

# Bushfire Hazard Assessment

## Tweed Valley Hospital



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## Bushfire Disclaimer

This report in no way suggests or guarantees that a bushfire or grass fire will not occur at the Project Site and/or impact the proposed development. This report advises on matters published by the NSW Rural Fire Service in the guideline Planning for Bushfire Protection 2006 and Planning for Bushfire Protection Pre-release 2018 and other advice available from that organisation. Due consideration has been given to site conditions and to appropriate legislation and documentation available at the time of writing. The report is therefore current at the time of writing only.

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## Acronyms

<b>Acronym</b>	<b>Meaning</b>
AHD	Australian Height Datum
APZ	Asset Protection Zone
AS	Australian Standard
BAL	Bushfire Attack Level
BCA	Building Code of Australia
BDAR	Biodiversity Development Assessment Report
BFMC	Bushfire Management Committee
BPL	Bushfire Prone Land
BSA	Bushfire Safety Authority
DPE	NSW Department of Planning & Environment
DPIE	NSW Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
FDI	Fire Danger Index
HAC	Health Administration Corporation
HI	Health Infrastructure
IPA	Inner Protection Area
LGA	Local Government Area
LPG	Liquefied Petroleum Gas
NASH	National Association of Steel-Framed Housing
OEH	NSW Office of Environment & Heritage
OPA	Outer Protection Area
PBP	Planning for Bushfire Protection
RFS	Rural Fire Service
SEAR	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SFPP	Special Fire Protection Purpose
SSD	State Significant Development
TLEP	Tweed Local Environment Plan
TSC	Tweed Shire Council



# Executive Summary

This Bushfire Hazard Assessment has been prepared for the proposed Tweed Valley Hospital at 771 Cudgen Road, Cudgen, NSW (Lot 11 DP 1246853).

The proposed development is regarded as 'special fire protection purposes' (SFPP) and is State Significant Development (SSD). SSD is exempt from requiring a Bushfire Safety Authority (BSA) and is not required to be assessed under Section 4.14 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The NSW Department of Planning, Industry and Environment (DPIE) is responsible for assessing the development application with the Minister for Planning and Public Spaces being the consent authority.

This Bushfire Hazard Assessment has been prepared in accordance with Planning for Bushfire Protection (PBP) 2006, Addendum 3 to PBP and PBP Pre-release 2018. RFS were also consulted as part of this assessment process. A site inspection was undertaken on 6 June 2019. Coastal Swamp Forest are located to the north and north-west of the Project Site which is regarded as the dominant bushfire hazard vegetation. Areas to the north are separated by a service road, landscaped gardens and asset protection zone (APZ).

It is recommended that the following conditions be included in the consent for approval:

- The proposed hospital building shall be built to BAL-12.5.
- The proposed hospital building shall include a minimum APZ complying with Condition B19 of SSD9575 as marked in the approved plans and generally divided into a 47 m inner protection area (IPA) and 20 m outer protection area (OPA).
- Landscaping is to be in accordance with Appendix 4 of PBP Pre-release 2018.
- Access provisions are to comply with Table 6.4b of PBP Pre-release 2018.
- Water, electricity and gas supply services are to comply with Table 6.4c of PBP Pre-release 2018.
- An Emergency and Evacuation Management Plan be prepared for the proposal.

This Bushfire Hazard Assessment has taken into consideration the proposed Tweed Valley Hospital, which is identified as SFPP, landscaping, vegetation, effective slope and fire danger index (FDI) detailed within PBP Pre-release 2018. Adequate and appropriate bushfire hazard protection measures are available and can be implemented to facilitate the proposed hospital on 771 Cudgen Road, Cudgen, NSW (Lot 11 DP 1246853). This Bushfire Hazard Assessment has determined that the proposal generally conforms to the standards and specific objectives set out in PBP 2006/PBP Pre-release 2018 and complies with relevant provisions of the EP&A Act. Condition of consent (SSD 9575) Schedule 2 B19 of the Concept Proposal and Stage 1 approval is also satisfied.



# 1. Introduction

## 1.1 Scope

GeoLINK has been engaged by Health Infrastructure (HI) to prepare a Bushfire Hazard Assessment for the proposed Tweed Valley Hospital which is State Significant Development (SSD) at 771 Cudgen Road, Cudgen, NSW (Lot 11 DP1246853).

The proposed development is located on land mapped by Tweed Shire Council (TSC) as being bushfire prone. This triggers formal assessment against the provisions of Planning for Bushfire Protection (PBP) 2006 and/or PBP Pre-release 2018. The proposal is regarded as 'special fire protection purposes' (SFPP) as the vulnerable nature of the occupants means a lower radiant heat threshold is required in order to allow the evacuation of occupants, and emergency services to operate in support of those occupants. As the proposed development is considered SSD, the NSW Department of Planning, Industry and Environment (DPIE) is responsible for assessing the development application with the Minister for Planning and Public Spaces being the consent authority. SSD is exempt from requiring a Bushfire Safety Authority (BSA) and is not required to be assessed under Section 4.14 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

## 1.2 Purpose

This report serves to:

- identify the Project Site and proposed development.
- address the condition of consent, B19 (of Schedule 2) of the Tweed Valley Hospital (SSD 9575) concept approval relating to bushfire protection.
- address the requirement of the Secretary's Environmental Assessment Requirements (SEARs) to demonstrate the project's compliance with Planning for Bush Fire Protection (PBP) 2006 and/ or PBP Pre-release 2018.
- determine the bushfire threat.
- recommend bushfire protection measures, including the provision of asset protection zones (APZs), construction standards and other specific fire management issues to improve the chances of building survival in the event of a bushfire.

## 1.3 Background

On 11 June 2019, the Minister for Planning and Public Spaces granted approval for the Concept Proposal and Stage 1 Early and Enabling Works for the new Tweed Valley Hospital (SSD 9575) located at 771 Cudgen Road, Cudgen (Lot 11 DP1246853). All documents relating to this consent can be found on the major project website of DPIE at <https://www.planningportal.nsw.gov.au/major-projects/project/10756>.

An Environmental Impact Statement (EIS) has been prepared to assist in the SSD Stage 2 Application for the Tweed Valley Hospital which will be assessed under Part 4 Division 4.7 of the EP&A Act. This, along with supporting documentation, provide a clear outline of the Stage 2 Application.



The Tweed Valley Hospital Project broadly consists of:

- Construction of a new Level 5 major regional referral hospital to provide the health services required to meet the needs of the growing population of the Tweed-Byron region (in conjunction with the other hospitals and community health facilities across the region).
- Delivery of the supporting infrastructure required for the Tweed Valley Hospital, including green space and other amenities, roads and car parking, external road upgrades and connections, utilities connections, and other supporting infrastructure.

## 1.4 Planning for Bushfire Protection (PBP) 2006 and Pre-release 2018

On 3 September 2018, the NSW Rural Fire Service (RFS) issued PBP Pre-release 2018. It is anticipated that PBP 2019 (as it is expected to be referred) will become legislated by late 2019. Until then, PBP Pre-release 2018 is in a transitional period and until it becomes legislated, PBP 2006 will remain the legally referenced document and can be used on a performance basis in consultation with RFS.

The RFS Pre-release edition of Planning for Bushfire Protection 2018 Factsheet (dated September 2018) states that:

*During the interim period up to the adoption of PBP 2018, the NSW RFS will assess applications for a BSA under either PBP 2006 or the pre-release edition of PBP 2018. An assessment to which the proposal conforms with or deviates from either PBP 2006 or the pre-release edition of PBP 2018 will be required to accompany development applications which fall under Section 100B of the RF Act.*

SFPP developments therefore may need to be assessed against either PBP 2006 or PBP Pre-release 2018. It is noted however that SSD do not require a BSA to be issued by the Commissioner of the NSW RFS, since the integrated planning provisions do not apply to SSD proposals. Advice from RFS has however been sought for the current proposal.

## 1.5 Report Requirements

Approval for the Concept Plan and Stage 1 Early and Enabling Works for the new Tweed Valley Hospital included several conditions of consent relating to bushfire. Sections of this report which address these conditions of consent are outlined in **Table 1.1**. Further to this, the SEARs state requirements that are to be addressed in relation to bushfire (refer to **Table 1.1**).



**Table 1.1 Report Requirements**

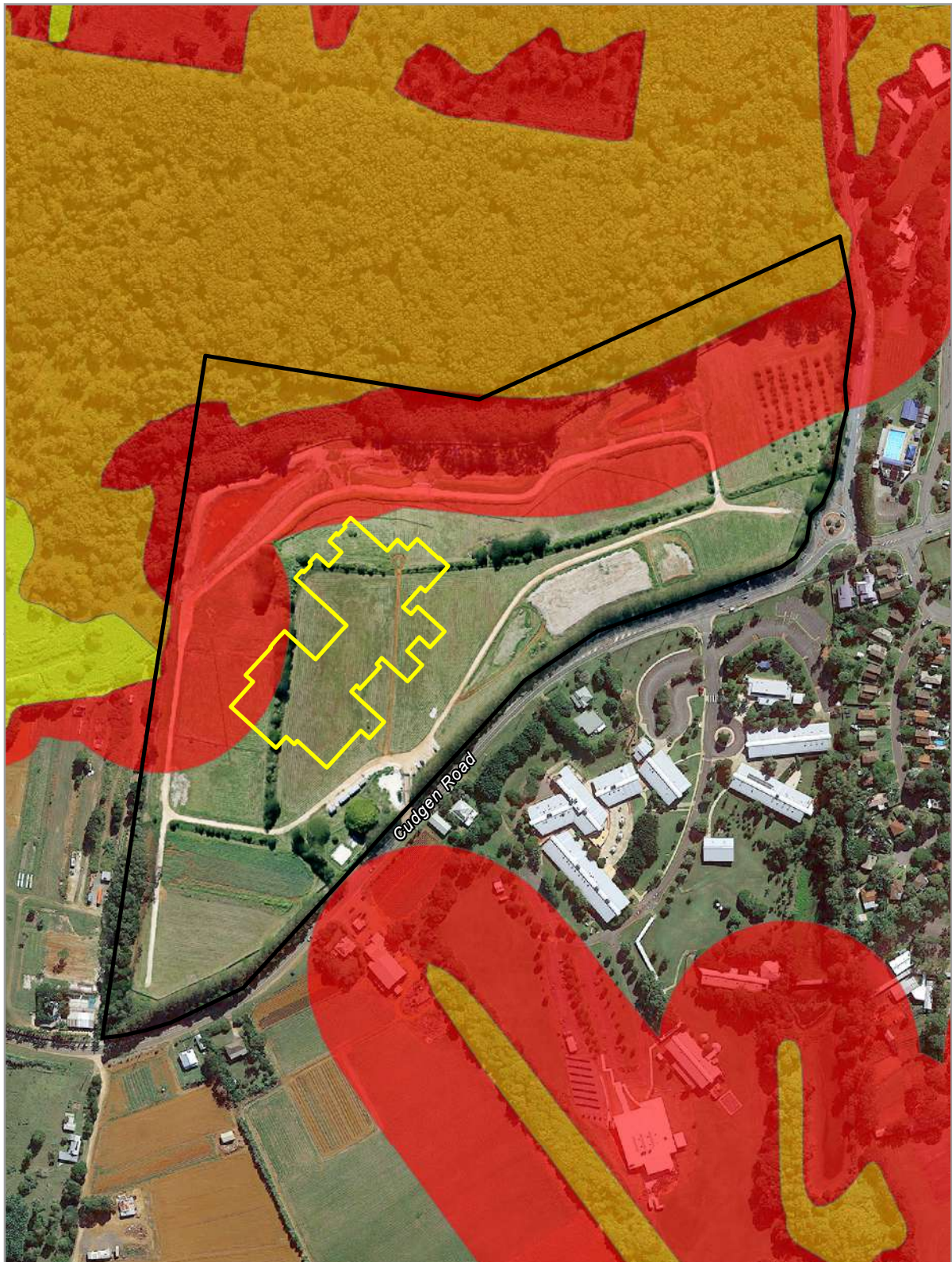
<b>Condition/Issue to be Addressed</b>	<b>Section of Report Addressed in</b>
<b>Condition B19 of Concept Approval</b> <b>The design of the Stage 2 application, must demonstrate satisfactory compliance with the relevant provisions of PBP 2006 or PBP 2018 (pre-release version), including (but not limited to):</b>	
a) <i>a minimum APZ complying with that marked in the approved plans in condition A2 of Schedule 2 (refer to Appendix A);</i>	Section 4.1 and Illustration 4.1.
b) <i>construction of the hospital building in accordance with section 3 &amp; 4 (BAL 12.5) of AS3959-2009 'Construction of Buildings in Bushfire Prone Areas'; and</i>	Section 0, Appendix A and Appendix D.
c) <i>entry and/or exit point to the hospital building, including service delivery areas, not being exposed to more than 10 kW/m<sup>2</sup> of radiant heat exposure.</i>	Section 4.1 and Appendix B.
<b>SEARs</b>	
18. <i>Address bushfire hazard and, if relevant, prepare a report that addresses the requirements for Special Fire Protection Purpose Development as detailed in Planning for Bushfire Protection 2006 (NSW RFS).</i>	This report in its entirety addresses the bushfire hazard at the site for the proposed SFPP development. This report addresses requirements from PBP 2006 and PBP Pre-release 2018.

