the topography, slopes, aspect, drainage, vegetation and adjoining land use. The identification of existing bushfire measures and a visual appraisal of bushfire hazard and risk were also undertaken.

2.3 Site description

The proposed residential development site (proposed R3 zone) is confined within 10 & 12 Boondah Road, Warriewood within the local government Area (LGA) of Northern Beaches (refer Figure 1.4).

The property is adjoined to the north by high density residential development, to the south by managed land and a commercial shopping complex and to the east by Boondah Road and a strip of grazing land. Forested wetland vegetation extends beyond the grazing land to the north-east and adjoins the site boundary to the west, forming part of the broader Warriewood Wetlands landscape.

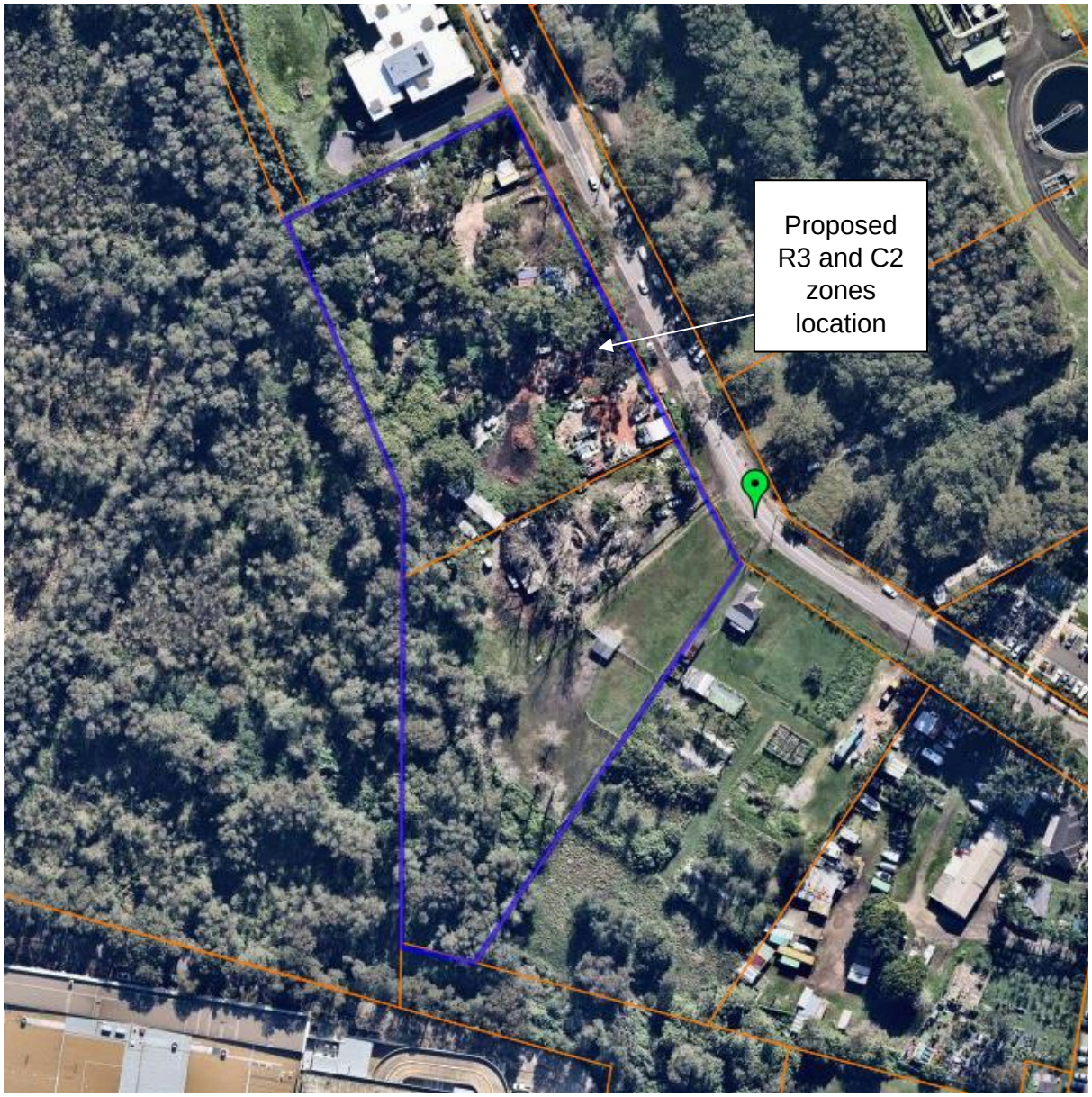

Figure 1- 3 – Aerial appraisal

(Source – NearMap 2022)

2.4 Legislation and planning instruments

2.4.1 Environmental Planning and Assessment Act 1979 (EP&A Act) and bushfire prone land

The *EP&A Act* governs environmental and land use planning and assessment within New South Wales. It provides for the establishment of environmental planning instruments, development controls and the operation of construction controls through the *National Construction Code (NCC).* The identification of bushfire prone land is required under Section 10.3 of the *EP&A Act*.

Bushfire prone land maps provide a trigger for the development assessment provisions. The proposed rezoning is located on land that is mapped by Northern Beaches Council as being bushfire prone – Category 1 vegetation (depicted red) and its associated buffer (depicted yellow) (refer Figure 1.5).

PBP stipulates that if a proposed amendment to land use zoning or land use affects a designated bushfire prone area then the Section 9.1(2) Direction No 4.4 of the *EP&A Act* must be applied. This requires Council to consult with the Commissioner of the RFS and to take into account any comments by the Commissioner and to have regard to the planning principles of *PBP* (detailed within Section 1.5.3).

Figure 1- 4 – Bushfire prone land map

(Source: NSW Planning portal)

2.4.2 Local Environmental Plan (LEP) and Development Control Plan (DCP)

An LEP provides for a range of zonings which list development that is permissible or not permissible, as well as the objectives for development within a zone. The proposal is to proceed as an amendment to the current *Pittwater LEP 2014.*

The site is currently zoned RU2 – Rural Landscape (refer Figure 1.1). The proposal seeks a rezoning of the site to R3 – Medium Density Residential and C2 Environmental Conservation.

The proposal, including the provision of APZs, would seek to comply with the objectives of the proposed rezoning.

2.4.3 Planning for Bush Fire Protection 2019 (PBP)

Bushfire protection planning requires the consideration of the RFS planning document entitled *PBP. PBP* provides planning principles for rezoning to residential land as well as guidance on effective bushfire protection measures.

The proposed concept masterplan has been assessed in compliance with *PBP 2019.* This includes a bush fire strategic study (Section 3 of this report) and assessment against the following bushfire protection measures to ensure that future development is capable of complying with *PBP 2019*:

- asset protection zones
- building construction and design
- access arrangements
- water supply and utilities
- landscaping
- emergency arrangements

2.4.4 National Construction Code (NCC) and the Australian Standard AS3959 Construction in bushfire-prone areas 2018 (AS3959)

The *NCC* is given effect through the *EP&A Act* and forms part of the regulatory environment of construction standards and building controls.

The *NCC* outlines objectives, functional statements, performance requirements and deemed to satisfy provisions. For residential dwellings these include Classes 1, 2 and 3 buildings. The construction manual for the deemed to satisfy requirements is *AS3959.*

Although consideration of *AS3959* is not specifically required in a rezoning proposal, this report (Section 3.3) provides the indicative bushfire attack level (BAL) setbacks based on the current concept plan to guide future planning within the site.

2.5 Environmental constraints

A review of the Biodiversity Constraints Assessment Report application prepared by this firm (dated May 2022) has been undertaken. The assessment identified two (2) endangered ecological communities (EEC) within the study area:

- Swamp Oak Floodplain Forest
- Bangalay Sand Forest

As outlined in the Biodiversity Constraints Assessment, the current concept layout follows previous advice to:

- Retain, and where appropriate restore, riparian habitat along Narrabeen Creek that ensures habitat connectivity is maintained in the locality; and
- Ensure that any proposal does not impact directly or indirectly on the high-quality habitat available in the adjacent Warriewood Wetlands to the west.

