



BUSHFIRE CONSULTING

Bushfire Assessment

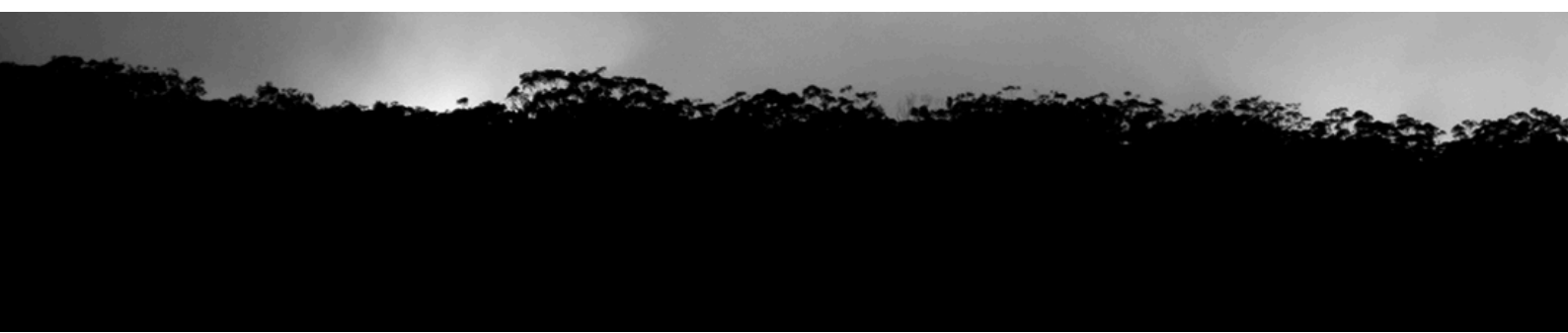
Special Fire Protection Purpose Development

Phase 1 Lindfield Learning Village
Eton Road, Lindfield

Prepared for

NSW Department of Education

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Phase 1 School Lindfield Learning Village Eton Road, Lindfield

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Glossary of Terms

APZ	Asset protection zone
AS2419	<i>Australian Standard – Fire hydrant installations</i>
AS3745	<i>Australian Standard – Planning for emergencies in facilities</i>
AS3959	<i>Australian Standard – Construction of buildings in bushfire-prone areas 2009</i>
BAL	<i>Bushfire attack level</i>
BCA	<i>Building Code of Australia</i>
BSA	Bushfire safety authority
EPA Act	<i>Environmental Planning & Assessment Act 1979</i>
FDI	Fire danger index
ha	Hectare
m	Metres
PBP	<i>Planning for Bush Fire Protection 2006</i>
RF Act	<i>Rural Fires Act 1997</i>

1. Introduction

The NSW Department of Education have commissioned Blackash Bushfire Consulting (Blackash) to prepare a bushfire assessment for the proposed use of the existing facilities at 100 Eton Road, Linfield with the redevelopment of the old UTS campus in West Lindfield as State Significant Development (SSD) for a future school known as the Lindfield Learning Village. The Lindfield Learning Village (the School) incorporates Lot 2 and 4 in DP 1151638 known as 100 Eton Road Lindfield (the site). The site is within the Ku-ring-gai Local Government Area (LGA) and is shown at Figure 1 and land zoning at Figure 2.

State Significant Development (SSD) application (SSD 16_8114) for the Lindfield Learning Village includes development for a school. Because of their size, complexity, importance and/or potential impact, the Department of Planning and Environment (DPE) is responsible for assessing development applications relating to these project types. The Minister for Planning is the consent authority for SSD applications. DGRS were issued on 16/12/2016 and the Department of Education is now responding to issues as part of the SSD process.

Previous Bushfire Reports have been completed by Advanced Bushfire Solutions for reuse of the site as “infill” development. The NSW Rural Fire Service (RFS) rejected the classification of the “infill” provisions within *Planning for Bushfire Protection 2006* (PBP 2006). The original proposal for the new school at Lindfield was for a comprehensive primary and high school strongly providing for kindergarten through to Year 12 with approximately 2,000 students and 500 staff including an early learning centre located within the grounds accommodating 0-5-year-olds.

In response to the RFS submission, the Department of Education (DoE) has significantly modified the original proposal to meet RFS requirements. The original proposal has been amended to provide a school of 350 students to be opened for the commencement of Term 1, 2019. The amended proposal involves:

- Removal of the childcare centre from the SSD application; and
- Creation of the following phases within Construction Stage 1:
 - Phase 1: School for 350 students accommodating a 100m Asset Protection Zone (APZ).
 - Phases 2a and 2b: Phase 2a includes the remaining area of Construction Stage 1 as previously proposed (minus the childcare centre), while Phase 2b includes the repurposing of the Phase 1 area. Phase 2 will accommodate 1,000 students (inclusive of the 350 students in Phase 1) in three home-bases.

The NSW government is committed to opening the school in term 1 2019.

The design and project team has made every effort to locate the new Phase 1 school as far as practical from the bushfire prone land and has sought to use the existing buildings to provide shielding for the new development.

Existing Asset Protection Zones (APZs) will be maintained and new areas will be established to provide appropriate separation from bushfire hazard areas. The existing access will be maintained and augmented with a fire trail to the perimeter of the site. Internal fire services will be upgraded throughout the site including significant upgrading of the interior of the buildings to provide National Construction Code (NCC) compliance and fire compartmentation. External elements of the buildings will be upgraded to provide for BAL 40 equivalence for construction elements (excluding window screens). A comprehensive Bushfire Evacuation Plan has been drafted which will be refined with the teaching staff and key stakeholders prior to occupation of the school.

The configuration of the existing development and adjoining unmanaged bushland within National Park lands provides a potential that the site will be impacted by high intensity bushfire. There is potential for the site to be impacted from three sides with prolonged bushfire attack in the form of ember attack, smoke and radiant heat. However, the framework provided by PBP 2006 and the required Bushfire Protection Measures (BPM) for the Phase 1 school have been achieved to ensure the school meets modern bushfire safety requirements. The Phase 1 school will meet the aim, objectives and Standards within PBP 2006 for Special Fire Protection Purpose Developments (SFPP).

