



BUSHFIRE ASSESSMENT REPORT

JOHN HUNTER HEALTH and INNOVATION PRECINCT

John Hunter Hospital

Prepared for: NSW Health Infrastructure

Bushfire Planning Australia

Ref: 1940 JHHIP
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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.

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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.




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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 by NSW Health Infrastructure (the 'Client') to undertake a Bushfire Assessment Report (BAR) for a State Significant Development Application (SSDA) for the John Hunter Health and Innovation Precinct that includes the construction and operation of a new Acute Services Building (ASB), refurbishment of the existing hospital facilities at John Hunter Hospital (JHH), construction of several new internal roads and associated site wide infrastructure; including the provision of a connecting road to the interchange of the approved Newcastle Inner City Bypass.

The existing approved use is considered a Special Fire Protection Purpose (SFPP) under Planning for Bushfire Protection 2019 (PBP 2019). The proposed ASB is located within the broader John Hunter Health Campus (JHHC) which is the largest hospital in New South Wales outside the Sydney metropolitan area.

The primary objective for development exposed to a bushfire hazard is to protect human life (including fire fighters). The BAR will demonstrate the existing and proposed facility is able to afford acceptable levels of protection to the occupants of any building/s or anyone using the facilities within the JHHC.

The predominant hazardous vegetation identified surrounding the site is consistent with a *forest* vegetation classification; specifically the Hunter Macleay Dry Sclerophyll Forest.

Based on the findings of the hazard assessment, the potential fire line intensity was calculated using the NBC Bushfire Attack Assessor V4.1. The results verified a High potential intensity bushfire hazard is located to the north of the proposed development. Furthermore, all land within 100m of the identified bushfire hazard is considered to be subject to potential bushfire attack, predominantly from airborne embers.

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 modifying less than 1 hectare of land. The buffer will be provided by an Asset Protection Zone (APZ) up to 61m from the outer elevation of the closest buildings to the vegetation. The APZ will contain roads, parking areas, service areas and has been designed to minimise disturbance to vegetation with the existing riparian zone.

In summary, the following key recommendations have been generated to provide the proposed ASB 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) or associated uses are located to ensure they will not be exposed to radiant heat levels greater than 10kW/m²;
2. An Asset Protection Zone (APZs) between 50m and 71m is to be provided for all buildings (administration, staff facilities and amenities); as shown in **Figure 13**. 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. The proposed water quality and stormwater detention basins are to be replanted using species type and density commensurate with a *grassland*, as described by PBP 2019;
5. The new facility shall be constructed in accordance with Section 3 and 5 of Australian Standard AS3959-2018 Construction of buildings in bushfire prone areas; being to a BAL-12.5 standard. New construction must also comply with the construction requirements in Section 7.5 of PBP 2019;
6. The proposed internal roads are to be constructed in accordance with Table 6.8b of PBP 2019;
7. A 10m un-managed vegetated buffer is to be located on either side of the new east-west road link. The planting in the buffer is to be limited to species type and density commensurate with a grassland, as described by PBP 2019;
8. 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;
9. 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;
10. Roof penetrations, including arials, 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;
11. Non-combustible gutter guards shall be installed on the new buildings;
12. Any box gutters shall be non-combustible and flashed at the junction with the roof with non-combustible materials;
13. 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/m² 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 (March 2021) and demonstrates the proposed development satisfies the relevant requirements and is able to meet the aims and objectives of Planning for Bushfire Protection 2019.

Abbreviations

Abbreviation	Description
ASB	Acute Services Building
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
CoN	City of Newcastle
DoE	Commonwealth Department of the Environment
DPIE	NSW Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
FDI	Fire Danger Index
ha	hectare
HI	NSW Health Infrastructure
HNELHD	Hunter New England Local Health District
HMRI	Hunter Medical Research Institute
IPA	Inner Protection Area
JHH	John Hunter Hospital
JHHC	John Hunter Health Campus
JHHIP	John Hunter Hospital Innovation Precinct
LGA	Local Government Area
NCC:BCA	National Construction Standard: Building Code of Australia
NPH	Newcastle Private Hospital
OPA	Outer Protection Area
RNC	Royal Newcastle Centre
SEARs	Secretary's Environmental Assessment Requirements
SSDA	State Significant Development Application

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1. Introduction

1.1. Project Overview

In June 2019, the NSW Government announced a significant expansion of the John Hunter and John Hunter Children's Hospitals with the \$780 million John Hunter Health and Innovation Precinct (JHHIP) project.

The JHHIP will transform healthcare services for Newcastle, the greater Hunter region and northern NSW communities. The infrastructure will provide additional inpatient capacity to the John Hunter and John Hunter Children's Hospitals and create further opportunities for partnerships with industry and higher education providers.