3. BUSHFIRE STRATEGIC STUDY

PBP 2019 includes the requirement to prepare a strategic bushfire study for rezoning applications. The level of information required is dependent upon the nature of the scale of the proposal, the bushfire risk and its potential impact upon the wider infrastructure network.

The Strategic Bush Fire Study is designed to assess whether new development is appropriate in the bushfire hazard context. It also provides the ability to assess the strategic implications of future development for bushfire mitigation and management.

The following Table 2.1 assesses the proposed development in terms of the broader bushfire landscape, land use, access and egress and associated infrastructure.

The following Sections 3-5 outline the relevant performance criteria to be achieved for future development in accordance within *PBP 2019.*

Table 2- 1– Bushfire strategic study.

Issue	Detail	Assessment considerations	Proposal's compliance

Bushfire landscape assessment	A bushfire landscape assessment considers the likelihood of a bushfire, its potential severity and intensity and the potential impact on life and property in the context of the broader surrounding landscape.	• The bushfire hazard in the surrounding area, including:
		  ○ vegetation
		  ○ topography
		  ○ weather
		• The potential fire behaviour that might be generated based on the above
		• Any history of bushfire in the area
		• Potential fire runs into the site and the intensity of such fire runs.
			The site is located within a moderately developed landscape with managed / developed land adjoining the site to the north and south.
			
			The land adjoining the site to the west is zoned C2 Environmental Conservation and forms part of the Warriewood Wetlands. The wetlands support existing broad walks and pedestrian tracks which connect to further wetlands in the west. The land beyond Boondah Road to the east supports a narrow (<30 metre) strip of grazed vegetation (horse paddock) with a narrow strip of Coastal Swamp Forest located beyond. This land is owned and managed by *Sydney Water.*
			
			The topography within the adjacent bushland to the west is level to upslope.
			
			Figure 2.1 provides fire history information for the site and surrounding area. Whilst bush fire has not impacted the property, the land located >1km to the west (Cottage Point) was impacted by the 1994 bush fires.

Issue	Detail	Assessment considerations	Proposal's compliance
			Although there is no recorded history of bush fire impacting the site, it should not be assumed that fire may not impact the site in the future. With consideration of the vegetation type and presence of relatively moist ground conditions, a period of prolonged drought or high fire danger weather conditions could be conducive to a fire of significant intensity, albeit limited to a small area. To achieve an appropriate level of bushfire protection measures to mitigate the impact of such a fire, the assessment of the bushfire threat (Section 4 of this report) and protection measures (Section 5) should be adopted. Potential fire runs affecting the site from the west and east have been identified and are assessed in Section 4 of this report)
Land use assessment	The land use assessment will identify the most appropriate locations within the masterplan area or site layout for the proposed land uses.	• The risk profile of different areas of the development layout based on the above landscape study; • The proposed land use zones and the resultant permitted land uses; • The most appropriate siting of different land uses based on risk profiles within the site (i.e. not locating development on ridge tops, SFPP development to be located in lower risk areas of the site);	The APZs identified in the report are based on a standard residential development, with the bushfire threat (identified as a medium risk) due to the location of the proposed buildings within the site. Appropriate APZs can be provided based on this risk whilst taking into account the ecological constraints (i.e. retention of the EEC vegetation to the south) with consequent reductions in clearing of sensitive vegetation where appropriate and possible. The wider landscape, taking into account surrounding land uses, is a mixture of residential, commercial and conservation. It is envisioned that further residential and

Issue	Detail	Assessment considerations	Proposal's compliance
		• The impact of the siting of these uses on APZ provision.	commercial development will occur in the area, however the current conservation areas of vegetation are likely to remain and may be expanded. Achieving a balance of these uses is critical to the provision of community safety from wild fire impact. In this proposal, APZ areas and access provisions can be provided to achieve an acceptable level of protection. Existing development has been utilised to bolster protection for the proposal. The introduction of further development should follow this general principle, where developments complement each other in the provision of protection.
Access and egress	A study of the existing and proposed road networks both within and external to the masterplan area or site layout.	• The capacity for the proposed road network to deal with evacuating residents and responding emergency services, based on the existing and proposed community profile; • The location of key access routes and direction of travel; • The potential for development to be isolated in the event of a bushfire.	Public access into the site will be provided from three (3) access points to Boondah Road to the east. This existing network provides sufficient and safe egress away from the direct threat of bushfire into areas of highly managed land. A fire trail access located on the southern boundary provides additional access and egress options for residents and emergency services.
Emergency services	An assessment of the future impact of new development on	• Consideration of the increase in demand for emergency services responding to a bushfire	Ingleside Rural Fire Brigade (RFB) has a station located at King Road, Ingleside, approximately 6km to the north-west, and Tumbledown Dick RFB a further 2 km to the west. Fire

Issue	Detail	Assessment considerations	Proposal's compliance
	emergency services provision.	emergency (including the need for new stations / bridges); • Impact on the ability of emergency services to carry out fire suppression in a bushfire emergency.	Rescue NSW (FRNSW) Stations are located at Narrabeen (approx. 3km) and Avalon (approx. 3km). This service is considered adequate and no further stations are required. The proposed development will comply with *PBP* with the provision of access to the bushfire hazard (perimeter road), APZs and building construction standards will increase the site's resilience to bushfire attack and improve firefighting access.
Infrastructure	An assessment of the issues associated with infrastructure provision.	• The ability of the reticulated water system to deal with a major bushfire event (particularly in terms of water pressure); • Life safety issues associated with fire and proximity to high voltage power lines, natural gas supply lines etc.	The current and projected future services capacity should be the subject of a separate study and analysis to be carried out by the consent authority or a suitably qualified person. It is however, envisaged that any residential or commercial density increase would be accompanied by necessary upgrades to infrastructure where appropriate and required.
Adjoining land	The impact of new development on adjoining landowners and their ability to undertake bushfire management.	• Consideration of the implications of a change in land use on adjoining land including; ○ The ability of adjoining and nearby land to carry a bushfire;	The proposed development will provide for *PBP* complying bushfire protection measures with all measures being implemented within the site. Adjoining landholders are not required to increase their bushfire management responsibility.

Issue	Detail	Assessment considerations	Proposal's compliance
		○ Consideration of increased pressure on adjoining landowners to introduce or increase BPMs through the implementation of Bush Fire Management Plans as a result of the changes in land use.	

Legend

- Development site boundary
- Fire history (NSW RFS 2019)

Aerial source: Nearmap

0 100 200 m

Disclaimer: The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered surveyor.

PROJECT & MXD REFERENCE	DATE & ISSUE NUMBER	SCALE & COORDINATE SYSTEM
10-12 Boondah Rd, Warriewood 18HEN03_BF002	9/08/2019 Issue 1 EB	1:10,000 @A3 GDA 1994 MGA Zone 56

TITLE

Fire history

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4. BUSHFIRE THREAT ASSESSMENT

To assess the bushfire threat and to determine the required width of an APZ for a development, a review of the elements that comprise the overall threat needs to be completed.

PBP provides a methodology to determine the size of any APZ that may be required to offset possible bushfire attack. These elements include the potential hazardous landscape that may affect the site and the effective slope within that hazardous vegetation.

4.1 Hazardous fuels

PBP guidelines require the identification of the predominant vegetation formation in accordance with David Keith (2004) to determine APZ distances for new developments.

The hazardous vegetation is calculated for a distance of at least 140m from a proposed development boundary and has been confirmed by ecological studies undertaken by this firm. These plant community types (PCTs) have been converted to vegetation class / formation using the Bionet Vegetation Classification website available via the following link;

http://environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx?ReturnUrl=%2fNSWVCA20PRapp%2fTimeout.aspx

The vegetation posing a threat to the planning proposal is summarised in Table 3.1 below and is depicted in Schedule 1.

