BUSHFIRE ASSESSMENT REPORT

Regrowth: Kurri Kurri
Cessnock Road, Gillieston Heights (Precinct 1A)
Proposed Residential Subdivision

Prepared for Loxford Project Management Pty Ltd

Bushfire Planning Australia

Stuart Greville
Accredited Bushfire Practitioner
BPAD-26202
✆ 0400 917 792
✉ stuart@bfpa.com.au

Reference: 2158
Version: FINAL V6 – 9 February 2022

Disclaimer and Limitation

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

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

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

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

Document Status: 2158 - Bushfire Assessment Report

Version	Status	Purpose	Author	Review Date
1	Draft	Draft for Review	Katrina Mukevski	15 December 2021
2	Draft	Draft for Client Review	Stuart Greville	19 December 2021
3	Draft	Draft for Submission	Stuart Greville	7 February 2022
4	Final	Final for Submission	Stuart Greville	9 February 2022

Certification

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

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

Stuart Greville

Accredited Bushfire Practitioner

BPAD-26202

Date: 9 February 2022

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

Executive Summary

Bushfire Planning Australia (BPA) has been engaged by Loxford Project Management (the 'Client') to undertake a Bushfire Assessment Report (BAR) for the proposed residential subdivision known as Precinct 1A of the Regrowth Kurri Kurri at Cessnock Road, Gillieston Heights (the 'subject site').

The landscape, vegetation and topographic studies show that this site is subject to a low to moderate bushfire threat immediately to the south of the site. The hazard is consistent with a *forest* vegetation, namely Hunter Macleay Dry Sclerophyll Forest (DSF) and Sydney Sand Flats DSF, and transitions to Woodland as described in the NSW Rural Fire Service document Planning for Bushfire Protection 2019 (PBP 2019). Additionally, *grassland* is present to the east of the site although will be cleared as a result of a neighbouring development site; and to the west of the site whereby it will be cleared and managed as part of a proposed APZ. The BAR concludes that the hazard identified can be successfully mitigated by applying the requirements of PBP 2019, such as a combination of temporary and permanent Asset Protection Zones (APZs).

Measures that are applied to create compliance with PBP 2019 would reduce the vulnerability of the future buildings and occupants. Construction measures can increase the likelihood of assets to withstand most bushfires. A good access and egress strategy can also reduce the vulnerability of the development by enabling occupants to move away from a bushfire as it approaches.

The following key recommendations have been designed to enable the proposed development to maintain an acceptable level of protection from the residual risk of a bushfire that may occur in the existing vegetation, in accordance with *Planning for Bush Fire Protection 2019*:

1. The entire site; excluding areas zoned RU2 shall be managed as an Inner Protection Area (IPA) as outlined within Appendix 4 of PBP 2019 and the RFS document Standards for asset protection zones;
2. A temporary APZ shall be provided up to 100m (excluding land zoned RU2 Rural Landscape) as each stage is completed and contained to within the development footprint as shown on **Figure 19**;
3. Access shall be provided in accordance with Table 5.3b of PBP 2019. This will require the provision of a minimum of two (2) separate road access points provided from the development site to the north and east to ensure safe evacuation for all residents;
4. Following the completion of Stage 1, a temporary emergency access road shall be constructed and connect to Auburn Street (north) and remain accessible by emergency services at all times. The temporary emergency access road shall be constructed in accordance with the NSW RFS Fire Trail Standards;
5. Any temporary turning heads shall be constructed in accordance Appendix A3.3 of PBP 2019;
6. Vegetation within road verges (including swales) to be consistent with a grassland vegetation classification with tree canopy less than 10% at maturity (and considered unmanaged);
7. The provision of water, electricity and gas must comply with the requirements of Table 5.3c of PBP 2019;
8. All future dwellings to be constructed on the proposed lots shall have due regard to the specific considerations given in the National Construction Code: Building Code of Australia (BCA) which makes specific reference to Australian Standard AS3959-2018 Construction of buildings in bushfire prone areas (AS3959-2018) and the NASH Standard Steel Framed Construction in Bushfire Prone Areas;
9. All new lots are to be connected to a reliable water supply network and that suitable fire hydrants are located throughout the development site that are clearly marked and provided for the purposes of bushfire protection. Fire hydrant spacing, sizing and pressure shall comply with AS2419.1 2005 and section 5.3.3 of PBP 2019; and

10. Consideration should be given to landscaping and fuel loads on site to decrease potential fire hazards on site.

This assessment has been made based on the bushfire hazards observed in and around the site at the time of inspection and production (February 2021) and demonstrates the development has satisfied the aims and objectives of Planning for Bushfire Protection 2019.

Finally, should the above recommendations be implemented, 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 and that property and life damage/loss will not occur.

Table of Contents

Figures

Tables

Plates

Appendices

Terms and Abbreviations

Abbreviation	Meaning
APZ	Asset Protection Zone
AS2419-2005	Australian Standard – Fire Hydrant Installations
AS3959-2018	Australian Standard – Construction of Buildings in Bush Fire Prone Areas
BAR	Bushfire Assessment Report
BCA	Building Code of Australia
BC Act	NSW Biodiversity Act 2016
BMP	Bush Fire Management Plan
BPA	Bush Fire Prone Area (Also Bushfire Prone Land)
BPL	Bush Fire Prone Land
BPLM	Bush Fire Prone Land Map
BPM	Bush Fire Protection Measures
DoE	Commonwealth Department of the Environment
DPI Water	NSW Department of Primary Industries – Water
EPA Act	NSW Environmental Planning and Assessment Act 1979
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
FDI	Fire Danger Index
FMP	Fuel Management Plan
ha	hectare
IPA	Inner Protection Area
LGA	Local Government Area
MCC	Maitland City Council
OPA	Outer Protection Area
OEH	NSW Office of Environment and Heritage
PBP 2019	Planning for Bushfire Protection 2019
RF Act	Rural Fires Act 1997
RF Regulation	Rural Fires Regulation
RFS	NSW Rural Fire Service
TSC Act	NSW Threatened Species Conservation Act 1995 (as repealed)

1. Introduction

Bushfire Planning Australia (BPA) has been appointed by Loxford Project Management (the 'Client') to undertake a Bushfire Assessment Report (BAR) for the proposed residential subdivision known as Precinct 1A of the Regrowth Kurri Kurri at Cessnock Road, Gillieston Heights (the 'subject site'). The proposed development will include the completion of bulk earthworks, development of 345 residential Torrens Title allotments and construction of associated ancillary services over 17 stages.

The assessment aims to provide a bushfire risk assessment which considers and assesses the bushfire hazard and associated potential bushfire threat relevant to the proposed development on a landscape scale. The assessment outlines the minimum mitigative measures which would be required in accordance with the BAR, provisions of the New South Wales Rural Fire Service (RFS) publication *Planning for Bushfire Protection 2019* (PBP 2019) and the *Rural Fires Regulation 2013*.

1.1. Aims and Objectives

This BAR aims to assess the bushfire threat and recommends a series of bushfire protection measures that aim to minimise the risk of adverse impact of bush fires on life, property and the environment.

This assessment has been undertaken in accordance with Appendix 2 of *Planning for Bushfire Protection 2019* and clause 44 of the *Rural Fires Regulation 2013*. This assessment also addresses the aim and objectives of PBP 2019, being:

- Afford buildings and their occupants protection from exposure to a bushfire;
- Provide for a defendable space to be located around buildings;
- Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;
- Ensure that appropriate operational access and egress for emergency service personnel and occupants is available;
- Provide for ongoing management and maintenance of bushfire protection measures (BPMs); and
- Ensure that utility services are adequate to meet the needs of firefighters.

2. Site Description

Table 1: Site Description

Address	Cessnock Road, Gillieston Heights
Title	Lots 3, 4, 7 and 9 DP456946 (partial) Lots 1, 2, 5 & 8 DP456946 Lots 54, 55, 69, 70 & 71 DP975994 457, 463, 501, 527 Cessnock Road (road works)
LGA	Maitland City Council
Subject Site/ Study Area	74.05 ha
Development Site	~68 ha
Land Use Zone	RU2 Rural Landscape & R1 General Residential (**Figure 1**)
Bushfire Prone Land	Vegetation Category 1 and Vegetation Buffer (**Figure 3**)
Context	The site is located to the west of Cessnock Road, Gillieston Heights. The portion of lots 3, 4, 7 & 9 DP 456946 located to the east of the disused railway line form part of the proposed development. The site has historically been used for grazing and predominantly cleared however some remnant vegetation exists contained to the riparian corridor.
Topography	Undulating, no more than 10m at its deepest point
Fire History	No (recorded) fire history directly impacting site FFDI 100

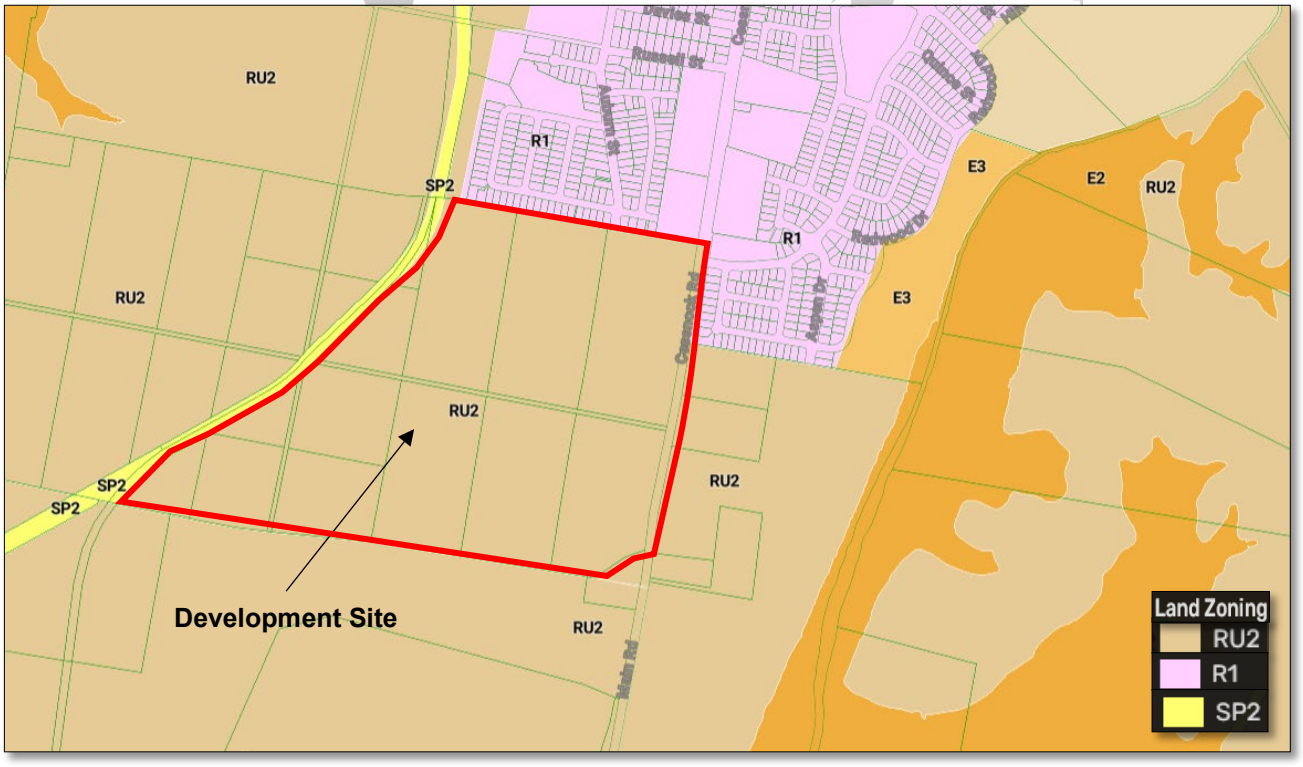


Figure 1: Land Use Zone Map (Maitland Local Environment Plan 2011)

Gillieston Heights

Figure 2

Site Location

BUSHFIRE PLANNING AUSTRALIA

Subject site

2km site buffer

SOURCE:
Base Map © Department of Customer Service 2020

N W E S

0 250 500 750 1,000
Meters

A3 Scale: 1:20,000

File:GilliestonHeights_Fig1_SiteLocation_220208 Date: 8/02/2022

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

2.1. Background

The proposed development is within the landholdings of Hydro Aluminium Kurri Kurri; part of approximately 2,000 hectares of land was used for the former Hydro Aluminium Kurri Kurri Smelter and adjacent buffer lands. The Smelter ceased operations in October 2012.

The land identified as part of the redevelopment project has been renamed as Regrowth Kurri Kurri. Precinct 1 is located at the northern end of ReGrowth Kurri Kurri and is only 2km south of the Maitland central business district (CBD) and approximately 33km northwest of the Newcastle CBD.

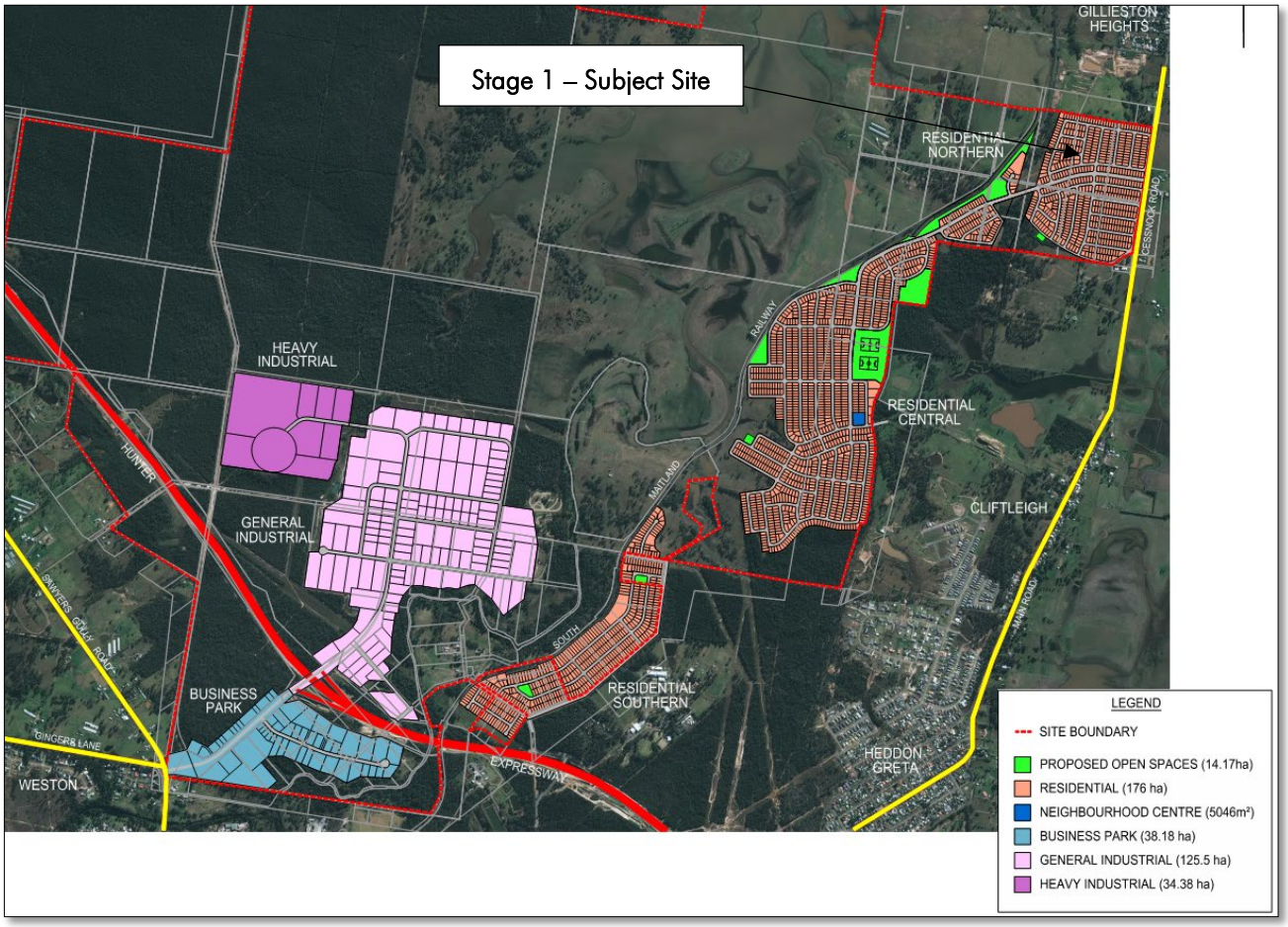


Figure 3: ReGrowth Kurri Kurri Masterplan (ESS Planning Proposal 2014)

2.2. Bushfire Prone Land

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

Figure 4 demonstrates that the majority of the site is mapped as a bushfire Buffer across all lots or non-bushfire prone land along the eastern boundary.

There is a portion of Lot 4 DP456946, Lot 54 & 55 DP975994 that are mapped as bushfire prone land Vegetation Category 1 although isolated in nature. Lot 2 & 5 DP456946 and Lot 69, 70 & 71 DP975994 are also mapped as bushfire prone land Vegetation Category 1 and connect to the primary bushfire hazard located immediately to the south of the site.

There is also bushfire prone land within 100m to the west of the development site although separated by a disused railway line, and to the north of the site in an existing neighbouring residential subdivision.

Gillieston Heights

Figure 4

NSW Bush Fire Prone Land

BUSHFIRE PLANNING AUSTRALIA

Subject Site

Bushfire Prone Land

- Vegetation Category 1
- Vegetation Category 3
- Buffer

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2021
NSW Bush Fire Prone Land: NSW Rural Fire Service 2018
Aerial photo: NearMap 06/08/2021

N
W E
S

0 50 100 150 200 250 300
Meters

A3 Scale: 1:6,000

File:Gillieston Heights_Fig2_BFPL_220208 Date: 8/02/2022

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

2.3. Fire History

There is no recorded evidence of recent bushfires at the site itself and the surrounding area.

2.4. Proposed Development

The proposed development seeks consent for a residential subdivision that will create 345 residential allotments over 17 stages. Residual lots will be developed further under a future development application.

The proposed development will also include bulk earthworks and benching over the site with retaining walls up to 1.5m in height. Associated pathways and services including a district park and a water basin are also included in the proposed residential subdivision.

Construction of roads including a divided carriageway (MC01), collector roads (MC05) and a signalised interchange on Cessnock Road are also proposed to manage traffic and access in and around the development.