The JHHIP will deliver an innovative and integrated precinct with industry-leading facilities working in collaboration with health, education and research partners to meet the current and future needs of the Greater Newcastle, Hunter New England and Northern NSW regions.

The John Hunter Health and Innovation Precinct Project is being planned and designed with ongoing communication and engagement with clinical staff, operational staff, the community and other key stakeholders with a strong focus on the following:

- ☐ Patient-centred care
- ☐ Contemporary models of care
- ☐ Future economic, health and innovation development opportunities
- ☐ Environmental sustainability

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 defensible 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 attack 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 JHHIP and proposed development are classified as a SFPP development, the specific objectives and acceptable solutions for a SFPP development have been considered.

1.3. Secretary Environmental Assessment Requirements

The Department of Planning, Industry and Environment (DPIE) have issued Secretary's Environmental Assessment Requirements (SEARs) to the Applicant for the preparation of an Environmental Impact Statement (EIS) for the proposed development. This BAR has been prepared having regard to Item 19 Bushfire of the SEARs, as detailed below.

SEARs Requirements	Relevant Report Section
19 Bushfire Provide a bush fire assessment that details proposed bush fire protection measures and demonstrates compliance with Planning for Bush Fire Protection (NSW RFS, 2019)	This Document Appendix D

1.4. Proposed Development

Approval is being sought for a new Acute Services Building and refurbishment of existing hospital facilities at John Hunter Hospital comprising:

- ❑ Construction and operation of a new seven-storey Acute Services Building (plus 4 semi-basement levels) to provide:
 - An expanded and enhanced Emergency Department;
 - Expanded and enhanced medical imaging services;
 - Expanded and enhanced intensive care services – Adult, Paediatric and Neonatal;
 - Expanded and enhanced Operating Theatres including Interventional Suites;
 - An expanded Clinical Sterilising Department;
 - Woman's Services including Birthing Unit, Day Assessment Unit and Inpatient Units;
 - Integrated flexible education and teaching spaces;
 - Expanded support services;
 - Associated retail spaces;
 - New rooftop helipads;
 - New semi-basement car parking;
- ❑ Refurbishment of existing buildings to provide:
 - Additional Inpatient Units;
 - Expanded support services;
- ❑ A new Hospital entry canopy and works to the existing drop off;
- ❑ Link bridge to the Hunter Medical Research Institute (HMRI);
- ❑ Campus wayfinding and signage;
- ❑ Landscape works;
- ❑ Site preparation including bulk earthworks, tree removal, environmental clearing, cut and fill;
- ❑ Mines grouting remediation works;
- ❑ Construction of internal roads network and construction access roads and works to existing at-grade carparking;
- ❑ Connection to the future Newcastle Inner City Bypass; and
- ❑ Inground building services works and utility adjustments.

