BUSHFIRE PLANNING AUSTRALIA

BUSHFIRE ASSESSMENT REPORT

Centre of Excellence in Agricultural Education

Western Sydney University, Hawkesbury

Prepared for: NBRS and Partners Pty Ltd

Bushfire Planning Australia

Ref: 2107 Richmond CoE
Version: V4 FINAL - April 2021

✆ 0400 917 792
✉ stuart@bfpa.com.au

FPA AUSTRALIA BRONZE MEMBER Fire Protection Association Australia

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

Disclaimer and Limitation

This report is prepared for NBRS and Partners Pty Ltd on behalf of Schools Infrastructure NSW (the 'Client') for the specific purposes of only for which it is supplied (the 'Purpose'). This report is not for the benefit of any other person; either directly or indirectly and is strictly limited to the purpose and the facts and matters stated in it and will not be used for any other application.

This report is based on the site conditions surveyed at the time the document was prepared. The assessment of the bushfire threat made in this report is made in good faith based on the information available to Bushfire Planning Australia at the time.

The recommendations contained in this report are considered to be minimum standards and they do not guarantee that a building or assets will not be damaged in a bushfire. In the making of these comments and recommendations it should be understood that the focus of this document is to minimise the threat and impact of a bushfire.

Finally, the implementation of the adopted measures and recommendations within this report will contribute to the amelioration of the potential impact of any bushfire upon the development, but they do not and cannot guarantee that the area will not be affected by bushfire at some time.

Document Status: 2107 Centre of Excellence, Richmond

Version	Status	Purpose	Author	Date
1	Draft	Draft for review	Katrina Mukevski	11 April 2021
2	Draft	Revised Draft for Client review	Stuart Greville	13 April 2021
3	Final	Final submitted to Client	Stuart Greville	14 April 2021
4	Final	Final for submission	Stuart Greville	28 April 2021

BPAD Certification

As the author of this Bushfire Assessment Report (BAR), I certify this BAR provides the detailed information required by the NSW Rural Fire Service under Clause 44 of the Rural Fires Regulation 2013 and Appendix 2 of Planning for Bushfire Protection 2019 for the purposes of an application for a bush fire safety authority under section 100B(4) of the Rural Fires Act 1997.

Stuart Greville

Accredited Bushfire Practitioner
BPAD-26202
Graduate Diploma Bushfire Protection and Design (WSU) 2013
Masters Urban and Regional Planning (USyd) 2006
Bachelor Environmental Science (Env. Mgt) 2001

Date: 28 April 2021

In signing the above, I declare the report is true and accurate to the best of my knowledge at the time of issue

Executive Summary

Bushfire Planning Australia (BPA) has been engaged Department of Education NSW (the 'Applicant') to undertake a Bushfire Assessment Report (BAR) for a State Significant Development Application (SSDA) for the construction of the Centre of Excellence in Agricultural Education (CoE) on a leased land parcel within the Western Sydney University (Hawkesbury Campus), Richmond NSW.

The CoE will accommodate up to 325 students and up to 25 full-time employees and also include short-term on-site accommodation facilities for up to 62 visiting students and teaching professionals.

The Secretary's Environmental Assessment Requirements issued by the Department of Planning and Environment (DPE) on 19th March 2021 required the completion of a bushfire assessment that details the proposed bushfire protection measures and demonstrates compliance with the NSW Rural Fire Service (RFS) guideline; Planning for Bushfire Protection 2019 (PBP 2019).

This BAR has been prepared in accordance with the PBP 2019 and based on the findings of the bushfire hazard assessment, has found that, subject to the implementation of the recommendations contained within this report, the proposed development complies with PBP 2019.

The BAR confirmed that the buildings defined by the RFS as a Special Fire Protection Purpose (SFPP) are not located on designated bushfire prone land. Notwithstanding, for the purpose of demonstrating the suitability of the site for the proposed use, this bushfire assessment considered the possibility of the site being exposed to a measurable bushfire hazard.

The predominant hazardous vegetation identified surrounding the site was observed during the site inspection to be commensurate with a *grassland* vegetation classification. The unmanaged vegetation was contained within grazing paddocks that have been historically used by the WSU for teaching purposed. Yet, an existing Bushfire Mitigation Strategy prepared by WSU requires all land within and surrounding the lease area to be managed in perpetuity as an Asset Protection Zone (APZ).

The BAR concluded that the site was exposed to low bushfire threat primarily due to the landscape, dominance of low-threat vegetation and existing management practices in place throughout the campus and surrounding managed properties.

Notwithstanding, whilst the proposed development is able to provide appropriate separation between the nearest hazard and the proposed building/s, the following precautionary measures are provided for consideration. These recommendations will further minimise the potential impact of a bushfire on the property.

Based on the findings of the hazard assessment, a series of bushfire protection measures have been designed appropriate to the land use to achieve an acceptable level of risk. In this instance the most effective bushfire protection measure is to ensure sufficient separation from the bushfire hazard which would require a portion of grassland outside of the proposed development to be suitably managed as an Asset Protection Zone (APZ); up to 50m from the outer elevation of the closest buildings to the vegetation.

The following key recommendations have been generated to ensure the proposed Centre of Excellence is not exposed to radiant heat levels that do not exceed critical limits:

1. All buildings to be used for a Special Fire Protection Purpose (SFPP) (Buildings A, B, C, D, E and F) are located to ensure they will not be exposed to radiant heat levels greater than 10kW/m^2;
2. An Asset Protection Zone (APZs) a minimum of 50m is to be provided surrounding the curtilage of Buildings A, B, C, D and F; as shown in **Figure 11**. The APZs shall be managed in perpetuity as follows:
    i. Tree canopy cover shall be less than 15% at maturity;
    ii. Trees at maturity shall not touch or overhang buildings;
    iii. Lower limbs shall be removed up to a height of 4m above the ground;
    iv. Tree canopies shall be separated by 2m to 5m;

v. Shrubs should not form more than 10% ground cover;

vi. Shrubs shall not be located under trees;

vii. Grass/ ground covers shall be kept mown and be no more than 100mm in height; and

viii. Leaves and debris shall be removed regularly.

Note: the APZ is measured from the surface fuel and not the tree canopy drip line.

3. The APZ needs to be established before any buildings are occupied. Surface fuel needs to be maintained frequently (< monthly) and an inspection of all trees within the APZ shall be carried out in August and April (pre and post bushfire season) to ensure vegetation remains in accordance with the requirements for APZs;
4. No hazardous or flammable materials are to be stored between any buildings and the bushfire hazards without being suitably enclosed to prevent air borne embers from direct contact;
5. All weepholes, ventilation openings, gaps shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2mm;
6. Roof penetrations, including aerials, vent pipes and supports for solar collectors or the like shall be sealed with a non-combustible mineral fibre at the roof to prevent gaps;
7. Non-combustible gutter guards shall be installed on the new buildings;
8. Any box gutters shall be non-combustible and flashed at the junction with the roof with non-combustible materials;
9. An updated Bushfire Survival Plan and Emergency Management Plan shall be prepared in accordance with the RFS Guide to development a Bush Fire Emergency Management and Evacuation Plan.

The BAR has been prepared in accordance with the Planning for Bushfire Protection 2019 (PBP 2019) published by the NSW Rural Fire Service (RFS).

Should the above recommendations be implemented, any person evacuating a building will not be exposed to radiant heat levels greater than 10kW/m^2 and the existing bushfire risk should be suitably mitigated to offer an acceptable level of protection to life and property for those persons and assets occupying the site but they do not and cannot guarantee that the area will not be affected by bushfire at some time.

This assessment has been made based on the bushfire hazards observed in and around the site at the time of inspection and production (April 2021).

Abbreviations

Abbreviation	Description
APZ	Asset Protection Zone
AS2419-2005	Australian Standard – Fire Hydrant Installations
AS3959-2018	Australian Standard – Construction of Buildings in Bush Fire Prone Areas 2018
BAR	Bushfire Assessment Report
BMP	Bushfire Management Plan
BPAD	Bushfire Planning and Design (accreditation scheme)
BPA	Bushfire Prone Area (Also Bushfire Prone Land)
BPL	Bushfire Prone Land
BPLM	Bushfire Prone Land Map
BPM	Bushfire Protection Measures
CoE	Centre for Excellence
DPIE	NSW Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
FDI	Fire Danger Index
ha	hectare
HCC	Hawkesbury City Council
IPA	Inner Protection Area
LGA	Local Government Area
NCC:BCA	National Construction Standard: Building Code of Australia
PBP	Planning for Bushfire Protection
OPA	Outer Protection Area
RFS	NSW Rural Fire Service
SEARs	Secretary's Environmental Assessment Requirements
SSDA	State Significant Development Application
WSU	Western Sydney University

Table of Contents

Figures

Tables

Plates

Appendices

1. Introduction

1.1. Project Overview

The proposed development involves the construction and operation of a new Centre of Excellence (CoE) in Agricultural Education on a leased land parcel within the Western Sydney University (Hawkesbury Campus) site, Richmond NSW.

The CoE will include five science laboratories, ten general learning spaces, practical activity teaching areas, seminar, botany room, administration block and accommodation facilities. It will also include covered outdoor learning areas, dining / recreation hall, canteen and kitchen, agricultural plots, significant landscaping spaces, car parking and provision of necessary infrastructure.

The proposed development has been designed to be well integrated into the Western Sydney University site, having due regard for scale, bulk and orientation of existing buildings. The proposed development has been designed with a strong focus on the speciality function of the educational facility. The learning environment offers a strong focus on Agriculture and STEM skills, as such the external learning environment produces equal if not more significance to the facility than the internal arrangements.

1.2. Aims and Objectives

The assessment aims to consider and assess the bushfire hazard and associated potential bushfire threat relevant to the proposed development, and to outline the minimum mitigative measures which would be required in accordance with the provisions of the New South Wales Rural Fire Service (RFS) publication *Planning for Bushfire Protection 2019* (PBP 2019) and the *Rural Fires Regulation 2013.*

This assessment has been undertaken in accordance with clause 44 of the Rural Fires Regulation 2013. This BAR also addresses the aims and objectives of PBP 2019, being:

- Afford occupants of any buildings adequate protection from exposure to a bushfire;
- Provide a defendable space to be located around buildings;
- Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition;
- Ensure that safe operational access and egress for emergency service personnel and residents is available;
- Provide for ongoing management and maintenance of bushfire protection measures, including fuel loads in the asset protection zone (APZ); and
- Ensure that utility services are adequate to meet the needs of firefighters (and others assisting in bushfire fighting).

A compliance table demonstrating compliance with PBP 2019 is provided in **Appendix D**.

1.2.1. Specific Objectives for Special Fire Protection Purposes

The aims and objectives listed in section 1.1 of PBP 2019 remain applicable to SFPP developments, however further consideration has been given to SFPP developments due to the nature of these environments and the occupants they accommodate. Occupants of SFPP developments are generally more vulnerable to bushfire attack therefore specific objectives have been put in place to ensure greater protection is provided (section 6.2 PBP 2019). Specific objectives include:

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

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

As the entire Western Sydney University (WSU) and proposed development are classified as a SFPP development, the specific objectives and acceptable solutions for a SFPP development have been considered.

1.3. Proposed Development

Approval is being sought for a new Centre of Excellence (CoE) in Agricultural Education building at Western Sydney University. The proposed development is to be sited on a vacant parcel to the south of the existing Western Sydney University (Hawkesbury Campus) and Vines Drive. The proposed CoE buildings are sited to the south of Vines Road with the primary access from a private road. The proposed development includes new educational buildings, open spaces and parking facilities as per below.

The CoE will provide new agricultural / STEM teaching facilities with general learning and administration spaces to be utilised by rural, regional, metropolitan and international school students. The CoE will accommodate up to 325 students and up to 25 full-time employees consisting of farm assistants, administration staff and teachers and up to five itinerant staff members. The CoE will also include short-term on-site accommodation facilities for up to 62 visiting students and teaching professionals from regional and rural NSW.

New educational buildings

Six (6) main educational buildings are proposed as part of the development.

- Block A: One (1) single- storey building on the site will accommodate the administrative activities, shared office space and staff located at the main entrance from Vines Road.
- Block B: One (1) single storey building provides a central practical activities/ seminar room and four general learning areas (two on the northeast elevation and two on the southwest elevation) to be used as teaching areas. Oriented generally north to south.
- Block C: One (1) single storey building offers two (2) areas for practical activities, one (1) seminar, semi commercial food tech with kitchen prep and six (6) general learning areas. Generally oriented east to west.
- Block D: One (1) single storey building to provide five (5) labs, one (1) botany/ zoology room, two (2) practical spaces and one preparation area. Oriented east to west.
- Block E: One (1) Single story building containing the dining hall and conference area with canteen and kitchen. Oriented north to south.
- Block H: One (1) Single storey Agricultural workshop.
- Block G: One (1) Single storey green house.

Accommodation

- Block F: One (1) Single storey building to accommodate short term accommodation, dormitory style bedrooms with a wellbeing area extending to the northeast.

Open space and amenities

Buildings have been oriented on the site in linear open building forms utilising 7.5m x 9m DfMA grid for a light weight steel structure and portal frame structures. The buildings are connected by Covered Outdoor Learning Areas, facilitating pedestrian activity. Agricultural plots are sited to the west of the buildings and accessed by internal circulation path. The arrangement of the outdoor learning spaces and buildings create a comprehensive site wayfinding strategy with landscaping utilised to reinforce the site plan.

Site and parking facilities

The site planning focuses on separate private and public vehicular access with minibus/ student drop off and pickup occurring at the north from Vines Road. Further parking for staff, short-term accommodation, loading, waste removal and maintenance is located to the eastern side of the site.

1.4. Site Description

The site of the proposed CoE is located within the Western Sydney University Campus (WSU). The WSU is located at 2 College Street, Richmond within the Hawksbury City Council local government area (LGA).

The site is wholly within the Hawkesbury campus of the Western Sydney University; located on a vacant parcel of land towards the southern boundary. The site is currently occupied by large expanses of cleared land surrounded by the education facilities and infrastructure. There is very little change in grade across the site, with the exception of a narrow drainage corridor defining the southern boundary of the site.

Table 1: Site Description

Address	Vines Drive, Richmond (Western Sydney University)
Title	Part Lot 2 DP1051798
LGA	Hawkesbury City Council
Site Area	11.37 (Study Area)
Land Use Zone	SP1 – Special Activities
Bushfire Prone Land	Category 3 Vegetation Vegetation Buffer
Fire Danger Index (FDI)	100

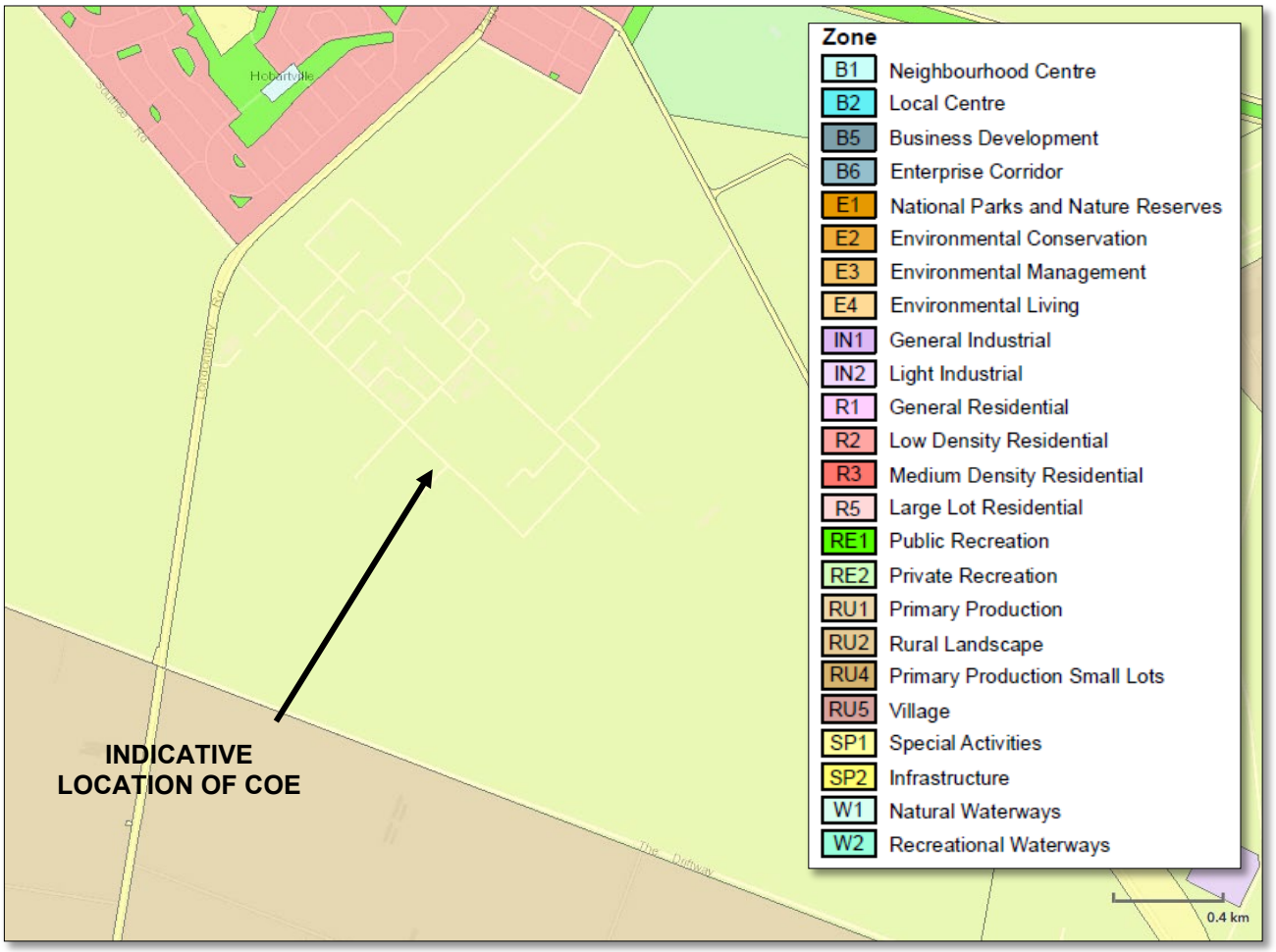


Figure 1: Land Use Zone (Hawkesbury LEP 2012)

UWS
Hawkesbury

Figure 2

Site Location

BUSHFIRE PLANNING AUSTRALIA

Lease boundary

Proposed Building

BAL-LOW

APZ – SFPP

SOURCE:
Base Map © Department of Customer Service 2020
© Commonwealth of Australia (Geoscience Australia) 2016. Creative Commons Attribution 4.0 International Licence.