Table 3- 1 – Vegetation communities

Aspect	PCT code	Vegetation community type (verified by *Travers bushfire & ecology*, 2019)	Keith vegetation formation (*Pre-release PBP*)	Vegetation class / comprehensive vegetation fuel load
North-west, south and east (beyond Boondah Road)	1232	Swamp Oak floodplain swamp forest	Forest	Forested Wetland / Coastal Swamp Forest **22.6/34.1 t/ha**
West (Warriewood Wetland)	1236	Swamp Paperbark – Swamp Oak tall shrubland	Forested Wetland	Forested Wetland / Riverine Forest **8.2/15.1 t/ha**
West (refer Note 1)	781	Coastal Freshwater Lagoon	Freshwater Wetland	Freshwater wetland **4.4/4.4 t/ha**

Note 1: The predominant vegetation to the west of the site has been determined as forested wetland (supports a higher fuel load than freshwater wetland) based on the extensive area and predominance of this vegetation type.

4.2 Effective slope

The effective slope is assessed for a distance 100m. Effective slope refers to that slope which provides the most effect upon likely fire behaviour. A mean average slope may not in all cases provide sufficient information such that an appropriate assessment can be determined. The effective slope within the hazardous vegetation is level.

4.3 Bushfire attack assessment

A fire danger index (FDI) of 100 has been used to calculate bushfire behaviour on the site based on its location within the Greater Sydney Region.

Table 3.2 provides a summary of the bushfire attack assessment for future residential development in accordance with Table A1.12.5 of *PBP*. The following table is to be read in conjunction with Schedule 1 attached.

Table 3- 2 – Bushfire attack assessment

Aspect	Vegetation formation within 140m of development	Effective slope of land	Minimum APZ required *PBP 2019* (metres)	APZ provided (metres)	Indicative bushfire construction standards
East	Coastal Swamp Forest (beyond Boondah Road)	Level	24	26	BAL 29 (refer Note 1)
West	Coastal Swamp Forest (within Warriewood Wetland)	Level	24	24	BAL 29 (refer Note 1)
North	Managed	N/A	N/A	>100	BAL 29 (refer Note 1)
South	Managed	N/A	N/A	>100	BAL 29 & 19 (refer Note 1)

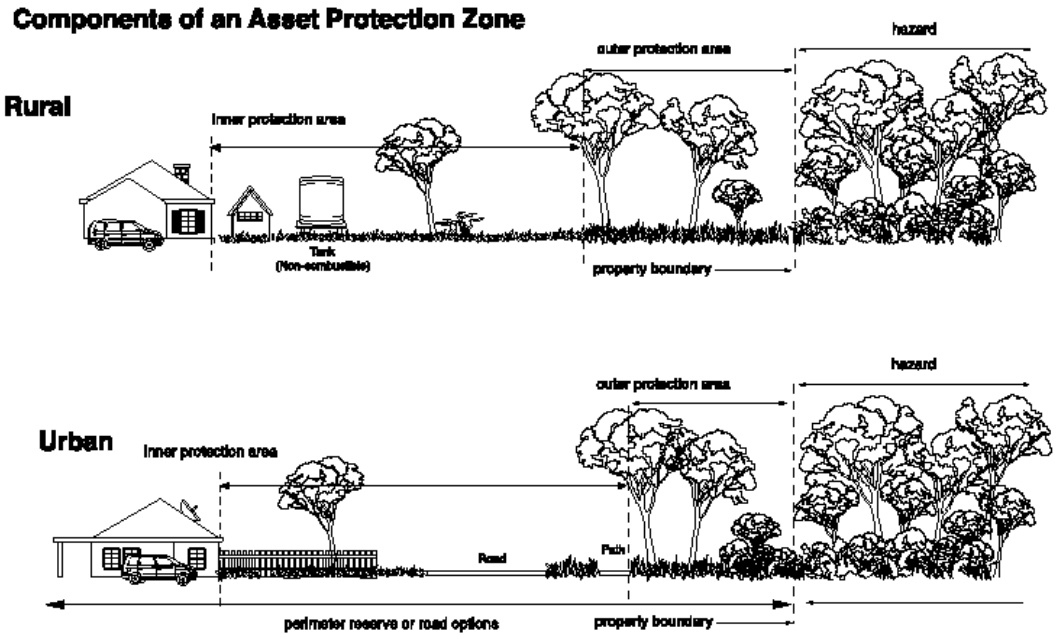
Note 1*:* The BAL levels for these aspects are determined by the BAL rating applied to the hazard side of the building. The implementation of the construction standards is such that

where a building has direct exposure to a particular level of bushfire attack, then that construction standard shall apply. Where a particular elevation of the same building is completely shielded from the impacts (i.e. on the leeward side), then the construction requirements may be downgraded by one level of construction – for example, a BAL 29 building may have the rear (shielded) elevation downgraded to BAL 19. The roof is required to be constructed to the higher level.

5. SPECIFIC PROTECTION ISSUES

5.1 Asset protection zones (APZs)

APZs are areas of defendable space separating hazardous vegetation from buildings. The APZ generally consists of two (2) subordinate areas, an inner protection area (IPA) and an outer protection area (OPA). The OPA is closest to the bush and the IPA is closest to the dwellings. The IPA cannot be used for habitable dwellings but can be used for all external non-habitable structures such as pools, sheds, non-attached garages, cabanas, etc. A typical APZ and therefore defendable space is graphically represented below:



APZ design Source: RFS, 2006

Note: Vegetation management as shown is for illustrative purposes only. Specific advice is to be sought in regard to vegetation removal and retention from a qualified and experienced expert to ensure APZs comply with the *RFS* performance criteria.

PBP dictates that the subsequent extent of bushfire attack that can potentially emanate from a bushfire must not exceed a radiant heat flux of 29kW/m^2 for residential subdivision. This rating assists in determining the size of the APZ in compliance with Appendix 2 of *PBP* to provide the necessary defendable space between hazardous vegetation and a building.

Table 4.1 outlines the proposal's compliance with the performance criteria for APZs.

Table 4- 1 – Performance criteria for asset protection zones (PBP 2019 guidelines)

Performance criteria	Acceptable solution	Acceptable solution	Performance solution	Comment
Potential building footprints will not be exposed to radiant heat levels exceeding 29 kW/m^2 on each proposed lot.	APZs are provided in accordance with Tables A1.12.2 and A1.12.4 based on the FDI.	☑		Refer Section 2.3. A deemed to satisfy approach has been undertaken using Table A1.12.5 of *PBP* 2019.
APZs are managed and maintained to prevent the spread of a fire towards the building.	NOTE:A APZs are managed in accordance with the requirements of Appendix 4.	☑		The APZ consists of landscaped areas, roads and turfed areas.
The APZ is provided in perpetuity.	APZs are wholly within the boundaries of the development site.	☑		APZs are within the site boundary.
APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	APZs are located on lands with a slope less than 18 degrees.	☑		APZs are on slopes of <18 degrees.

5.2 Building protection

Building construction standards for the proposed future buildings are to be applied in accordance with *AS3959 Construction of buildings in bushfire prone areas (2018)* and *Planning for Bush Fire Protection 2019.*

Building construction standards have been outlined within Table 3.2 and are depicted in Schedule 1 attached.

The BAL assessment provided in Table 3.2 is based on a deemed to satisfy approach in compliance with Table A1.12.5 of *PBP 2019.*

5.3 Hazard management

The APZ is to be managed as an inner protection area (IPA) in line with the NSW RFS guidelines *Standards for Asset Protection Zones (RFS, 2005),* with landscaping to comply with Appendix 4 of *PBP.*

A summary of the guidelines for managing APZs is attached as Appendix 1 to this report.

5.4 Access for firefighting operations

Public access into the site will be provided via three (3) points from Boondah Road in the east, including a main entrance serviced by a roundabout.

The current concept plan provides for three (3) public roads which will run approximately north east to south west from Boondah road, and a north south road linking the western ends of the aforementioned roads. These roads are to be provided with a minimum 5.5m carriageway width.

The north south road will form a perimeter road, allowing firefighting access to the vegetation to the west. A perimeter road is existing via Boondah road to the east, and managed land to the north and south precludes the requirement for a perimeter road. Although not meeting the criteria of a perimeter road, access will be provided via a 4-6m wide roadway on the southern boundary. It is recognized that access to the southern boundary may be required and advantageous in the event of a fire emanating from the west or east.

It is recommended that the short dead end road located in the south western corner of the site be linked to the 4-6m access provided on the southern boundary.

Table 4.2 outlines the performance criteria and acceptable solutions for future public roads.