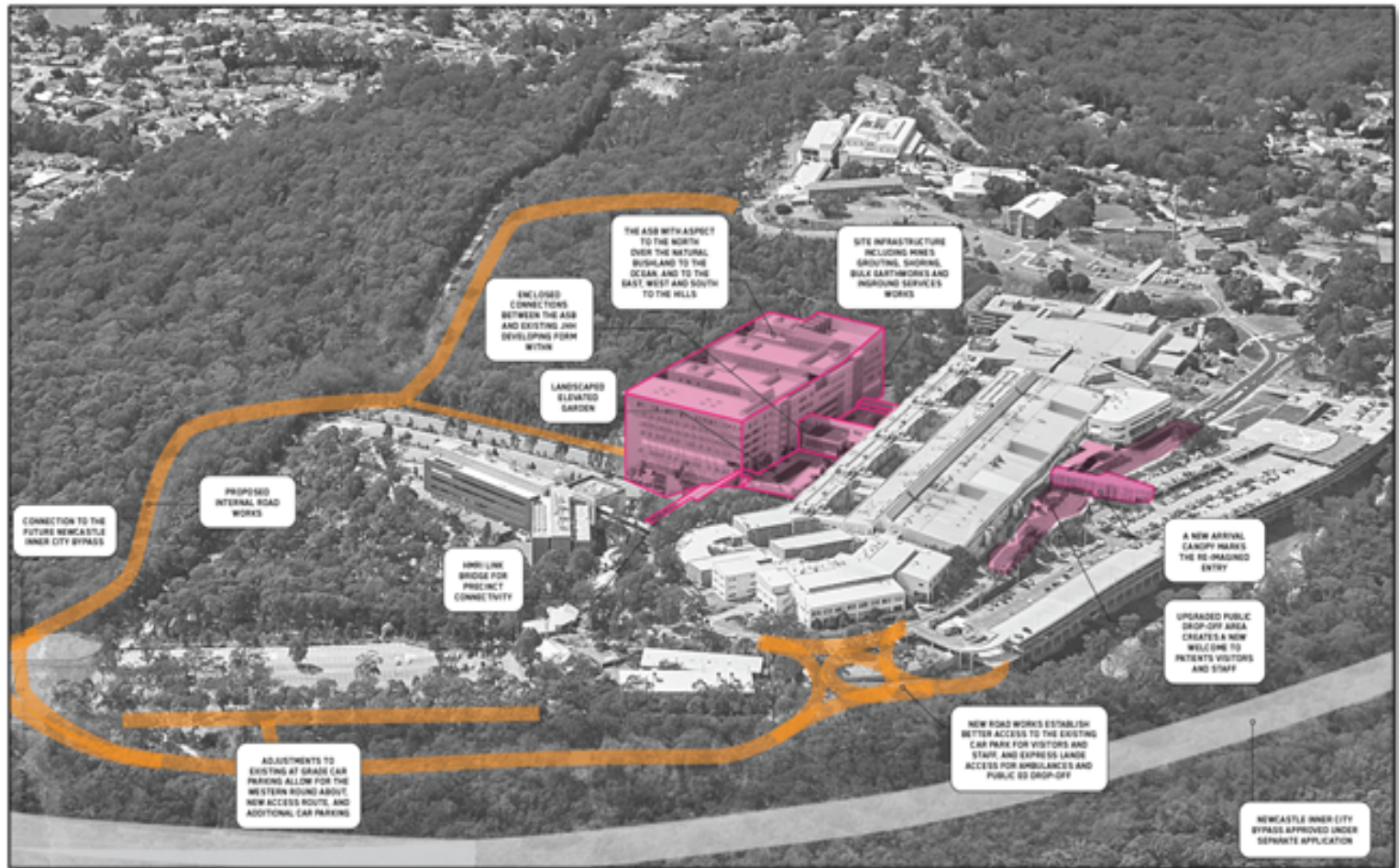


Figure 1: Indicative Description of the Proposed Development

1.5. Site Description

The John Hunter Hospital Campus (JHHC) is located on Lookout Road, Lambton Heights, within the City of Newcastle local government area (LGA), approximately 8km west of the Newcastle CBD. The hospital campus is located approximately 3.5km north of Kotara railway station.

The John Hunter Health Campus (JHHC) comprises the John Hunter Hospital (JHH), John Hunter Children's Hospital (JHCH), Royal Newcastle Centre (RNC), the Rankin Park Rehabilitation Unit and the Nexus Unit (Children & Adolescent Mental Health Unit). JHHC is a Level 6 Principal Referral Hospital, providing the clinical hub for medical, surgical, child and maternity services within the Hunter New England Local Health District (HNELHD) and across northern NSW through established referral networks. Other services at the campus are the Hunter Medical Research Institute (HMRI), Newcastle Private Hospital and the HNELHD Headquarters. An aerial photograph of the JHHC is shown at **Figure 2**.

Table 1: Site Description

Address	John Hunter Hospital Campus, Lookout Road, New Lambton Heights
Title	Lot 1 DP1228246 Lot 2 DP1228246 Lot 9 DP826092 Lot 11 DP826092 Lot 41 DP1176191 Lot 202 DP1176551
LGA	City of Newcastle (CoN)
Site Area	33 ha 10.2 ha (development footprint)
Land Use Zone	SP2 – Health Care Facility E3 - Environmental Management
Bushfire Prone Land	Category 1 Vegetation Bushfire Buffer
Fire Danger Index (FDI)	100

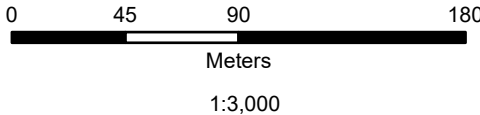
PROJECT 1940: JOHN HUNTER HOSPITAL
FIGURE 2: SITE LOCATION
JOHN HUNTER HOSPITAL

4/03/2021



Legend

- Proposed and Existing Layout
- Proposed Acute Services Building
- Cadastral Boundaries
- Approved APZ
- Proposed Development
- Proposed Road
- Future Road Connection
- Temporary Construction Access/
Permanent Fire Trail
- Existing Fire Trails



Aerial: NearMap (2019) | Data: MJD Environmental (2020), LPI (2019) | Datum/Projection: GDA 1994 MGA Zone 56 | Date: 4/03/2021 | Version 8 | GIS\19050 John Hunter Hospital | This plan should not be relied upon for critical design dimensions.