## 1.6 Consultation






Mr Alan Bawden of the NSW RFS has been the main point of contact regarding bushfire management for the project to date. Consultation for SSD Stage 2 has included emails and telephone conversations regarding APZs, road widths, building design, landscaping requirements and species selection within the required asset protection zone including requirements for any proposed edible species, hydrant locations and roof top gardens (which are no longer proposed).

## 1.7 Bushfire Prone Land

Tweed Shire Council's BPL mapping has been prepared as a requirement of Section 10.3 of the EP&A Act and in accordance with the NSW Rural Fire Services '*Guideline to Bushfire Prone Land Mapping*'. TSC's BPL mapping indicates that Project Site is identified as BPL (refer to **Illustration 1.1**).



#### LEGEND

-  Project site
-  Proposed hospital building envelope
-  Vegetation Buffer
-  Vegetation Category 1
-  Vegetation Category 2

0 100



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## Bushfire Prone Land Map

Illustration 1.1



## 2. Background

### 2.1 Site Location

The proposed Tweed Valley Hospital is located on land described as Lot 11 DP1246853, 771 Cudgen Road, Cudgen (refer to **Illustration 2.1**). The Project Site is owned by Health Administration Corporation (HAC). The Project Site has a total area of 19.4 ha and is approximately 13.5 km south of Tweed Heads and is situated on the immediate urban periphery of Kingscliff, within the TSC local government area (LGA). **Table 2.1** provides a quick reference for the location and description details of the Project Site.

**Table 2.1 Project Site Detail Summary**

<b>Site Details</b>	
Lot/DP	Lot 11 DP1246853*
Street address	771 Cudgen Road, Cudgen NSW 2487
Effective slope	Flat
Elevation	10 -20 m AHD
Site area	19.38 hectares
Tweed LEP 2014 Zoning	Mostly SP2 Infrastructure (Health Facility). Northern fringe is Deferred Matter (DM) and is zoned 7(l) Environmental Protection (Habitat), 2(c) Urban Expansion, 1(b1) Agricultural Protection (TLEP 2000).
Fire weather area	North Coast
Fire danger index (FDI)	80
Fire control centre	Far North Coast Office, Murwillumbah

\* The Project Site was previously identified as Lot 102 DP 870722, which included the northern-eastern forested portion which has now been excised.

### 2.2 Site Description

The Project Site predominantly consists of cleared/cultivated land with Swamp Sclerophyll Forest and Subtropical Rainforest to the north. A small custard apple orchard is located in the north-eastern corner. Apart from a self-sown windrow along the southern Project Site boundary with Cudgen Road, most of the southern section has been cleared of native vegetation (refer to **Illustration 2.2**).

Four water quality control ponds are located in the northern portion of the site to ensure appropriate soil and water management control measures are in place to mitigate impacts of stormwater runoff from the unimproved site (refer to **Plate 2.1**).



### 2.2.1 Land Use

The southern 16.3 ha of the Project Site has been previously used for long-term small-scale agricultural purposes, including cropping and horticulture (predominantly sweet potatoes) over the last 30 years. It is understood that no stock animals have been on-site since 2010.

The Project Site is accessed via Cudgen Road with proximal access to Tweed Coast Road, which connects to the Pacific Motorway (M1) in the north.

Land uses surrounding the Project Site include:

- South: Cudgen Road, Kingscliff TAFE (refer to **Plate 2.2**).
- South-west: rural/ farmland.
- North and north-west: vegetated land, including environmental protection areas and mapped Coastal Wetlands.
- East: Turnock Street, Kingscliff urban and residential area.
- West: rural/farmland.

Other land uses in proximity to the Project Site include urban, rural and environmental uses/ zones. Further west is the village of Cudgen, on the western side of Tweed Coast Road. Further north of the mapped Coastal Wetland is existing residential development which is identified in the draft Kingscliff Locality Plan, as having major development potential including a Business and Knowledge Precinct adjacent to the M1 and residential development of around 1500 dwellings.



**Plate 2.1** Water Quality Control Ponds in northern portion of the Project Site



**Plate 2.2** View south showing Kingscliff TAFE

### 2.2.2 Environmental Considerations

The northern section of the Project Site is located on the Tweed River floodplain and is part of an important forested wetland that has been mapped under State Environmental Planning Policy (Coastal Management) 2018 (Coastal Management SEPP) (refer to **Plate 2.3** and **Plate 2.4**). The wetland is part of a mapped regional fauna corridor (Department of Environment, Climate Change and Water, 2010;) and is a significant stepping-stone habitat to the Cudgen Creek estuary located approximately 800 m to the south-east of the Project Site.

Proposed bushfire protection measures will not impact this area.



**Plate 2.3 View north showing mapped Coastal Wetland**



**Plate 2.4 Typical vegetation within mapped Coastal Wetland**

### **2.2.3 Cultural Considerations**

Five dry-stone walls are located within the Project Site which are very early features and probably built by South Sea Islanders, and have local historical, aesthetic and possibly social significance.

Proposed bushfire protection measures will not impact the dry-stone walls that are proposed for retention.

## **2.3 Review of Background Information**

Information reviewed to enable this assessment include:

- Bushfire Assessment for Proposed State Significant Development at Lot 102 DP870722, 771 Cudgen Road, Cudgen, NSW. Prepared by Paola Rickard of Land and Fire Assessments Pty Ltd dated 17 October 2018.
- Drawing AR-SKE-10-005 Rev 3 Asset Protection Zones (23/04/2019).
- NBC Bushfire Attack Assessment Report V2.1 (dated 20/09/2018).
- Response to TSA-RFI-000104 - Request for additional information DPE. Prepared by Paola Rickard of Land and Fire Assessments Pty Ltd dated 28 February 2019.
- Australian Standard 3959-2009 Construction of Buildings in Bushfire Prone Areas.
- Australian Standard 3959-2018 Construction of Buildings in Bushfire Prone Areas.
- Building Code of Australia (Volume 2).
- Planning for Bushfire Protection (PBP) 2006.
- PBP 2018 (Pre-release).



## 2.4 Proposed Development

The Stage 2 SSD component seeks consent for the Main Works and Operation of the Tweed Valley Hospital, including:

- Construction of Main Hospital Building:
  - Main entry and retail area
  - Administration
  - Community health
  - In-Patient units
  - Outpatient clinics and day only units
  - Child and Adolescent Services
  - Intensive Care Unit
  - Mental Health Unit
  - Maternity Unit and Birthing Suites
  - Renal Dialysis
  - Pathology
  - Pharmacy
  - Radiation Oncology as part of integrated Cancer Care
  - Emergency Department
  - Perioperative Services
  - Interventional Cardiology
  - Medical Imaging
  - Mortuary
  - Education, Training, Research
  - Back of House services
  - Rooftop Helipad
- Construction of Support Buildings, referred to as the 'Health Hub', containing:
  - Oral Health
  - Community Health
  - Aboriginal Health
  - Administration
  - Education, Training and Research
- Internal Roads and carparking, including multi-deck parking for staff, patients and visitors
- Construction of a temporary building for the 'Tweed Valley Skills Centre'
- External road infrastructure upgrades and main site access
- Environmental and wetland rehabilitation, including rehabilitation of existing farm dam as outlined in the Biodiversity Development Assessment Report (BDAR) prepared for the Concept Proposal and Stage 1 works
- Site landscaping
- Signage
- Utility and service works.

