

Bushfire Opportunities and Constraints Assessment Report

for

**Marsden High School
22 Winbourne Street
West Ryde NSW 2114**

**Proposed repurpose of site to a community sports
facility**

**Prepared for: Schools Infrastructure NSW
Report No: AE21-2227-BAL-OPPCon-REP-ISS-3
Prepared by: Abel Ecology
Date: 13 May 2021**



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Document History

Report	Version	Prepared by	Proofread by	Technical Review by	Submission	
					Method	Date
Report	Issue 1	Mark Mackinnon	Danny Wotherspoon	DW	Dropbox	3 February 2021
Report	Issue 2	Mark Mackinnon	Denise McNamara	DW	Dropbox	1 March 2021
Report	Issue 3	Mark Mackinnon  	Jane Bonwick		Dropbox	12 May 2021



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List of Abbreviations

AHIMS	Aboriginal Heritage Information Management System
APZ	Asset Protection Zone
BAL	Bushfire Attack Level
NCC	<i>National Construction Code</i>
BC Act 2016	<i>Biodiversity Conservation Act 2016</i>
BFMC	Bushfire Management Committee
DCP	Development Control Plan
DP	Deposited Plan
DPIE	Department of Planning, Industry and Environment
DTS	Deemed-To-Satisfy
EP&A Act 1979	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation 2000	<i>Environmental Planning and Assessment Regulation 2000</i>
EPBC Act 1999	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
IPA	Inner Protection Area
kW/m ²	kilowatts per square metre (being a measure of radiant heat)
LEP	Local Environment Plan
LGA	Local Government Area
LLS Act 2013	<i>Local Land Services Act 2013</i>
NP&W Act 1974	<i>National Parks and Wildlife Act 1974</i>
OEH	Office of Environment and Heritage (old State department name)
OPA	Outer Protection Area
PDA	Principal Development Area
PBP 2019	<i>Planning for Bushfire Protection 2019</i>
RFS	Rural Fire Service
RF Act 1997	<i>Rural Fires Act 1997</i>
RF Regulation 2013	<i>Rural Fires Regulation 2013</i>
RHF	Radiant Heat Flux
SEPP	State Environmental Planning Policy
SFPP	Special Fire Protection Purpose

Note regarding maps in this report

The diagrams/site maps used in this report have been supplied by and are used with the permission of Gina Gou (Project Officer), Schools Infrastructure NSW.

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Executive summary

This Bushfire Opportunities and Constraints Assessment Report has been prepared by an Accredited BPAD Practitioner using the Simplified Procedure (Method 1) as detailed in Appendix 1 of *Planning for Bushfire Protection 2019*.

This proposal has been prepared in accordance with *Planning for Bushfire Protection 2019* in its entirety and the development complies with most relevant Acceptable Solutions in *PBP 2019*. In accordance with s.4.14(1A) of the *EP&A Act 1979* ... "the consent authority may, ..., grant consent to the carrying out of the development but only if it has consulted with the Commissioner of the NSW Rural Fire Service concerning measures to be taken with respect to the development to protect persons, property and the environment from danger that may arise from a bush fire." As a result, this planning proposal must be referred to the Rural Fire Service in accordance with Section 4.14(1A) of the *EP&A Act 1979*.

Abel Ecology makes no warranties as to the accuracy of the information provided in the report. All enquiries related to the information and conclusions presented in this report must be made to the Practitioner.

A bushfire assessment of the proposed redevelopment site at 22 Winbourne Street, West Ryde NSW (the 'site') was undertaken on 20 January 2021. The 5.56 ha (approx.) allotment has existing infrastructure currently being used by Marsden High School. The proposal is for Marsden High School to relocate to the Meadowbank Education (and Employment) Precinct. At which point the site will be free for repurpose as a community sports (netball) facility. Current infrastructure (buildings and services) is proposed to be demolished and in their place, will be an indoor four-court sports centre, 32 outdoor netball courts, associated car parks and landscaping. The redevelopment has two design layouts for consideration that will occupy an area of up to 2.93 ha (Option 1: 29,345 m² approx.) and 3.09 ha (Option 2: 30,939 m² approx.) respectively.

The aim of the assessment was to ascertain the potential fire hazard and establish the site capability for an Asset Protection Zone (APZ) while complying with relevant legislation. The report will be used to ensure the planning proposal satisfies the performance requirements of the *National Construction Code (NCC)*, *Planning for Bushfire Protection 2019*.

The access road to the proposed development footprint is from Winbourne Street and/or from Brush Road. Winbourne Street is a council bitumen road, 590 metres long, of suitable grades, 7 - 12 metres wide and is regularly maintained. Winbourne Street serves as the main entry to the site. Brush Road on the east side of the site, is a council bitumen road, 835 metres long, of suitable grades, 7 - 9 metres wide and is regularly maintained.

City of Ryde Council has not listed any significant environmental features relevant to the proposed development site. The site has significant vegetation as mapped on the Biodiversity Values Map. In composition the vegetation in the northeast corner of the site is closest to Sydney Blue Gum - Blackbutt - Smooth-barked Apple (PCT id: 1237) moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin Bioregion.



In part, Blue Gum High Forest in the Sydney Basin Bioregion is scheduled as a Critically Endangered Ecological Community under the NSW *Biodiversity Conservation Act 2016* and potentially could be classified under the same category for the Commonwealth under the *Environment Protection and Biodiversity Conservation Act 1999*. The Principal Development Area has no threatened, protected or endangered floral or faunal species, populations, or habitat as prescribed by Department of Planning, Industry and Environment (DPIE). No part of the Principal Development Area has been identified as critical habitat for threatened species.

With regard to any clearing of native vegetation on the property, it is the responsibility of the landowner to check whether all required permissions from local and statutory authorities are in place. This may include Part 5 of the *EP&A Act 1979* and the *Biodiversity Conservation Act 2016*.

The vegetation hazard which will most significantly influence fire behaviour is the 'Remnant' (Low Hazard) Forest in the Northeast corner of the site. There is no hazardous vegetation identified offsite.

The following conclusions and recommendations apply:

The site is not mapped as bush fire prone land. In our opinion, the site is not sterilised by the bushfire threat. This report concludes that the planning proposal can comply with PBP 2019. The State will therefore be able to construct the proposed development with the following measures included:

- a) This proposal has been prepared in accordance with *PBP 2019* in its entirety and the development complies with most relevant Acceptable Solutions in *PBP 2019*. In accordance with s.4.14(1A) of the *EP&A Act 1979* ... "the consent authority may, ..., grant consent to the carrying out of the development but only if it has consulted with the Commissioner of the NSW Rural Fire Service concerning measures to be taken with respect to the development to protect persons, property and the environment from danger that may arise from a bush fire." As a result, this planning proposal must be referred to the Rural Fire Service in accordance with Section 4.14(1A) of the *EP&A Act 1979*.
- b) The site is not mapped as bush fire prone land.
- c) Building construction for all aspects of the proposed Indoor Sports Centre are to be built in accordance with the NCC, and must comply with section 3 and 5 (BAL – 12.5) of *Australian Standard 3959 (2018) Construction of buildings in bushfire-prone areas* and Table 6.8a of *PBP 2019* and as modified by Section 7.5, 7.5.1, 7.5.2, 7.5.3, and 7.5.4 (where applicable) of *PBP 2019*. Refer to AS 3959 (2018) for a detailed description.
 - Proposed Class 10 buildings are to comply with Section 7 of this report and:
 - Class 10a: Sheds – s.8.3.2 of *PBP 2019*,
 - Class 10b: fences and gates – Section 7.6 of *PBP 2019*.

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- d) We recommend a site Vegetation Management Plan (VMP) be produced for the on-going management and maintenance of the site asset protection zone. The APZ will be maintained to Inner Protection Area condition as per Sec. 6.1 and 6.7 of this report, Appendix 4 of *PBP 2019* and the RFS *Standards for Asset Protection Zones* (Appendix 3 and see www.rfs.nsw.gov.au). The VMP will observe



mapped / shaded vegetation on the Biodiversity Values Land Map, and retention of hollow-bearing trees (Abel Ecology Due Diligence Report AE21-2216-REP-ISS 1, Dated 22 Jan 2021). Total clearance of all vegetation is not acceptable. Vegetation management undertaken to establish the required Asset Protection Zone shall be minimised while still complying with PBP guidelines.

- e) In accordance with a site Vegetation Management Plan, an asset protection zone is to be maintained permanently on the north / northwest aspect:
- To IPA condition (15% tree canopy cover) for a horizontal distance of 21 - 82 metres from the external wall of the Indoor Sports Centre to the north site boundary.
 - Trees will need to be removed to achieve this requirement.
- f) In accordance with a site Vegetation Management Plan, an asset protection zone is to be maintained permanently on the east / northeast aspect:
- To IPA condition (15% tree canopy cover) for a horizontal distance of 38 metres from the external wall of the Indoor Sports Centre to the boundary of shaded vegetation on the Biodiversity Values Land Map.
 - Trees will need to be removed to achieve this requirement. The Abel Ecology Due Diligence Assessment (AE21 2216 REP ISS 1 22Jan21) has identified trees 41 – 46 (numbering - Bradshaw Consulting Arborists 2020) to be nominated for removal. Vehicles, plant, storage items, dumpings/stockpiles and walkways are not permitted anywhere within the shaded areas on the Biodiversity Values Land Map. Trees are not to be felled into the shaded areas on the Biodiversity Values Land Map.
- g) In accordance with a site Vegetation Management Plan, an asset protection zone is to be maintained permanently on the west / southwest aspect:
- To IPA condition (15% tree canopy cover) for a horizontal distance of 28 metres from the external wall of the Indoor Sports Centre to the west boundary.
 - Trees will need to be removed to achieve this requirement.
- h) In accordance with a site Vegetation Management Plan, an asset protection zone is to be maintained permanently on the south / southeast aspect:
- To IPA condition (15% tree canopy cover) for a horizontal distance of 100 metres from the external wall of the Indoor Sports Centre to the south boundary.
 - Trees will need to be removed to achieve this requirement.
- i) Winbourne Street offers adequate access and egress to firefighters, emergency workers, and those involved in evacuation and complies with the performance criteria in Table 6.8b of *PBP 2019*. Brush Road does not comply with the performance criteria in Table 6.8b of *PBP 2019* in the following ways:
- It is a two-way road with a carriageway less than an 8 metre width kerb to kerb;
 - Parking is provided inside the carriageway width, further reducing the carriageway width.
- j) All weather access to the site will be provided in recognition of the risk to fire fighters and / or evacuating occupants. There will be access to the rear of the Indoor Sports Centre for operational activities via the proposed 93 - 99 metre long site driveway / car park. Fire vehicles must be able to drive to the rear of the Indoor Sports Centre. The access driveway / car park must comply with



section 6.4 of this report and acceptable solutions from Table 6.8b of *PBP 2019* for non-perimeter roads, property access and RFS vehicle access and turning requirements.