N
W E
S

0 100 200
Meters

A3 Scale: 1:5,000

File:UWSHawkesburyFig01_Locality_210312 Date: 12/03/2021

GEOVIEW
GIS & mapping solutions for infrastructure, town planning & environmental management

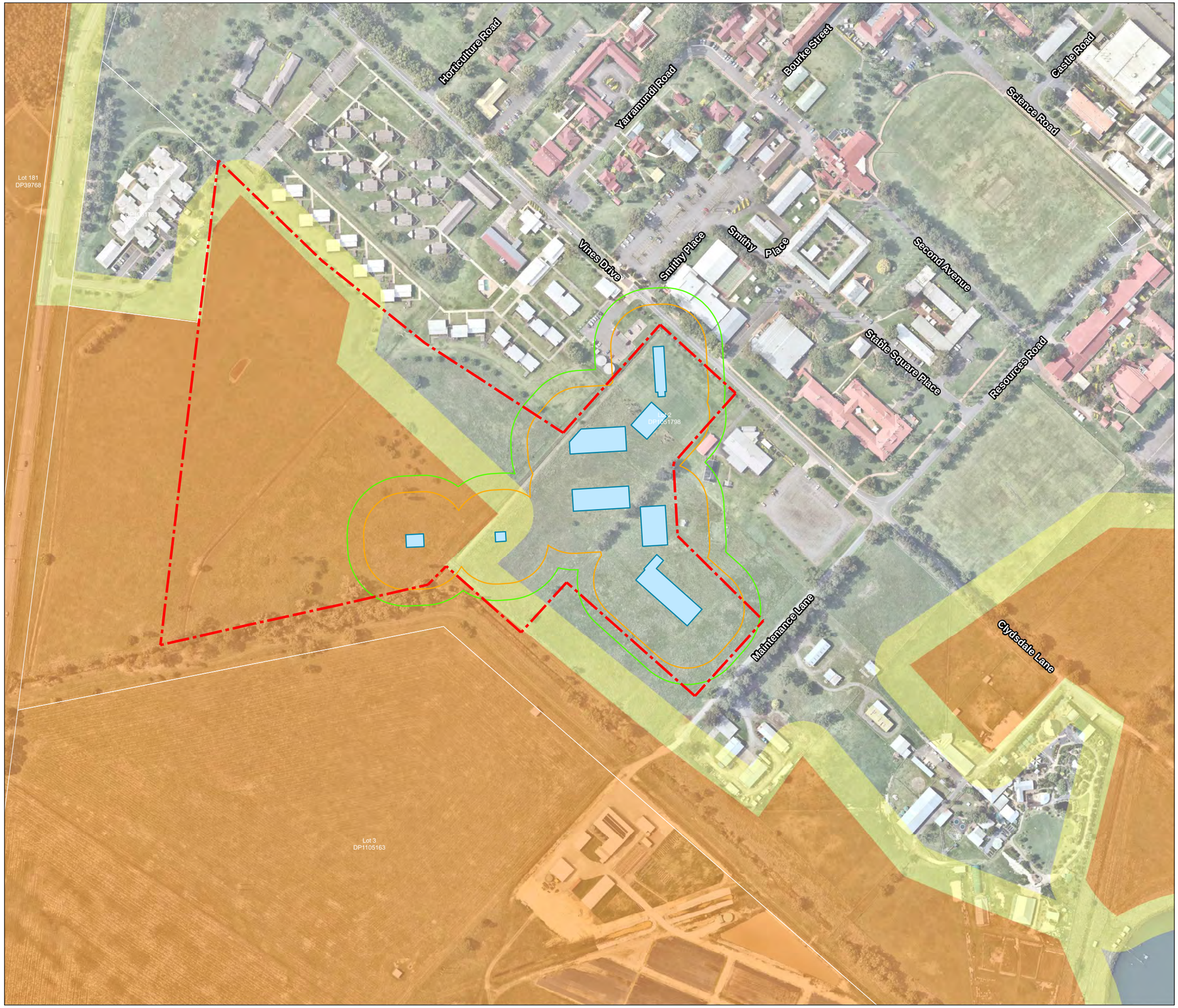
1.5. Bushfire Prone Land

Bushfire activity is prevalent in landscapes that carry fuel and the two predominant bushfire types are grassland and forest fires. Factors such as topographic characteristics and quantity of fuel loads influence the intensity and spread of fire. The scale of a bushfire hazard is tailored to the characteristics of the hazard, the size and characteristics of the affected population, types of land use exposed to bushfire, predicted development growth pressures and other factors affecting bushfire risk.

The majority of the site is not identified as designated bushfire prone land. The only buildings associated with the development that are located on mapped bushfire prone land are limited to Buildings G and H, which are Class 7b buildings are not considered a SFPP or residential.

The balance of the buildings proposed to be used for teaching and accommodation that are considered a SFPP (buildings A, B, C, D, E and F) are sited on land that was observed to be managed and not mapped as bushfire prone as shown in **Figure 3**.

Notwithstanding, several paddocks surrounding the proposed development; both within the WSU campus and also beyond, are identified as Vegetation Category 3; being ‘medium bushfire risk vegetation’.



UWS Hawkesbury

Figure 3

NSW Bush Fire Prone Land

BUSHFIRE PLANNING AUSTRALIA

- Lease boundary
- Proposed Building
- BAL-LOW
- APZ – SFPP

Bushfire Prone Land

- Vegetation Category 3
- Vegetation Buffer

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2020
Aerial Photo: NearMap 12/01/21
NSW Bush Fire Prone Land: NSW Rural Fire Service 2018

N
W E
S

0 25 50 75 100 125 150
Meters

A3 Scale: 1:3,000

File:UWSHawkesburyFig02_BFPL_210312 Date: 12/03/2021

GEOVIEW
GIS & mapping solutions for infrastructure, town planning & environmental management

1.6. Hawkesbury Bush Fire Risk Management Plan

The Rural Fires Act 1997 (RF Act) requires each bushfire management committee to prepare a bushfire risk management plan for a nominated area; commonly defined by local government area boundaries. The Hawkesbury Bush Fire Management Committee developed the Hawkesbury Bush Fire Risk Management Plan (BFRMP) which was approved on 19 December 2017. The BFRMP investigated the high-risk human settlements in the Hawkesbury local government area (LGA) and ranked them according to the assessed bushfire risk and the likely consequence of a bushfire attack.

BFRMPs are often not site specific, and individual sites or development do not have a statutory obligation to prepare a BFRMP, however it is often recommended as part of preparedness, a BFRMP is prepared. The WSU campus (including the subject site) was not identified on the Asset Register in the BFRMP. Accordingly, it is presumed the HBFRMP do not consider the campus to be exposed to measurable bushfire risk.

1.7. Bushfire Mitigation Strategy: Hawkesbury Campus

Western Sydney University implemented a Bushfire Mitigation Strategy (BMS) in 2015 and is contained in **Appendix B**. The BMS outlines:

- The known fire history of the Campus;
- Key assets requiring bushfire protection;
- Strategies relating to Bushfire Protection Measures; and
- Statutory requirements for bushfire protection in NSW.

The BMS was based on the information and requirements outlined in several RFS documents including PBP 2006. The Bushfire Protection Measures contained in the BMS are a combination of the bushfire protection measures offered by PBP 2006 and aim to protect the identified key assets from wildfire, grassfire and ember attack.

Asset Protection Zones (APZs) are a key mitigation strategy required by the BMS, the strategy for APZs and defendable space includes the following aspects:

- Agricultural and paddock areas are clearly identified as APZs with land management practices to maintain reduced fuel load (eg. slashing, grazing);
- Areas bordering key research and teaching assets, SFPP and neighbouring residential areas are identified as Strategic Fire Zones. These will be a focus of fuel load reduction through mechanical means and hazard reduction burns; and
- Identification of a mosaic of remnant vegetation areas which can potentially have hazard reduction burns, with the timing and intensity guided by management requirements as priority conservation lands as well as asset protection.

In addition to vegetation hazard management throughout the Campus, the BMS also details requirements for access, emergency management arrangements, landscaping and construction standards.

Of importance to the proposed development is the requirement to manage agricultural and paddock areas as APZs; as shown in **Figure 4**, which effectively means that all vegetation throughout the entire campus is either low-hazard or managed as an APZ. As such, there should be no unmanaged vegetation on the WSU campus.

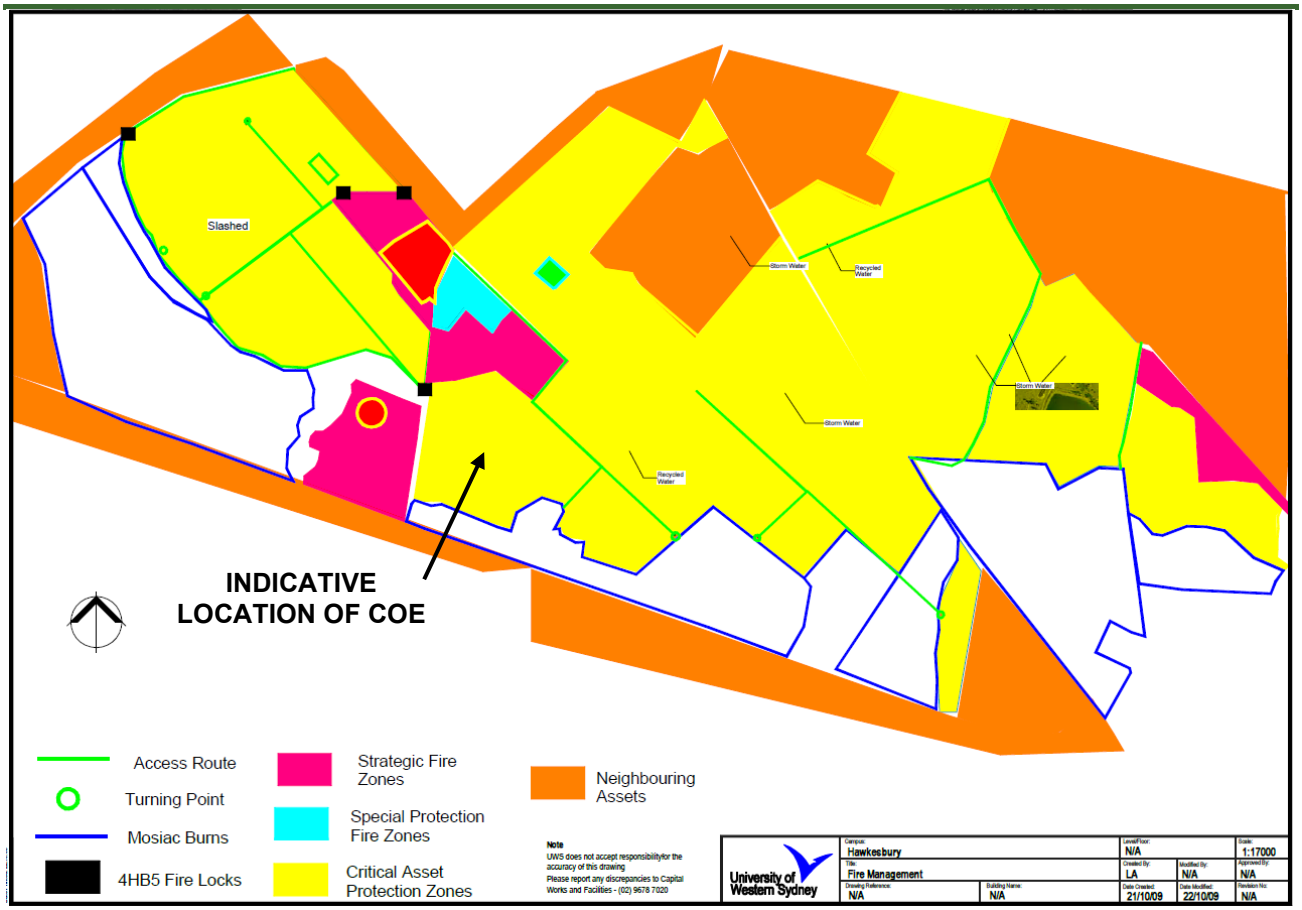


Figure 4: WSU Bushfire Mitigation Strategy – Fire Management Plan

2. Bushfire Hazard Assessment

The bushfire hazard assessment involves a quantitative and qualitative assessment of the site. The quantitative assessment includes a detailed site inspection to record and review vegetation communities, slope and aspect both within and surrounding the site. The qualitative assessment is based on the known bushfire behaviour of the subject land.

2.1. Vegetation Assessment

Vegetation classification over the subject site and up to 140m surrounding the subject site has been carried out as follows:

- Aerial Photograph Interpretation to map the vegetation classification and extent;
- Vegetation mapping of the Western Cumberland Subregion, 2013 VIS_ID 4207 (OEH), (**Figure 5**);
- Vegetation mapping of the Eastern Bushlands, 2011 VIS_ID 181 (DECCW), (**Figure 6**);
- Western Sydney University Bushfire Mitigation Strategy (2015); and
- Ground site inspection 1 April 2021 undertaken by Catherine Rylan (CR Bushfire).

In accordance with PBP 2019, an assessment of the vegetation over a distance of 140m in all directions from the development site was undertaken. Vegetation that may be considered a bushfire hazard was identified in all directions from the development footprint. The vegetation classification is based on Appendix 1 of PBP 2019; per Keith (2004). The unmanaged fuel loads detailed in the *Comprehensive Vegetation Fuel Loads* published by the RFS in March 2019 have been adopted for the purpose of assessing the bushfire hazard. The findings of the site inspection were compared to the Keith Vegetation Formations mapping provided by the NSW RFS. The inconsistencies between the mapping sources was quantified during the site inspection.

The outcomes of the field survey verified the differing vegetation composition and structure and identified in **Figure 8**. Areas typically affected by the development footprint are excluded from the assessment, as it is assumed the vegetation in these areas will be removed or maintained in a low threat condition; including the new roads and service areas.

The vegetation and landform observed during the site inspection confirmed the development site and the balance of the Campus is suitably managed as either an APZ or is cleared/managed land. However, several paddocks were observed to be unmanaged, in that the grass was greater than 100mm in height. In this regard, and in the absence of any evidence of ongoing vegetation management the dominant vegetation type identified as the primary bushfire hazard was found to be a *grassland*.

UWS Hawkesbury

Figure 5

Vegetation: Cumberland Plain West 2013

BUSHFIRE PLANNING AUSTRALIA

- Lease boundary
- Proposed Building
- 100m Buffer
- 140m Buffer
- Coastal Valley Grassy Woodlands

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2020
Aerial Photo: NearMap 12/01/21
vegetation: Remnant Vegetation of the western Cumberland subregion, 2013 Update. VIS_ID 4207: Office of Environment and Heritage (OEH)

N W E S

0 25 50 75 100 125 150 175 200
Meters

A3 Scale: 1:4,000

File:UWSHawkesburyFig04_VegVIS_ID_4207_210312 Date: 12/03/2021

UWS
Hawkesbury

Figure 6

Vegetation: Eastern Bushlands VIS_ID 181

BUSHFIRE PLANNING AUSTRALIA

- Lease boundary
- Proposed Building
- BAL-LOW
- APZ – SFPP
- Non forest system
- Urban system

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2020
Aerial Photo: NearMap 12/01/21
Vegetation: Eastern Bushlands Database Central VIS ID 181: NSW Department of Environment,Climate Change and Water (DECCW) 2011

N
W E
S

0 25 50 75 100 125 150 175 200
Meters

A3 Scale: 1:4,000

File:UWSHawkesburyFig05_VegVIS_ID_181_210312 Date: 12/03/2021

GEOVIEW MAPPING SERVICE
Web: www.geoview.com.au
Email: info@geoview.com.au
Office: (02) 6685 5654
Mobile: 0409 461147
Address: 3/18 Jacaranda Dr Byron Bay NSW Australia 2481
GIS & mapping solutions for infrastructure, town planning & environmental management

Plate 1: Indicative location of proposed Centre of Excellence – looking east across existing APZ

Plate 2: Land surrounding proposed CoE managed as an APZ

Plate 3: Land to the west of CoE currently managed as an APZ (within 100m of lease area)

Plate 4: Vegetation within lease currently unmanaged grassland

Plate 5: Paddocks to the south of the proposed CoE – observed to be managed in 2017

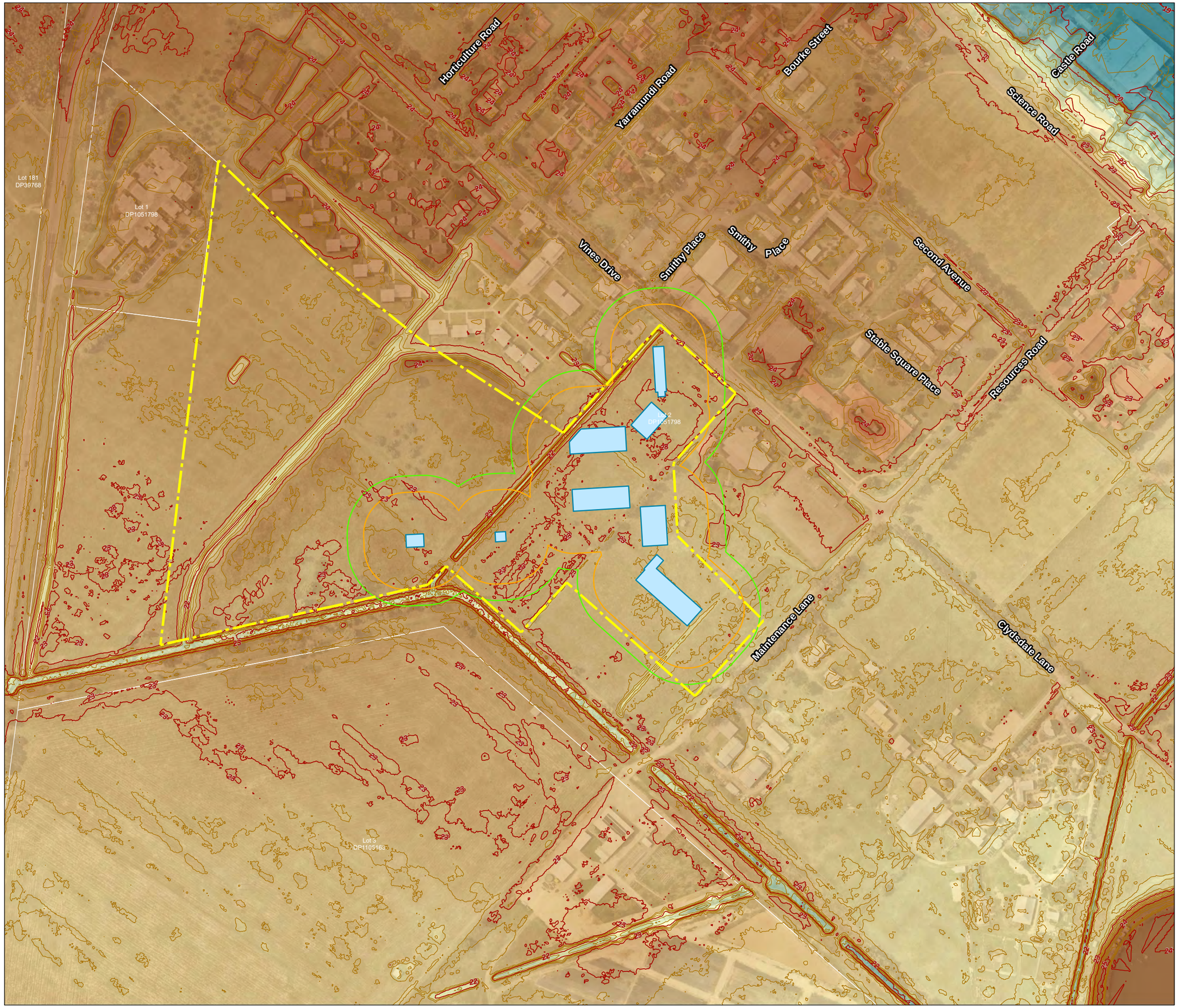
2.1.1. Slope Assessment

The slope assessment was undertaken as follows:

- Review of LiDAR point cloud data – including DEM (**Figure 7**); and
- Site inspection 1 April 2021.

