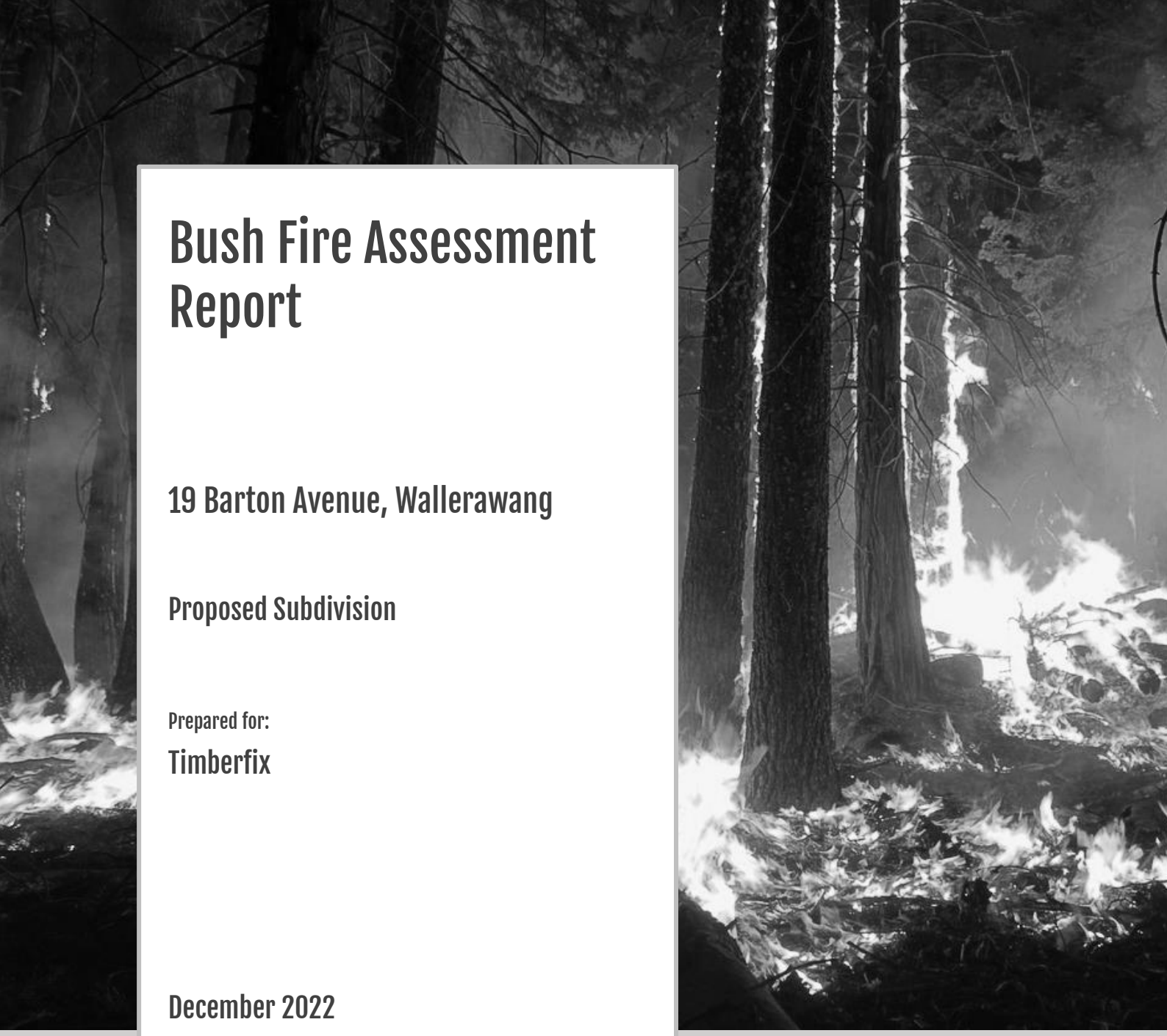
Appendix G

Bush Fire Assessment Report



Bush Fire Assessment Report

19 Barton Avenue, Wallerawang

Proposed Subdivision

Prepared for:

Timberfix

December 2022

Integrated Consulting
Planning | Bushfire | Surveying

REPORT DETAILS	
Project Number	20040
Project Name	Subdivision DA
Project Address	19 Barton Avenue, Wallerawang
Client	Timberfix
Prepared by	Erika Dawson BPAD 36371 Level 3 (NSW & WA)
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Disclaimer

This report is prepared solely for Timberfix (the 'client') and any future landowners (or their delegated representatives) of the subject lot(s) and is not for the benefit of any other person and may not be relied upon by any other person.

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1 Introduction

1.1 Purpose

This Bush Fire Assessment Report (BFAR) has been prepared to support a Development Application (DA) for the subdivision of Lot 1 DP 1253903, known as 19 Barton Avenue, Wallerawang.

The DA is to be lodged with Lithgow City Council and will require referral to the NSW Rural Fire Service for a Bush Fire Safety Authority (BFSA) as part of the DA assessment process. This report has been prepared in accordance with *Planning for Bush Fire Protection 2019* (**PBP**) to provide sufficient information for both approval authorities.

1.2 The Development

The proposed development involves the subdivision of the site into 55 lots for the purpose of large lot residential development and two (2) open space lots. The lots have a minimum permitted lot size of 800m^2. Plans of the development are provided in **Appendix A**.

1.3 The Site

1.3.1 Location

The subject site is comprised of Lot 1 DP 1253903 which is located on the western side of Barton Avenue directly north of Wallerawang Public School. The location of the site is shown in **Figure 1** and an aerial image in **Figure 2**.

Figure 1: Site Location

Figure 2: Site Aerial Photograph

1.3.2 Site Details

The site has an area of 17.43 hectares. It is currently semi managed grassland with scattered remnant trees.

The site is zoned R5 Large Lot Residential under *Lithgow Local Environmental Plan 2014* as shown in **Figure 3**. The land to the west and north of the site is zoned R2 Low Density Residential, to the south R5, and to the east SP2 Infrastructure (Electricity Generating Works).