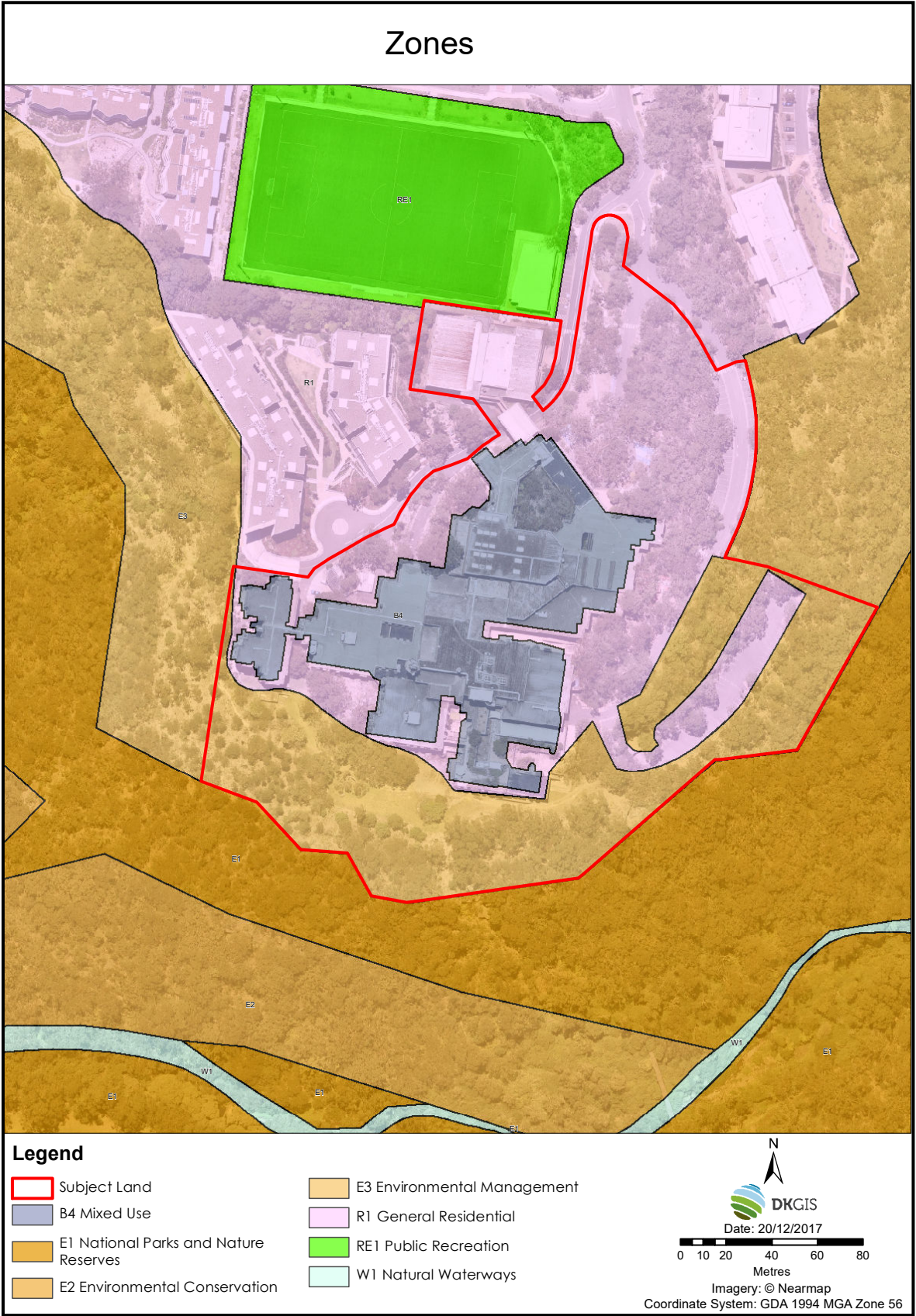
Several meetings have been held with DoE representatives, the RFS and the DPE in preparing the Response to Submissions to ensure that issues were understood and reflected in the amended application.

This assessment has been prepared by Lew Short, Principal Blackash Bushfire Consulting (FPAA BPAD-A Certified Practitioner No. BPD-PA-16373) who is recognised by the RFS as qualified in bushfire risk assessment and has been accredited by the Fire Protection Association of Australia as a suitably qualified consultant to undertake alternative solution proposals. An inspection of the site and surrounds has been undertaken on several occasions between December 2017 and May 2018.

Figure 1 Site Location



Figure 2 Land Zoning of the Site and Surrounds



2. The Proposal

'Lindfield Learning Village' is proposed to eventually accommodate approximately 1,000 students from kindergarten to Year 12. The school will take enrolment pressure off surrounding primary schools exceeding student capacity, and accommodate future population growth within Ku-ring-gai Local Government Area (LGA). The school will contain high quality classrooms, collaborative learning spaces, open play spaces, sports courts and associated facilities.

Vehicular and pedestrian access to the campus is available via Eton Road and a private road within the site. A total of 184 marked parking spaces are currently available within the site, including 35 spaces within the basement and 149 at-grade spaces. A pedestrian footbridge over Dunstan Grove links the main campus building to the gymnasium.

In response to the submission from the RFS, the proposal has been amended to provide a Phase School of 350 students to be opened for the commencement of Term 1, 2019 (see Appendix 1 for Phase 1 School Floor Plans).

The Phase 1 School has been located beyond 100m from unmanaged vegetation that could support a bushfire. A series of fire compartments will be installed within the buildings to provide separation from any areas within 100m of unmanaged bushfire hazard lands. The fire compartments will provide two-hour fire rated walls to separate the Phase 1 School from other existing components of the school.

The Phase 1 School will not provide any functions associated with "schooling" for children within the 100m separation distance for APZs. The RFS have previously indicated that utilisation of space within existing parts of the buildings could be used for "other" purposes. Some common areas for teachers and administrative staff have been provided within the 100m to utilise small portions of the existing space.

The amended proposal involves:

- Removal of the childcare centre from the SSD application; and
- Creation of the following phases within Construction Stage 1:
 - Phase 1: partial School for 350 students accommodating a 100m Asset Protection Zone (APZ).
 - Phases 2a and 2b: Phase 2a includes the remaining area of Construction Stage 1 as previously proposed (minus the childcare centre), while Phase 2b includes the

repurposing of the Phase 1 area. Phase 2 will accommodate 1,000 students (inclusive of the 350 students in Phase 1) in three home-bases.

The Planning Proposal also seeks development consent for the following works at the site:

Internal reconfiguration and refurbishment of the former UTS Ku-ring-gai Campus to create:

- New learning spaces for the Lindfield Learning Village;
- Administration facilities for Aurora College (distance education).
- Minor external alterations to revitalise the existing building facades and bring them up to the required construction from *Australian Standard for Construction of Buildings in Bushfire Prone Areas (AS3959)*;
- Upgrades to the existing facilities and car parking to address the NCC and access requirements; and
- Provision of upgraded APZs within the site, landscaping and open space throughout the site.

2.1. Detailed Summary of Construction Stages:

In order to address the concerns raised by the RFS and to permit a school for 350 students to open in time for Term 1 2019, the proposal has been amended as follows:

Construction Stage 1

Phase 1 will comprise:

- One home-base accommodating 350 students from Kindergarten to Year 12;
- All requisite technical spaces to support a full primary and secondary curriculum;
- Administration space for approximately 20-30 staff;
- Construction of a 4m wide access trail for bushfire trucks to the south of the building;
- Fencing of the green space around the perimeter of the site.
- Remediation of targeted roof areas to create additional outdoor play areas; and
- Traffic and transport infrastructure associated with the Eton bus stop, and parking and drop-off/pick-up area.
- Tree and vegetation removal to establish a 100m APZ around the perimeter of the School.

Phases 2A and 2B:

Phase 2A includes the remainder of the original Construction Stage 1, while Stage 2B includes the repurposing of the Phase 1 area. Phases 2A and 2B will comprise:

- Three home-bases totalling approximately 1,000 students (inclusive of the 350 students in Phase 1) from K-12 in the eastern wing of the building.
- All requisite technical spaces to support a full primary and secondary curriculum for 1,000 students;

-
- Administration space for approximately 160 staff;
 - Fencing of the green space around the perimeter of the site, if any remains to be fenced after Phase 1 fencing has been completed;
 - Remediation of any targeted roof areas to create additional outdoor play areas if they have not already been remediated under Phase 1; and
 - Traffic and transport infrastructure associated with the Eton bus stop, and parking and drop-off/pick-up area if it has not been provided under Phase 1.

Construction Stage 2

Phase 3 will comprise:

- Three home-bases totalling approximately 1,100 students from K-12 in the western wing of the building; and
- Remediation of targeted roof areas to expand outdoor play areas.

It is appreciated that a significant amount of work needs to be undertaken to provide surety for Construction Stage 2, 2A, 2B. These additional areas will be worked through for compliance with PBP 2006 and to meet RFS requirements. The DoE have advised Blackash that occupation of areas outside the designated orange areas as per Appendix 1 will not occur until satisfactory resolution of outstanding issues and with concurrence from the RFS.