An assessment of the slope over a distance of 140m in the hazard direction from the site boundary was undertaken. The effective slope was then calculated under the classified vegetation where there was a fire run greater than 50m using a Digital Elevation Model (DEM) dervied from recent LiDAR capture. The topography of the site has been evaluated to identify both the average slope and by identifying the maximum slope present. These values help determine the level of gradient which will most significantly influence the fire behaviour of the site.

The effective slope in all directions is shown in **Figure 8** and **Table 2.**



UWS
Hawkesbury

Figure 7

Elevation

BUSHFIRE PLANNING AUSTRALIA

Lease boundary

Proposed Building

BAL-LOW

APZ – SFPP

Elevation (AHD)

High : 25.3m

Low : 18.8m

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2020
Aerial Photo: NearMap 12/01/21
Surface analysis: Derived from Penrith201904 LID1 AHD 2906278 56 0002 0002 1m © Department Finance, Services and Innovation 2019

N
W E
S

0 25 50 75 100 125 150
Meters

A3 Scale: 1:3,000

File:UWSHawkesburyFig06_Elevation_210312 Date: 12/03/2021

GEOVIEW
GIS & mapping solutions for infrastructure, town planning & environmental management

2.2. Significant Environmental Features

There are no known environmental features of significance within the development footprint or the balance of the site. The development footprint is wholly located within that part of the site that is predominantly cleared.

2.3. Threatened Species, populations or ecological communities

The area of the site to be affected by the proposed development has been identified to avoid impact on any threatened species, population or EEC. All bushfire mitigation measures; including APZs have considered the existing and potential biodiversity values to avoid impact where possible.

ted the ecological impact on these species can be appropriately managed.

2.4. Aboriginal Objects

A search of the AHIMS database (results contained in **Appendix C**) revealed there are two (2) Aboriginal sites or places recorded in or near the subject site. Further investigation is required to demonstrate any proposed bushfire mitigation measures will impact on the recorded Aboriginal sites.

2.5. Results

The dominant vegetation that was observed throughout and surrounding the site that provides the greatest bushfire hazard was identified as a *grassland*, which was contained to the fenced paddocks to the south of the development site. However, all vegetation within the WSU campus is required to be managed as an APZ.

Based on the site inspection and DEM, the effective slope across the site was generally flat, with small deviations associated with drainage channels to the south of the development.

The final bushfire hazard assessment defining vegetation classifications and effective slope are shown in **Figure 8.**

UWS Hawkesbury

Figure 8

Slope and Vegetation Assessment

BUSHFIRE PLANNING AUSTRALIA

- Lease boundary
- Proposed Accommodation
- Proposed Teaching Buildings
- Proposed Workshops and Greehnouse
- BAL-LOW
- APZ – SFPP
- Contour (1m)
- Contour (0.25m)
- Grassland
- Managed Land

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2020
Aerial Photo: NearMap 12/01/21
Surface analysis: Derived from Penrith201904 LID1 AHD 2906278 56 0002 0002 1m © Department Finance, Services and Innovation 2019

N W E S

0 25 50 75 100
Meters

A3 Scale: 1:2,000

File:UWSHawkesburyFig03_SlopeVegAssessment_210414 Date: 14/04/2021

GEOVIEW
GIS & mapping solutions for infrastructure, town planning & environmental management

3. Bushfire Protection Measures

This BMP has adopted the methodology to determine the appropriate Bushfire Protection Measures (BPMs) detailed in PBP 2019. As part of the BMP, the recommended BPMs demonstrate the aims and objectives of PBP 2019 have been satisified; includinig the matters considered by the RFS necessary to protect persons, property and the environment from the danger that may arise from a bushfire.

- APZs;
- Access;
- Services;
- Construction;
- Landscaping; and
- Emergency Management

3.1. Asset Protection Zones

An APZ is an area surrounding a development that is managed to reduce the bushfire hazard to an acceptable level to mitigate the risk to life and property. The rrequired width of the APZ varies with slope and the type of hazard. An APZ can consist of both an inner protection area (IPA) and an outer protection area (OPA). In this instance the entire APZ and the balance of the development site shall be managed as an IPA.

An APZ can include the following:

- Lawns;
- Discontinuous gardens;
- Swimming pools;
- Roads, driveways and managed verges;
- Unattached non-combustible garages with suitable separation from the dwelling;
- Open space / parkland; and
- Car parking.

The presence of a few shrubs or trees in the APZ is acceptable provided that they:

- Do not touch or overhang any buildings;
- Are well spread out and do not form a continuous canopy;
- Are not species that retain dead material or deposit excessive quantities of ground fuel in a short period or in a danger period; and
- Are located far enough away from any dwelling so that they will not ignite the dwelling by direct flame contact or radiant heat emission.

Woodpiles, wooden sheds, combustible material storage areas, large areas / quantities of garden mulch, stacked flammable building materials etc. are not be recommended in the APZ.

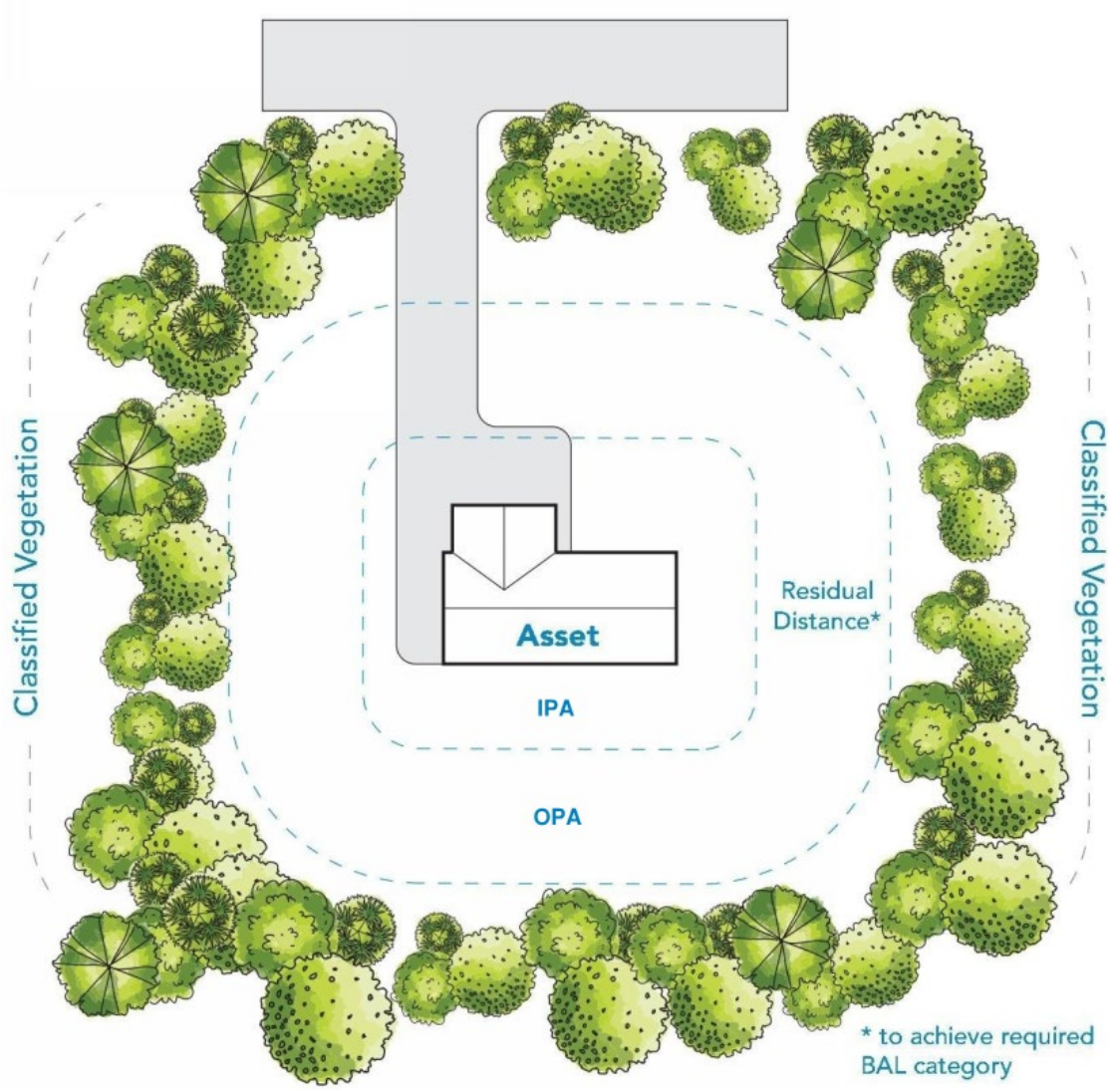


Figure 9: Asset Protection Zone

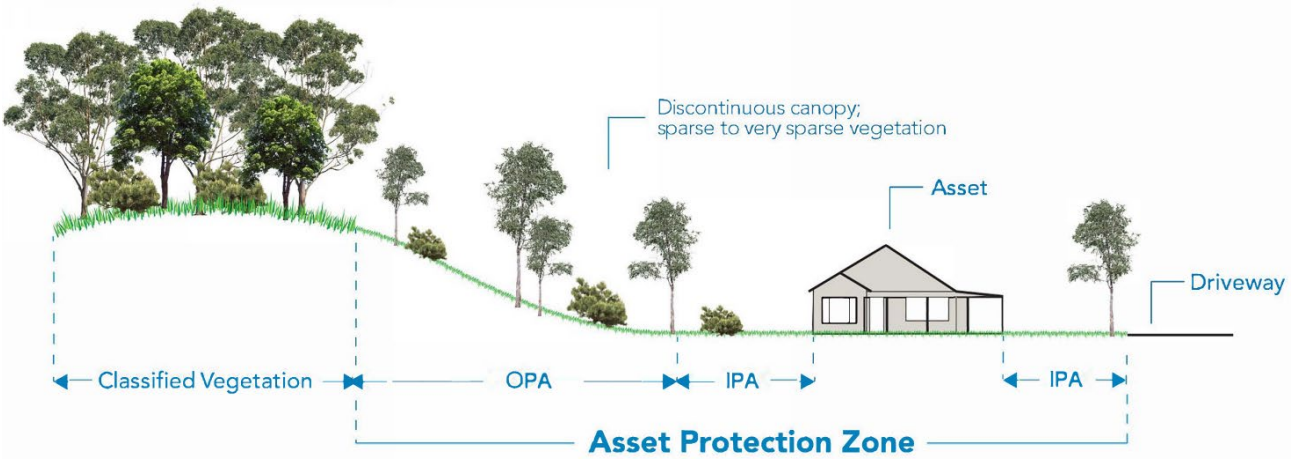


Figure 10: APZ profile

3.1.1. Special Fire Protection Purposes

SFPP developments mean the occupants of the proposed development may be more vulnerable to bush fire attack and therefore may require greater protection from such threats as well as assisted evacuation. SFPPs include schools, seniors housing, child care centres, hospitals and tourist accommodation.

Section 6 of PBP 2019 provides protection measures for SFPP developments. In comparison to a standard residential development where radiant heat levels of no greater than 29kW/m^2 are acceptable, radiant heat levels of greater than 10kW/m^2 must not be experienced on any part of the building. To achieve radiant heat levels of less than 10kW/m^2, APZs of 67m or greater are typically required (based on Table A1.12.1 of PBP 2019) for *forest* vegetation.

Objectives for SFPP developments place emphasis on the space surrounding buildings (as defendable space and APZs) and less reliance on construction standards. SFPP developments are highly dependent on suitable emergency evacuation arrangements, which require greater separation from bush fire threats. Areas of defendable space (APZs) surrounding SFPP buildings can extend up to 60m wide.

3.1.2. Determining the Appropriate Setbacks

Based on the unique site characteristics identified by the BAR, the intensity of a bushfire event presented as the radiant heat exposure was calculated at several locations throughout the development site. To demonstrate compliance with the Acceptable Solutions for SFPP, as detailed in Table 6.8a of PBP 2019, the APZ requirements have been provided in accordance with Table A1.12.1 in Appendix 1 of PBP 2019.

Refer to **Table 2** for the required APZs.The required APZs are also indicated in **Figure 11**.

Table 2: Recommended Asset Protection Zone

Aspect	Vegetation Classification (PBP 2019)	Slope	APZ (PBP 2019)	APZ provided
West, East, South	*Grassland*	Flat	36m	50m

The recommended APZs have been designed to utilise the features and siting of the ancillary works associated with the CoE. The APZ is mainly contained within the lease area, however some areas of the required APZ extend beyond the lease area into the WSU campus. It is recommended a minimum APZ of 50m is provided to ensure the proposed buildings are provided with an improved level of protection.

The combined area beyond the lease area totals 2,356m^2. The WSU Bushfire Mitigation Strategy already requires this vegetation to be managed as an APZ. Whilst some vegetation within 50m of the proposed CoE was observed during the site inspection not to satisfy the requirements of an APZ, there is no significant vegetation (trees or shrubs) that are required to be removed. Maintenance of the APZ only requires slashing of the grass (or reintroducing active grazing).

UWS Hawkesbury

Figure 11

Asset Protection Zone

BUSHFIRE PLANNING AUSTRALIA

- Lease boundary
- Proposed Accommodation
- Proposed Teaching Buildings
- Proposed Workshops and Greehnouse
- BAL-LOW
- APZ – SFPP

Managed APZ

- 36m APZ (1874m²)
- 50m APZ (2356m²)

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2020
Aerial Photo: NearMap 12/01/21
Surface analysis: Derived from Penrith201904 LID1 AHD 2906278 56 0002 0002 1m © Department Finance, Services and Innovation 2019

N W E S

0 25 50 75 100
Meters

A3 Scale: 1:2,000

File:UWSHawkesburyFig07_APZ_210414 Date: 14/04/2021

GEOVIEW
GIS & mapping solutions for infrastructure, town planning & environmental management

3.2. Access

In the unlikely event of a serious bushfire, it will be essential to ensure that adequate ingress / egress and the provision of defendable space are afforded in the layout.

The proposed CoE incorporates two separate internal roads that provide access to the teaching buildings and the student accommodation. The primary access to the CoE is from Vines Drive and is a one-way 8m wide road with a separate entry and exit to/from Vines Drive. Parking for buses and a small number of cars is provided outside of the main path of travel.

Building F, being the student accommodation is accessible from Maintenance Lane and is a two-way cul-de-sac with a large turning head designed to enable the maneuvering of large buses.

Egress routes from the CoE to the broader public road network are provided to Londondery Road via Vines Drive to the west. Alternative egress routes are provided by the Campus Drive and College Drive, both to the north.

3.3. Services – water electricity and gas

3.3.1. Water

A new reticulated water supply will be provided to the CoE in accordance with Table 6.8c of PBP 2019.

3.3.2. Electricity

The proposed CoE will be connected to an underground transmission line in accordance with the Acceptable Solutions outlined in Table 6.8c of PBP 2019.

3.3.3. Gas

All gas services will be provided in accordance with the relevant standards as outlined in Table 6.8c of PBP 2019.

3.4. Construction Standards

PBP 2019 requires all buildings proposed for use as a SFPP to be designed and constructed to withstand bushfire attack in the form of wind, embers, radiant heat and flame contact. Whilst the recommended APZs have been determined to ensure the proposed CoE will not be exposed to direct flame contact, or excessive levels of radiant heat, the building must be constructed to withstand ember attack. To achieve this, a construction level of BAL-12.5 under Australia Standard 3959-2018 Construction of buildings in bushfire prone areas (AS3959-2018) and section 7.5 of PBP 2019 is applied.

Building design and the materials used for construction of the proposed ASB should be chosen based on the information contained within AS3959-2018, and accordingly the designer/architect should be made aware of this recommendation.

The determinations of the appropriate bushfire attack level (BAL) is based on the maximum potential radiant heat exposure. BALs are based upon parameters such as weather modelling, fire-line intensity, flame length calculations, as well as vegetation and fuel load analysis. The determination of the BAL is derived by assessing the:

- Relevant FDI = *100*;
- Flame temperature = 1200*K*;
- Slope = flat;
- Vegetation classification = *grassland*; and
- Building location.

Table 3: Bushfire Attack Levels

Aspect	Vegetation Classification (PBP 2019)	Slope	APZ	Distance from Hazard	Bushfire Attack Level (BAL)
West, east, south	*Grassland*	Flat	Min. 50m	0m-<8m	BAL-FZ
				8m-<10m	BAL-40
				10m-<15m	BAL-29
				15m-<22m	BAL-19
				22m-<50m	BAL-12.5
				36m	**10kW/m^2**
				>50m	**BAL-LOW**
				>100m	**NSP (<2kw/m^2)**

Given all land and vegetation within a minimum 50m is either within the site of the CoE, or within the WSU campus and required to be managed as an APZ, the BAL rating for the proposed buildings is **BAL-LOW**. Primarily as there is insufficient risk to warrant additional construction requirements.