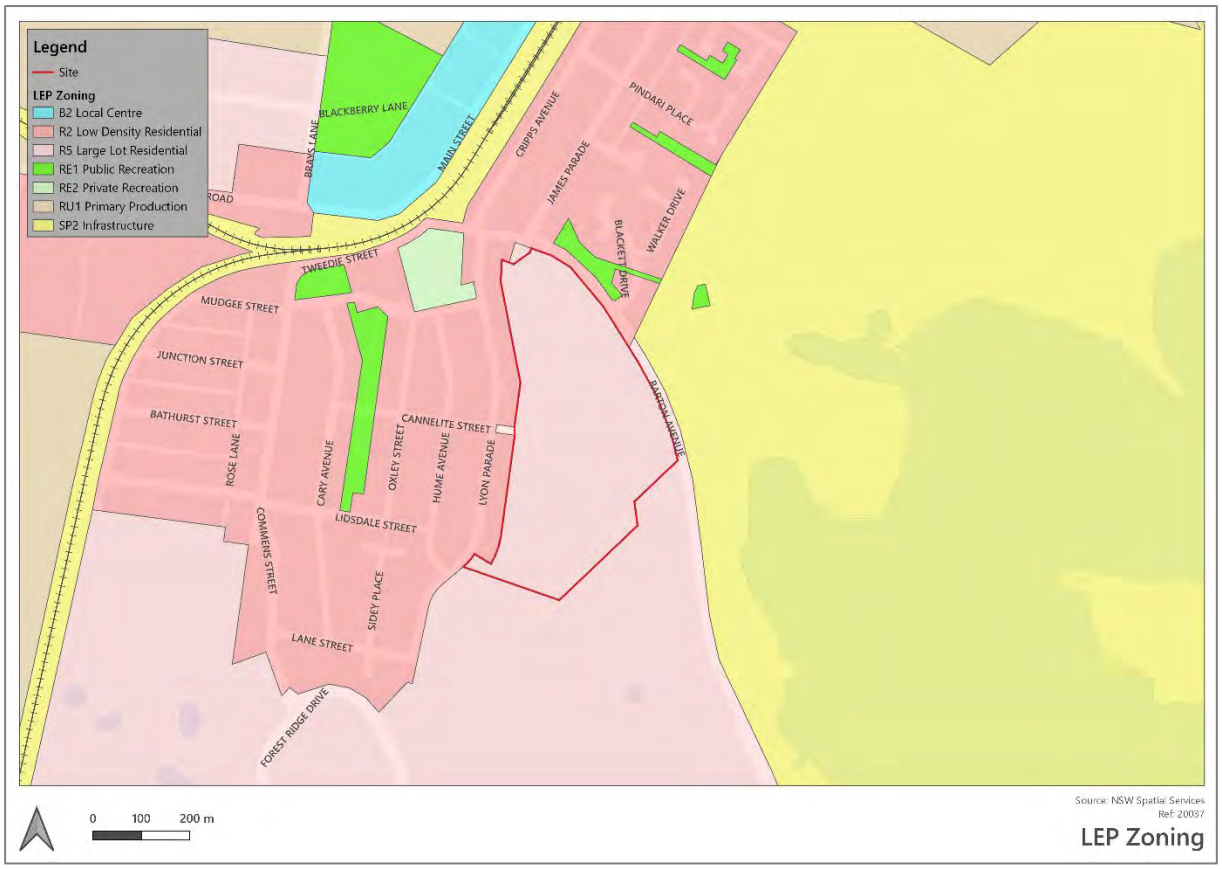

Figure 3: LEP Zoning Map

1.3.3 Environmental Significance

The site mapped by the LEP as being within the Sydney Drinking Water Catchment (refer **Figure 4**) and within a Groundwater Vulnerable area (refer **Figure 5**). None of the site is mapped as being of Biodiversity Values under the Biodiversity Values Map (refer **Figure 6**).