The plan of subdivision is contained in **Appendix A** and shown in **Figure 5.**

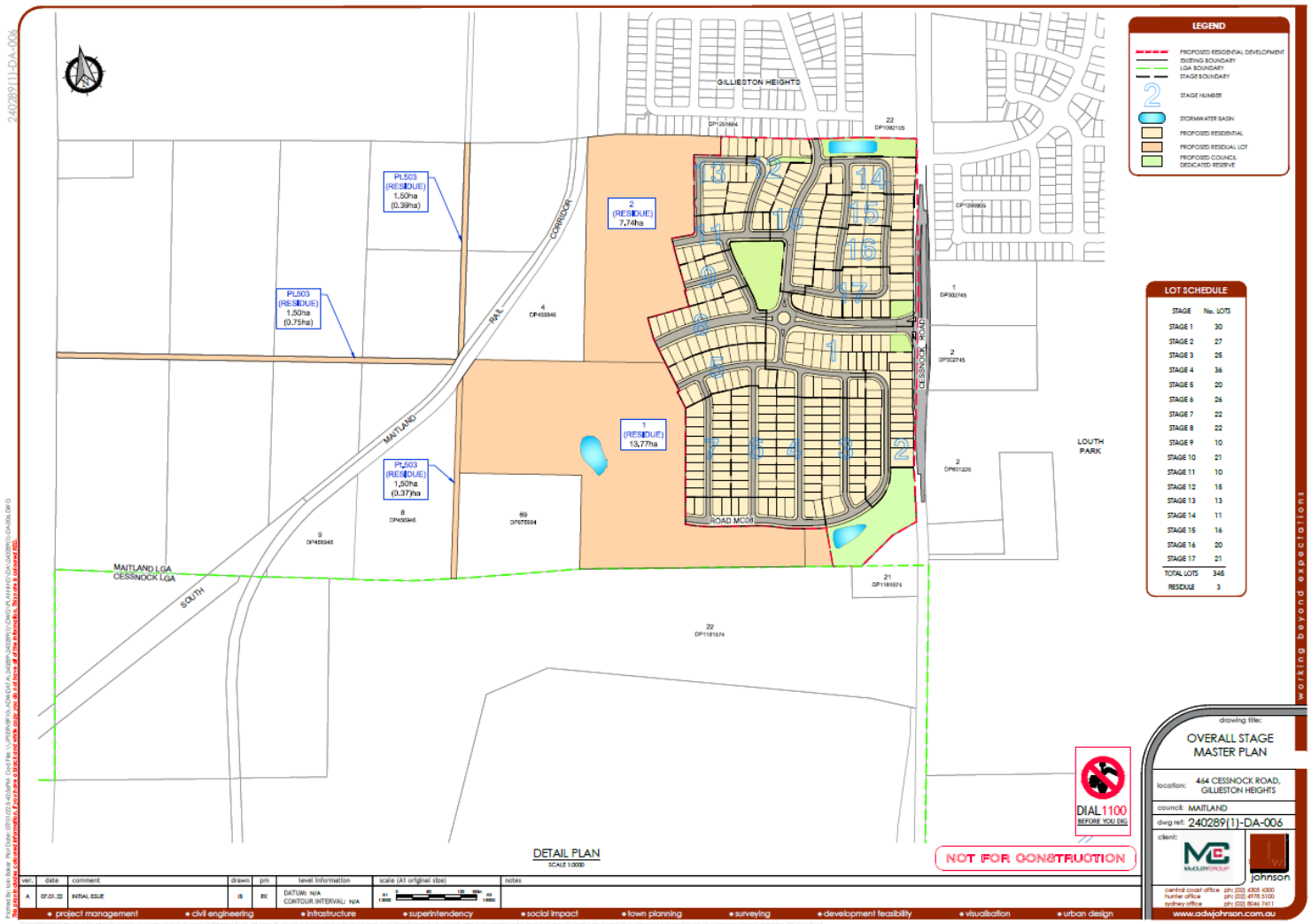


Figure 5: Plan of Proposed Subdivision - Stage 1

3. Bushfire Hazard Assessment

The appropriateness of the proposed development was previsouly established through the Strategic Bushfire Study prepared by Kleinfelder (June 2021). Assuming that any issues identified within the SBS can be overcome through the re-zoning process, the Bushfire Assessment Report provides an assessment of the proposed development and subdivision against the requirements of section 100B of the *Rural Fires Act 1997* and *Planning for Bush Fire Protection 2019* (PBP) and can be used in an application for a Bush Fire Safety Authority.

The Bushfire Hazard Assessment is conducted on a more localised scale, assessing vegetation categories out to a distance of 140 metres and slope to a distance of 100m, in accordance with the Site Assessment Methodology within Appendix 1 of PBP. This establishes a more localised risk context for the development and specific bush fire protection measures required for the subdivision of the land to occur.

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

3.1. Vegetation Assessment

Vegetation classification over the site and surrounding area has been carried out as follows:

- Aerial Photograph Interpretation to map the vegetation classification and extent (NearMap historical series);
- Review of Greater Hunter Native Vegetation Mapping v4.0 VIS ID 3855 OEH 2012 (**Figure 6** & **7**);
- Lower Hunter and Central Coast Regional Vegetation Survey VIS ID 2225 DECCW 2010 (**Figure 8** & **9**); and
- Lower Hunter and Central Coast Regional Vegetation Survey VIS ID 2227 DECCW 2011 (**Figure 10** & **11**);
- Review of Hydro Biodiversity Certification Assessment Report, GHD 2 September 2021 (**Figure 12**); and
- Site Inspection on 3 September 2021 by Stuart Greville (BPA).

A desktop study of the site was initially undertaken prior to field investigations. In accordance with PBP 2019, an assessment of the vegetation over a distance of 100m in all directions from the site was undertaken. As the subject site is in a regional area, an additional assessment over a 2km distance in all directions was also completed.

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

The predominant bushfire hazard vegetation directly impacting the subject site occurs in the adjacent land to the south. There are also pockets of grassland and floodplain vegetation to the east and west which are of lower bushfire risk. Fires are typically more intense where there are higher fuel loads for them to burn through however grassland fires can burn a lot quicker as they are heavily influenced by wind.

Table 2: Desktop study vegetation classifications

PCT ID and Name	Greater Hunter Native Vegetation (OEH 2012)	Lower Hunter and Central Coast Regional Vegetation (DECCW 2011)	Keith Class (2004)	PBP 2019
PCT 1591 Grey Gum – Rough-barked Apple shrubby open forest of the Lower Hunter		Hunter Lowland Redgum Forest	Hunter Macleay Dry Sclerophyll Forest	*Forest*
PCT 1600 Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter			Hunter Macleay Dry Sclerophyll Forest	*Forest*
PCT 1602 Spotted Gum – Narrow-leaved Ironbark shrub – grass open forest of the central and lower hunter		Lower Hunter Spotted Gum – Ironbark Forest	Hunter Macleay Dry Sclerophyll Forest	*Forest*
PCT 1633 Parramatta Red Gum – Narrow-leaved Apple – Prickly-leaved Paperbark shrubby woodland in the Cessnock-Kurri Kurri area	Sydney Sand Flats Dry Sclerophyll Forest	Lower Hunter Spotted Gum – Ironbark Forest	Sydney Sand Flats Dry Sclerophyll Forest	*Forest*

Gillieston Heights

Figure 6

Vegetation (VISmap 3855)

BUSHFIRE PLANNING AUSTRALIA

- Subject Site
- Cleared / Managed Land
- Coastal Freshwater Lagoons
- Hunter-Macleay Dry Sclerophyll Forests
- Sydney Sand Flats Dry Sclerophyll Forests

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2021
Vegetation: Vegetation Formation: Greater Hunter Native Vegetation Mapping v4.0. VIS ID 3855 (c) OEH 2012
Aerial photo: NearMap 06/08/2021

N
W E
S

0 50 100 150 200 250 300
Meters

A3 Scale: 1:6,000

File:GilliestonHeights_Fig3a_Vegetation_VIS3855_Site_220208 Date: 8/02/2022

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

Gillieston Heights

Figure 7

Vegetation (VISmap 3855)

BUSHFIRE PLANNING AUSTRALIA

- Subject Site
- 2km site buffer
- Cleared / Managed Land
- Coastal Floodplain Wetlands
- Coastal Freshwater Lagoons
- Coastal Swamp Forests
- Dry Rainforests
- Hunter-Macleay Dry Sclerophyll Forests
- Sydney Hinterland Dry Sclerophyll Forests
- Sydney Sand Flats Dry Sclerophyll Forests

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2021
Vegetation: Vegetation Formation: Greater Hunter Native Vegetation Mapping v4.0. VIS ID 3855 (c) OEH 2012
Aerial photo: NearMap 06/08/2021

N W E S

0 250 500 750 1,000
Meters

A3 Scale: 1:20,000

File:Gillieston Heights_Fig3b_Vegetation_VIS3855_2km_220208 Date: 8/02/2022

Gillieston Heights

Figure 8

Vegetation (VISmap 2225)

BUSHFIRE PLANNING AUSTRALIA

- Subject Site
- Alluvial Tall Moist Forest
- Freshwater Wetland Complex
- Hunter Lowland Redgum Forest
- Hunter Valley Dry Rainforest
- Lower Hunter Spotted Gum - Ironbark Forest

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2021
Vegetation: Lower Hunter and Central Coast Regional vegetation survey VIS ID 2225 (c) DECCW 2010
Aerial photo: NearMap 06/08/2021

N
W E
S

0 50 100 150 200 250 300
Meters

A3 Scale: 1:6,000

File:GilliestonHeights_Fig4a_Vegetation_VIS2225_Site_220208 Date: 8/02/2022

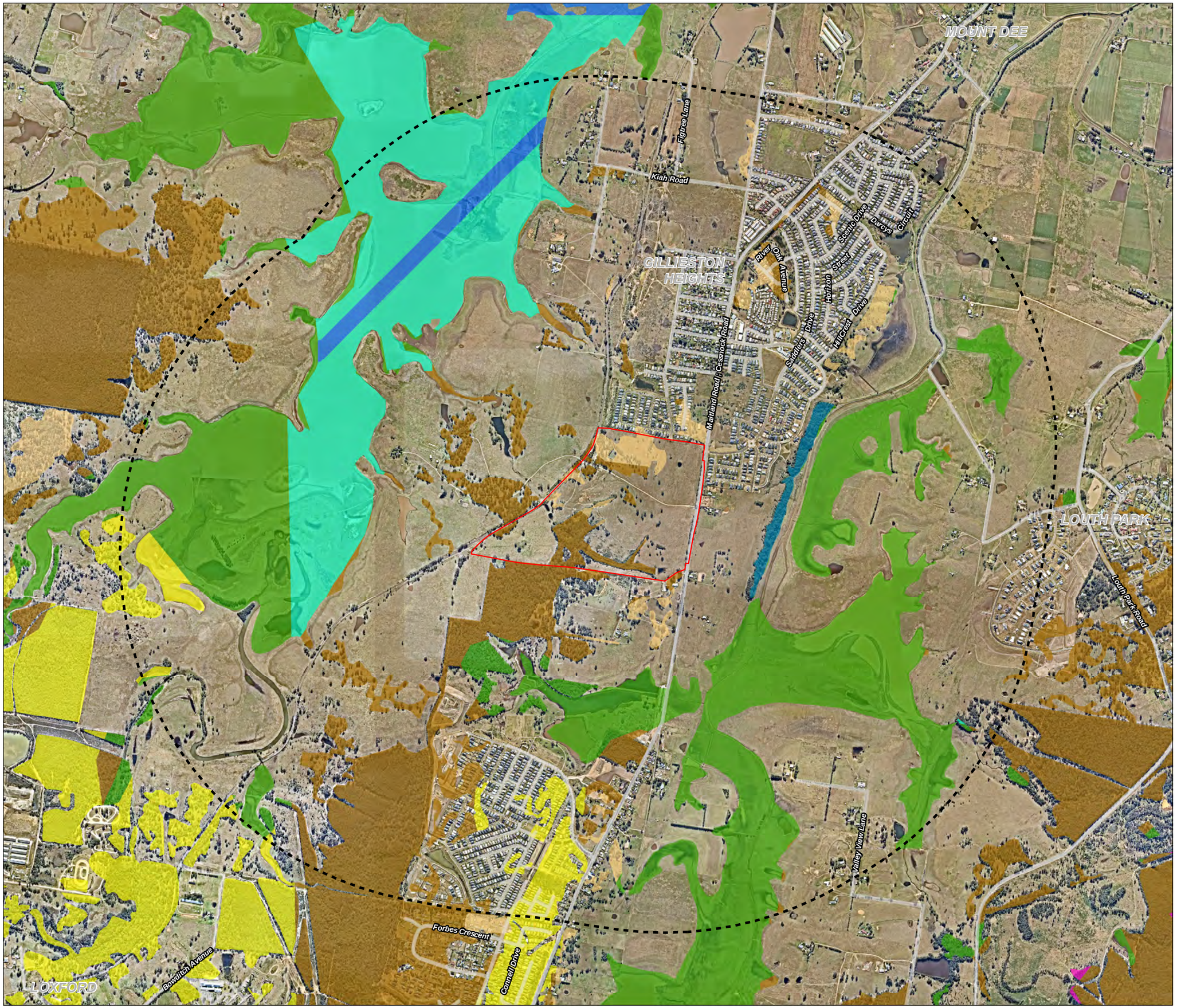
GEOVIEW
GIS & mapping solutions for infrastructure, town planning & environmental management

Gillieston Heights

Figure 9

Vegetation (VISmap 2225)

BUSHFIRE PLANNING AUSTRALIA



- Subject Site
- 2km site buffer
- Alluvial Tall Moist Forest
- Coastal Plains Smooth-barked Apple Woodland
- Freshwater Wetland Complex
- Hunter Lowland Redgum Forest
- Hunter Valley Dry Rainforest
- Kurri Sand Swamp Woodland
- Lower Hunter Spotted Gum - Ironbark Forest
- Swamp Oak Rushland Forest

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2021
Vegetation: Lower Hunter and Central Coast Regional vegetation survey VIS ID 2225 (c) DECCW 2010
Aerial photo: NearMap 06/08/2021

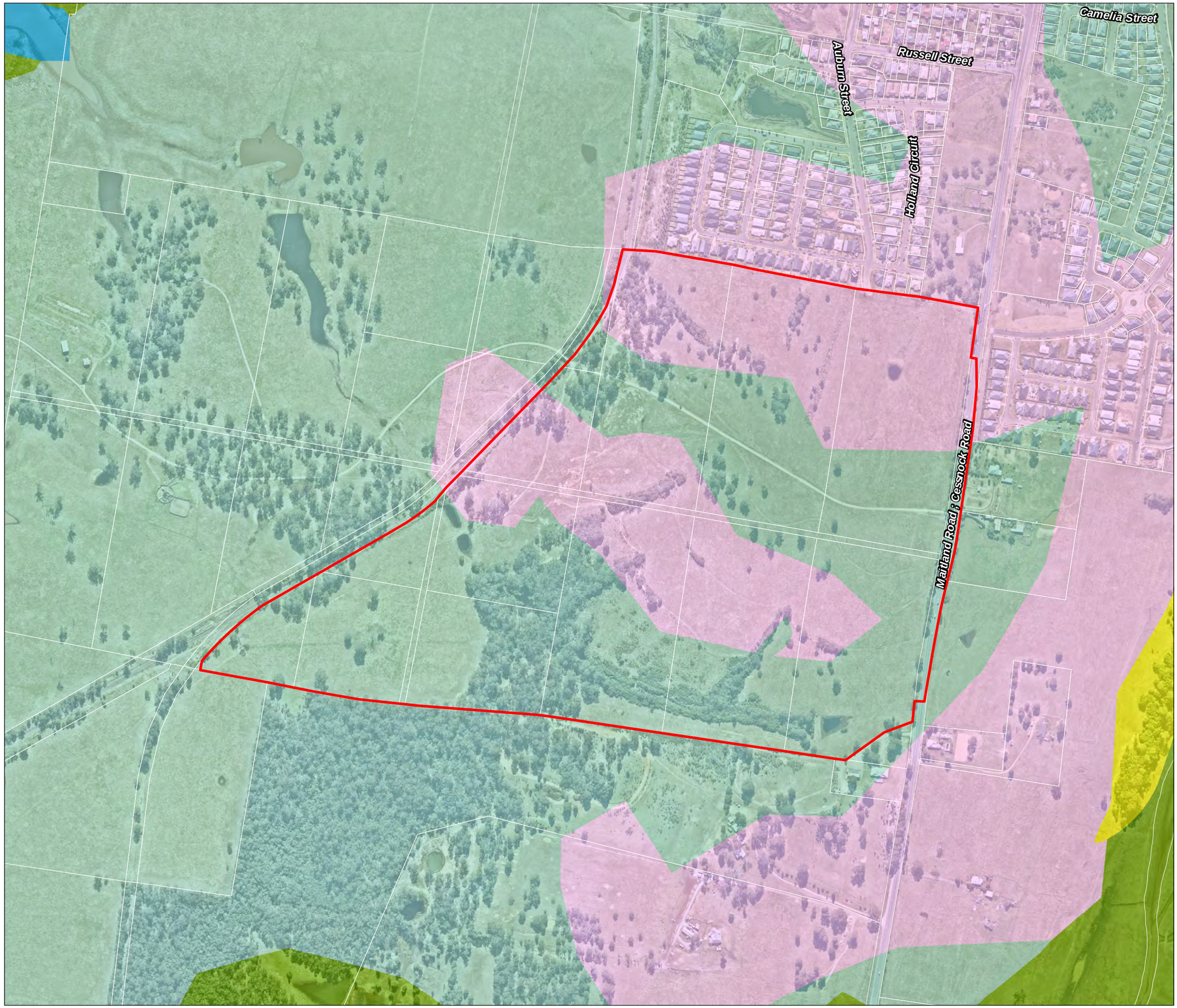
N W E S

0 250 500 750 1,000
Meters

A3 Scale: 1:20,000

File:Gillieston Heights_Fig4b_Vegetation_VIS2225_2km_220208 Date: 8/02/2022

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



Gillieston Heights

Figure 10

Vegetation (VISmap 2227)

BUSHFIRE PLANNING AUSTRALIA

- Subject Site
- Alluvial Tall Moist Forest
- Freshwater Wetland Complex
- Hunter Lowland Redgum Forest
- Hunter Valley Dry Rainforest
- Lower Hunter Spotted Gum - Ironbark Forest

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2021
Vegetation: Lower Hunter and Central Coast Regional vegetation survey VIS ID 2227 (c) DECCW 2011
Aerial photo: NearMap 06/08/2021

N W E S

0 50 100 150 200 250 300
Meters

A3 Scale: 1:6,000

File:Gillieston Heights_Fig5a_Vegetation_VIS2227_Site_220208 Date: 8/02/2022

Gillieston Heights

Figure 11

Vegetation (VISmap 2227)

BUSHFIRE PLANNING AUSTRALIA

- Subject Site
- Alluvial Tall Moist Forest
- Coastal Plains Smooth-barked Apple Woodland
- Freshwater Wetland Complex
- Hunter Lowland Redgum Forest
- Hunter Valley Dry Rainforest
- Kurri Sand Swamp Woodland
- Lower Hunter Spotted Gum - Ironbark Forest
- Seaham Spotted Gum Iron Bark Forest
- Swamp Oak Rushland Forest

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2021
Vegetation: Lower Hunter and Central Coast Regional vegetation survey VIS ID 2227 (c) DECCW 2011
Aerial photo: NearMap 06/08/2021

