



Bushfire Risk Assessment

Special Fire Protection Purpose Development

Murwillumbah High School

86 Riverview St, Murwillumbah NSW 2484

Prepared for

**NSW Department of Education -
School Infrastructure NSW**



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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	Bushfire attack level
BCA	<i>Building Code of Australia</i>
BFPL	Bushfire Prone Land
BSA	Bushfire safety authority
DoE	Department of Education
EMP	Emergency Management Plan
EPA Act	<i>Environmental Planning & Assessment Act 1979</i>
FDI	Fire danger index
NSP	Neighbourhood Safer Places
PBP	<i>Planning for Bushfire Protection 2019</i>
RF Act	<i>Rural Fires Act 1997</i>
SINSW	School Infrastructure NSW
SFPP	Special fire protection purpose

EXECUTIVE SUMMARY

Murwillumbah High School is seeking due diligence assessment to inform bushfire risk and planned school upgrades. The Tweed Shire has mapped the land as Bushfire Prone Land (**BFPL**) and as such, development will need to consider the bushfire risk to life and safety, current and future development.

The Planning Secretary's Environmental Assessment Requirements (SSD-16848913). The SEARs requires:

Provide a bushfire assessment that details proposed bushfire protection measures and demonstrates compliance with Planning for Bush Fire Protection (NSW RFS, 2019).

On inspection, the classified bushfire prone vegetation is the school site vegetation (plantations). No other classified bushfire prone vegetation is mapped within 100m from Department of Education (**DoE**) land boundary. The due diligence assessment does however consider the potential for the agricultural areas (cane fields) to the southwest as a potential fire hazard to the school redevelopment.

Closer inspection of the classified vegetation parcel on school grounds has classified it as a Low Threat Vegetation, based on the characteristics being a single area of vegetation less than 1ha in area and greater than 100m from other areas of Category 1 or 2 vegetation, an assessment consistent with Section A.10 Low Threat Vegetation – Exclusions (PBP 2019). The vegetation on the school grounds has capacity to be managed to meet this required characteristic.

Although not mapped as bushfire prone, the future development should still consider the potential fire impacts from the cane fields and agricultural areas to the south west. Cane fields are considered as curing crops and would be assessed as for grasslands. These fields are separated from the school buildings by greater than 50m. The minimum required distance for APZ in SFPP developments is 36m (to achieve 10kW/m² Table A1.12.1, PBP 20-19).

The current (existing) developments are in excess of 45m from the school boundary and >70m from potential bushfire prone vegetation (cane fields). All existing school buildings are assessed as having a BAL Low.

Any future development at the school should consider the provision of 36m separation as APZ from the south west school boundary and/or cane fields. With this provision, and suitable landscape management (whilst potentially retaining some trees as windbreak), future developments at the school would achieve DTS provisions for SFPP Developments in accordance with PBP 2019.

1. The Project

The Murwillumbah Education Campus development, involves the co-location of Murwillumbah Primary School, Murwillumbah East Primary School, Murwillumbah High School, and Wollumbin High School, to establish a new primary school and a new high school as part of the same education campus.

The project will include the following scope of works within the SSD application:

- Demolition of Building E
- All inground slabs, pathways, hardstands and footings including those to buildings B, C, D, G, H, M, P, S, AW and AZ
- Associated ground works required to facilitate the construction of new buildings and landscaped areas
- Construction of new Buildings 1, 2, 3 and 4:
 - Building 1 – New public school building comprising general learning spaces, administration, canteen, School Support Unit (SSU) and library;
 - Building 2 – Hall building including a public school hall, out of school hours care (OSHC) facilities, high school hall/gymnasium and other spaces for physical education and creative and performing arts (CAPA);
 - Building 3 – New high school building including the following facilities; general and specialist learning spaces, SSU, and library.
 - Building 4 - New high school building including the following facilities; science, support, administration and canteen;
 - Refurbish Building A for DoE offices and school community health facilities along with associated access requirements. Building A is a locally listed heritage building and will be retained and refurbished;
 - Refurbishment of Building F to provide learning space for agricultural education;
 - Retention of existing AY.
 - Creation of new public school and high school outdoor learning spaces to support future focused learning outcomes;
 - New landscaping and embellishment of outdoor playgrounds;
 - Civil and infrastructure works; and
 - Kiss n drop and parking off Nullum Street

2. Introduction

EMM Consulting has requested Blackash to undertake a bushfire risk assessment and preparation of a due diligence report for the Murwillumbah High School (complete with recommendations and possible engineered solutions as required).