Table 4- 2 – Performance criteria and acceptable solutions for access for residential and rural subdivisions (PBP 2019)

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
ACCESS (GENERAL REQUIREMENTS)	Firefighting vehicles are provided with safe, all weather access to structures and hazard vegetation.	Perimeter roads are provided for residential subdivisions of three or more allotments;		☑	Perimeter roads are provided where necessary and required.
		Subdivisions of three or more allotments have more than one access in and out of the development;	☑		Access is available via three access points onto Boondah Road.
		Traffic management devices are constructed to not prohibit access by emergency services vehicles;	☑		Future road design is to comply with the acceptable solutions.
		Maximum grades for sealed roads do not exceed 15 degrees and an average grade of no more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient;	☑		Complies.
		All roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200m in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end;	☑		A dead end road is proposed to the southern portion of the site, however is less than 200m in length and is recommended to connect to

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
					the southern boundary fire trail.
		Where kerb and guttering are provided perimeter roll top kerbing should be used to the hazard side of the road;	☑		Can comply
		Where access / egress can only be achieved through forest, woodland or heath vegetation, secondary access shall be provided to an alternate point on the existing public road system;	☑		N/A
	The capacity of access roads is adequate for firefighting vehicles.	The capacity of perimeter and non-perimeter road surfaces and any bridges / causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges / causeways are to clearly indicate load rating;	☑		Future road design is to comply with the acceptable solutions.
	There is appropriate access to water supply.	Hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression;	☑		
		Hydrants are provided in accordance with AS2419.1:2005;	☑		

Performance criteria		Acceptable solution	Acceptable solution	Performance solution	Comment
		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	Access roads are designed to allow safe access and egress for medium rigid 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.	Perimeter roads are two-way sealed roads;		☑	A perimeter road is proposed to the west of the development and can comply with the acceptable solutions.
		8m carriageway width kerb to kerb;		☑	
		Parking is provided outside of the carriageway width;		☑	
		Hydrants are located clear of parking areas;		☑	
		There 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° and average grade is 10°;		☑	
		The road crossfall does not exceed 3°;		☑	
		A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.		☑	

NON-PERIMETER ROADS	Access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while residents are evacuating.	Minimum 5.5m width kerb to kerb;	☑		Future road design is to comply with the acceptable solutions.
		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°;	☑		
		A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	☑		

5.5 Water supplies

Table 4.3 outlines the proposal's compliance with the acceptable solutions for reticulated water supply.

Table 4- 3 – Performance criteria for reticulated water supplies (PBP 2019 guidelines)

Performance criteria	Acceptable solution	Acceptable solution	Performance solution	Comment
A water supply is provided for firefighting purposes.	Reticulated water is to be provided to the development, where available;	☑		Future water supply is to comply with the acceptable solutions.
	A static water supply is provided where no reticulated water is available;	N/A		
Water supplies are located at regular intervals. The water supply is accessible and reliable for firefighting operations.	Fire hydrant spacing, design and sizing comply with the *Australian Standard AS2419.1:2005;*	☑		
	Hydrants are not located within any road carriageway;	☑		
	Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads;	☑		
Flows and pressure are appropriate.	Fire hydrant flows and pressures comply with *AS2419.1:2005;*	☑		
The integrity of the water supply is maintained.	All above-ground water service pipes are metal, including and up to any taps;	☑		

5.6 Gas

Table 4.4 outlines the required performance criteria for the gas supply.

Table 4- 4 – Performance criteria for gas supplies (PBP 2019 guidelines)

Performance criteria	Acceptable solution	Acceptable solution	Performance solution	Comment
Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	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;	☑		Future gas supply is to comply with the acceptable solutions.
	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;	☑		
	Above-ground gas service pipes are metal, including and up to any outlets.	☑		

5.7 Electricity

Table 4.5 outlines the required performance criteria for electricity supply.

Table 4- 5 – Performance criteria for electricity services (PBP 2019 guidelines)

Performance criteria	Acceptable solution	Acceptable solution	Performance solution	Comment
Location of electricity services	Where practicable, electrical transmission lines are underground;	☑		Future electricity supply is to

limits the possibility of ignition of surrounding bush land or the fabric of buildings.	Where overhead, electrical transmission lines are proposed as follows: • lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas; • 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.*	☑		comply with the acceptable solutions.

6. CONCLUSION & RECOMMENDATIONS

6.1 Conclusion

Travers bushfire & ecology has been engaged to undertake a strategic bushfire study and bushfire assessment for the planning proposal located at No. 10-12 Boondah Road , Warriewood.

The strategic bush fire study and analysis shows that the development should not impose any undue additional demand on services and that existing services are adequate. As part of an overall change in land use occurring in the surrounding area, the propose development is appropriate and supported.

Our bushfire protection assessment found that bushfire attack can potentially affect the development site from the Coastal Floodplain Wetland and Coastal Swamp Forest (EEC) located within Warriewood Wetlands to the west, the retained Coastal Swamp Forest to the south and to a lesser extent the Coastal Swamp Forest associated with the creek line beyond Boondah Road to the east, resulting in possible ember and radiant heat attack.

In recognition of the bushfire risk posed to the site by the surrounding bushland, *Travers bushfire & ecology* propose the following combination of bushfire measures;

- APZs in accordance with the acceptable solutions outlined within *PBP 2019;*
- Provision of access in accordance with the performance requirements outlined in *PBP 2019*;
- Water, electricity and gas supply in compliance with the acceptable solutions outlined in *PBP 2019;*
- Future dwelling construction in compliance with the appropriate construction sections of *AS3959-2018*, and *PBP 2019*.

The following recommendations are provided to ensure that future residential development is in accordance with, or greater than, the requirements of *PBP.*

6.2 Recommendations

Recommendation 1 - APZs are to be provided to the future residential development as generally depicted in Schedule 1 attached.

Recommendation 2 - The APZ is to be managed as an IPA as outlined within Section 4.1.3 and Appendix 4 of *Planning for Bush Fire Protection 2019* and the NSW Rural Fire Service document *'Standards for asset protection zones'.*

Recommendation 3 - Building construction standards for the proposed future buildings are to be applied in accordance with *AS3959 Construction of buildings in bushfire prone areas (2018)* or *NASH Standard* (1.7.14 updated) *National Standard Steel Framed Construction in Bushfire Areas - 2014* as appropriate and *PBP 2019.*

Recommendation 4 - Access is to comply with the performance criteria outlined in Section 5.3 of *Planning for Bush Fire Protection 2019.*

Recommendation 5 - Water, electricity and gas supply is to comply with the acceptable solutions as provided within Section 5.3c of *PBP* 2019 (refer Sections 4.5, 4.6 and 4.7 of this report).

Recommendation 6 – The dead end road located in the south western corner of the site should be linked to the southern boundary fire trail.

REFERENCES

Australian Building Codes Board (2019) – *Building Code of Australia*, Class 1 and Class 10 Buildings Housing Provisions Volume 2.