- k) Utility services along Winbourne Street are adequate to meet the needs of firefighters and others assisting in bush fire fighting. Gas and electricity services are to be located so as to not contribute to the risk of fire to the buildings. Gas and electricity services are to be installed as per Sec. 6.3 of this report.
- l) Fire hazard management for the subject site needs to take into account hollow-bearing trees, and native vegetation that is:
- Scheduled as Critically Endangered under the NSW *Biodiversity Conservation Act 2016* and for the Commonwealth under the *Environment Protection and Biodiversity Conservation Act 1999* and or,
 - Is shaded in the Biodiversity Values Land Map. Refer to the Abel Ecology Due Diligence Report (AE21-2216-REP-ISS 1, Dated 22 Jan 2021).
- m) Water supply is to be provided in accordance with Sec. 6.2 of this report and Table 6.8c of *PBP 2019*.
- n) A site Bushfire Emergency Management and Evacuation Plan is to be prepared consistent with Sec. 6.6 of this report.



Introduction

Abel Ecology was engaged by the Schools Infrastructure NSW, to prepare a bushfire opportunities and constraints assessment for the proposed redevelopment of the Marsden High School site. The report will be used to supplement a business case for submission to Treasury NSW. The report will be used to ensure the planning proposal satisfies the performance requirements of the *National Construction Code (NCC)*, and *Planning for Bushfire Protection 2019*.

We have considered the details sent to us and completed a detailed inspection of the site on 20 January 2021. This report serves to:

- a) Identify the site and proposed development,
- b) Determine the bushfire threat, and
- c) Identify work to be completed in order to improve the chances of building survival in the event of a bushfire. These works will satisfy the Performance Requirements of the *National Construction Code (NCC)* and achieve compliance with *Planning for Bushfire Protection 2019 (PBP 2019)*.

The *Bushfire Opportunities and Constraints Assessment Report* concludes, the site is not sterilised by the bushfire threat and the State will be able to construct the proposed development provided appropriate precautions are taken. This report concludes that the planning proposal can comply with *PBP 2019*.

1.1 Planning relationships

1.1.1 Legislation

- a) Section 4.14 *Environmental Planning and Assessment Act 1979 (Previously s.79BA EP & A Act 1979)*
- b) Clause 272 *EP & A Regulation 2000*
- c) Section 10.3 *EP & A Act 1979 (Previously s.146 EP & A Act 1979)*
- d) Section 4.15(1) *EP & A Act 1979 (Previously s.79C(1)(c) EP & A Act 1979)*
- e) Section 4.46 *EP & A Act 1979 (Previously s.91 EP & A Act 1979)*
- f) *Rural Fires Act 1997 (amended) s.63(1), 63(2)*

1.1.2 Planning policies

- a) *Planning for Bushfire Protection 2019*
- b) City of Ryde Council DCP 2014
- c) City of Ryde Council LEP 2014
- d) Adjacent land is controlled by the Hunters Hill, Lane Cove, Ryde, Willoughby Bushfire Risk Management Plan 2010.

This report is prepared using *PBP 2019*. Section 4.14(1A) of the *EP&A Act 1979* provides that the consent authority may issue consent for the development, after it has consulted with the Commissioner of the NSW Rural Fire Service (NSW RFS) (8.3.11 of *PBP 2019*).



2 The site and proposed development

2.1 Existing site description

On Site

The site is identified as 22 Winbourne Street, West Ryde NSW (Figure 1 and Figure 2).

The site is approximately 5.56 ha in area and is zoned:

- Educational Establishment (SP2).

The site is not mapped as Bush Fire Prone Land (Figure 3).

The site is roughly regularly shaped with a frontage of 190 metres to Winbourne Street and depths of 256 metres and 253 metres on the north and south boundaries respectively (Figure 1). The east boundary is 240 metres long and has frontage to Brush Road along its entire length.

It is likely the site has been historically cleared of intact native vegetation for more than a century (see 1943 aerial image – Figure 4). In 1943 the landuse appears to have been agricultural (e.g. pig farm, grazing and cropping). A small number of remnant trees are present in the northeast corner and along the north boundary (Figure 4). In 1959 Marsden High School was established on the site and this landuse has continued until this day. The highest elevation point is in the northwest corner of the site and the land slopes evenly towards a drainage line running parallel the east site boundary.

The site is accessed from Winbourne Street and/or from Brush Road. Winbourne Street is a council bitumen road, 590 metres long, of suitable grades, 7 - 12 metres wide and is regularly maintained. Winbourne Street serves as the main entry to the site. Brush Road on the east side of the site, is a council bitumen road, 835 metres long, of suitable grades, 7 - 9 metres wide and is regularly maintained.

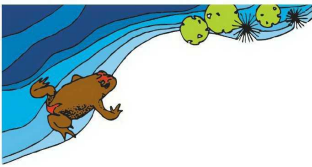


Figure 1. Aerial photo of the site.



Site locality 22 Winbourne Street, West Ryde NSW

Scale: Picture width = 470 metres

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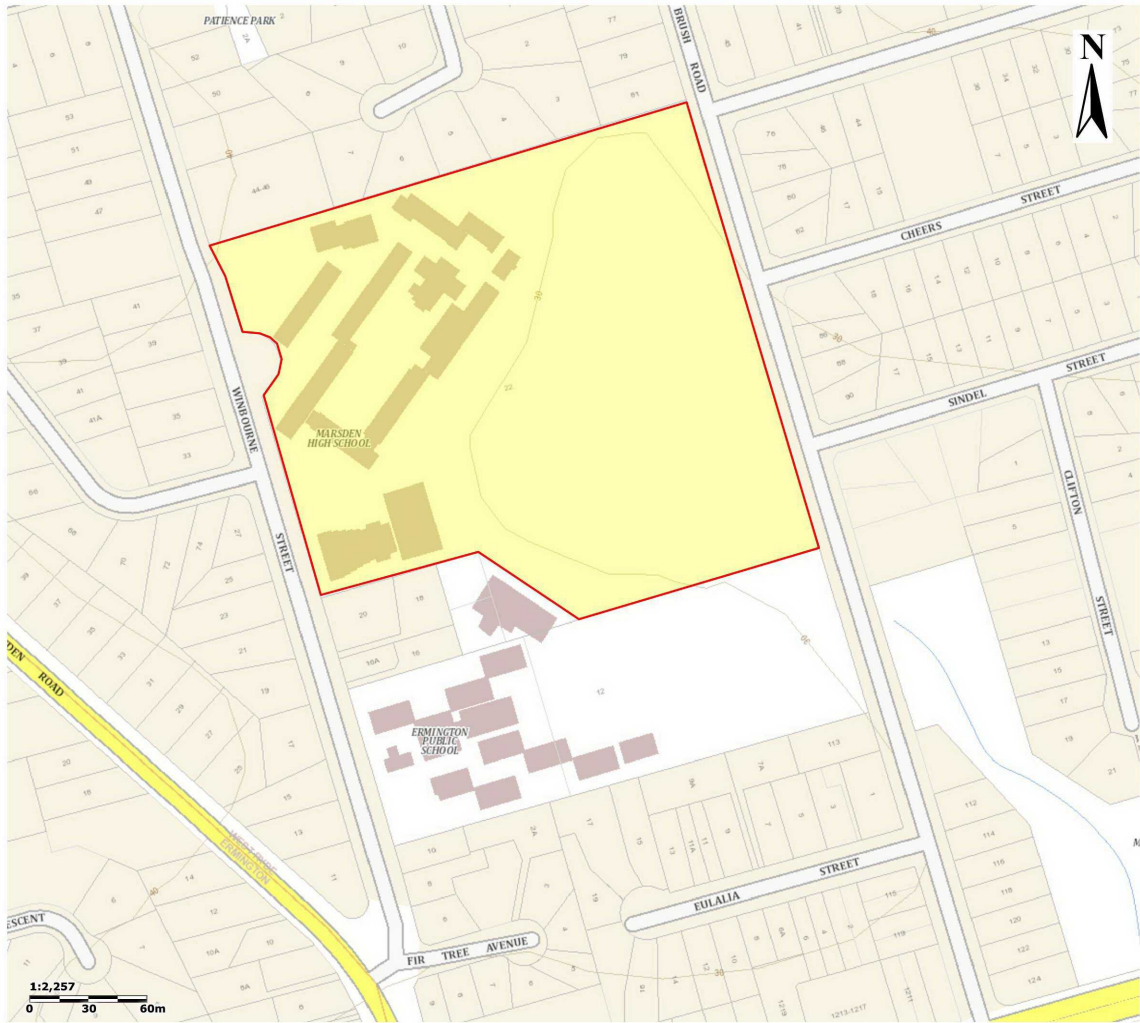


Figure 2. Topographic map of the site.



Site locality – 22 Winbourne Street, West Ryde NSW

Scale: Picture width = 575 metres

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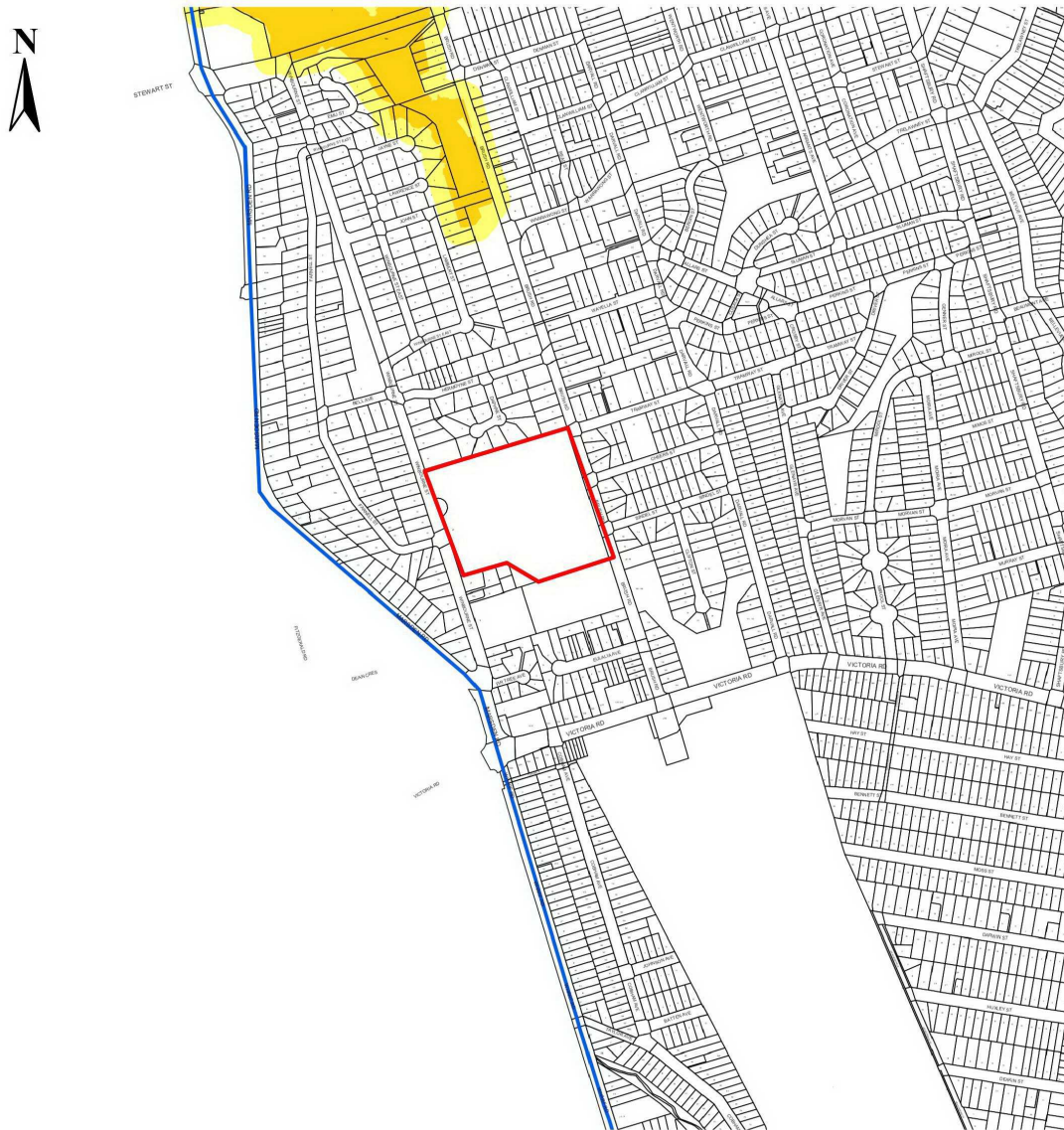


Figure 3. Bush Fire Prone Land map.