Figure 4: Drinking Water Catchment Map

Figure 5: Riparian Lands & Watercourses Map

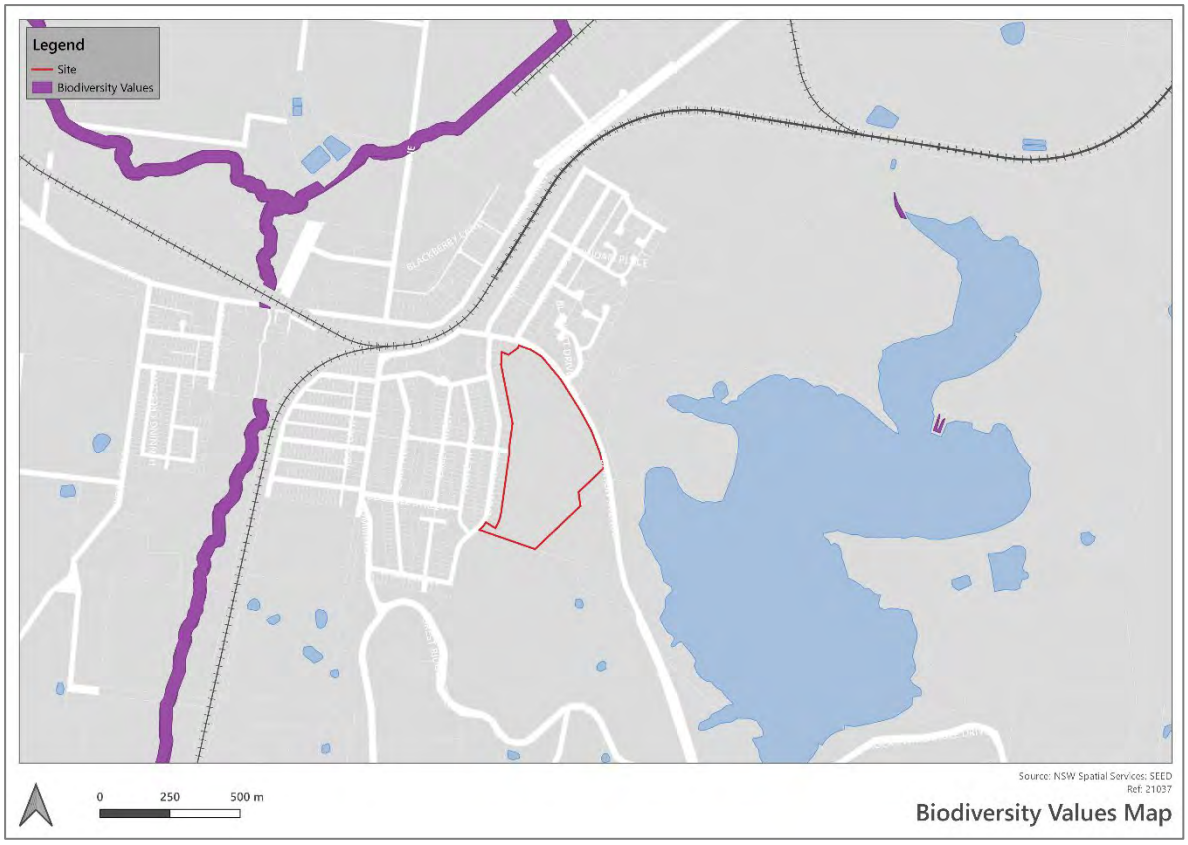

Figure 6: Biodiversity Values Map

1.3.4 Threatened Species

A Biodiversity Development Assessment Report (BDAR) has been prepared for the development by AREA Environmental (refer **Appendix B**). It identifies that no fauna threatened species were identified on site and one flora threatened species is located on site (Black Gum). The black gum is to be retained within a Tree Protection Zone.

1.3.5 Indigenous Heritage

An Aboriginal Heritage Due Diligence Assessment was undertaken for the site. No items of indigenous heritage have been recorded or identified on the site (refer **Appendix C**).

1.4 Legislative Framework

1.4.1 Bush Fire Safety Authority

Subdivision of land, that could lawfully permit residential purposes, within a bush fire prone area requires a Bush Fire Safety Authority (BFSA) to be obtained under section 100B of the *Rural Fires Act 1997* (RF Act).

Clause 45 of the *Rural Fires Regulation 2013* specifies the requirements for any application for a BFSA. These requirements have been addressed within this report and a checklist provided in **Appendix D** outlining where each requirement has been specifically addressed.

1.4.2 Bush Fire Prone Land

The site is designated as bush fire prone land in accordance with Section 10.3 of the *Environmental Planning & Assessment Act 1979* (EP&A Act). As shown in **Figure 7** the site is mapped as being within the Category 3 Vegetation (dark orange) and buffer (yellow).

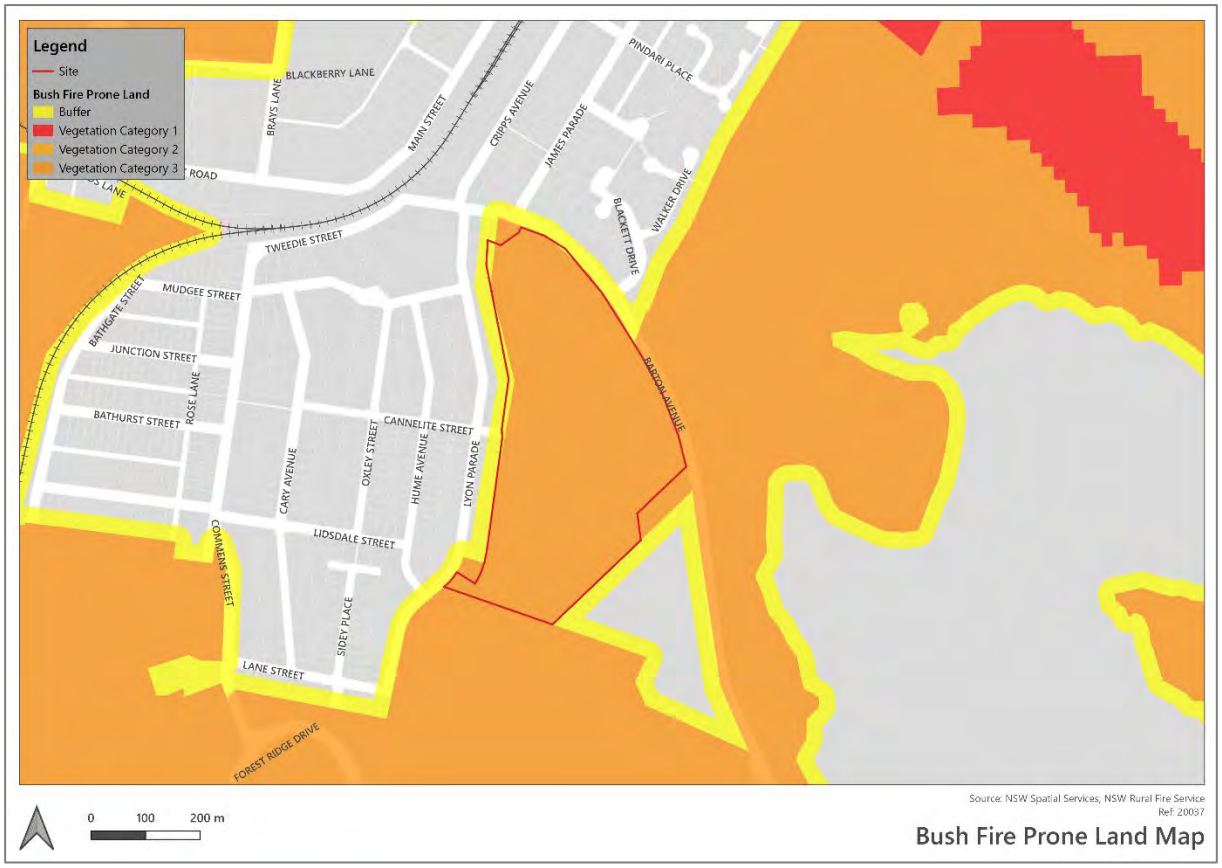

Figure 7: Bush Fire Prone Land Map

1.4.3 Integrated Development

As the development requires both development consent and authorisation under Section 100B (Bushfire Safety Authority) of the RF Act in order for it to be carried out, the development becomes Integrated Development pursuant to Section 4.46 of the EP&A Act.