N W E S

0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000
Meters

A3 Scale: 1:20,000

File:GilliestonHeights_Fig5b_Vegetation_VIS2227_2km_220208 Date: 8/02/2022

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

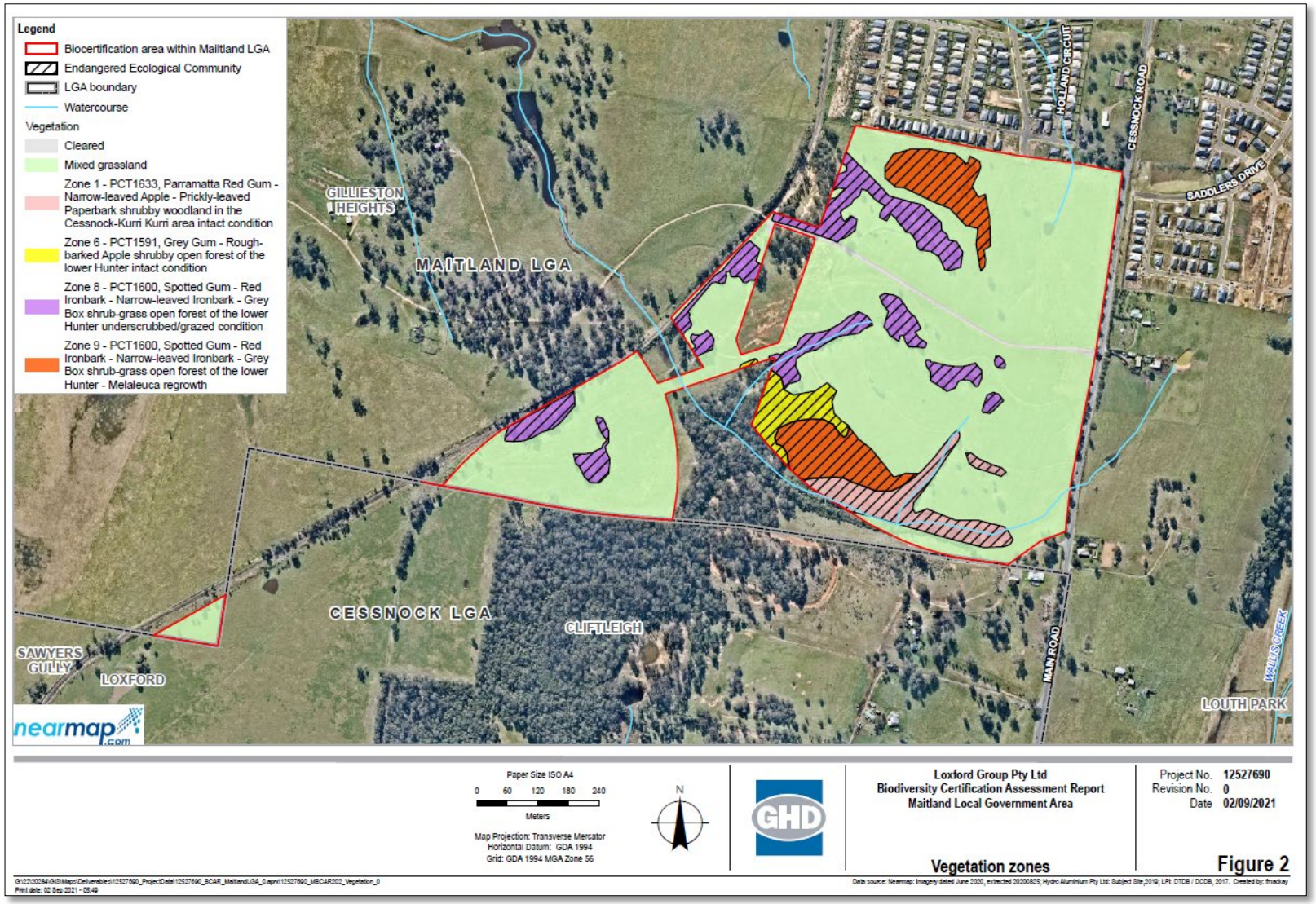


Figure 12: Vegetation Zones (GHD September 2021)

Plate 1: Site looking south west along Cessnock Road

Plate 2: Site looking south east along South Maitland Railway Line

Plate 3: Site looking north west across land to be rezoned (eastern side of Cessnock Rd)

Plate 4: Looking south across grassland (grazing land owner by Proponent))

Plate 5: North west corner of the site – to be managed as Temporary APZ

Plate 6: Southern boundary of site – primary hazard within riparian corridor adjacent to boundary (within site)

Plate 7: Looking south along Cessnock Road. Gateway Determination granted for rezoning of land east of Cessnock Road)

Plate 8: T5 Typical vegetation across site is modified through historical grazing

Plate 9: T3 Existing vegetation within narrow gullies

Plate 10: T3 looking north west into narrow gully.

Plate 11: T5 looking west – area to be managed as a Temporary APZ

Plate 12: T10/T11 Typical Sydney Sand Flats DSF towards southern boundary

Plate 13: Looking south along eastern boundary towards watercourse

Plate 14: T13 looking south east across cleared watercourse (potentially to be revegetated)

Plate 15: Vegetation within southern watercourse transitions from shrubby to grassy forest

Plate 16: Western boundary defined by South Maitland Railway Line

Plate 17: T17 Stormwater device east of site is managed and used as open space

3.2. Slope Assessment

Assessment of the effective slope impacting the site was undertaken using LiDAR point cloud data including DEM (NSW LPI) and results from field investigations carried out on the 3 September 2021.

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

A series of figures were produced that demonstrate the slope within 140m and 2km of the site from the subject site in several formats, including:

- Digital Elevation Model - **Figure 13 & 14**; and
- Slope analysis in gradients of 5 degrees - **Figure 15 & 16**.

Gillieston Heights

Figure 13

Digital Elevation Model (site)

BUSHFIRE PLANNING AUSTRALIA

Subject Site

Contour (10m)

Contour (1m)

Watercourse

Elevation 9AHD)

High : 47m

Low : 0.5m

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2021
Watercourse: Geoscience Australia 2015
Surface analysis: Derived from LiDAR - Newcastle & Cessnoc 1 metre Resolution Digital Elevation Model

N W E S

0 50 100 150 200 250 300
Meters

A3 Scale: 1:6,000

File:Gillieston Heights_Fig6a_DEM_Site_220208 Date: 8/02/2022

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

Gillieston Heights

Figure 14

Digital Elevation Model (2Km)

BUSHFIRE PLANNING AUSTRALIA

Subject Site

Watercourse

Contour (10m)

Contour (5m)

Elevation (AHD)

High : 61m

Low : 0m

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2021
watercourse: Geoscience Australia 2015
Surface analysis: Derived from LiDAR - Newcastle & Cessnoc 1 metre Resolution Digital Elevation Model

N W E S

0 250 500 750 1,000
Meters

A3 Scale: 1:20,000

File:Gillieston Heights_Fig6b_DEM_2km_220208 Date: 8/02/2022

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

Gillieston Heights

Figure 15

Slope Analysis: LiDAR (site)

BUSHFIRE PLANNING AUSTRALIA

Subject Site
Contour (10m)
Contour (1m)
Watercourse

Slope

0° - 5°
5° - 10°
10° - 15°
15° - 20°
>20°

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2021
Watercourse: Geoscience Australia 2015
Surface analysis: Derived from LiDAR - Newcastle & Cessnoc 1 metre Resolution Digital Elevation Model
© Department Finance, Services and Innovation 2012

N
W E
S

0 50 100 150 200 250 300
Meters

A3 Scale: 1:6,000

File:Gillieston Heights_Fig7a_SlopeLiDAR_Site_220208 Date: 8/02/2022

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

Gillieston Heights

Figure 16

Slope Analysis: LiDAR (2Km)

BUSHFIRE PLANNING AUSTRALIA

Subject Site
Watercourse
Contour (10m)
Contour (5m)

Slope

0° - 5°
5° - 10°
10° - 15°
15° - 20°
>20°

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2021
watercourse: Geoscience Australia 2015
Surface analysis: Derived from LiDAR - Newcastle & Cessnoc 1 metre Resolution Digital Elevation Model
© Department Finance, Services and Innovation 2012

N
W E
S

0 250 500 750 1,000
Meters

A3 Scale: 1:20,000

File:Gillieston Heights_Fig7b_SlopeLiDAR_2km_220208 Date: 8/02/2022

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

3.3. Results

Field investigations conducted on 3 September 2021 followed 18 transects to the north, east, south and west of the site and identified plant communities illustrated in **Figure 17** and described in **Table 3**. Using the site assessment methodology in PBP 2019, **Table 3** summarises vegetation classifications identified on site as per *Ocean Shores to Desert Dunes* - David Keith (2004) and vegetation formations as per PBP 2019.

All vegetation identified within the current Bush Fire Prone Land map was confirmed during the site inspection. A large portion of the site is managed land (by way of active and continuous grazing) and therefore excluded for the purposes of PBP 2019.

Vegetation located to the west within the site was confirmed as *grassland* and is reflective of the floodplain environment and previous land use activities such as grazing.

A temporary APZ will be created to the west of the Stage 1; within the development site and therefore a large portion of the confirmed *grassland* will be cleared and continued to be managed in future. The remaining *grassland* transitions to a *forest* (Hunter Macleay Dry Sclerophyll Forest (DSF)) with a cleared understorey. Similarly in the south-western corner of the site and external to the site, a *forest* (Hunter Macleay DSF) exists, however, with a shrubby understorey within a riparian corridor.

The primary bushfire hazard within 100m of the site was confirmed along the sites southern boundary and identified as a *forest* vegetation formation; namely Hunter Macleay DSF and Sydney Sand Flats DSF, transitioning to a *woodland*.

Vegetation within 100m of the site located to the north and east is confirmed as managed *grassland* that forms part of approved neighbouring developments either yet to or have commenced construction.

The effective slope on the adjoining lands is almost flat, with minor falls and rises on all elevations. Although there have been no recorded fires within the subject site and on adjoining land, measures must be put in place to afford future occupants protection against flame, radiant heat and ember attack. By employing a combination of bushfire protection measures as listed in PBP 2019 the development will better mitigate against the impact of fire through the inclusion of appropriate Asset Protection Zones, access, water and utilities and emergency response procedures in the design phase.

The results of hazard assessment are detailed in **Table 2** and shown in **Figure 17**.

Table 3: Slope and Vegetation Assessment Results

Transect	Vegetation Description	Vegetation Classification (PBP 2019)	Slope
T1 & T3	Not Applicable - deleted as part of Temporary APZ	Not Applicable	N/A
T2	Small grassland behind an existing residential development	*Woodland* (Grassy and Semi Arid)	3.1° Downslope
T4	Typical grassy forest common in the Lower Hunter with a cleared understorey	*Forest* (Hunter Macleay Dry Sclerophyll Forest)	1.3° Downslope
T5	Open cleared land that will be used as a temporary APZ and transitions to grassland	*Low threat / excluded* (Temporary APZ)	3.7° Downslope
T6	Open cleared land that will be used as a temporary APZ and transitions to grassland	*Low threat / excluded* (Temporary APZ)	3.4° Downslope

Transect	Vegetation Description	Vegetation Classification (PBP 2019)	Slope
T7	Open cleared land that will be used as a temporary APZ and transitions to a forest	*Low threat / excluded* (Temporary APZ)	3.5° Downslope
T8	Transitioning from managed temporary APZ to a forest with a shrubby understorey within a riparian corridor	*Forest* (Hunter Macleay Dry Sclerophyll Forest)	-2.7° Upslope
T9	Transitioning from managed temporary APZ to a forest with a shrubby understorey within a riparian corridor	*Forest* (Hunter Macleay Dry Sclerophyll Forest)	-1.4° Upslope
T10	Sydney Sands DSF transitioning to a Hunter Macleay DSF within a riparian corridor	*Forest* (Sydney Sand Flats Dry Sclerophyll Forest)	1.4° Downslope
T11	Sydney Sands DSF that will be revegetated	*Forest* (Sydney Sand Flats Dry Sclerophyll Forest)	-1.9° Upslope
T12	Sydney Sands DSF with a shrubby / grassy understorey within a riparian corridor	*Forest* (Sydney Sand Flats Dry Sclerophyll Forest)	3.1° Downslope
T13	Sydney Sands DSF with a grassy understorey transitioning to a Forest Woodland; alongside a water dam	*Forest* (Sydney Sand Flats Dry Sclerophyll Forest)	-1.9° Upslope
T14	Existing grassy paddock, to be retained as a drainage reserve with minimal revegetation	*Grassland*	2.4° Downslope
T15	Managed land that is listed as a neighbouring development; any existing vegetation will be cleared	*Low threat / excluded* (Future development site) (existing Grassland)	-2.2° Upslope
T16	Managed land that is listed as a neighbouring development; any existing vegetation will be cleared	*Low threat / excluded* (Future development site) (existing Grassland)	2.4° Downslope
T17	Managed land that is a floodway / park	*Low threat / excluded* (Non-hazard)	-2.1° Upslope
T18	Managed land that is listed as a neighbouring development; any existing vegetation will be cleared	*Low threat / excluded* (Future development site) (existing Grassland)	-2.4° Upslope

Gillieston Heights

Figure 17

Slope & Vegetation Assessment

BUSHFIRE PLANNING AUSTRALIA

- Stage 1 boundary
- 100m Buffer
- 140m Buffer
- Watercourse
- 10m creek buffer
- 5m creek buffer
- RL
- Downslope transect
- Upslope transect
- Contour (10m)
- Contour (1m)
- Proposed Zoning
- Managed Land (Temporary APZ)
- Forest (Hunter Macleay DSF - cleared understorey/ grazed
- Forest (Hunter Macleay DSF)
- Forest (Sydney Sand Flats DSF)
- Forest (Sydney Sand Flats DSF) to be revegetated
- Woodland
- Grassland
- Managed Land (active open space)
- Managed Land (actively grazed paddocks)
- Managed Land (development under construction)
- Managed Land (floodway / park)
- Managed Land / Grassland (development Site)
- Managed Land (road corridor)
- Managed Land (railway corridor)

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2021
Watercourse: Geoscience Australia 2015
PCT Vegetation Zones: GHD 2021
Surface analysis: Derived from LiDAR - Newcastle & Cessnoc 1 metre Resolution Digital Elevation Model

N W E S

0 50 100 150 200
Meters

A3 Scale: 1:4,000

File:GilliestonHeights_Fig8_SlopeVeg_220208 Date: 8/02/2022

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

3.4. Significant Environmental Features

The recommended bushfire protection measures have been designed to avoid any unacceptable impacts on a significant environmental feature. A comprehensive biodiversity impact assessment has been undertaken and considered the impact of the recommended bushfire mitigation measures.

3.5. Threatened Species, populations or ecological communities

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

3.6. Aboriginal Objects

A search of the AHIMS database (results contained in **Appendix B**) revealed there are no Aboriginal sites or places recorded near the site. All bushfire mitigation measures, such as APZs have considered this and been designed to avoid disturbing any artefacts if identified.

4. Bushfire Risk and Mitigation

4.1. 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.

4.1.1. Determining the Appropriate Setbacks

To achieve compliance with the performance criteria for APZs (Table 5.3a), the Acceptable Solutions outlined in Table A1.12.2 of PBP 2019 may be adopted as a deemed-to-satisify solution.

Alternatively, the appropriate APZ setback may be determined to achieve the Performance Criteria by adopting a performance-based solution. 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 using the NBC Bushfire Attack Assessor V4.1. The nominated fuel loads for the respective vegetation classifications as published by the RFS in March 2019 have been used to determine the APZs and the effective slope obtained from the Digital Elevation Model (DEM) for each transect.

As the site lies within the Maitland City Council LGA, it is assessed under a FDI rating of 100. The Detailed Method (Method 2) outlined in Australian Standard *AS3959-2018 Construction of buildings in bushfire prone areas* was used to calculate the potential level of radiant heat flux generated at the nominated locations (see transects T1-T18). To ensure the APZs achieve the intent of Section 5.3.1 of PBP 2019, the APZs have been determined to ensure all lots are able to accomomodate a dwelling that will not be exposed to radiant heat levels exceeding 29kW/m^2. The NBC Bushfire Attack Assessor report detailing the inputs used is contained in **Appendix C**.

All land to the immediate west of Stage 1 will be cleared as part of the development and will be maintained as a temporary APZ (T5-T7) until such time the land is developed. Similarly, neighbouring development sites to the north and east (T15-T18) is currently identified as *grassland* however classified as managed land / excluded given any existing vegetation will be cleared when the land is developed. This will likely occur prior to the commencement of this proposed development.

Refer to **Table** 4 and **Figure 19** for the recommended APZs.

4.1.1.1. Radiant Heat Shield

The narrow fire run to the south of Lot 216 in the southeast corner of Stage 2 comes out of the watercourse along the southern boundary and becomes constricted as the vegetation transitions into a narrow drainage reserve (Lot 326). The length of the grassland fire run is over 250m, however the maximum potential flame width is approximately 50m. The drainage reserve will be retained as a grassland and is not intended to be revegetated. An uncontrolled fire spreading from the west across the basin into the drainage reserve is likely to reduce in speed and intensity as a result of the reduced fuel load and reduced width of the drainage reserve. To provide an acceptable level of protection to the future dwelling on Lot 216, a 1.8m high radiant heat shield is proposed to be installed along the southern boundary (50m wide) – separating the dwelling lot from the drainage reserve. The radiant heat shield will be installed on top of a retaining wall, which will have a minimum height of 1m. In total a 2.8m high shield will be provided to Lot 216. In addition to acting as a physical obstruction, any radiant heat generated from a fire would be deflected by the non-combustible fence; which will perform as a radiant heat shield.

Table 4: Required and Recommended Asset Protection Zones

Transect	Vegetation Classification (PBP 2019)	Slope Class	PBP 2019 FDI 100 Table A1.12.2	Recommended APZ (29kW/m^2) Method 2
T1 & T3	Not Applicable	N/A	N/A	N/A
T2	*Woodland* (Grassy and Semi Arid)	3.1° Downslope	16m	14m
T4	*Forest* (Hunter Macleay Dry Sclerophyll Forest)	1.3° Downslope	29m	17m
T5	*Low threat / excluded* (Temporary APZ)	3.7° Downslope	0m	0m
T6	*Low threat / excluded* (Temporary APZ)	3.4° Downslope	0m	0m
T7	*Low threat / excluded* (Temporary APZ)	3.5° Downslope	0m	0m
T8	*Forest* (Hunter Macleay Dry Sclerophyll Forest)	-2.7° Upslope	24m	14m
T9	*Forest* (Hunter Macleay Dry Sclerophyll Forest)	-1.4° Upslope	24m	15m
T10	*Forest* (Sydney Sand Flats Dry Sclerophyll Forest)	1.4° Downslope	29m	23m
T11	*Forest* (Sydney Sand Flats Dry Sclerophyll Forest)	-1.9° Upslope	24m	20m
T12	*Forest* (Sydney Sand Flats Dry Sclerophyll Forest)	3.1° Downslope	29m	25m
T13	*Forest* (Sydney Sand Flats Dry Sclerophyll Forest)	-1.9° Upslope	24m	20m
T14	*Grassland (drainage reserve south of lot 216)*	2.4° Downslope	12m	5m[1]
T15	*Low threat / excluded* (Future development site) (existing Grassland)	-2.2° Upslope	10m	10m
T16	*Low threat / excluded* (Future development site) (existing Grassland)	2.4° Downslope	10m	11m

[1] 2.8m high radiant heat shield (1.8m fence + 1m retaining wall)

Transect	Vegetation Classification (PBP 2019)	Slope Class	PBP 2019 FDI 100 Table A1.12.2	Recommended APZ (29kW/m^2) Method 2
T17	*Low threat / excluded (Non hazard)*	-2.1° Upslope	0m	0m
T18	*Low threat / excluded* (Future development site) (existing Grassland)	-2.4° Upslope	10m	9m

4.2. 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.

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.