Scale: Picture length = 1.9 km

- Subject land
- Bush Fire Prone Land – Vegetation Category 1
- Bush Fire Prone Land – Vegetation Buffer 30 m and 100 m

Extract from the Bush Fire Prone Land Map for the City of Ryde Local Government Area, dated January 2021.

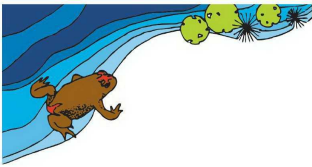


Figure 4. An aerial photograph and boundary of the subject site in 1943.



Figure 5. Site photos of Dry Sclerophyll Forest in the northeast corner of the site.



2.2 Existing vegetation description

On Site

The vegetation description is according to Figures A1.2 in *PBP 2019* based on Keith (2004). The vegetation and fuel load within the site boundary on the northeast corner of the Principal Development Area is consistent with Dry Sclerophyll Forest (22/36.1 t/Ha) (Figure 5). However, the provisions of A1.11.1 of *PBP 2019* could be applied due the small patch size of the unmanaged vegetation (0.5 ha). Remnant vegetation with a patch size of less than 1 ha are considered low hazard and APZ setbacks and building construction standards for this patch size may be the same as for Rainforests (10/13.2 t/Ha). To be clear, the current extent of unmanaged vegetation in the northeast corner of the site is 0.5 ha. The Biodiversity Values shaded area (Figure 9), which is proposed to be fully retained and regenerated to forest is 0.75 ha is size. The current extent of canopy cover in the northeast corner of the site is 0.99 ha (Figure 10 and Figure 11). All three areas uniformly overlap each other; we are describing the same area with three possible boundaries based on existing and proposed management actions (Figure 10 and Figure 11). A significant amount of mown lawn exists under tree canopy cover in the northeast corner of the site (Figure 6), which changes where the edge of managed vegetation is measured towards the proposal.

Adjacent Properties

The vegetation and fuel load on adjacent properties on all aspects of the Principal Development Area is consistent with suburban residential properties with managed gardens (<4 t/Ha) (Figure 1 and Figure 10).



Figure 6. A significant amount of mown lawn exists under tree canopy cover in the northeast corner of the site.



2.3 The proposal

The proposal is for Marsden High School to relocate to the Meadowbank Education (and Employment) Precinct. At which point the site will then be free for repurpose as a community sports (netball) facility. Current infrastructure (buildings and services) is proposed to be demolished and in their place will be, an indoor four-court sports centre, 32 outdoor netball courts, associated car parks and landscaping.

The redevelopment has two design layouts (Figure 7 and Figure 8) for consideration that will occupy an area of up to 2.93 ha (Option 1: 29,345 m² approx.) and 3.09 ha (Option 2: 30,939 m² approx.) respectively. The option of removing all site remnant vegetation is no longer being explored to expand the development proposal.

The indoor sports centre in accordance with the provisions of 8.3.11 of *Planning for Bushfire Protection 2019* (PBP 2019), is to be treated as a Special Fire Protection Purpose, public assembly building due to its proposed footprint being in excess of 500 m². The proposed footprint of the indoor sports centre in both design layouts is between 3,424 m² and 4,172 m². The proposal will thus include the construction of a public assembly building (Class 9b) with the appropriate level of bushfire protection measures in order to meet the required performance criteria of PBP 2019. This includes the clearance / maintenance of an Asset Protection Zone (APZ) within the Principal Development Area (PDA) of the site. The PDA is all site area but the northeast corner of the site (i.e. Biodiversity Values shaded area) (Figure 7, Figure 8 Figure 9, Figure 10 and Figure 11).

To meet the bushfire protection measures stated in PBP 2019 for the indoor sports centre the proposed APZ distances are:

Proposed Option 1

- The full length from the external wall of the Indoor Sports Centre to the north site boundary (21 - 82 metres),
- 38 metres on the east aspect,
- 100 metres on the south and
- 28 metres on the west aspect.

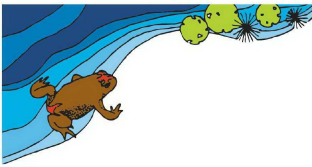
Proposed Option 2

- 34 metres on the northwest aspect,
- 38 metres on the northeast aspect,
- 28 metres on the southwest aspect and
- 100 metres on the southeast aspect.

Within the APZ, tree canopy will be reduced / maintained to 15 per cent cover and will continue to be mown consistent with inner protection area (IPA) condition. Trees will need to be removed to achieve this requirement.

2.4 Significant environmental features

City of Ryde Council has not listed any significant environmental features relevant to the proposed development site. The site has significant vegetation as mapped on the Biodiversity Values Map (Figure 9). Almost all of the regenerating native vegetation in the northeast corner of the site is shaded on the Biodiversity Values Land Map (Figure 9). If any of the shaded vegetation on the Biodiversity Values Land Map is removed or altered as part of this proposal, a Biodiversity Development Assessment Report will be required for entry into the Biodiversity Offsets Scheme identified in s. 7.4 of the *Biodiversity Conservation Act 2016*.



Abel Ecology assumes the proposal is not State Significant Development, requiring approval under Part 5 of the EP & A Act 1979.

The following State Environmental Planning Policies apply to the site:

- SEPP (Vegetation in Non-Rural Areas) 2017
- SEPP No 19—Bushland in Urban Areas 1986



Figure 7. Site proposal diagram (Option 1– Client preferred option).

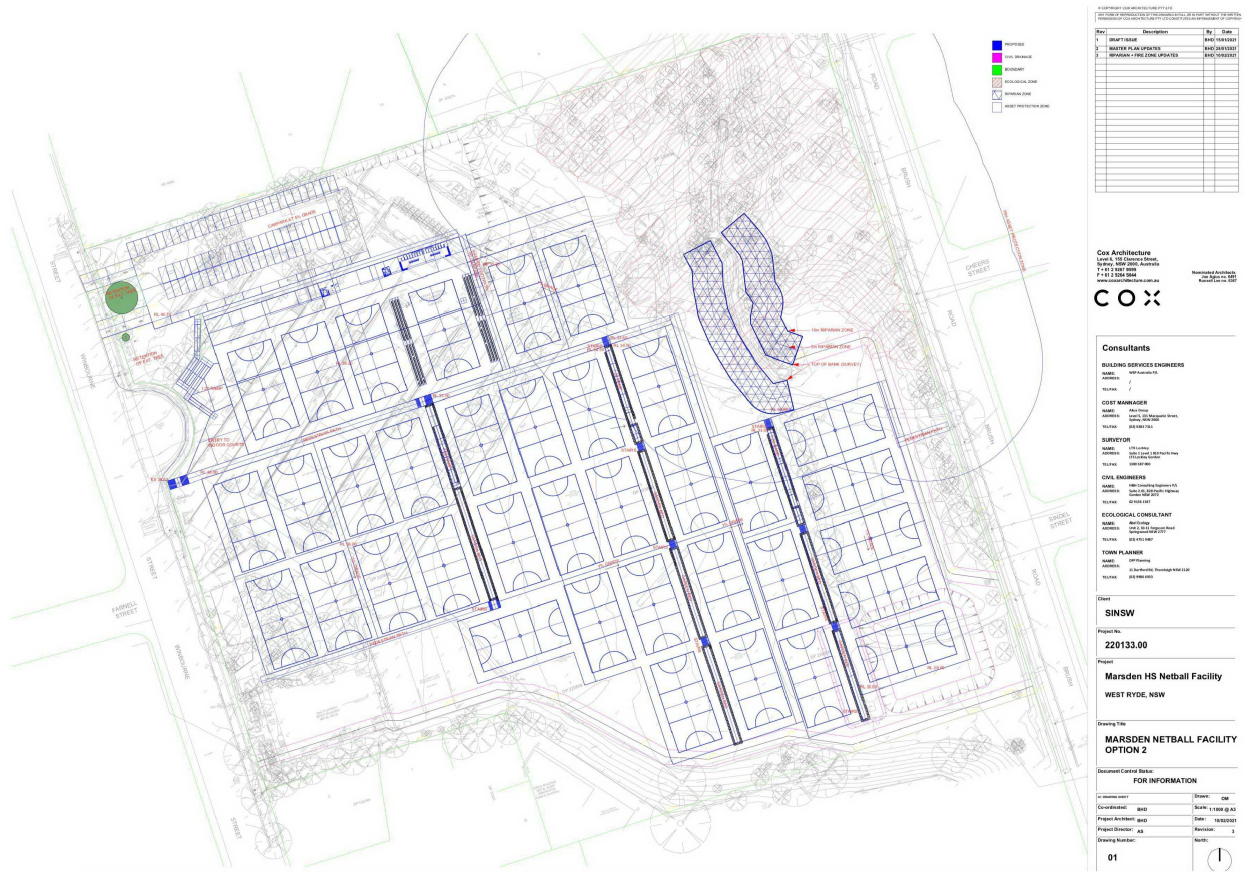
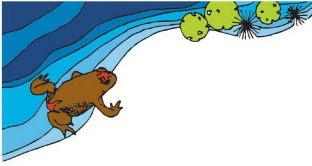


Figure 8. Site proposal diagram (Option 2).



2.5 Threatened flora and fauna

The Principal Development Area has no threatened, protected or endangered floral or faunal species, populations, or habitat as prescribed by Department of Planning, Industry and Environment (DPIE). No part of the Principal Development Area has been identified as critical habitat for threatened species. No 'Areas of Outstanding Biodiversity Value' were discovered upon site inspection.

The site has significant vegetation. Almost all of the regenerating native vegetation in the northeast corner of the site is shaded on the Biodiversity Values Land Map (Figure 9). In composition it is closest to Sydney Blue Gum - Blackbutt - Smooth-barked Apple (PCT id: 1237) moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin Bioregion. In part, Blue Gum High Forest in the Sydney Basin Bioregion is scheduled as a Critically Endangered Ecological Community under the NSW *Biodiversity Conservation Act 2016* and potentially could be classified under the same for the Commonwealth under the *Environment Protection and Biodiversity Conservation Act 1999*.