3. Site Context

The area around the site includes:

- Land Cove National Park Lot PT 20 DP 1204689 to the south;
- Lot 1 D 270770 being Community Title to the immediate west of the site;
- Lot 3 DP 1151638 being Education – University west of Lot 1 D 270770;
- Lot 3 D 270770 known as 5-7 Dunstan Grove to the north of the site;
- Lot 7 D 270770 Community Title sports field known as 4 Shout Ridge;
- Lot 9 D 270770 Community title known as 2 Shout Ridge;
- Lot 4 D 270770 Community title known as 1 – 3 Tubbs View.

4. Consultation with the NSW Rural Fire Service

In the preparation of a planning proposal the relevant planning authority must consult with the Commissioner of the RFS following receipt of a gateway determination under section 56 of the Act, and prior to undertaking community consultation in satisfaction of section 57 of the Act, and take into account any comments so made. Consultation with the RFS has occurred throughout the life of the design phase of the proposal. The RFS provided a formal response that has affected the modification in the current proposal.

5. Legislative Framework

Land use planning within bushfire prone areas is guided by legislation, directives and guidelines. In September 2011, Part 3A of the *Environmental Planning and Assessment Act, 1979* (EPA Act) was repealed, leading to the creation of two new major project development categories: state significant infrastructure (SSI) and state significant development (SSD). This application is a SSD.

Because of their size, complexity, importance and/or potential impact, the DPE is predominantly responsible for assessing development applications relating to these project types. The Minister for Planning is the consent authority for SSI and SSD applications.

Applications for SSD are exempt from requiring a bushfire safety authority (BFSA) from the RFS. Given SSD scale, the requirements of PBP 2006 (currently in force) and the new version *Planning for Bushfire Protection 2017* (PBP 2017) which is in draft form and due to be adopted in mid 2018, should be applied, and consultation with the NSW RFS is encouraged. Even where comments are sought at the strategic planning stage, further development applications may need to be referred to the NSW RFS. However, the legal mechanisms and provisions surrounding such a referral are unclear, particularly if the DPE through the Minister issue consent.

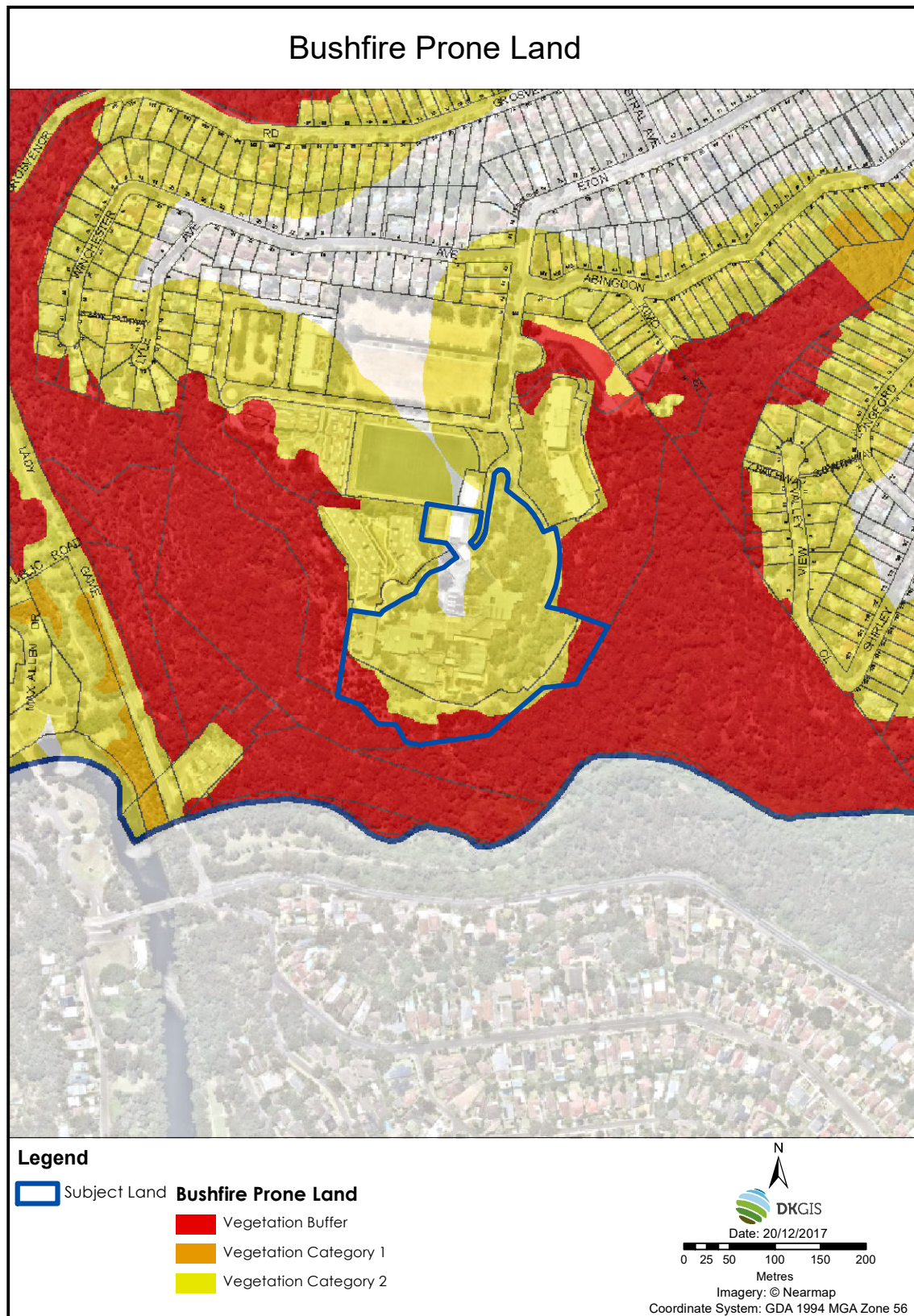
As vulnerable communities, SFPP developments are afforded the highest level of protection from bushfires by PBP 2006. The underlying intent is to reduce the risk significantly. While the "measures in combination" continues as a principle within PBP, there is more reliance on space around buildings, access, emergency management arrangements and less reliance on construction standards. The minimum requirements for SFPP development (that are not infill development) are that 10kWm of radiant heat is not experienced at any point on a building housing SFPP communities (PBP 2006 p. 33).

6. Bushfire Prone Land

The site is identified as 'bushfire prone land' (See Figure 3) for the purposes of Section 10.3 of the EPA Act and the legislative requirements for developing bushfire prone lands are applicable.

Bushfire prone land maps provide a trigger for the development assessment provisions and consideration of sites that are bushfire prone. Bushfire prone land (BFPL) is land which can support a bushfire or is likely to be subject to bushfire attack (radiant heat, embers or flame). Bushfire prone land maps are prepared by local council and certified by the Commissioner of the RFS.

Figure 3 Bushfire Prone Land Map



7. Planning for Bushfire Protection 2006 and 2017

The PBP 2006 and 2017 guidelines are performance-based, seeking to achieve a safe outcome based on innovation and the specific circumstances of the individual site and development proposal. PBP provides a planning framework for developments in rural and urban areas close to land, which is likely to be affected by bushfire.

PBP sets out an overall framework consisting of an aim and objectives, specific objectives for defined development types, types of bushfire protection measures (BPMs), which may be employed in a development, and performance criteria for each BPM. In this regard, the structure of PBP 2006 is similar to the structure of the NCC and provides considerable flexibility for outcomes. However, the aim of PBP in terms of ensuring appropriate consideration of risk and protection is paramount.

