PROJECT 1940: JOHN HUNTER HOSPITAL

FIGURE 9: DIGITAL ELEVATION MODEL / SLOPE

4/03/2021

BUSHFIRE PLANNING AUSTRALIA

Legend

- Proposed and Existing Layout
- 1st Order Stream
- Contours (1m)
- 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

Elevation (m)

105m

25m

N

W E

S

0 20 40 80

Meters

1:1,500

MJD Environmental

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.

2.2. Significant Environmental Features

Umwelt Environmental Consultants have completed a comprehensive ecological assessment and identified all relevant environmental features throughout the impact area and also the surrounding area. The recommended bushfire mitigation measures have considered the potential impact on any significant environmental features and have been adjusted to minimise any adverse impact; such as offsetting the required APZ 10m from the existing riparian zone.

2.3. Threatened Species, populations or ecological communities

The ecological investigation completed by Umwelt did record at least one threatened species, however it is expected the ecological impact on these species can be appropriately managed.

2.4. Aboriginal Objects

A search of the AHIMS database (results contained in **Appendix B**) revealed there are no Aboriginal sites or places recorded in or near the subject site.

2.5. Results

The dominant vegetation throughout the site was identified as a *forest*; being the Hunter Macleay Dry Sclerophyll forest. However surrounding the JHHC the vegetation was observed to suffer from edge effects which has resulted in weed infestation; including in the vicinity of the proposed ASB.

The final bushfire hazard assessment defining vegetation classifications and effective slope are detailed in **Table 6** and **7.** The results are presented in the Bushfire Hazard Assessment figure contained in **Figure 10**.

Table 6: Vegetation formations

Transect	Vegetation or Other Infrastructure	Vegetation Classification (PBP 2019)	Vegetation Classification (AS3959-2018)	Surface/ Overall Fuel Load (RFS)
T1	Remnant vegetation, riparian zone, proposed detention basin, grassy batters	*Forest* (Hunter Macleay Dry Sclerophyll Forest and North Coast Wet Sclerophyll Forest)	A - Forest	>6 t/ha - 22 t/ha > 6 t/ha – 35.98 t/ha
T2	Remnant vegetation, grassy batters	*Forest* (Hunter Macleay Dry Sclerophyll Forest)	A - Forest	14 t/ha 24.6 t/ha
T3	Remnant vegetation, narrow riparian corridor	*Forest* (Hunter Macleay Dry Sclerophyll Forest)	A - Forest	14 t/ha 24.6 t/ha
T4	Remnant vegetation, narrow riparian corridor	*Forest* (Hunter Macleay Dry Sclerophyll Forest)	A - Forest	14 t/ha 24.6 t/ha
T5	Remnant vegetation, narrow riparian corridor	*Forest* (Hunter Macleay Dry Sclerophyll Forest)	A - Forest	14 t/ha 24.6 t/ha
T6	Remnant vegetation, narrow riparian corridor	*Forest* (Hunter Macleay Dry Sclerophyll Forest)	A - Forest	14 t/ha 24.6 t/ha

Table 7: Slope Analysis

Transect	Vegetation Classification	Slope
T1	Forest & grassland	5.2° downslope
T2	Forest	5.9° downslope
T3	Forest	-6.6° upslope
T4	Forest	-8.6° upslope
T5	Forest	-2.9° upslope
T6	Forest	7.4° downslope
T7	Forest	1.1° downslope

PROJECT 1940: JOHN HUNTER HOSPITAL

FIGURE 10: SLOPE & VEGETATION ASSESSMENT

2/03/2021

BUSHFIRE PLANNING AUSTRALIA

Legend

- Elevation (m)
- Transects
- Contours (1m)
- Proposed and Existing Layout
- 1st Order Stream
- Proposed Acute Services Building
- Slope Classification Buffer (100m)
- Vegetation Classification Buffer (140m)
- Cadastral Boundaries
- Required Asset Protection Zone
- 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

N W E S

0 30 60 120

Meters

1:2,000

MJD Environmental

Aerial: NearMap (2019) | Data: MJD Environmental, BPA (2021), LPI (2019) | Datum/Projection: GDA 1994 MGA Zone 56 | Date: 2/03/2021 | Version 12 | GIS\19050 John Hunter Hospital| This plan should not be relied upon for critical design dimensions.

3. Bushfire Protection Measures

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

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

3.1. Asset Protection Zones

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

An APZ can include the following:

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

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

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

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

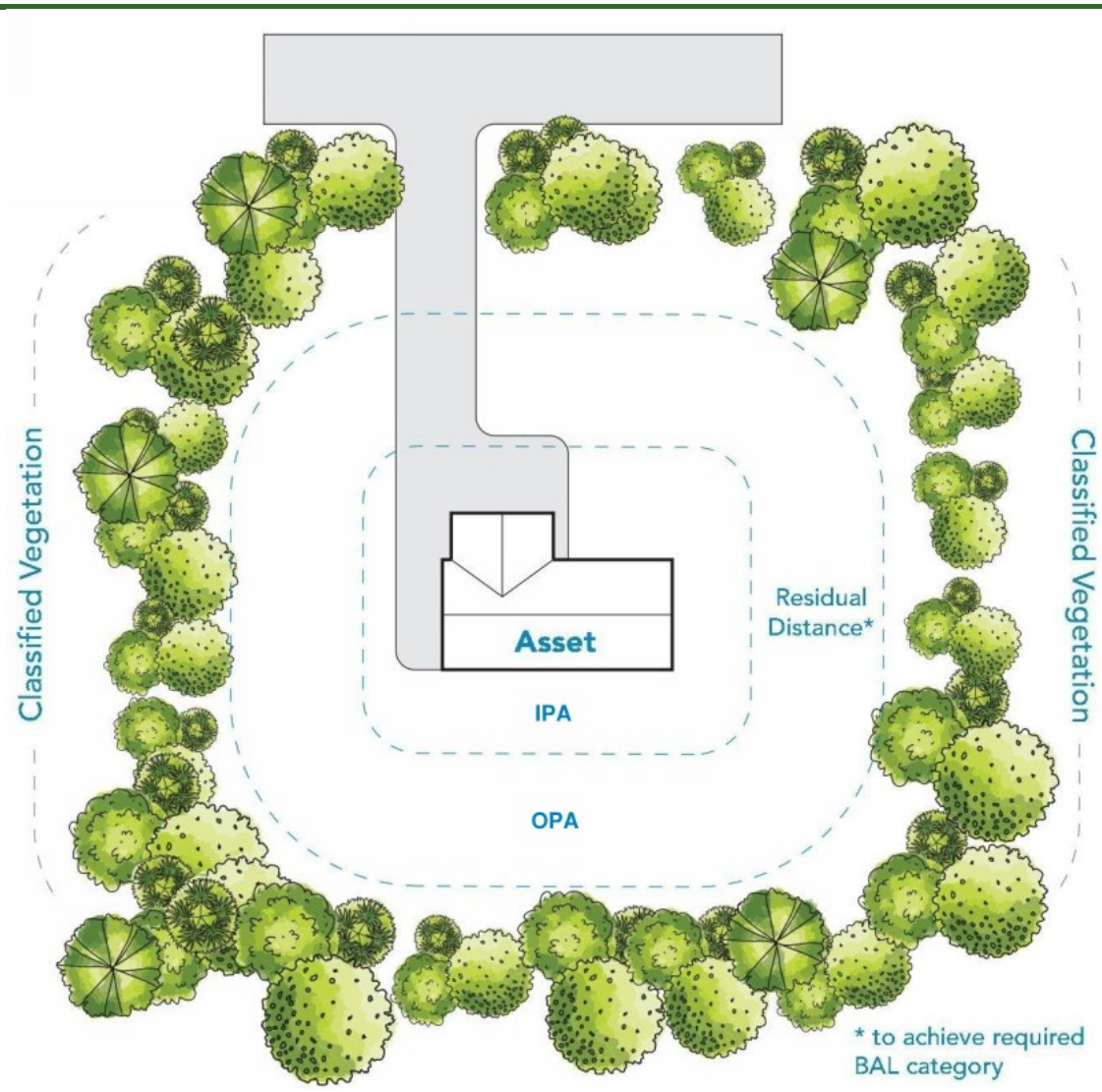


Figure 11: Asset Protection Zone

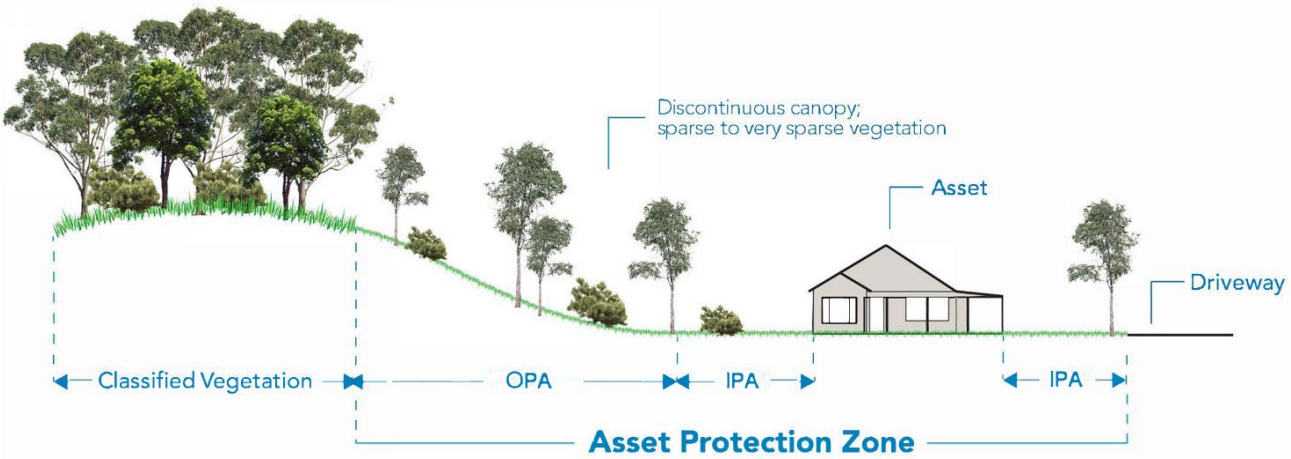


Figure 12: APZ profile

3.1.1. Special Fire Protection Purposes

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

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

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

3.1.2. Determining the Appropriate Setbacks

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

Refer to **Table 8** for the required APZs. **Table 9** details the Bushfire Attack Level (BALs) distances.The required APZs are also indicated in **Figure 13**.