Specific requirements for the management of vegetation and landscaping around vulnerable developments and within the APZ the following conditions apply:

- Within 10m of a building, flammable objects such as plants, mulches and fences must not be located close to vulnerable parts of the building such as windows, decks and eaves;
- Trees must not overhang the roofline of the building, touch walls or any other elements of a building;
- Grass should be no more than 100mm in height. All leaves and vegetation debris are to be removed at regular intervals (rake leaves and twigs from grass every week during the fire season);

- Establish lawn substitutes including non-flammable ground covers such as decorative stone or gravel;
- Plants greater than 100m in height at maturity must not be placed directly in front of a window or other glass features;
- Tree canopy separation of 2 metres and overall canopy cover no more than 15% at maturity;
- Preference should be given to smooth barked and evergreen trees;
- Shrubs should not be located under trees;
- Shrubs should not form more than 10% ground cover; and
- Provide a reliable and sufficient water supply and installation of sprinkler systems to create a well-watered landscape.

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.

4.3. 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 subdivision layout. All dwellings must have direct access to a public road. Section 5.3.2 of PBP 2019 requires a development to provide safe operational access to structures and water supply for emergency services while residents are seeking to evacuate.

Refer to **Appendix A** for the development plans indicating the proposed access arrangements. Access will be provided from Cessnock Road and an existing adjoining development to the north of the site via Auburn Street.

A 24m wide perimeter road (MC08) will be constructed to the south of the development and act as the APZ against the primary bushfire hazard. There will be several non-perimeter roads constructed that will provide direct access to each lot. All non-perimeter roads are a minimum 8m wide and are able to provide for on-street parking outside the minimum required 5.5m wide carriageway. All perimeter roads are 10.5m wide and permit on-street parking outside of the primary carriageway.

Secondary access is provided to the north of the development, connecting to Auburn Street. The completion of the Auburn Street connection is likely to occur after several stages of the development have been completed. Accordingly, to ensure an alternative access route is available throughout the construction of the entire development, it is recommended a temporary emergency access road is constructed to connect to Auburn Street along the northern boundary. The temporary access road shall be constructed in accordance with the NSW Fire Trail Standards and be accessible at all times for use by emergency services. The temporary access road does need to be accessible for the general residents of the general public.

In summary, it is considered the proposed road network provides safe, all-weather two-way through roads and safe operational access for emergency service personnel and evacuation purposes; complying with the relevant provisions contained in Section 5.3.2 of PBP.

4.4. Services - water electricity and gas

4.4.1. Water

Fire hydrant spacing, sizing and pressure should comply with AS 2419.1 - 2005. Hydrants are not to be located within any road carriageway.

All sites within the proposed development will be connected to the internal reticulated water supply.

4.4.2. Electricity

All electricity services will be located underground.

4.4.3. Gas

Any reticulated or bottled gas should be installed and maintained according to the requirements of the relevant authorities and AS 1592-2002. It is expected that the location of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.

4.5. Construction Standards: Bushfire Attack Level

All buildings must satisfy the Performance Requirements of the National Construction Code: Building Code of Australia (BCA). Part 2.3 of Volume 2 of the BCA applies to dwellings located within designated bushfire areas, which are defined as:

> *Land which has been designated under a power in legislation as being subject, or likely to be subject to, bushfires.*

Accordingly, all forthcoming habitable buildings must satisfy the requirements of Part 3.7.4 of the BCA. The *Deemed-to-Satisfy* (DTS) provision of the BCA can only be achieved if dwellings in bushfire prone areas are constructed in accordance with Australian Standard *AS3959-2018 Construction of buildings in bushfire prone areas*. Alternatively, the DTS provisions can also be achieved if the habitable building is constructed in accordance with the NASH Standard 'Steel Framed Construction in Bushfire Areas'.

Building design and the materials used for construction of future dwellings 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 = *1090K*;
- Slope = *varied*;
- Vegetation classification = *Forest (shrubby)*; and
- Building location.

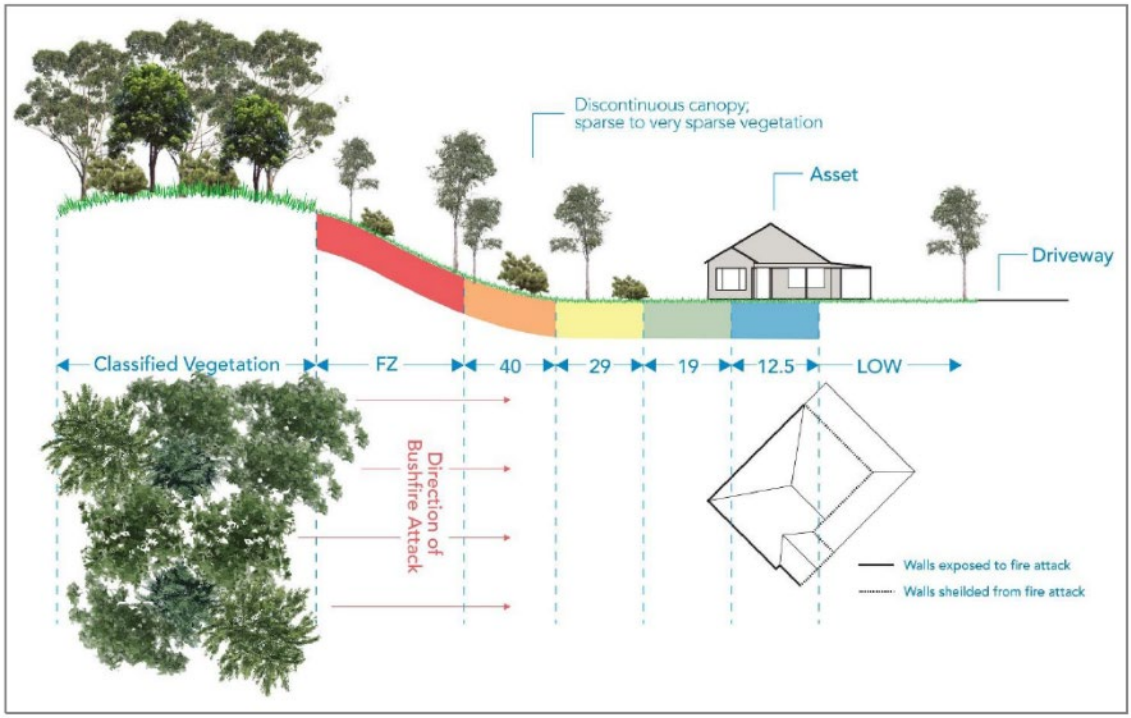


Figure 18: Bushfire Attack Level

The BALs for each transect have been calculated and provided in **Table 5**. To demonstrate the BAL ratings, **Figure 19** has been prepared in accordance with the methodology to prepare a Subdivision BAL Plan outlined in the RFS User Guide for Subdivision of Urban Release Areas on Bush Fire Prone land to represent the BALs required prior to the development of Lot 4.

Table 5: Required BALs

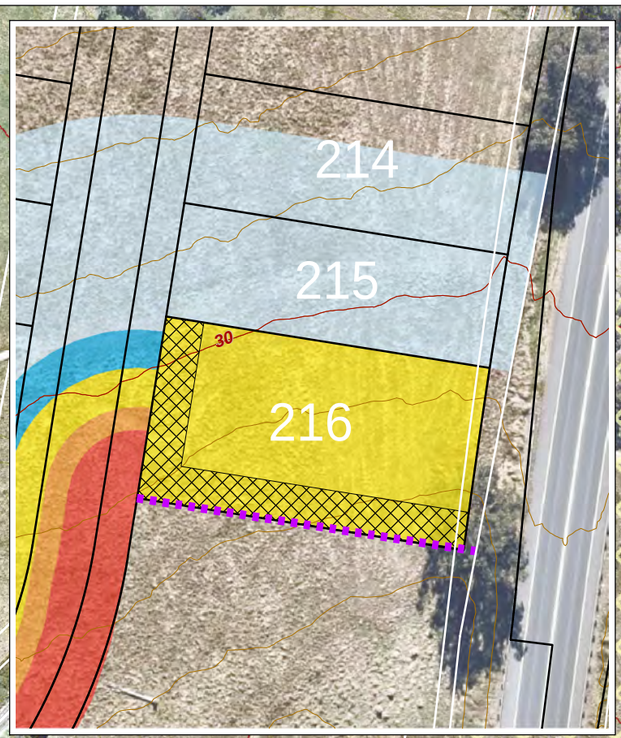
Transect	Vegetation Classification (PBP 2019)	Slope	APZ (29kW/m^2)	Distance from Hazard	Bushfire Attack Level (BAL)
T1 & T3	Not Applicable	N/A	N/A	Not Applicable	
T2	*Woodland* (Grassy and Semi-arid)	3.1° Downslope	**14m**	0m-<13m	BAL-FZ
				13m-<14m	BAL-40
				14m-<21m	BAL-29
				21m-<30m	BAL-19
				30m-<100m	BAL-12.5
T4	*Forest (Hunter Macleay DSF)*	1.3° Downslope	**17m**	0m-<15m	BAL-FZ
				15m-<17m	BAL-40
				17m-<24m	BAL-29
				24m-<34m	BAL-19
				34m-<100m	BAL-12.5
T5	*Low threat / excluded* (Temporary APZ)	3.7° Downslope	**0m**	N/A	BAL-LOW
T6	*Low threat / excluded* (Temporary APZ)	3.4° Downslope	**0m**	N/A	BAL-LOW
T7	*Low threat / excluded* (Temporary APZ)	3.5° Downslope	**0m**	N/A	BAL-LOW
T8	*Forest (Hunter Macleay DSF)*	-2.7° Upslope	**14m**	0m-<12m	BAL-FZ
				12m-<14m	BAL-40
				14m-<20m	BAL-29
				20m-<29m	BAL-19
				29m-<100m	BAL-12.5
T9	*Forest (Hunter Macleay DSF)*	-1.4° Upslope	**15m**	0m-<13m	BAL-FZ
				13m-<15m	BAL-40
				15m-<21m	BAL-29
				21m-<30m	BAL-19
				30m-<100m	BAL-12.5
T10	*Forest (Sydney Sand Flats DSF)*	1.4° Downslope	**23m**	0m-<22m	BAL-FZ
				22m-<23m	BAL-40
				23m-<32m	BAL-29
				32m-<44m	BAL-19
				44m-<100m	BAL-12.5

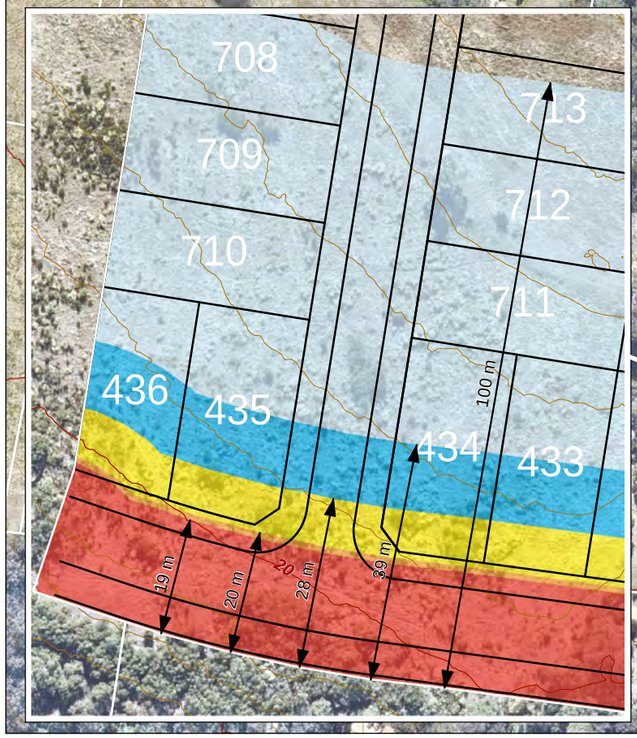
Transect	Vegetation Classification (PBP 2019)	Slope	APZ (29kW/m²)	Distance from Hazard	Bushfire Attack Level (BAL)
T11	*Forest (Sydney Sand Flats DSF)*	-1.9° Upslope	**20m**	0m-<18m	BAL-FZ
				18m-<20m	BAL-40
				20m-<28m	BAL-29
				28m-<38m	BAL-19
				38m-<100m	BAL-12.5
T12	*Forest (Sydney Sand Flats DSF)*	3.1° Downslope	**25m**	0m-<24m	BAL-FZ
				24m-<25m	BAL-40
				25m-<35m	BAL-29
				35m-<47m	BAL-19
				47m-<100m	BAL-12.5
T13	*Forest (Sydney Sand Flats DSF)*	-1.9° Upslope	**20m**	0m-<18m	BAL-FZ
				18m-<20m	BAL-40
				20m-<28m	BAL-29
				28m-<38m	BAL-19
				38m-<100m	BAL-12.5
T14 (Lot 216)	*Grassland (drainage reserve)*	2.4° Downslope	**5m²**	0m-<5m	BAL-FZ
				5m-<5m	BAL-40
				5m-<19m	BAL-29
				19m-<25m	BAL-19
				25m-<50m	BAL-12.5
T15	*Low threat / excluded* (Future development site) (existing Grassland)	-2.2° Upslope	**10m**	0m-<8m	BAL-FZ
				8m-<10m	BAL-40
				10m-<15m	BAL-29
				15m-<22m	BAL-19
				22m-<50m	BAL-12.5
T16	*Low threat / excluded* (Future development site) (existing Grassland)	2.4° Downslope	**11m**	0m-<9m	BAL-FZ
				9m-<12m	BAL-40
				12m-<17m	BAL-29
				17m-<25m	BAL-19
				25m-<50m	BAL-12.5
T17	*Low threat / excluded*	-2.1° Upslope	**0m**	N/A	BAL-LOW
T18	*Low threat / excluded* (Future development site) (existing Grassland)	-2.4° Upslope	**9m**	0m-<8m	BAL-FZ
				8m-<10m	BAL-40
				10m-<15m	BAL-29
				15m-<22m	BAL-19

[2] 2.8m high radiant heat shield (1.8m fence + 1m retaining wall)

Transect	Vegetation Classification (PBP 2019)	Slope	APZ (29kW/m²)	Distance from Hazard	Bushfire Attack Level (BAL)
				22m-<50m	BAL-12.5

Lot Number	BAL Rating
101-129	BAL-LOW
201-213	BAL-LOW
214	BAL-12.5
215	BAL-12.5
216	BAL-29
217	BAL-12.5
218	BAL-12.5
219	BAL-12.5
220	BAL-12.5
221	BAL-12.5
222-228	BAL-LOW
301	BAL-12.5
302	BAL-12.5
303	BAL-12.5
304	BAL-12.5
305-322	BAL-LOW
323	BAL-12.5
324	BAL-12.5
325	BAL-12.5
401	BAL-19
402	BAL-29
403	BAL-12.5
404	BAL-12.5
405	BAL-12.5
406-423	BAL-LOW
424	BAL-12.5
425	BAL-12.5
426	BAL-12.5
427	BAL-29
428	BAL-29
429	BAL-29
430	BAL-29
430	BAL-29
432	BAL-29
433	BAL-29
434	BAL-29
435	BAL-29
436	BAL-29
501-519	BAL-LOW
601-610	BAL-LOW
611	BAL-12.5
612	BAL-12.5
613	BAL-12.5
614	BAL-12.5
615	BAL-12.5
616	BAL-12.5
617-626	BAL-LOW
701-707	BAL-LOW
708	BAL-12.5
709	BAL-12.5
710	BAL-12.5
711	BAL-12.5
712	BAL-12.5
713	BAL-12.5
714-722	BAL-LOW
801-822	BAL-LOW
901-910	BAL-LOW
1001-1021	BAL-LOW
1101-1110	BAL-LOW
1201-1215	BAL-LOW
1301-1313	BAL-LOW
1401-1411	BAL-LOW
1501-1516	BAL-LOW
1601-1620	BAL-LOW
1701-1719	BAL-LOW





Gillieston Heights

Figure 19

Subdivision BAL Plan

BUSHFIRE PLANNING AUSTRALIA

- Stage 1 boundary
- Contour (10m)
- Contour (1m)
- Managed Land (active open space)
- Managed Land (floodway / park)
- 1.8m Radiant Heat Shield
- 5m APZ Setback (Lot
- 100m temporary APZ

Required Bushfire Attack Levels (AS3959-2018)

- BAL - FZ
- BAL - 40
- BAL - 29
- BAL - 19
- BAL - 12.5

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2021
Surface analysis: Derived from LiDAR - Newcastle & Cessnoc 1 metre Resolution Digital Elevation Model

N W E S

0 50 100 150
Meters

A3 Scale: 1:3,000

File:Gillieston Heights_Fig9_BALs_220208 Date: 8/02/2022

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

4.6. Emergency Services

There is a NSW Fire & Rescue Station located at 14 Church Street, Maitland, approximately 5.5km or 8 minutes drive away from the site. This station would likely be first responders with support from a second Fire & Rescue Station located in East Maitland (12kms) if required.

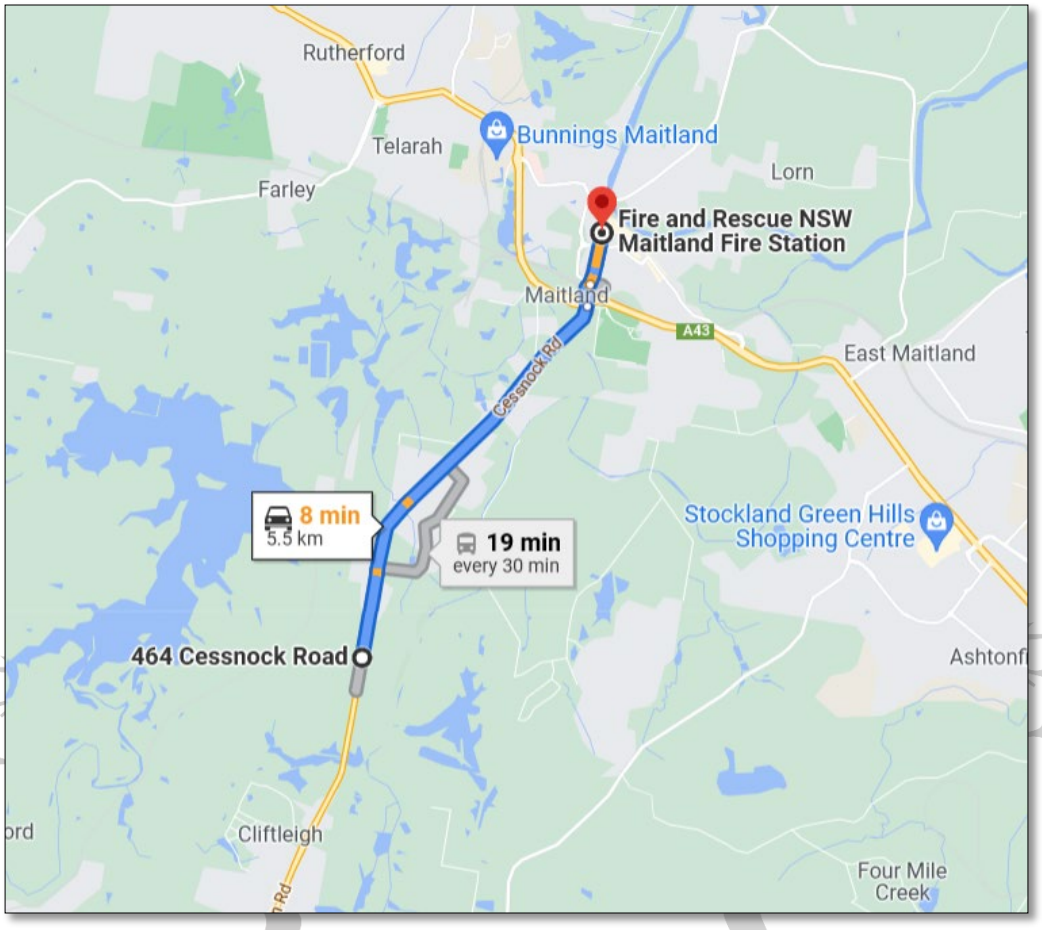


Figure 20: NSW Fire & Rescue - Maitland

5. Conclusion and Recommendations

Bushfire Planning Australia has been engaged by Loxford Project Management Pty Ltd to undertake a Bushfire Assessment Report for the proposed residential subdivision known as Precinct 1A of the Regrowth Kurri Kurri located at Cessnock Road, Gillieston Heights.