The intent (aim) of PBP is:

to protect people and property from the impact of bushfires. It also helps ensure that the firefighters who come to their aid in an emergency are not placed in greater danger because of unsuitable or unsafe developments.

The specific objectives for SFPP developments (p. 28) are to:

- *provide for the special characteristics and needs of occupants. Unlike residential subdivisions, which can be built to a construction standard to withstand the fire event, enabling occupants and firefighters to provide property protection after the passage of fire, occupants of SFPP developments may not be able to assist in property protection. They are more likely to be adversely affected by smoke or heat while being evacuated.*
- *provide for safe emergency evacuation procedures. SFPP Developments are highly dependent on suitable emergency evacuation arrangements, which require greater separation from bushfire threats.*

PBP requires that a planning and development proposal satisfy:

- The broad aim and objectives of PBP 2006;
- The planning principles;
- Specific objectives for the development type under consideration;
- The intent of measures for the various (BPM's);

-
- The performance criteria for the various proposed BPMs, which can be achieved by providing either the “acceptable solutions” specified in PBP 2006 or alternative solutions, which fulfill the intent of the relevant performance criterion.

8. Bushfire Threat Assessment

8.1. Bushfire Hazard

An assessment of the Bushfire prone land is necessary to determine the application of bushfire protection measures such as APZ locations, risk and Bushfire Attack Levels (BAL).

The vegetation formations (bushfire fuels) and the topography (effective slope) combine to create the bushfire threat that may affect bushfire behaviour at the site and which determine the planning and building response of the bushfire planning framework and PBP.

The bushfire hazard affecting the investigation area was assessed during site inspections and using recent aerial photographs for at least a distance of 140m from the perimeters of the investigation area (in line with PBP 2006). This assessment identifies the potential bushfire threat from both within and outside of the investigation area and provides an indication of required asset protection zones for risk and future development within the site. The method used for this assessment is outlined in PBP 2006 and 2017 and relies on consideration of vegetation and slope and is outlined below along with results.

8.2. Methodology

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.

The following assessment is prepared in accordance with Section 100B of the RF Act, Clause 44 of the RF Reg and PBP. This assessment is based on both a desktop assessment and numerous site inspections of the site assessment utilising the following resources:

- *Planning for Bushfire Protection* (NSW RFS, 2006)
- Council Bushfire Prone Land Map
- Aerial mapping
- Detailed GIS analysis

The methodology used in this assessment is in accordance with PBP and is outlined in the following sections.

8.3. Fire Danger

For SFPP development, PBP has designated the appropriate fire areas and corresponding Fire Danger Rating (**FDI**). The FDI within PBP is based on a historical fire weather assessment which assumes a credible worst case scenario and an absence of any other mitigating factors relating to aspect or prevailing winds. The 1:50 year fire weather scenario for most of the State was determined as FDI=80. However, a number of areas including the Greater Sydney, Greater Hunter, Illawarra, Far South Coast and Southern Ranges Fire Areas have higher FDIs which are set at 100 and does not take into account climate change. The FDI for Ku-ring-gai local government area is 100.

8.4. Vegetation Assessment

Clause 44 of the RF Regulation requires a classification of the vegetation on and surrounding the site out to a distance of 140 metres from the boundaries of the property in accordance with the system for classification of vegetation contained in PBP 2006.

The predominant vegetation is classified by structure or formation using the system adopted by *Ocean Shores to Desert Dunes* (Keith, 2004) and by the general description using PBP 2006. Vegetation types give rise to radiant heat and fire behaviour characteristics. The predominant vegetation is determined over a distance of at least 140 metres in all directions from the proposed site boundary. Where a mix of vegetation types exist, the type providing the greater hazard is said to predominate. The vegetation is shown in Figure 3 and is forest.

Figure 4 Vegetation Assessment



8.5. Slopes Influencing Bushfire Behavior

The RF Reg requires an assessment of the slope of the land on and surrounding the property (out to a distance of 100 metres from the boundaries of the property or from the proposed development footprint).

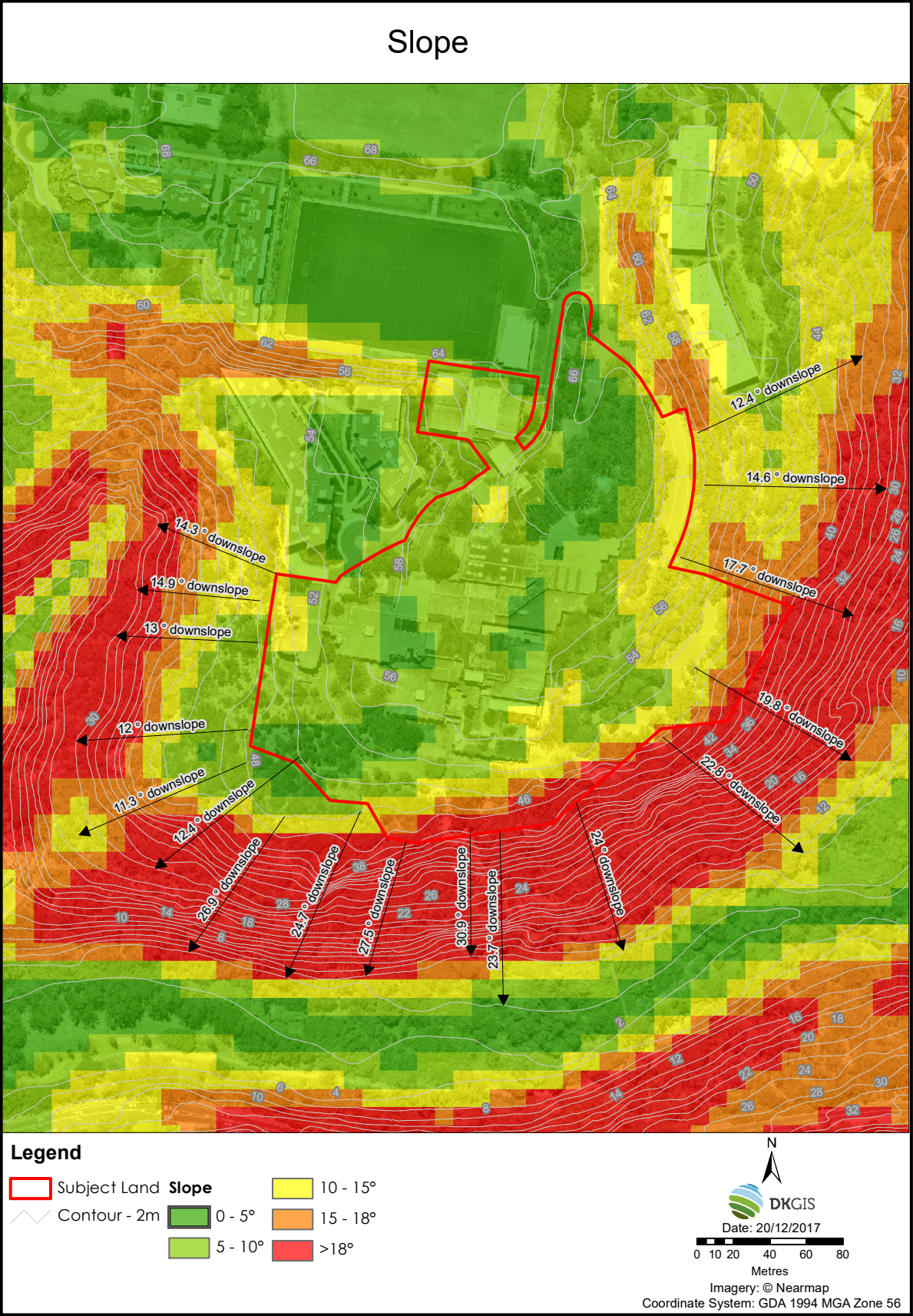
The 'effective slope' influencing fire behaviour approaching the sites has been assessed in accordance with the methodology specified within PBP. This is conducted by measuring the worst-case scenario slope where the vegetation occurs over a 100 m transect measured outwards from the development boundary or the existing/ proposed buildings. Figure 4 shows the slopes affecting the site. Table 1 shows the effective slopes relevant to the proposal.