Table 8: Recommended Asset Protection Zone

Transect	Vegetation Classification (PBP 2019)	Slope	APZ (PBP 2019)	APZ (Method 2 @ 10kW/m^2)	APZ provided
T1	Forest/ grassland	5.2° downslope	93m	61m	50m APZ + 45m grassland
T2	Forest	5.9° downslope	93m	63m	71m
T3	Forest	-6.6° upslope	67m	40m	>67m
T4	Forest	-8.6° upslope	67m	38m	>65m
T5	Forest	-2.9° upslope	67m	42m	>57m
T6	Forest	7.4° downslope	93m	66m	n/a (within 52m APZ)
T7	Forest	1.1° downslope	79m	52m	52m

The recommended APZs have been designed to utilise the features and siting of the ancillary works associated with the ASB; such as the stormwater basins, road batters and the construction access road (fire trail). Furthermore, the APZs have also been sited to avoid disturbing the riparian zone adjoining the First Order Stream that runs through the site in a northerly direction. A 10m offset has been provided from the watercourse to ensure the vegetation within the riparian zone is not disturbed. This results in a variable APZ following the 10m offset that continues south (upstream) until the junction with the new construction access road (to be used as a long-term fire trail). An APZ up to 52m is provided to the eastern elevation of the ASB to provide sufficient separation from the small, isolated patch of forest vegetation between the existing and proposed fire trails.

PROJECT 1940: JOHN HUNTER HOSPITAL

FIGURE 13: REQUIRED ASSET PROTECTION ZONES

AS3959-2019 Method 2

2/03/2021

BUSHFIRE PLANNING AUSTRALIA

Legend

- 1st Order Stream
- Proposed and Existing Layout
- Proposed Acute Services Building
- Cadastral Boundaries
- Required Asset Protection Zone
- 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

N W E S

0 20 40 80

Meters

1:1,500

MJD Environmental

Aerial: NearMap (2019) | Data: MJD Environmental (2020), LPI (2019) | Datum/Projection: GDA 1994 MGA Zone 56 | Date: 2/03/2021 | Version 9 | GIS\19050 John Hunter Hospital| This plan should not be relied upon for critical design dimensions.

3.2. Access

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

The proposed development incorporates an extensive upgrade to the internal road network for the entire JHHC which provides an additional containment line and defendable space between the assets within the campus and the primary bushfire hazard to the north and west.

The new east-west link to the north of the JHHC will be provided with a low fuel buffer a minimum of 10m wide on either side of the road. The buffer will not be managed, however the landscaping palette and density will be commensurate with a *grassland*, thereby reducing the level of radiant heat generated from the vegetation.

The initial phase of the internal road network includes the construction of the western portion of the northern road; from the roundabout near the interchange along to the eastern side of the HMRI car park. This phase will include a direct connection to the existing fire trail that is generally aligned with the overhead transmission line easement.

The subsequent phase; know as the north road east phase, will involve the connection of the north road across to Jacaranda Drive, opposite the Newcastle Private Hospital.

It is intended that upon commencing operation, the ASB will be provided with 2 permanent public roads to access and egress the building. Direct access for private vehicles to the car park levels and emergency services is provided from Kookaburra Circuit **(Figure 15**). Additional access is provided to the sub-basement level car parks is from the new road to the north that connects with the new east-west link road.

The existing fire trail located within the development footprint that connects to Jacaranda Drive will be upgraded and utilised by construction traffic during the construction phase of the project. Following operational commencement of the ASB, the construction road will be re-assigned as a fire trail that will directly connect the ASB with Jacaranda Drive.

Whilst the planning approval process of the last stage of the Newcastle Inner City Bypass is currently underway, it is expected that the new bypass and associated interchange with the JHHC will be operational in line with the opening of the ASB.

All new roads; including the proposed upgraded fire trail will be constructed in accordance with Table 6.8b of PBP 2019.