2.6 Archaeological and Heritage Significant sites

Abel Ecology is not aware of Heritage Significant sites on the land. The site does not form part of the Heritage map overlay of the City of Ryde Council LEP 2014.

Abel Ecology is not aware of Aboriginal relics on the land. Databases have not been searched.



Figure 9. NSW Biodiversity Values Mapping of the site. Clearing or disturbing any of the purple shaded vegetation will result in entry into the Biodiversity Offsets Scheme identified in s. 7.4 of the *Biodiversity Conservation Act 2016*.



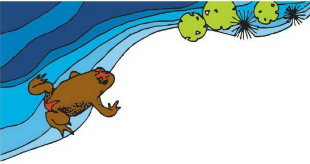
3 Survey methods

Survey methods were applied in accordance with assessment method set in Appendix 1 of *Planning for Bushfire Protection 2019*, Table A1.12.1 (*PBP 2019*), for Special Fire Protection Purpose. The report has also been prepared in accordance with Appendix 2, 3, and 4 of *PBP 2019*.

The provisions of A1.11.1 of *PBP 2019* have been applied due the small patch size (0.75 ha) of the onsite vegetation constituting a bushfire hazard (i.e. mapped Biodiversity Values area Figure 9, Figure 10, and Figure 11). Remnant vegetation with a patch size of less than 1 ha are considered low hazard and APZ setbacks and building construction standards for this patch size may be the same as for Rainforests (10/13.2 t/Ha).

A trained consultant used a slope meter on-site to gain the effective slope angle used in the site analysis.

See Appendix 1 for definitions of fire management terminology.



4 Assessment of bushfire hazard



Figure 10. Bushfire assessment of proposed Option 1.

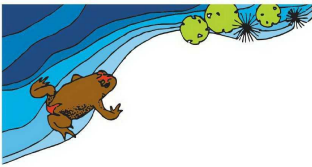


Figure 11. Bushfire assessment of proposed Option 2.



Hazard rating is assessed as follows:

Table 1: Summary Table - DTS Method 1: Appendix 1 of *Planning for Bushfire Protection 2019* and Table A1.12.1 of PBP 2019. FFDI 100

Proposed Indoor Sports Centre Option 1	Effective Slope	Vegetation	Separation distance from un-managed vegetation	Bushfire Attack Level
Northeast Aspect	Up-slope / Level	Remnant (Rainforest)	31 metres (Note: 38 metres needed to reach compliance)	BAL-12.5
Southwest Aspect	Up-slope	Managed Land	>140 metres	BAL-Low
Southeast Aspect	Level	Managed Land	>140 metres	BAL-Low
Northwest Aspect	Up-slope	Managed Land	>140 metres	BAL-Low
Proposed Indoor Sports Centre Option 2				
North Aspect	Up-slope	Managed Land	>140 metres	BAL-Low
West Aspect	Up-slope	Managed Land	>140 metres	BAL-Low
East Aspect	Up-slope / Level	Remnant (Rainforest)	35 metres (Note: 38 metres needed to reach compliance)	BAL-12.5
South Aspect	Up-slope	Managed Land	>140 metres	BAL-Low

5 Issues arising from the assessment

5.1 Assessment outcome

Dominant hazard

The dominant bushfire hazard to the proposal / PDA is from unmanaged Dry Sclerophyll Forest (Remnant) on the Northeast aspect of both Proposal Options (1 & 2) of the Indoor Sports Centre.

Building construction constraints

Our assessment indicates the required building construction for the proposed Indoor Sports Centre (Proposal Options 1 & 2) is BAL-12.5 on all aspects. Building construction for all aspects of the proposed Indoor Sports Centre are to be built in accordance with the NCC, and must comply with section 3 and 5 (BAL-12.5) of *Australian Standard 3959 (2018) Construction of buildings in bushfire-prone areas* and Table 6.8a of *PBP 2019* and as modified by Section 7.5, 7.5.1, 7.5.2, 7.5.3, and 7.5.4 (where applicable) of *PBP 2019*. Refer to AS 3959 (2018) for a detailed description.

The development is not in bush fire attack level-40 (BAL-40) or the flame zone (BAL-FZ).

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Proposed Class 10 buildings are to comply with:

- There is no bushfire protection requirement for Class 10a and 10b structures located more than 6 metres from Special Fire Protection Purpose buildings in bushfire prone areas.
- A Class 10a and 10b structure are not permitted to be located within 6 metres of a Special Fire Protection Purpose refuge building. Class 10a buildings are non-habitable buildings being a private garage, carport, shed or the like.
- For Class 10b buildings, fences and gates. All fences and gates in bushfire prone areas should be made of either hardwood or non-combustible material. In circumstances where the fence or gate is located within 6 metres of a Special Fire Protection Purpose building they should be made of non-combustible material only (Table 6.8a and s. 7.6 of *PBP 2019*).

Asset Protection Zone

There is adequate space on the allotment to clear existing vegetation and permit a deemed-to-satisfy separation distance for exposure of less than 10 kW/m² of radiant heat and BAL-12.5 construction of the Special Fire Protection Purpose building. The APZ is not located on lands with a slope exceeding 18°, and is wholly within the boundaries of the development site. The APZ will be maintained to Inner Protection Area condition. All APZs are achievable for either proposal 1 or 2.

An APZ will need to be maintained as Inner Protection Area condition for a minimum distance of 38 metres on the Northeast aspect for Proposal Option 1, or North aspect for Proposal Option 2 and 100 metres on all other aspects of each proposal or until the site boundary is reached. The Abel Ecology Due Diligence Assessment (AE21 2216 REP ISS 1 22Jan21) has identified trees 41 – 46 (numbering - Bradshaw Consulting Arborists 2020) to be nominated for removal (refer to Figure 6 of the Due Diligence Assessment, and Figure 10 and Figure 11 of this report).

The APZ distances reflect a balance between the requirements of Table A1.12.1 (*PBP 2019*) and the requirements of the *Biodiversity Conservation Act 2016* and City of Ryde Council LEP 2014. In saying that, the APZ could be larger in order to achieve a lower BAL assessment; however in doing so, the ecological impact and requirements of the Biodiversity Offsets Scheme would need to be carefully considered.

The APZ will be maintained to Inner Protection Area condition as per Appendix 4 of *PBP 2019* and the RFS document *Standards for Asset Protection Zones*. Individual tree canopies must have at least two metre gaps between them, but close standing trees are allowed to form clumps as long as the tree canopy cover threshold is not exceeded for IPA condition. Regeneration of the site vegetation and landscaping cannot conflict with the RFS document 'Standards for Asset Protection Zones' for the area that is designated as an APZ.



5.2 Conformance with the objectives in PBP 2019

This is Special Fire Protection Purpose (SFPP) development as the proposal is to build a new public assembly building (indoor sports centre), which does not fall under the requirements for sub-division and Infill.

The proposed position of the indoor sports centre for both proposal options (1 & 2), does not currently afford occupants and defenders protection from life threatening levels of radiant heat ($>10 \text{ kW/m}^2$) from a bushfire (Objective i). Compliance with the $<10 \text{ kW/m}^2$ of radiant heat threshold relies on the removal of trees 41 – 46 (numbering - Bradshaw Consulting Arborists 2020). The siting of the building for both proposal options has breached the 10 kW/m^2 Threshold Line illustrated in Figure 10, Figure 11 and Table 1. The proposed siting of the indoor sports centre (Proposal Options 1 & 2) is only suitable if trees located 'outside' the area shaded on the Biodiversity Values Land Map, but inside the 38 metres APZ on the northeast aspect are removed. Otherwise, the proposed siting of the indoor sports centre must be shifted to establish the 38 metres APZ in order to not breach the 10 kW/m^2 Threshold Line illustrated in Figure 10 and Figure 11. No part of an external wall of a SFPP development can be exposed to $>10 \text{ kW/m}^2$ of radiant heat. The separation distance required for the indoor sports centre is a minimum of 38 metres from un-managed vegetation.

The siting of the building for both proposal options does eliminate direct flame contact from flames originating within the unmanaged vegetation in the northeast corner of the site (Refer to Figure 10). This relates directly with the performance criteria for SFPP in relation to 'siting and design' and Objective iii. of PBP 2019. The indoor sports centre will be constructed to BAL-12.5 and the design will offer adequate defence against the estimated radiant heat level and from ember attack. A BAL-12.5 outcome is consistent with Objective iii. of PBP 2019.

Adequate space exists within the surrounding allotments to provide fire hazard protection. The current proposed footprints (Proposal Option 1 & 2) of the indoor sports centre will be exposed to radiant heat levels exceeding 10 kW/m^2 , therefore utilisation of the surrounding managed grounds is recommended. The existing managed grounds of the site and residential development on all aspects of the PDA (except the northeast site corner) fit the definition of Low Threat Vegetation - Exclusions (A1.10 PBP 2019 pp.88) and therefore meet PBP 2019 performance criteria for a defensible space (Objective ii). The existing managed ground will continue to be treated to IPA condition and meet on-site APZ requirements (Objective iii.).

The landscape design will incorporate a defensible space immediately surrounding the indoor sports centre (both proposal options). The APZ, which is wholly within the boundaries of the development site and located on land with a slope less than 18 degrees, will be managed and maintained to prevent the spread of a fire towards the indoor sports centre. The proposed indoor sports centre is currently not separated from the small patch of remnant forest to the north / north east, for a minimum distance of 38 metres. The area between, is mown grass and landscaped garden. The area between, will be landscaped appropriately to meet IPA condition and maintained through the enforcement of a Vegetation Management Plan (Objective v.).



Winbourne Street offers adequate access and egress to firefighters, emergency workers, and those involved in evacuation (Objective iv.). Brush Road is only seven (7) metres wide and is not compliant with the minimum eight (8) metre wide acceptable solution required by Table 6.8b of *PBP 2019* for SFPP development. Therefore, full compliance with the access and egress provisions of Table 6.8b of *PBP 2019* will be challenging if Brush Road is to be used as the primary access point to the site. Brush Road is not currently relied upon for public road access by the current proposal options. Utility services along Winbourne Street and Brush Road are adequate to meet the needs of firefighters and others assisting in bush fire fighting (Objective vi.).

While the proposed development currently does not meet the minimum APZ for Special Fire Protection Purpose development, it can comply with the PBP Specific Objectives for Special Fire Protection Purpose development as listed at Section 6.2 of PBP and is repeated below:

The specific objectives of Special Fire Protection Purpose are:

- a) *Minimize levels of radiant heat, smoke and ember attack through increased APZ, building design and siting;*

The size of the current APZ illustrates only a minor non-compliance (3 – 7.5 metres) based on the current tree line. This objective can be satisfied if trees 41 – 46 (numbering - Bradshaw Consulting Arborists 2020) to be nominated for removal. Trees 41 – 46 are located outside the area shaded on the Biodiversity Values Land Map. BAL – 12.5 construction is designed to deal with a 10 k/W m² level of radiation, and siting of the indoor sports centre will be satisfied if trees 41 – 46 to be nominated for removal.