The works outlined above comprise five key components, which are subject to various funding allocations and may be delivered independently to each other. Stage 2 has therefore been defined in the following sub-stages (stages are not listed in chronological order and may be delivered independently to each other):

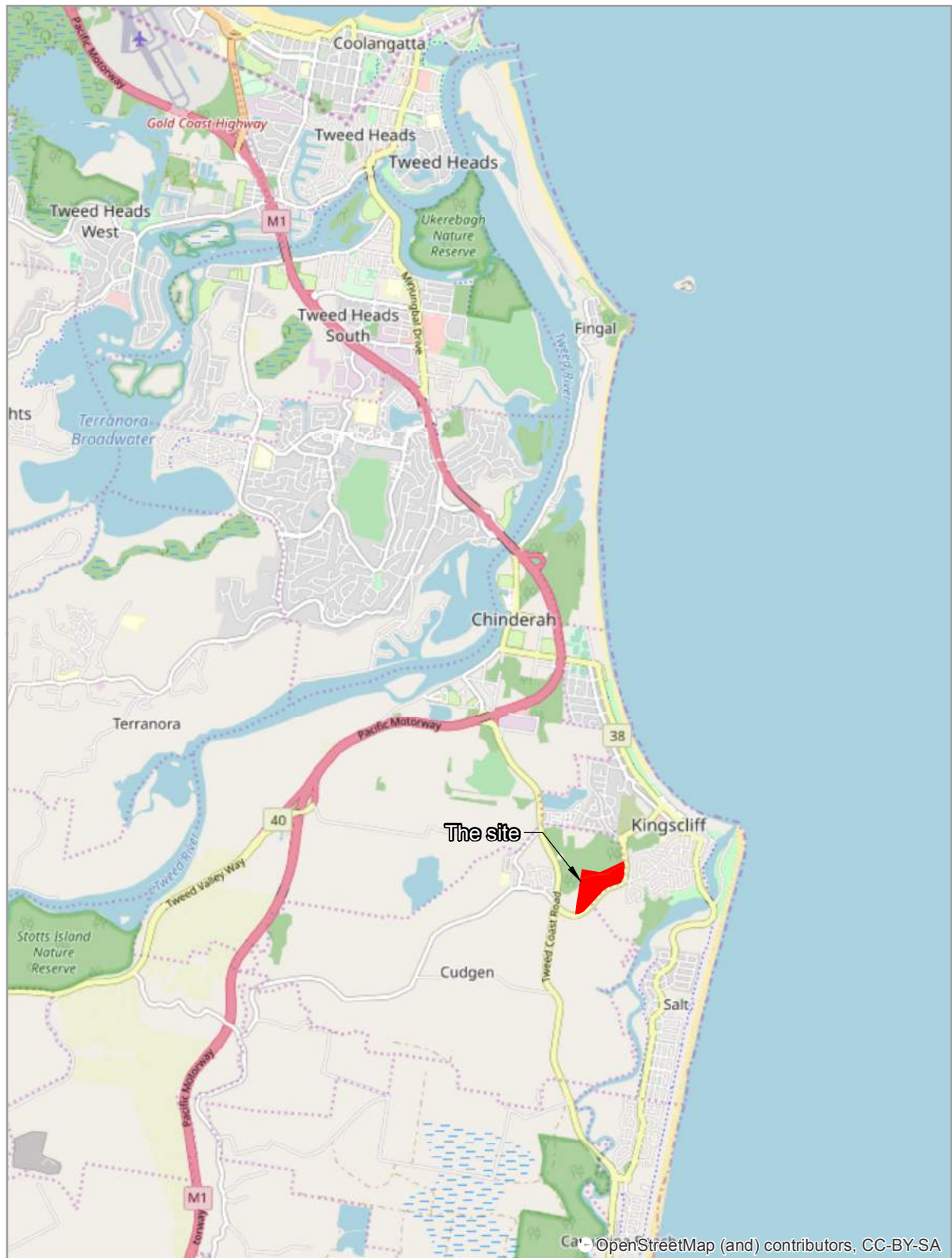
- Stage 2A – Main Hospital Building complete with supporting roads, services infrastructure and landscaping.
- Stage 2B – Main Hospital Building incremental expansion areas.
- Stage 2C – Health Hub.
- Stage 2D – Tweed Valley Skills Centre.
- Stage 2E – Multi-deck car park.

The location of the proposed buildings are shown in **Illustration 2.2**. Plans for Stage 2 Main Works and Operation are provided in **Appendix A**. Development consent is sought for all five components of Stage 2 under this SSDA. Approval of Stage 2 will enable the new Tweed Valley Hospital to be built which will provide a much-needed contemporary health service facilities for the surrounding region.

### 2.4.1 Potential Future Expansions

Any subsequent stages or modifications to the proposal would be subject to separate applications as required, including the potential future expansion of the facility.





0 1.5 Km



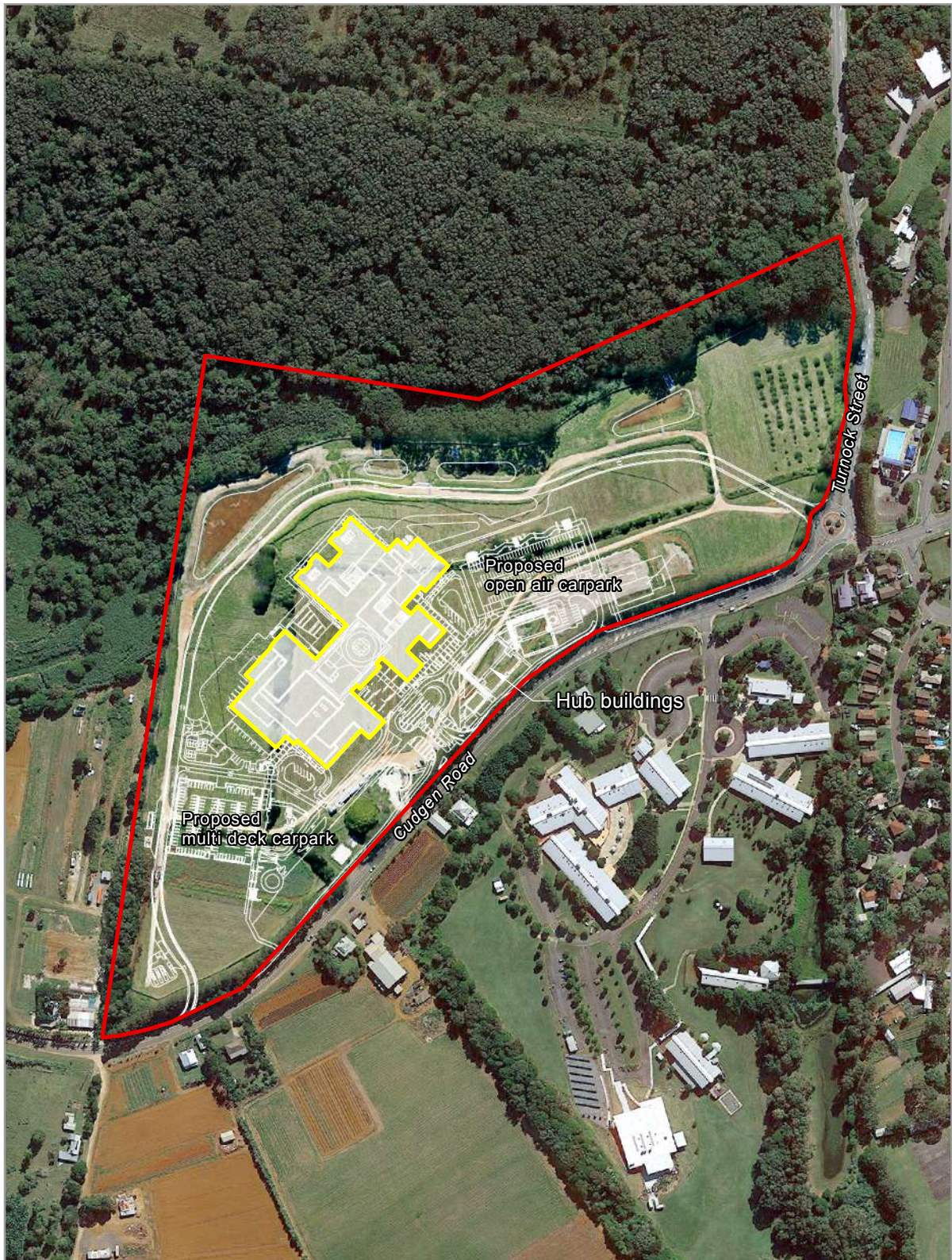
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**Site Locality**

Illustration 2.1





## LEGEND

- Project site
- Proposed hospital building envelope

0 100

## The Project Site



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Illustration 2.2





## 3. Bushfire Threat Assessment

### 3.1 Bushfire Assessment

A site assessment was undertaken by GeoLINK on 6 June 2019 to confirm slope and vegetation presenting a bushfire hazard to the proposed development. Strong north to north-westerly winds pose the most danger to the Project Site from bushfires.

### 3.2 Climate and Bushfire Season

The typical/ average climate in the Far North Coast Bushfire Management Committee (BFMC) area, which includes Tweed, is described as temperate to subtropical. Although the area can experience high rainfall, this can be very seasonal, the driest months on average being August to October and wettest in late summer and autumn.

The bushfire season generally runs from September through November although statutorily extends to March most seasons due to hot summer temperatures and strong coastal winds. Worst bushfire seasons occur after prolonged periods of drought. The season can often start “early” in July or August if drought conditions prevail (BFMC 2009).

### 3.3 Vegetation

Vegetation surrounding the Project Site has been assessed in terms of potential fire hazard over a distance of 140 m, using the formation classes provided within Table A2.1 of PBP 2006 (refer to **Table 3.1**).

**Table 3.1 Vegetation within 140 m of the Project Site**

<i><b>Direction</b></i>	<i><b>Vegetation Description within 140 m of the Site</b></i>	<i><b>Predominant Vegetation Class</b></i>
North	Swamp sclerophyll forest	Coastal Swamp Forest
South	Managed Land	Managed Land
East	Managed Land	Managed Land
West	Managed Land	Managed Land
North-west	Swamp sclerophyll forest	Coastal Swamp Forest