Notwithstanding, to enable the buildings; including the student accommodation to be suitable for use as a refuge should a bushfire occur beyond the WSU campus, it is recommended all new buildings implement a series of measures to protect the buildings from the risk of ignition from embers. The following mitigation measures are recommended for consideration of the Project Team;

- ❑ All weepholes, ventilation openings, gaps shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2mm;
- ❑ Roof penetrations, including aerials, vent pipes and supports for solar collectors or the like shall be sealed with a non-combustible mineral fibre at the roof to prevent gaps;
- ❑ Non-combustible gutter guards shall be installed on the new buildings;
- ❑ Any box gutters shall be non-combustible and flashed at the junction with the roof with non-combustible materials;

3.5. Landscaping and Vegetation Management

In APZs and IPAs, the design and management of the landscaped areas in the vicinity of buildings have the potential to improve the chances of survival of people and buildings. Reduction of fuel does not require the removal of all vegetation. Trees and plants can provide some bushfire protection from strong winds, intense heat and flying embers (by filtering embers) and changing wind patterns.

Generally landscaping in and around a bushfire hazard should consider the following:

- ❑ Priority given to retaining species that have a low flammability;
- ❑ Priority given to retaining species which do not drop much litter in the bushfire season and which do not drop litter that persists as ground fuel in the bush fire season;
- ❑ Priority given to retaining smooth barked species over stringy bark; and
- ❑ Create discontinuous or gaps in the vegetation to slow down or break the progress of fire towards the dwellings.

Landscaping within APZs and IPAs should give due regard to fire retardant plants and ensure that fuel loads do not accumulate as a result of the selected plant varieties.

The principles of landscaping for bushfire protection aim to:

- ❑ Prevent flame impingement on dwellings;
- ❑ Provide a defendable space for property protection;

- Reduce fire spread;
- Deflect and filter embers;
- Provide shelter from radiant heat; and
- Reduce wind speed.

Plants that are less flammable have the following features;

- High moisture content;
- High levels of salt;
- Low volatile oil content of leaves;
- Smooth barks without 'ribbons' hanging from branches or trunks; and
- Dense crown and elevated branches.

Avoiding understorey planting and regular trimming of the lower limbs of trees also assists in reducing fire penetration into the canopy. Rainforests species such as Syzygium and figs are preferred to species with high fine fuel and/or oil content.

Trees with loose, fibrous or stringy bark should be avoided. These trees can easily ignite and encourage ground fire to spread up to, and then through the crown of trees.

Consideration should be given to vegetation fuel loads present on site with particular attention to APZs.

Careful thought must be given to the type and physical location of any proposed site landscaping. Inappropriately selected and positioned vegetation has the potential to 'replace' any previously removed fuel load.

Bearing in mind the desired aesthetic and environment sought by site landscaping, some basic principles have been recommended to help minimise the chance of such works contributing to the potential hazard on site.

Whilst it is recognised that fire-retardant plant species are not always the most aesthetically pleasing choice for site landscaping, the need for adequate protection of life and property requires that a suitable balance between visual and safety concerns be considered.

It is reiterated again that it is essential that any landscaped areas and surrounds are subject to ongoing fuel management and reduction to ensure that fine fuels do not build up.

Table 4: Characteristics of low flammability species

Plant attribute	Effect	Design measure
Foliage moisture content	Leaves with higher moisture content retard ignition and slow the rate of combustion	Select species with high leaf moisture content (e.g. rainforest species, succulents and semi-succulents)
Foliage volatile oil content	Foliage with higher volatile oil content ignite more readily and enhance ignition of surrounding vegetation, even though volatile oils themselves do not contribute significant- ly to total radiant heat	Select species with lower volatile oil content[68, 69]
Foliage mineral content	Foliage with higher mineral content tend to be less flammable (e.g. Amyema spp mistle- toes)	Species selection should favour species with higher leaf mineral content

Plant attribute	Effect	Design measure
Leaf fineness	The ratio of area-to-volume of leaves is one of the main factors affecting ease of ignition and intensity of burning. Finer leaves (greater area to volume ratio) tend to ignite and burn more easily than broader leaves	Species selection should favour broad-leafed species
Density of foliage and continuity of plant form	Species with continuous, denser foliage can act as a barrier to wind-borne embers and radiant heat; however, increased density can increase flammability. Species with open branching and low foliage density are less effective as a barrier, though can be less flammable	Select species on a case-by-case basis
Height of lowest foliage	Shrub and tree species with persistent low height foliage are more likely to be ignited by surface fires, allowing the spread of fires into the canopy above	Species selection should favour species which can be maintained or pruned to reduce persistent, near-ground foliage
Size of plant (volume and spread)	The effect of plant size varies according to volume or spread. Species with a greater spread tend to be more effective as a barrier to the diffusion of radiant heat than narrower trees with the same volume. Species with a greater volume can result in increased ember attack, radiation and flame if ignited. For example, narrow columnar trees are less effective as a barrier than wider trees with the same overall volume	Species selection should ensure plant size (volume and spread) does not increase ignition likelihood
Dead foliage on plant	Persistent dead leaves and woody twigs increase flammability	Species selection should favour species which have a low volume of persistent dead leaves and woody material or can be maintained or pruned to reduce persistent, dead leaves and woody material
Bark texture	Loose, flaky, stringy, papery or ribbon-like bark contribute to ladder fuels which: • can contribute to destructive crown fires • act as a potential source of flame, radiant heat and ember attack	Avoid species with persistent loose, flaky, stringy, papery or ribbon-like bark. Species selection should favour smooth- barked and tightly-held bark species
Potential available surface fuel	The availability of surface fuel is a function of volume (quantity) and fineness. The fireline intensity increases in proportion to available fine fuel quantity. Fine fuel includes dead fallen material such as leaves, bark, twigs and branches up to 6mm in diameter (forest) and grass greater than 5cm in height (grass- lands). Coarse fuel ignites less readily but may burn for longer	Species selection should favour species which do not contribute significantly to persistent, fine ground fuel

Whilst it is recognised that fire-retardant plant species are not always the most aesthetically pleasing choice for site landscaping, the need for adequate protection of life and property requires that a suitable balance between visual and safety concerns be considered.

It is reiterated again that it is essential that any landscaped areas and surrounds are subject to ongoing fuel management and reduction to ensure that fine fuels do not build up.

4. Conclusion and Recommendations

Bushfire Planning Australia (BPA) has been engaged by Schools Infrastructure NSW (the 'Client') to undertake a Bushfire Assessment Report (BAR) for a State Significant Development Application (SSDA) for the construction of the Centre of Excellence in Agricultural Education (CoE) on a leased land parcel within the Western Sydney University (Hawkesbury Campus), Richmond NSW.

The CoE will accommodate up to 325 students and up to 25 full-time employees and also include short-term on-site accommodation facilities for up to 62 visiting students and teaching professionals.

The predominant hazardous vegetation identified surrounding the site was observed during the site inspection to be commensurate with a *grassland* vegetation classification. The unmanaged vegetation was contained within grazing paddocks that have been historically used by the WSU for teaching purposed. Yet, an existing Bushfire Mitigation Strategy prepared by WSU requires all land within and surrounding the lease area to be managed in perpetuity as an Asset Protection Zone (APZ).

The BAR concluded that the site was exposed to low bushfire threat primarily due to the landscape, dominance of low-threat vegetation and existing management practices in place throughout the campus and surrounding managed properties.

Notwithstanding, whilst the proposed development is able to provide appropriate separation between the nearest hazard and the proposed building/s, the following precautionary measures are provided for consideration. These recommendations will further minimise the potential impact of a bushfire on the property.

The following key recommendations have been generated to ensure the proposed Centre of Excellence is not exposed to radiant heat levels that do not exceed critical limits:

1. All buildings to be used for a Special Fire Protection Purpose (SFPP) (Buildings A, B, C, D, E and F) are located to ensure they will not be exposed to radiant heat levels greater than 10kW/m^2;
2. An Asset Protection Zone (APZs) a minimum of 50m is to be provided surrounding the curtilage of Buildings A, B, C, D and F; as shown in **Figure 11**. The APZs shall be managed in perpetuity as follows:
    i. Tree canopy cover shall be less than 15% at maturity;
    ii. Trees at maturity shall not touch or overhang buildings;
    iii. Lower limbs shall be removed up to a height of 4m above the ground;
    iv. Tree canopies shall be separated by 2m to 5m;
    v. Shrubs should not form more than 10% ground cover;
    vi. Shrubs shall not be located under trees;
    vii. Grass/ ground covers shall be kept mown and be no more than 100mm in height; and
    viii. Leaves and debris shall be removed regularly.

    Note: the APZ is measured from the surface fuel and not the tree canopy drip line.
3. The APZ needs to be established before any buildings are occupied. Surface fuel needs to be maintained frequently (< monthly) and an inspection of all trees within the APZ shall be carried out in August and April (pre and post bushfire season) to ensure vegetation remains in accordance with the requirements for APZs;
4. No hazardous or flammable materials are to be stored between any buildings and the bushfire hazards without being suitably enclosed to prevent air borne embers from direct contact;
5. All weepholes, ventilation openings, gaps shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2mm;

6. Roof penetrations, including aerials, vent pipes and supports for solar collectors or the like shall be sealed with a non-combustible mineral fibre at the roof to prevent gaps;
7. Non-combustible gutter guards shall be installed on the new buildings;
8. Any box gutters shall be non-combustible and flashed at the junction with the roof with non-combustible materials;
9. An updated Bushfire Survival Plan and Emergency Management Plan shall be prepared in accordance with the RFS Guide to development a Bush Fire Emergency Management and Evacuation Plan.

The BHA has been prepared in accordance with the Planning for Bushfire Protection 2019 (PBP 2019) published by the NSW Rural Fire Service (RFS).

Should the above recommendations be implemented, any person evacuating a building will not be exposed to radiant heat levels greater than 10kW/m^2 and the existing bushfire risk should be suitably mitigated to offer an acceptable level of protection to life and property for those persons and assets occupying the site but they do not and cannot guarantee that the area will not be affected by bushfire at some time.

This assessment has been made based on the bushfire hazards observed in and around the site at the time of inspection and production (April 2021).

5. References

- Leonard, J and Opie, K, (2017) Estimating the potential bushfire hazard of vegetation patches and corridors. CSIRO
- NSW Rural Fire Service (2018). Pre-Release Planning for Bushfire Protection – A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners.
- Ramsay, GC and Dawkins, D (1993). Building in Bushfire-prone Areas – Information and Advice. CSIRO and Standards Australia.
- Standards Australia (2018). AS 3959 – 2018: Construction of Buildings in Bushfire-prone Areas.

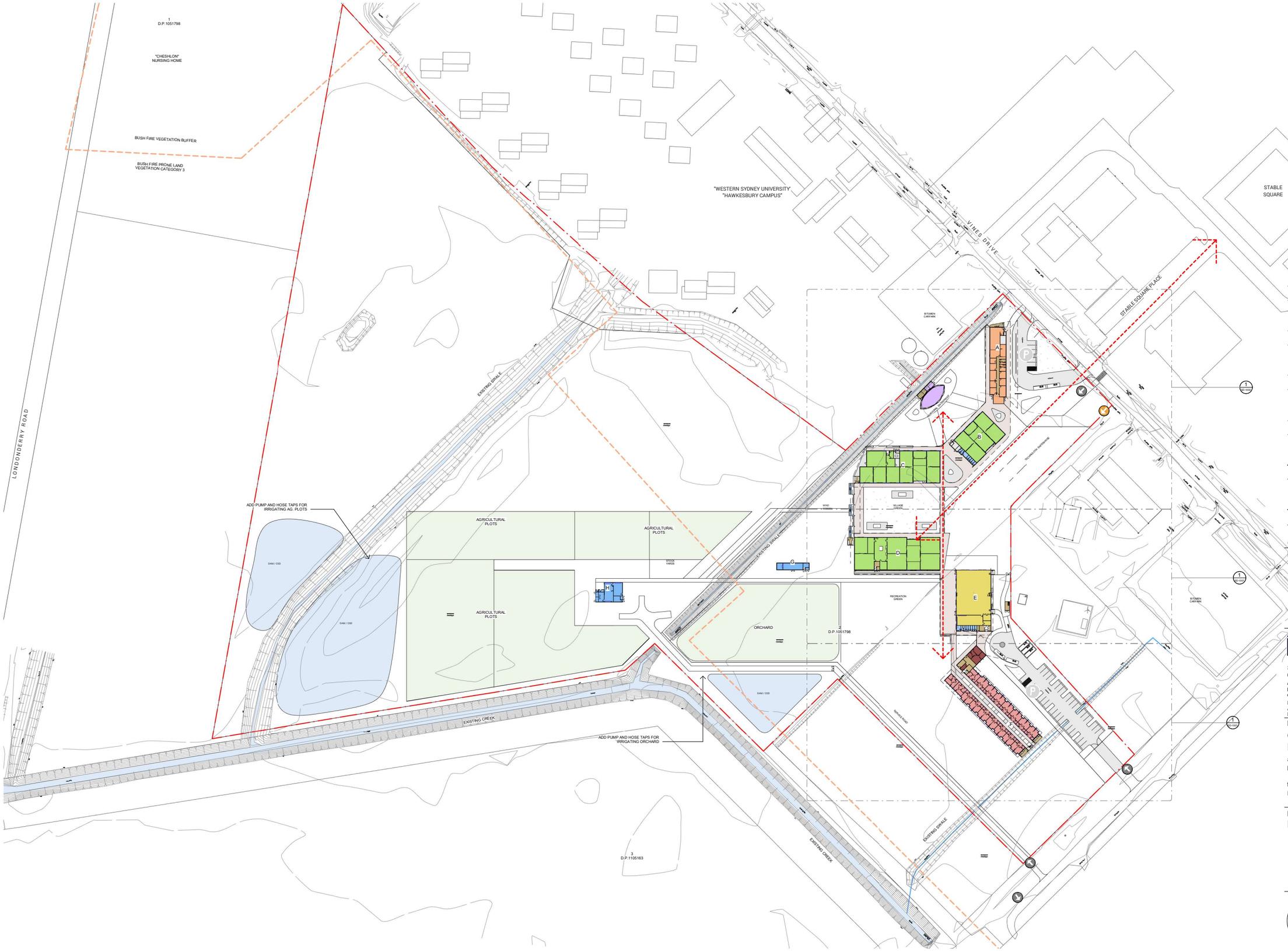
Appendix A: Architectural Drawings (selection)

NSW GOVERNMENT | EDUCATION

NBRSARCHITECTURE.

RICHARD CROOKES CONSTRUCTIONS

PRELIMINARY



LEGEND

- LEASE LINE
- PEDESTRIAN AXIS
- EXISTING SWALE & CREEK
- BUSH FIRE PRONE LAND VEGETATION BUFFER
- B — BUS STOP
- P — CAR PARKING
- PEDESTRIAN ACCESS
- VEHICLE ENTRY/EXIT
- BLOCK A - ADMINISTRATION
- BLOCK B, C & D - LEARNING
- BLOCK E - DINNING
- BLOCK F - ACCOMMODATION
- BLOCK G & H - FARMING
- ABORIGINAL ENTERPRISE - COLA

Issue

No.	Date	Description	Chkd
4	23/12/2020	PRELIMINARY	
5	05/02/2021	DRAFT CONCEPT	SJF
6	17/02/2021	CONCEPT DESIGN	SJF
7	26/02/2021	CONCEPT DESIGN	SJF
8	14/01/2021	PRELIMINARY	
9	25/01/2021	PRELIMINARY	
10	04/03/2021	CONCEPT DESIGN	SJF
11	23/03/2021	DRAFT SCHEMATIC	SJF

Architect
NBRSARCHITECTURE.

Sydney
61 2 9922 2344 nbrsarchitecture.com

Nominated Architect:
Andrew Duffin NSW 5602
NBRS & Partners Pty Ltd VIC 51197

ABN 16 002 247 565

Project

Centre of Excellence in Agricultural Education

at
HAWKESBURY

for
DEPARTMENT OF EDUCATION

Drawing Title
Proposed Site Plan

Date 24/03/2021 8:48:12 AM
Scale As indicated @ A1

Drawing Reference
20417-NBRS-A-SD-0103

Revision
11

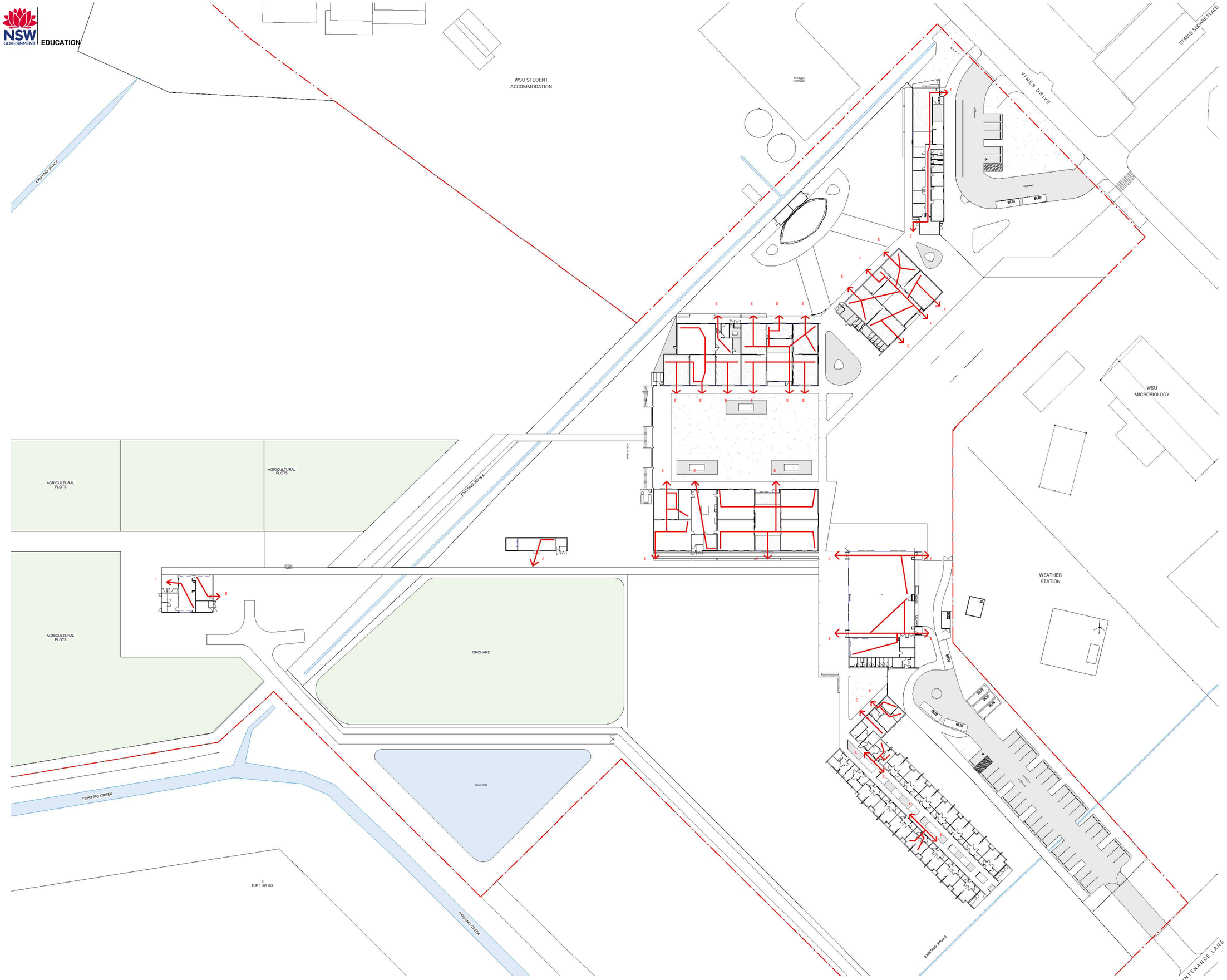
0 10 20 30 40 50 60 70 80 90 100

NSW GOVERNMENT EDUCATION

NBRSARCHITECTURE.