The bushfire risk assessment will assess potential for bushfire behaviour from adjacent bushfire prone vegetation and measure the bushfire attack level (**BAL**) across the school grounds, buildings and access routes. The bushfire risk assessment methodology will be compliant with NSW RFS *Planning for Bushfire Protection 2019* (**PBP 2019**), observing the raft of accepted bushfire protection measures (**Section 1.2**).

The assessment and report includes:

- 1) an assessment of the bushfire risk consistent with the methodology detailed in NSW RFS Planning for Bushfire Protection 2019;
- 2) recommendations for the building construction elements against AS3959, including any recommendations on potential upgrades and mitigation measures;
- 3) review the school's emergency management and evacuation planning and arrangements for bushfire emergency. This would review emergency management arrangements compliance with National Standards AS3745-2010.

This assessment has been prepared by Lew Short at Blackash Bushfire Consulting (FPAA BPAD-A Certified Practitioner No. BPD-PA-16373), recognised by the RFS as qualified in bushfire risk assessment and has been accredited by the Fire Protection Association of Australia (FPAA) as a suitably qualified consultant.

3. Location

The Murwillumbah High School is located at 86 Riverview St, Murwillumbah and is legally defined as Lot 2 in DP 578679 and Lots 5 and 6 in DP 820602 (Figure 1 and Figure 2). The school site is located within the Tweed Shire Council Local Government Area (LGA) and the land is owned by the NSW Department of Education (DoE).

Figure 2 identifies the proposed site and the four schools which are proposed to come together to create the Murwillumbah Education Campus. Figure 3 identifies the existing site boundary and site layout.

Figure 1 Locality



Legend

- Subject Land
- Lot



Date: 21/02/2020

0 125 250 500 750
Metres

Coordinate System: GDA 1994 MGA Zone 56
Imagery: © Neamap



Figure 2 Murwillumbah Education Campus

3.1. Site Description

The school site is irregular in shape and has a total area of approximately 11.7ha. It is located approximately 1km from the Murwillumbah town centre and to the south of a well-established suburban area with residential properties. The site is bordered on the east, south and west by open rural landscape and is approximately 500 metres from the Tweed River. The school is bound by Riverview Street, High School Lane, Nullum Street and residential structures to the north; grassland/farmland to the west and south; and sports fields to the east.

The school currently comprises eleven (11) permanent buildings, as well as an off-street staff car park, various playgrounds, sports ovals, sport courts and green space.

3.2. Topography

This school site slopes from the entrance at Riverview Street to the lower playing fields adjacent to the agricultural land and a levy bank system to the south.