In this regard, Council is required to refer the DA to the NSW Rural Fire Service to obtain the BFSA before it can determine the application in accordance with Section 4.46 of the EP&A Act.

1.4.4 Planning for Bush Fire Protection

PBP applies to all DAs on bush fire prone land. As required by Section 1.4 of PBP, this report has been prepared to address the requirements of the PBP as a subdivision that could lawfully contain residential development. Specifically, the following has been addressed in this report:

- The objectives of PBP, as outlined in Section 1.1 of PBP; and
- The performance criteria of the relevant Bush Fire Protection Measures (BFPM) which are outlined in section 5.2 of PBP.

2 Bush Fire Assessment

2.1 Methodology

The methodology utilised for this bush fire assessment is consistent with Appendix 1 of PBP. The following provides the required information in accordance with the methodology.

2.2 Vegetation Formations

A site inspection was carried out on 27 January 2021 of the site and land within 140m of the site (assessment area). All vegetation within the assessment area has been classified in accordance with *Ocean Shores to Desert Dunes* (Keith 2004) as required by A1.2 of PBP.

The classified vegetation within the assessment area has been mapped and is shown in **Figure 9** in **Appendix E**. Photographs of the classified vegetation from the site inspection are provided in the following plates for each of the assessment plots.

Plot 1	
Vegetation Description	Managed and unmanaged grassland with scattered remnant trees within the development site.
Existing Classification	Grassland
Post Development Classification	APZ/Grassland

Plate 1: Plot 1

Plate 2: Plot 1

Plot 1	
Vegetation Description	Managed and unmanaged grassland with scattered remnant trees within the development site.
Existing Classification	Grassland
Post Development Classification	APZ/Grassland

Plate 3: Plot 1

Plate 4: Plot 1

Plate 5: Plot 1

Plate 6: Plot 1

Plate 7: Plot 1

Plate 8: Plot 1

Plot 1	
Vegetation Description	Managed and unmanaged grassland with scattered remnant trees within the development site.
Existing Classification	Grassland
Post Development Classification	APZ/Grassland

Plate 9: Plot 1

Plate 10: Plot 1

Plot 2	
Vegetation Description	Unmanaged grassland with scattered remnant trees on adjacent land
Existing Classification	Grassland
Post Development Classification	Grassland

Plate 11: Plot 2

Plate 12: Plot 2

Plot 3	
Vegetation Description	Stand of predominantly gum trees with a grass understorey. Small black wattle and other woody shrubs growing under the gums.
Existing Classification	Forest
Post Development Classification	Forest

Plate 13: Plot 3

Plate 14: Plot 3

Plot 4	
Vegetation Description	Unmanaged grass under powerline easement, not apparently being managed as lawn or parkland.
Existing Classification	Grassland
Post Development Classification	Grassland

Plate 15: Plot 4

Plate 16: Plot 4

Plot 5	
Vegetation Description	Mainly grass under powerlines with some exotic bushes, small trees and one large gum. Under the powerlines is all grass and unvegetated but to the north there is small exotic trees and a large gum. The area doesn't appear to be managed, however given powerline easement, it is not expected that the vegetation would evolve into woodland or forest vegetation.
Existing Classification	Grassland
Post Development Classification	Grassland

Plate 17: Plot 5

Plate 18: Plot 5

Plate 19: Plot 5

Plot 6	
Vegetation Description	Existing managed urban area with hard paved surfaces and managed vegetation
Existing Classification	Low Threat Vegetation - Exclusion A1.10
Post Development Classification	Low Threat Vegetation - Exclusion A1.10

Plate 20: Plot 6

Plate 21: Plot 6

Plate 22: Plot 6

Plate 23: Plot 6

Plate 24: Plot 6

Plate 25: Plot 6

Plot 6	
Vegetation Description	Existing managed urban area with hard paved surfaces and managed vegetation
Existing Classification	Low Threat Vegetation - Exclusion A1.10
Post Development Classification	Low Threat Vegetation - Exclusion A1.10

Plate 26: Plot 6

Plate 27: Plot 6

Plate 28: Plot 6

Plate 29: Plot 6

Plot 7	
Vegetation Description	Unmanaged grassland under powerline easement
Existing Classification	Grassland
Post Development Classification	Grassland

Plate 30: Plot 7

Plate 31: Plot 7

Plot 8	
Vegetation Description	Stand of planted tree varieties which directly contacts the unmanaged grassland to the south and provides a conduit for fire to reach the subject site. Consists mainly of small gum, exotic trees and pinus varietals with a semi managed grass understorey. Contains a large row of pines along the south eastern common boundary of the development site.
Existing Classification	Woodland
Post Development Classification	Woodland

Plate 32: Plot 8

Plate 33: Plot 8

Plot 8	
Vegetation Description	Stand of planted tree varieties which directly contacts the unmanaged grassland to the south and provides a conduit for fire to reach the subject site. Consists mainly of small gum, exotic trees and pinus varietals with a semi managed grass understorey. Contains a large row of pines along the south eastern common boundary of the development site.
Existing Classification	Woodland
Post Development Classification	Woodland

semi

Plate 34: Plot 8

Plate 35: Plot 8

Plot 9	
Vegetation Description	Existing area of managed gardens and lawns within curtilage of buildings and non-vegetated road areas. Includes school football pitch and play areas all, lawn. Alco contains non vegetated road area.
Existing Classification	Low Threat Vegetation - Exclusion A1.10
Post Development Classification	Low Threat Vegetation - Exclusion A1.10

Plate 36: Plot 9

Plate 37: Plot 9

Plot 9	
Vegetation Description	Existing area of managed gardens and lawns within curtilage of buildings and non-vegetated road areas. Includes school football pitch and play areas all, lawn. Alco contains non vegetated road area.
Existing Classification	Low Threat Vegetation - Exclusion A1.10
Post Development Classification	Low Threat Vegetation - Exclusion A1.10