PROJECT 1940: JOHN HUNTER HOSPITAL
**FIGURE 3: SITE LOCATION
DEVELOPMENT ZONE**

4/03/2021



Legend

- Proposed and Existing Layout
- ▭ Proposed Acute Services Building
- ▭ Cadastral Boundaries
- ▨ Approved APZ
- ▭ Proposed Development
- ▭ Proposed Road
- ▭ Future Road Connection
- ▭ Temporary Construction Access/
Permanent Fire Trail
- ▭ Existing Fire Trails



0 20 40 80
Meters

1:1,500

MJDEnvironmental

Aerial: NearMap (2019) | Data: MJD Environmental (2020),
LPI (2019) | Datum/Projection: GDA 1994 MGA Zone 56 |
Date: 4/03/2021 | Version 8 | GIS\19050 John Hunter
Hospital| This plan should not be relied upon for critical
design dimensions.

1.6. 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 site is exposed to a significant bushfire hazard (**Figure 4**) and is considered a high-risk asset due to the geographic location, surrounding vegetation and terrain and competing land uses.

1.7. Fire History and Likely Behaviour

There is limited data available regarding any uncontrolled fire history within and immediately surrounding the subject site. Several prescribed burns managed by NSW Fire & Rescue have been undertaken to the north of the John Hunter Hospital in 2015 and to the south/ south-west of the main car park in 2013, however there has not been an event which threatens the site's location.

The site is surrounded by a large bushfire hazard extending to the north, west and south and is exposed on these aspects from a direct fire attack. The highest fire risk aspects are the westerly and northerly aspects of the site, leading from the forest vegetation. With the construction of the road network circulating the perimeter of the JHHC, and the completion of the final stage of the Newcastle Inner City Bypass flanking the site to the west, the rate of spread of a bushfire would weaken as it approaches the ASB.

The main sources of ignition are fire escape from legal or illegal fires (mainly prior to the introduction of the bush fire danger period), arson, and lightning strikes.

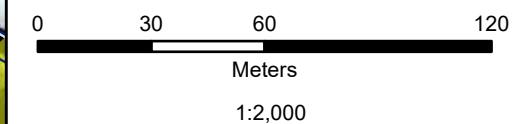
PROJECT 1940: JOHN HUNTER HOSPITAL

FIGURE 4: BUSHFIRE PRONE LAND



Legend

- Proposed and Existing Layout
 - - - 1st Order Stream
 - ▭ Proposed Acute Services Building
 - ▭ Slope Classification Buffer (100m)
 - ▭ Vegetation Classification Buffer (140m)
 - ▭ Cadastral Boundaries
 - ▨ Approved APZ
 - ▭ Proposed Development
 - ▭ Proposed Road
 - ▭ Future Road Connection
 - ▭ Temporary Construction Access/ Permanent Fire Trail
 - ▭ Existing Fire Trails
- Bush Fire Prone Vegetation**
- ▭ Category 1
 - ▭ BFPV Buffer



MJDEnvironmental

Aerial: NearMap (2019) | Data: MJD Environmental (2020), LPI (2019), NSW RFS (2021) | Datum/Projection: GDA 1994 MGA Zone 56 | Date: 4/03/2021 | Version 8 | GIS\19050 John Hunter Hospital| This plan should not be relied upon for critical design dimensions.

1.8. Newcastle 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 Newcastle Bush Fire Management Committee developed the Newcastle Bush Fire Risk Management Plan (BFRMP) which was endorsed on 16 April 2019. The BFRMP investigated the high-risk human settlements in the Newcastle 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 JHHC is ranked as the 2nd highest risk asset in the Newcastle LGA; second only to the University of Newcastle.

A description of the different bushfire management zones are described in **Table 2** below.

Table 2: NBRMP Bushfire Management Zones

Zone	Purpose	Suppression Objectives	Zone characteristics
Asset Protection Zone (APZ)	To protect human life, property and highly valued public assets and values.	To enable the safe use of Direct Attack suppression strategies within the zone.	As per RFS document <i>Standards for Asset Protection Zones</i> .
Strategic Fire Advantage Zone (SFAZ)	To provide strategic areas of fire protection advantage which will reduce the speed and intensity of bushfires and reduce the potential for spot fire development; To aid containment of wildfires to existing management boundaries.	To improve the likelihood and safe use of: Parallel Attack suppression strategies with the zone;and/or Indirect Attack (back burning) in high to very high fire weather conditions within the zone. To reduce the likelihood of: Crown fire development within the zone;and/or Spot fire ignition potential from the zone.	Zone width related to suppression objectives and dependent: <ul style="list-style-type: none"><input type="checkbox"/> Topography;<input type="checkbox"/> Aspect;<input type="checkbox"/> Spotting propensity;<input type="checkbox"/> Location of adjacent firebreaks;<input type="checkbox"/> Mosaic pattern of treatment; Assess Overall Fuel Hazard (OFH) once vegetation communities reach minimum fire thresholds within this plan. Management practices should aim to achieve mosaic fuel reduction patterns so that the majority of the SFAZ has an OFH of less than high.
Land Management Zone (LMZ)	To meet relevant land management objectives in areas where APZ's or SFAZ's are not appropriate.	As per the land management and fire objectives of the responsible land management agency. To reduce the likelihood of spread of fires. To undertake mosaic burning.	As appropriate to achieve land management eg. heritage and/or fire protection eg. broad scale mosaic burning objectives.
Fire Exclusion Zone (FEZ)	To exclude bushfires	N/A	Variable dependent on size of fire sensitive area requiring protection.