### 3.4 Slope

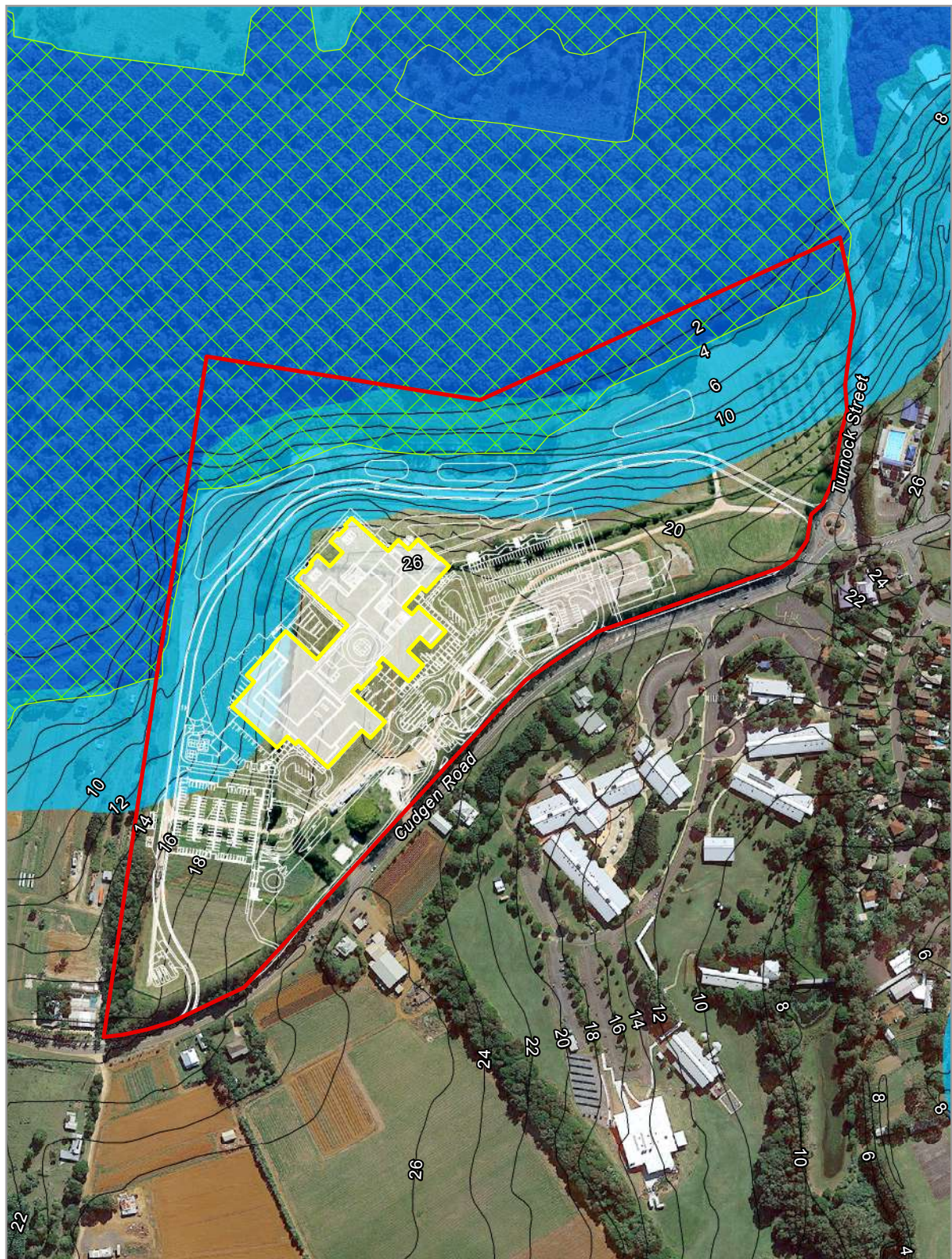
The Project Site comprises an elevated relatively flat area in the south which slopes down to the low-lying swamp sclerophyll forest in the north. The highest point of the Project Site is approximately 27 m AHD at the boundary to Cudgen Road. The lowest point of the Project Site is approximately one metre AHD at the northern boundary.

The effective slope for the proposal has been assessed over 100 m. The effective slope, that is the slope of the land beneath the vegetation which most significantly affects fire behaviour, having regard to the vegetation present (RFS 2018) is calculated as flat within the Coastal Swamp Forest to the north (refer to **Illustration 3.1**).

### 3.5 Fire (Weather Area)

Tweed Shire Council LGA is located within the 'North Coast' fire area, with a Fire Danger Index (FDI) rating of 80.





## LEGEND

- Project site
- Proposed hospital building envelope
- Forested Wetlands - Coastal Swamp Forest
- Coastal wetland
- Proximity area for coastal wetland
- Contour at 2m intervals

0 100



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## Project Site Analysis

Illustration 3.1



## 4. Bushfire Protection Measures

### 4.1 Asset Protection Zones

An Asset Protection Zone (APZ) is a fuel-reduced area surrounding a built asset or structure. Extensive discussions have been undertaken during Stage 1 of the Tweed Valley Hospital proposal between Land and Fire Assessments Pty Ltd, Rural Fire Service (RFS), Office of Environment and Heritage (OEH) and Department of Planning and Environment (DPE) regarding required APZs for the Project Site. Outcomes of these discussions were that the proposal will conform with the required APZs set out in PBP Pre-release 2018 rather than PBP 2006 and that the hazard vegetation is the Coastal Swamp Forest to the north as well as Coastal Wetland to the north-west.

APZs have therefore been calculated based on the effective slope, FDI rating and vegetation formations, in accordance with Table A1.12.1 (*Minimum Distances for APZs – SFPP developments <10 kW/m<sup>2</sup> @ 1200K*) of PBP Pre-release 2018 (refer to **Table 4.1**).

**Table 4.1 APZs for SFPP PBP 2018**

<b>Direction</b>	<b>Dominant Vegetation Formation (within 140 m)</b>	<b>Slope Category (within 140 m)</b>	<b>Total Asset Protection Zone required SFPP (m)</b>
North	Coastal Swamp Forest	Upslope/flat	67
South	Managed Land	Upslope/flat	-
East	Managed Land	Upslope/flat	-
West	Managed Land	Upslope/flat	-
North-west	Coastal Swamp Forest	Upslope/flat	67

#### 4.1.1 APZ Maintenance

The 67 m APZ is made up of a 47 m IPA and a 20 m OPA in accordance with Table A1.12.3 of PBP Pre-release 2018. The IPA is the area closest to the asset and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and be a defensible space. In accordance with PBP Pre-release 2018, vegetation within the IPA should be kept to a minimum level. Litter fuels within the IPA should be kept below one centimetre in height and be discontinuous. Requirements when establishing and maintaining an IPA are listed in **Table 4.2**.

**Table 4.2 IPA Requirements**

<b>Layer</b>	<b>Requirements</b>
Trees	Canopy cover should be less than 15% (at maturity).
	Trees (at maturity) should not touch or overhang the building.
	Lower limbs should be removed up to a height of two metres above ground.
	Canopies should be separated by two to five metres.
	Preference should be given to smooth barked and evergreen trees.
Shrubs	Create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings.
	Shrubs should not be located under trees.
	Shrubs should not form more than 10% ground cover.
	Clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.
Grass	Should be kept mown (as a guide grass should be kept to no more than 100 mm in height).
	Leaves and vegetation debris should be removed.

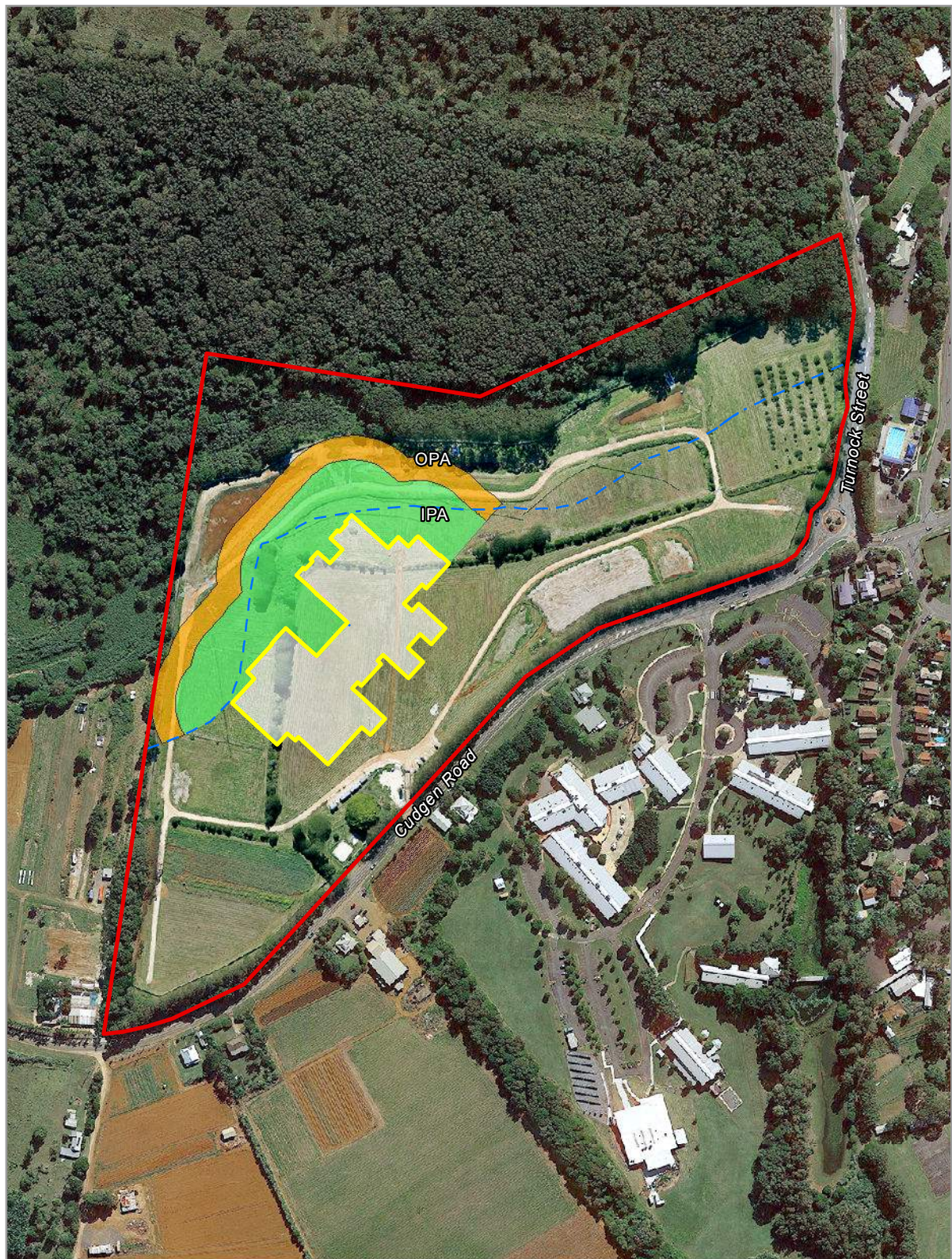
An OPA is located between the IPA and the unmanaged vegetation. Vegetation within the OPA can be managed to a more moderate level. The reduction of fuel in this area substantially decreases the intensity of an approaching fire and restricts the pathways to crown fuels; reducing the level of direct flame, radiant heat and ember attack on the IPA. Requirements when establishing and maintaining an OPA are listed in **Table 4.3**.

**Table 4.3 OPA Requirements**

<b>Layer</b>	<b>Requirements</b>
Trees	Canopy cover should be less than 30%.
	Trees should have canopy separation.
	Canopies should be separated by two to five metres.
Shrubs	Shrubs should not form a continuous canopy.
	Shrubs should form no more than 20% of ground cover.
Grass	Should be kept mown (as a guide grass should be kept to no more than 100 mm in height).
	Leaves and other vegetation debris should be mown, slashed or mulched.

The APZ will be maintained in perpetuity to ensure ongoing protection from the impact of bushfires. Maintenance of the IPA and OPA to the standards given above should be undertaken on an annual basis, in advance of the fire season (generally prior to September), as a minimum.