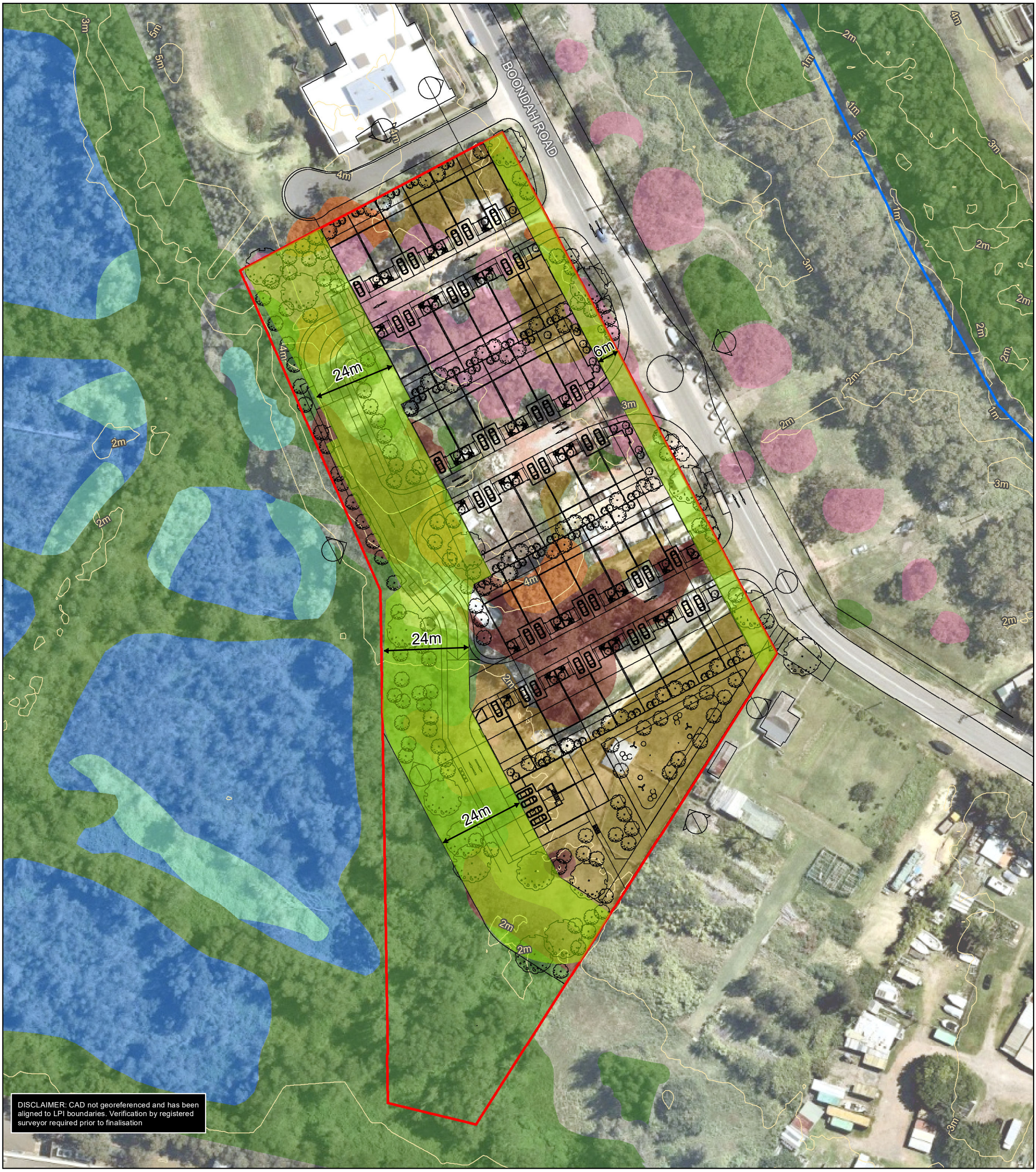
Councils of Standards Australia AS3959 (2018) – *Australian Standard Construction of buildings in bush fire-prone areas.*

Keith, David (2004) – *Ocean Shores to Desert Dunes – The Native Vegetation of New South Wales and the ACT*. The Department of Environment and Climate Change.

Rural Fire Service (2019) –*Planning for bushfire protection– a guide for councils, planners, fire authorities and developers*. NSW Rural Fire Service.

Tan, B., Midgley, S., Douglas, G. and Short (2004) - *A methodology for assessing bushfire attack.* RFS Development Control Service.

SCHEDULE 1. PLAN OF BUSHFIRE PROTECTION MEASURES



Legend

- Site boundary (source - LPI)
- Asset Protection Zone (APZ)
- Contour 1m (source - LiDAR)
- Watercourse

Vegetation Communities

Threatened Ecological Community (TEC)

- PCT 781 - Coastal Freshwater Lagoons
- PCT 1232 - Swamp Oak Floodplain Swamp Forest (poor) (0.44ha) (Impacted 0.26ha)
- PCT 1236 - Swamp Paperbark - Swamp Oak Tall Shrubland
- PCT 1793 - Smooth-barked Apple - Bangalay / Tuckeroo - Cheese Tree Open Forest (poor) (Impacted 0.23ha)

(non TEC)

- Planted and derived exotic vegetation (Impacted 0.27ha)
- Planted native vegetation *(E. microcorys)* (Impacted 0.10ha)
- Pasture and weeds (impacted 0.48ha)

TRAVERS BUSHFIRE & ECOLOGY
A TBE ENVIRONMENTAL COMPANY

PROJECT & MXD REFERENCE
10 & 12 Boondah Road, Warriewood
18HEN03.3_BF001

DATE & ISSUE NUMBER
6/06/2022
Issue 1
KM

SCALE & COORDINATE SYSTEM
1:1,000 @ A3
GDA 1994 MGA Zone 56

0 25 50 m

TITLE

Schedule 1 - Bushfire Protection Measures

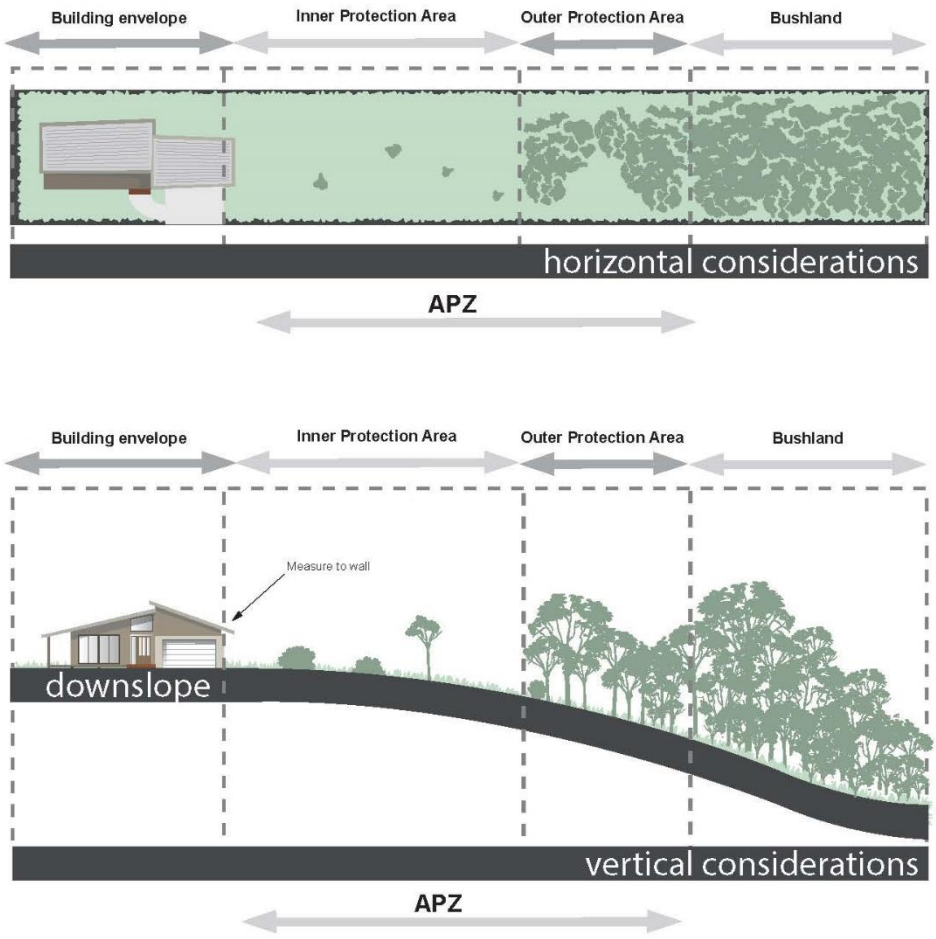
Document Path: N:\GIS STORAGE\N Drive\18HEN03 BoondahRd Warriewood\MXDs\18HEN03.3 BF001.mxd

Disclaimer: The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered surveyor.

APPENDIX 1. MANAGEMENT OF ASSET PROTECTION ZONES

The RFS provides basic advice in respect of managing APZs through documents such as, *Standards for Asset Protection Zones* (RFS, 2005), with landscaping to comply with Appendix 4 of *PBP*.

The APZ generally consists of two subordinate areas, an inner protection area (IPA) and an outer protection area (OPA). The OPA is closest to the bush and the IPA is closest to the dwellings. The property is to be managed to IPA standards only. A typical APZ is graphically represented below.