Figure 5 displays the context of the site in relation to other assets included in the NFRMP.

The NBFRC includes a series of treatment actions available for implementation at any particular site exposed to a bushfire threat. **Table 3** describes the available treatment actions.

Table 3: Asset Specific Treatments for the NBFRC Area

Strategy	Targeted treatments used in the Newcastle BFMC Area	Responsible Agency
Ignition Management	Identify hot spots with fire investigation Erect gates and signage and keep gates locked Implement proactive programs	City of Newcastle
Hazard Reduction	Identify, survey, implement and inspect asset protection zones Identify, survey, implement SFAZ.s Develop and implement fuel reduction program in LMZ's	City of Newcastle
Community Education	Conduct street meetings and community forums Conduct review to determine community needs Implement targeted community awareness programs Identify and implement 'Bush FireWise action plans' Identify and implement property preparedness plans Distribution of educational brochures	
Property Planning	Identify and implement 'Pre Incident Plans'	NSW Fire & Rescue
Preparedness	Inspect and maintain fire trails	City of Newcastle

Appendix 3 of the NBFRC further refines the treatment actions specific for the JHHC and are indicated in **Figure 5**. **Table 4** outlines the action items and the responsible agency. It is noted the land manager of the JHHC is not the primary responsible agency tasked to ensure all actions are completed. The Hunter New England Local Health District (HNELHD) is identified as a support agency and provides a secondary role. Whilst it is acknowledged NSW Fire and Rescue (F&R) have completed a prescribed burn within the last 6 years, during several site inspections it was observed the condition of some sections of the existing fire trails identified on the NBFRC are likely to require some attention to ensure they remain trafficable. **Table 4** above confirms the responsible agency to inspect and maintain the fire trails is the City of Newcastle.

There are several APZs identified on the Campus that have been established as part of other developments. Both the HMRI building, and the Newcastle Private Hospital were required to establish APZs of differing distances and areas. These APZs are indicated on **Figure 9**.

Table 4: NBFRC Treatment Register – John Hunter Hospital

Strategy	Action	Responsible Agency	'Other' Responsible Agency
Hazard Reduction	Implement prescribed burn program in LMZ and SFAZ	City of Newcastle	
Hazard Reduction	Inspect and maintain APZs	City of Newcastle	HNELHD
Ignition Management	Maintain fire trail security	City of Newcastle	-
Preparedness	Prepare and review 'Pre-Incident Plans'	NSW Fire & Rescue	-
Preparedness	Maintain fire trails	City of Newcastle	HNELHD