## LEGEND

- Project site
- Proposed hospital building envelope
- IPA / OPA 47m boundary
- 67 m APZ boundary
- 67 m APZ offset from hazard (concept approval)

0 100



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## Asset Protection Zones

Illustration 4.1



**Table 4.4** demonstrates compliance with the acceptable solutions of PBP Pre-release 2018 relating to APZs.

**Table 4.4 Demonstration of Compliance with Table 6.4a of PBP Pre-release 2018**

<i>Performance Criteria</i>	<i>Acceptable Solution</i>	<i>Application</i>	<i>Compliant with Acceptable Solution</i>
Radiant heat levels of greater than 10 kW/m <sup>2</sup> (calculated at 1200K) are not experienced by emergency service personnel and occupants during firefighting and emergency management.	The building is provided with an APZ in accordance with Table A1.12.1 (see Appendix 1) of PBP Pre-release 2018.	<ul style="list-style-type: none"> <li>■ The proposed hospital building is located 67 m from the hazard to the north and north-west.</li> <li>■ An APZ of 67 m to the north and north-west has been calculated in accordance with PBP Pre-release 2018.</li> <li>■ Radiant heat level exposure on the building is less than 10 kW/m<sup>2</sup> (refer to <b>Appendix B</b>).</li> </ul>	Yes
Issues relating to slope are addressed: 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°.	The maximum slope of the APZ is 12°.	Yes
APZs are managed and maintained to prevent the spread of a fire towards the building.	The APZ is managed in accordance with the requirements of Appendix 4 of PBP Pre-release 2018, and is wholly within the boundaries of the development site, and	<ul style="list-style-type: none"> <li>■ A landscaping plan (refer to <b>Appendix C</b>) has been designed to ensure that the APZ will be managed with a 47 m IPA and 20 m OPA in accordance with the requirements of Appendix 4 of PBP Pre-release 2018, which are also stated in Section 4.1.1 of this assessment. The full landscape package is appended to the Environmental Impact Statement for the proposal.</li> <li>■ The 67 m APZ is wholly within the boundaries of the Project Site.</li> </ul>	Yes
	Mechanisms are in place to provide for the maintenance of the APZ over the life of the development, and	Regular maintenance of the APZ will be undertaken by the owner/contractor for the life of the development.	Yes
	Other structures located within the APZ need to be located further than 6 m from the refuge building.	Bulk diesel fuel storage tanks installed below containerised generators will be located approximately 30 m from the hospital building.	Yes

The APZ that was mapped as part of the Concept Proposal and Stage 1 of the proposed Tweed Valley Hospital was determined to ensure that the proposed building could be appropriately positioned

within the Project Site. The approved APZ for Concept Proposal and Stage 1 therefore extended from the identified existing hazard vegetation towards the proposed building rather than from the building towards the hazard (refer to **Illustration 4.1**). Detailed design has since been completed and the APZ for Stage 2 therefore extends from the building towards the hazard. The proposal conforms with the Concept Proposal and Stage 1 (SSD 9575) conditions and stamped approved APZ plan.

## 4.2 Landscaping

Landscaping for the Tweed Valley Hospital will comprise different designs for each 'key place' within the hospital grounds such as courtyards, west entry, east entry, boulevards etc. Of most importance for bushfire purposes is the area to the north of the hospital building which will comprise the APZ. Turf Design (2019) state that the landscape design for these areas acknowledges the need to minimise ongoing maintenance inputs, and responds with the proposal for predominantly open lawns, with sporadic planting of a mix of appropriate trees species that connect with the landscape character of adjacent forest. Planting of individual trees with generous spacing enables efficient mowing maintenance. To connect with the patchwork design narrative and landscape context, the existing delineation of different paddocks across the site is defined by a change in lawn species, providing a subtle contrast of textures and green hues across the site. These different lawn species require delineation with another element to prevent migration of the lawns together, and loss of strong edge definition over time. A combination of stone boulders (salvaged from within the site in existing swales) and discontinuous shrub lines will define this edge.

It is noted that future expansion of the hospital may occur both west and east of the current proposed building footprint. To ensure future-proofing of the landscape, the above APZ requirements have been adhered to for the entire landscape interface with existing forest to the north (i.e. within a 67 m offset from the existing tree trunk line). Landscape plans are provided in **Appendix C**.

**Table 4.5** demonstrates compliance with the acceptable solutions of PBP Pre-release 2018 relating to landscaping. The full landscape package is appended to the Environmental Impact Statement for the proposal.

**Table 4.5 Demonstration of Compliance with Table 6.4a of PBP Pre-release 2018**

<i>Performance Criteria</i>	<i>Acceptable Solution</i>	<i>Application</i>	<i>Compliant with Acceptable Solution</i>
Landscaping is managed to minimise flame contact, reduce radiant heat levels, minimise embers and reduce the effect of smoke on residents and firefighters.	Landscaping is in accordance with 'Asset protection Zone standards' (see Appendix 4 of PBP Pre-release 2018).	A landscaping plan has been designed for the proposed development (refer to <b>Appendix C</b> ) in accordance with the requirements of Appendix 4 of PBP Pre-release 2018. The full landscape package is appended to the Environmental Impact Statement for the proposal.	Yes



### 4.3 Building Construction

The main building of the proposed Tweed Valley Hospital is classified under Section A3.2 of the Building Code of Australia (BCA) as Class 9a health care building. PBP Pre-release 2018 states that a construction level of BAL-12.5 under AS 3959 or National Association of Steel-framed Housing (NASH) standard and Table 7.4b is to be applied to all SFPP developments to minimise their vulnerability to ignition from radiant heat and ember attack. An extract of Additional NSW construction requirements from Table 7.4b of PBP Pre-release 2018 is provided in **Appendix D**.

STH Batesmart (2019) advise that the material palette for the hospital building varies across its elemental parts. The outer extremities of the hospital comprise a combination of precast concrete and profiled metal sheet finishes incorporating punch-hole windows. A variety of façade materials will be used for each separate area such as:

- Quadrant anchors: are to be clad in a lightweight metal façade
- Recessive support core: metal panel and glazed façade.

**Table 4.6** demonstrates compliance with the acceptable solutions of PBP Pre-release 2018 relating to construction.

**Table 4.6 Demonstration of Compliance with Table 6.4a of PBP Pre-release 2018**

<i>Performance Criteria</i>	<i>Acceptable Solution</i>	<i>Application</i>	<i>Compliant with Acceptable Solution</i>
The proposed building can withstand bushfire smoke 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 7.4b is applied.	The proposed hospital building is being designed to BAL-12.5 including additional NSW construction requirements from Table 7.4b. The full architectural package is appended to the Environmental Impact Statement for the proposal.	Yes

### 4.4 Access

The existing public road system in the locality provides alternate access or egress for firefighters and residents during a bushfire emergency if part of the road system is cut by fire.

The proposed Tweed Valley Hospital design incorporates the following access arrangements:

- A primary access point on Cudgen Road. This access point will ultimately be a signalised intersection, providing the main public inward and outward access onto the Project Site.
- An inward only access point (un-signalised) off Cudgen Road at the western end of the site for a service road that would provide access for emergency vehicles, service vehicles and staff.
- A secondary access point (inward only - un-signalised) off Cudgen Road east of the main entry, providing access to the eastern carparks (bypassing the main entry).
- An eastern access point via the roundabout connecting Cudgen Road and Turnock Street, facilitating ingress and egress.

Cudgen Road joins Tweed Coast Road approximately 670 m to the west (from central entry point) which in turn connects with the Pacific Motorway approximately 2.5 km to the north.

The proposed service road would be located between the hazard vegetation to the north and the rear of the proposed hospital building. Although referred to as a service road, this road is regarded as a non-perimeter road, open to public service vehicles (such as delivery vehicles), not just emergency service vehicles. This road is proposed to be 8.5 m wide including two by one metre wide cycle lanes.


Pedestrian access and egress for the proposed hospital building is available via the southern side of the building, which is the non-hazard side (i.e. away from the hazard vegetation to the north).

**Table 4.7** demonstrates compliance with the acceptable solutions of PBP Pre-release 2018 relating to access. The full engineering and road design package is appended to the Environmental Impact Statement for the proposal.

**Table 4.7 Demonstration of Compliance with Table 6.4b of PBP Pre-release 2018**

<b>Access Component</b>	<b>Performance Criteria</b>	<b>Acceptable Solution</b>	<b>Application</b>	<b>Compliant</b>
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.	All roads associated with the proposed development are two-wheel drive, all-weather roads.	Yes
		Access is provided to all structures and hazard vegetation.	The proposed service road would be located between the hazard vegetation to the north and the rear of the proposed hospital building.	Yes
		Traffic management devices are constructed to not prohibit access by emergency services vehicles.	No traffic management devices are proposed.	Yes
		Access roads must provide suitable turning areas in accordance with Appendix 3.	Road design is in accordance with Appendix 3 of PBP Pre-release 2018.	Yes
Access and 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.	The proposed design does not require any bridges/causeways.	Yes
Access to Water	There is appropriate access to water supply	Hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression.	Hydrants will be located outside of parking reserves and road carriageways.	Yes

<b>Access Component</b>	<b>Performance Criteria</b>	<b>Acceptable Solution</b>	<b>Application</b>	<b>Compliant</b>
		Hydrants are provided in accordance with AS 2419.1:2005.	The proposed road design includes hydrants which are provided in accordance with AS 2419.1:2005.	Yes
		There is suitable access for a Category 1 fire appliance to within four metres of the static water supply where no reticulated supply is available.	Reticulated water supply is available.	N/A
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	<p>There are two-way sealed roads, and eight metre carriageway width kerb to kerb.</p> <p>Parking is provided outside of the carriageway width.</p> <p>Hydrants are to be located clear of parking areas.</p> <p>There are through roads, and these are linked to the internal road system at an interval of no greater than 500 m.</p> <p>Curves of roads have a minimum inner radius of six metres.</p> <p>The maximum grade road is 15° and average grade is 10°.</p> <p>The road crossfall does not exceed 3°.</p> <p>A minimum vertical clearance of four metres to any overhanging obstructions, including tree branches, is provided.</p>	A perimeter road is not included in the proposed design; however, a service road (non-perimeter road) extends between the hazard vegetation to the north and the rear of the proposed hospital building.	N/A
Non-perimeter roads	Non-perimeter access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while occupants are evacuating.	<p>Minimum 5.5 m width kerb to kerb.</p> <p>Parking is provided outside of the carriageway width.</p> <p>Hydrants are located clear of parking areas.</p>	<p>■ The service road will be 6.5 m wide plus two by one metre wide cycle lanes.</p> <p>■ No parking is proposed along the proposed service road. A 8.5 m wide total carriageway width will be constructed.</p> <p>■ Hydrants will be located outside of parking</p>	<p>Yes</p> <p>Yes</p> <p>Yes</p>



Access Component	Performance Criteria	Acceptable Solution	Application	Compliant
			reserves and road carriageways.	
		There are through roads, and these are linked to the internal road system at an interval of no greater than 500 m.	<ul style="list-style-type: none"> <li>■ The service road is a through road of approximately 920 m.</li> <li>■ A carpark is accessed off the service road approximately 240 m from the eastern junction of the service road and Turnock Street.</li> </ul>	Yes
		Curves of roads have a minimum inner radius of six metres.	<ul style="list-style-type: none"> <li>■ Curves of roads have a minimum inner radius of six metres.</li> </ul>	Yes
		The maximum grade road is 15° and average grade is 10°.	<ul style="list-style-type: none"> <li>■ The maximum grade of proposed roads are 9°.</li> </ul>	Yes
		The road crossfall does not exceed 3°.	<ul style="list-style-type: none"> <li>■ Maximum road crossfall is 1.8°.</li> </ul>	Yes
		A minimum vertical clearance of four metres to any overhanging obstructions, including tree branches, is provided.	<ul style="list-style-type: none"> <li>■ A minimum vertical clearance of four metres will be provided to any overhanging obstructions, including tree branches.</li> </ul>	Yes

## 4.5 Services – Water, gas and electricity

JHA Consulting Engineers (2019) state that natural gas infrastructure is currently unavailable within close vicinity of the Project Site and there is no projected plan for expansion of this infrastructure in the near future to the Kingscliff area. It is proposed a private bulk underground Liquefied Petroleum Gas (LPG) from ELGAS to be utilised as the primary gas supply for domestic hot water, mechanical heating equipment, commercial cooking equipment and laboratories.