- b) *Provide an appropriate operational environment for emergency service personnel during fire fighting and emergency management;*

The size of the current APZ illustrates only a minor non-compliance (3 – 7.5 metres) based on the current tree line. This objective can be satisfied if trees 41 – 46 (numbering - Bradshaw Consulting Arborists 2020) to be nominated for removal. Proposed vehicle access provides an appropriate operational environment for emergency service personnel to access the proposed building and hazardous vegetation. A defendable space is established through the proposed APZ. This objective can be satisfied.

- c) *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;*

The site is currently used as a Public High School. Existing roads can handle the increase in demand during emergencies as a result of the development. This objective is satisfied.

- d) *Ensure emergency evacuation procedures and management, which provides for the special characteristics and needs of occupants;*

The provision of a Bushfire Emergency Management and Evacuation Plan, access, and services that comply with PBP will be recommended conditions of approval. This objective is satisfied.



5.3 Deviation from the objectives of PBP 2019

The proposed position of the indoor sports centre for both proposal options (1 & 2), does not currently afford occupants and defenders protection from life threatening levels of radiant heat ($>10 \text{ kW/m}^2$) from a bushfire (Objective i). The siting of the building for both proposal options has breached the 10 kW/m^2 Threshold Line illustrated in Figure 10, Figure 11 and Table 1. Compliance with the $<10 \text{ kW/m}^2$ of radiant heat threshold relies on the removal of trees 41 – 46 (numbering - Bradshaw Consulting Arborists 2020). The proposed siting of the indoor sports centre (Proposal Options 1 & 2) is only suitable if trees located 'outside' the area shaded on the Biodiversity Values Land Map, but inside the 38 metres APZ on the northeast aspect are removed.

Brush Road does not comply with Objective iv. of PBP 2019 and the specific objectives of Special Fire Protection Purposes in the following ways:

- Brush Road is only seven (7) metres wide and is not compliant with the minimum eight (8) metre wide acceptable solution required by Table 6.8b of PBP 2019 for SFPP development as a primary public access road.

In our opinion we do not believe the aims and objectives of PBP 2019 regarding safe operation access, egress and protection from life threatening levels of radiant heat ($>10 \text{ kW/m}^2$) from a bushfire for emergency personnel and visitors has been compromised. The planning proposal will therefore not need to be referred to the local Rural Fire Service for comment on non-compliance with PBP 2019 in accordance with Section 4.14 of the *Environmental Planning and Assessment Act 1979*.

5.4 Flame length

Flame length is not expected to impact the building from north / northeast aspects.

5.5 Expected radiant heat flux (RHF)

The BAL-12.5 construction is designed to deal with a 10 kW/m^2 level of radiation.



6 Infrastructure and other requirements

6.1 Asset Protection Zone management

All APZs are achievable for this proposal. The APZ objective can be satisfied if trees 41 – 46 (numbering - Bradshaw Consulting Arborists 2020) are nominated for removal. If the nominated trees are not removed, both proposal footprints for the indoor sports centre must be modified to accommodate the required APZ distances.

To meet the bushfire protection measures stated in PBP 2019 for the indoor sports centre the proposed APZ distances are:

Proposed Option 1

- The full length from the external wall of the Indoor Sports Centre to the north site boundary (21 - 82 metres),
- 38 metres on the east aspect,
- 100 metres on the south and
- 28 metres on the west aspect.

Proposed Option 2

- 34 metres on the northwest aspect,
- 38 metres on the northeast aspect,
- 28 metres on the southwest aspect and
- 100 metres on the southeast aspect.

Legislative responsibility to manage hazardous fuels s.63(2) *RF Act 1997*.

S.63(2) of the *Rural Fires Act 1997* No 65 states, "It is the duty of the owner or occupier of land to take the notified steps (if any) and any other practicable steps to prevent the occurrence of bush fires on, and to minimise the danger of the spread of bush fires on or from, that land."

The residents will be required to maintain fuel levels consistent with the provisions of the Asset Protection Zone being, *Table 6.8a of PBP 2019 (SFPP)* and Appendix 4 of PBP 2019 as well as the *RFS Standards for Asset Protection Zones* (see www.rfs.nsw.gov.au). The Asset Protection Zone is to be maintained on a permanent basis through the enforcement of a Vegetation Management Plan. The site is zoned as Land Management Zone with 'Low risk' (likelihood: unlikely, consequence: moderate) human settlement' which will be impacted upon by bushfire in the Hunters Hill, Lane Cove, Ryde, Willoughby Bushfire Risk Management Plan 2010. Ultimate responsibility will fall on the landowner to manage bushfire fuel on the property.

Total clearance of all vegetation is generally not acceptable especially in areas mapped by the Biodiversity Values Map (i.e. Critically Endangered Ecological Communities). Vegetation management undertaken to establish the required Asset Protection zone should be minimised while still complying with PBP guidelines.



6.2 Water supply

There is town mains water supply available. The nearest hydrant is located approximately 24 metres west of the proposed northwest car park entrance of the site on the nature strip outside any designated parking bays. The next nearest hydrant is located on the corner of Farnell Street and Winbourne Street directly adjacent the site and complies with the performance criteria for a reticulated water supply in Table 6.8c of *PBP 2019*. Hydrants are located every 100 metres along Winbourne Street and Brush Road.

Where applicable, fire hydrants / reticulated water supply to the site is to be installed compliant with the following:

- Fire hydrant spacing, design and sizing comply with the relevant clauses of Australian Standard AS 2419.1:2005 - *Fire hydrant installations System design, installation and commissioning*;
- Hydrants are not to be located within any road carriageway or parking bay;
- Fire hydrant flows and pressures are to comply with AS 2419.1:2005; and
- All above-ground water service pipes external to the building are metal, including and up to any taps.
- Unobstructed access is to be provided at all times;
- A suitable accessible connection located within the IPA or non-hazard side and away from the building is to be provided for RFS purposes in the form of a 65 mm ball valve and Storz fitting;
- The ball valve, and pipes must be adequate for full 50mm inner diameter water flow through the Storz fitting and are metal.
- Ball valve and pipes are adequate for water flow and are metal.
- Access to the water supply (i.e. pump and hose reel) is to be shielded from radiant heat.
- Fire hose reels are constructed in accordance with *AS/NZS 1221:1997 Fire hose reels*, and installed in accordance with *AS 2441:2005 Installation of Fire hose reels*.

6.3 Gas and electricity services

Gas and electricity services are to be located so as to not contribute to the risk of fire to the building in the following ways:

- Reticulated or bottled gas is installed and maintained in accordance with *AS/NZS 1596:2014 2014 – The storage and handling of LP Gas* and the requirements of relevant authorities. Metal piping is to be used;
- All fixed gas cylinders are kept clear of all flammable materials to a distance of 10 metres and shielded on the hazard side of the installation;
- If gas cylinders need to be kept close to the building, the release valves are directed away from the building and at least 2 metres away from any combustible material, so that they do not act as a catalyst to combustion. Connections to and from gas cylinders are metal;
- Polymer sheathed flexible gas supply lines are not used;
- Gas service pipes are metal, including and up to any outlets;
- The location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of buildings;
- Where practicable, electrical transmission lines are underground;
- Where overhead, electrical transmission lines are proposed, the lines must comply with the



following:

- Lines are installed with short pole spacing (30 metres), 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*.

6.4 Access and egress

The following roads provide access for fire fighting vehicles and evacuation opportunity for residents.

Public roads

Winbourne Street provides all weather access to the site and complies with the performance criteria in Table 6.8b of *PBP 2019* in the following ways. Winbourne Street is a two-wheel drive, all weather road, council bitumen road, which is:

- Access is provided to all structures;
- Clearly sign-posted (buildings/properties are clearly numbered);
- 590 metres long, with three through road connections along its length, the closest being between 55 -110 metres from any of the proposed site entrances onto Winbourne Street;
- Is linked to the internal road system at an interval of no greater than 500 metres in urban areas;
- Traffic management devices are constructed to not prohibit access by emergency services vehicles;
- Of suitable grades (does not exceed 15 degrees for sealed roads or an average of 10 degrees across its length, or other gradient specified by road design standards, whichever is the lesser gradient);
- Has a cross fall not exceeding 3 degrees;
- Twelve metres wide kerb to kerb, including curves;
- Designed to carry fully loaded fire fighting vehicles (up to 23 tonnes);
- Suitable turning areas for fire fighting vehicles in accordance with Appendix 3 of *PBP 2019* are provided;
- A height clearance of four metres is maintained;
- Provides clear access to reticulated water supply (hydrants are located outside of parking bays and road carriageways);
- Hydrants are provided in accordance with the relevant clauses of Australian Standard AS 2419.1:2005 - *Fire hydrant installations System design, installation and commissioning*;
- Parking does not obstruct the minimum paved width; and
- Is regularly maintained.

Winbourne Street has no compliance issues with Table 6.8b of *PBP 2019*.

Brush Road does not comply with the performance criteria in Table 6.8b of *PBP 2019* in the following ways:

1. It is a two-way road with a carriageway less than 8 metre width kerb to kerb;
2. Parking is provided inside the carriageway width, further reducing the carriageway width.



Perimeter Roads

The site perimeter road (Winbourne Street) does comply with Table 6.8b of *PBP 2019* in the following ways:

- It is a two-way sealed road with a 8 - 12 metre carriageway width kerb to kerb;
- Parking is provided outside of the carriageway width;
- Hydrants are located clear of parking areas and carriageway, and should be located on the side of the road away from the bushfire threat where possible;
- There are through roads, and these are linked to the internal road system at an interval of no greater than 500 metres;
- Curves of roads have a minimum inner radius of 6 metres;
- The maximum road grade is 15° and an average grade not exceeding 10°;
- The road crossfall does not exceed 3°;
- A minimum vertical clearance of 4 metres to any overhanging obstructions, including tree branches, is provided;
- Designed to carry fully loaded fire fighting vehicles (up to 23 tonnes).

Brush Road does not comply with the performance criteria in Table 6.8b of *PBP 2019* in the following ways:

1. It is a two-way road with a carriageway less than 8 metre width kerb to kerb;
2. Parking is provided inside the carriageway width, further reducing the carriageway width.

Non-perimeter Roads

The site non-perimeter roads shall comply with Table 6.8b of *PBP 2019* in the following ways:

- There is a minimum 5.5 metre width kerb to kerb;
- Parking is provided outside of the carriageway width;
- Hydrants are located clear of parking areas and carriageway, and should be located on the side of the road away from the bushfire threat where possible;
- There are through roads, and these are linked to the internal road system at an interval of no greater than 500 metres;
- Curves of roads have a minimum inner radius of 6 metres;
- The maximum road grade is 15° and an average grade not exceeding 10°;
- The road crossfall does not exceed 3°;
- All kerbs constructed around access lanes should be no higher than 250mm and free of vertical obstructions at least 300mm back from the kerb face to allow clearance for front and rear body overhang of RFS vehicles;
- A minimum vertical clearance of 4 metres to any overhanging obstructions, including tree branches, is provided, and

The design of the car parks for each proposal (Proposal Options 1 & 2) appear to comply with the performance criteria in Table 6.8b of *PBP 2019* for a non-perimeter road.



Property access

All weather access to the site will be provided in recognition of the risk to fire fighters and / or evacuating occupants. There is access to the rear of the site for operational activities. Fire vehicles must be able to drive to the rear of the indoor sports centre.