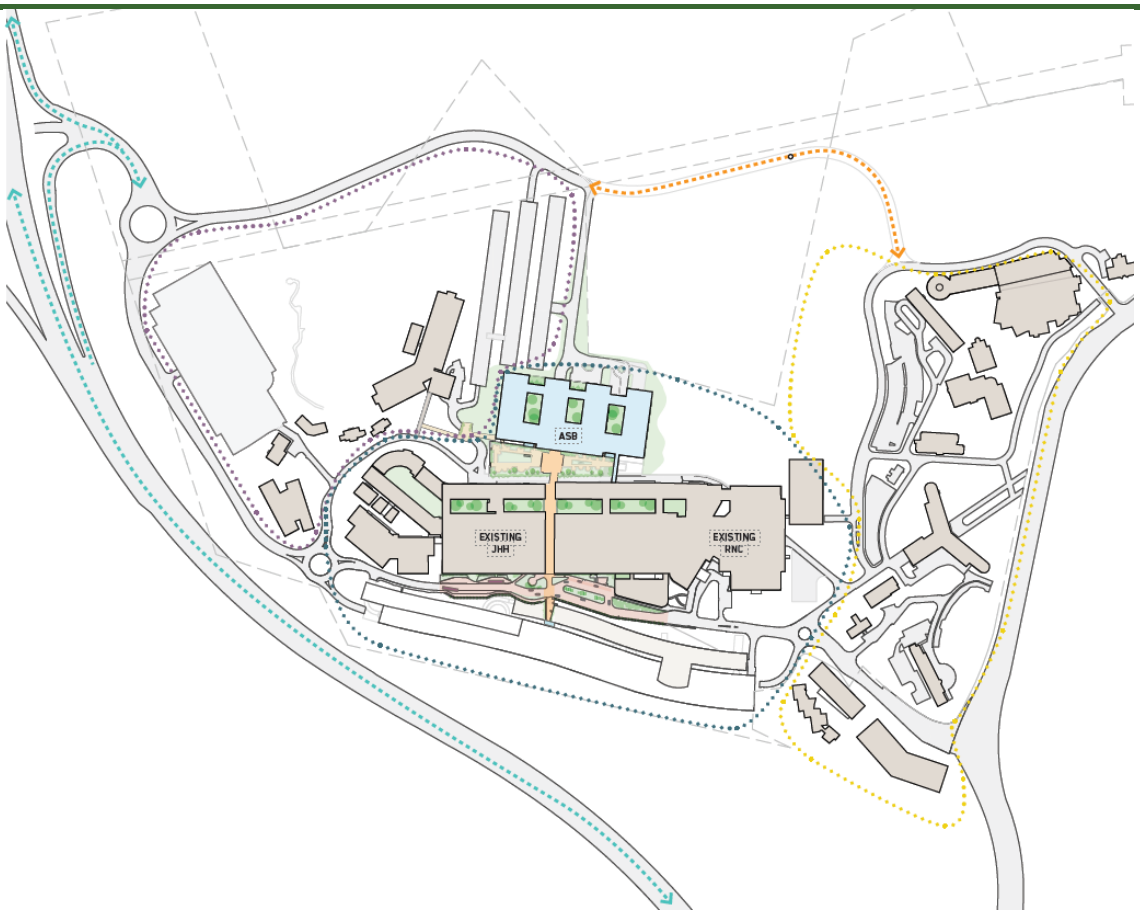


Figure 14: Indicative internal road network and interchange with Inner City Bypass

Figure 15: Indicative cross- section of ASB indicating vehicle access to Kookaburra Circuit