This BAR found that the site is currently exposed to a low to medium bushfire hazard immediately to the south of the site. The hazard is consistent with a *forest* vegetation, namely Hunter Macleay Dry Sclerophyll Forest (DSF) and Sydney Sand Flats DSF, and transitions to a w*oodland* as described in PBP 2019. Additionally, *grassland* is present to the east of the site although will be cleared as a result of a neighbouring development site; and to the west of the site whereby it will be cleared and managed as part of a proposed APZ. The BAR concludes that the hazard identified can be successfully mitigated by applying the requirements of PBP 2019, such as a combination of temporary and permanent Asset Protection Zones.

In summary, the following key recommendations have been designed to enable the proposed residential development to achieve the aims and objectives of PBP 2019:

1. The entire site; excluding areas zoned RU2 shall be managed as an Inner Protection Area (IPA) as outlined within Appendix 4 of PBP 2019 and the RFS document Standards for asset protection zones;
2. A temporary APZ shall be provided up to 100m (excluding land zoned RU2 Rural Landscape) as each stage is completed and contained to within the development footprint as shown on **Figure 19**;
3. Access shall be provided in accordance with Table 5.3b of PBP 2019. This will require the provision of a minimum of two (2) separate road access points provided from the development site to the north and east to ensure safe evacuation for all residents;
4. Following the completion of Stage 1, a temporary emergency access road shall be constructed and connect to Auburn Street (north) and remain accessible by emergency services at all times. The temporary emergency access road shall be constructed in accordance with the NSW RFS Fire Trail Standards;
5. Any temporary turning heads shall be constructed in accordance Appendix A3.3 of PBP 2019;
6. Vegetation within road verges (including swales) to be consistent with a grassland vegetation classification with tree canopy less than 10% at maturity (and considered unmanaged);
7. The provision of water, electricity and gas must comply with the requirements of Table 5.3c of PBP 2019;
8. All future dwellings to be constructed on the proposed lots shall have due regard to the specific considerations given in the National Construction Code: Building Code of Australia (BCA) which makes specific reference to Australian Standard AS3959-2018 Construction of buildings in bushfire prone areas (AS3959-2018) and the NASH Standard Steel Framed Construction in Bushfire Prone Areas;
9. All new lots are to be connected to a reliable water supply network and that suitable fire hydrants are located throughout the development site that are clearly marked and provided for the purposes of bushfire protection. Fire hydrant spacing, sizing and pressure shall comply with AS2419.1 2005 and section 5.3.3 of PBP 2019; and
10. Consideration should be given to landscaping and fuel loads on site to decrease potential fire hazards on site.

Consideration should be given to landscaping and fuel loads on site to decrease potential fire hazards on site. Finally, should the above recommendations be implemented, 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 and that property and life damage/loss will not occur.

6. References

- NSW Rural Fire Service (2005). *Standards for Asset Protection Zones*. NSW Rural Fire Service.
- NSW Rural Fire Service (2019). 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.
- Rural Fires and Environmental Assessment Legislation Amendment Act 2002.
- Standards Australia (2018). AS 3959 – 2018: Construction of Buildings in Bushfire-prone Areas.
- Strategic Bushfire Study – Hydro Landholdings, Kleinfelder (20220382) July 2021

Appendix A: Plan of Proposed Residential Subdivision

240289(1)-DA-001

DEVELOPMENT APPLICATION

LOTS 1 & 2 D.P.456946, LOT 54, 55, 69, 70 & 71 D.P.975994, LOT 1 D.P.1206034, LOT 1 & 2 D.P.302745, LOT 2 D.P.601226 FRONTING CESSNOCK ROAD , GILLIESTON HEIGHTS

INDEX OF DRAWINGS

DRAWING No.	TITLE NAME
DA-001	COVER SHEET & DRAWING INDEX
DA-002	SITE CONTEXT PLAN
DA-003	EXISTING SITE NATURAL SURFACE PLAN
DA-004	LEP ZONING
DA-005	LEP MINIMUM LOT SIZE
DA-006	OVERALL STAGE MASTER PLAN
DA-007	STAGE 1 DETAIL PLAN
DA-008	STAGE 2, 3, 4, 6 & 7 DETAIL PLAN
DA-009	STAGE 5 & 8 DETAIL PLAN
DA-010	STAGE 9, 10, 11, 12, 13, 14, 15, 16 & 17 DETAIL PLAN
DA-011	RESIDUE PLAN: LOT 1 & LOT 2
DA-012	LOT DIVERSITY PLAN
DA-013	MOBILITY PLAN (PATHWAYS, CYCLEWAYS, SHARED PATHS)
DA-014	VEGETATION REMOVAL/RETENTION PLAN: SHEET 1
DA-015	VEGETATION REMOVAL/RETENTION PLAN: SHEET 2

DIAL1100 BEFORE YOU DIG

working beyond expectations

drawing title:

COVER SHEET AND DRAWING INDEX

location: 464 CESSNOCK ROAD, GILLIESTON HEIGHTS

council: MAITLAND

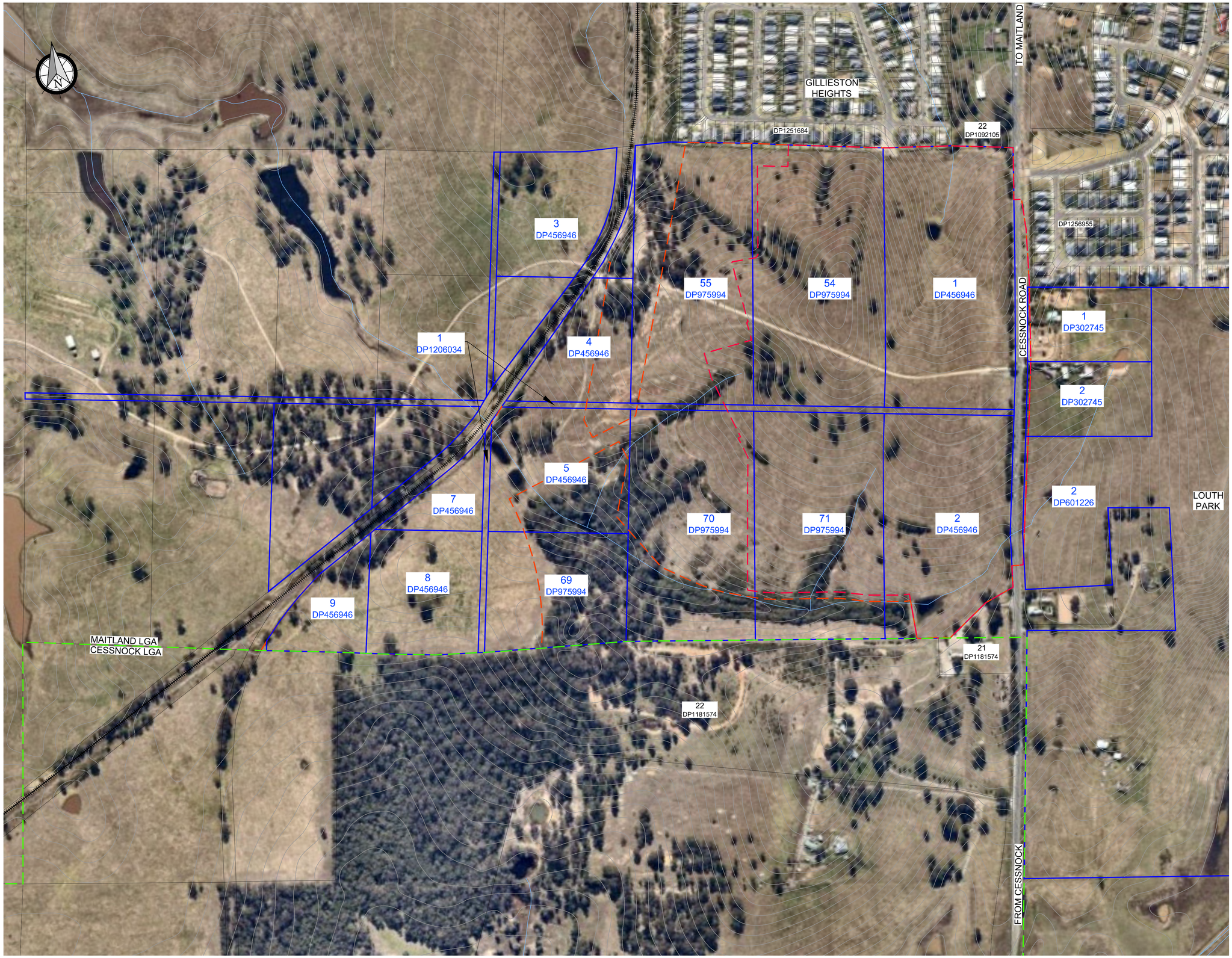
dwg ref: 240289(1)-DA-001

client: McCLOYGROUP

adw johnson
central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
sydney office ph: (02) 8046 7411
www.adwjohnson.com.au

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
B	28.01.22	INITIAL ISSUE	DN	RK	DATUM: N/A CONTOUR INTERVAL: N/A		SHEET PLAN-(1) OF 15

• project management • civil engineering • infrastructure • superintendency • social impact • town planning • surveying • development feasibility • visualisation • urban design



DETAIL PLAN

SCALE 1:3000

LEGEND

- SUBJECT DEVELOPMENT LOTS
- PROPOSED RESIDENTIAL DEVELOPMENT
- PROPOSED EXTENT OF CLEARING
- EXISTING BOUNDARY
- LGA BOUNDARY
- 1 DP302745 — EXISTING ADJACENT LOT NUMBER AND TITLE
- 1 DP456946 — SUBJECT DEVELOPMENT LOT NUMBER AND TITLE

NOTES:-

1. BOUNDARIES HAVE BEEN DETERMINED BY PLAN DIMENSIONS ONLY, AND HAVE NOT BEEN SURVEYED. ALL DIMENSIONS, AREAS AND EASEMENTS ARE SUBJECT TO FINAL SURVEY.
2. CONTOURS SHOWN HEREON ARE DERIVED FROM LIDAR DATA FOR DESIGN PURPOSES ONLY AND ARE TO BE CONFIRMED ON SITE PRIOR TO ANY EXCAVATION OR CONSTRUCTION.
3. THIS PLAN HAS BEEN PREPARED FOR THE PURPOSE OF D.A. AND SHOULD NOT BE USED FOR ANYTHING OTHER THAN THAT PURPOSE.

DIAL1100 BEFORE YOU DIG

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
B	28.01.22	INITIAL ISSUE	DN	RK	DATUM: N/A CONTOUR INTERVAL: N/A	A1 1:3000 — 0 60 120 150m — A3 1:6000	SHEET PLAN-(3) OF 15

drawing title: EXISTING SITE NATURAL SURFACE PLAN

location: 464 CESSNOCK ROAD, GILLIESTON HEIGHTS

council: MAITLAND

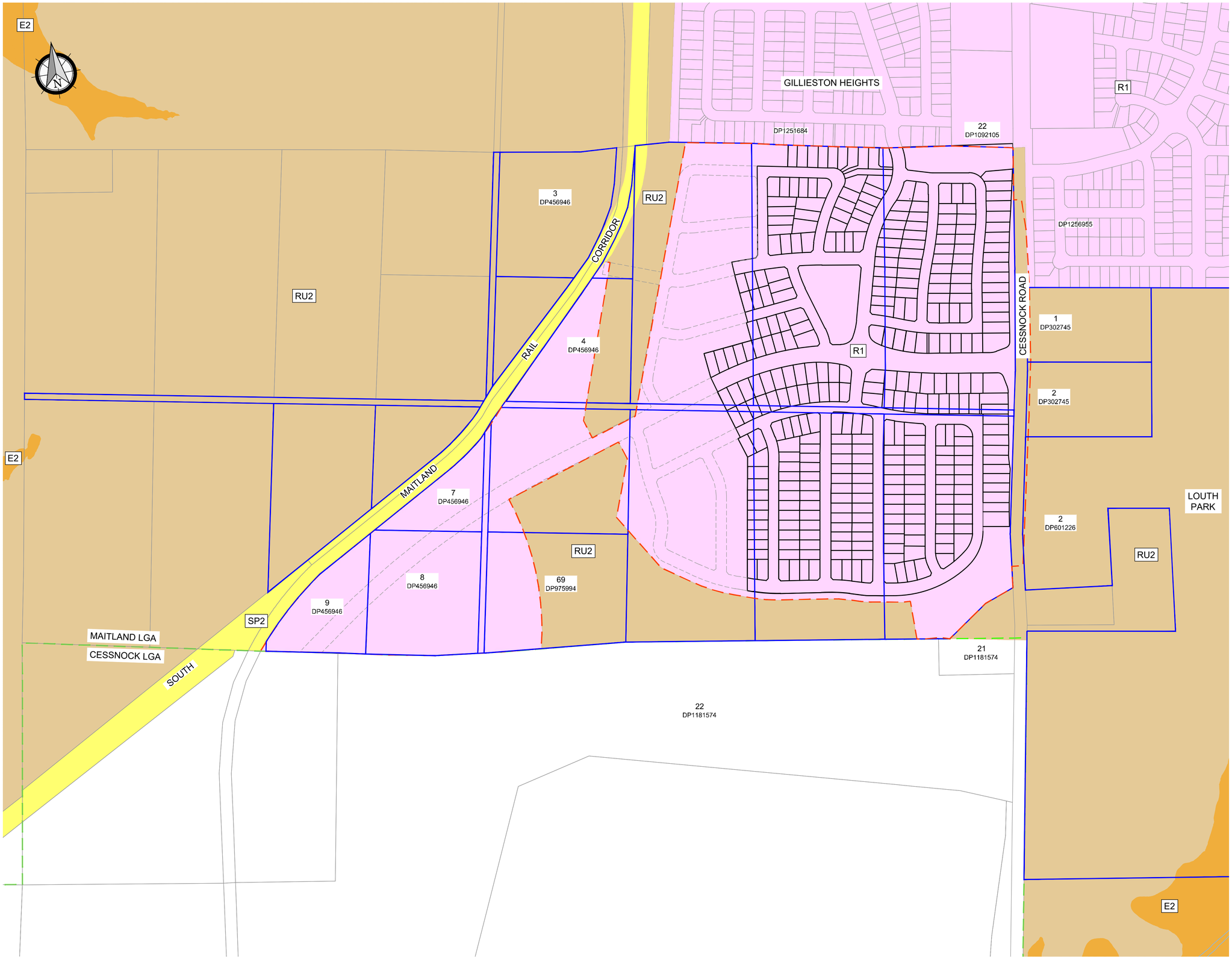
dwg ref: 240289(1)-DA-003

client:

adw johnson
central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
sydney office ph: (02) 8046 7411
www.adwjohnson.com.au

working beyond expectations

240289(1)-DA-004



LEGEND

- SUBJECT DEVELOPMENT LOTS
- DCP DEVELOPMENT PATTERN
- EXISTING BOUNDARY
- PROPOSED BOUNDARY
- LGA BOUNDARY
- PROPOSED EXTENT OF CLEARING
- R1 GENERAL RESIDENTIAL
- RU2 RURAL LANDSCAPE
- E2 ENVIRONMENTAL CONSERVATION
- SP2 INFRASTRUCTURE

DETAIL PLAN

SCALE 1:3000

DIAL1100 BEFORE YOU DIG

working beyond expectations

drawing title:

LEP ZONING

location: 464 CESSNOCK ROAD, GILLIESTON HEIGHTS

council: MAITLAND

dwg ref: 240289(1)-DA-004

client: McCLOYGROUP

adw johnson

central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
sydney office ph: (02) 8046 7411
www.adwjohnson.com.au

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
B	28.01.22	INITIAL ISSUE	DN	RK	DATUM: N/A CONTOUR INTERVAL: N/A	A1 1:3000 — 0 60 120 150m — A3 1:6000	SHEET PLAN-(4) OF 15

• project management • civil engineering • infrastructure • superintendency • social impact • town planning • surveying • development feasibility • visualisation • urban design

LEGEND

- PROPOSED RESIDENTIAL DEVELOPMENT
- EXISTING BOUNDARY
- PROPOSED BOUNDARY
- LGA BOUNDARY
- STAGE BOUNDARY
- 2 — STAGE NUMBER
- STORMWATER BASIN
- PROPOSED RESIDENTIAL
- PROPOSED RESIDUAL LOT
- PROPOSED COUNCIL DEDICATED RESERVE

LOT SCHEDULE

STAGE	RESIDENTIAL LOTS	PUBLIC RESERVE LOTS
STAGE 1	29	0
STAGE 2	28	2
STAGE 3	25	1
STAGE 4	36	0
STAGE 5	19	0
STAGE 6	26	0
STAGE 7	22	0
STAGE 8	22	0
STAGE 9	10	0
STAGE 10	21	2
STAGE 11	10	0
STAGE 12	15	1
STAGE 13	13	0
STAGE 14	11	0
STAGE 15	16	0
STAGE 16	20	0
STAGE 17	19	1
TOTAL LOTS	342	7
RESIDULE LOTS	3	