Fire services demands for the Tweed Valley Hospital have been calculated by JHA consulting Engineers as follows:

- Fire hydrants: 20 L/s.
- Fire sprinklers (OH3): 21.6 L/s.
- Fire drenchers: 9 L/s.

Therefore simultaneous fire demand is estimated to be 50.6 L/s.


Data for flow rates provided and the proposed building height validates that a storage tank and booster pump-sets are required for fire services. The reliability of the water main has been confirmed with Tweed Shire Council as reliable. A 423.5 kL fire water storage tank will be installed to minimise the peak draw-off from the Tweed Shire Council main (JHA Consulting Engineers 2019).

**Table 4.8** demonstrates compliance with the acceptable solutions of PBP Pre-release 2018 relating to access. The full engineering and hydraulics package is appended to the Environmental Impact Statement for the proposal.

**Table 4.8 Demonstration of Compliance with Table 6.4c of PBP Pre-release 2018**

<b>Performance Criteria</b>		<b>Acceptable Solution</b>	<b>Application</b>	<b>Compliant</b>
Water Supply	A water supply is provided for firefighting purposes.	Reticulated water is to be provided to the development, where available, or	Reticulated water will be provided to the development.	Yes
		A 10,000 litres minimum static water supply dedicated for firefighting purposes is provided for each occupied building where no reticulated water is available.	N/A as reticulated water is available.	N/A
	Water supplies are located at regular intervals and the water supply is accessible and reliable for firefighting operations.	Fire hydrant spacing, design and sizing comply with the Australian Standard AS2419.1:2005.	Fire hydrants along the service road will be spaced every 140 m. Fire hydrant spacing, design and sizing will comply with AS2419.1:2005.	Yes
		Hydrants are not located within any road carriageway.	Hydrants will be located within the road shoulders.	Yes
		Reticulated water supply to SFPPs uses a ring main system for areas with perimeter roads.	Ring main system has been designed.	Yes
	Flows and pressure are appropriate.	Fire hydrant flows and pressures comply with AS2419:2005.	Fire hydrant flows and pressures will comply with AS2419:2005.	Yes
	The integrity of the water supply is maintained.	All above-ground water service pipes external to the building are metal, including and up to any taps.	All above-ground water service pipes external to the building will be metal, including and up to any taps.	Yes
	A static water supply is provided for firefighting purposes in areas where reticulated water is not available.	<ul style="list-style-type: none"> <li>■ A connection for firefighting purposes is located within the IPA or non-hazard side and away from the structure; a 65 mm Storz outlet with a ball valve is fitted to the outlet, and</li> <li>■ Ball valve and pipes are adequate for water flow and are metal, and</li> <li>■ Supply pipes from tank to ball valve have the same bore size to ensure flow volume, and</li> <li>■ Underground tanks have an access hole of 200 mm to allow tankers to refill direct from the tank, and</li> </ul>	N/A as reticulated water is available.	N/A

Performance Criteria		Acceptable Solution	Application	Compliant
		<ul style="list-style-type: none"> <li>■ A hardened ground surface for truck access is supplied within four metres of the access hole, and</li> <li>■ Above-ground tanks are manufactured from concrete or metal, and</li> <li>■ Raised tanks have their stands constructed from non-combustible material or bush fire-resisting timber (see Appendix F AS 3959), and</li> <li>■ Unobstructed access can be provided at all times, and</li> <li>■ Tanks on the hazard side of a building are provided with adequate shielding for the protection of firefighters, and</li> <li>■ Underground tanks are clearly marked, and</li> <li>■ All exposed water pipes external to the building are metal, including any fittings, and</li> <li>■ Where pumps are provided, they are a minimum 5 hp or 3 kW petrol or diesel-powered pump, and are shielded against bush fire attack; any hose and reel for firefighting connected to the pump shall be 19 mm (internal diameter), and</li> <li>■ Fire hose reels are constructed in accordance with AS/NZS 1221:1997 Fire hose reels, and installed in accordance with AS 2441:2005 Installation of fire hose reels.</li> </ul>		
Electricity Services	Location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.	Where practicable, electrical transmission lines are underground.	Electrical services for the proposed development will be underground.	Yes
		Where overhead, electrical transmission lines are proposed as follows: <ul style="list-style-type: none"> <li>■ lines are installed with short pole spacing (30 m), unless crossing gullies, gorges or riparian areas, and</li> <li>■ 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.</li> </ul>	N/A	N/A
Gas Services	Location and design of gas services will not	Reticulated or bottled gas is installed and maintained in accordance with AS/NZS	Bottled gas will be installed and maintained in	Yes



<b>Performance Criteria</b>	<b>Acceptable Solution</b>	<b>Application</b>	<b>Compliant</b>
lead to ignition of surrounding bushland or the fabric of buildings.	1596:2014 and the requirements of relevant authorities, and metal piping is used.	accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping will be used.	
	All fixed gas cylinders are kept clear of all flammable materials to a distance of 10 m and shielded on the hazard side.	Fixed gas cylinders will be located on the northern side of the hospital building and shielded to the north. One bulk underground LPG tank will also be installed.	Yes
	Connections to and from gas cylinders are metal.	Connections to and from gas cylinders will be metal.	Yes
	If gas cylinders need to be kept close to the building, safety valves are directed away from the building and at least two metres away from any combustible material, so they do not act as a catalyst to combustion.	Gas cylinders will be kept close to the building, safety valves will be directed away from the building and at least two metres away from any combustible material.	Yes
	Polymer-sheathed flexible gas supply lines to gas meters adjacent to buildings are not used.	Supply lines to gas meters will be copper.	Yes
	Above-ground gas service pipes external to the building are metal, including and up to any outlets.	Above-ground gas service pipes external to the building will be metal, including and up to any outlets.	Yes

## 4.6 Emergency Management Planning

Hospitals require careful emergency planning due to the extent of patients with a range of ages and mental/ physical capacity. An Emergency and Evacuation Management Plan prepared in accordance with Section 6.4.4 (Emergency and Evacuation Planning) of PBP Pre-release 2018 will be prepared prior to occupation of the proposed hospital.

The bushfire emergency and evacuation management plan for the site will then be approved by the relevant authority in accordance with the RFS Guidelines for the Preparation of Emergency/ Evacuation Plan. The plan should be regularly monitored and amended when required and details of



its contents included during induction of new staff members. Detailed plans of all emergency assembly areas including on and offsite arrangements as stated in AS 3745-2010 should be clearly displayed and an annual trial emergency evacuation conducted.

**Table 4.9** demonstrates compliance with the acceptable solutions of PBP Pre-release 2018 relating to emergency management.

**Table 4.9 Demonstration of Compliance with Table 6.4d of PBP Pre-release 2018**

<b>Performance Criteria</b>	<b>Acceptable Solutions</b>	<b>Application</b>	<b>Compliant</b>
A bushfire emergency and evacuation management plan is prepared.	Bush fire emergency management and evacuation plan is prepared consistent with the: <ul style="list-style-type: none"> <li>■ The NSW RFS document: A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan</li> <li>■ NSW RFS Schools Program guide (where applicable)</li> <li>■ Australian Standard AS 3745:2010 Planning for emergencies in facilities</li> <li>■ Australian Standard AS 4083:2010 Planning for emergencies – Health care facilities (where applicable).</li> </ul>	A bushfire emergency management and evacuation plan will be prepared for the proposed development in accordance with the required documents.	Yes
	The emergency and evacuation management plan should include a mechanism for the early relocation of occupants. Note: A copy of the bushfire emergency management plan should be provided to the Local Emergency Management Committee for its information prior to occupation of the development.	The emergency and evacuation management plan will include a mechanism for the early relocation of occupants.	Yes
Stable management arrangements are established for consultation and implementation of the bushfire emergency and evacuation management plan.	An Emergency Planning Committee is established to consult with residents (and their families in the case of aged care accommodation and schools) and staff in developing and implementing an Emergency Procedures Manual.	An Emergency Planning Committee comprising hospital staff will be formed to prepare and implement an Emergency Procedures Manual upon occupation of the hospital.	Yes
	Detailed plans of all emergency assembly areas including 'on-site' and 'off-site' arrangements as stated in AS 3745 are clearly displayed, and an annual (as a minimum) trial emergency evacuation is conducted.	Emergency assembly areas will be clearly displayed. Annual emergency evacuation trials will be conducted.	Yes



## 5. Recommendations and Conclusion

### 5.1 Recommendations

It is recommended that the following conditions be included in the consent for approval:


- The proposed hospital building shall be built to BAL-12.5.
- The proposed hospital building shall include a 67m APZ to the north and north-west, divided into a 47 m IPA and 20 m OPA.
- Landscaping is to be in accordance with Appendix 4 of PBP Pre-release 2018.
- Access provisions are to comply with Table 6.4b of PBP Pre-release 2018.
- Water, electricity and gas supply services are to comply with Table 6.4c of PBP Pre-release 2018.
- An Emergency and Evacuation Management Plan be prepared for the proposal.

### 5.2 Conclusion

This Bushfire Hazard Assessment, for the proposed Tweed Valley Hospital, which is identified as SFPP, has taken into consideration the proposed development, landscaping, vegetation, effective slope and FDI detailed within PBP 2006/PBP 2018 (pre-release). Adequate and appropriate bushfire hazard protection measures are available and can be implemented to facilitate the proposed development on Lot 11 DP 1246853 at 771 Cudgen Road, Cudgen, NSW. The proposal generally conforms to the standards set out in PBP 2006/PBP Pre-release 2018 and complies with Part 4 Division 4.7 of the EP&A Act. Furthermore, **Table 5.1** demonstrates that the proposal complies with the specific objectives of SFPP development.