RICHARD CROOKES CONSTRUCTIONS

PRELIMINARY



Issue

No.	Date	Description	Chkd

Architect

NBRSARCHITECTURE.

Sydney

61 2 9922 2344 nbrsarchitecture.com

Nominated Architect:
Andrew Duffin NSW 5602

NBRS & Partners Pty Ltd VIC 51197 ABN 16 002 247 565

Project

Centre of Excellence in Agricultural Education

at

HAWKESBURY

for

DEPARTMENT OF EDUCATION

Drawing Title

Site Circulation Plan

Date 24/03/2021 8:48:32 AM

Scale 1 : 500 @ A1

Drawing Reference

20417-NBRS-A-SD-0106

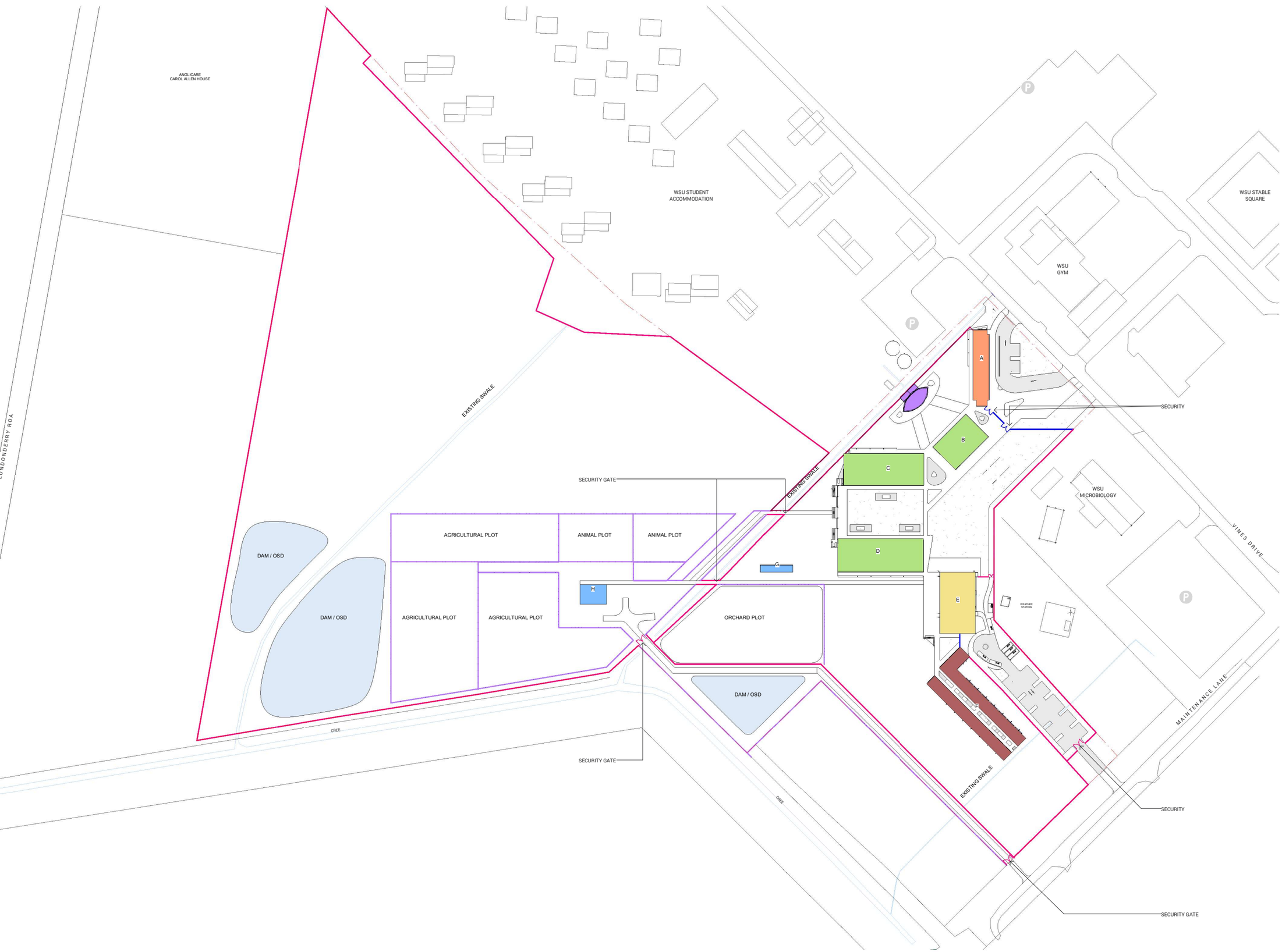
Revision

0 10 20 30 40 50 60 70 80 90 100

NSW GOVERNMENT EDUCATION

NBRSARCHITECTURE.

RICHARD CROOKES CONSTRUCTIONS



PRELIMINARY

- 2.1m DIPLOMAT
- 2.1m CORROMESH
- 1.5m WIRE FARM
- OUT OF HOURS

Issue

No.	Date	Description	Chkd
1	04/03/2021	CONCEPT DESIGN	SJF
2	23/03/2021	DRAFT SCHEMATIC	SJF

Architect
NBRSARCHITECTURE.

Sydney
61 2 9922 2344 nbrsarchitecture.com

Nominated Architect:
Andrew Duffin NSW 5602
NBRS & Partners Pty Ltd VIC 51197

ABN 16 002 247 565

Project

Centre of Excellence in Agricultural Education

at
HAWKESBURY

for
DEPARTMENT OF EDUCATION

Drawing Title

Site Security/ Fence Plan

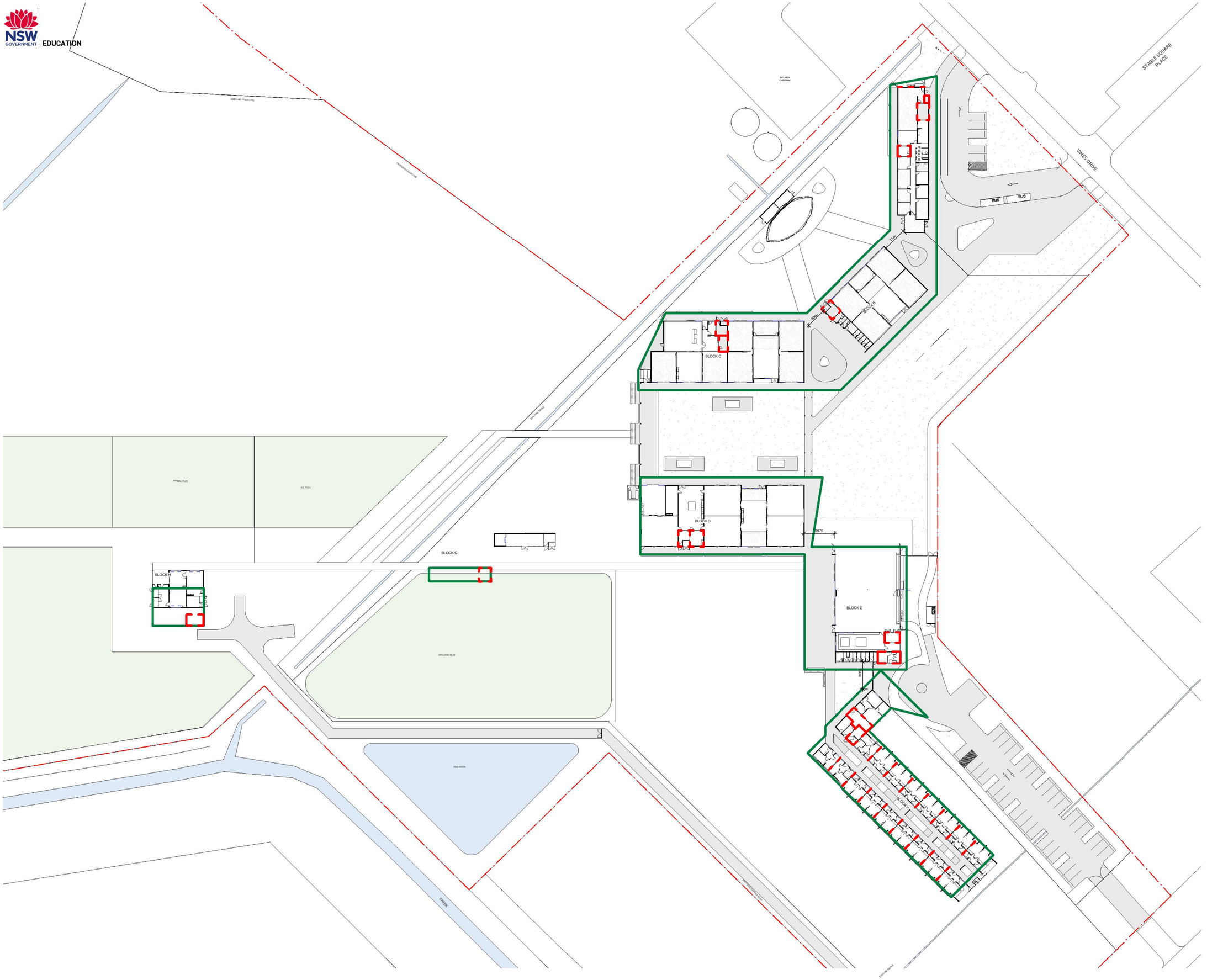
Date 24/03/2021 8:48:41 AM
Scale 1 : 1000 @ A1

Drawing Reference
20417-NBRS-A-SD-0107

Revision
2

0 10 20 30 40 50 60 70 80 90 100

NSW GOVERNMENT EDUCATION



NBRSARCHITECTURE.

RICHARD CROOKES CONSTRUCTIONS

PRELIMINARY

- FRL 60/60/60 FH TO UNDERSIDE OF ROOF
- FIRE COMPARTMENT
- ALL COMMS ROOMS & EDB TO BE FIRE SEPARATED FRL 60/60/60
- ALL STORE ROOMS TO BE FIRE SEPARATED FRL 60/60/60
- EACH ACCOMMODATION ROOM TO BE FIRE SEPARATED FRL 60/60/60 BETWEEN EACH ROOM
- BLOCK A, B & C ARE COMBINED AS ONE FIRE COMPARTMENT
- BLOCK D & E ARE COMBINED AS ONE FIRE COMPARTMENT
- BLOCK F IS A SEPARATE FIRE COMPARTMENT
- BLOCK G IS A SEPARATE FIRE COMPARTMENT
- BLOCK H IS A SEPARATE FIRE COMPARTMENT

Issue

No.	Date	Description	Chkd
1	23/03/2021	DRAFT SCHEMATIC	SJF

Architect
NBRSARCHITECTURE.
Sydney
61 2 9922 2344 nbrsarchitecture.com

Nominated Architect:
Andrew Duffin NSW 5602

NBRS & Partners Pty Ltd VIC 51197 ABN 16 002 247 565

Project

Centre of Excellence in Agricultural Education

at
HAWKESBURY

for
DEPARTMENT OF EDUCATION

Drawing Title

Fire Compartments

Date 24/03/2021 8:48:48 AM
Scale As indicated @ A1

Drawing Reference 20417-NBRS-A-SD-0108
Revision 1

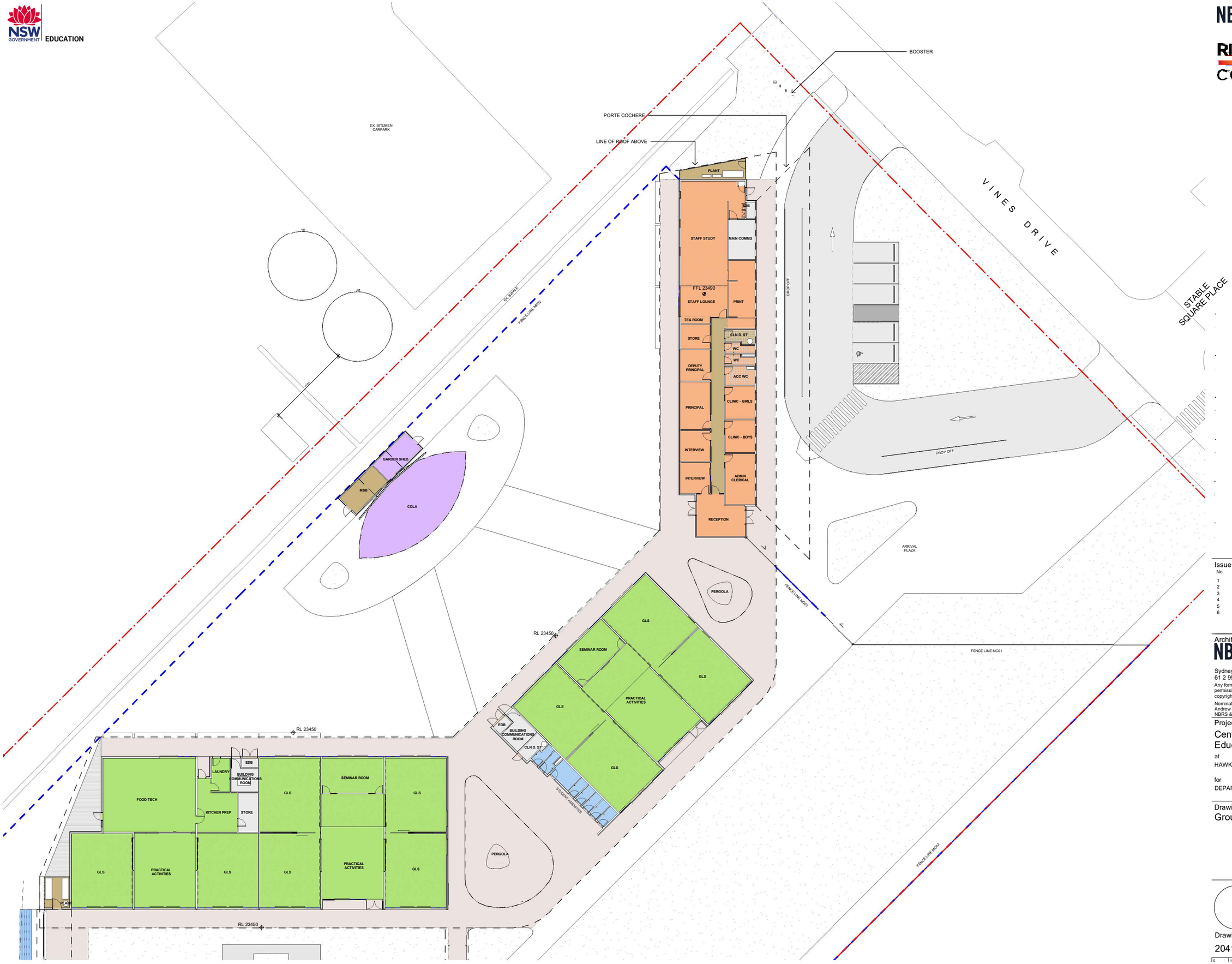
0 10 20 30 40 50 60 70 80 90 100

NSW GOVERNMENT | EDUCATION

NBRSARCHITECTURE.

RICHARD CROOKES CONSTRUCTIONS

PRELIMINARY



DRAWING CONTINUES IN PAGE-1012

Issue

No.	Date	Description	Chkd
1	05/02/2021	DRAFT CONCEPT	SJF
2	17/02/2021	CONCEPT DESIGN	SJF
3	26/02/2021	CONCEPT DESIGN	SJF
4	25/01/2021	PRELIMINARY	
5	04/03/2021	CONCEPT DESIGN	SJF
6	23/03/2021	DRAFT SCHEMATIC	SJF

Architect

NBRSARCHITECTURE.
Sydney
61 2 9922 2344 nbrsarchitecture.com

Nominated Architect:
Andrew Duffin NSW 5602
NBRS & Partners Pty Ltd VIC 51197

ABN 16 002 247 565

Project

Centre of Excellence in Agricultural Education

at

HAWKESBURY

for

DEPARTMENT OF EDUCATION

Drawing Title

Ground Floor Plan Part 1

Date 24/03/2021 8:48:53 AM

Scale As indicated @ A1

Drawing Reference

20417-NBRS-A-SD-1000

Revision

6

0 10 20 30 40 50 60 70 80 90 100

NSW GOVERNMENT EDUCATION

NBRSARCHITECTURE.