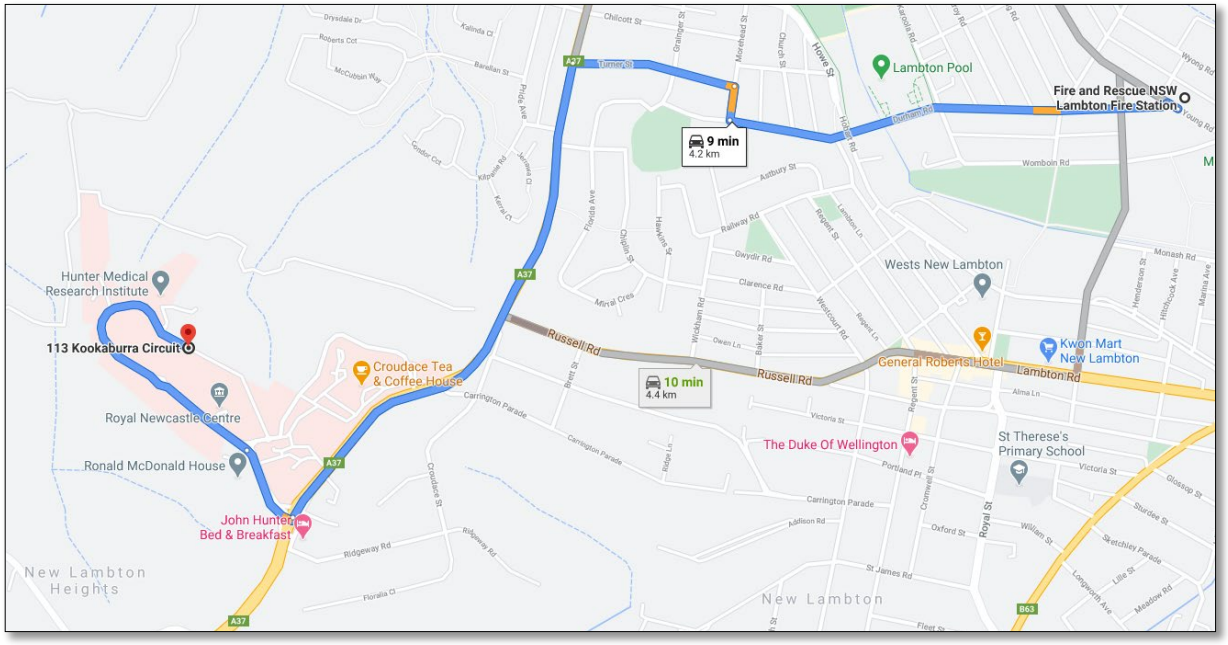


Figure 16: NSW Fire & Rescue – Young Road, Lambton

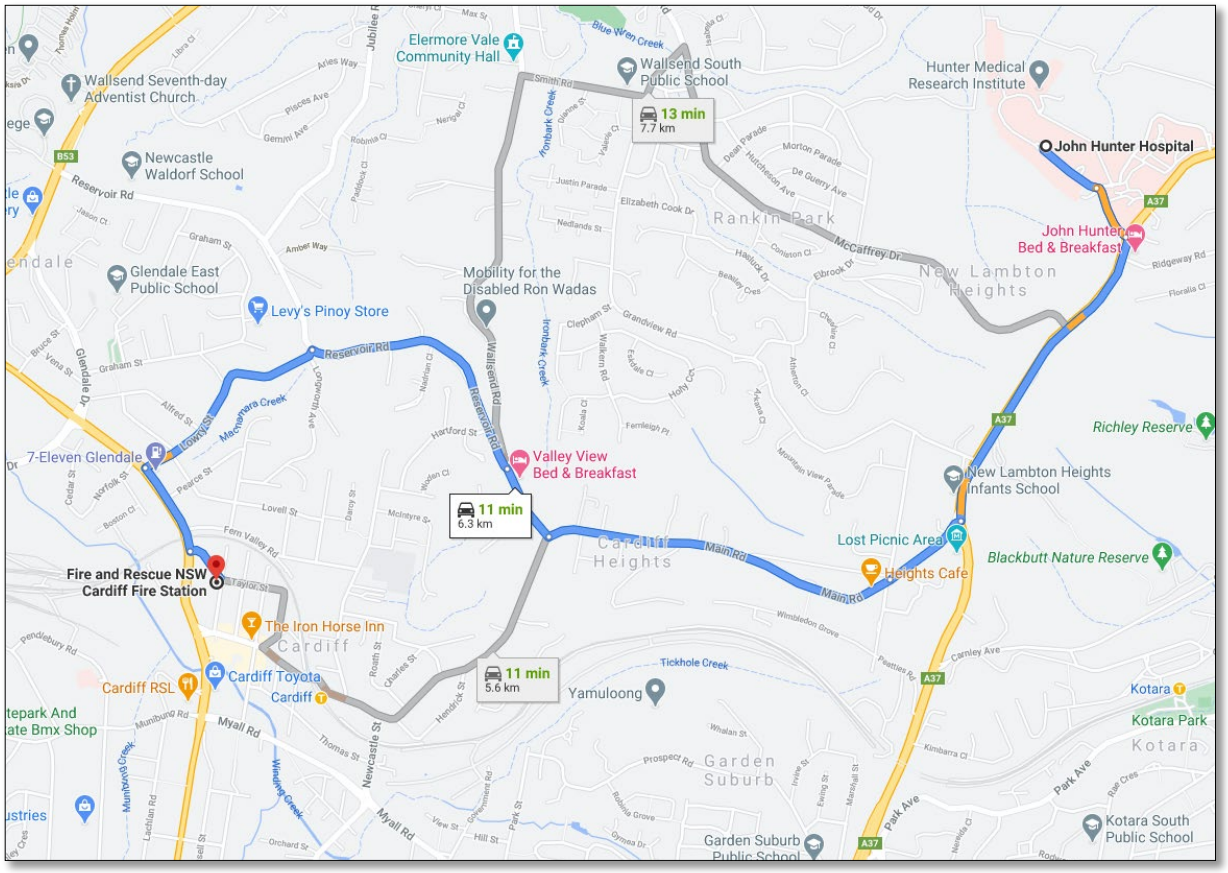


Figure 17: NSW Fire & Rescue – Cardiff Fire Station

3.4. Services – water electricity and gas

3.4.1. Water

A new reticulated water supply will be provided on the northern side of the ASB; in addition to the existing water supply provided to the JHHC. Multiple fire hydrants will be located in the immediate vicinity of the ASB to enable multiple Fire & Rescue and RFS firefighting applicances to connect

directly to the reticulated water. It is expected that most F&R appliances can only operate when connected to a reticualted water supply via a fire hydrant. Accordingly, it is recommended that a minimum of 2 additional fire hydrants are provided in the vicinity of the road to the north of the ASB (hydrants must not be located within any road carriageway).

3.4.2. Electricity

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

3.4.3. Gas

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

3.5. Construction Standards

PBP 2019 requires all buildings proposed for use as a SFPP (Class 9 building) to be designed and constructed to withstand bushfire attack in the form of wind, embers, radiant heat and flame contact. Whilst the recommended APZs have been determined to ensure the proposed ASB is unlikely to be exposed to direct flame contact, or excessive levels of radiant heat, the building must be constructed to withstand ember attack. To achieve this, a construction level of BAL-12.5 under Australia Standard 3959-2018 Construction of buildings in bushfire prone areas (AS3959-2018) and section 7.5 of PBP 2019 is applied.

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

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

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

The Detailed Method (Method 2) outlined in AS3959-2018 was used to calculate the Bushfire Attack Level (BAL) for the development. The NBC Bushfire Attack Assessor V4.1 was used to model the bushfire radiant heat exposure for the greatest bushfire hazard (T2) which determined the applicable BAL. Refer to **Table 9** for the distance between the classified bushfire hazard and all existing and proposed dwelling sites. The BAL Assessor Report is contained in **Appendix C**.

Table 9: Bushfire Attack Levels

Transect	Vegetation Classification (PBP 2019)	Slope	APZ	Distance from Hazard	Bushfire Attack Level (BAL)
T2	Forest	3.0° downslope	Min. 63m	0m-<23m	BAL-FZ
				23m-<29m	BAL-40
				29m-<41m	BAL-29
				41m-<54m	BAL-19
				54m-<100m	BAL-12.5
				63m	**10kW/m^2**

3.6. Landscaping and Vegetation Management

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

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

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

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

The principles of landscaping for bushfire protection aim to:

- Prevent flame impingement on dwellings;
- Provide a defendable space for property protection;
- Reduce fire spread;
- Deflect and filter embers;
- Provide shelter from radiant heat; and
- Reduce wind speed.