Table 1 Effective Slopes Influencing Bushfire Behaviour

Slope	Aspect			
	North	East	South	West
	NA/ Managed	Greater than 18 degrees downslope	Greater than 18 degrees downslope	Greater than 18 degrees downslope

Small sections of slopes over 18 degrees have APZs within the site (southern boundary). However, these sections are short and will be accessed by foot with contractors using hand tools. APZ establishment and maintenance can be undertaken in accordance with PBP 2006 and RFS Standards for Asset Protection Zones.

Figure 5 Slope Assessment



8.6. APZ Requirements

The site assessment identifies the potential bushfire threat from outside of the site area and provides an indication of required asset protection zones to meet the deemed to satisfy distances of PBP.

The APZ requirements from PBP 2006 are shown in Table 2 and PBP 2017 in Table 3. As a SFPP development, full APZ compliance of 100m would be required from unmanaged bushland areas to support the school. Figure 5 shows the APZ that will be provided for the Phase 1 School that meet the deemed to satisfy requirements of PBP 2006.

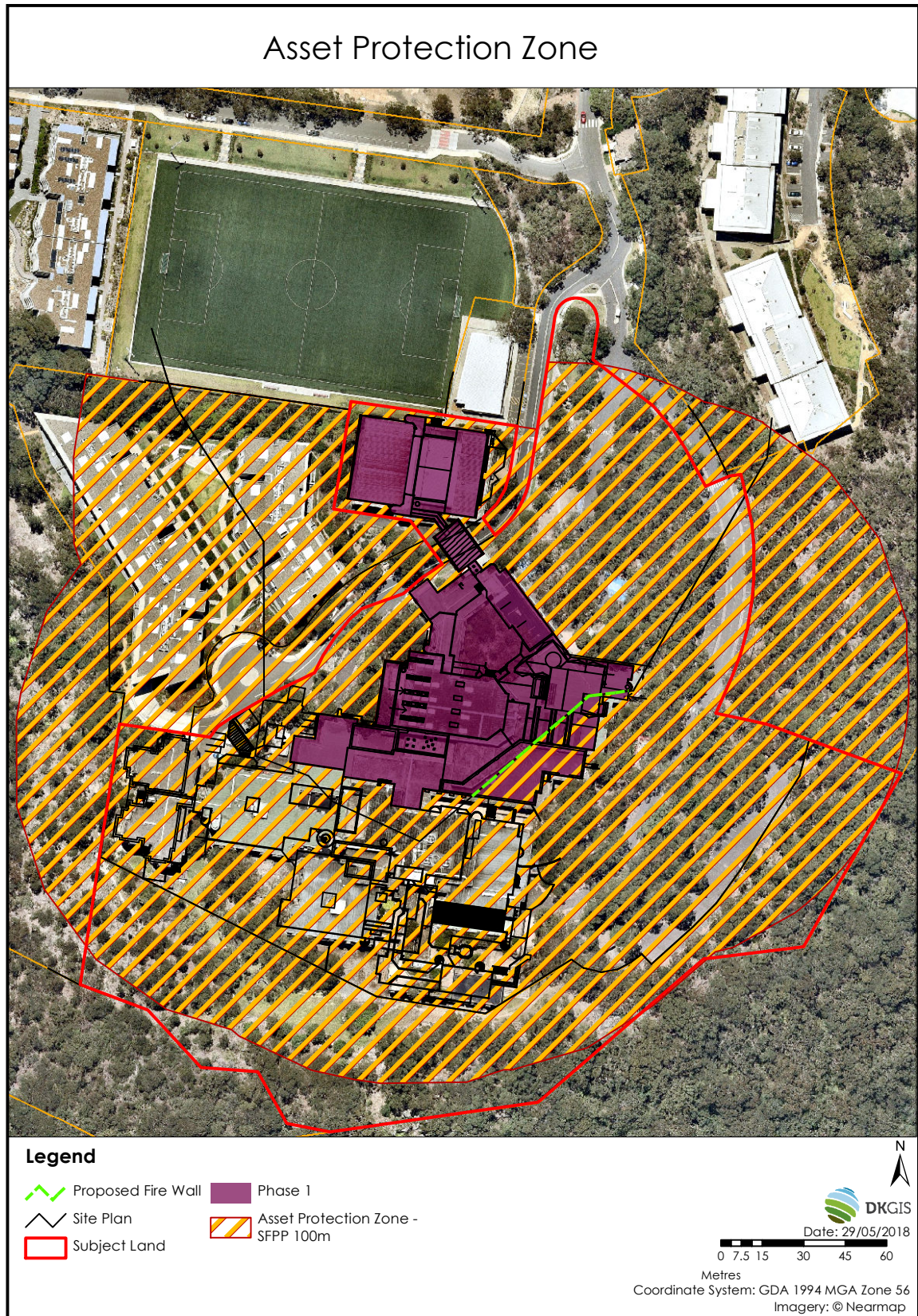
Table 2 SFPP APZ Requirements PBP 2006 (p. 58)

Table A2.6 Minimum Specifications for Asset Protection Zones (m) for Special Fire Protection Purposes in bush fire prone areas ($\leq 10\text{kW/m}^2$)					
Vegetation Formation	Effective Slopes				
	Upslope/Flat	>0°-5°	>5°-10°	>10°-15°	>15°-18°
Rainforests	30	40	50	60	65
Forests	60	70	85	100	100
Woodland (Grassy)	40	50	60	70	75
Plantations (Pine)	50	60	70	85	95
Tall Heath (Scrub)	45	50	55	60	65
Short Heath (Open Scrub)	35	35	40	45	45
Freshwater Wetlands	35	35	40	45	45
Forested Wetlands	50	60	75	90	95
Semi-Arid (Woodland)	30	35	40	45	50
Arid Shrubland	30	35	40	45	45
Alpine Resorts	(see page 31 and Table A3.5 on page 66)				

Table 3 SFPP APZ Requirements PBP 2017 (p. 112)

KEITH VEGETATION FORMATION	KEITH VEGETATION CLASSIFICATION	EFFECTIVE SLOPES				
		Upslope and flat	> 0-5	> 5-10	> 10-15	> 15-20
		Distance (m) asset to predominant vegetation class				
Rainforest	All	38	47	57	69	81
Wet Sclerophyll Forests	Shrubby and Grassy	73	86	100	100	100
Dry Sclerophyll Forests	Western Slopes DSF and Yetman DSF	51	61	73	87	100
	Pilliga Outwash DSF	30	37	45	55	66
	Shrubby and Shrub Grass	67	79	93	100	100
Pine Plantations	Radiata Pine	64	76	90	100	100
Forested Wetlands	Forested wetlands - Coastal swamp forest	67	79	94	100	100
	Forested wetlands and Riverine forest	34	42	51	62	73
Grassy Woodlands	Grassy Woodlands	42	50	60	72	85
	Sub alpine Woodlands	58	69	82	97	100
Semi-arid woodlands	Grassy	26	32	40	49	59
	Semi-arid woodlands (shrubby) – Mallee	47	56	68	81	96
Heathlands	Tall Heath	53	58	64	70	75
Heathlands, Freshwater Wetlands and Alpine Complex	Short Heath	35	39	43	48	52
Arid shrublands	Acacia	24	27	30	34	37
	Chenopod	18	21	24	27	29
Grassland	Determined at GFDI 110	20	23	26	30	34