Figure 3 Proposed Development



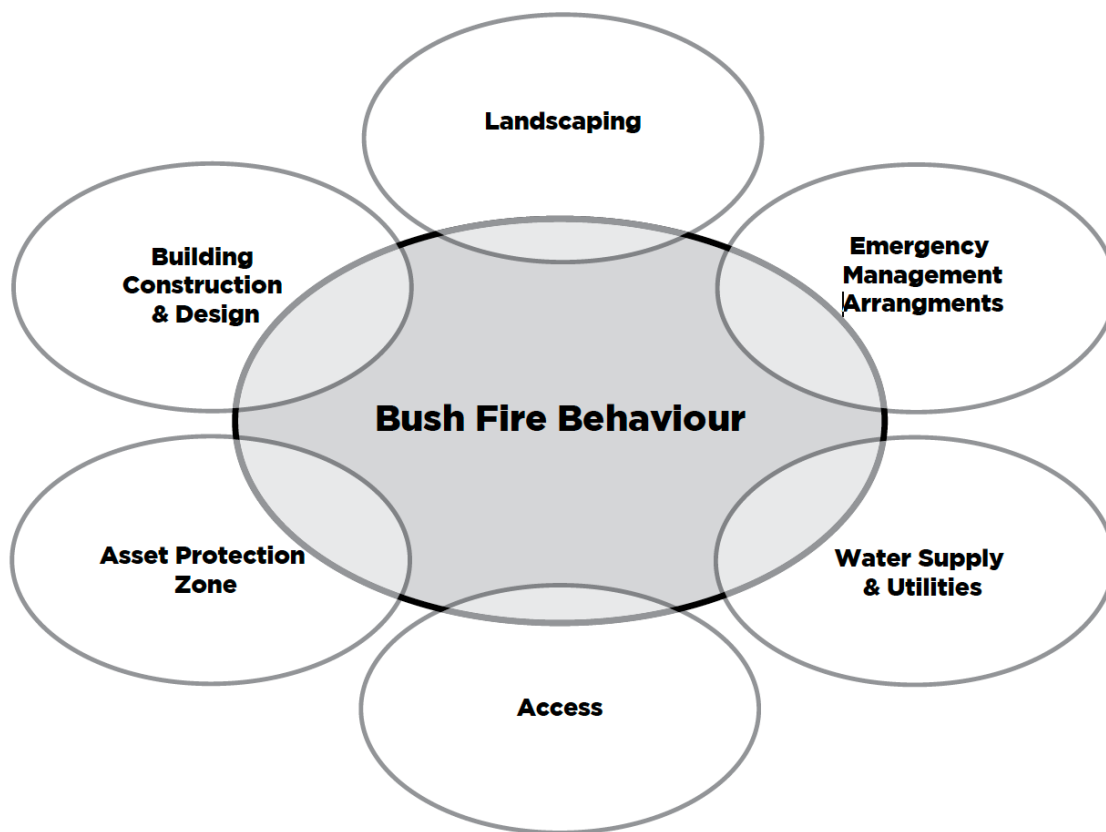
4. The Bushfire Protection Measures

PBP 2019 identifies that the Bushfire Protection Measures (BPMs) are general measures which are required to improve life safety, property protection and community resilience to bush fire attack.

The types of protection measures include APZs, access, landscaping, water supply, building design and construction and emergency management arrangements as shown in Figure 4. These measures assist building and occupant survival during a bushfire. They also contribute to the safety of firefighters and members of the community occupying buildings during the passage of a bushfire front.

Each of the BPMs have been assessed and applied separately and used in based upon the development type and the assessed level of bushfire risk. Specific strategies have been put into place for each of the BPMs that meet or exceed the requirements of PBP 2019. These will be discussed throughout the report.

Figure 4 Bushfire Protection Measures (source PBP 2019 p. 26)



5. Assessment Framework

Land use planning within bushfire prone areas is guided by legislation, directives and guidelines.

5.1. Planning for Bushfire Protection 2019

NSW RFS PBP 2019 is the formal NSW guideline which provides development standards for planning, designing and building on bushfire prone lands in NSW. PBP 2019 details specific provisions for Special Fire Protection Purpose (**SFPP**) development taking into account occupant vulnerability, BPMs and guidance in upgrading and maintaining existing developments.

2019 sets out an overall framework consisting of an aim and objectives, specific objectives for defined development types, types of BPMs which may be employed in a development or risk assessment, and performance criteria for each BPM.

The aim of PBP 2019 in terms of ensuring appropriate consideration of risk and protection is:

- *to protect people and property from the impact of bushfires. Ensure that the firefighters who come to aid in an emergency are not placed in greater danger due to unsuitable or unsafe developments.*

The specific objectives for SFPP developments 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.*

5.2. General Objectives of Planning for Bushfire Protection

All development on BFPL must satisfy the aim and objectives of PBP 2019. The aim of PBP 2019 is to provide for the protection of human life and minimise impacts on property from the threat of bushfire, while having due regard to development potential, site characteristics and protection of the environment. The objectives are to:

- I. *Afford buildings and their occupants protection from exposure to a bushfire*
- II. *Provide for a defensible space to be located around buildings*
- III. *Provide appropriate separation between a hazard and buildings which, in combination with other measures, minimises material ignition*
- IV. *Ensure that appropriate operational access and egress for emergency service personnel and residents is available*
- V. *Provide for ongoing management and maintenance of BPMs*
- VI. *Ensure that utility services are adequate to meet the needs of firefighters.*

5.3. Specific Objectives for SFPP Development

The Murwillumbah High School is a designated SFPP, defined in Section 100B(6) of the *Rural Fires Act 1997* as a development that includes schools (as well as other purposes). Planning for Bushfire Protection states that:

"An SFPP development is one which is occupied by people who are identified as at-risk members of the community. In a bushfire event, these occupants may be more susceptible to the impacts of radiant heat and other bushfire effects. Evacuating at-risk members of the community is more challenging because they may be physically or psychologically less able to relocate themselves or are unfamiliar with their surroundings. Examples of SFPP developments are schools, hospitals, nursing homes and tourist accommodation."