**Table 5.1 Specific SFPP Objectives of PBP Pre-release 2018**

<i>Specific Objectives</i>	<i>Application</i>	<i>Compliant</i>
Minimise levels of radiant heat, smoke and ember attack through increased APZ, building design and siting.	<ul style="list-style-type: none"> <li>■ An APZ complying with Condition B19 of SSD9575 as marked in the approved plans and generally divided into a 47 m inner protection area (IPA) and 20 m outer protection area (OPA).</li> <li>■ The proposed hospital building is being designed to BAL-12.5 including additional NSW construction requirements from Table 7.4b.</li> <li>■ The proposed hospital building is sited to maximise distance between the hazard vegetation and take advantage of access from Cudgen Road and Turnock Street.</li> </ul>	Yes
Provide an appropriate operational environment for emergency service personnel during firefighting and emergency management.	<ul style="list-style-type: none"> <li>■ A 6.5 m wide (plus one metre shoulders) service road will be located between the hazard vegetation to the north and the rear of the proposed hospital building.</li> <li>■ APZ complying with Condition B19 of SSD9575 as marked in the approved plans and generally divided into a 47 m inner protection area (IPA) and 20 m outer protection area (OPA).</li> </ul>	Yes
Ensure the capacity of existing infrastructure (such as roads and utilities) can handle the increase in	<ul style="list-style-type: none"> <li>■ A traffic and access assessment has been prepared for the proposal. This assessment determined that the existing road system has</li> </ul>	Yes



<b>Specific Objectives</b>	<b>Application</b>	<b>Compliant</b>
demand during emergencies as a result of the development.	<p>capacity to handle increased demand during emergencies (Bitzios Consulting 2019).</p> <ul style="list-style-type: none"> <li>■ The proposed development will be serviced by a reticulated water supply with flows and pressures that comply with AS 2419:2005.</li> </ul>	
Ensure emergency evacuation procedures and management which provides for the special characteristics and needs of occupants.	<ul style="list-style-type: none"> <li>■ A bushfire emergency and evacuation management plan will be prepared which will take into account the special needs of the occupants.</li> <li>■ Detailed plans of all emergency assembly areas including 'onsite' and 'offsite' arrangements as stated in AS 3745-2010 will be clearly displayed throughout the Project site.</li> <li>■ An annual trial emergency evacuation will be conducted.</li> <li>■ Assembly areas will be clearly sign-posted throughout the hospital.</li> <li>■ The broader site comprises largely of managed land distant from the hazard vegetation.</li> <li>■ Designated areas will be nominated on-site as suitable refuge areas.</li> </ul>	Yes

It is therefore recommended that the proposed development is approved and conditioned in accordance with the recommendations provided within this assessment.



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- Standards Australia (2018). *Construction of buildings in bushfire-prone areas, AS 3959*. Standards Australia International Ltd, Sydney.
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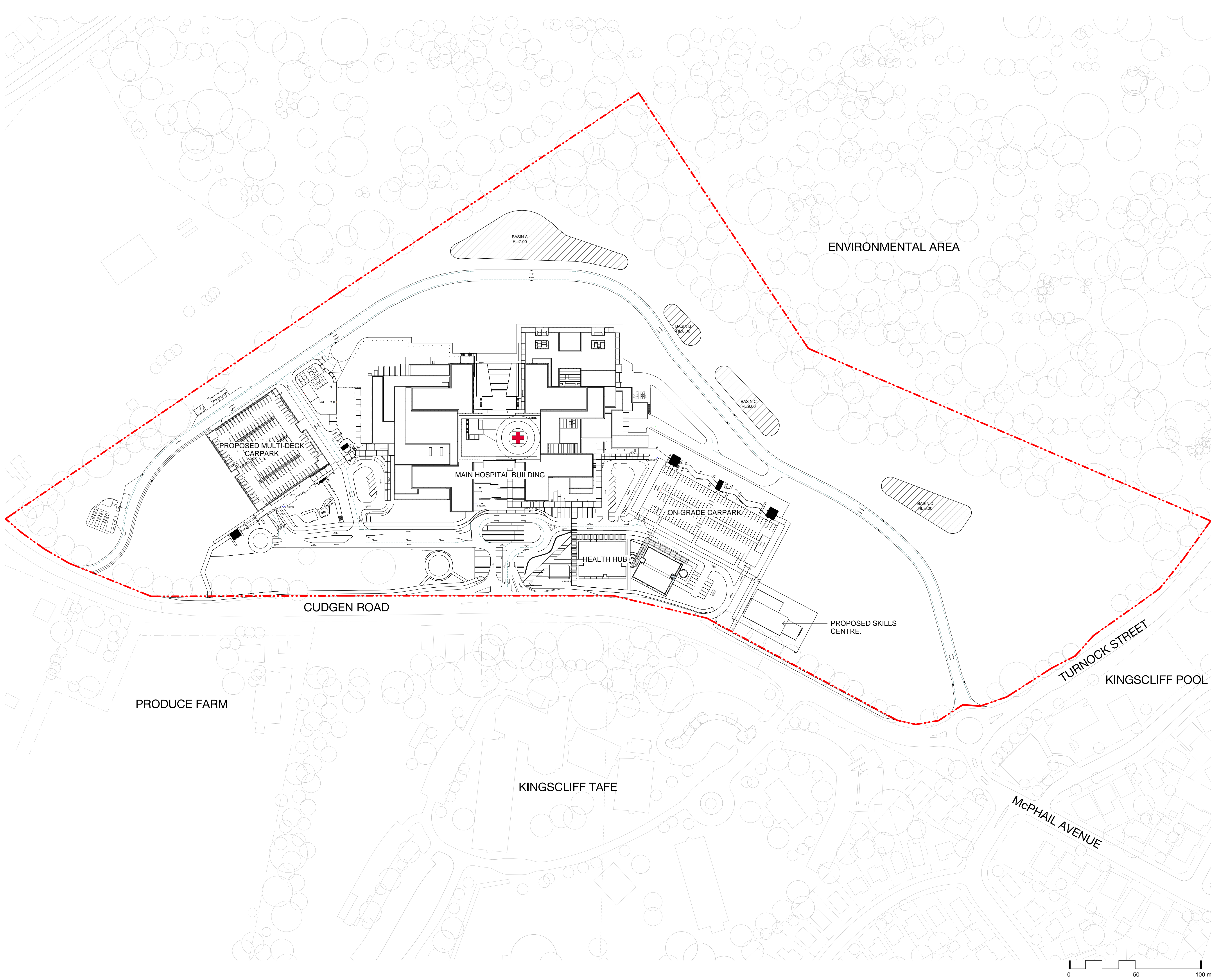
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## **Appendix A**

# **Proposed Plans**





KEY PLAN

REV	DESCRIPTION	DRN	DATE
1	ISSUED FOR S502	BM	06/09/19

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PROJECT MANAGER

TSA  
MANAGEMENT

CLIENT

Health  
Infrastructure | Health  
Northern NSW  
Local Health District

PROJECT

TWEED VALLEY HOSPITAL

DRAWING TITLE

PROPOSED SITE PLAN

SCALE	DATE	DRAWN BY	CHECKED
1 : 1250@ A1	06/09/19	BM	BS
1 : 2500@ A3			
PROJECT No	DRAWING No	REVISION	
10363	STB-AR-SKE-PRW-1000015A	1	





## Appendix B

# Bushfire Attack Calculator Results



Calculated August 7, 2019, 12:36 pm (BALc v.4.8)

**Tweed Valley Hospital (PBP 2006)**

**Bushfire Attack Level calculator - AS3959-2009 (Method 2)**

Inputs		Outputs	
Fire Danger Index	80	Rate of spread	2.4 km/h
Vegetation classification	Forest	Flame length	19.8 m
Surface fuel load	25 t/ha	Flame angle	77 °
Overall fuel load	35 t/ha	Panel height	19.29 m
Vegetation height	n/a	Elevation of receiver	9.640000000000001 m
Effective slope	0 °	Fire intensity	43,400 kW/m
Site slope	0 °	Transmissivity	0.76
Distance to vegetation	67 m	Viewfactor	0.1067
Flame width	100 m	Radiant heat flux	9.07 kW/m²
Windspeed	n/a	Bushfire Attack Level	BAL-12.5
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,200 K		

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005





Calculated August 7, 2019, 12:35 pm (BALc v.4.8)

**Tweed Valley Hospital (PBP Pre-release 2018)**

**Bushfire Attack Level calculator - AS3959-2009 (Method 2)**

Inputs		Outputs	
Fire Danger Index	80	Rate of spread	2.11 km/h
Vegetation classification	Forest	Flame length	18.05 m
Surface fuel load	22 t/ha	Flame angle	78 °
Overall fuel load	36.1 t/ha	Panel height	17.66 m
Vegetation height	n/a	Elevation of receiver	8.83 m
Effective slope	0 °	Fire intensity	39,392 kW/m
Site slope	0 °	Transmissivity	0.76
Distance to vegetation	67 m	Viewfactor	0.09710000000000001
Flame width	100 m	Radiant heat flux	8.25 kW/m²
Windspeed	n/a	Bushfire Attack Level	BAL-12.5
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,200 K		

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

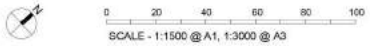
Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005



## **Appendix C**

# **Landscaping Plan**





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5	16.08.2019	FOR INFORMATION	AR	MC
4	09.08.2019	FOR INFORMATION	AR	MC
3	02.08.2019	FOR INFORMATION	AR	MC
2	08.07.2019	FOR INFORMATION	HH	MC
1	19.06.2019	70% SCHEMATIC DESIGN	AR	MC

Rev	Date	Description	Drawn	Checked
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Client

**NSW** Health Infrastructure | **Health** Northern NSW Local Health District

Project

**TWEED VALLEY HOSPITAL DEVELOPMENT**

Drawing Title

**Site-wide Landscape Plan**

Drawing Status

**SSD2**

Scale:	As indicated @A1	Plot Date:	
Project No.	Drawing No.	Revision	
1719	LS-DWG -10-001	7	