The site driveway servicing the PDA (i.e. the proposed north car park) must comply with the performance criteria in Table 6.8b of *PBP 2019* in the following ways. These are:

- Access is provided to the indoor sports centre;
- The site driveway carriageway / swept path (excluding drainage and edging) is a minimum 5.5 metres wide;
- Clearly sign-posted, two-wheel drive, sealed bitumen all- weather road;
- Some short constrictions in the access may be accepted where they are not less than 3.5 metres wide, extend for no more than 30 metres and where the obstruction cannot be reasonably avoided or removed;
- The dead end of the proposed north car park must incorporate a minimum 12 metre outer radius turning circle compliant with Figure A3.3 Type A, B, C, or D of *PBP 2019* (refer to Figure 12 – 15 below);
- Curves have a minimum inner radius of six metres and are minimal in number to allow for rapid access and egress;
- The minimum distance between inner and outer curves is six metres;
- Is less than 200 metres in length, contains no bridges (bridges must be sign-posted with weight rating). The proposed driveway / car park on-site is 93 - 99 metres long;
- Crossfall of the pavement is not more than 10 degrees;
- Maximum grades for sealed roads / the site driveway do not exceed 15 degrees and average grades are not more than 10 degrees;
- A minimum vertical clearance of four metres to any overhanging obstructions, including tree branches;
- Traffic management devices are constructed to facilitate access by emergency services vehicles;
- The site driveway does not traverse through a wetland or other land potentially subject to periodic inundation (other than flood or storm surge);
- The internal road surfaces have a capacity to carry fully-loaded fire fighting vehicles (23 tonnes), bridges and causeways are to clearly indicate load rating;
- Suitable access for a Category 1 fire appliance to within 4 metres of the static water supply must be provided where no reticulated supply is available; and
- Is regularly maintained.



RFS vehicle access and turning requirements

Turn-around areas for RFS vehicles, which comply with Appendix 3 of PBP 2019 are located along Winbourne Street and Brush Road. A turning circle is located directly outside the west end of the proposed indoor sports centre, adjoining the swept path of Winbourne Street. Along Brush Road, the only suitable turning points for medium- rigid vehicles are three-point-turns at the closest road intersections: Cheers Street, Tramway Street and Hermoyne Street 41 metres, 129 metres, and 265 metres to the north respectively, and Sindel Street 52 metres to the south of the existing vehicle access gate. Winbourne Street and Brush Road are council bitumen through roads. Due to street parking along Brush Road, there is limited areas where the formed road provides space for medium-rigid vehicles to pass in opposite directions safely.

The RFS requires that any dead ends (e.g. proposed site car park/s) should be provided with a turn-around area, which preferably avoids multipoint turns. The minimum turning radius should be no less than the respective outer radius given in Figure 12. Where multipoint turning is proposed the RFS will consider the following types shown in Figure 13, Figure 14 and Figure 15:

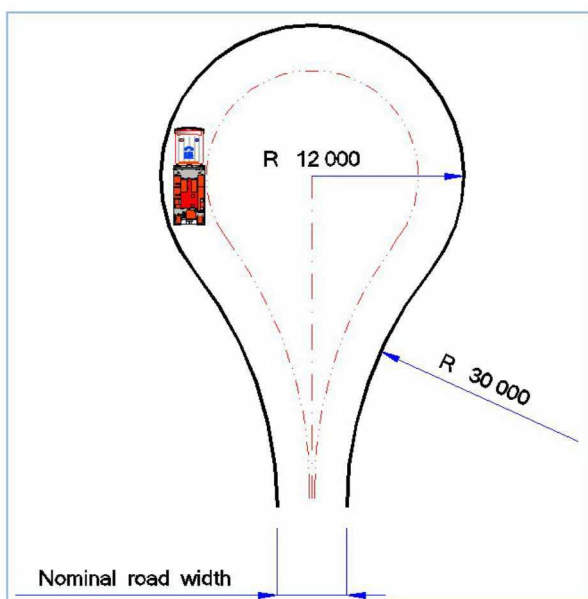


Figure 12 Type A

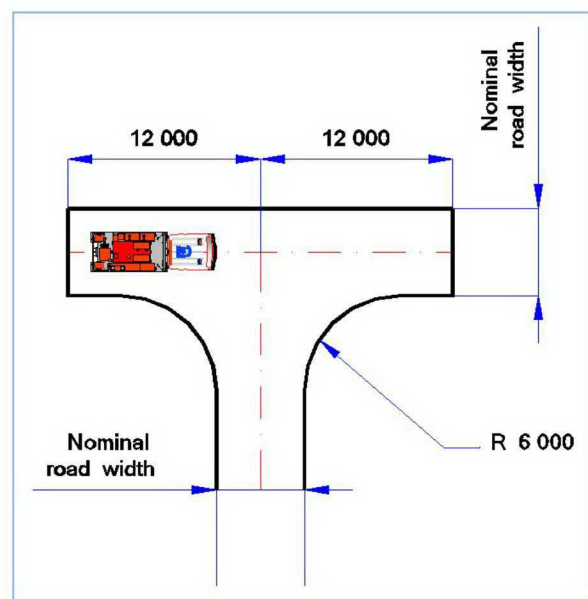


Figure 13 Type B

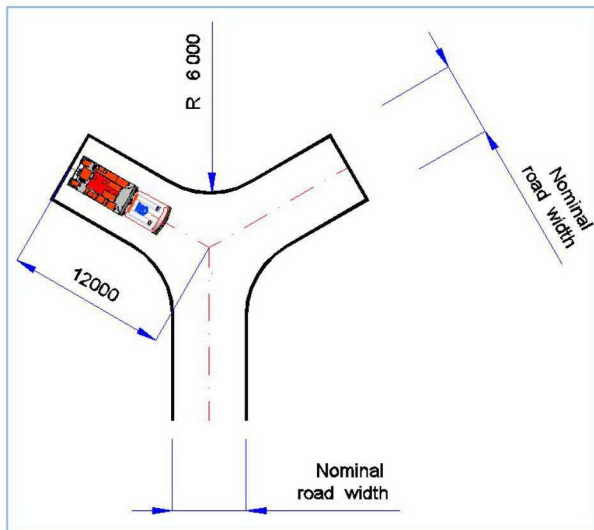


Figure 14 Type C

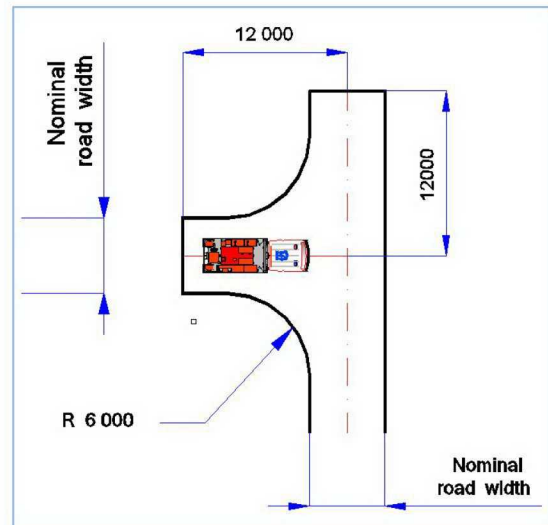


Figure 15 Type D

Fire trails

Fire trails are not required for compliance with *PBP 2019*.

6.5 Availability of fire fighting services

The nearest NSW Fire and Rescue Station is located at 269 Rowe Street, Eastwood NSW, 2.4 km from the site.

6.6 Bushfire Emergency Evacuation Plan development

Bushfire Emergency Management and Evacuation Plan is a prescriptive measure of Special Fire Protection Purpose (SFPP) developments.

A site Bushfire Emergency Management and Evacuation Plan is to be prepared consistent with the:

- The NSW RFS document: *A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan*,
- NSW RFS Schools Program guide (where applicable),
- Australian Standard AS 3745:2010 *Planning for emergencies in facilities*, and
- The emergency and evacuation management plan should include a mechanism for the early relocation of occupants.

Stable management arrangements must be established for consultation and implementation of the bushfire emergency and evacuation management plan. An Emergency Planning Committee must be established to consult with the community membership and staff in developing and implementing an Emergency Procedures Manual. Detailed plans of all emergency assembly areas including 'on-site' and 'off-site' arrangements as stated in AS 3745 are clearly displayed within the building, and an annual (as a minimum) trial emergency evacuation must be conducted.



6.7 Landscaping

The Vegetation Management Plan within the asset protection zone is to comply with the principles of Appendix 4 of *PBP 2019* (see Appendix 2). For example, this means:

- Landscaping is not to abut the indoor sports centre as this may cause a direct fire path to combustible building elements. Suitable impervious areas are provided immediately surrounding the building such as courtyards, paths and driveways. A pathway or non-combustible ground finish is to adjoin the indoor sports centre for a distance of at least 1.0 metre.
- Total clearance of all vegetation within the APZ is not acceptable. Vegetation management undertaken to establish the required Asset Protection zone shall be minimised while still complying with PBP guidelines.
- Grassed areas, mowed lawns or ground cover plantings are provided in close proximity to the building. Garden beds of flammable shrubs are not to be located under trees and must be no closer than 10 metres from an exposed window or door.
- Planting of trees and shrubs are restricted in the immediate vicinity of the building, which over time, if not properly maintained, can come in contact with or overhang the building.
- Retained or planted trees and shrubs do not form a continuous stand from the hazard to the asset and will not over time compromise the asset protection zone.
- Local plant species that are of low flammability (low volatile oil levels, high moisture content in leaves and low levels of retained dead material) are selected or retained for use within the asset protection zone.
- The Vegetation Management Plan is to accommodate emergency vehicle access to the rear of the dwelling and turning circle requirements.
 - Fire hazard management for the subject site needs to take into account hollow-bearing trees, and any of the shaded vegetation on the Biodiversity Values Land Map. Refer to the Abel Ecology Due Diligence Report (AE21-2216-REP-ISS 1, Dated 22 Jan 2021).

A full list of landscaping requirements can be found Appendix 4 of *PBP 2019* and the RFS document *Standards for Asset Protection Zones* must also be consulted.



7 Building construction requirements

Our assessment indicates the required building construction for the proposed Indoor Sports Centre (Proposal Options 1 & 2) is BAL-12.5 on all aspects. Building construction for all aspects of the proposed Indoor Sports Centre are to be built in accordance with the NCC, and must comply with section 3 and 5 (BAL – 12.5) of *Australian Standard 3959 (2018) Construction of buildings in bushfire-prone areas* and Table 6.8a of *PBP 2019* and as modified by Section 7.5, 7.5.1, 7.5.2, 7.5.3, and 7.5.4 (where applicable) of *PBP 2019*. Refer to AS 3959 (2018) for a detailed description.

The development is not in bush fire attack level-40 (BAL-40) or the flame zone (BAL-FZ).