Figure 6 APZ Provision for Phase 1 School

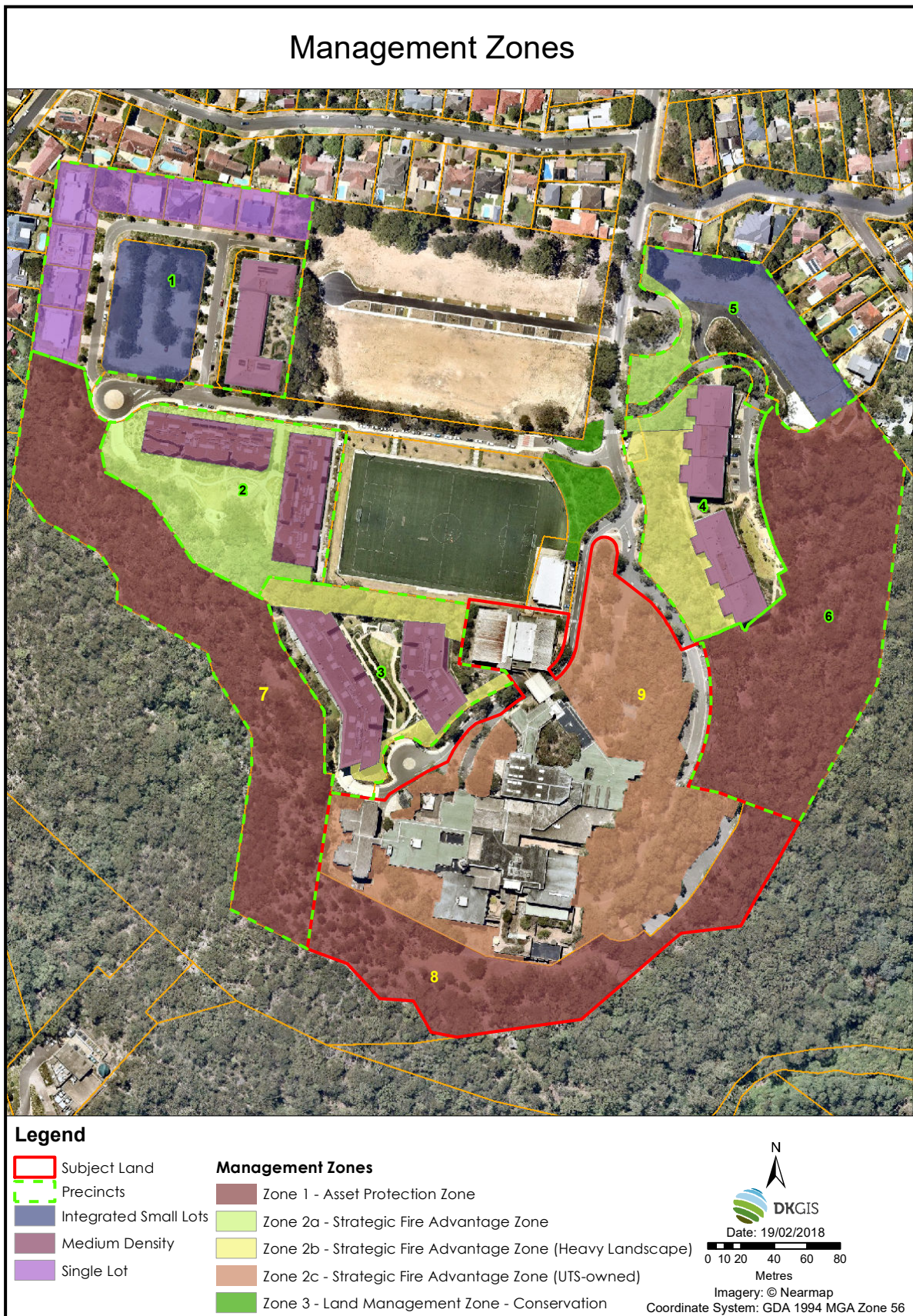


Mutually beneficial APZs are provided on adjoining land that are associated with Defence Housing approved developments. Management zones are shown in Figure 7.

Generally, APZs are provided within the site and are not on adjoining lands. For the Phase 1 School, an off-site APZ is being relied upon that is within the area designated as Zone 4 and 6 in Figure 7. Zone 4 is currently managed as an OPA. This area is part of an approved APZ associated with the Crimson Hill Defence Housing Australia (DHA) development. The APZs within the area that are being relied upon have been established under an approved management plan and are managed to Outer Protection Zone standards.

Zone 9 has partial APZs established to the south of the site. Extensive APZ establishment works will be carried out in this zone to exceed Inner Protection Zone Requirements prior to occupation. Zone 1, 2, 3 and 5 are currently managed to APZ Standards and are considered managed areas. Zone 7 is an APZ that is maintained by DHA that benefits the Phase 1 School.

Figure 7 Management Zones



8.7. Establishment and maintenance of APZs

An APZ is a buffer zone between a bushfire hazard and buildings, which is managed progressively to minimise fuel loads and reduce potential radiant heat levels, flame, ember and smoke attack. The appropriate APZ is based on vegetation type, slope and levels of construction (and for SFPPs the nature of development). The APZ can include managed areas, perimeter roads, existing roads, other buildings or managed properties can be considered as part of the APZ.

APZs of 100m has been provided for the Phase 1 School to meet PBP 2006 requirements. The APZs extend over adjoining lands where they have been provided as existing development consent requirements or where they meet the criteria for managed areas as per PBP 2006. No APZs are proposed or required over adjoining National Park lands.

The site is currently partially cleared but does not extend to the required APZs. The proposed development will remove all the bushfire hazard vegetation on the site and improve the quality of the APZ to meet inner protection area standards and outer protection area standards as described in the Bushfire Assessment Plan.

Management of APZs will be provided for under a separate Fire Management Program and Vegetation Management Plan (VMP) which will be completed upon consent for the opening of the school. All asset protection zones provided within the site will be the responsibility of the Dept of Education.

9. Water Supplies

The Site land is currently serviced by reticulated water. An existing internal ring mains system is provided and will be replaced by a new ring mains. Hydrant spacing, sizing and pressures will comply with AS2419-2005. The development is located within 70 m of these hydrants. Existing single head hydrants will be replaced with dual head hydrants. The fire hydrant system (incorporating internal and external hydrant connections) will be designed to ensure coverage in accordance with AS 2419.1:2005 and NCC Clause E1.3. This complies with PBP.

10. Gas and electrical supplies

The existing electricity supply for the site will be utilised and will comply with PBP. Gas services are to be installed and maintained in accordance with *Australian Standard AS/NZS 1596 'The storage and handling of LP Gas'* (Standards Australia 2008). This complies with PBP.

11. Access

The design of public access roads and property access (within a site) should enable safe access, egress and defensible space for fire fighters and emergency services. Eton Road is a public Road and provides a two-way road to the site boundary. From Abingdon Road, the existing urban infrastructure and development provides suitable access arrangements and depth for evacuation. From the site boundary to the north, a private road exists that provides access into and around the site. Shout Ridge Road, Dunstan Grove Road and Tubbs View all service new, high density residential developments and comply with PBP 2006.