RICHARD CROOKES CONSTRUCTIONS

- Accommodation Facilities
- Covered Walkway
- Dining Hall
- Parking Facilities
- Services
- Student Facilities
- Teaching Areas
- Well Being
- Lease Line
- Fence

PRELIMINARY

Issue

No.	Date	Description	Chkd
1	05/02/2021	DRAFT CONCEPT	SJF
2	17/02/2021	CONCEPT DESIGN	SJF
3	26/02/2021	CONCEPT DESIGN	SJF
4	25/01/2021	PRELIMINARY	
5	04/03/2021	CONCEPT DESIGN	SJF
6	23/03/2021	DRAFT SCHEMATIC	SJF

Architect
NBRSARCHITECTURE.
Sydney
61 2 9922 2344 nbrsarchitecture.com

Nominated Architect:
Andrew Duffin NSW 5602
NBRS & Partners Pty Ltd VIC 51197

ABN 16 002 247 565

Project

Centre of Excellence in Agricultural Education

at
HAWKESBURY

for
DEPARTMENT OF EDUCATION

Drawing Title

Ground Floor Plan Part 2

Date 24/03/2021 8:48:58 AM
Scale As indicated @ A1

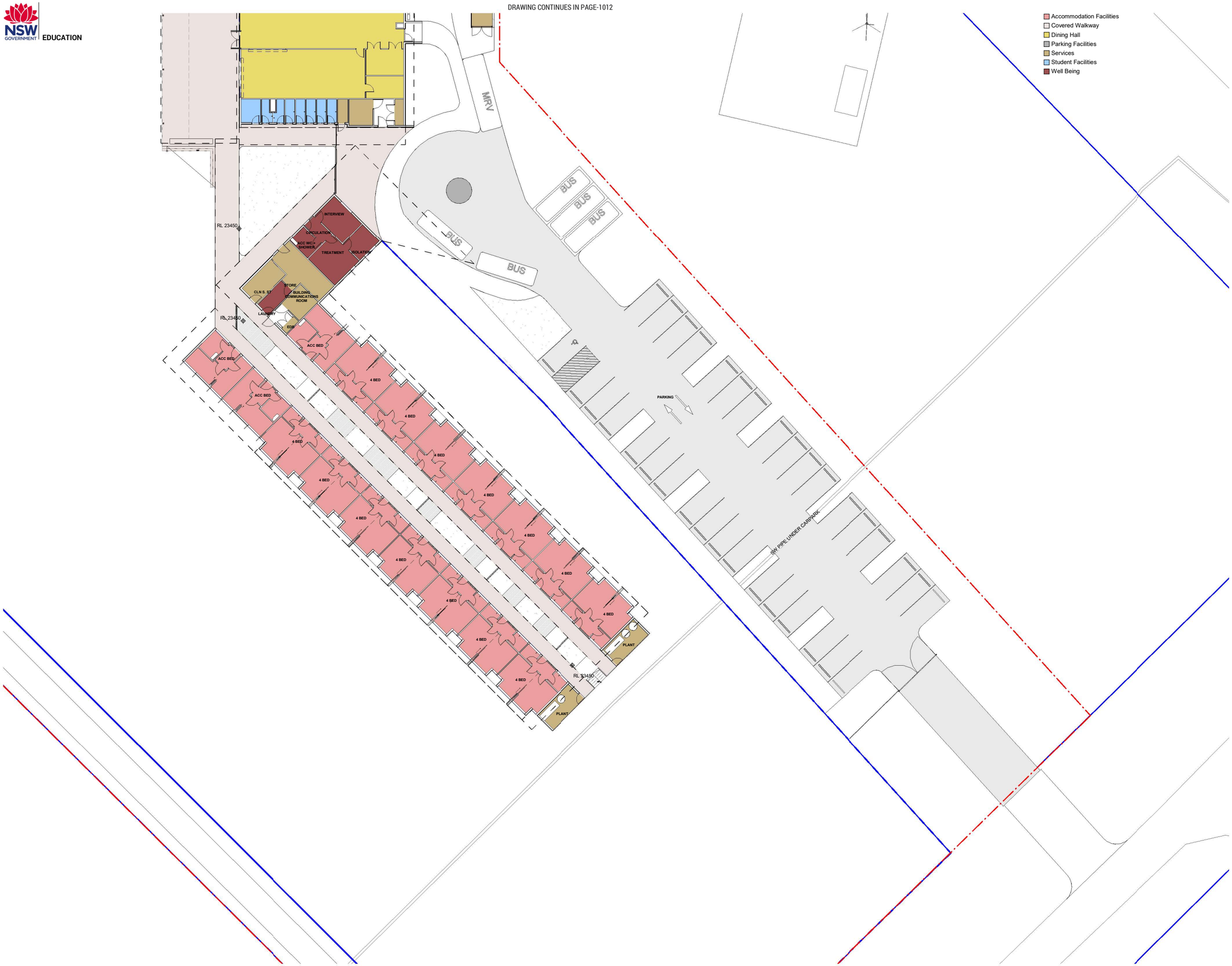
Drawing Reference
20417-NBRS-A-SD-1001

Revision
6

0 10 20 30 40 50 60 70 80 90 100

NSW GOVERNMENT EDUCATION

DRAWING CONTINUES IN PAGE-1012



- Accommodation Facilities
- Covered Walkway
- Dining Hall
- Parking Facilities
- Services
- Student Facilities
- Well Being

NBRSARCHITECTURE.

RICHARD CROOKES CONSTRUCTIONS

- Lease Line
- Fence

PRELIMINARY

Issue

No.	Date	Description	Chkd
1	05/02/2021	DRAFT CONCEPT	SJF
2	17/02/2021	CONCEPT DESIGN	SJF
3	26/02/2021	CONCEPT DESIGN	SJF
4	25/01/2021	PRELIMINARY	
5	04/03/2021	CONCEPT DESIGN	SJF
6	23/03/2021	DRAFT SCHEMATIC	SJF

Architect
NBRSARCHITECTURE.
Sydney
61 2 9922 2344 nbrsarchitecture.com

Nominated Architect:
Andrew Duffin NSW 5602
NBRS & Partners Pty Ltd VIC 51197

ABN 16 002 247 565

Project

Centre of Excellence in Agricultural Education

at
HAWKESBURY

for
DEPARTMENT OF EDUCATION

Drawing Title
Ground Floor Plan Part 3

Date 24/03/2021 8:49:02 AM
Scale As indicated @ A1

Drawing Reference
20417-NBRS-A-SD-1003

Revision
6

0 10 20 30 40 50 60 70 80 90 100

Appendix B: Western Sydney University Bushfire Mitigation Strategy

University of Western Sydney

Environment and Risk Management
CAPITAL WORKS & FACILITIES

DRAFT

Bush Fire Mitigation Strategy
Hawkesbury Campus

22nd October 2009

Overview

This draft Bush Fire Mitigation Strategy for UWS Hawkesbury Campus outlines:

- the known fire history of the Campus;
- key assets requiring bush fire protection;
- strategies relating to Bush Fire Protection Measures;
- Mapping of these zones and strategies;
- Statutory requirements for bush fire protection in NSW.

Site analysis and bushfire history

The Hawkesbury Campus covers an area of approximately 1500 ha, of which approx. 500 ha is of remnant vegetation identified as 'priority conservation lands', approx. 500 ha of agricultural and horticultural land uses, and approx. 500 ha of the built environment of the Campus. The Campus adjoins suburban housing along its north western boundaries, along with surrounding peri-urban housing and land uses to the south and east. The campus supports a broad range of teaching and research, along with hosting a range of tenant organisations.

The known bushfire history is as follows:

- 1977 "The entire area north of The Driftway was treated by Wild Fire. When the wildfire came through, the Northern side of The Driftway was lit up as a back burn, which would have been High intensity for the majority of the bushland area" (Ellem pers.comm.).

- 1996 Fire begun in a campsite on the northern edge of bush just east of Londonderry Rd creating grassfires which moved north-easterly across Yarramundi Paddocks destroying a PhD research area.

This fire history reinforced the critical risk of bushfires driven by south and south-westerly winds from the vegetation and open areas along the Driftway, and also vegetation along Rickabys Creek threatening adjoining property near the Hawkesbury Racecourse. There is also a risk from north-westerly winds and fire spreading east along Southee Rd, and associated threats from changes in wind direction and subsequent fire path through a sector driven by northwest, southwest, southerly and south-easterly winds.

The following sections outline the statutory requirements for bushfire mitigation, and preliminary bushfire protection measures underway or to be developed.

Bush fire planning and management

The following strategies are based upon strategies outlined in the following documents and associated NSW statutory requirements:

- NSW Rural Fire Service (2006) Planning for Bushfire Protection.
- NSW Rural Fire Service (2004) A guide to developing a bushfire evacuation plan.
- NSW Rural Fire Service (2006) Bushfire Environmental assessment code.

The following Bush Fire Protection Measures (RFS 2006) are used in combination and build upon a detailed site analysis:

- Asset protection zones and defendable space;
- Access standards (public roads, private access and fire trails);
- Water supply and utility services;
- Emergency management arrangements; and
- Landscaping;
- Construction standards and design.

Key aspects of the developing strategies relating to these Bush Fire Protection Measures for UWS Hawkesbury Campus are outlined below and are mapped on Figure 1. Key legislation relating to bush fire prone lands and planning consent is outlined in Appendix 1.

Key assets

Key assets on or near Hawkesbury Campus requiring protection from wildfire, grassfire, and ember attack include the following:

- Research and teaching assets, including the Climate Change and Energy Research Facility (CCERF), including Hawkesbury Forest Experiment, and proposed FACE experiment site;
- Residential and Special Fire Protection Purposes such as Anglicare aged home and UWS student villas;
- The built assets of the central campus, including heritage buildings and landscapes;
- Extensive research and teaching areas, including Dept of I&I Sydney Vegetable Demonstration Site;
- Neighbouring residential areas, including that north of Southee Rd, and north of Rickaby St adjoining Hawkesbury Racecourse.

Asset protection zones and defendable space

The draft strategy for asset protection zones and defendable space include the following aspects:

- Agricultural and paddock areas are clearly identified as Asset Protection Zones with land management practices to maintain reduced fuel load (eg slashing, grazing.);
- Areas bordering key research and teaching assets, Special Fire Management Purposes, and neighbouring residential areas, are identified as Strategic Fire Zones. These will be a focus of fuel load reduction through mechanical means and hazard reduction burns.
- Identification of a mosaic of remnant vegetation areas which can potentially have hazard reduction burns, with the timing and intensity guided by management requirements as priority conservation lands as well as asset protection.

Access standards (public roads, private access and fire trails)

Based upon a field visit on 13th October 2009 undertaken with both UWS and RFS representatives, the following strategies relating to access standards are being implemented:

- RFS locks are being placed on four access laneways to the Yarramundi Paddocks, including access from Southee Rd, Castlereagh Rd and Londonderry Rd. (Figure 2)
- Mown laneways are being mapped to provide access to RFS tankers to paddock areas. An audit of hazards such as boggy areas will be undertaken, along with the clear identification of turning circles, and gates to provide access along the perimeter of areas of remnant vegetation.
- Maintenance of internal laneway systems to ensure access, through the use of appropriate materials such as crushed sandstone with known source and purity.

Water supply and utility services

Supplementary water supplies are being identified for RFS tankers, along with the fire fighting equipment which can be mobilised as necessary. Key aspects of this strategy include identification of locations where:

- RFS tankers can draught or refill from dams of recycled water or stormwater (eg Yarramundi Dam for recycled water, Stormwater Detention Basin for stormwater);
- RFS helicopters can access water supplies without hazards associated with overhead power lines (eg Horticulture Dam for recycled water, Lindsay Dam for stormwater).
- Sprinkler systems and associated pump arrangements which have independent power supply for areas where this strategy may reduce ember attack (eg CCERF/HFE Whole Tree Chambers).
- Supporting fire fighting equipment should be located, along with associated PPE.

Emergency management arrangements

Building upon established UWS procedures for critical incident management, emergency management arrangements will be developed for:

- Strategic actions such as hazard reduction burns;
- Coordinated responses with RFS to bush fire incidents and associated communication strategies to staff and students;
- Response protocols for Special Fire Protection Purposes, such as the Anglicare aged care facility, and the UWS student residential areas.
- Clear identification of hazards associated with fire fighting, such as chemical or fuel storages, electrical services, etc.

Landscaping

Landscaping and property maintenance will be undertaken in a manner consistent with the need to protect buildings and critical assets from ember attack, flames and radiant heat, smoke and winds. Strategies include:

- Provision of recycled water through sprinklers around student residential areas, and key research areas such as the CCERF/HFE Whole Tree Chambers;
- Choice of landscaping species and materials which contribute to reduced bush fire risks, consistent with UWS Landscape Masterplan;
- Maintenance of grounds, paddocks, drainage lines and riparian zones to reduce risks of bush fire and ensure ease of access;
- Maintenance of built assets to reduce risks associated with ember attack and smoke prior to bush fire season;
- Maintenance schedules relating to bush fire protection for sprinkler systems and associated infrastructure.

Construction standards and design

Application of appropriate standards to building and refurbishment, including those relating to heritage items.

To be developed further

APPENDIX 1

Legislation relating to bush fire and development

Key legislation relating to bushfire planning outlined in Appendix 1 by RFS (2006) includes:

Environmental Planning and Assessment Act 1979

- *Section 79BA Consultation and development consent – certain bush fire prone land*: development must conform with NSW RFS (2001) Planning for Bushfire Protection, or consent authority must consult Commissioner of NSW RFS;

- *Section 146 Bushfire prone land*: have areas designated in bush fire risk management plan, mapped by Council and available for public.

Rural Fires Act 1997

- *Section 100B – Bush Fire Safety Authority:* issued for bush fire prone land for residential, rural residential uses, or special fire protection purposes authorising development in relation to compliance with standards.
- "Special fire protection purpose" includes schools and housing for older people.

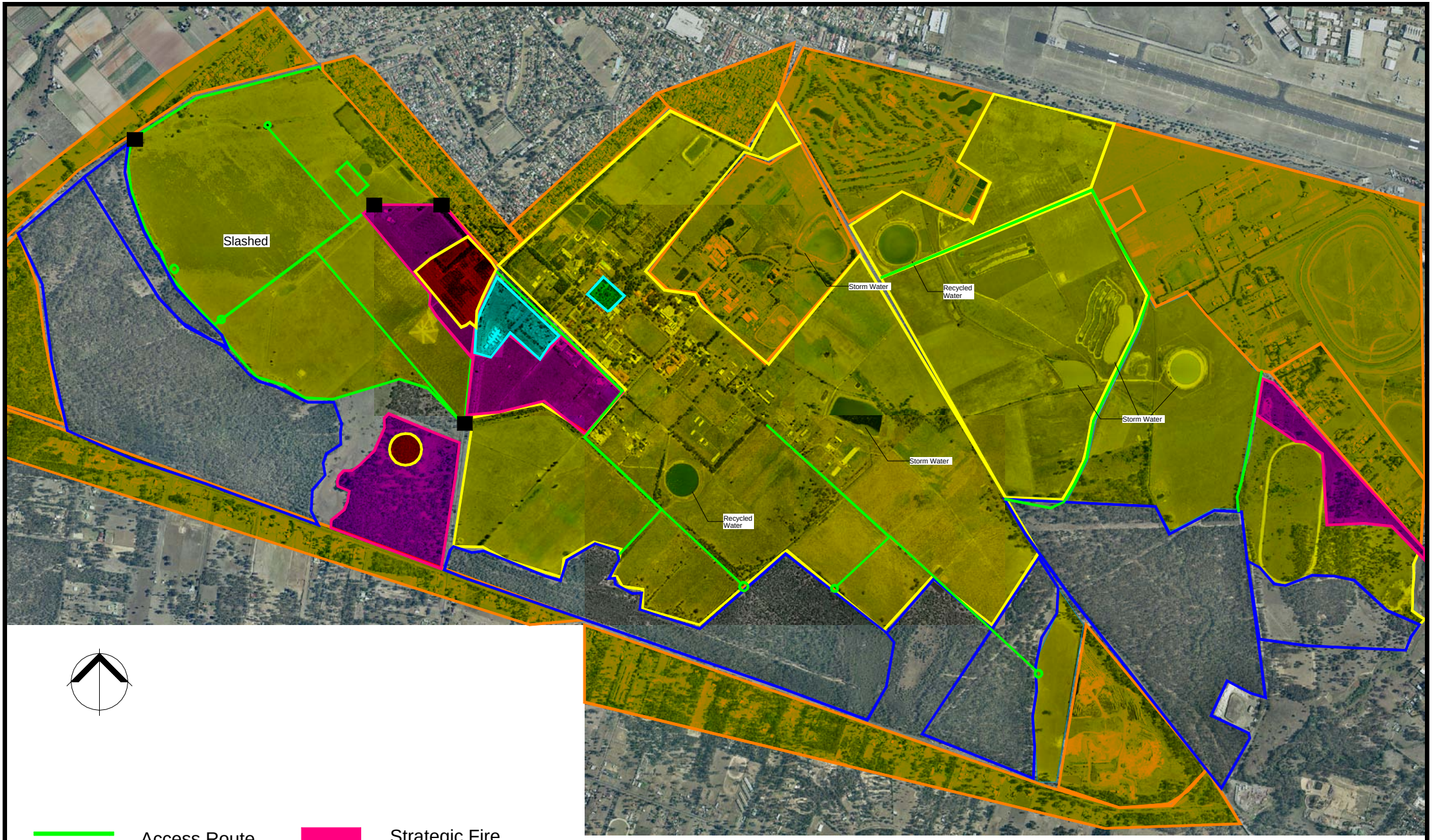
EP&A Regulation 11

- *Schedule 4 - Bush Fire Prone Land*: requires statement regarding bush fire prone lands in a planning certificate.

Rural Fires Regulation 2002

- *Clause 46 – Application for bush fire safety authority:* Under section 100B of Rural Fires Act, application must include:
    - Description and address of property;
    - Classification of vegetation on and around property;
    - Assessment of slope;
    - Identification of significant environmental features;
    -

To be developed further.