AS-3959 (2018) is now available as PDF for free from -

https://infostore.saiglobal.com/en-au/standards/as-3959-2018-122340_saig_as_as_2685241/

Proposed Class 10 buildings are to comply with:

- There is no bushfire protection requirement for Class 10a and 10b structures located more than 6 metres from Special Fire Protection Purpose buildings in bushfire prone areas.
- A Class 10a and 10b structure are not permitted to be located within 6 metres of a Special Fire Protection Purpose refuge building. Class 10a buildings are non-habitable buildings being a private garage, carport, shed or the like.
- For Class 10b buildings, fences and gates. All fences and gates in bushfire prone areas should be made of either hardwood or non-combustible material. In circumstances where the fence or gate is located within 6 metres of a Special Fire Protection Purpose building they should be made of non-combustible material only (Table 6.8a and s. 7.6 of *PBP 2019*).



8 Conclusion and recommendations

The site is not mapped as bush fire prone land. In our opinion, the site is not sterilised by the bushfire threat. This report concludes that the planning proposal can comply with *PBP 2019*. The State will therefore be able to construct the proposed development with the following measures included:

- a) This proposal has been prepared in accordance with *PBP 2019* in its entirety and the development complies with most relevant Acceptable Solutions in *PBP 2019*. In accordance with s.4.14(1A) of the *EP&A Act 1979* ... "the consent authority may, ..., grant consent to the carrying out of the development but only if it has consulted with the Commissioner of the NSW Rural Fire Service concerning measures to be taken with respect to the development to protect persons, property and the environment from danger that may arise from a bush fire." As a result, this planning proposal must be referred to the Rural Fire Service in accordance with Section 4.14(1A) of the *EP&A Act 1979*.
- b) The site is not mapped as bush fire prone land.
- c) Building construction for all aspects of the proposed Indoor Sports Centre are to be built in accordance with the NCC, and must comply with section 3 and 5 (BAL – 12.5) of *Australian Standard 3959 (2018) Construction of buildings in bushfire-prone areas* and Table 6.8a of *PBP 2019* and as modified by Section 7.5, 7.5.1, 7.5.2, 7.5.3, and 7.5.4 (where applicable) of *PBP 2019*. Refer to AS 3959 (2018) for a detailed description.
 - Proposed Class 10 buildings are to comply with Section 7 of this report and:
 - Class 10a: Sheds – s.8.3.2 of *PBP 2019*
 - Class 10b: fences and gates – Section 7.6 of *PBP 2019*.

AS-3959-2018 is now available as PDF for free from -

 - https://infostore.saiglobal.com/en-au/standards/as-3959-2018-122340_saig_as_as_2685241/
- d) We recommend a site Vegetation Management Plan (VMP) be produced for the on-going management and maintenance of the site asset protection zone. The APZ will be maintained to Inner Protection Area condition as per Sec. 6.1 and 6.7 of this report, Appendix 4 of *PBP 2019* and the *RFS Standards for Asset Protection Zones* (Appendix 3 and see www.rfs.nsw.gov.au). The VMP will observe mapped / shaded vegetation on the Biodiversity Values Land Map, and retention of hollow-bearing trees (Abel Ecology Due Diligence Report AE21-2216-REP-ISS 1, Dated 22 Jan 2021). Total clearance of all vegetation is not acceptable. Vegetation management undertaken to establish the required Asset Protection zone shall be minimised while still complying with *PBP* guidelines.
- e) In accordance with a site Vegetation Management Plan, an asset protection zone is to be maintained permanently on the north / northwest aspect:
 - To IPA condition (15% tree canopy cover) for a horizontal distance of 21 - 82 metres from the external wall of the Indoor Sports Centre to the north site boundary.
 - Trees will need to be removed to achieve this requirement.
- f) In accordance with a site Vegetation Management Plan, an asset protection zone is to be maintained permanently on the east / northeast aspect:
 - To IPA condition (15% tree canopy cover) for a horizontal distance of 38 metres from the external wall of the Indoor Sports Centre to the boundary of shaded vegetation on the Biodiversity Values Land Map.



- Trees will need to be removed to achieve this requirement. The Abel Ecology Due Diligence Assessment (AE21 2216 REP ISS 1 22Jan21) has identified trees 41 – 46 (numbering - Bradshaw Consulting Arborists 2020) to be nominated for removal. Vehicles, plant, storage items, dumpings/stockpiles and walkways are not permitted anywhere within the shaded areas on the Biodiversity Values Land Map. Trees are not to be felled into the shaded areas on the Biodiversity Values Land Map.
- g) In accordance with a site Vegetation Management Plan, an asset protection zone is to be maintained permanently on the west / southwest aspect:
- To IPA condition (15% tree canopy cover) for a horizontal distance of 28 metres from the external wall of the Indoor Sports Centre to the west boundary.
 - Trees will need to be removed to achieve this requirement.
- h) In accordance with a site Vegetation Management Plan, an asset protection zone is to be maintained permanently on the south / southeast aspect:
- To IPA condition (15% tree canopy cover) for a horizontal distance of 100 metres from the external wall of the Indoor Sports Centre to the south boundary.
 - Trees will need to be removed to achieve this requirement.
- i) Winbourne Street offers adequate access and egress to firefighters, emergency workers, and those involved in evacuation and complies with the performance criteria in *Table 6.8b of PBP 2019*. Brush Road does not comply with the performance criteria in *Table 6.8b of PBP 2019* in the following ways:
- It is a two-way road with a carriageway less than an 8 metre width kerb to kerb;
 - Parking is provided inside the carriageway width, further reducing the carriageway width.
- j) All weather access to the site will be provided in recognition of the risk to fire fighters and / or evacuating occupants. There will be access to the rear of the Indoor Sports Centre for operational activities via the proposed 93 - 99 metre long site driveway / car park. Fire vehicles must be able to drive to the rear of the Indoor Sports Centre. The access driveway / car park must comply with section 6.4 of this report and acceptable solutions from *Table 6.8b of PBP 2019* for non-perimeter roads, property access and RFS vehicle access and turning requirements.
- k) Utility services along Winbourne Street are adequate to meet the needs of firefighters and others assisting in bush fire fighting. Gas and electricity services are to be located so as to not contribute to the risk of fire to the buildings. Gas and electricity services are to be installed as per Sec. 6.3 of this report.
- l) Fire hazard management for the subject site needs to take into account hollow-bearing trees, and native vegetation that is:
- Scheduled as Critically Endangered under the NSW *Biodiversity Conservation Act 2016* and for the Commonwealth under the *Environment Protection and Biodiversity Conservation Act 1999* and or,
 - Is shaded in the Biodiversity Values Land Map. Refer to the Abel Ecology Due Diligence Report (AE21-2216-REP-ISS 1, Dated 22 Jan 2021).
- m) Water supply is to be provided in accordance with Sec. 6.2 of this report and *Table 6.8c of PBP 2019*.



- n) A site Bushfire Emergency Management and Evacuation Plan is to be prepared consistent with Sec. 6.6 of this report.



9 Literature Review

Abel Ecology 2021. Due Diligence Report for Marsden High School, 22 Winbourne St, West Ryde NSW 2114 Lot 1 DP 220808, Lots C & D DP23326. Proposed Netball complex. (AE21-2216-REP-ISS 1, Dated 22 Jan 2021).

Hunters Hill, Lane Cove, Ryde, Willoughby BFMC (2010). Bush Fire Prone Land Map for the City of Ryde Local Government Area in New South Wales, NSW Rural Fire Service.

Keith, D. (2004). *Ocean shores to desert dunes: the native vegetation of New South Wales and the ACT*. Department of Environment and Conservation (NSW), Hurstville.

Standards Australia (2018) AS 3959. *Construction of buildings in bushfire-prone areas*. Standards Australia, Sydney.

Tozer, M.G. Turner, K., Keith, D.A., Tindall, D., Pennay, C., Simpson, C., MacKenzie, B., Beukers, P. and Cox, S. (2010). Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands. *Cunninghamia*, 11 (3): 359-406.



Appendix 1. Glossary of Definitions and Terms

This section defines and explains some commonly used expressions relating to bushfires.

Bushfire (or wild fire) is generally defined to mean any unplanned fire in vegetation. Fires can also be used for land management purposes such as grazing or hazard reduction. Bushfires generally have a seasonal pattern and occur in spring and summer but can occur at other times of year under suitable conditions. The behaviour of fires is primarily influenced by:

- fuel (type, load, moisture, continuity and compaction);
- ignition source;
- topography (slope and aspect); and
- weather (humidity, temperature, wind).

Bushfire danger is a relative measure of weather conditions (temperature, drought indices, humidity and wind speed) describing the likelihood of fire ignition, spread, control difficulty and damage potential. There is currently an emphasis on prevention and suppression of bushfires to minimise damage to human life and property.

Bushfire hazard is an assessment of the particular combination of available fuel (vegetation), slope and climate/weather pattern relating to a site. This includes leaf litter and ground cover, standing fuel of the shrub and canopy layers and the season of the year. The assessment is usually rated on a scale from 'low' (or insignificant) to 'extreme' and gives a final indicator of the potential severity of a fire.

Bushfire risk means the probability of a wildfire "igniting, spreading and causing damage to assets of value to the community" (Planning for Bushfire Protection 2019). Related to this is bushfire threat which is the threat of potential damage to life and property arising from a combination of hazard, risk and bushfire danger.

Hazard reduction means a reduction or modification of fuel by burning, chemical, mechanical or manual means.

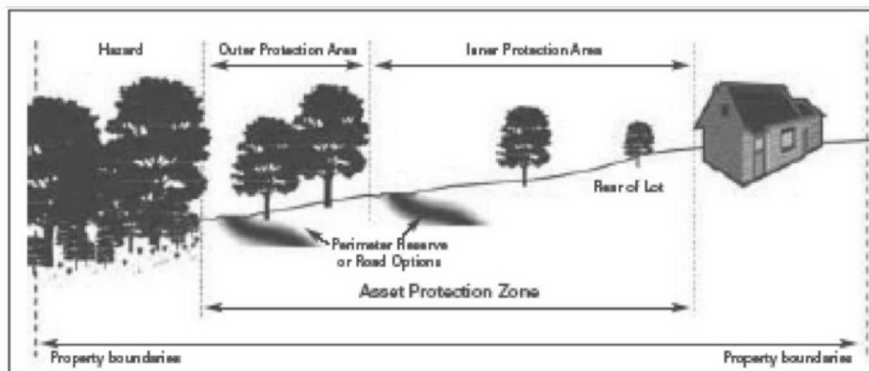
Prescribed burn means a planned fire ignited by a land manager in accordance with a fuel management plan or for ecosystem management purposes.

Fire regime means the pattern of occurrence of fire, specifically the regularity, periodicity, seasonality, spatial extent, patchiness and intensity. This is important in terms of assessing risks and ecological impacts and is often used in prescribing a management goal to be achieved. There is debate about what constitutes a natural or pre European fire pattern. For the purpose of these definitions natural means an existence independent of human action.

Bushfire Risk Management is achieved by use of **Asset Protection Zones (APZ)**, defined by the document "Planning For Bushfire Protection 2019" (NSW Rural Fire Service). An APZ acts as a buffer zone between the development and the bushfire hazard, and consists of an Outer Protection Area (OPA) and an Inner



Protection Area (IPA). The primary purpose of an Asset Protection Zone is to ensure that a progressive reduction of bushfire fuels occurs between the bushfire hazard and any habitable structures within the development.



OPA = Outer Protection Area

Location: adjacent to the hazard

Purpose: substantially reduces the intensity of an approaching fire, reducing the level of direct flame, radiant heat and ember attack on the IPA

Depth: between 10 and 15m deep, depending on the type of land use and vulnerability of the building or persons affected.