APZs and progressive reduction in fuel loads

(Source: PBP, 2019)

> **Note:** Vegetation management as shown is for illustrative purposes only. Specific advice is to be sought regarding vegetation removal and retention from a qualified and experienced expert to ensure APZs comply with the RFS performance criteria.

The following provides maintenance advice for vegetation within the IPA and OPA. The APZ is to be maintained in perpetuity and should be undertake regularly, particularly in advance of the bushfire season.

Inner protection area (IPA)

Fuel loads within the IPA are to be maintained so it does not exceed 4t/ha.

Trees are to be maintained to ensure;

- canopy cover does not exceed 15% at maturity;
- trees (at maturity) do not touch or overhang the building;
- lower limbs should be removed up to a height of 2m above ground;
- tree canopies should be separated by 2 to 5m; and
- preference should be given to smooth barked and evergreen trees.

Shrubs are to be maintained to ensure;

- create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings;
- shrubs should not be located under trees;
- shrubs should not form more than 10% of ground cover; and
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of vegetation.

Grass is to be maintained to ensure:

- grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and
- leaves and vegetation debris should be removed (litter fuel within the IPA should be kept below 1cm)

General advice for landscaping is provided below:

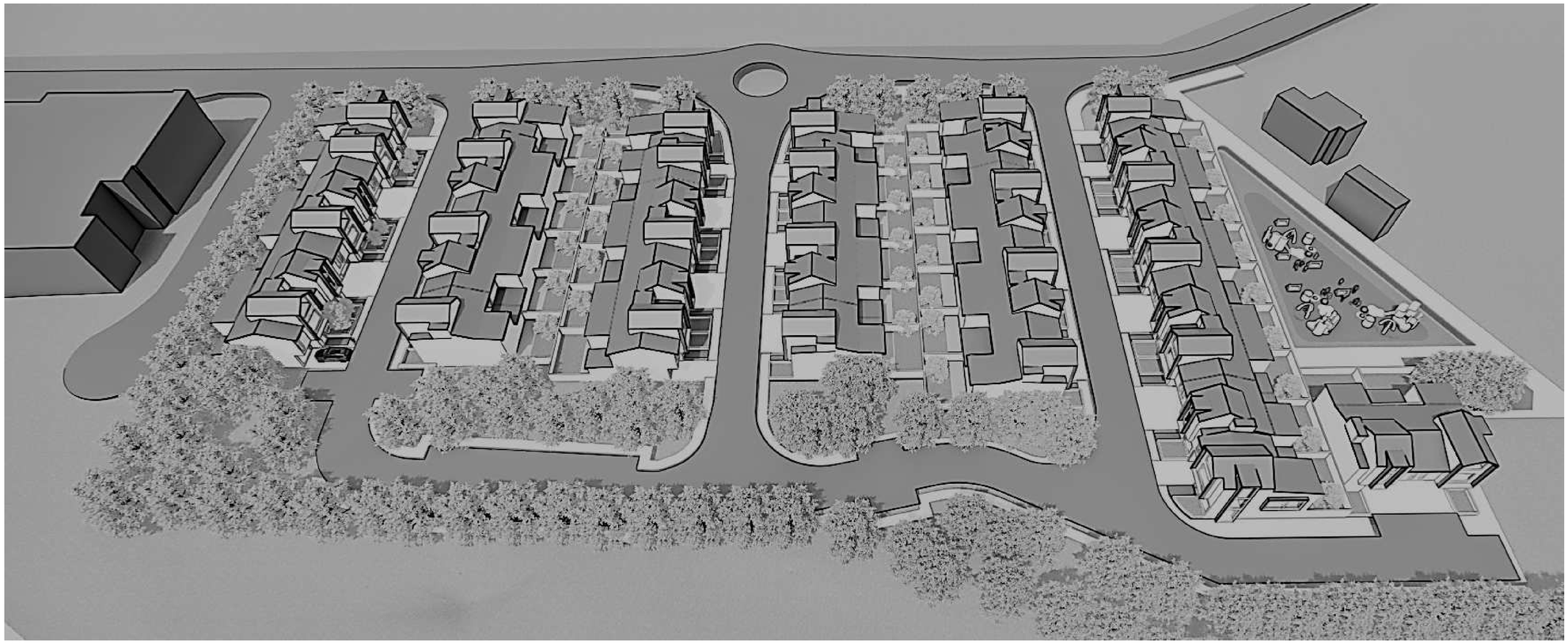
- Suitable impervious areas being provided immediately surrounding the building such as courtyards, paths and driveways;
- Restrict planting in the immediate vicinity of the building which may over time and if not properly maintained come into contact with the building;
- When considering landscape species consideration needs to be given to estimated size of the plant at maturity;
- Avoid species with rough fibrous bark, or which retain/shed bark in long strips or retain dead material in their canopies;
- Use smooth bark species of trees species which generally do not carry a fire up the bark into the crown;
- Avoid planting of deciduous species that may increase fuel at surface / ground level (i.e. leaf litter);
- Avoid climbing species to walls and pergolas;
- Locate combustible materials such as woodchips / mulch, flammable fuel stores away from the building;

- Locate combustible structures such as garden sheds, pergolas and materials such timber garden furniture way from the building; and

- Use of low flammability vegetation species.

APPENDIX 2. SITE PLANS

10-12 BOONDAH ROAD AND 6 JACKSON ROAD AND BOONDAH PLAYING FIELDS - PLANNING PROPOSAL



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AMP-0001	COVER SHEET	6
AMP-0102	SITE PLAN	6
AMP-2001	LEVEL G	6
AMP-2002	LEVEL 1	
AMP-2003	LEVEL 2	
AMP-2005	ROOF PLAN	
AMP-2300	LAYOUT - STANDARD HOUSINGS TYPE 1	5
AMP-2301	LAYOUT - CORNER HOUSINGS TYPE 2	5
AMP-2303	LAYOUT - STANDARD HOUSING TYPE 2	3
AMP-4000	ELEVATIONS & SECTIONS	4
AMP-9901	3D VIEWS-SHEET -01	4
AMP-10001	PRELIMINARY CONCEPT PLAN (L)	1

DRAFT

Project
WARRIEWOOD
10 Boondah Rd, Warriewood, New South Wales 2102

Project Number
10

Status

Rev.	Date	Description	Iss.	Appr.
1	28/04/2022	DRAFT	SA	AP
2	05/05/2022	DRAFT	SA	AP
3	13/05/2022	DRAFT	RW	AP
4	18/05/2022	DRAFT	RW	AP
5	24/05/2022	DRAFT	RW	AP
6	27/05/2022	DRAFT	RW	AP

Drawing Number
AMP-0001

Nominated Architect: Anthony Palamara NSW ARN 7274

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Site Plan

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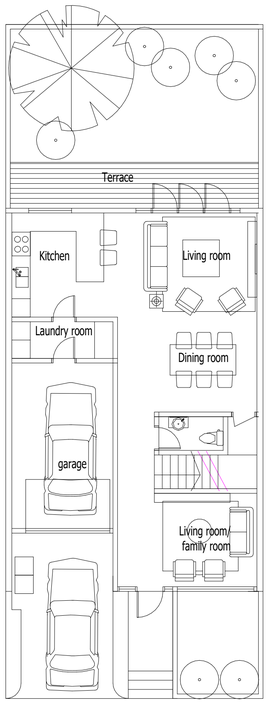

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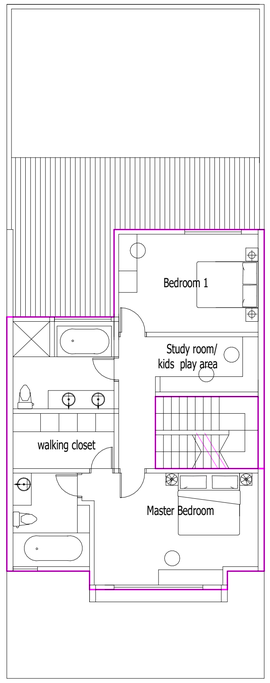