DETAIL PLAN
SCALE 1:3000

DIAL1100 BEFORE YOU DIG

working beyond expectations

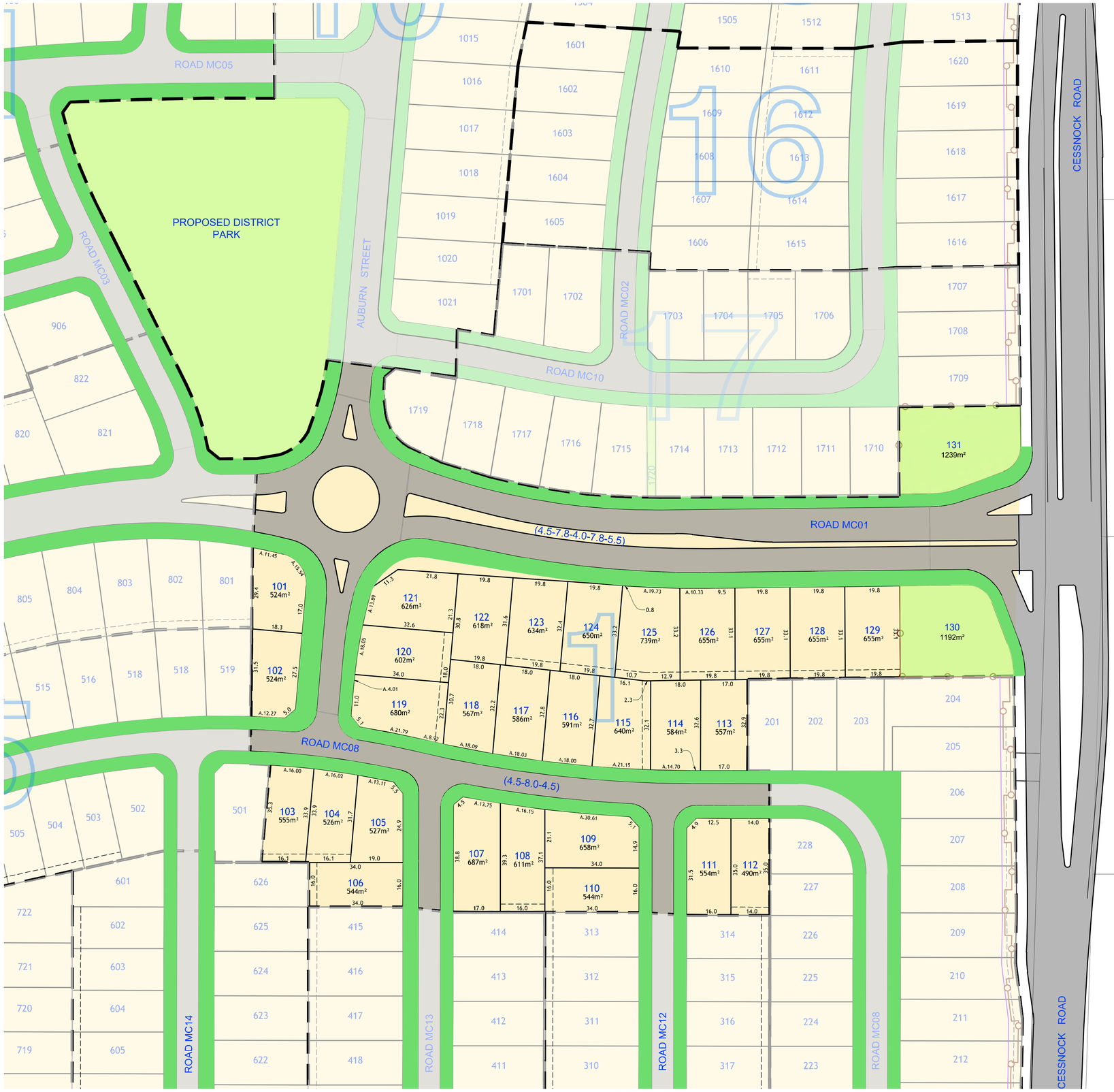
ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
B	28.01.22	INITIAL ISSUE	DN	RK	DATUM: N/A CONTOUR INTERVAL: N/A	A1 1:3000 — 0 60 120 150m — A3 1:6000	SHEET PLAN-(6) OF 15

drawing title:
OVERALL STAGE MASTER PLAN

location: 464 CESSNOCK ROAD, GILLIESTON HEIGHTS
council: MAITLAND
dwg ref: 240289(1)-DA-006
client: McCLOYGROUP

adw johnson
central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
sydney office ph: (02) 8046 7411
www.adwjohnson.com.au

240289(1)-DA-007



DETAIL PLAN

SCALE 1:750

LEGEND		
STAGE	RESIDENTIAL LOTS	PUBLIC RESERVE LOTS
STAGE 1	29	2

EASEMENT TO DRAIN WATER
5m LANDSCAPE BUFFER
FRONT BOUNDARY FENCE

DIAL1100 BEFORE YOU DIG

working beyond expectations

drawing title:

DETAIL SHEET OF STAGES 1

location: 464 CESSNOCK ROAD, GILLIESTON HEIGHTS

council: MAITLAND

dwg ref: 240289(1)-DA-007

client: McCLOYGROUP

adw johnson

central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
sydney office ph: (02) 8046 7411
www.adwjohnson.com.au

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
B	28.01.22	INITIAL ISSUE	DN	RK	DATUM: N/A CONTOUR INTERVAL: N/A	A1 1:750 — 0 15.0 30.0 37.5m — A3 1:1500	SHEET PLAN-(7) OF 15

• project management • civil engineering • infrastructure • superintendency • social impact • town planning • surveying • development feasibility • visualisation • urban design

Plotted By: Iain Baker Plot Date: 28/01/22 9:03:27 AM Cad File: \\FSERVER10\ADW-DATA\240289\240289(1)\DWG\PLANNING\DA\240289(1)-DA-007.DWG

This plan includes coloured information. If you have a black and white copy you do not have all of the information. This note is coloured RED.

240289(1)-DA-008

ROAD MC08

CESSNOCK ROAD

ROAD MC15 (4.5-8.0-4.5)

ROAD MC14 (4.5-8.0-5.5)

ROAD MC13 (5.5-8.0-4.5)

ROAD MC12 (4.5-8.0-4.5)

ROAD MC08 (4.5-8.0-4.5)

ROAD MC08 (4.5-10.5-5.5)

DRAINAGE RESERVE

326
1.59ha

1
(RESIDUE)
13.77ha

LEGEND		
STAGE	RESIDENTIAL LOTS	PUBLIC RESERVE LOTS
STAGE 2	28	0
STAGE 3	25	1
STAGE 4	36	0
STAGE 6	26	0
STAGE 7	22	0

EASEMENT TO DRAIN WATER
5m LANDSCAPE BUFFER
FRONT BOUNDARY FENCE

DETAIL PLAN
SCALE 1:750

DIAL1100 BEFORE YOU DIG

working beyond expectations

drawing title:
DETAIL SHEET OF STAGES 2, 3, 4, 6 & 7

location: 464 CESSNOCK ROAD, GILLIESTON HEIGHTS
council: MAITLAND
dwg ref: 240289(1)-DA-008
client: McCLOYGROUP

adw johnson
central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
sydney office ph: (02) 8046 7411
www.adwjohnson.com.au

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
B	28.01.22	INITIAL ISSUE	DN	RK	DATUM: N/A CONTOUR INTERVAL: N/A	A1 1:750 — 0 15.0 30.0 37.5m — A3 1:1500	

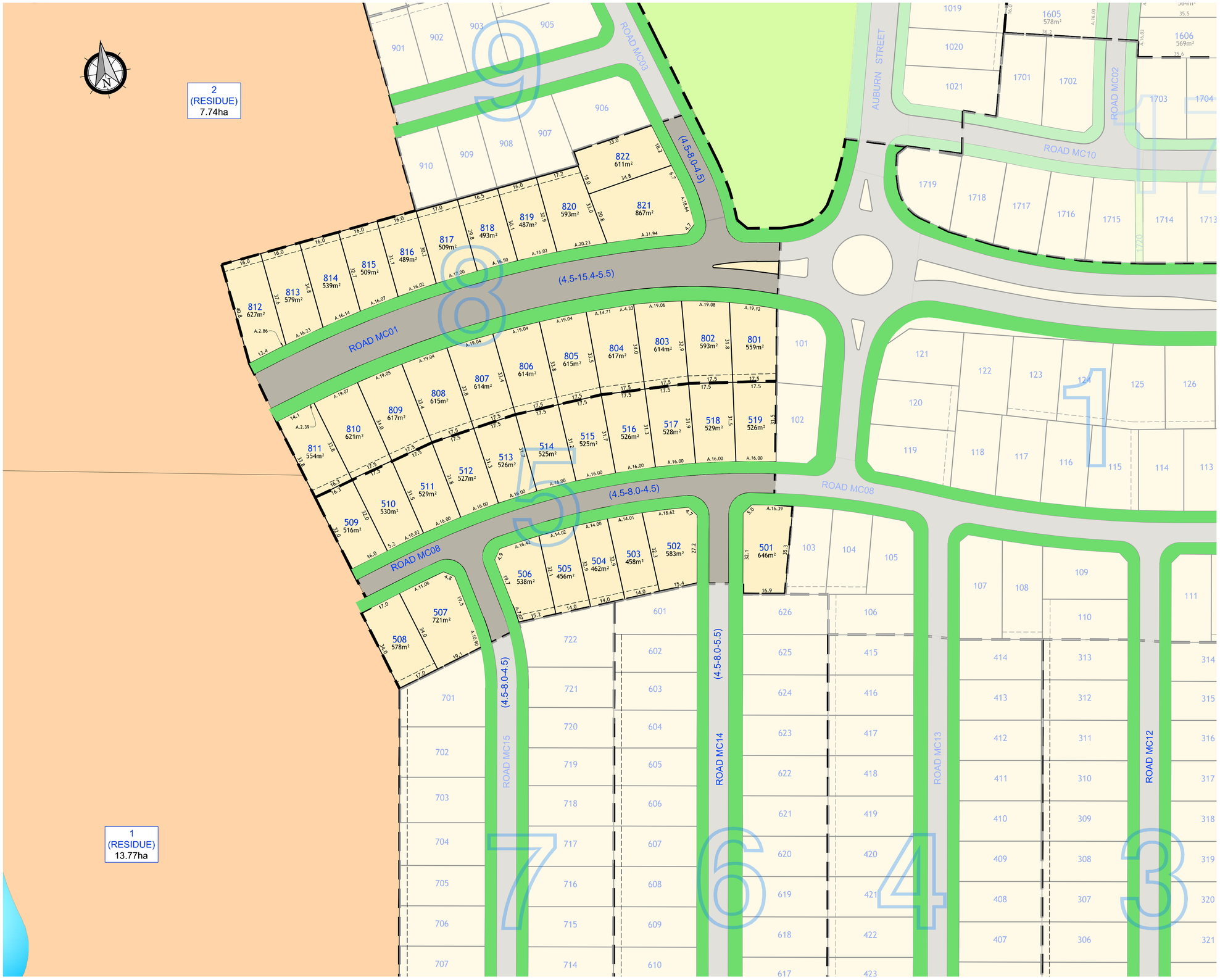
SHEET PLAN-(8) OF 15

• project management • civil engineering • infrastructure • superintendency • social impact • town planning • surveying • development feasibility • visualisation • urban design

Plotted By: Iain Baker Plot Date: 28/01/22 9:03:43AM Cad File: \\JPSERVER10\ADW-DATA\240289\240289(1)\DWG\PLANNING\DA\240289(1)-DA-008.DWG

This plan includes coloured information. If you have a black and white copy you do not have all of the information. This note is coloured RED.

240289(1)-DA-009



DETAIL PLAN
SCALE 1:750

STAGE	RESIDENTIAL LOTS	PUBLIC RESERVE LOTS
STAGE 5	19	0
STAGE 8	22	0

RESIDUE LOT BOUNDARY
EASEMENT TO DRAIN WATER
5m LANDSCAPE BUFFER
FRONT BOUNDARY FENCE

DIAL1100 BEFORE YOU DIG

working beyond expectations

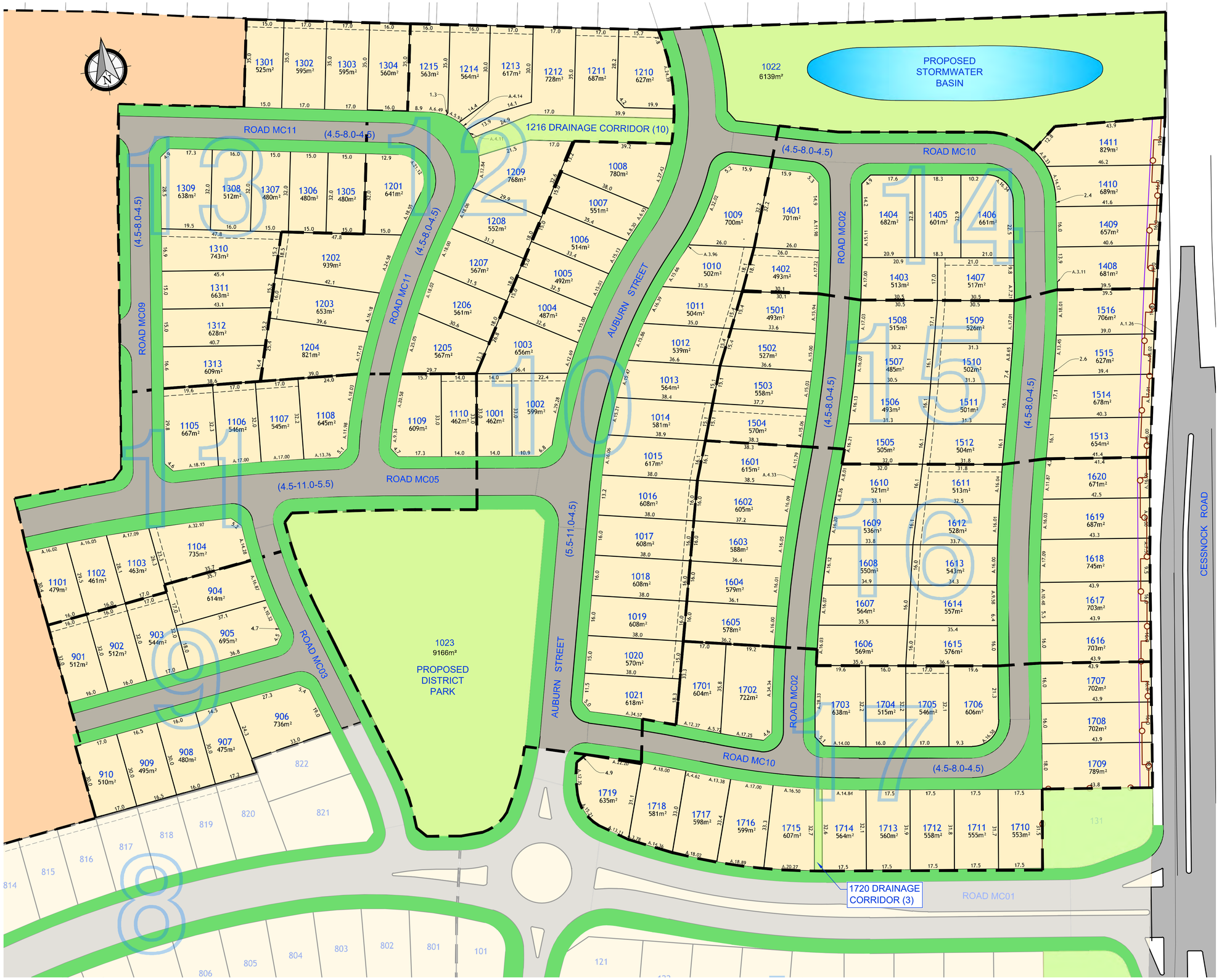
drawing title:
DETAIL SHEET OF STAGES 5 & 8

location: 464 CESSNOCK ROAD, GILLIESTON HEIGHTS
council: MAITLAND
dwg ref: 240289(1)-DA-009
client:

central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
sydney office ph: (02) 8046 7411
www.adwjohnson.com.au

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
B	28.01.22	INITIAL ISSUE	DN	RK	DATUM: N/A CONTOUR INTERVAL: N/A	A1 1:750 (0 15.0 30.0 37.5m) A3 1:1500	SHEET PLAN-(9) OF 15

• project management • civil engineering • infrastructure • superintendency • social impact • town planning • surveying • development feasibility • visualisation • urban design



DETAIL PLAN
SCALE 1:750

LEGEND		
STAGE	RESIDENTIAL LOTS	PUBLIC RESERVE LOTS
STAGE 9	10	0
STAGE 10	21	2
STAGE 11	10	0
STAGE 12	15	1
STAGE 13	13	0
STAGE 14	11	0
STAGE 15	16	0
STAGE 16	20	0
STAGE 17	19	1

- – – – EASEMENT TO DRAIN WATER
- 5m LANDSCAPE BUFFER
- FRONT BOUNDARY FENCE

DIAL1100 BEFORE YOU DIG

working beyond expectations

drawing title: DETAIL SHEET OF STAGES 9, 10, 11, 12, 13, 14,15, 16 & 17

location: 464 CESSNOCK ROAD, GILLIESTON HEIGHTS

council: MAITLAND

dwg ref: 240289(1)-DA-010

client: McCLOYGROUP

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
B	28.01.22	INITIAL ISSUE	DN	RK	DATUM: N/A CONTOUR INTERVAL: N/A	A1 1:750 — 0 15.0 30.0 37.5m — A3 1:1500	SHEET PLAN-(10) OF 15

adw johnson
central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
sydney office ph: (02) 8046 7411
www.adwjohnson.com.au

240289(1)-DA-011

GILLIESTON HEIGHTS

Pt.3
(RESIDUE)
1.50ha
(0.39ha)

Pt.3
(RESIDUE)
1.50ha
(0.75ha)

Pt.3
(RESIDUE)
1.50ha
(0.37)ha

2
(RESIDUE)
7.74ha

1
(RESIDUE)
13.77ha

CORRIDOR

RAIL

MAITLAND

SOUTH

3
DP456946
(PARTIAL CLEARING ONLY,
NO CHANGE TO LOT)

4
DP456946
(PARTIAL CLEARING ONLY,
NO CHANGE TO LOT)

7
DP456946
(PARTIAL CLEARING ONLY,
NO CHANGE TO LOT)

8
DP456946
(PARTIAL CLEARING ONLY,
NO CHANGE TO LOT)

69
DP975994
(PARTIAL CLEARING ONLY,
NO CHANGE TO LOT)

(A) (B) (C)

CONNECT TO THE END OF THE ROAD
AND GULLY CONTOURS THEN USE FUTURE
ROAD TO CONNECT TO BASIN EASEMENT

CONNECT TO THE END OF ROAD
AND FOLLOW GULLY CONTOURS
UNTIL IT HITS THE BASIN EASEMENT

ROAD MC11
ROAD MC09
ROAD MC05
AUBURN STREET
ROAD MC02
ROAD MC01
ROAD MC08
ROAD MC15
ROAD MC14
ROAD MC13
ROAD MC12

DETAIL PLAN
SCALE 1:1500

LEGEND

- PROPOSED EASEMENT ZONE
- EXISTING BOUNDARY
- LGA BOUNDARY
- STAGE BOUNDARY
- 2 STAGE NUMBER
- STORMWATER BASIN
- PROPOSED RESIDENTIAL
- PROPOSED RESIDUAL LOT
- PROPOSED COUNCIL DEDICATED RESERVE

(A) - POSITIVE COVENANT (ASSET PROTECTION ZONE)

(B) - EASEMENT TO DRAIN WATER AND EASEMENT FOR ACCESS (20 WIDE AND VARIABLE)

(C) - EASEMENT TO DRAIN WATER (20 WIDE)

DIAL 1100 BEFORE YOU DIG

working beyond expectations

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
B	28.01.22	INITIAL ISSUE	DN	RK	DATUM: N/A CONTOUR INTERVAL: N/A	A1 1:1500 · 0 30 60 75m · A3 1:3000	SHEET PLAN-(11) OF 15

drawing title:

RESIDUE PLAN:
LOT 1 & LOT 2

location: 464 CESSNOCK ROAD, GILLIESTON HEIGHTS

council: MAITLAND

dwg ref: 240289(1)-DA-011

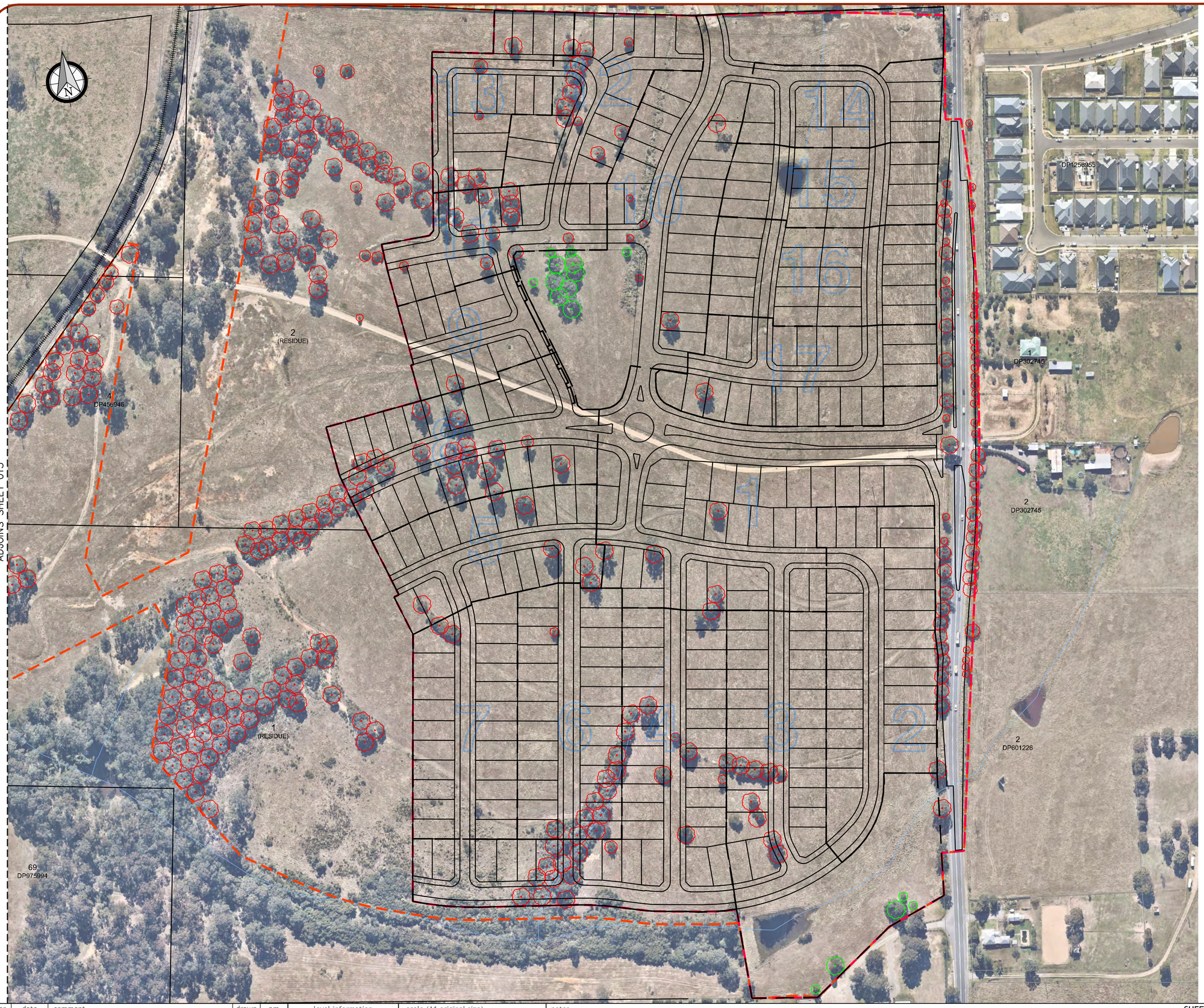
client: McCLOY GROUP

adw johnson
central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
sydney office ph: (02) 8046 7411
www.adwjohnson.com.au

• project management • civil engineering • infrastructure • superintendency • social impact • town planning • surveying • development feasibility • visualisation • urban design

240289(1)-DA-014

ADJOINS SHEET 015



LEGEND

- SITE CADASTRAL BOUNDARY
- PROPOSED DEVELOPMENT APPLICATION
- PROPOSED EXTENT OF CLEARING
- ADJACENT BOUNDARY
- TREES TO BE RETAINED
- TREES TO BE REMOVED

DIAL 1100 BEFORE YOU DIG

working beyond expectations

drawing title:
VEGETATION REMOVAL/RETENTION PLAN

location: 464 CESSNOCK ROAD, GILLIESTON HEIGHTS

council: MAITLAND

dwg ref: 240289(1)-DA-014

client: McCLOYGROUP

adw johnson

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
B	28.01.22	INITIAL ISSUE	DN	RK	DATUM: N/A CONTOUR INTERVAL: N/A	A1 1:1500 — 0 30 60 75m — A3 1:3000	SHEET PLAN-(14) OF 15

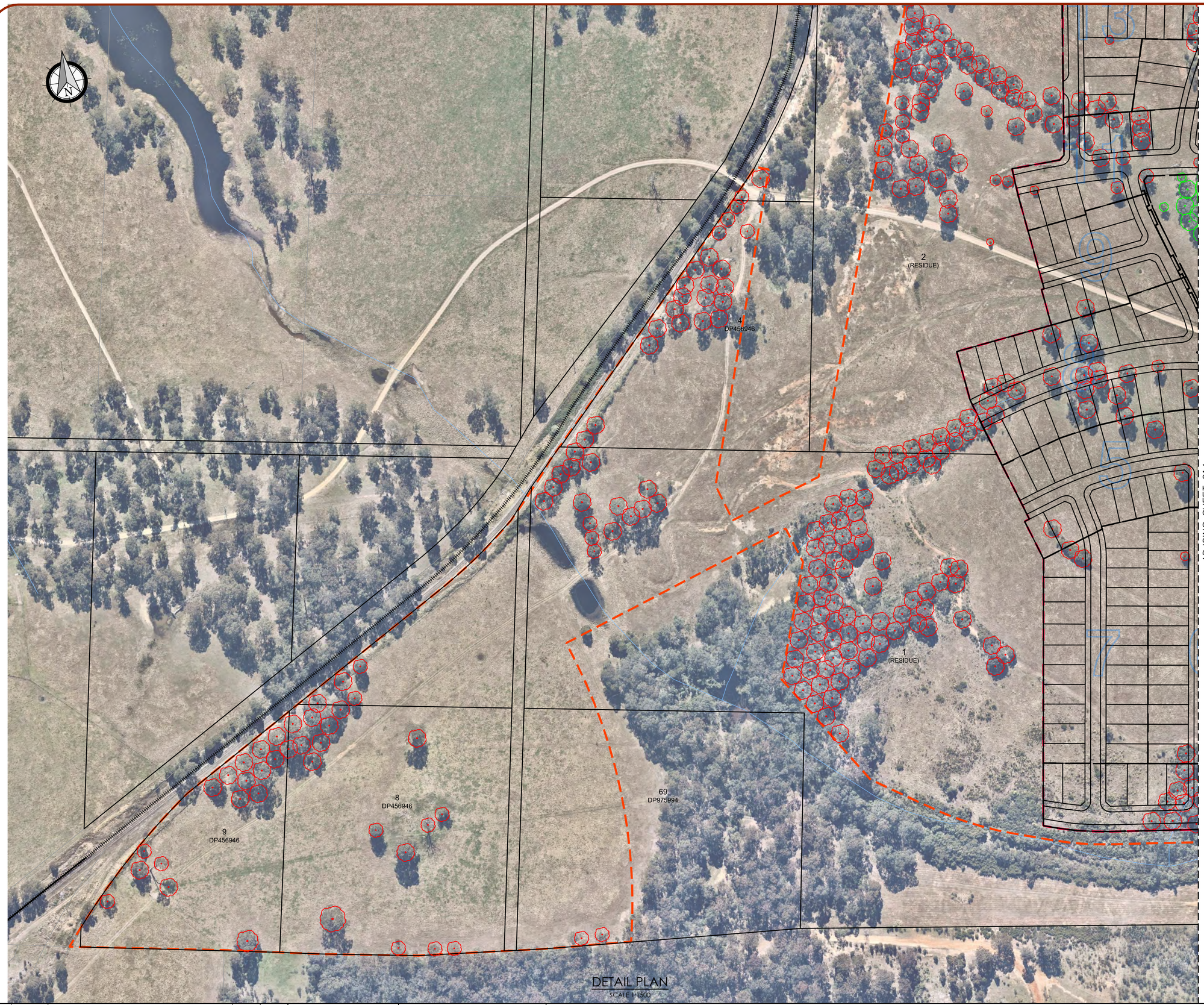
central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
sydney office ph: (02) 8046 7411
www.adwjohnson.com.au

• project management • civil engineering • infrastructure • superintendency • social impact • town planning • surveying • development feasibility • visualisation • urban design

Plotted By: Iain Baker Plot Date: 28/01/22 9:05:40AM Cad File: \\PSERVER10\ADW-DATA\240289\240289(1)\DWG\PLANNING\DA\240289(1)-DA-014.DWG

This plan includes coloured information. If you have a black and white copy you do not have all of the information. This note is coloured RED.

240289(1)-DA-015



ADJOINS SHEET 014

LEGEND

- SITE CADASTRAL BOUNDARY
- PROPOSED DEVELOPMENT APPLICATION
- PROPOSED EXTENT OF CLEARING
- ADJACENT BOUNDARY
- TREES TO BE RETAINED
- TREES TO BE REMOVED

DETAIL PLAN
SCALE 1:500

DIAL1100 BEFORE YOU DIG

working beyond expectations

drawing title:
VEGETATION REMOVAL/RETENTION PLAN

location: 464 CESSNOCK ROAD, GILLIESTON HEIGHTS

council: MAITLAND

dwg ref: 240289(1)-DA-015

client:

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
B	28.01.22	INITIAL ISSUE	DN	RK	DATUM: N/A CONTOUR INTERVAL: N/A	A1 1:1500 — 0 30 60 75m — A3 1:3000	SHEET PLAN-(15) OF 15

central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
sydney office ph: (02) 8046 7411
www.adwjohnson.com.au

• project management • civil engineering • infrastructure • superintendency • social impact • town planning • surveying • development feasibility • visualisation • urban design

Appendix B: AHIMS Search Results

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : 2158 Kurri McCloy

Client Service ID : 646214

Katrina Greville

Date: 09 December 2021

21 Costata Crescent
Adamstown New South Wales 2289

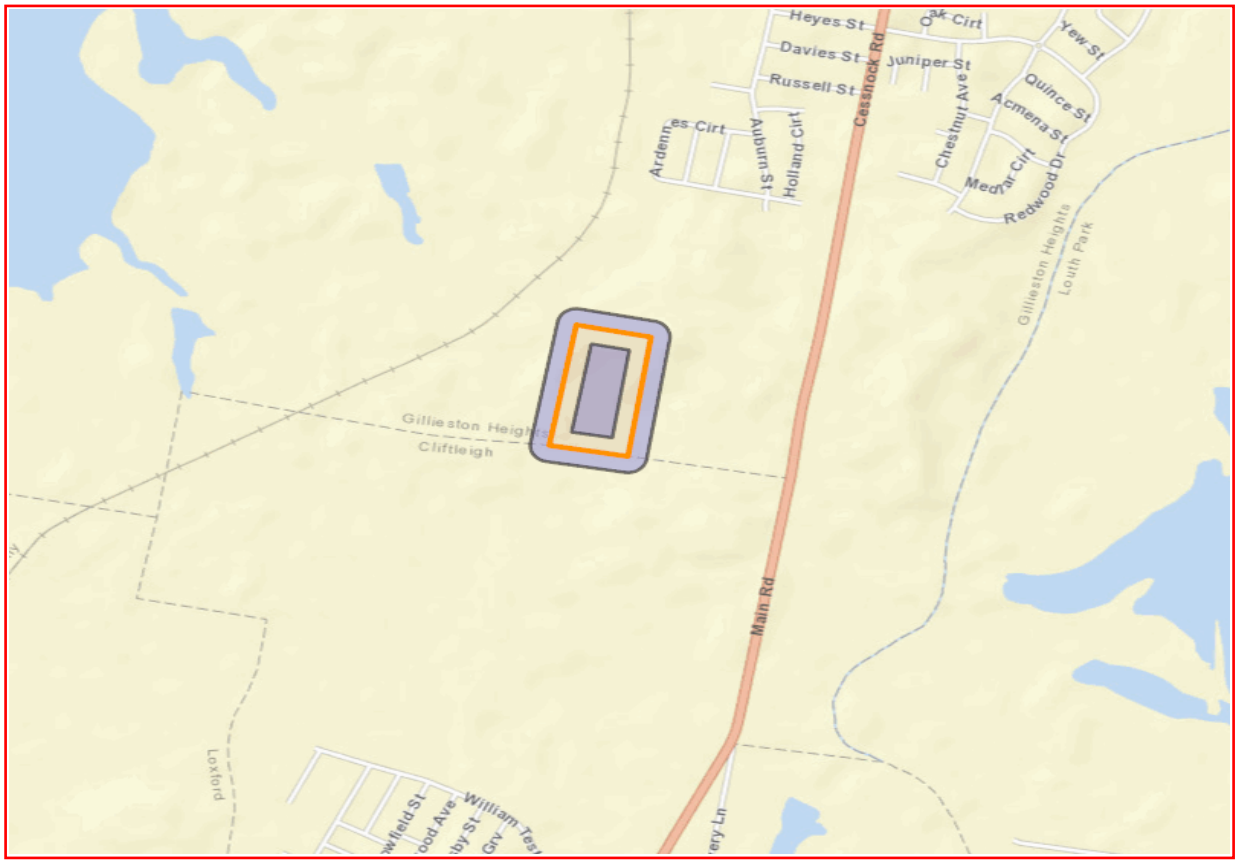
Attention: Katrina Greville

Email: klmukevski@bigpond.com

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 70, DP:DP975994, Section : - with a Buffer of 50 meters, conducted by Katrina Greville on 09 December 2021.

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



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

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

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

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

Important information about your AHIMS search

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

Level 6, 10 Valentine Ave, Parramatta 2150
Locked Bag 5020 Parramatta NSW 2124
Tel: (02) 9585 6345

ABN 34 945 244 274
Email: ahims@environment.nsw.gov.au
Web: www.heritage.nsw.gov.au

Appendix C: NBC Bushfire Attack Assessor V4.1 Report

NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 9/02/2022 **Assessment Date:** 2/09/2021

Site Street Address: 2158 Cessnock Road - Stage 1, Gillieston Heights

Assessor: Stuart Greville; Bushfire Planning Australia

Local Government Area: Maitland **Alpine Area:** No

Equations Used

Transmissivity: Fuss and Hammins, 2002
Flame Length: RFS PBP, 2001/Vesta/Catchpole
Rate of Fire Spread: Noble et al., 1980
Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005
Peak Elevation of Receiver: Tan et al., 2005
Peak Flame Angle: Tan et al., 2005

Run Description: T10

Vegetation Information

Vegetation Type: Sydney Sand Flats DSF

Vegetation Group: Dry Sclerophyll Forests (Shrubby)

Vegetation Slope: 1.4 Degrees **Vegetation Slope Type:** Downslope

Surface Fuel Load(t/ha): 20.5 **Overall Fuel Load(t/ha):** 29.5

Vegetation Height(m): 2 Only Applicable to Shrub/Scrub and Vesta

Site Information

Site Slope: 2 Degrees **Site Slope Type:** Downslope

Elevation of Receiver(m): Default **APZ/Separation(m):** 23

Fire Inputs

Veg./Flame Width(m): 100 **Flame Temp(K):** 1090

Radiant Heat Shielding Inputs

Shield Height(m): 0 **Shield Width(m):** 0

Calculation Parameters

Flame Emissivity: 95 **Relative Humidity(%):** 25

Heat of Combustion(kJ/kg 18600 **Ambient Temp(K):** 308

Moisture Factor: 5 **FDI:** 100

Program Outputs

Category of Attack: HIGH **Peak Elevation of Receiver(m):** 8.55

Level of Construction: BAL 29 **Fire Intensity(kW/m):** 41297

Radiant Heat(kW/m2): 29 **Flame Angle (degrees):** 62

Flame Length(m): 21.15 **Maximum View Factor:** 0.455

Shielded View Factor: 0 **Inner Protection Area(m):** 0

Rate Of Spread (km/h): 2.71 **Outer Protection Area(m):** 0

Transmissivity: 0.838

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	17	23	32	44	66	6

Run Description:	T11 & T13

Vegetation Information

Vegetation Type:	Sydney Sand Flats DSF		
Vegetation Group:	Dry Sclerophyll Forests (Shrubby)		
Vegetation Slope:	1.9 Degrees	**Vegetation Slope Type:**	Upslope
Surface Fuel Load(t/ha):	20.5	**Overall Fuel Load(t/ha):**	29.5
Vegetation Height(m):	2	Only Applicable to Shrub/Scrub and Vesta	

Site Information

Site Slope:	2 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	Default	**APZ/Separation(m):**	20

Fire Inputs

Veg./Flame Width(m):	100	**Flame Temp(K):**	1090

Radiant Heat Shielding Inputs

Shield Height(m):	0	**Shield Width(m):**	0

Calculation Parameters

Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	100

Program Outputs

Category of Attack:	HIGH	**Peak Elevation of Receiver(m):**	7.17
Level of Construction:	BAL 29	**Fire Intensity(kW/m):**	32888
Radiant Heat(kW/m2):	29	**Flame Angle (degrees):**	63
Flame Length(m):	17.58	**Maximum View Factor:**	0.451
Shielded View Factor:	0	**Inner Protection Area(m):**	11
Rate Of Spread (km/h):	2.16	**Outer Protection Area(m):**	8
Transmissivity:	0.847		

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	15	19	28	38	59	6

Run Description:	T12 (compare flame length to T11 & T13)

Vegetation Information

Vegetation Type:	Sydney Sand Flats DSF		
Vegetation Group:	Dry Sclerophyll Forests (Shrubby)		
Vegetation Slope:	3.1 Degrees	**Vegetation Slope Type:**	Downslope
Surface Fuel Load(t/ha):	20.5	**Overall Fuel Load(t/ha):**	29.5
Vegetation Height(m):	2	Only Applicable to Shrub/Scrub and Vesta	

Site Information

Site Slope:	2 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	Default	**APZ/Separation(m):**	25

Fire Inputs

Veg./Flame Width(m):	100	**Flame Temp(K):**	1090

Radiant Heat Shielding Inputs

Shield Height(m):	0	**Shield Width(m):**	0

Calculation Parameters

Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	100

Program Outputs

Category of Attack:	HIGH	**Peak Elevation of Receiver(m):**	9.46
Level of Construction:	BAL 29	**Fire Intensity(kW/m):**	46437
Radiant Heat(kW/m2):	29	**Flame Angle (degrees):**	62
Flame Length(m):	23.36	**Maximum View Factor:**	0.458
Shielded View Factor:	0	**Inner Protection Area(m):**	14
Rate Of Spread (km/h):	3.05	**Outer Protection Area(m):**	11
Transmissivity:	0.834		

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	19	25	35	47	70	6

Run Description:	T14		

Vegetation Information

Vegetation Type:	Grassland		
Vegetation Group:	Grassland		
Vegetation Slope:	2.4 Degrees	**Vegetation Slope Type:**	Downslope
Surface Fuel Load(t/ha):	6	**Overall Fuel Load(t/ha):**	6
Vegetation Height(m):	0	Only Applicable to Shrub/Scrub and Vesta	

Site Information

Site Slope:	1 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	5.2	**APZ/Separation(m):**	10

Fire Inputs

Veg./Flame Width(m):	50	**Flame Temp(K):**	1090

Radiant Heat Shielding Inputs

Shield Height(m):	2.8	**Shield Width(m):**	50

Calculation Parameters

Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	130

Program Outputs

Category of Attack:	HIGH	**Peak Elevation of Receiver(m):**	3.96
Level of Construction:	BAL 29	**Fire Intensity(kW/m):**	61825
Radiant Heat(kW/m2):	23.67	**Flame Angle (degrees):**	66
Flame Length(m):	9.37	**Maximum View Factor:**	0.357
Shielded View Factor:	0.093	**Inner Protection Area(m):**	10
Rate Of Spread (km/h):	19.94	**Outer Protection Area(m):**	0
Transmissivity:	0.871		