Plate 38: Plot 9

Plate 39: Plot 9

Plate 40: Plot 9

Plate 41: Plot 9

Plot 10	
Vegetation Description	Predominantly willow trees with a reed and low bush understorey around lake. Classified as rainforest due to the lack of eucalypts, a canopy of soft horizontal held leaves and the presence of vines. Also looked at the exotic vegetation and drew parallels between Camphor Laurel trees mixed with privet or woody weeds which with a canopy greater than 70% should be classified as rainforest.
Existing Classification	Rainforest
Post Development Classification	Rainforest

Plate 42: Plot 10

Plate 43: Plot 10

Plate 44: Plot 10

Plate 45: Plot 10

Plot 10	
Vegetation Description	Predominantly willow trees with a reed and low bush understorey around lake. Classified as rainforest due to the lack of eucalypts, a canopy of soft horizontal held leaves and the presence of vines. Also looked at the exotic vegetation and drew parallels between Camphor Laurel trees mixed with privet or woody weeds which with a canopy greater than 70% should be classified as rainforest.
Existing Classification	Rainforest
Post Development Classification	Rainforest

Plate 46: Plot 10	*Plate 47: Plot 10*

Plot 11	
Vegetation Description	Unmanaged grassland
Existing Classification	Grassland
Post Development Classification	Grassland

Plate 48: Plot 11	*Plate 49: Plot 11*

Plot 12	
Vegetation Description	Reserve/parkland area maintained in a low fuel load state. Typically mown grass understorey with a scattered trees both exotic and natives (predominantly eucalypt).
Existing Classification	Low Threat Vegetation - Exclusion A1.10
Post Development Classification	Low Threat Vegetation - Exclusion A1.10

Plate 50: Plot 12

Plate 51: Plot 12

Plate 52: Plot 12

Plate 53: Plot 12

Plate 54: Plot 12

Plate 55: Plot 12

Plot 12	
Vegetation Description	Reserve/parkland area maintained in a low fuel load state. Typically mown grass understorey with a scattered trees both exotic and natives (predominantly eucalypt).
Existing Classification	Low Threat Vegetation - Exclusion A1.10
Post Development Classification	Low Threat Vegetation - Exclusion A1.10

Plate 56: Plot 12

Plate 57: Plot 12

2.3 Effective Slope

The topography for the site is shown in **Figure 8.** To determine the effective slope, 1m contour data has been sourced from the ELVIS Website (International Committee on Surveying & Mapping) nd). The contour data was verified by ground truthing during the site inspection.

Note, the figure below only shows the slope under the areas of classified vegetation that will remain post development and worst case slopes on the development site.

Figure 8: Slope

2.4 Fire Weather

The subject site is located within the Lithgow City Council LGA. Pursuant to A1.6 of the PBP and the RFS' NSW Local Government Areas FDI (NSW Rural Fire Service 2017), the relevant Fire Danger Index (FDI) for the site is 80.

2.5 Asset Protection Zone Determination

The minimum Asset Protection Zones (APZ) have been determined for the proposed development based on Table A1.12.3 of PBP. The detailed APZ calculations for each plot are provided in **Table 1**.

The majority of the site will be managed as an APZ post development. Proposed Lot 15 will have an indicative building envelope provided for the purpose of this assessment, to which an APZ has been determined in order to demonstrate suitable locations can be provided for a future dwelling.

The location and extent of the APZ to be provided is shown in **Figure 10**. A BAL Contour Map is also provided in Figure 11 to demonstrate the subdivision will provide for suitable building locations for future dwellings of ≤ 29kW/m². From this it can be seen that the APZs to be provided exceeds the minimum required.

Table 1: APZ Determination

Plot	Vegetation Classification	Effective Slope	APZ Required
1a	Grassland	Upslope	10m
1b	Grassland	Downslope >15°-20°	16m
2	Grassland	Downslope >5°-10°	12m
3	Forest	Downslope >5°-10°	31m
4	Grassland	Downslope >0°-5°	11m
5	Grassland	Upslope	10m
6	Exclusion	N/A	N/A
7	Grassland	Downslope >5°-10°	12m
8	Woodland	Downslope >5°-10°	17m
9	Exclusion	N/A	N/A
10	Rainforest	Downslope >0°-5°	12m
11	Grassland	Downslope >0°-5°	11m
12	Exclusion	N/A	N/A

3 Bush Fire Protection Measures

3.1 Introduction

Subdivisions that will accommodate residential land uses is required to comply with the Bush Fire Protection Measures (BFPM) outlined in Section 5.3 of PBP. There are six key BFPMs outlined by PBP:

- Asset Protection Zones and Defendable Space;
- Construction Standards and Design;
- Access Standards (public roads, private access and fire trails);
- Water Supply and Utility Services;
- Emergency Management Arrangements; and
- Landscaping

The BFPMs relevant to the development have been considered in **Section 3.4**. The plan in **Appendix F** illustrates the BFPM as applied to the development.

PBP requires consideration of the development in relation to the aims and objectives of PBP and also the objectives for subdivision. These matters have been considered respectively in **Sections 3.2** and **3.3**.

3.2 PBP Aims & Objectives

The aim of PBP is:

> *… to provide for the protection of human life and minimise impacts on property from the threat of bush fire, while having due regard to development potential, site characteristics and protection of the environment.*

The objectives of PBP are to:

- *afford buildings and their occupants protection from exposure to a bush fire;*
- *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 BPMs; and*
- *ensure that utility services are adequate to meet the needs of firefighters.*

The subdivision has been designed to provide for developable areas within each of the lots that will have radiant heat levels of less than 29kW/m² and avoid flame contact, thus providing for appropriate separation to the hazards. The subject lot layout in conjunction with the bush fire protection measures will provide for safe operational access and egress for emergency services personnel and possible residents within the subdivision, as well as sufficient water supply. Therefore, the proposed development is considered to be consistent with the objectives of PBP.