The specific objectives within PBP 2019 for SFPP developments are to:

- I. *Minimise levels of radiant heat, smoke and ember attack through increased APZ, building design and siting;*
- II. *Provide an appropriate operational environment for emergency service personnel during firefighting and emergency management;*

-
- III. *Ensure the capacity of existing infrastructure (such as roads and utilities) can handle the increase in demand during emergencies as a result of the development; and*
- IV. *Ensure emergency evacuation procedures and management which provides for the special characteristics and needs of occupants.*

5.4. Development of Existing SFPP Facilities

The assessment provides information to guide approvals for new buildings and continued use of the existing education facilities. The school and buildings have been constructed prior to modern bushfire planning requirements.

PBP 2019 notes that in circumstances where new building projects within existing SFPP developments are proposed, an appropriate combination of BPMs and compliance with the performance criteria is required. Proposals that involve internal alterations only are not subject to any specific requirements unless the proposal results in a change of use or repurpose and/ or results in an increase in occupants.

2019 acknowledges that for existing SFPP developments, circumstances may make the acceptable deemed to satisfy criteria standards difficult to achieve.

The intention of PBP 2019 is for any building work occurring within an existing SFPP development is to achieve a better bushfire outcome (such as improved construction standards, APZs and evacuation management) than if the development did not proceed. This may result in a level of retrofitting of existing buildings and managing other portions of the site (i.e. APZs) to ensure an improved level of bush fire protection.

Any works that result in intensification or increase in occupancy must carefully consider the risk to occupants and firefighters and ensure an appropriate combination of BPMs.

Existing SFPP facilities constructed without the benefit of current bush fire requirements should consider, as a minimum, the identification of a designated safe refuge building to accommodate all occupants. The safe refuge should provide a radiant heat threshold of no greater than 10kW/m² and a minimum BAL-12.5 construction.

The specific objectives (2019) that apply to SFPP infill development and which should be used as a guide in any development include:

- *provide an appropriate defensible space;*

-
- *site the building in a location which ensures appropriate separation from the hazard to minimise potential for material ignition;*
 - *provide a better bush fire protection outcome for existing buildings;*
 - *new buildings should be located as far from the hazard as possible and should not be extended towards or situated closer to the hazard than the existing buildings;*
 - *ensure there is no increase in bush fire management and maintenance responsibility on adjoining land owners without their written confirmation;*
 - *ensure building design and construction enhances the chances of occupant and building survival; and*
 - *provide for safe emergency evacuation procedures including capacity of existing infrastructure (such as roads).*

PBP 2019 requires that a bushfire emergency management plan that is consistent with the NSW RFS publication: *A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan*, and the Australian Standard AS 3745:2010 *Planning for emergencies in facilities* will be required to be prepared for the existing facility that are bushfire prone.

6. Bushfire Hazard Assessment

6.1. Methodology

PBP 2019 provides a methodology to quantify the possible bushfire attack level. These elements include the fire danger rating, 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 site inspection utilising the following resources:

- *Planning for Bushfire Protection (PBP 2019)*
- *Council Bushfire Prone Land Map*
- *Aerial mapping (vegetation, contours, urban landscape)*
- *Detailed GIS analysis*
- *Detailed site survey and building inspections*
- *Meetings and liaison*

The methodology used in this assessment is in accordance with PBP 2019 and is outlined in the following sections.

6.2. Fire Danger

PBP 2019 has designated the appropriate fire areas and corresponding Fire Danger Rating (FDI). The FDI 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 fire danger rating for the Far North Coast (Tweed) is determined as **FDI 80**.