## LEGEND


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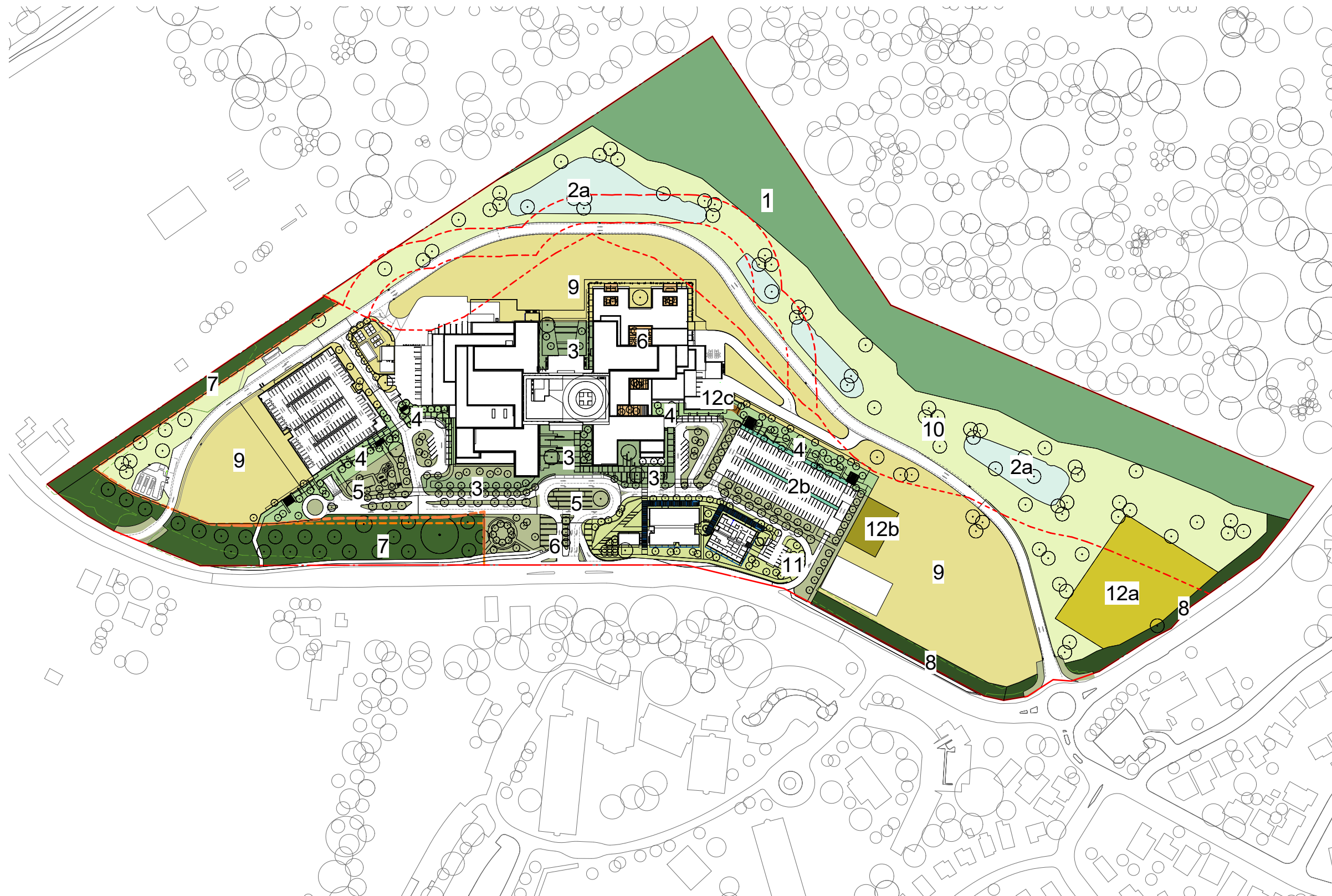


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## LEGEND

1. Retained forest - Restored and enhanced in accordance with Biodiversity Management Plan	4. Green Spine	8. Embellished Buffer - Embellished in accordance with Biodiversity Management Plan	12a. Existing Orchard
2a. Bioretention planting	5. Feature Entries/Hospital landscape fringe	9. Hydromulched/drill seeded lawn (Exotic grass-mowing maintenance eg. couch, buffalo)	12b. Community Garden Opportunity
2b. Rain Gardens	6. Landscaped courtyards within hospital envelope	10. Lawn with clusters of native planting	12c. Therapy garden Opportunity
3. Hospital landscape	7. Vegetated buffer	11. Health Hub / Support Building	

8	16.09.2019	SSD2	AR	MH
7	28.08.2019	FOR INFORMATION	AR	MC
6	16.08.2019	FOR INFORMATION	AR	MC
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## TWEED VALLEY HOSPITAL DEVELOPMENT

### Zonal Plan

Drawing Status

SSD2

Scale: As indicated @A1 Plot Date

Project No. Drawing No. Revision

1719 LS-DWG -10-003 8

NOT FOR CONSTRUCTION



## Appendix D

# Additional NSW Construction Requirements



**The following is reproduced from Addendum: Appendix 3 (RFS 2010, pp8-10)**

*Planning for Bush Fire Protection* is designed to provide for improved bush fire protection outcomes through the planning system, whereas the construction requirements are established through the operation of the BCA. However, based on a review of AS3959-2009 and recent developments through the interim findings from the Victorian Royal Commission, the RFS has concerns over the levels of safety for ember protection at lower BAL levels (BALs 12.5 and 19) provided by AS3959-2009. The RFS is concerned that by adopting the new Standard there would be a reduction in safety created from that afforded by the previous NSW application of AS3959-1999 in relation to ember protection. In this regard, the RFS will aim to maintain the safety levels previously provided by AS3959-1999. In particular, the areas of concern arise from requirements for:

- Sarking
- Sub floor screening
- Floors
- Verandas, Decks, Steps, Ramps And Landings.

In addition, in order to provide a suitable combination of bush fire protection measures the NSW Rural Fire Service will, as part of the planning assessment process, recommend/require additional construction requirements beyond those prescribed in AS3959-2009 as deemed appropriate.

Planning requirements for grasslands are contained within the main body of PBP.

As part of the planning requirements, the following will create part of the suite of protection measures required to form compliance with *Planning for Bush Fire Protection*.

## **SARKING**

Any sarking used for BAL-12.5, BAL-19, BAL-29 or BAL-40 shall be:

- a. Non-combustible; or
- b. Breather-type sarking complying with AS/NZS 4200.1 and with a flammability index of not more than 5 (see AS1530.2) and sarked on the outside of the frame; or
- c. An insulation material conforming to the appropriate Australian Standard for that material.


## **SUBFLOOR SUPPORTS**

For BAL-12.5 and BAL-19, Clause 5.2 and 6.2 shall be replaced by the provisions of Clause 7.2. In this regard, Clause 7.2 states:

### **“7.2 SUBFLOOR SUPPORTS**

*This Standard does not provide construction requirements for subfloor supports where the subfloor space is enclosed with—*

- a. *A wall that complies with ..... (clause 5.4 or 6.4 as appropriate); or*
- b. *A mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion resistant steel, bronze or aluminium; or*
- c. *A combination of items (a) and (b) above.*



Where the subfloor space is unenclosed, the support posts, columns, stumps, piers and poles shall be—

- i. Of non-combustible material; or
- ii. Of bushfire-resisting timber (see appendix f); or
- iii. A combination of items (i) and (ii) above.

*NOTE: This requirement applies to the principal building only and not to verandas, decks, steps, ramps and landings (see Clause 7.7)."*

## **ELEVATED FLOORS**

For BAL-12.5 and BAL-19, Clause 5.3 and 6.3 shall be replaced by the provisions of clause 7.3. In this regard, clause 7.3.2 states:

### *"7.3.2 Elevated floors*

#### *7.3.2.1 Enclosed subfloor space*

*This Standard does not provide construction requirements for elevated floors, including bearers, joists and flooring, where the subfloor space is enclosed with—*

- a. *A wall that complies with ..... (clause 5.4 or 6.4 as appropriate); or*
- b. *A mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion resistant steel, bronze or aluminium; or*
- c. *A combination of items (a) and (b) above.*

#### *7.3.2.2 Unenclosed subfloor space*

*Where the subfloor space is unenclosed, the bearers, joists and flooring, less than 400 mm above finished ground level, shall be one of the following:*

*Materials that comply with the following:*

- a. *Bearers and joists shall be—*
  - i. *Non-combustible; or*
  - ii. *Bushfire-resisting timber (see appendix f); or*
  - iii. *A combination of items (a) and (b) above.*
- b. *Flooring shall be—*
  - i. *Non-combustible; or*
  - ii. *Bushfire-resisting timber (see appendix f); or*
  - iii. *Timber (other than bushfire-resisting timber), particleboard or plywood flooring where the underside is lined with sarking-type material or mineral wool insulation; or*
  - iv. *a combination of any of items (a), (b) or (c) above. Or*
- c. *A system complying with AS 1530.8.1*

*This Standard does not provide construction requirements for elements of elevated floors, including bearers, joists and flooring, if the underside of the element is 400 mm or more above finished ground level."*



## VERANDAS, DECKS, STEPS, RAMPS AND LANDINGS

For BAL -12.5 and BAL-19, Clause 5.7 and 6.7 shall be replaced by the provisions of clause 7.7. In this regard, clause 7.7 states:

### *“7.7 VERANDAS, DECKS, STEPS, RAMPS AND LANDINGS*

#### *7.7.1 General*

*Decking may be spaced.*

*There is no requirement to enclose the subfloor spaces of verandas, decks, steps, ramps or landings.*

#### *7.7.2 Enclosed subfloor spaces of verandas, decks, steps, ramps and landings*

##### *7.7.2.1 Materials to enclose a subfloor space*

*The subfloor spaces of verandas, decks, steps, ramps and landings are considered to be ‘enclosed’ when —*

- a. The material used to enclose the subfloor space complies with .... (clause 5.4 or 6.4 as appropriate); and*
- b. All openings greater than 3 mm are screened with a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.*

##### *7.7.2.2 Supports*

*This Standard does not provide construction requirements for support posts, columns, stumps, stringers, piers and poles.*

##### *7.7.2.3 Framing*

*This Standard does not provide construction requirements for the framing of verandas, decks, ramps or landings (i.e., bearers and joists).*

##### *7.7.2.4 Decking, stair treads and the trafficable surfaces of ramps and landings*

*Decking, stair treads and the trafficable surfaces of ramps and landings shall be—*

- a. Of non-combustible material; or*
- b. Of bushfire-resisting timber (see appendix f); or*
- c. A combination of items (a) and (b) above.*


#### *7.7.3 Unenclosed subfloor spaces of verandas, decks, steps, ramps and landings*

##### *7.7.3.1 Supports*

*Support posts, columns, stumps, stringers, piers and poles shall be—*

- a. Of non-combustible material; or*
- b. Of bushfire-resisting timber (see appendix f); or*
- c. A combination of items (a) and (b) above.*





#### 7.7.3.2 Framing

*Framing of verandas, decks, ramps or landings (i.e., bearers and joists) shall be—*

- a. Of non-combustible material; or*
- b. Of bushfire-resisting timber (see appendix f); or*
- c. A combination of items (a) and (b) above.*

#### 7.7.3.3 Decking, stair treads and the trafficable surfaces of ramps and landings

*Decking, stair treads and the trafficable surfaces of ramps and landings shall be—*

- a. Of non-combustible material; or*
- b. Of bushfire-resisting timber (see appendix f); or*
- c. A combination of items (a) and (b) above.*

#### 7.7.4 Balustrades, handrails or other barriers

*Those parts of the handrails and balustrades less than 125 mm from any glazing or any combustible wall shall be—*

- a. Of non-combustible material; or*
- b. Bushfire-resisting timber (see appendix f); or*
- c. A combination of items (i) and (ii) above.*

*Those parts of the handrails and balustrades that are 125 mm or more from the building have no requirements.*