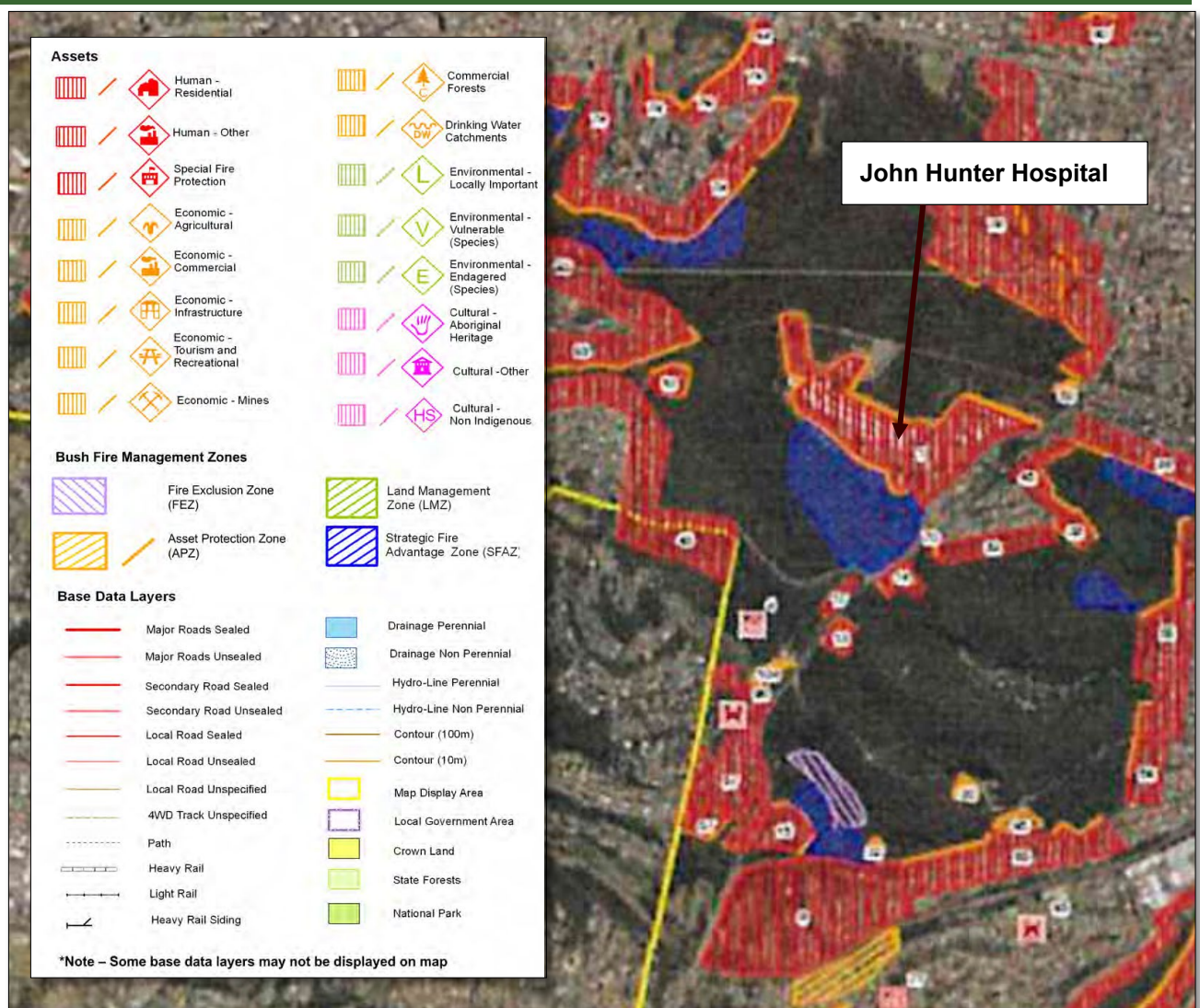


Figure 5: Excerpt of NBFRMC Plan (2019)

1.9. Newcastle Fire Access and Fire Trail Plan

The Newcastle Fire Access and Fire Trail Plan (NFAFTP) has recently been prepared by NSW Fire & Rescue. The NFAFTP (**Figure 6**) identifies all tactical and strategic fire trails that are 'registered' by F&R and RFS. The NBFRMP identifies the City of Newcastle as the authority responsible for maintenance of the fire trails to ensure they remain operational and are able to be safely traversed by emergency services.