6.3. Bushfire Prone Land

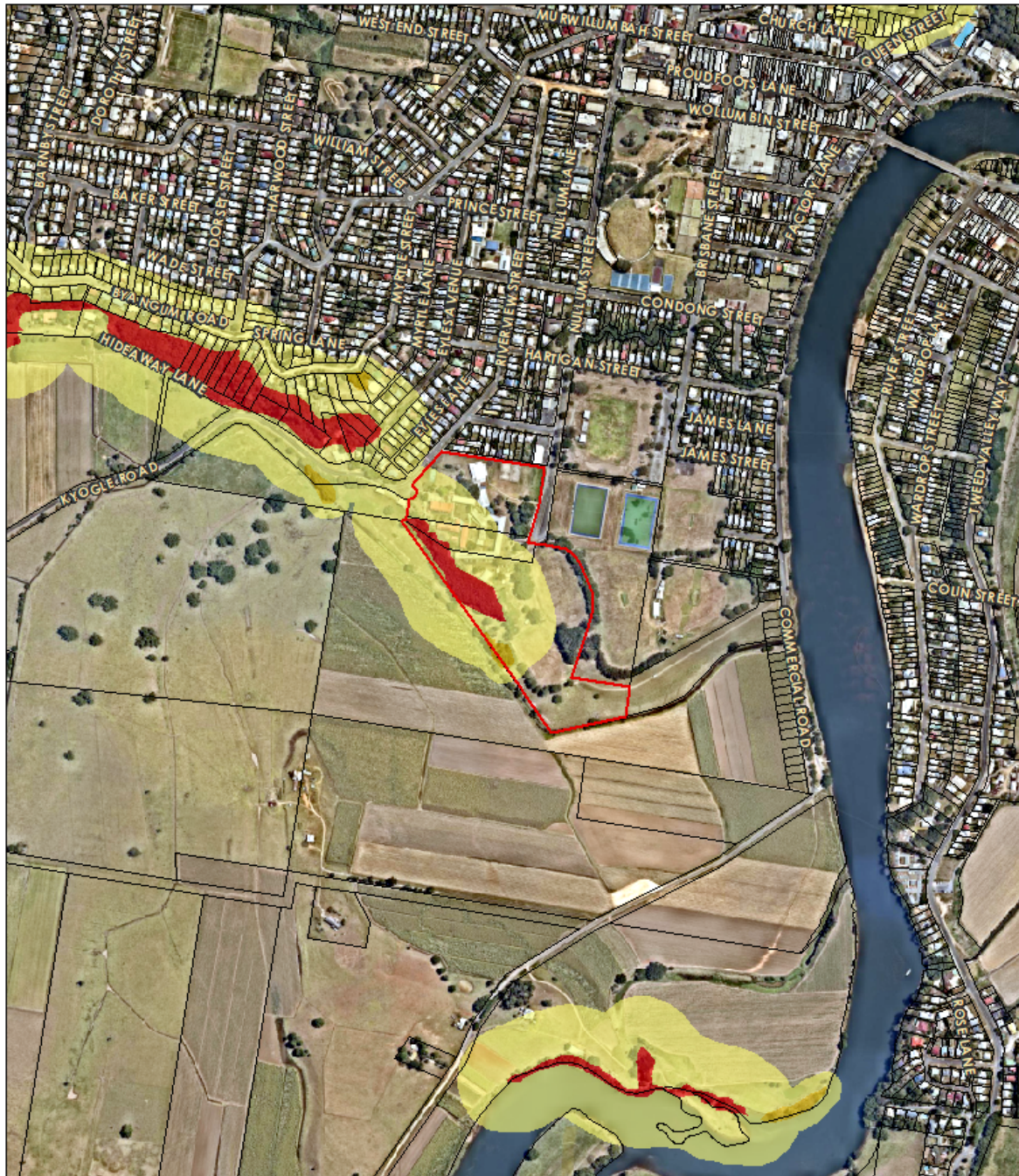
Bushfire prone land is land which can support a bushfire or is likely to be subject to bushfire attack (radiant heat, embers or flame). Bushfire prone land maps are prepared by local council and certified by the Commissioner of the RFS.

The school site is identified as being within mapped 'bushfire prone land' being a parcel of Category 1, Category 2 and associated buffers (**Figure 5**).

The mapped or designated bushfire prone vegetation is located within the school boundary, bordering the south-western boundary. This mapped bushfire prone vegetation is less than 1 ha in total area.

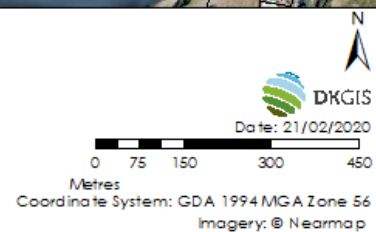
The nearest bushfire prone vegetation outside the school property is greater than 100m to the north west.