3.3 PBP Objectives for Subdivisions

Section 4.1.2 of PBP contains the specific objectives for subdivisions:

- *minimise perimeters of the subdivision exposed to the bush fire hazard (hourglass shapes, which maximise perimeters and create bottlenecks should be avoided);*
- *minimise vegetated corridors that permit the passage of bush fire towards buildings;*
- *provide for the siting of future dwellings away from ridge-tops and steep slopes, within saddles and narrow ridge crests;*
- *ensure that APZs between a bush fire hazard and future dwellings are effectively designed to address the relevant bush fire attack mechanisms;*
- *ensure the ongoing maintenance of APZs;*
- *provide adequate access from all properties to the wider road network for residents and emergency services;*
- *provide access to hazard vegetation to facilitate bush fire mitigation works and fire suppression; and*

- *ensure the provision of an adequate supply of water and other services to facilitate effective firefighting.*

In complying with the BFPM, the proposed development complies with objectives for subdivisions outlined above.

3.4 Bush Fire Protection Measures

3.4.1 Asset Protection Zones & Defendable Space

The intent of measures for the Asset Protection Zone (APZ) BFPM is:

> *To provide sufficient space and maintain reduced fuel loads to ensure radiant heat levels at the buildings are below critical limits and prevent direct flame contact.*

The following table outlines the Performance Criteria and associated Acceptable Solutions for the APZ BFPM, and how the development responds.

Table 2: Asset Protection Zone (APZ) Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
Asset Protection Zones					
Potential building footprints must not be exposed to radiant heat levels exceeding 29 kW/m² on each proposed lot.	APZs are provided in accordance with Tables A1.12.2 and A1.12.3 based on the FFDI.	☒	☐	☐	As outlined in **Section 2.5** and shown on **Figure 10** and **Figure 11** each lot is provided with an APZ that achieves the minimum size required by Table A1.12.3.
APZs are managed and maintained to prevent the spread of a fire towards the building.	APZs are managed in accordance with the requirements of Appendix 4.	☒	☐	☐	The APZ is to be managed in accordance with the requirements of Appendix 4 of PBP (and contained in **Appendix H** of this report).
The APZs is provided in perpetuity	APZs are wholly within the boundaries of the development site	☒	☐	☐	APZ is wholly within the subject site and adjacent road reserves managed by the occupant.
APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised	APZs are located on lands with a slope less than 18 degrees.	☒	☐	☐	The APZ will be predominantly located on land with a slope of less than 18 degrees. There are some very small areas of the APZ will be greater than 18 degrees (refer **Figure 9**), consequentially a Performance Solution has been provided in **Section 3.4.1.1.**
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 Appendix 4; and	☒	☐	☐	Any future landscaping of the lots is to be in accordance with the requirements of Appendix 4 of PBP (and contained in **Appendix H** of this report).
	Fencing is constructed in accordance with section 7.6.	☒	☐	☐	Any future fencing is to be constructed in accordance with section 7.6 of PBP.

Figure 9: APZ Slopes

3.4.1.1 Performance Solution APZ: Slopes

The development will provide an APZ located on slopes exceeding 18 degrees in some very limited areas as shown in **Figure 9**. In this regard, the APZ slope does not comply with the Acceptable Solution.

Pursuant to Section 1.4.5 of PBP:

> *Performance based solutions must provide substantiated evidence and clearly demonstrate how the specific objectives and performance criteria are to be satisfied.*

Furthermore, Section A2.4 of PBP requires:

> *For performance based applications, it must be demonstrated how the product, design or material can meet the performance criteria of this document including the intent of measures and also, the aim and objectives.*

The Intent and Performance Criteria are outlined in the table below.

Table 3: Applicable Performance Criteria & Acceptable Solutions for APZ

Intent	Performance Criteria	Acceptable Solution
To provide sufficient space and maintain reduced fuel loads to ensure radiant heat levels at the buildings are below critical limits and prevent direct flame contact.	APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	APZ are located on lands with a slope less than 18 degrees.

To achieve an appropriate APZ, it is necessary to demonstrate that the performance solution complies with the Performance Criteria. It is proposed in this instance to demonstrate this through evidence to demonstrate that the design meets the performance criteria.

The 18 degree maximum slope requirement is deemed to be the threshold for which maintenance of surface fuels will be practical and will not adversely impact upon soil stability. As shown in **Figure 9**, there are only a few small scattered areas within the site that exceed the 18 degree slope requirement and these areas will be located within an urban type requirement with the entire area managed as an APZ. Future development of the individual lots may even remove the steeper areas through terracing. Whilst these areas technically exceed the acceptable solution, it is not expected that the management of these patches would be appreciably any different to the surrounding land. It is expected that these patches of land would be managed as the adjacent areas and in the context of an urban environment, would be practically managed to as to enable low fuel management and ensuring soil stability. Furthermore, this area is all grassland vegetation and would not result in crown fires.

Based on this, the APZ will meet the Performance Criteria. It will also provide sufficient space and maintain reduced fuel loads to ensure radiant heat levels at the buildings are below critical limits and prevent direct flame contact.

Therefore, the proposed performance solution is considered to be consistent with both the intent and Performance Criterion of the BFPM and the overall aims and objectives of PBP.

3.4.2 Access

The intent of measures for the Access BFPM is:

to provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area.

The following table outlines the Performance Criteria and associated Acceptable Solutions for the Access BFPM, and how the development responds.

Table 4: Access Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
Access (General Requirements)					
Firefighting vehicles are provided with safe, all-weather access to structures.	Property access roads are two-wheel drive, all-weather roads;	☒	☐	☐	All roads are two wheeled drive, all weather roads.
	Perimeter roads are provided for residential subdivisions of three or more allotments;	☐	☒	☐	A perimeter road is not able to be provided at the southern interface of the development site due to topography and existing powerline infrastructure. Therefore, a Performance Solution is provided in **Section 3.4.2.1.**
	Subdivisions of three or more allotments have more than one access in and out of the development;	☒	☐	☐	The development has two accesses in and out: via Barton Avenue and Lyons Parade. Proposed Lot 15 has two directions of travel available along Lyon Parade.
	Traffic management devices are constructed to not prohibit access by emergency services vehicles;	☒	☐	☐	All traffic management devices will be constructed to facilitate access by emergency services vehicles.
	Maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or	☒	☐	☐	Grades are to not exceed 15 degrees sealed road.