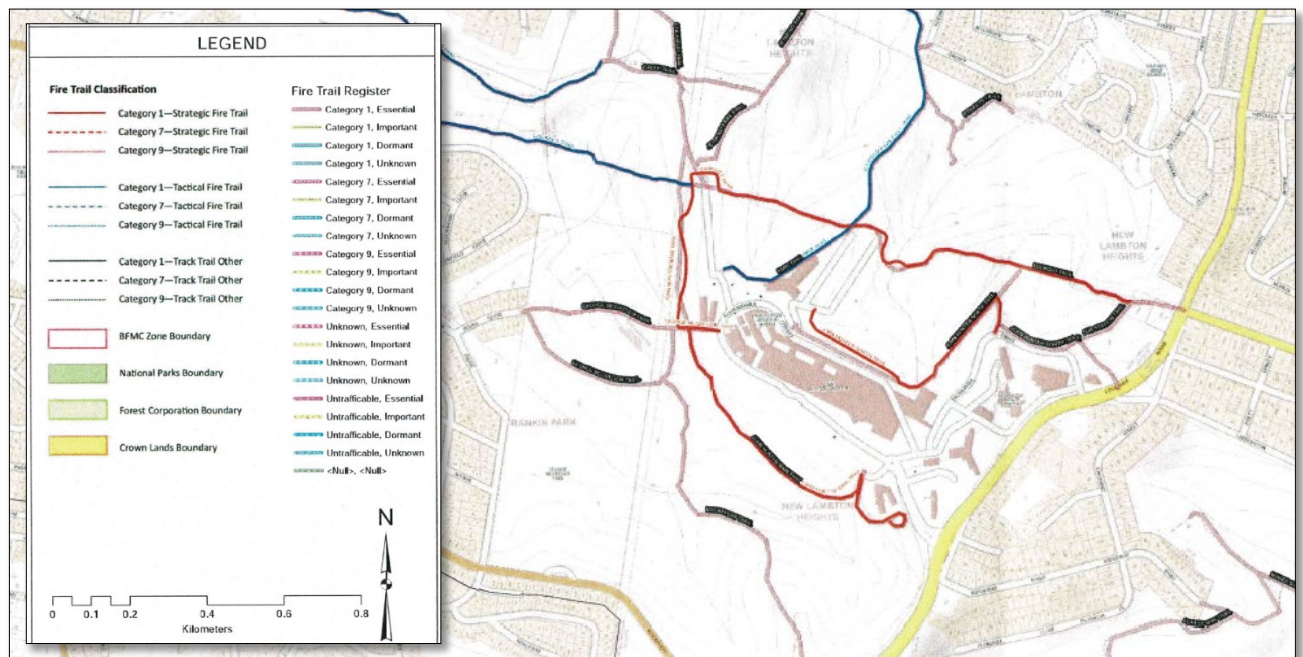


Figure 6: Newcastle BFRMC Fire Access and Fire Trail Plan 2018



Plate 1: Existing registered fire trail within JHHC

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;
- ❑ Reference to Biodiversity Development Assessment Report (Umwelt 2021) (**Figure 7**); and
- ❑ Ground site inspection 5 August 2020 undertaken by Stuart Greville (BPA).

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 9**. As the Umwelt Assessment identify the Plant Community Types (PCT), the equivalent Keith Class was identified. 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 dominant vegetation type identified as the primary bushfire hazard was found to be a *forest*; specifically the Hunter Macleay Dry Sclerophyll Forest.

Table 5: Vegetation classification conversions

PCT ID	Plant Community Type (PCT)	Vegetation Formation (Keith 2004)	Vegetation Classification (Keith 2004)
1592	Spotted Gum – Red Ironbark – Grey gum shrub – grass open forest of the Lower Hunter	Forest	Hunter Macleay Dry Sclerophyll Forest
1619	Smooth-barked Apple – Red Bloodwood – Brown stringybark – hairpin Banksia healthy open forest of coastal lowlands	Forest	Sydney Coastal Dry Sclerophyll Forest
1627	Smooth-barked apple – Turpentine – Sydney Peppermint healthy woodland on sandstone ranges of the Central Coast	Forest	Hunter Macleay Dry Sclerophyll Forest
1568	Alluvial Tall Moist Forest	Forest	North Coast Wet Sclerophyll Forest



Plate 2: ASB located to the north of existing JHHC – looking east along Kookaburra Circuit