Figure 5 Bushfire Prone Land Mapping



Legend

- Subject Land
- Lot
- Bushfire Prone Land**
- Vegetation Category 1
- Vegetation Category 2
- Vegetation Category 3
- Vegetation Buffer



6.4. Vegetation Assessment

The vegetation formations (bushfire fuels) combine with topography (effective slope) to create the bushfire behaviour that may affect the site, and which determine the planning and building response of the bushfire planning framework and PBP 2019.

The bushfire hazard affecting the investigation area was assessed and confirmed 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 2019).

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 2019.

The woody vegetation along the south western boundary is assessed as plantations consistent with a Rainforest structure. The total area of vegetation is currently less than 1ha in area, and has potential to be managed in perpetuity. This vegetation is planned to be cleared for the future development, thus eliminating the hazard.

Being greater than 100m from other areas of Category 1 or 2 vegetation, the vegetation is not required to be considered for the purpose of PBP, consistent with Section A1.10 Low Threat Vegetation – Exclusions (PBP 2019). Low Threat vegetation can be managed to retain the aesthetic, shade and windbreak values.

The due diligence assessment also recognises the cane fields to the west of the school. Although these are managed lands, cane fields are classified as a curing crop, have potential to carry a fire and emit embers, and should be assessed the same as for grasslands.

All other lands surrounding the school are either managed as low threat vegetation (sporting fields and managed parks) or non-vegetated. There is no other bushfire prone vegetation within 100m of the DoE land and the Murwillumbah High School.

In summary, the classified (Council mapped) bushfire prone vegetation is in fact a Low Threat Vegetation category, and the hazard has been assessed as the cane fields to the west (curing crops), which are to be assessed as for grasslands.

Figure 6 Bushfire Hazard Assessment

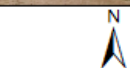


Legend

- Contour - 2m
- Watercourse
- Subject Land
- Lot
- Assessment Area - 140m

Vegetation Formation

- Cane Fields - Grassland
- Low Hazard - Rainforest



DKGIS

Date: 21/02/2020

0 25 50 100 150

Metres

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

6.5. Slopes Influencing Bushfire Behavior

The 'effective slope' influencing fire behaviour approaching the sites has been assessed in accordance with the methodology specified within PBP 2019. This analysis is conducted by measuring the worst-case scenario slope within the bushfire prone vegetation over a 100m measured outwards from the property boundary or the existing/proposed buildings.

Detailed slope analysis is classified as flat, being river flats supporting the cane fields.

7. Bushfire Protection Measures

7.1. APZ Requirements

An APZ is a buffer zone between a bushfire hazard and buildings or assets, 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 is generally landscape managed areas within the designated landholding, and can include roads and fire trails, sporting fields and courts etc. APZ requirement can also be incorporated on adjacent land when these lands can be demonstrated as being managed land in perpetuity, such as existing roads and managed easements, adjacent buildings and associated APZs. These APZ on adjacent land are determined on the basis that they will be managed in perpetuity as fuel free (non vegetated) or as low threat vegetation (PBP 2019).

APZ for SFPP developments are defined in Table A1.12.1 (PBP 2019), and the setbacks are designed to achieve a radiant heat not exceeding 10kW/m² at the building or where emergency workers would be supporting or evacuating occupants from a building. The radiant heat is predicted at a higher flame temperature of 1200K. This is a conservative measure that has been formulated to allow attending emergency services (fire fighters) a safer area to defend the asset while supporting evacuation.

The vegetation assessment has determined the cane fields as grassland hazard, on Flat ground, and in accordance with Table A1.12.1 (PBP 2019), a **36m APZ** is required between the hazard (cane fields) and the nearest proposed new building.