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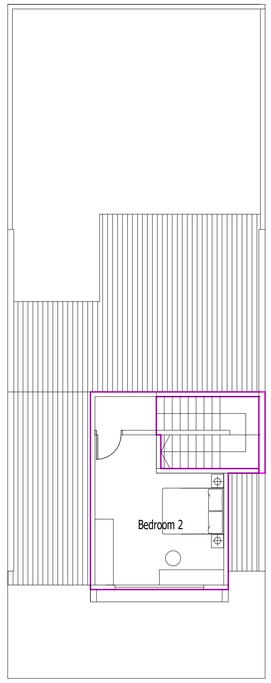

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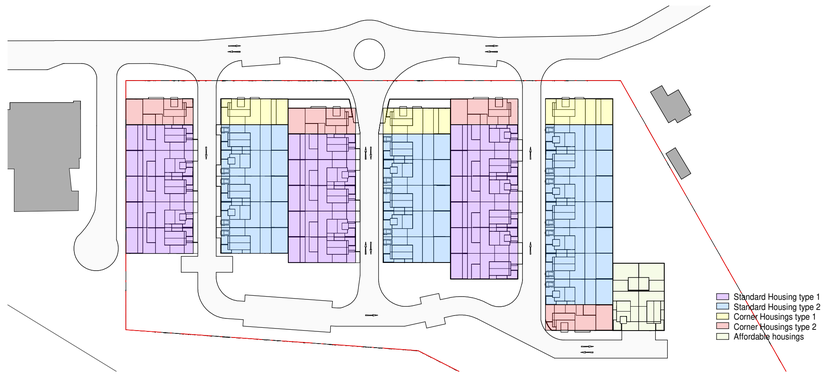

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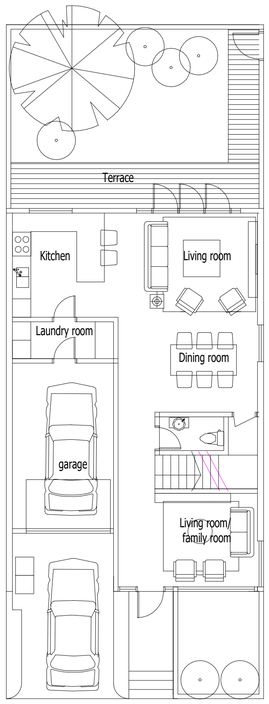

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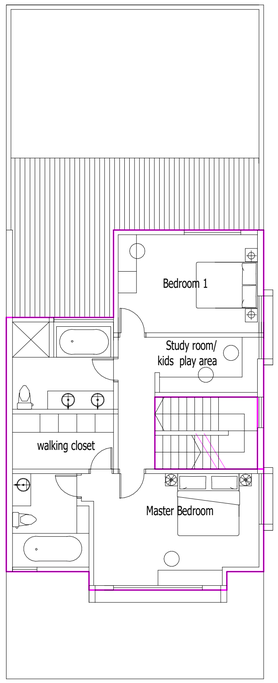

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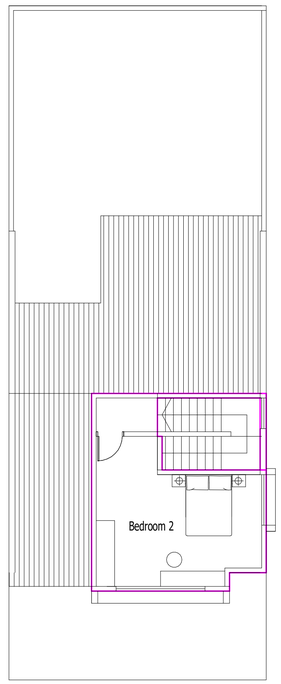

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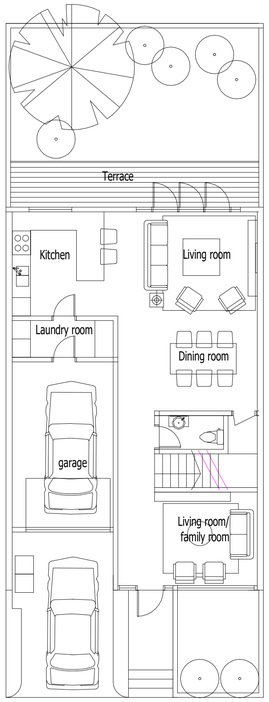

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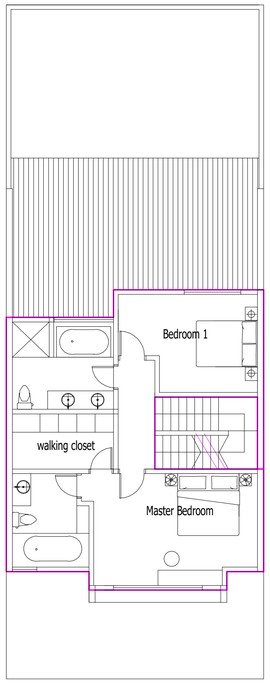

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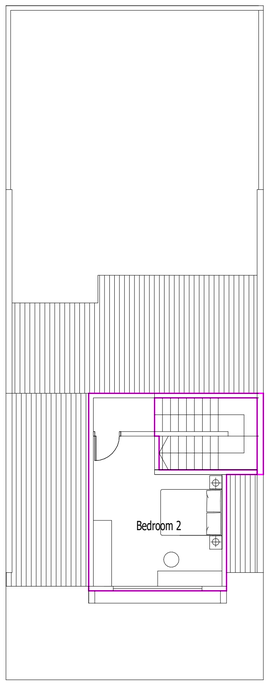

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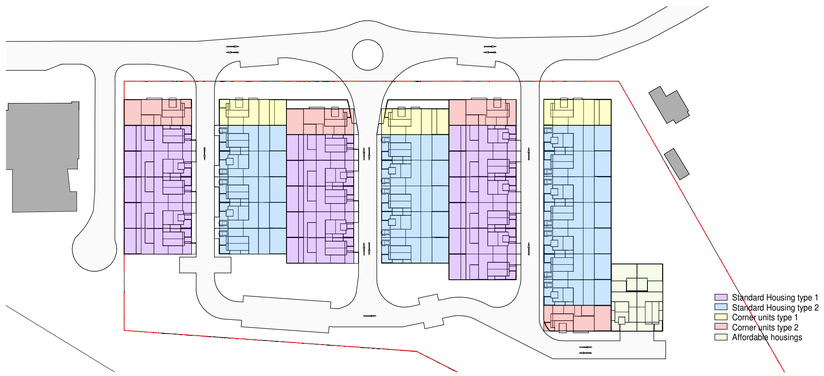

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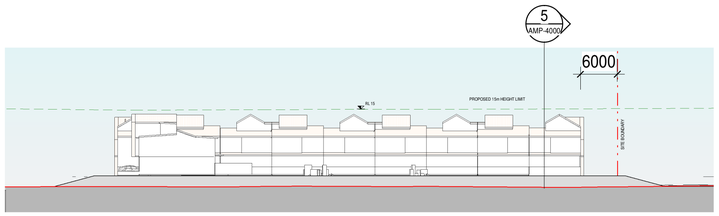

1 - 8 BOONDAH ROAD STREET VIEW

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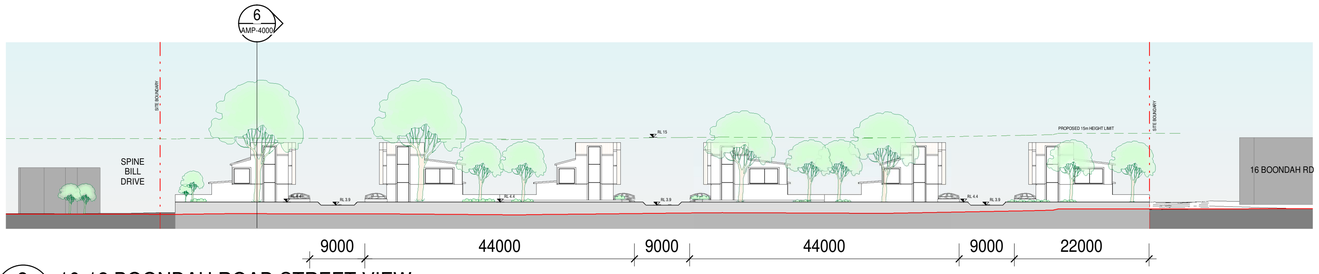