Access Route

Turning Point

Mosiac Burns

4HB5 Fire Locks

Strategic Fire Zones

Special Protection Fire Zones

Critical Asset Protection Zones

Neighbouring Assets

Note

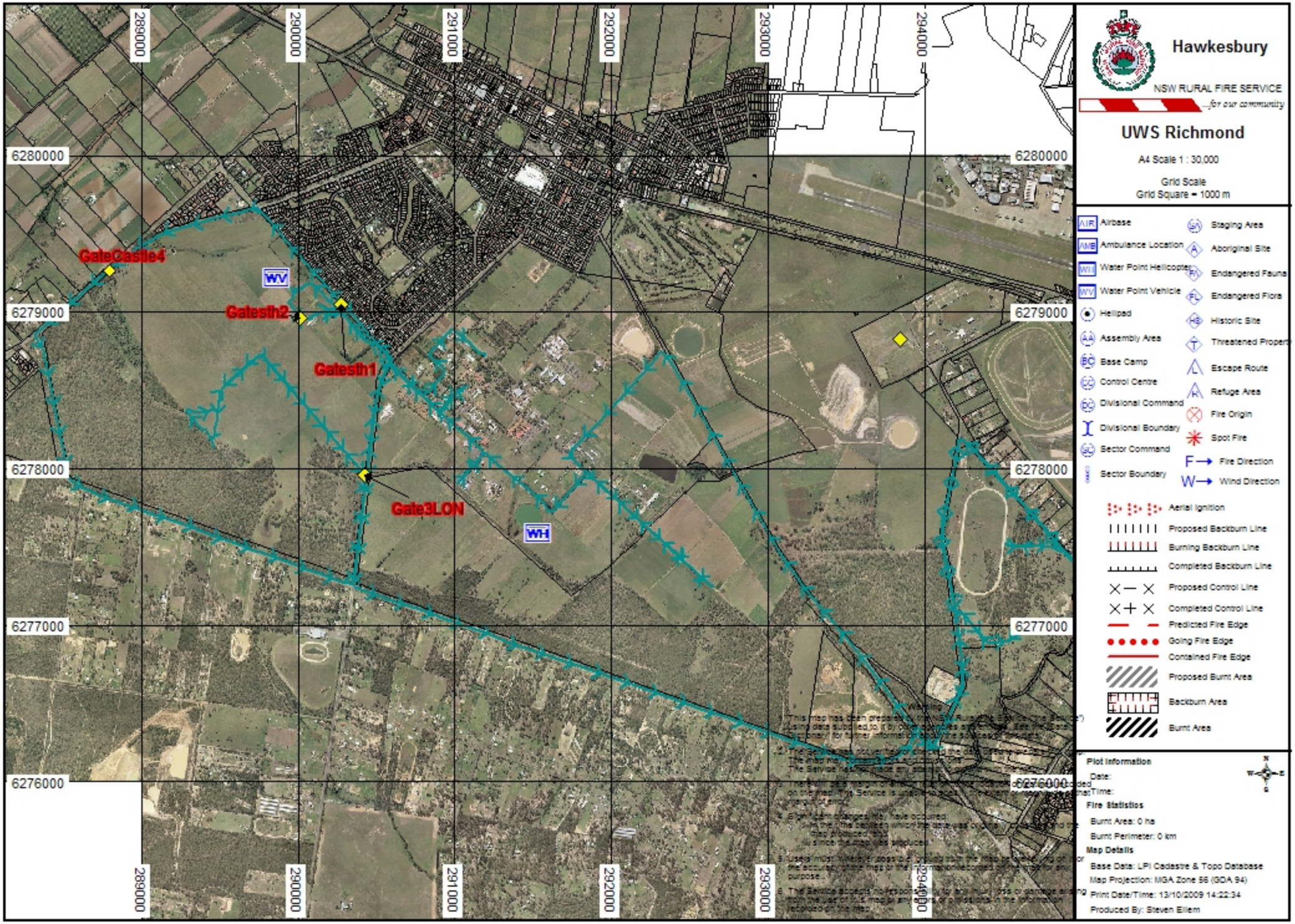
UWS does not accept responsibilityfor the accuracy of this drawing

Please report any discrepancies to Capital Works and Facilities - (02) 9678 7020

University of Western Sydney

Campus: Hawkesbury		Level/Floor: N/A		Scale: 1:17000
Title: Fire Management		Created By: LA	Modified By: N/A	Approved By: N/A
Drawing Reference: N/A	Building Name: N/A	Date Created: 21/10/09	Date Modified: 22/10/09	Revision No: N/A

Date Printed: 22/10/09



Hawkesbury

NSW RURAL FIRE SERVICE

...for our community

UWS Richmond

A4 Scale 1 : 30,000

Grid Scale
Grid Square = 1000 m

- Airbase
- Ambulance Location
- Water Point Helicopter
- Water Point Vehicle
- Helipad
- Assembly Area
- Base Camp
- Control Centre
- Divisional Command
- Divisional Boundary
- Sector Command
- Sector Boundary
- Staging Area
- Aboriginal Site
- Endangered Fauna
- Endangered Flora
- Historic Site
- Threatened Property
- Escape Route
- Refuge Area
- Fire Origin
- Spot Fire
- Fire Direction
- Wind Direction
- Aerial Ignition
- Proposed Backburn Line
- Burning Backburn Line
- Completed Backburn Line
- Proposed Control Line
- Completed Control Line
- Predicted Fire Edge
- Going Fire Edge
- Contained Fire Edge
- Proposed Burnt Area
- Backburn Area
- Burnt Area

Plot Information

Date:

Time:

Fire Statistics

Burnt Area: 0 ha

Burnt Perimeter: 0 km

Map Details

Base Data: LPI Cadastre & Topo Database

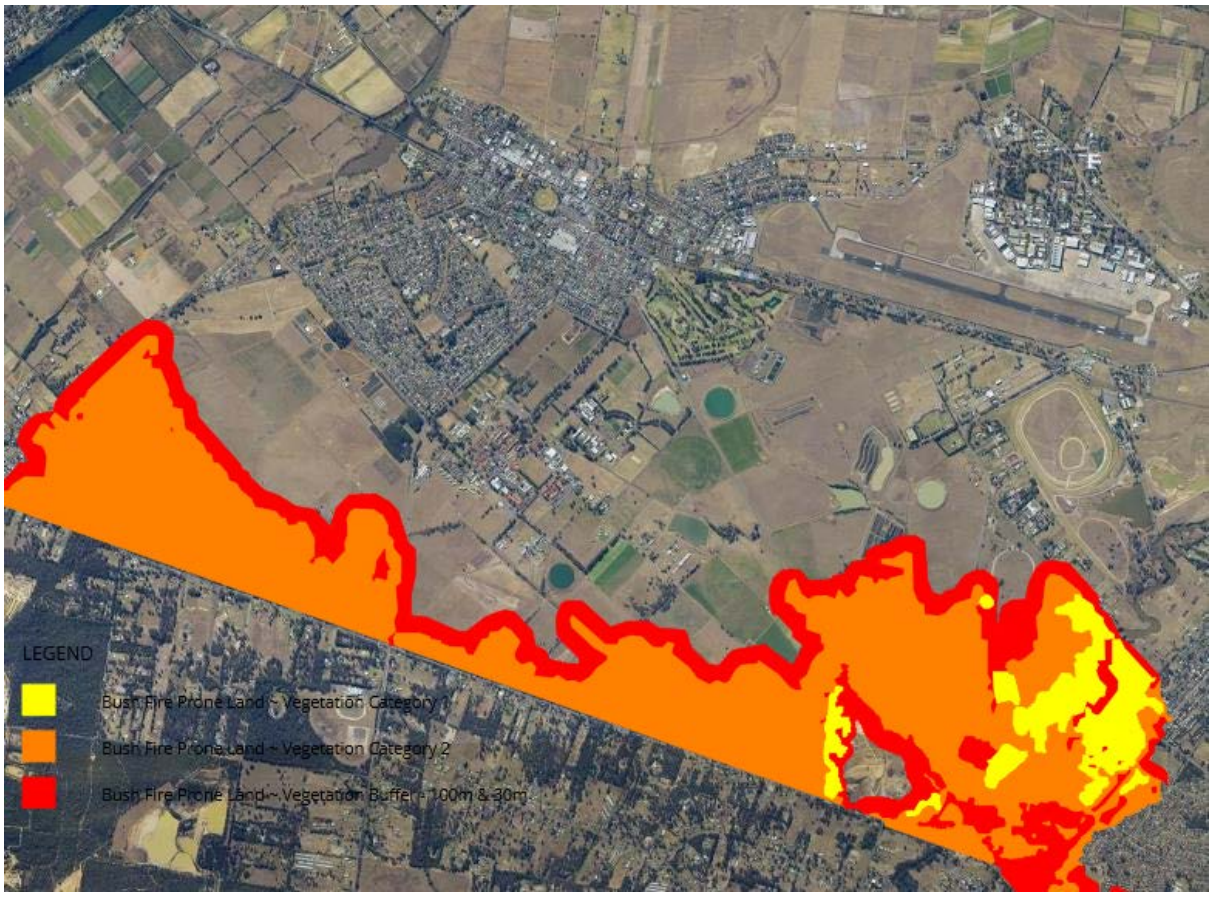
Map Projection: MGA Zone 56 (GDA 94)

Print Date/Time: 13/10/2009 14:22:34

Produced By: Steven Ellem

Draft Bushfire Management Plan: Hawkesbury campus

This Bushfire Management Plan outlines the Standard Operating Procedures (SOPs) and supporting information for the Hawkesbury Bushfire Unit relating to Preparedness and, Incident Responses, and potential Recovery needs on the Hawkesbury campus.



Map 1: Fire zones of the Hawkesbury campus.

1. Preparedness for bushfire risk

Key aspects of Preparedness for bushfire risk include:

- Accredited training of the Bushfire Unit (BFU)
- Provision of RFS standard PPE and equipment
- Seasonal land management of control lines and access
- Maintenance of EucFACE drenching system
- Planned Hazard Reduction burns in collaboration with RFS
- Escalation of preparedness and bushfire risk rating (SOP 1)
- BFU training relating to Incident Response SOPs

1.1 Accredited training of the Bushfire Unit (BFU)

The Hawkesbury Bushfire Unit comprises staff from Technical Services associated with the HIE outdoor research facilities, Office of Estate and Commercial, and Campus Safety and Security. A number of BFU members have completed training to at least BF Bushfire Fighter) level through in-house training by RFS or through involvement in other RFS brigades. This ensures that any BFU member actively involved in incident responses has training to standards associated with national accreditation. Members who do not have BF accreditation are still supplied with PPE and participate in campus-based training activities, but in the case of incident responses only provide support roles.

1.2 Provision of RFS standard PPE and equipment

In establishing the BFU, the RFS provided contact details for suppliers of standard RFS Personal Protective Equipment (PPE), radios, and firefighting vehicles. All BFU members are supplied with a PPE kit including fire- fighting jacket, pant, boots, gloves, helmet, and goggles. This PPE is maintained on-site by BFU members and is used in training and live firefighting associated with hazard reduction burns and incident responses. Along with this PPE, the Bushfire Unit has the following equipment, with training exercises reinforcing familiarity in use of this equipment.

- Radios, both HIE / Security standard and RFS fire ground radios
- A CAT 9 Toyota Landcruiser firefighting vehicle
- Associated trailer-based firefighting pump and water tank, and other sundry equipment.

Communications is a critical aspect of both everyday access to research and remote areas of the campus. EucFACE protocols for sign in and carrying hand held VHF(?) radios whenever on-site are followed and extended to broader BFU access. Radios held by Tech Services staff at the EucFACE site, OEC and Security all have HIE, Security and Fire channels. RFS band ‘fire ground’ radios are also used, along with an emergency services radio (PMF ?) in the Cat 9 vehicle. In case of preparedness BFU staff also use text messages in a “Whats App” Group. In incident responses texts are preferred to mobile phone calls.

The CAT 9 firefighting unit seats 2, and has firefighting hose reel and associated equipment. This is maintained in readiness in the lead up to fire season, and is used in monthly and fortnightly training sessions of the BFU. During RFS coordinated hazard reduction burns this vehicle is included in the RFS sector resources, along with having been used for both minor and major live fire responses. Other equipment maintained in readiness during training exercise includes trailer mounted small firefighting hose reel, a diesel refueler, and assorted handheld equipment.

INSERT PICTURE BFU members in PPE with CAT 9

1.3 Seasonal land management of control lines and access

In the lead up into fire season, control lines, buffer zones, and access requirements are maintained, as outlined for the:

- Western sector comprising EucFACE and bushland bounded by The Driftway, Londonderry Rd, Catlereagh Rd and Southee Rdsxd (Map 2)
- Eastern sector of bushland bounded by Londonderry Rd, The Driftway, The Hawkesbury tip site and the main campus and Hawkesbury farm (Map 3).
- Northern sector comprising bushland on either side of Racecourse Rd and bounded by Blacktown Rd, Rickabys Creek and Rickaby St (Map 4).

Control lines are maintained around the EucFACE perimeter, to the west of EucFACE with access from The Driftway and paddock laneways, and a control line through the bushland adjacent to The Driftway from near Londonderry Rd to the Hawkesbury Tip site. Maintenance of slashed or mulched buffer zones are coordinated between grounds contractors, farm staff and EucFACE Tech Services team to ensure coverage for buffers adjacent to bushlands, roadways, laneways and critical assets. Access points, hydrants and other key resources for visiting RFS crews are also mapped for each area.

1.4 Maintenance of EucFACE drenching system

The EucFACE research site has a drenching system along its western and southern boundary, and around the ring structures. The design is to provide a perimeter wet line for approaching grass fire and ember attack particularly from west, northwest and southwest. This perimeter system is used often when conditions deteriorate. The drenching components around the rings are designed for direct ember attack around the research rings, seeking to reduce the run of fire driven by winds. This component is a controlled application for only critical circumstances.

This drenching system is supplied by pumps, pipelines and tanks, with both potable water for testing, and recycled water from Horticulture Dam, with a series of diesel powered pumps with controls from the EucFACE site or by mobile phone. This is maintained throughout the year with additional checks coming into fire season, with storage levels maintained in Horticulture Dam in case required. There are also firehose reels at each ring shed.

1.5 Planned Hazard Reduction burns in collaboration with RFS

To date, two hazard reduction burns have been undertaken with broader RFS support; one in 2015 around the EucFACE site and west of the adjacent wetland (Figure 1), and in 2019 for the bushland adjacent to The Driftway from the Tip site in the east to Londonderry Rd in the west (Figure Y). Continuing planning with RFS for hazard reduction across other areas of bushland will occur.

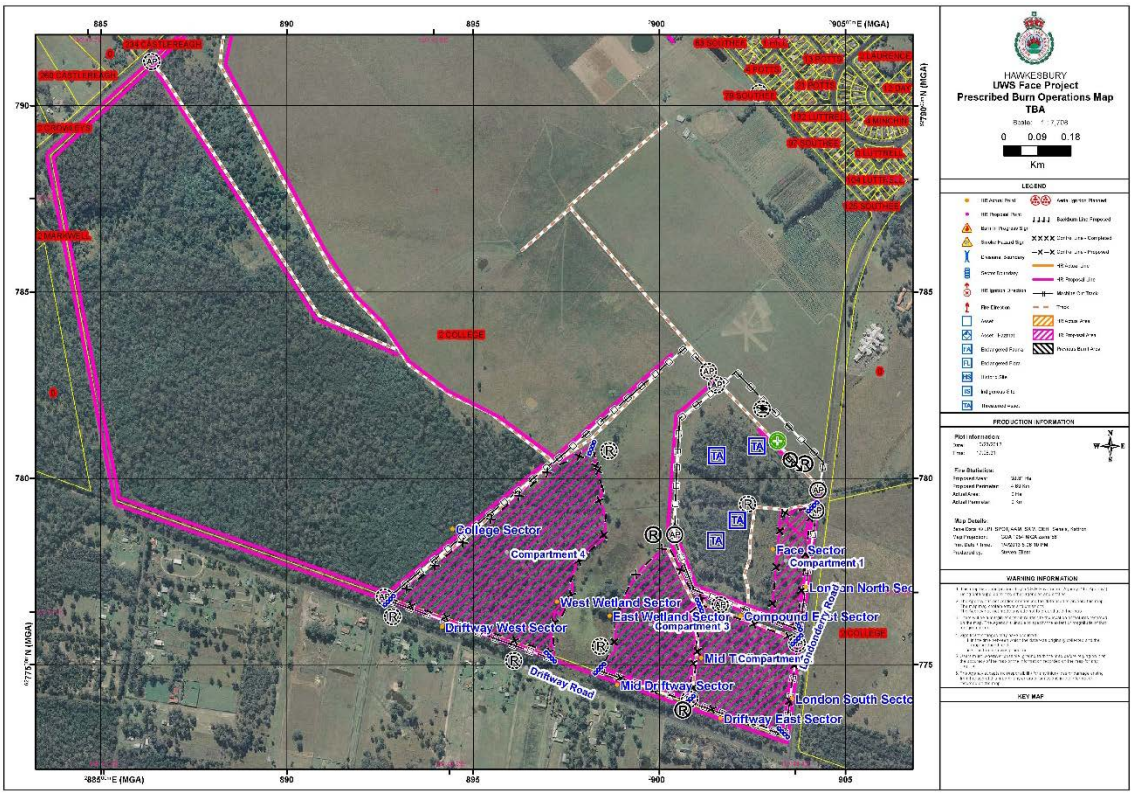


Figure 1: Hazard Reduction burn in Western Sector – 2015

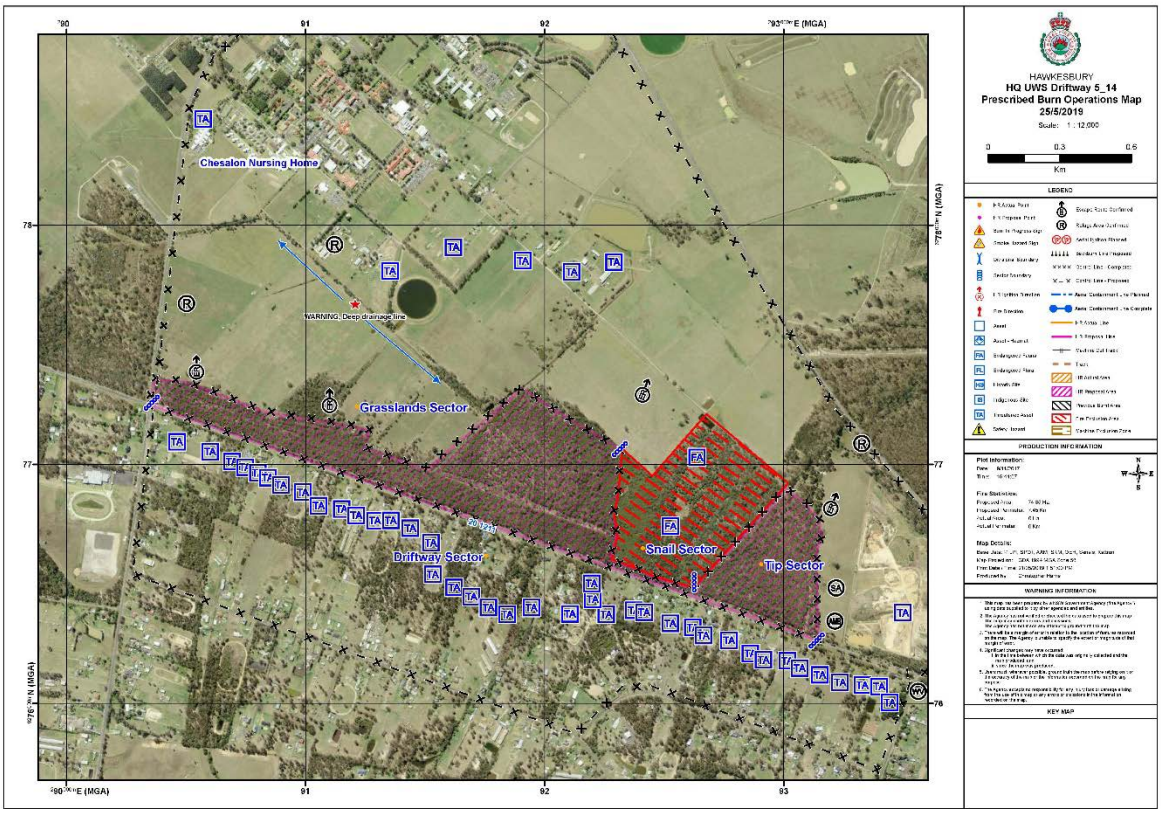


Figure 2: Hazard Reduction Burn in Eastern Sector - 2019

2. Escalation of preparedness and bushfire risk rating (SOP 1)

A fundamental risk management tool (SOP 1) is the escalation of preparedness by the BFU in response to the daily bushfire risk rating from the RFS (Table 1). Increasing levels of preparedness hit a critical point when Total Fire Ban (TOBAN) is announced, with subsequent restrictions on activities across the campus, and communication to all staff by Campus Safety and Security. Requirements for contractors is specified in the OEC Contractor Induction System, and TOBAN triggers restricted access by contractors.