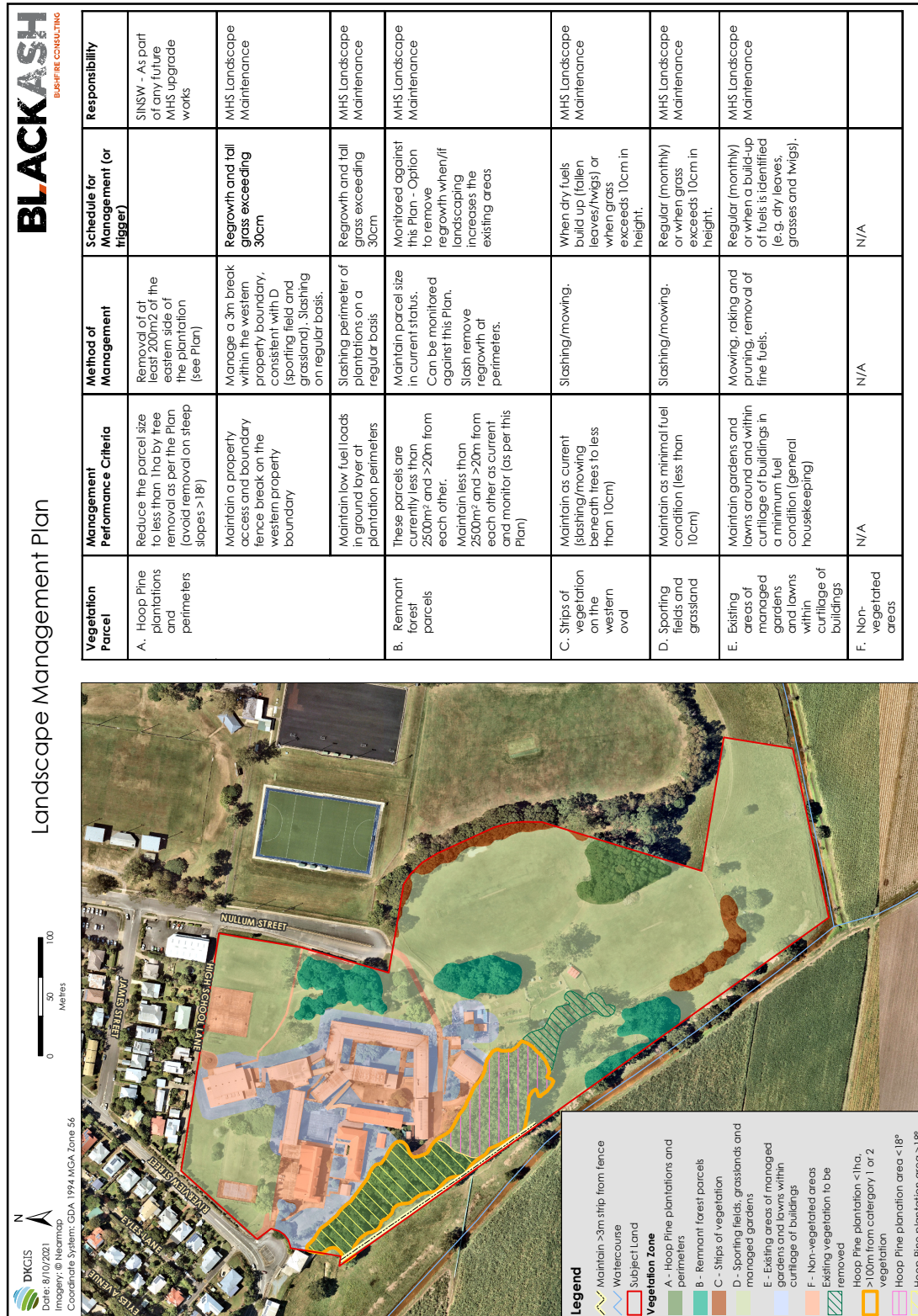
7.2. Landscaping - Establishment and Maintenance of APZs

Landscaping provides for the establishment of a designated APZ and the ongoing maintenance. Landscaping also ensures the APZ standards are adequate and meet the guidelines and principles of low threat vegetation. The DoE is only responsible for the APZ within the school property. Appendix 4 of PBP 2019 details the performance criteria for APZ.

The Murwillumbah High School grounds, including the low threat vegetation on the south western boundary, would be maintained to Inner Protection Area (IPA) standards and will be maintained in perpetuity (through the schools landscaping plan of management).

The proposed development would include provision of landscape management plan (Figure 7) within the south western plantation areas to the school boundary, such that it would be considered as Low Threat Vegetation, on the basis that continued landscaping management in perpetuity on school.

Figure 7 Landscape Management Plan



7.1. Construction Standards

The existing buildings at Murwillumbah High School exceed 50m separation from bushfire prone vegetation (grassland) and have a **BAL Low** risk rating. BAL Low is beyond the construction requirements within AS3959 and as such there is insufficient risk to warrant specific AS3959-2009 bushfire construction requirements. No upgrades to existing buildings are required.