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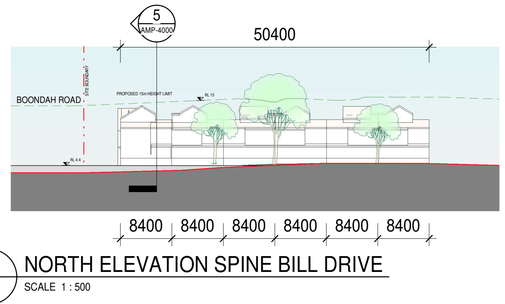

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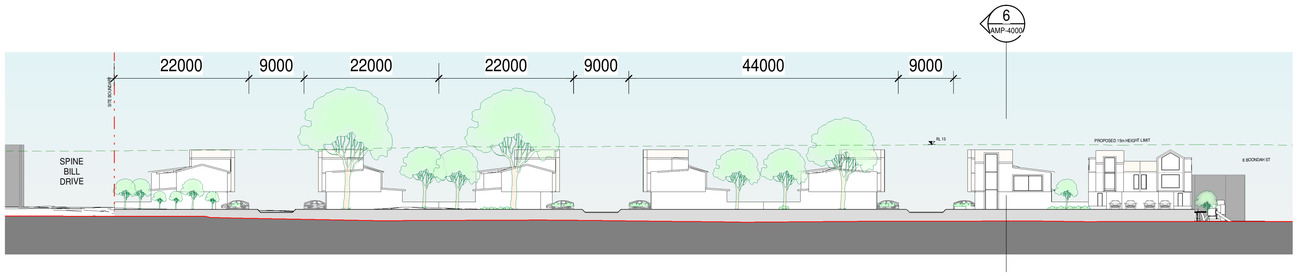

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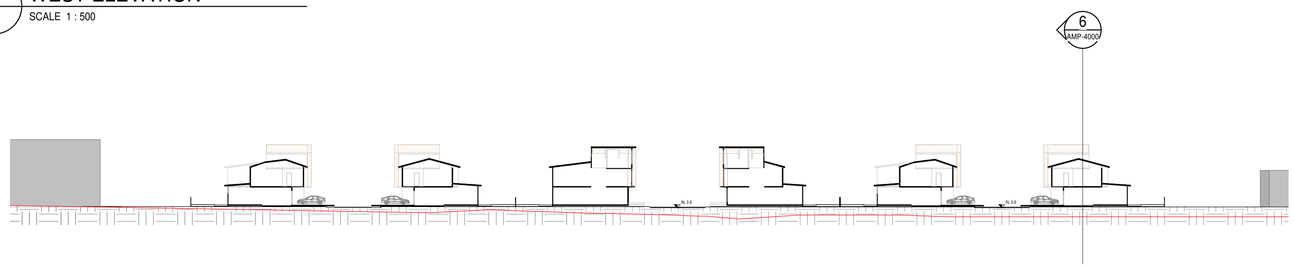

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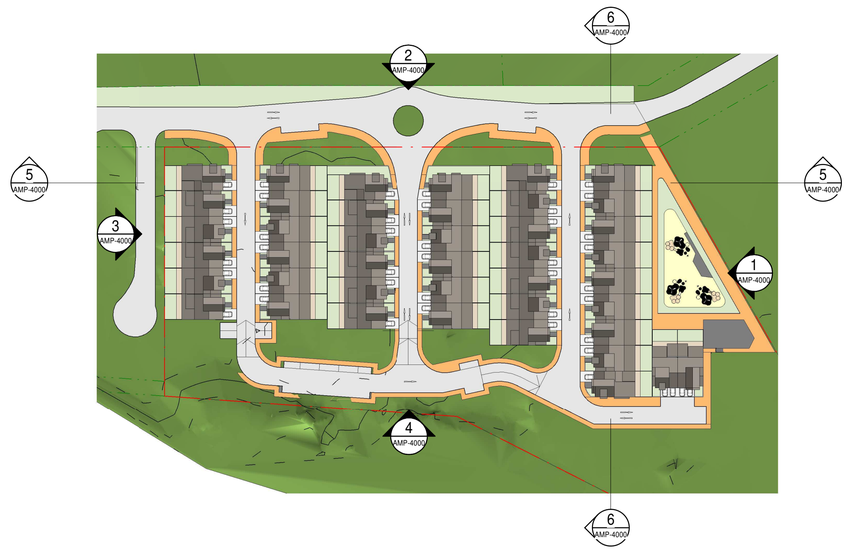

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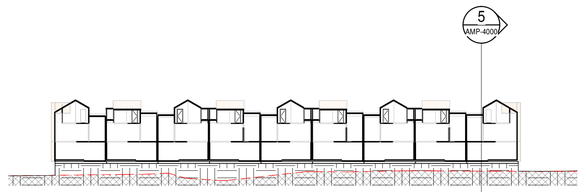

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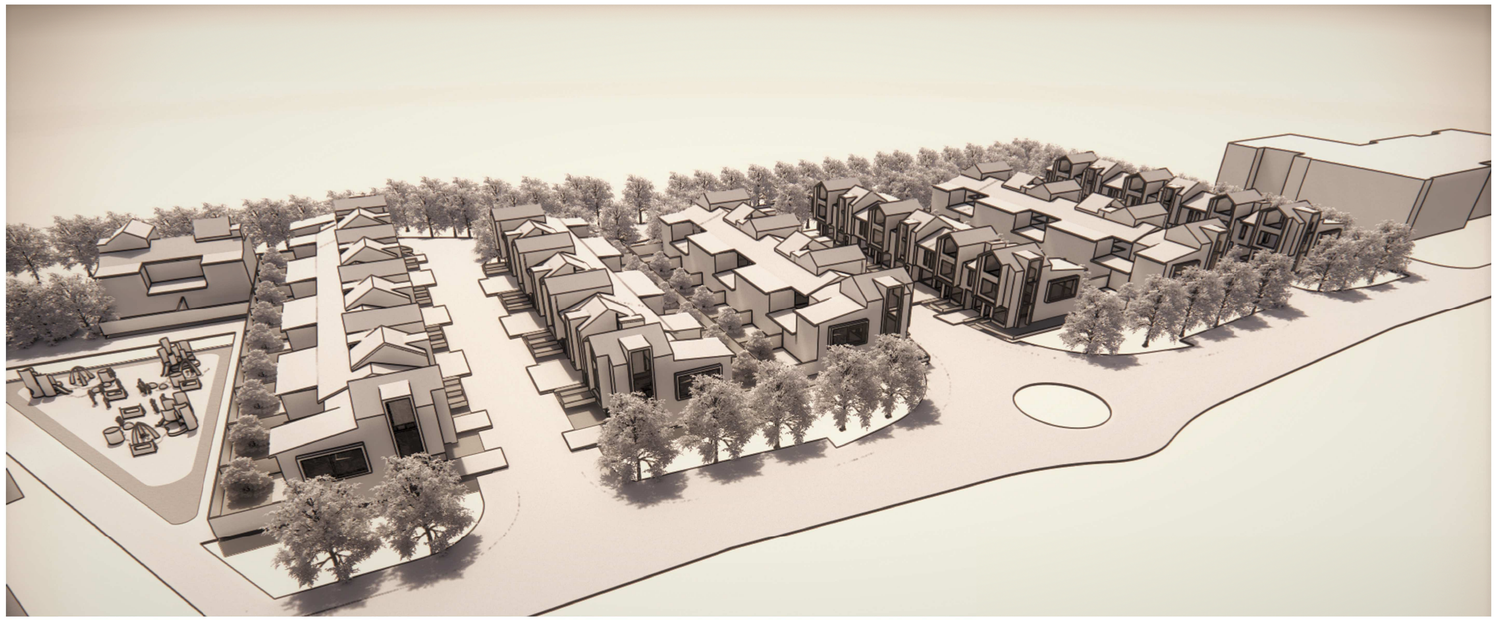

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Revision
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Project
WARRIEWOOD
10 Boondah Rd, Warriewood, New South Wales 2102

Project Number
10

Status

Date Plotted 5/27/2022 12:27:29 PM

Date Issued

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Drawing Title
PRELIMINARY CONCEPT PLAN (L)

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AMP-10001

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