Table 4: Access Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
	other gradient specified by road design standards, whichever is the lesser gradient;				
	All roads are through roads;	☒	☐	☐	All roads will be through roads apart from two short cul-de-sacs which are compliant with the requirements below.
	Dead end roads are not recommended, but if unavoidable, are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end;	☒	☐	☐	The two cul-de-sacs are less than 200m in length and will have a turning area of at least 12m minimum outer radius.
	Where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road;	☐	☐	☒	No perimeter roads to be constructed as part of this development.
	Where access/egress can only be achieved through forest, woodland and heath vegetation, secondary access shall be provided to an alternate point on the existing public road system; and	☐	☐	☒	All access is through APZ areas or grassland.
	One way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression.	☐	☐	☒	No one way only public access roads.

Table 4: Access Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
The capacity of access roads is adequate for firefighting vehicles.	The capacity of perimeter and non-perimeter road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges/causeways are to clearly indicate load rating	☒	☐	☐	All new roads will have capacities suitable to carry fully laden firefighting vehicles.
There is appropriate access to water supply.	Hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression;	☒	☐	☐	Hydrants are located outside of parking reserves and road carriageways.
	Hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005 - Fire hydrant installations System design, installation and commissioning; and	☒	☐	☐	Hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005.
	There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	☒	☐	☐	Proposed Lot 15 will be able to provide for suitable access to the future dwelling.
Perimeter Roads					
Access roads are designed to allow safe access and egress for firefighting vehicles while	Are two-way sealed roads;	☐	☐	☒	No perimeter roads to be provided.
	Minimum 8m carriageway width kerb to kerb;	☐	☐	☒	No perimeter roads to be provided.

Table 4: Access Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface.	Parking is provided outside of the carriageway width;	☐	☐	☒	No perimeter roads to be provided.
	Hydrants are located clear of parking areas;	☐	☐	☒	No perimeter roads to be provided.
	Are through roads, and these are linked to the internal road system at an interval of no greater than 500m;	☐	☐	☒	No perimeter roads to be provided.
	Curves of roads have a minimum inner radius of 6m;	☐	☐	☒	No perimeter roads to be provided.
	The maximum grade road is 15 degrees and average grade of not more than 10 degrees;	☐	☐	☒	No perimeter roads to be provided.
	The road crossfall does not exceed 3 degrees; and	☐	☐	☒	No perimeter roads to be provided.
	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	☐	☐	☒	No perimeter roads to be provided.
Non-Perimeter Roads					
Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.	Minimum 5.5m carriageway width kerb to kerb;	☒	☐	☐	The public road will provide a minimum of 8m carriageway.
	Parking is provided outside of the carriageway width;	☐	☐	☒	No on street parking bays

Table 4: Access Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
	Hydrants are located clear of parking areas;	☒	☐	☐	No hydrants within parking areas.
	Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m;	☒	☐	☐	All roads a through roads apart from two short cul-de-sacs which are compliant with the <200m requirement as outlined above.
	Curves of roads have a minimum inner radius of 6m;	☒	☐	☐	Curves of public roads are to have a minimum inner radius of six metres.
	The road crossfall does not exceed 3 degrees; and	☒	☐	☐	Cross fall on the public roads will not exceed 3 degrees.
	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	☒	☐	☐	All public roads will have a minimum vertical clearance of 4m.
Property Access					
Firefighting vehicles can access the dwelling and exit the property safely	There are no specific access requirements in an urban area where an unobstructed path (no greater than 70m) is provided between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles.	☐	☐	☒	Whilst being within an urban area, proposed Lot 15 will not comply with this requirement.

Table 4: Access Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
	In circumstances where this cannot occur, the following requirements apply:				
	• minimum 4m carriageway width;	☒	☐	☐	Proposed Lot 15 is capable of providing a property access that has a minimum width of 4m.
	• in forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m at the passing bay;	☐	☐	☒	The access road for proposed Lot 15 will be within grassland vegetation.
	• a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches;	☒	☐	☐	Proposed Lot 15 is capable of providing a property access that will have a minimum vertical clearance of 4m.
	• provide a suitable turning area in accordance with Appendix 3;	☒	☐	☐	Proposed Lot 15 is capable of providing a property access that will provide for a suitable turning area in accordance with Appendix 3 of PBP.
	• curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress;	☒	☐	☐	Proposed Lot 15 is capable of providing a property access with curves having a minimum inner radius of 6m and are minimal in number.
	• the minimum distance between inner and outer curves is 6m;	☒	☐	☐	Proposed Lot 15 is capable of providing a property access that has a minimum distance between inner and outer curves of 6m.
	• the crossfall is not more than 10 degrees;	☒	☐	☐	Proposed Lot 15 is capable of providing a property access that has a crossfall of less than 10 degrees.

Table 4: Access Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
	• maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads; and	☒	☐	☐	Proposed Lot 15 is capable of providing a property access that has a grades of less than 10 degrees unsealed or 15 degrees sealed.
	• a development comprising more than three dwellings has access by dedication of a road and not by right of way.	☒	☐	☐	No right of ways proposed.
	Note: Some short constrictions in the access may be accepted where they are not less than 3.5m wide, extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also apply to community style development property access roads in addition to the above.				

3.4.2.1 Performance Solution – Access: Perimeter Road

PBP requires that residential subdivision of three or more allotments are provided with a perimeter road. The development does not provide for a perimeter road along the southern/south eastern interface of the development (which is the only interface to classified vegetation). In this regard, the access does not comply with the Acceptable Solution.

Pursuant to Section 1.4.5 of PBP:

> *Performance based solutions must provide substantiated evidence and clearly demonstrate how the specific objectives and performance criteria are to be satisfied.*

Furthermore, Section A2.4 of PBP requires:

> *For performance based applications, it must be demonstrated how the product, design or material can meet the performance criteria of this document including the intent of measures and also, the aim and objectives.*

The Intent and Performance Criteria are outlined in the table below.

Table 5: Applicable Performance Criteria & Acceptable Solutions for APZ

Intent	Performance Criteria	Acceptable Solution
To provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area.	Firefighting vehicles are provided with safe, all-weather access to structures.	Perimeter roads are provided for residential subdivisions of three or more allotments.