Any proposed new building at Murwillumbah High School should be provided a minimum setback of 36m. In accordance with PBP2019 and AS3959:2009, any building located within 50m of the grassland hazard will be afforded BAL12.5 construction standards, essentially for the purpose of ember protection.

Any new construction beyond 50m from cane field hazard, BAL Low would apply (is insufficient risk to warrant specific AS3959-2009 bushfire construction requirements).

Figure 8 Bushfire Hazard Assessment and Setbacks for School Site and Buildings



Legend

- Contour - 2m
- Watercourse
- Subject Land
- Assessment Area - 140m

Vegetation Formation

- Cane Fields - Grassland
- Managed

Bushfire Attack Level (BAL)

- BAL Flame Zone
- BAL 40
- BAL 29

- BAL 19
- BAL 12.5

DKGIS
Date: 21/02/2020
0 25 50 100 150
Metres
Coordinate System: GDA 1994 MGA Zone 56
Imagery: © Nearmap

7.2. 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. 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.

The access provisions of Murwillumbah High School adequately meet the performance requirements of PBP 2019. Riverview Street provides a suitable entry to the school and supports access to all buildings.

Any future development at this site should consider accessibility for fire fighting appliances to all building elevations. Accessibility should include provisions for a perimeter access road constructed between any new building and the south western boundary, with the recommended 36m APZ.

7.3. Water Supplies

The Murwillumbah High School is serviced by reticulated water supply onto and throughout the site. New building will provide water supplied for firefighting purposes compliant with or equivalent to AS2419.1:2005. (i.e. reticulated water to use ring main system on perimeter road).

7.4. Gas and Electrical Supplies

The Murwillumbah High School electricity supplies would not increase the possibility of ignition of surrounding bushland or the fabric of the buildings and would comply with PBP 2019 performance criteria.

Any proposed gas services would be installed and maintained in accordance with Australian Standard AS/NZS 1596 'The storage and handling of LP Gas' (Standards Australia 2008).

7.5. Evacuation and Emergency Management

In consultation with school representative, the Murwillumbah High School Oval has been used as an evacuation location, and the school has been used as an evacuation centre.

The current evacuation and emergency management arrangements (**EMP**) will need to be updated to consider any new developments and ensure the EMP is consistent with Australian Standard AS 3745:2010 – Planning for Emergencies in Facilities.

8. Risk Profile Summary

The Murwillumbah High School is assessed as having a Low Bushfire Risk.

The Murwillumbah High School assessment takes into consideration the surrounding urban development and rural land management as providing managed areas consisting of low threat vegetation or non-vegetated areas. The sugar cane fields have been identified as a potential fire hazard. With the provision to manage the vegetation on site to APZ standards, and any new buildings applying a 36m setback from the south western boundary, the bushfire risk assessment has identified the following:

- Manage vegetation within school grounds to APZ standards (plantation managed to less than 1ha in area and as low threat vegetation/windbreaks) as per Figure 7
- The school grounds and surrounding landscape are adequately managed as IPA;
- All existing and proposed school buildings would experience a radiant heat yield from bushfire prone vegetation less than 10kW/m²;
- Construction requirements (AS3959-2009) for existing buildings are BAL Low, being insufficient risk to warrant specific bushfire construction requirements;
- Avoid construction for future buildings that would be within 50m from the south western boundary;
- Public access is considered as suitable for an emergency event, being sealed public through roads surrounding the school (equivalent to perimeter road system) and adequate for simultaneous emergency vehicle access and evacuation;
- Onsite access is suitable for fire fighting vehicle accessibility to all buildings. A perimeter road should be offered to any new buildings, between the building and the western boundary;
- Water supplies, electricity and gas services are adequate with respect to bushfire planning;
- The School Emergency and Evacuation Management Plan is up to date and address the requirements Australian Standard AS 3745-2010 – Planning for Emergencies in Facilities.

Appendix 1 References

Australian Building Codes Board *Building Code of Australia Volumes 1&2*

Councils of Standards Australia AS3959 (2009) – *Australian Standard Construction of buildings in bushfire-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

NSW Rural Fire Service (2015) *Guide for Bushfire Prone Land Mapping*

NSW Rural Fire Service (RFS). PBP 2019. *Planning for Bushfire Protection: A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners*. Australian Government Publishing Service, Canberra

NSW Government (1979) *Environmental Planning and Assessment Act 1979*. NSW Government Printer