Plants that are less flammable have the following features;

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

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

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

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

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

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

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

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

Table 10: Characteristics of low flammability species

Plant attribute	Effect	Design measure
Foliage moisture content	Leaves with higher moisture content retard ignition and slow the rate of combustion	Select species with high leaf moisture content (e.g. rainforest species, succulents and semi-succulents)
Foliage volatile oil content	Foliage with higher volatile oil content ignite more readily and enhance ignition of surrounding vegetation, even though volatile oils themselves do not contribute significant- ly to total radiant heat	Select species with lower volatile oil content[68, 69]
Foliage mineral content	Foliage with higher mineral content tend to be less flammable (e.g. Amyema spp mistle- toes)	Species selection should favour species with higher leaf mineral content
Leaf fineness	The ratio of area-to-volume of leaves is one of the main factors affecting ease of ignition and intensity of burning. Finer leaves (greater area to volume ratio) tend to ignite and burn more easily than broader leaves	Species selection should favour broad-leafed species
Density of foliage and continuity of plant form	Species with continuous, denser foliage can act as a barrier to wind-borne embers and radiant heat; however, increased density can increase flammability. Species with open branching and low foliage density are less effective as a barrier, though can be less flammable	Select species on a case-by-case basis
Height of lowest foliage	Shrub and tree species with persistent low height foliage are more likely to be ignited by surface fires, allowing the spread of fires into the canopy above	Species selection should favour species which can be maintained or pruned to reduce persistent, near-ground foliage
Size of plant (volume and spread)	The effect of plant size varies according to volume or spread. Species with a greater spread tend to be more effective as a barrier to the diffusion of radiant heat than narrower trees with the same volume. Species with a greater volume can result in increased ember attack, radiation and flame if ignited. For example, narrow columnar trees are less effective as a barrier than wider trees with the same overall volume	Species selection should ensure plant size (volume and spread) does not increase ignition likelihood

Plant attribute	Effect	Design measure
Dead foliage on plant	Persistent dead leaves and woody twigs increase flammability	Species selection should favour species which have a low volume of persistent dead leaves and woody material or can be maintained or pruned to reduce persistent, dead leaves and woody material
Bark texture	Loose, flaky, stringy, papery or ribbon-like bark contribute to ladder fuels which: • can contribute to destructive crown fires • act as a potential source of flame, radiant heat and ember attack	Avoid species with persistent loose, flaky, stringy, papery or ribbon-like bark. Species selection should favour smooth- barked and tightly-held bark species
Potential available surface fuel	The availability of surface fuel is a function of volume (quantity) and fineness. The fireline intensity increases in proportion to available fine fuel quantity. Fine fuel includes dead fallen material such as leaves, bark, twigs and branches up to 6mm in diameter (forest) and grass greater than 5cm in height (grass- lands). Coarse fuel ignites less readily but may burn for longer	Species selection should favour species which do not contribute significantly to persistent, fine ground fuel

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

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

4. Conclusion and Recommendations

Bushfire Planning Australia (BPA) has been engaged by NSW Health Infrastructure 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 BAR found that 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.

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 up to 56m from the outer elevation of the closest buildings to the vegetation.

In summary, the following key recommendations have been generated to ensure 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/m^2;
2. An Asset Protection Zone (APZs) between 52m 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 aerials, vent pipes and supports for solar collectors or the like shall be sealed with a non-combustible mineral fibre at the roof to prevent gaps;
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).

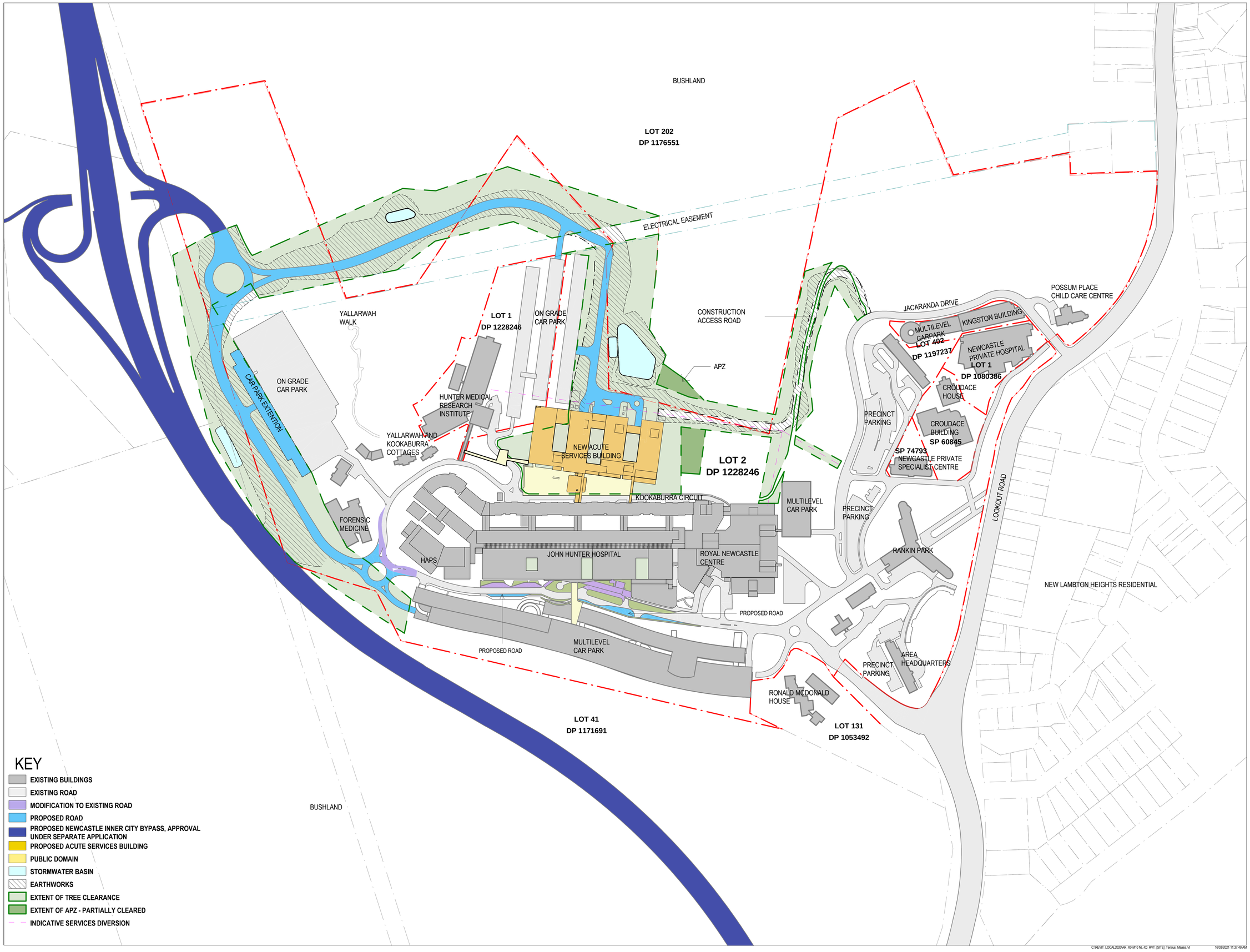
Should the above recommendations be implemented, any person evacuating a building will not be exposed to radiant heat levels greater than 10kW/m^2 and the existing bushfire risk should be suitably mitigated to offer an acceptable level of protection to life and property for those persons and assets occupying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