Fuel Loading: discontinuous tree canopy and shrub layer; fine fuel load usually less than 8 tonnes per hectare.

IPA = Inner Protection Area

Location: extends from the edge of the OPA to the development to be protected

Purpose: minimise the impact of direct flame contact and radiant heat on the development

Depth: dependent upon the slope of the land

Performance criteria for IPA:

- Minimal fine fuel which can be set alight by a fire
- Any vegetation in the IPA does not provide a path for the transfer of fire to the development - i.e. fuels are discontinuous.

The presence of trees and shrubs in the IPA is acceptable provided that they:

- Do not touch or overhang the building;
- Do not form a continuous canopy;
- Are not species that retain dead material or deposit excessive quantities of ground fuel in a short time;
- Are located far enough away from a building that they will not ignite the building by direct flame contact or radiant heat emission.



Appendix 2. Asset Protection Zone maintenance

To meet the bushfire protection measures stated in *PBP 2019* for the indoor sports centre the proposed APZ distances are:

Proposed Option 1

- The full length from the external wall of the Indoor Sports Centre to the north site boundary (21 - 82 metres),
- 38 metres on the east aspect,
- 100 metres on the south and
- 28 metres on the west aspect.

Proposed Option 2

- 34 metres on the northwest aspect,
- 38 metres on the northeast aspect,
- 28 metres on the southwest aspect and
- 100 metres on the southeast aspect.

The APZ will be maintained to Inner Protection Area condition as per Appendix 4 of *PBP 2019* and the RFS document *Standards for Asset Protection Zones*. At least 75% of the ground cover must be retained after maintenance to prevent soil erosion:

Inner Protection Area

Specification

a) Trees

- i. Canopy - average cover of whole IPA less than 15% (at maturity); not continuous from hazard to asset with 2-5 metres separation between tree crowns; not overhanging within 2-5 metres of building; islands of canopy permitted.
- ii. All lower limbs less than two metres above ground removed.
- iii. Preference should be given to smooth barked and evergreen trees.

b) Trees and shrubs

- i. Retained as clumps or islands, cover less than 10% of whole area.
- ii. Shrubs should not be located under trees.
- iii. Create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings.
- iv. Clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

c) Grass

- i. Should be kept mown (as a guide grass should be kept to no more than 100mm in height).
- ii. Leaves and vegetation debris should be removed.

Maintenance

The IPA is to be maintained as follows:

- a) Minimal fine fuel at ground level which could be set alight by a bushfire,
- b) Vegetation does not provide a path for the transfer of fire to the development - that is, fuels are discontinuous,
- c) No trees to overhang the building,
- d) Trees must be well spread out and not form a canopy,
- e) Trees or shrubs that retain dead material or deposit excessive quantities of fuel in a short period of time must not be within the IPA,



- f) Trees and shrubs must be located far enough from the house that the radiant heat they produce or direct flame contact will not ignite the house,
- g) Wooden sheds, combustible material, large areas/quantities of garden mulch, stacked flammable building materials etc, must not be within the IPA.



Appendix 3. Fire emergency procedure

Bush Fire Survival Plan

We recommend that you prepare your own Bush Fire Survival Plan

http://www.rfs.nsw.gov.au/file_system/attachments/Attachment_BushFireSurvivalPlan.pdf

Personal safety and survival

(from s6.5 of Planning for Bushfire Protection 2001)

The survivability of a building and its occupants is dependent upon the amount of preparation prior to the actual fire event.

As the bushfire approaches

Personal Protection

Protect yourself from radiant heat by wearing:

- a) cotton overalls or thicker long sleeved shirt and long pants of cotton or wool;
- b) clothes which are loose fitting;
- c) a strong pair of shoes or boots with woollen or cotton socks;
- d) gloves, if your hands are not used to working with tools;
- e) goggles, if the smoke is thick;
- f) a "bandana" or large handkerchief to protect the airways from smoke and hot air;
- g) a wide-brimmed hat or hard hat if one is available; but
- h) leave your ears uncovered - they warn you of heat levels.

DO NOT WEAR SYNTHETICS – WEAR WOOL, COTTON OR DENIM.

Protection of Children, Elderly and Pets

During the approach of a bushfire:

- a) keep children, elderly and pets inside the house;
- b) give them plenty of water to drink; and
- c) make sure you keep track of their movements.

Outside the home

- a) Close windows and doors and any shutters and fit any screens.
- b) Block the down pipes and fill them with water.
- c) Put doormats inside.
- d) Store all combustible furniture and awnings.
- e) Wet down wood piles and areas of garden mulch.



Inside the home

- a) Fill all sinks, baths and any buckets with water and put a filled bucket in the roof.
- b) Block any gaps under the doors with wet towels.
- c) Place a ladder to provide access to the roof area.
- d) Monitor the radio – keep a spare set of batteries.
- e) Turn off any gas.

The car

- a) Park in a cleared area.
- b) Close all doors, windows and vents.
- c) Leave the keys in the ignition.
- d) Store woollen blankets inside.

When the bushfire is close

- a) Remain outside as long as possible patrolling the area for spot fires.
- b) Suppress any spot fires which start close to the house or in the guttering.
- c) Take refuge when the smoke starts to thicken.
- d) Take your hoses and fittings inside when you move inside.
- e) Activate any sprinkler system.

As the bushfire passes over

- a) Remain calm and keep other occupants calm.
- b) Move to the side of the house away from the main fire front.
- c) Carry out regular inspections, particularly of windows to determine if they have shattered and embers have entered any rooms.

After the bushfire has passed

- a) Before passing through a closed doorway, feel the door – if it is hot do not open it as there may be a fire on the other side – leave it closed to stop the fire spreading and exit via another route.
- b) Check the house for fires – the roof, roof spaces and any under floor areas.
- c) If the house is on fire move onto burnt out ground but keep clear of burning trees.

Evacuation or relocation

- a) Research shows that where people are in attendance and are well prepared then buildings are more likely to survive a bushfire. Early evacuation or relocation is a serious consideration where:
 - b) you are not confident that your house is prepared to withstand a bushfire;
 - c) you are worried about your children or elderly members of the household;
 - d) you suspect that you or members of the household will be unable to cope with the stress of staying;
 - e) it is safe to leave and you have a clear idea of where a safe refuge is to be found; and
 - f) you know the destination to be safe.



If you do decide to relocate, or are directed to evacuate:

- a) DO IT EARLY;
- b) close all doors and windows and consider leaving them unlocked – a fire fighter may need access to your home;
- c) know where you are going;
- d) drive carefully.

NOTE: According to Section 60L of the *NSW State Emergency and Rescue Management Act 1989* No 165, you can be directed to evacuate an area or premises (<https://www.legislation.nsw.gov.au/#/view/act/1989/165>):

60L Power of police to evacuate or to take other steps concerning persons

(1) A directing officer may, if satisfied that there are reasonable grounds for doing so for the purpose of protecting persons from injury or death threatened by an actual or imminent emergency, direct, or authorise a police officer to direct, a person to do any or all of the following:

- (a) to leave any particular premises and to move outside the danger area,
- (b) to take any children or adults present in any particular premises who are in the person's care and to move them outside the danger area,
- (c) not to enter the danger area.

directing officer means:

- (a) the Minister, or
- (b) the State Emergency Operations Controller, or
- (c) a police officer of or above the rank of sergeant, or
- (d) a police officer of a class prescribed by the regulations for the purposes of this definition.



Appendix 4. Company Profile

Abel Ecology has been in the ecological consulting business since 1991, starting in the Sydney Region, and progressively more state wide in New South Wales since 1998, and now also in Victoria. During this time extensive expertise has been gained with regard to Master Planning, Environmental Impact assessments including biodiversity reports, bushfire reports, Vegetation Management Plans, Management of threatened species, Review of Environmental Factors, and as Expert Witness in the Land and Environment Court. We have done consultancy work for industrial and commercial developments, golf courses, civil engineering projects, tourist developments as well as residential and rural projects. This process has also generated many connections with relevant government departments and city councils in NSW. Our team consists of four scientists and two administrative staff, plus casual assistants as required.

Licences

NPWS s132C Scientific licence number is SL100780 expires 31 July 2021

NPWS GIS data licence number is CON95034

DG NSW Dept of Primary Industries Animal Care and Ethics Committee Approval expires 8 November 2021

DG NSW Dept of Primary Industries Animal Research Authority expires 8 November 2021.

The Consultancy Team

Dr Danny Wotherspoon

Grad Dip Bushfire Protection (University of Western Sydney 2012)

PhD (researching Cumberland Plain vegetation and fauna habitat, at Centre for Integrated Catchment Management, University of Western Sydney, 2008)

Planning for Bushfire Protection Certificate course (University of Technology, 2006)

Consulting Planners Bushfire Training Course (Planning Institute of Australia, 2003)

MA (Macquarie University, 1991)

Wildlife Photography Certificate (Sydney Technical College, 1987)

Herpetological Techniques Certificate (Sydney Technical College, 1986)

Applied Herpetology Certificate (Sydney Technical College, 1980)

Dip Ed (University of New England, 1978)

BSc (Zoology, Ecology) University of New England 1974)

Dr Daniel McDonald

Cert IV – GIS (Riverina TAFE 2016)

PhD (The University of Sydney 2006)

M. Agr (The University of Sydney 1996)

B. Ag Sc. (The University of Sydney 1991)

Daniel is an accredited Biobanking Assessor

Quantified Tree Risk Assessment (QTRA) and Visual Tree Assessment (VTA)



Daniel is an experienced ecologist with expertise in fauna, plant species identification, vegetation assessment, agriculture, conservation genetics and seed collection and preservation. He is accredited both for BioBanking assessments and Biodiversity Certification. His present research interest is in Eastern Suburbs Banksia Scrub and fragmented endangered ecological communities.

Mark Mackinnon

Qualifications: Grad. Dip. of Bushfire Protection, B Env. Sci. (Hons).

Accredited Practitioner Level 2 - Bushfire Planning & Design (BPAD), Accreditation number 36395.

MEIANZ, General firefighter departmental accreditation, Snr 1st Aid Cert, Agricultural Chemical User Permit (1080 and PAPP), Chainsaw Lev.1 (Cross-cut), Manual 4x4 Driving Ticket, Medium-Rigid Vehicle Licence, Elevated-Work-Platform (+11m) Licence, Working at Height Cert., Simple & Complex Tree Climbing Cert., Venomous Snake and Reptile Handling Cert., Lyssavirus Immunisation (bat handling prerequisite), White Card.

Mark is a passionate and enthusiastic scientist who thrives in the field of natural resource management. In the last 6 years, Mark has worked for a number of inter-state government agencies and environmental consultancies. He has experience in threatened species, fire ecology, bushfire management, pest plant and animals, and landscape restoration. In particular he specializes in ornithology and bushfire management. Mark has a number of specialized field-based skills including: simple and complex tree climbing, working at heights, general firefighter departmental fire accreditation, venomous snake and reptile handling, immunization to handle bat species, and an A - class bird banding licence with mist-net endorsement. Mark is also skilled in ArcGIS mapping, first-aid, four -wheel-driving.