TABLE 1. SOP 1 – Escalation of preparedness and bushfire risk rating.

Bush Fire Risk	Conditions	Response	Call out / communication
Low to High	General fire season	*Readiness* • Test and check pumps • BFU weekly training / readiness	• Establish call out procedures • Communicate with lessees • Remote access for staff / students
V. high - Severe	High temperatures, low humidity, strong winds Total Fire ban	*Alert* • Trailer at EucFACE site • Security scans • BFU availability and roster	• Email / text alert to BFU members • Restricted access to bushlands
Fires in area	Fires in area Fires upwind	*Standby* • Security scans increase • Security open key access ways • BFU on roster at EucFACE • Perimeter drench • Farm animals in safe refuges	• Email / text alert to BFU members • Comms to RFS
Fire on ground	Ember attack Fire on ground (roadside) Grass fire Bush fire	*1st response* • BFU response • Hand reels at rings • Drench perimeter / rings • Handover to RFS/F&R	• BFU on site with radios / buddy system • Comms and logistics support • Escalation for drenching rings
Emergency	Campus wide response	*Critical incident response* • Roles for BFU	• Follow security protocols

3. BFU training relating to Incident Response SOPs

Training and incident response scenarios are reflected in the established SOPs for:

- Communication protocols and first response (SOP 2)
- Scenarios for grassfire and ember attack scenarios at EucFACE (SOPs 3)

BFU training is reduced to limited equipment maintenance during winter, and then increases in frequency to once monthly before fire season, and fortnightly in the months at the end of the year when bushfire risk is at its highest. Workloads at the end of calendar and financial years do impact upon member's availability, though all core members try their best to give this important role the time it deserves.

Western Sydney University Hawkesbury Bushfire Unit
Standard Operating Procedures – Communication Protocols

SOP No: 02 – Communication Protocols

PURPOSE: Procedure for communicating within the fire unit

OBJECTIVE: Bushfire risk and readiness use of radios and operation of drenching system

EQUIPMENT: Mobile phones, Motorola DP4801 radios.

PERSONNEL: Bushfire Unit members (BFU), Senior staff from HIE, OEC and Campus Safety and Security.

TO BE READ INCONJUNCTION WITH:

- SOP 1 – Bushfire Risk and Escalation
- SOP 4 - Operation drenching system for EucFACE research rings

PROCEDURES:

- *Readiness/escalation and fire risk*
    1. Text to BFU and senior staff as fire escalates (refer SOP 1 – Bushfire Risk and Escalation).
    2. Messaging and BFU access through 'WhatsApp'.
- *Incident control and escalation*
    1. First on site is incident controller (IC), passes to senior staff thence RFS.
    2. Perimeter drenching system run by IC or designated personnel.
- *First response and radios*
    1. Radios collected from Campus Safety and Security, Hawkesbury Forest Experiment or EucFace site office are brought on site by First Responders.
    2. All BFU members and vehicles to have radios, tuned to the Fire Channel.
    3. BFU members located within the ring sites and in remote areas to confirm actions with IC by radio.
- *Drenching system operation – Perimeter only*
    1. Manual run and stop by control panel in Y8.
        - Buttons for Perimeter Pump Ready
        - Toggle "Perimeter North" / "Perimeter South" for start at north/south
        - Press MAN to run
        - Press OFF to stop
    2. Run from mobile phone (AUTO on control panel)
        - Text to 0419241581.
    3. "Perimeter north start" / "Perimeter south start" –NB case sensitive (runs 20 minute 2 cycles)
        -
        - The controller will respond with the following message - "Perimeter pump run"
        - Text back with the text "Ok"
        - Controller will respond "Ok"
    4. **NB Ring drenching system operation restricted (SOP 4 – Operation drenching system for EucFACE research rings).**

DATE OF RELEASE: Revised November 2020

REVIEW AND DISTRIBUTION:

- To be reviewed November 2025
- TRIM file: TBA

AUTHORS AND AUTHORISATION:

- Roger Attwater, Senior Manager Environmental Sustainability

Western Sydney University Hawkesbury Bushfire Unit
Standard Operating Procedures – Ember Attack

SOP No: 03 – Ember Attack at the EucFACE Site

PURPOSE: Procedure for first response to ember attack at the EucFACE site

OBJECTIVE: Protection of critical research from fire attack

EQUIPMENT: Full general PPE.

PERSONNEL: Bushfire Unit members (BFU), Senior staff from HIE, OEC and Campus Safety and Security.

TO BE READ INCONJUNCTION WITH:

- SOP 1 – Bushfire Risk and Escalation
- SOP 2 – Communication Protocol
- SOP 4 - Operation drenching system for EucFACE research rings

PROCEDURES:

- *Readiness*
    1. Escalation of readiness and gate access (refer SOP 1 – Bushfire Risk and Escalation).
- *First on site and Incident Control escalation*
    1. First on site is incident controller (IC), passes to senior staff thence RFS.
    2. Perimeter drenching system run by IC or designated personnel.
    3. Monitoring ring drenching approval only designated (refer to SOP 4 – Operation drenching system for EucFACE research rings).
    4. Handover to RFS or further actions as per IC directions

- *Communications*
    1. All personnel to use radios from EucFACE or Security (SOP 2 – Communication Protocol).
    2. IC oversees from pump control site and patrols with vehicle & trailer.
    3. Logistics / communications support at EucFACE to liaise with Campus Safety & Security.

- *Personnel in EucFACE site*
    1. Buddy System for personnel monitoring rings.
    2. Personnel at rings
        - Maintain buddy system in adjacent rings.
        - Maintain radio communications at all times (refer SOP 2 – Communication Protocol)
        - Utilise hoses on hand reels to respond to ember attack
    3. Personnel at gates and control lines as per IC directions

- *Evacuation or refuge response*
    1. Evacuation or refuge if escalation as per IC directions

DATE OF RELEASE: Revised November 2020

REVIEW AND DISTRIBUTION:

- To be reviewed November 2025
- TRIM file: TBA

AUTHORS AND AUTHORISATION:

- Roger Attwater, Senior Manager Environmental Sustainability

4. Incident Responses

To date, two live fire responses have occurred. A major incident in ???? occurred when branches falling onto high voltage wires on Castlereagh Rd, leading to a fire driven into the bushland adjacent to Castlereagh Rd and The Driftway by strong westerly winds. A major RFS response followed and southerly wind change enable back burning off a new control line to contain the fire. Another small grassfire in paddock during slashing occurred, which was controlled with the CAT 9 firefighting equipment.

In both these situations, rapid response by BFU members occurred due to the escalation of preparedness and equipment and vehicles being on standby.

5. Incident Recovery

To date, there have been no incidents causing significant injury, or damage to campus or research assets. Thankfully the dire circumstances across the State and the Blue Mountains in 2019-2020 did not affect the campus.

In all live fire and hazard reduction activities, a debriefing is undertaken with BFU members to address issues and concerns raised, and to identify areas of improvement.

A significant area of current concern is the much reduced membership of the BFU following a number of years of organisational and staff changes resulting in the loss of available trained and experienced members.

Appendix C: AHIMS Search Results

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : 2107 CoE

Client Service ID : 583115

Stuart Greville

21 Costata Crescent
Adamstown New South Wales 2289

Attention: Stuart Greville

Email: sgreville@bigpond.com

Date: 14 April 2021

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -33.6212, 150.7395 - Lat, Long To : -33.6122, 150.7538 with a Buffer of 50 meters, conducted by Stuart Greville on 14 April 2021.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

2	**Aboriginal sites are recorded in or near the above location.**
0	**Aboriginal places have been declared in or near the above location. ***

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

3 Marist Place, Parramatta NSW 2150
Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

Appendix D: Planning for Bushfire Protection 2019 – Compliance Table

Table 1: Aims and Objectives of Planning for Bushfire Protection 2019

Objectives	Satisfied	Comment
➢ Afford buildings and their occupants protection from exposure to a bush fire	✓	It is unlikely that any occupants of the proposed CoE will be directly exposed to a prolonged bushfire attack as the entire lease area and surrounding campus is managed as an APZ. Notwithstanding, the only hazardous vegetation in the vicinity of the proposed development is either a poorly managed grassland or is greater than 500m from the site.
➢ Provide for a defendable space to be located around buildings	✓	The proposed CoE is provided with an APZ a minimum of 50m from all buildings.
➢ Provide appropriate separation between a hazard and buildings, which, in combination with other measures, prevent the likely fire spread to buildings	✓	All buildings to be used for teaching purposed or accommodation is provided with a 50m separation from the nearest potential hazard. Notwithstanding, the Bushfire Strategy for the UWS campus identifies all land within a minimum 100m of the lease area is managed as an APZ.
➢ Ensure that safe operational access and egress for emergency service personnel and residents is available	✓	The proposed development; incorporating multiple buildings is provided with 2 separate entry/ access points; being a separate entrance and driveway for the school and a second, exclusive access road for the campus accommodation.
➢ Provide for ongoing management and maintenance of BPMs	✓	All vegetation and APZs within the lease will be managed and maintained by the CoE maintenance team.
➢ Ensure that utility services are adequate to meet the needs of firefighters	✓	The proposed CoE and associated works includes all essential utility services to meet the needs of firefighters; including a reliable water supply.

Table 2: Performance Criteria and Acceptable Solutions for SFPP Developments (Chapter 6 PBP 2019)

Intent of Measure	Performance Criteria	Acceptable Solution	Complies	Comment
6.8.1 ASSET PROTECTION ZONES Table 6.8a To provide suitable building design, construction and sufficient space to ensure that radiant heat levels at buildings does not exceed critical limits for firefighters and other emergency services personnel undertaking operations, including supporting or evacuating occupants.	Radiant heat levels of greater than 10kW/m^2 (1200K) are not experienced at any part of the building.	The building is provided with an APZ in accordance with Table A1.12.1. in Appendix 1.	✓	The proposed CoE; including all buildings used for teaching and the separate accommodation are provided with a minimum guaranteed 50m APZ. Notwithstanding, the WSU Bushfire Mitigation Strategy identifies all land within at least 100m of the lease area to be a Critical Asset Protection Zone.
	APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is negated.	The APZ is not located on lands with a slope exceeding 18°	✓	All APZs are located on land with slopes 2° or less.
	APZs are managed and maintained to prevent the spread of a fire towards the building. The APZ is provided in perpetuity.	The APZ is managed in accordance with the requirements of Appendix 4 of PBP 2019 and is wholly within the boundaries of the development site.	✓	There are no exceptional circumstances that would require an APZ to be located external to the development site.
		Mechanisms are in place to provide for the maintenance of the APZ over the life of the development.	✓	The manager of the property will be responsible to maintain the recommended APZs.
		Other structures located within the APZ need to be located further than 6m from the refuge building.	✓	Any ancillary structures to the CoE (eg. Buildings G and H) will be greater than 6m from the primary structure.
LANDSCAPING	Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions.	Landscaping is in accordance with APZ standards (see Appendix 4). Fencing is constructed in accordance with section 7.6.	✓ **N/A**	The project Landscape Architects have been provided with the RFS guidelines for landscaping. Accordingly, all proposed landscaping has been designed in accordance with PBP 2019 requirements for landscaping and the APZ standards. No new fences will be constructed in the immediate vicinity of the proposed CoE.
CONSTRUCTION	The proposed building can withstand bush fire attack in the form of wind, smoke, embers, radiant heat and flame contact.	A construction level of BAL-12.5 under AS3959 or NASH and Table 6.8a is applied	✓	The proposed CoE is sited greater than 50m from the nearest potential grassland hazard. Furthermore, there are no other identified bushfire hazardous vegetation within 100m of the CoE. Accordingly A BAL-LOW rating applies to all

Intent of Measure	Performance Criteria	Acceptable Solution	Complies	Comment
				buildings as there is insufficient risk to warrant specific bushfire construction requirements.
6.8.2 **ACCESS** **Table 6.8b** To provide safe operational access for emergency services personnel in suppressing a bush fire, while residents are accessing or egressing an area. **FIREFIGHTING VEHICLES**	Firefighting vehicles are provided with safe all weather access to structures and hazard vegetation.	SFPP access roads are two-wheel drive, all-weather roads	✓	A new internal network of roads will be constructed throughout the site.
		Access is provided to all structures and hazard vegetation.	✓	
		Traffic management devices are constructed to not prohibit access by emergency services vehicles.	✓	
		Access roads must provide suitable turning areas in accordance with Appendix 3.	✓	
ACCESS ROAD CAPACITY	The capacity of access roads is adequate for firefighting vehicles.	The capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges and causeways are to clearly indicate load rating.	✓	All new roads will have sufficient capacity to carry fully loaded fire fighting vehicles.
ACCESS TO WATER	There is appropriate access to water supply.	Hydrants ae located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression.	✓	A new water supply main will be located within the defendable space and multiple hydrants will be located directly to the north of the proposed CoE.
		Hydrants are provided in accordance with AS2419.1:2005	✓	
		There is suitable access for Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	✓	
PERIMETER ROADS	Perimeter access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while occupants are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface.	There are two-way sealed roads.	✓	The new internal road network; whilst not strictly perimeter roads, provide wide and open road carriageways.
		8m carriageway width kerb to kerb.	✓	
		Hydrants are to be located clear of parking areas.	✓	
		There are through roads, and these are linked to the internal road system at an interval of no greater than 500m.	✓	
		Curves of roads have a minimum inner radius of 6m.	✓	

Intent of Measure	Performance Criteria	Acceptable Solution	Complies	Comment
		The maximum grade road is 15° and average grade is 10°.	✓	
		The road crossfall does not exceed 3°.	✓	
		A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; and	✓	
NON-PERIMETER ROADS	Non-perimeter access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while occupants are evacuating.	Minimum 5.5m width kerb to kerb.	✓	The new roads may be considered non-perimeter roads as they do not adjoin a property boundary (perimeter), however they are designed in accordance with PBP 2019.
		Parking is provided outside of the carriageway.	✓	
		Hydrants are to be located clear of parking areas.	✓	
		There are through roads, and these are linked to the internal road system at an interval of no greater than 500m.	✓	
		Curves of roads have a minimum inner radius of 6m.	✓	
		The maximum grade road is 15° and average grade is 10°.	✓	
		The road crossfall does not exceed 3°.	✓	
		A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; and	✓	
6.8.3 SERVICES Table 6.8c To provide adequate services for water for the protection of buildings during and after the passage of a bushfire, and not to locate gas and electricity so as not to contribute to the risk of fire to a building. **WATER**	A water supply is provided for firefighting purposes	Reticulated water is to be provided to the development, where available	✓	A reticulated water supply is provided.
		A static water supply is provided where no reticulated water is available	**N/A**	
	Water supplies are located at regular intervals The water supply is accessible and reliable for firefighting operations	Fire hydrant spacing, design and sizing comply with AS2419.1:2005;	✓	A series of fire hydrants will be located around the various buildings that comprise the proposed CoE.
		Hydrants are not located within any road carriageway;	✓	
		Reticulated water supply to SFPPs uses a ring main system for areas with perimeter roads.	**N/A**	The existing water supply ring main will be augmented to include the proposed CoE.

Intent of Measure	Performance Criteria	Acceptable Solution	Complies	Comment
	Flows and pressures are appropriate	Fire hydrant flows and pressures comply with AS2419.1:2005.	✓	
	The integrity of the water supply is maintained	All above ground water service pipes are metal, including and up to any taps.	**N/A**	
ELECTRICITY	Location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of buildings.	Where practicable, electrical transmission lines are underground.	✓	An existing underground electricity service is provided to the site.
		Where overhead electrical transmission lines are proposed as follows: - lines are installed with short pole spacing (30 metres), unless crossing gullies, gorges or riparian areas; and - no part of a tree is closer to a power line than the distance set out in accordance with the specifications in ISSC3 Guideline for Managing Vegetation Near Power Lines	**N/A**	
GAS	Location of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	Reticulated or bottled gas is installed and maintained in accordance with AS 1596:2014 and the requirements of relevant authorities, metal piping is to be used.	✓ **Able to comply**	
		All fixed gas cylinders are kept clear of all flammable materials to a distance of 10 metres and shielded on the hazard side;	✓	All tanked gas stored on site will be sited and secured with appropriate shielded from the bushfire hazard.
		Connections to and from gas cylinders are metal:	✓	
		Polymer-sheathed flexible gas supply lines are not used; and	✓	
		Above-ground gas service pipes are metal, including and up to any outlets.	✓	

Intent of Measure	Performance Criteria	Acceptable Solution	Complies	Comment
6.8.4 EMERGENCY MANAGEMENT PLANNING **Table 6.8d** To provide suitable emergency and evacuation arrangements for occupants of SFPP developments	A bush fire emergency and evacuation management plan is prepared.	Bush fire emergency management and evacuation plan is prepared consistent with the: ❑ the NSW RFS document: A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan; and ❑ AS3745:2010 Planning for emergencies in facilities.	✓ **Able to comply**	A Bushfire Management Plan is recommended to be prepared for the new CoE. Alternatively, the existing BMP for the UWS will need to be updated to address the new additions including the CoE and the improved road network.
		The emergency and evacuation management plan should include a mechanism for the early relocation of occupants.	✓ **Able to comply**	
	Appropriate and adequate management arrangements are established for consultation and implementation of the bush fire emergency and evacuation management plan.	An Emergency Planning Committee is established to consult with residents and staff in developing and implementing an Emergency Procedures Manual.	✓ **Able to comply**	Where required, consultation with staff and residents will be undertaken during the preparation of the Bushfire Management Plan.
		Detailed plans of all emergency assembly areas including 'on-site' and 'off-site' arrangements as started in AS3745 are clearly displayed, and an annual (as a minimum) trial emergency evacuation is conducted.	✓ **Able to comply**	