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

5. References

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

Appendix A: Architectural Drawings (selection)



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5356 NIKOTSCHKA TITCHKOSKY
7115 JULIAN ASHTON
7353 MATTHEW BLAIR
7151 PHILLIP ROSSINGTON
4937 JAMES GROSE

Telephone +61 2 8297 7200
Facsimilie +61 2 8297 7299
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1	22-02-2021	ENG. BACKGROUNDS
2	05-03-2021	FOR INFORMATION
3	16-03-2021	FOR INFORMATION

PROJECT MANAGER
TSA MANAGEMENT
TEL: 02 9276 1400

ARCHITECT
BVN
TEL: 02 8297 7200

STRUCTURAL & CIVIL CONSULTANT
NORTHROP ENGINEERS
TEL: 02 4943 1777

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TEL: 02 8233 9900

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HEALTH INFRASTRUCTURE, NSW

CLIENT NUMBER

PROJECT
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Lookout Rd, New Lambton Heights NSW 2305

BVN PROJECT NUMBER
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GRAPHIC SCALE
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STATUS

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PROPOSED SITE PLAN - INITIAL PHASE

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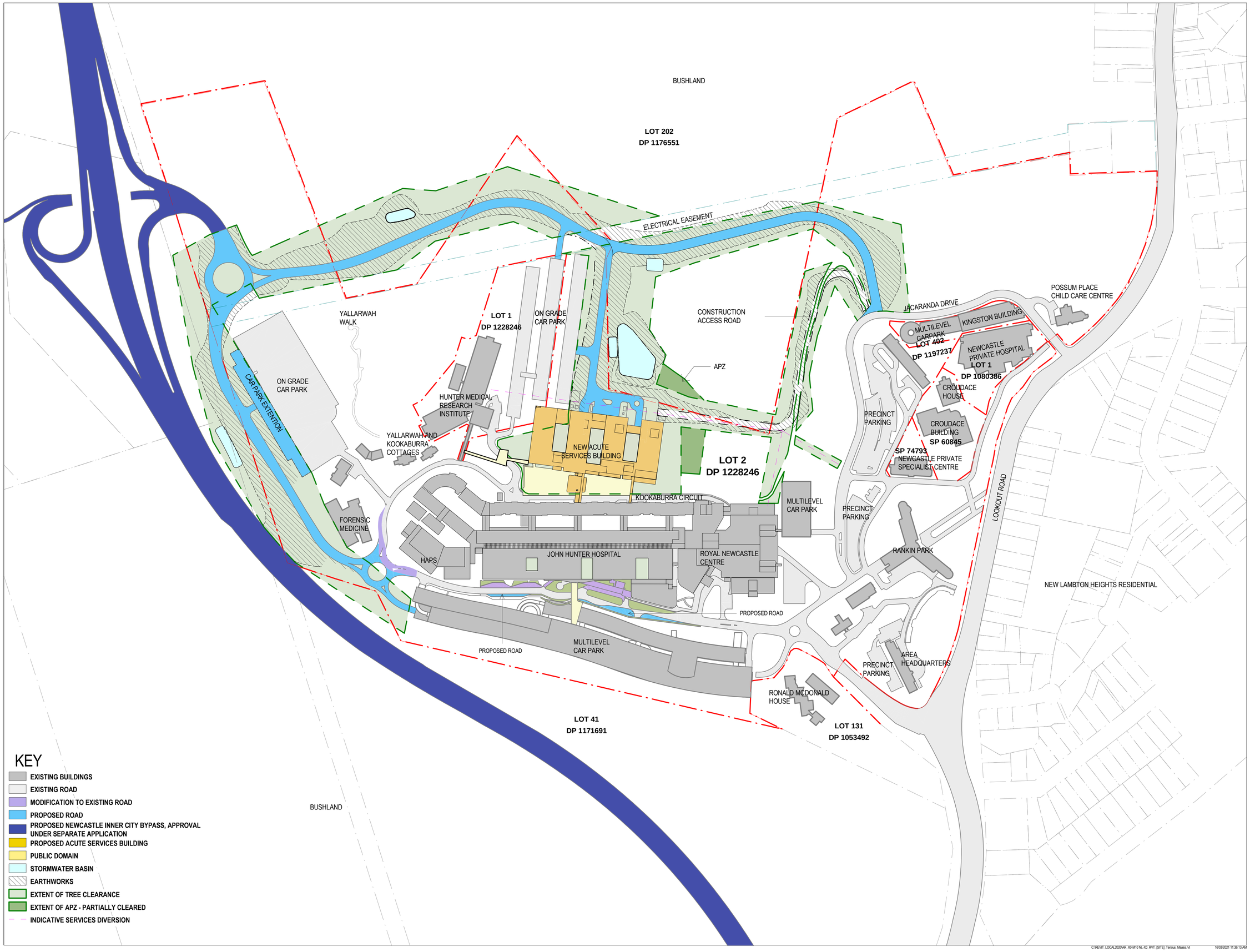