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	8	11	15	21	32	3

Run Description:	T15 (actively grazed paddock east of Cessnock Road		
Vegetation Information			
Vegetation Type:	Grassland		
Vegetation Group:	Grassland		
Vegetation Slope:	2.2 Degrees	**Vegetation Slope Type:**	Upslope
Surface Fuel Load(t/ha):	6	**Overall Fuel Load(t/ha):**	6
Vegetation Height(m):	0	Only Applicable to Shrub/Scrub and Vesta	
Site Information			
Site Slope:	1.1 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	Default	**APZ/Separation(m):**	10
Fire Inputs			
Veg./Flame Width(m):	100	**Flame Temp(K):**	1090
Radiant Heat Shielding Inputs			
Shield Height(m):	0	**Shield Width(m):**	0
Calculation Parameters			
Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	130
Program Outputs			
Category of Attack:	HIGH	**Peak Elevation of Receiver(m):**	3.45
Level of Construction:	BAL 29	**Fire Intensity(kW/m):**	45011
Radiant Heat(kW/m2):	29	**Flame Angle (degrees):**	65
Flame Length(m):	8	**Maximum View Factor:**	0.436
Shielded View Factor:	0	**Inner Protection Area(m):**	10
Rate Of Spread (km/h):	14.52	**Outer Protection Area(m):**	0
Transmissivity:	0.874		

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	0	0	0	0	0	0

Run Description: T16

Vegetation Information

Vegetation Type: Grassland

Vegetation Group: Grassland

Vegetation Slope: 2.4 Degrees

Vegetation Slope Type: Downslope

Surface Fuel Load(t/ha): 6

Overall Fuel Load(t/ha): 6

Vegetation Height(m): 0

Only Applicable to Shrub/Scrub and Vesta

Site Information

Site Slope: 1 Degrees

Site Slope Type: Downslope

Elevation of Receiver(m): Default

APZ/Separation(m): 11

Fire Inputs

Veg./Flame Width(m): 100

Flame Temp(K): 1090

Radiant Heat Shielding Inputs

Shield Height(m): 0

Shield Width(m): 0

Calculation Parameters

Flame Emissivity: 95

Relative Humidity(%): 25

Heat of Combustion(kJ/kg 18600

Ambient Temp(K): 308

Moisture Factor: 5

FDI: 130

Program Outputs

Category of Attack: HIGH

Peak Elevation of Receiver(m): 4.06

Level of Construction: BAL 29

Fire Intensity(kW/m): 61825

Radiant Heat(kW/m2): 29

Flame Angle (degrees): 65

Flame Length(m): 9.37

Maximum View Factor: 0.439

Shielded View Factor: 0

Inner Protection Area(m): 11

Rate Of Spread (km/h): 19.94

Outer Protection Area(m): 0

Transmissivity: 0.869

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	0	0	0	0	0	0

Run Description: T17 - managed floodway/ park

Vegetation Information

Vegetation Type: Non-Hazard

Vegetation Group: Non-Hazard

Vegetation Slope: 2.1 Degrees

Vegetation Slope Type: Upslope

Surface Fuel Load(t/ha): 0

Overall Fuel Load(t/ha): 0

Vegetation Height(m): 0

Only Applicable to Shrub/Scrub and Vesta

Site Information

Site Slope: 2 Degrees

Site Slope Type: Downslope

Elevation of Receiver(m): Default

APZ/Separation(m): 1

Fire Inputs

Veg./Flame Width(m): 100

Flame Temp(K): 1090

Radiant Heat Shielding Inputs

Shield Height(m): 0

Shield Width(m): 0

Calculation Parameters

Flame Emissivity: 95

Relative Humidity(%): 25

Heat of Combustion(kJ/kg 18600

Ambient Temp(K): 308

Moisture Factor: 5

FDI: 100

Program Outputs

Category of Attack: HIGH

Peak Elevation of Receiver(m): 0

Level of Construction: BAL 29

Fire Intensity(kW/m): 0

Radiant Heat(kW/m2): 29

Flame Angle (degrees): 2

Flame Length(m): 0

Maximum View Factor: 0

Shielded View Factor: 0

Inner Protection Area(m): 0

Rate Of Spread (km/h): 0

Outer Protection Area(m): 0

Transmissivity: 0.905

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	0	0	0	0	0	6

Run Description:	T18 - development site		
Vegetation Information			
Vegetation Type:	Grassland		
Vegetation Group:	Grassland		
Vegetation Slope:	2.4 Degrees	**Vegetation Slope Type:**	Upslope
Surface Fuel Load(t/ha):	6	**Overall Fuel Load(t/ha):**	6
Vegetation Height(m):	0	Only Applicable to Shrub/Scrub and Vesta	
Site Information			
Site Slope:	2 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	Default	**APZ/Separation(m):**	9
Fire Inputs			
Veg./Flame Width(m):	100	**Flame Temp(K):**	1090
Radiant Heat Shielding Inputs			
Shield Height(m):	0	**Shield Width(m):**	0
Calculation Parameters			
Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	130
Program Outputs			
Category of Attack:	HIGH	**Peak Elevation of Receiver(m):**	3.31
Level of Construction:	BAL 29	**Fire Intensity(kW/m):**	44395
Radiant Heat(kW/m2):	29	**Flame Angle (degrees):**	66
Flame Length(m):	7.94	**Maximum View Factor:**	0.436
Shielded View Factor:	0	**Inner Protection Area(m):**	1
Rate Of Spread (km/h):	14.32	**Outer Protection Area(m):**	0
Transmissivity:	0.874		

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	0	0	0	0	0	6

Run Description:	T2		

Vegetation Information

Vegetation Type:	Grassy and Semi-Arid Woodland (including Mallee)		
Vegetation Group:	Forest and Woodland		
Vegetation Slope:	3.1 Degrees	**Vegetation Slope Type:**	Downslope
Surface Fuel Load(t/ha):	10.5	**Overall Fuel Load(t/ha):**	20.2
Vegetation Height(m):	2	Only Applicable to Shrub/Scrub and Vesta	

Site Information

Site Slope:	3 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	Default	**APZ/Separation(m):**	14

Fire Inputs

Veg./Flame Width(m):	100	**Flame Temp(K):**	1090

Radiant Heat Shielding Inputs

Shield Height(m):	0	**Shield Width(m):**	0

Calculation Parameters

Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	100

Program Outputs

Category of Attack:	HIGH	**Peak Elevation of Receiver(m):**	5.02
Level of Construction:	BAL 29	**Fire Intensity(kW/m):**	16287
Radiant Heat(kW/m2):	29	**Flame Angle (degrees):**	66
Flame Length(m):	12.56	**Maximum View Factor:**	0.444
Shielded View Factor:	0	**Inner Protection Area(m):**	0
Rate Of Spread (km/h):	1.56	**Outer Protection Area(m):**	0
Transmissivity:	0.859		

BAL Thresholds

	BAL-40:	**BAL-29:**	**BAL-19:**	**BAL-12.5:**	**10 kw/m2:**	**Elevation of Receiver:**
Asset Protection Zone(m):	10	14	21	30	47	6

Run Description: T4

Vegetation Information

Vegetation Type: Hunter Macleay DSF

Vegetation Group: Dry Sclerophyll Forests (Shrub/Grass)

Vegetation Slope:	1.3 Degrees	**Vegetation Slope Type:**	Downslope
Surface Fuel Load(t/ha):	14	**Overall Fuel Load(t/ha):**	24.6
Vegetation Height(m):	0.9	Only Applicable to Shrub/Scrub and Vesta	

Site Information

Site Slope:	1 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	Default	**APZ/Separation(m):**	17

Fire Inputs

Veg./Flame Width(m):	100	**Flame Temp(K):**	1090

Radiant Heat Shielding Inputs

Shield Height(m):	0	**Shield Width(m):**	0

Calculation Parameters

Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	100

Program Outputs

Category of Attack:	HIGH	**Peak Elevation of Receiver(m):**	6.4
Level of Construction:	BAL 29	**Fire Intensity(kW/m):**	23357
Radiant Heat(kW/m2):	27.9	**Flame Angle (degrees):**	64
Flame Length(m):	14.9	**Maximum View Factor:**	0.431
Shielded View Factor:	0	**Inner Protection Area(m):**	13
Rate Of Spread (km/h):	1.84	**Outer Protection Area(m):**	4
Transmissivity:	0.851		

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	13	17	24	34	53	6

Run Description:	T8		
Vegetation Information			
Vegetation Type:	Hunter Macleay DSF		
Vegetation Group:	Dry Sclerophyll Forests (Shrub/Grass)		
Vegetation Slope:	2.7 Degrees	**Vegetation Slope Type:**	Upslope
Surface Fuel Load(t/ha):	14	**Overall Fuel Load(t/ha):**	24.6
Vegetation Height(m):	0.9	Only Applicable to Shrub/Scrub and Vesta	
Site Information			
Site Slope:	0 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	Default	**APZ/Separation(m):**	14
Fire Inputs			
Veg./Flame Width(m):	100	**Flame Temp(K):**	1090
Radiant Heat Shielding Inputs			
Shield Height(m):	0	**Shield Width(m):**	0
Calculation Parameters			
Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	100
Program Outputs			
Category of Attack:	HIGH	**Peak Elevation of Receiver(m):**	5.34
Level of Construction:	BAL 29	**Fire Intensity(kW/m):**	17723
Radiant Heat(kW/m2):	29	**Flame Angle (degrees):**	63
Flame Length(m):	11.99	**Maximum View Factor:**	0.443
Shielded View Factor:	0	**Inner Protection Area(m):**	0
Rate Of Spread (km/h):	1.39	**Outer Protection Area(m):**	0
Transmissivity:	0.861		

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	10	14	20	29	46	6

Run Description: T9

Vegetation Information

Vegetation Type: Hunter Macleay DSF

Vegetation Group: Dry Sclerophyll Forests (Shrub/Grass)

Vegetation Slope: 1.4 Degrees **Vegetation Slope Type:** Upslope

Surface Fuel Load(t/ha): 14 **Overall Fuel Load(t/ha):** 24.6

Vegetation Height(m): 0.9 Only Applicable to Shrub/Scrub and Vesta

Site Information

Site Slope: 3 Degrees **Site Slope Type:** Downslope

Elevation of Receiver(m): Default **APZ/Separation(m):** 15

Fire Inputs

Veg./Flame Width(m): 100 **Flame Temp(K):** 1090

Radiant Heat Shielding Inputs

Shield Height(m): 0 **Shield Width(m):** 0

Calculation Parameters

Flame Emissivity: 95 **Relative Humidity(%):** 25

Heat of Combustion(kJ/kg 18600 **Ambient Temp(K):** 308

Moisture Factor: 5 **FDI:** 100

Program Outputs

Category of Attack: HIGH **Peak Elevation of Receiver(m):** 5.1

Level of Construction: BAL 29 **Fire Intensity(kW/m):** 19387

Radiant Heat(kW/m2): 29 **Flame Angle (degrees):** 65

Flame Length(m): 12.9 **Maximum View Factor:** 0.444

Shielded View Factor: 0 **Inner Protection Area(m):** 11

Rate Of Spread (km/h): 1.53 **Outer Protection Area(m):** 3

Transmissivity: 0.859

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	11	15	21	30	48	6

Appendix D: Planning for Bushfire Protection 2019 Compliance Table

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

Objectives	Satisfied	Comment
➢ Afford buildings and their occupants protection from exposure to a bush fire	✓	All lots within the proposed development are provided with sufficient separation from the nearest bushfire hazard by public roads.
➢ Provide for a defendable space to be located around buildings	✓	Defendable space by way of an APZ is provided between all new lots and the bushfire hazard to ensure radiant heat levels are below critical limits (29kW/m^2).
➢ Provide appropriate separation between a hazard and buildings, which, in combination with other measures, prevent the likely fire spread to buildings	✓	Appropriate APZs are provided between the proposed lots and the hazard, which in addition to other mitigation measures such as suitable construction, will provide an acceptable level of protection to the buildings, and prevent the spread of fire to the buildings and onto adjoining buildings.
➢ Ensure that safe operational access and egress for emergency service personnel and residents is available	✓	Public road access will be provided from Cessnock Road and an existing adjoining development to the north of the site via Auburn Street.
➢ Provide for ongoing management and maintenance of BPMs	✓	All owners will be responsible for the management and maintenance of the private property.
➢ Ensure that utility services are adequate to meet the needs of firefighters	✓	The development includes all essential utility services to meet the needs of firefighters; including a reliable water supply.

Table 2: Performance Criteria and Acceptable Solutions for residential subdivisions (Chapter 5 PBP 2019)

Intent of Measure	Performance Criteria	Acceptable Solution	Complies	Comment
			✓ - Acceptable Solution AS - Alternative Solution	
5.3.1 **ASSET PROTECTION ZONES** Table 5.3a To provide sufficient space and maintain reduced fuel loads, so as to ensure radiant heat levels at buildings are below critical limits and to prevent direct flame contact with a building.	Potential building footprints must not be exposed to radiant heat levels exceeding 29kW/m^2 on each proposed lot.	APZs are provided in accordance with Tables A1.12.2 and A1.12.3 based on the FFDI.	✓/AS	All proposed lots may be exposed to a maximum potential radiant heat level no greater than 29kW/m^2. A maximum APZ of 25m was calculated using methodology outlined in Appendix B of AS3959-2018 (Method 2 modelling).
	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	✓	All new landowners will be required to manage their respective lot as an IPA.
	The APZ is provided in perpetuity.	APZs are wholly within the boundaries of the development site.	✓	There are no exceptional circumstances that would require an APZ to be located external to the development site.
	APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is negated.	The APZ is not located on lands with a slope exceeding 18°	✓	The maximum slope of the site is 4° or less.
LANDSCAPING	Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions.	Landscaping is in accordance with APZ standards (see Appendix 4). Fencing is constructed in accordance with section 7.6.	✓	All new landscaping has considered the requirements of APZs per Appendix 4. All new fencing will be colorbond or similar non-combustible material.
5.3.2 **ACCESS** **(General Requirements)** **Table 5.3b** To provide safe operational access for emergency services personnel in suppressing a bush fire, while residents are accessing or egressing an area.	Fire fighters are provided with safe all weather access to structures	Property access roads are two-wheel drive, all-weather roads	✓	Public road access will be provided from Cessnock Road and an existing adjoining development to the north of the site via Auburn Street. A 24m perimeter road will be constructed to the south of the development and several on-perimeter roads constructed that will provide direct access to each lot.
		Perimeter roads are provided for residential subdivisions of three or more allotments	✓	
		Subdivisions of three or more allotments have more than one access in and out of the development		
		Traffic management devices are constructed to not prohibit access by	✓	

Intent of Measure	Performance Criteria	Acceptable Solution	Complies	Comment
			✓ - Acceptable Solution AS - Alternative Solution	
		emergency services vehicles.		
		Access roads must provide suitable turning areas in accordance with Appendix 3.	✓	
ACCESS ROAD CAPACITY	The capacity of access roads is adequate for firefighting vehicles.	The capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges and causeways are to clearly indicate load rating.	✓	
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.	✓	All proposed lots are able to be connected to a reticulated water supply.
		Hydrants are provided in accordance with AS2419.1:2005	✓	
		There is suitable access for Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	✓	
PERIMETER ROADS	Perimeter access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while occupants are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface.	There are two-way sealed roads.	✓	A 24m perimeter road will be constructed to the south of the development and several on-perimeter roads constructed that will provide direct access to each lot. A 10m wide paved carriageway will be provided allowing for an 8m wide unobstructed path of travel and on-street parking outside the carriageway.
		8m carriageway width kerb to kerb.	✓	
		Hydrants are to be located clear of parking areas.	✓	
		There are through roads, and these are linked to the internal road system at an interval of no greater than 500m.	✓	
		Curves of roads have a minimum inner radius of 6m.	✓	
		The maximum grade road is 15° and average grade is 10°.	✓	
		The road crossfall does not exceed 3°.	✓	

Intent of Measure	Performance Criteria	Acceptable Solution	Complies	Comment
			✓ - Acceptable Solution AS - Alternative Solution	
		A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; and	✓	
NON-PERIMETER ROADS	Non-perimeter access roads are designed to allow safe access and egress for medium rigid firefighting vehicles while occupants are evacuating.	Minimum 5.5m width kerb to kerb.	✓	The proposed road network is required to connect with the approved subdivision layout. A 8m wide paved carriageway will be provided allowing for an 5.5m wide unobstructed path of travel and on-street parking outside the carriageway. All roads; including non-perimeter roads will be constructed in accordance with PBP 2019.
		Parking is provided outside of the carriageway.	✓	
		Hydrants are to be located clear of parking areas.	✓	
		There are through roads, and these are linked to the internal road system at an interval of no greater than 500m.	✓	
		Curves of roads have a minimum inner radius of 6m.	✓	
		The maximum grade road is 15° and average grade is 10°.	✓	
		The road crossfall does not exceed 3°.	✓	
		A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; and	✓	
5.3.3 SERVICES Table 5.3c To provide adequate services for water for the protection of buildings during and after the passage of a bushfire, and not to locate gas and electricity so as not to contribute to the risk of fire to a building. **WATER**	Adequate water supplies is provided for firefighting purposes	Reticulated water is to be provided to the development, where available	✓	A reticulated water supply is provided.
		A static water supply is provided where no reticulated water is available	**N/A**	
		Static water supplies shall comply with Table 5.3d	**N/A**	
	Water supplies are located at regular intervals	Fire hydrant spacing, design and sizing comply with AS2419.1:2005;	✓	A reticulated water supply is provided.
		Hydrants are not located within any road carriageway;	✓	

Intent of Measure	Performance Criteria	Acceptable Solution	Complies	Comment
			✓ - Acceptable Solution AS - Alternative Solution	
	The water supply is accessible and reliable for firefighting operations	Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.	✓	A reticulated water supply is provided.
	Flows and pressures are appropriate	Fire hydrant flows and pressures comply with AS2419.1:2005.	✓	
	The integrity of the water supply is maintained	All above ground water service pipes are metal, including and up to any taps.	**Able to comply**	
ELECTRICITY	Location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of buildings.	Where practicable, electrical transmission lines are underground.	✓	The proposed new lots will be connected to the existing underground electricity service.
		Where overhead electrical transmission lines are proposed as follows: → lines are installed with short pole spacing (30 metres), unless crossing gullies, gorges or riparian areas; and → no part of a tree is closer to a power line than the distance set out in accordance with the specifications in ISSC3 Guideline for Managing Vegetation Near Power Lines	**N/A**	
GAS	Location of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	Reticulated or bottled gas is installed and maintained in accordance with AS 1596:2014 and the requirements of relevant authorities, metal piping is to be used.	✓	Any new gas connections will be underground and will be unlikely to create an additional hazard risk to surrounding bushland.
		All fixed gas cylinders are kept clear of all flammable materials to a distance of 10 metres and shielded on the hazard side;		

Intent of Measure	Performance Criteria	Acceptable Solution	Complies	Comment
			✓ - Acceptable Solution AS - Alternative Solution	
		Connections to and from gas cylinders are metal:		
		Polymer-sheathed flexible gas supply lines are not used; and		
		Above-ground gas service pipes are metal, including and up to any outlets.		