The precinct bound by the junction of Abingdon Rd to the north of the site has existing medium density development throughout. The combination of a range of developments (including the school) will result in an increased demand on existing services and may result in an increased risk to occupants and the existing community. It is likely that the road system will become bottle necked at the junction of Eton, Shout Ridge and Tubbs View in the event of a bushfire emergency.

Schools are particularly prone to traffic-generated congestion on roads at start and finish times. This is heightened when parents believe that their children are likely to be exposed to bushfire and in seeking to reach the school, cause road congestion and hamper the firefighting effort. A detailed Bushfire Evacuation Plan has been drafted that will provide for a range of scenarios including seeking onsite refuge within the school buildings. The Evacuation Plan will cater for access provisions including potential use of busses within the site and options to walk the school community to Lindfield Public School if required.

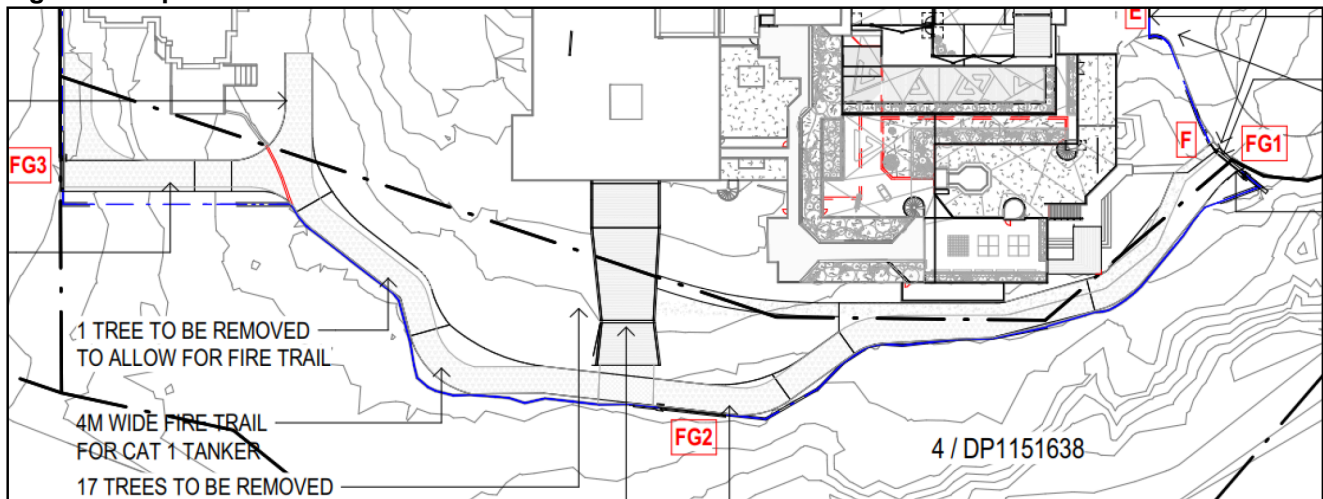
As the proposal seeks adaptive reuse the existing facilities including the road infrastructure, a full perimeter road is not provided. In recognition of the need to provide access to bushfire hazard areas for fire fighters, a fire trail is proposed for the south and the west of the site (see Figure 6). The fire trail will provide passing and turning areas for RFS Category 1 fire appliances and fill points at hydrants for firefighting purposes. The new fire trail will comply with Section 4.1.3 (3) of PBP 2006 and gates will be provided in the proposed fence to permit access for emergency service vehicles to the southern and western APZs.

The existing road and proposed fire trail will form part of the APZ and is required to provide a separation between the SFPP and the boundary of the bushfire hazard. The private road provides sufficient width to allow firefighting vehicle crews to work with firefighting equipment about the vehicle and to provide passing areas for fire appliances if required.

Roll-top kerbing is not provided, but kerbs are of a low design that would not inhibit fire-fighting vehicles mounting the kerb if required.

A new fence (1800mm) is proposed around the perimeter for security and safety on the site. All fencing will be coated tubular security fencing to allow for suppression activities through the fence if required. Gates will be provided around the perimeter to ensure access to all roads, pedestrian walkways and to provide access into the APZ for management and fire suppression activities.

Figure 8 Proposed Fire Trail



A summary of access provisions is at Table 4.

Table 4 Access - Internal Roads

Intent of Measures	To provide safe operational access for emergency services personnel in suppressing a bush fire, while residents are accessing or egressing an area (PBP p 34).	
Performance Criteria	Acceptable Solutions	Compliance
The intent may be achieved where:		
Internal road widths and design enable safe access for emergency services and allow crews to work with equipment about the vehicle.	internal roads are two-wheel drive, sealed, all-weather roads;	Achieved
	internal perimeter roads are provided with at least two traffic lane widths (carriageway 8 metres minimum kerb to kerb) and shoulders on each side, allowing traffic to pass in opposite directions;	Achieved The existing roads are not perimeter roads or 8m kerb to kerb. PBP 2006 requires that this element be tested against the performance criteria. The existing internal road widths enable safe access for emergency services and allow crews to work with equipment about the vehicles.
	roads are through roads. Dead end roads are not more than 100 metres in length from a through road, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end;	Achieved. 12 metres outer radius turning circle provided at key turning locations. Dead end roads will be clearly sign posted.
	traffic management devices are constructed to facilitate access by emergency services vehicles.	Achieved. No traffic management devices installed
	a minimum vertical clearance of four metres to any overhanging obstructions, including tree branches, is provided.	Achieved
	curves have a minimum inner radius of six metres and are minimal in number to allow for rapid access and egress.	Achieved
	the minimum distance between inner and outer curves is six metres.	Achieved
	maximum grades do not exceed 15 degrees and average grades are not more than 10 degrees.	Achieved
	Cross fall of the pavement is not more than 10 degrees.	Achieved
	roads do not traverse through a wetland or other land potentially subject to periodic inundation (other than flood or storm surge).	Achieved
	roads are clearly sign-posted and bridges clearly indicate load ratings.	Achieved
	the internal road surfaces and bridges have a capacity to carry fully-loaded firefighting vehicles (15 tonnes).	Achieved

12. Construction Standards

The design team has made every effort to locate the new development as far as practical from the bushfire prone land and has sought to use the existing buildings to provide shielding for the new development. The following was provided by the Senior Architect from DesignInc regarding the fire resistance of the buildings:

The fabric of the existing buildings is bushfire resistant with 2 hours fire rated concrete floors and roof. The walls are cavity brickwork with 2-hour fire rating. All existing windows and doors will be replaced with aluminium frames and 6.38mm thick glass to be bushfire resistant. A 2-hour fire rated wall will be constructed internally on levels four, five and six aligned to the 100m APZ as measured from the southern boundary to provide bushfire protection for the partial school. The partial school will be protected from fire with sprinklers throughout and drenchers around the perimeter glazing of the internal courtyard. Smoke doors will be provided throughout Phase 1 school. The internal and external fire hydrant system will be upgraded to comply with current codes.

The existing buildings will be upgraded, where relevant, as described in the RFS Building Best Practice Guideline – Upgrading Existing Buildings. All external vents and weepholes shall be screened with metal mesh screening with an aperture no greater than 2mm. External timber doors shall be repaired or replaced to comply with AS3959-2009 BAL-29. Roller doors and external doors shall be provided with brush seals or draught excluders to ensure no openings greater than 3mm.