KEY

- EXISTING BUILDINGS
- EXISTING ROAD
- MODIFICATION TO EXISTING ROAD
- PROPOSED ROAD
- PROPOSED NEWCASTLE INNER CITY BYPASS, APPROVAL UNDER SEPARATE APPLICATION
- PROPOSED ACUTE SERVICES BUILDING
- PUBLIC DOMAIN
- STORMWATER BASIN
- EARTHWORKS
- EXTENT OF TREE CLEARANCE
- EXTENT OF APZ - PARTIALLY CLEARED
- INDICATIVE SERVICES DIVERSION

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7115 JULIAN ASHTON
7353 MATTHEW BLAIR
7151 PHILLIP ROSSINGTON
4937 JAMES GROSE

Telephone +61 2 8297 7200
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TSA MANAGEMENT
TEL: 02 9276 1400

ARCHITECT
BVN
TEL: 02 8297 7200

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PROPOSED SITE PLAN - NORTH ROAD EAST PHASE

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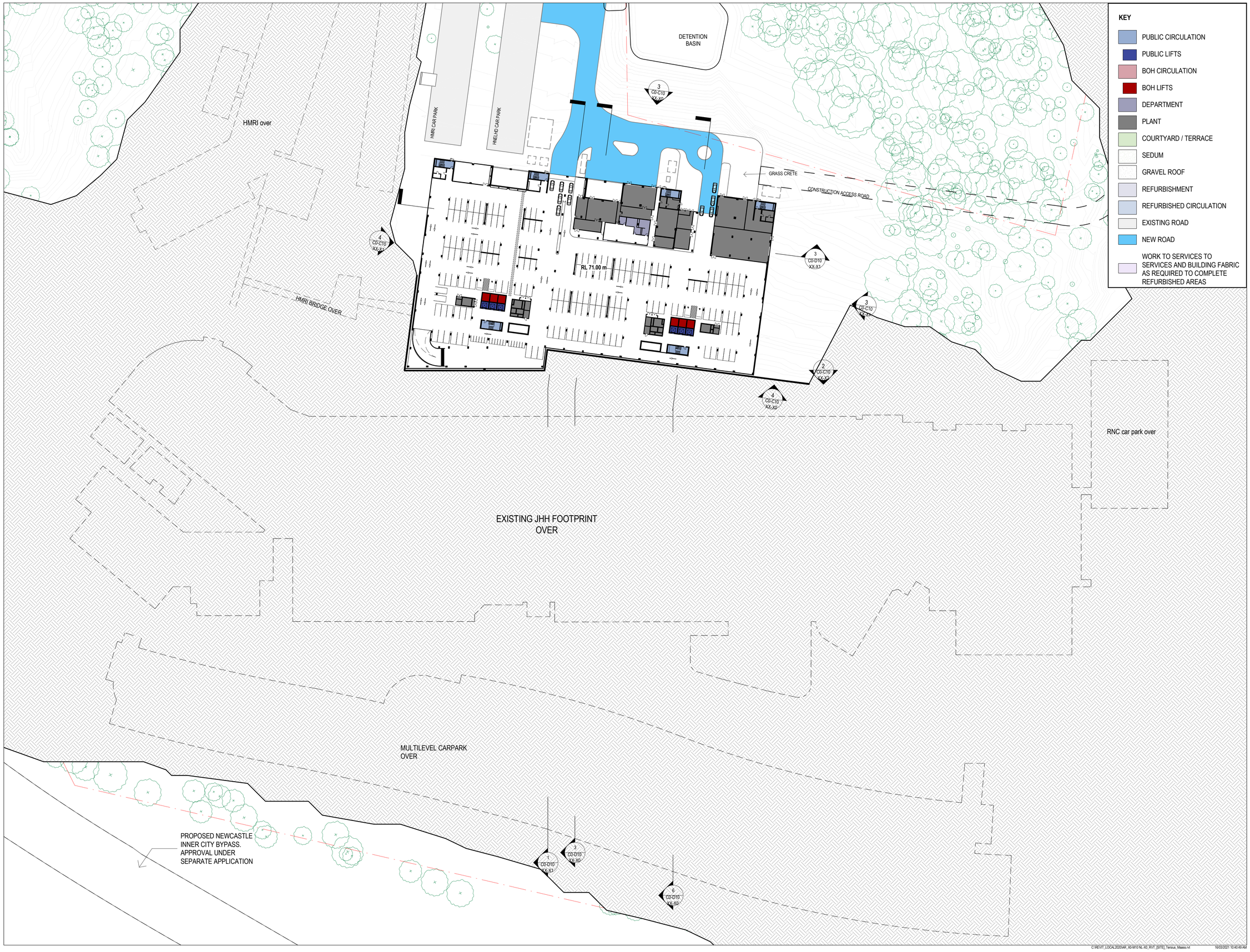

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7115 JULIAN ASHTON
7353 MATTHEW BLAIR
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NSW 2305

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BASEMENT LEVEL 4 FLOOR PLAN

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