Plate 3: ASB to be directly connected to existing JHHC



Plate 4: Approximate location of proposed ASB



Plate 5: Proposed ASB located in existing APZ and fire trail



Plate 6: Existing Hunter Medical and Research Institute (HMRI) Building



Plate 7: Existing APZ separating HMRI from bushfire hazard



Plate 8: Access gate from HMRI car park to registered fire trail



Plate 9: Western car park used as emergency assembly area



Plate 10: Typical forest vegetation to north of proposed ASB



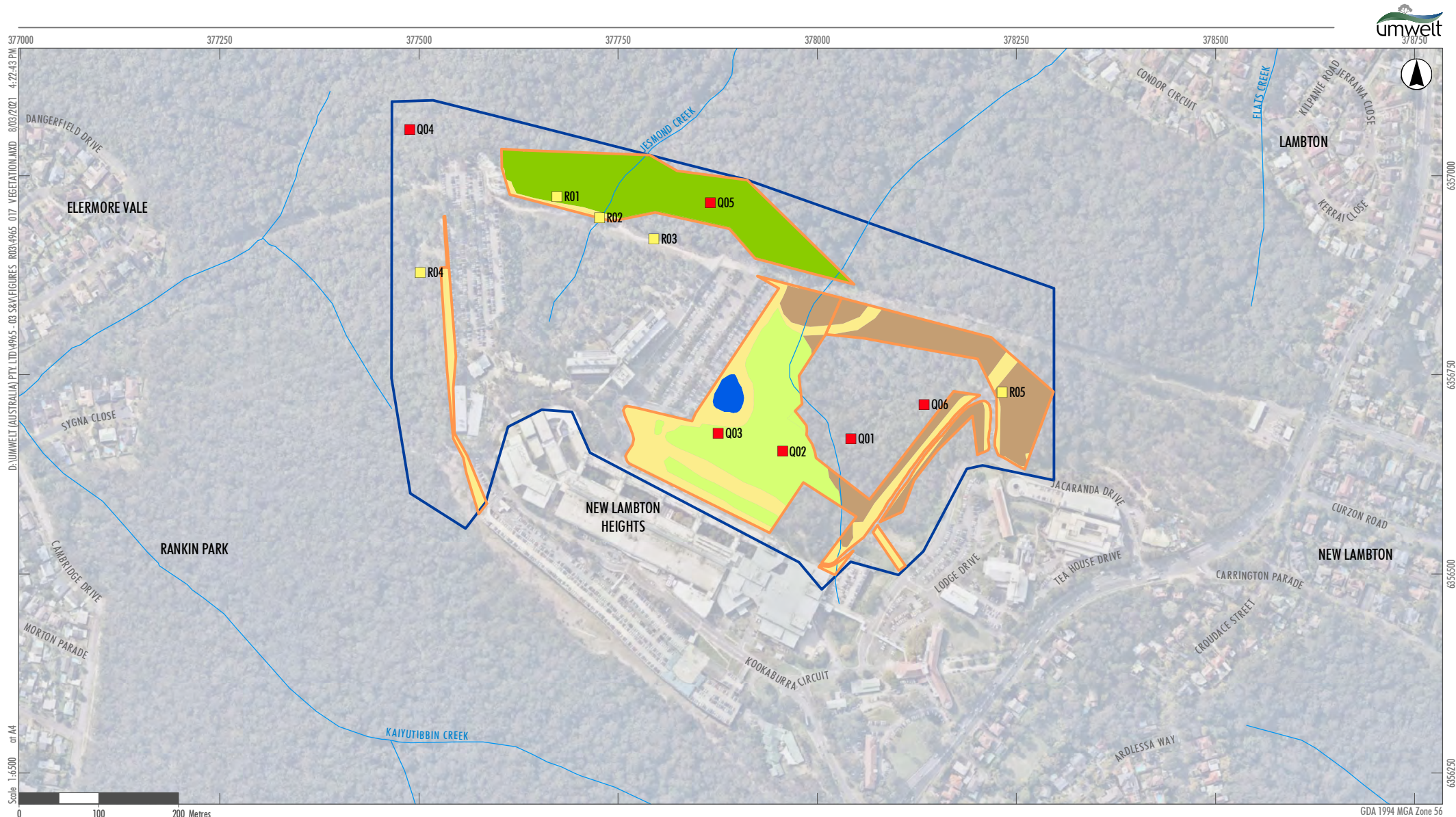
Plate 11: Registered fire trail located along transmission line easement – looking west towards HMRI carpark



Plate 12: Access gate to registered fire trail from Kookaburra Circuit – location of proposed Construction Access Road



Plate 13: Existing fire trail to be upgraded for use for temporary construction access and retained as permanent fire trail



Legend

- Study Area
- Biodiversity Assessment Area (Development Footprint)
- BAM Flora Plot
- Rapid Vegetation Assessment
- 1592 Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter
- 1619 Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands
- 1627 Smooth-barked Apple - Turpentine - Sydney Peppermint heathy woodland on sandstone ranges of the Central Coast
- Cleared or Exotic Vegetation
- Stormwater Basin

Figure 7: Vegetation Classes (Umwelt)

4/03/2021



Legend

- Proposed and Existing Layout
- 1st Order Stream
- Proposed Acute Services Building
- Slope Classification Buffer (100m)
- Vegetation Classification Buffer (140m)
- Cadastral Boundaries
- Approved APZ
- Proposed Development
- Proposed Road
- Future Road Connection
- Temporary Construction Access/ Permanent Fire Trail
- Existing Fire Trails

Vegetation (Keith 2004)

- Dry Sclerophyll Forests (Shrubby sub-formation) - Sydney Coastal Dry Sclerophyll Forests
- Dry Sclerophyll Forests (Shrub-grass sub-formation) - Hunter-Macleay Dry Sclerophyll Forests
- Wet Sclerophyll Forests - Alluvial Tall Moist Forest
- Grassland Batter
- Proposed Basin (Grassland)
- Managed Land



0 20 40 80
Meters

1:1,500



Aerial: NearMap (2019) | Data: MJD Environmental (2020), LPI (2019) | Datum/Projection: GDA 1994 MGA Zone 56 | Date: 4/03/2021 | Version 8 | GIS\19050 John Hunter Hospital | This plan should not be relied upon for critical design dimensions.

2.1.1. Slope Assessment

The slope assessment was undertaken as follows:

- ❑ Review of LiDAR point cloud data – including DEM (**Figure 9**); and
- ❑ Site inspection 5 August 2019.

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) derived 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 10** and **Table 6**.