13. Evacuation and Emergency Management

The draft bushfire evacuation procedures have been completed in accordance with RFS *Guide to Developing A Bushfire Emergency Management Plan* and meet the requirements of Australian Standard AS 3745-2010 – Planning for Emergencies in facilities. On-site and off-site evacuation procedures are included and will be worked through with key stakeholders (emergency services and staff) prior to occupation. The draft *Bushfire Emergency Management and Evacuation Plan* is a separate document.

Emergency Management arrangements and the Bushfire Evacuation Plan will cater for a wide range of scenarios including large campaign fires and fast run fires impacting the site within a short time frame. A bushfire refuge will be provided within the school that provides a two hour fire rating within a designated building that can provide short-term shelter from the immediate life-threatening effects of a bushfire event.

The refuge will provide one of a number of contingency shelter and evacuation options for the school community. The Australian Building Codes Board (ABCB) has developed a technical handbook for the design and construction of Community Fire Refuges which will be used in the design and construction of the refuge.

The evacuation Plan will clearly state that the safest option is to be out of bushfire prone areas in the event of a fire. However, it will provide sheltering options in a refuge as a last resort option when it is no longer safe to move to an area not prone to bushfire risk.

14. Fire Spread Control and NCC fire compliance

Internal construction and management requirements will be undertaken prior to occupation to achieve an acceptable level of life safety within the building to satisfy the performance requirements of the NCC.

These requirements will provide a place of shelter in the event of a fire in the adjoining reserve.

The following internal works will be undertaken to meet NCC and Australian Standard requirements:

- The building is of type B construction and will be divided into a number of fire compartments based on the requirements of NCC, which include 240 minute fire rating between compartments.
- A smoke detection system will be installed in accordance with NCC and AS1670.1: 2004.
- The building will be equipped with portable fire extinguishers in accordance with Clause E1.6 of the NCC and AS2444: 2001.
- Exit signage in accordance with AS 2293.1:2005.
- A sound system and intercom system for emergency purposes shall be installed in accordance with AS 1670.1:2004 and AS 1670.4:2004. This warning system will be connected to the smoke detection and sprinkler systems throughout the buildings, and will sound throughout upon activation of these systems.
- Emergency lighting in accordance with AS 2293.1:2005 will be installed throughout the buildings to assist the evacuation of occupants in low light conditions.
- The fire hydrant system incorporating internal and external hydrant connections as required to ensure coverage in accordance with AS 2419.1:2005.

15. Significant Environmental Features

Separate ecological assessment.

16. Threatened Species

Separate ecological assessment.

17. Aboriginal Objects or Places

There are no known Aboriginal objects or Aboriginal places (within the meaning of the National Parks and Wildlife Act 1974) that is known to the applicant to be situated on the property.

18. Assessment Against the Aim and Objective of PBP

The RF Reg requires an assessment of the extent to which the proposed development conforms with or deviates from the standards, specific objectives and performance criteria set out in Chapter 4 (Performance Based Controls) of PBP. All development in Bushfire Prone Areas needs to comply with the aim and objectives of PBP. Table 5 shows the compliance with PBP.

Table 5 Compliance with Aim & Objectives of PBP

Aim	Meets Criteria	Comment
The aim of PBP is to use the NSW development assessment system to provide for the protection of human life (including fire fighters) and to minimise impacts on property from the threat of bushfire, while having due regard to development potential, onsite amenity and the protection of the environment.	Yes	Landscaping, defensible space, access and egress, emergency risk management and construction standards are in accordance with the requirements of PBP and the aims of PBP have been achieved. APZs of 100m have been provided to the school parts of the existing buildings and no students will be within 100m of bushfire hazard vegetation for the Phase 1 School.
Objectives	Meets Criteria	Comment
Afford occupants of any building adequate protection from exposure to a bushfire.	Yes	The maximum exposure to a bushfire for the area where the development is proposed is 10KwM of radiant heat.
Provide for defensible space to be located around buildings.	Yes	Defensible space and APZs are provided on all sides of the proposed development.
Provide appropriate separation between a hazard and buildings, which, in combination with other measures, prevent direct flame contact and material ignition.	Yes	An asset protection zone of 100m has been provided to the Phase 1 School.
Ensure that safe operational access and egress for	Yes	The site has direct access to public roads, and access and egress for emergency vehicles and evacuation is

Phase 1 School Lindfield Learning Village Eton Road, Lindfield

emergency service personnel and occupants is available.		adequate. A detailed evacuation plan will be completed prior to occupation.
Provide for ongoing management and maintenance of bushfire protection measures, including fuel loads, in the asset protection zone.	Yes	A landscape and bush management plan for the compound and area surrounding the compound is included with the development application.
Ensure that utility services are adequate to meet the needs of firefighters (and others assisting in bushfire fighting).	Yes	Fire services are being updated throughout the site. Existing ring mains supply a hydrant system.

19. Response to Submissions

The Department of Education has provided a detailed Response to Submissions to the Department of Planning and Environment. Appendix 2 is a summary of issues raised by Ku-ring-gai Council of 9 August 2017. It is noted that Council is generally in support of the proposed adaptive re-use of the former college as an educational establishment. This Bushfire Assessment Report and consultation with the RFS has been completed having regard to the matters raised by the RFS, in their letter of 4 July 2017, specifically RFS rejection of infill provisions, safe access to and from the site and the provision of APZs and in accordance with the framework provided by PBP 2006.

20. Recommendations

The DoE primarily seeks full approval to the amended SSD 16_8114 to provide for the opening of the Phase 1 School in Term 1, 2019.

The following recommendations are made for the bushfire protection measures for the site.

1. Consent is issued to utilise those buildings in Phase 1 as shaded orange and marked "Phase 1" on the plan attached Appendix 1 which represents portions of the buildings and site greater than 100 metres from unmanaged vegetation.
2. Prior to the issue of a Construction Certificate for the Phase 1 School, the Department of Education shall deliver a Bushfire Management Plan, including Vegetation Management Plan setting out how it will comply with the provision and ongoing management of Asset Protection Zones in accordance with *Planning for Bushfire Protection, 2006*.
3. Prior to the issue of a Construction Certificate for the Phase 1 School, the Department of Education shall deliver a Bushfire Emergency Management and Evacuation Plan that is locally relevant and tailored with key stakeholders to a range of scenarios.

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4. Prior to occupation and in perpetuity, an Asset Protection Zone shall be established and maintained to the site boundaries. The APZ shall be established and maintained as an inner protection area as outlined within PBP and the NSW RFS document '*Standards for Asset Protection Zones*'. The areas adjacent to buildings and between the private access road will be managed as open space above APZ Standards to provide an outcome that is in keeping with a highly managed parkland environment.

21. Conclusion

State Significant Development application (SSD 16_8114) for the Lindfield Learning Village includes development for a school. This report supports the approval of the Phase 1 School for 350 students to be operational for Term 1, 2019.

As a State Significant Development application, the Department of Planning and Environment is responsible for assessing development applications relating to these project types. The Minister for Planning is the consent authority for SSD applications.

The design team has made every effort to locate the new development as far as practical from the bushfire prone land and has sought to use the existing buildings to provide shielding for the new development.

The Phase 1 School meets the requirements of Planning for Bushfire Protection 2006. It is appreciated that a significant amount of work needs to be undertaken to provide surety for Construction Stage 2, 2A, 2B. These additional areas will be worked through for compliance with PBP 2006/ 2018 and to meet RFS requirements. The DoE have advised Blackash that occupation of areas outside the designated orange areas as per Appendix 1 will not occur until satisfactory resolution of outstanding issues and with concurrence from the RFS.

In the author's professional opinion, the bushfire protection measures demonstrated in this report comply with Planning for Bush Fire Protection 2006.



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