To achieve an appropriate APZ, it is necessary to demonstrate that the performance solution complies with the Performance Criteria. It is proposed in this instance to demonstrate this through evidence to demonstrate that the design meets the performance criteria.

A perimeter road provides separation between the bushland and urban areas. PBP states:

> *The perimeter road provides space to conduct active firefighting operations and hazard reduction activities. In developments where no perimeter road exists, property defence in a bush fire event may be more difficult (NSW Rural Fire Service 2019)p.29.*

The southern/south eastern interface of the development site is substantially encumbered by above ground electricity infrastructure. The powerlines physically prohibit the ability to provide a road along the southern boundary of the site. This, combined with grades of the site, has resulted in the southern part of the site taking more of a rural-residential form and thus having substantially larger allotments than a typical urban subdivision.

Thus, to demonstrate suitable access is provided in the absence of a perimeter road interface to the hazard, the access provisions of a rural residential environment are applied to reflect the actual characteristics of the interface of the proposed development. This is an appropriate solution as the constraints of the site are such that it would not reasonably be expected to experience any further subdivision and thus would retain these characteristics in perpetuity.

This interface area contains only two (2) allotments: proposed Lot 15 and proposed Lot 25. The former provides access from Lyon Parade. This lot is to have an access compliant with the property access road requirements, this providing for suitable access for fire fighting vehicles to defend the site and future dwelling on proposed Lot 15. Lot 25 has been designed to have two (2) points of connection from the local road network in order to enable fire fighting vehicles to defend the site and future development on the site from the interface with the adjacent lot. It should be noted that this interface area is a school, and whilst partially mapped as a hazard, is not expected to constitute a significant risk. The southern part of the site, due to the powerlines and associated easements, will never be built upon, providing for a significant area of

defendable space. Furthermore, no significant fencing (e.g. Colorbond fencing) will be permitted in the easement area thus maintaining ease of access for emergency services.

Having an access from Lyon Parade and two from the internal road network will distribute accessibility and aid with conflict minimisation between emergency services vehicles accessing the site and occupants egressing the site. The subdivision layout was designed cognisant of these fire fighting access requirements whilst recognising the constraints of the site.

The entire site is to be managed as an APZ and thus will ensure radiant heat is minimised across the site and in access areas. This will provide for a lower exposure than many rural residential subdivisions which would only have a small APZ around a dwelling as opposed to the entire site.

Based on this, the access will meet the Performance Criteria. It will also provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area.

Therefore, the proposed performance solution is considered to be consistent with both the intent and Performance Criterion of the BFPM and the overall aims and objectives of PBP.

3.4.3 Services – Water, Electricity & Gas

The intent of measures for the Services – Water, Electricity & Gas BFPM is:

> *To provide adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building.*

The following table outlines the Performance Criteria and associated Acceptable Solutions for the Services – Water, Electricity and Gas BFPM, and how the development responds.

Table 6: Services – Water, Electricity & Gas Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
Water Supply					
Adequate water supplies is provided for firefighting purposes.	Reticulated water is to be provided to the development where available;	☒	☐	☐	Reticulated water supply will be provided to each of the lots within the development.
	A static water and hydrant supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed; and	☐	☐	☒	Reticulated water supply is to be provided to each of the lots.
	Static water supplies shall comply with Table 5.3d.	☐	☐	☒	Not applicable.
• Water supplies are located at regular intervals; and • The water supply is accessible and reliable for firefighting operations.	fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2005;	☒	☐	☐	Fire hydrant, spacing, design and sizing is to comply with the relevant clauses of Australian Standard AS 2419.1:2005.
	Hydrants are not located within any road carriageway; and	☒	☐	☐	Hydrants are not to be located within any road carriageway.

Table 6: Services – Water, Electricity & Gas Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
	Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.	☐	☐	☒	No new perimeter roads.
Flows and pressure are appropriate.	Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005.	☒	☐	☐	Fire hydrant flows and pressures are to comply with the relevant clauses of AS 2419.1:2005.
The integrity of the water supply is maintained.	All above-ground water service pipes are metal, including and up to any taps; and	☒	☐	☐	All above ground pipes and taps are to be metal.
	Above-ground water storage tanks shall be of concrete or metal.	☐	☐	☒	No tanks required.
Electricity Services					
Location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.	Where practicable, electrical transmission lines are underground;	☒	☐	☐	Where practicable, electrical transmission lines are underground.
	Where overhead, electrical transmission lines are proposed as follows: • lines are installed with short pole spacing of 30m, 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 ISSC3 Guideline for Managing Vegetation Near Power Lines.	☒	☐	☐	Where electricity transmission lines are above ground, short pole spacings are to be providing (i.e. less than 30m) and no part of a tree is closer to a power line than the distance set out in ISSC3 Guideline for Managing Vegetation Near Power Lines.

Table 6: Services – Water, Electricity & Gas Bush Fire Protection Measures

Performance Criteria	Acceptable Solution	Development Solution			
		Means of achieving Performance Criteria			Comments
The intent may be achieved where:		Acceptable Solution	Performance Solution	Not Applicable	
Gas Services					
Location and design 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/NZS 1596:2014 - The storage and handling of LP Gas, the requirements of relevant authorities, and metal piping is used;	☒	☐	☐	Reticulated or bottled gas is to be installed and maintained in accordance with AS/NZS 1596:2014. Metal piping is used.
	All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side;	☒	☐	☐	For any future dwellings, fixed cylinders are to be kept clear of flammable materials to a distance of 10m and are to be shielded from the hazard.
	Connections to and from gas cylinders are metal;	☒	☐	☐	Connections to and from any gas cylinders are to be metal.
	Polymer-sheathed flexible gas supply lines are not used; and	☒	☐	☐	For any future dwellings, no Polymer sheathed flexible gas supply lines are to be used adjacent to the building.
	Above-ground gas service pipes are metal, including and up to any outlets.	☒	☐	☐	Above-ground gas service pipes are to be metal, including and up to any outlets.

3.4.4 Emergency Management Arrangements

It is strongly recommended that a Bush Fire Survival Plan be prepared by the future residents of the property in accordance with the NSW RFS' guidelines located on the following webpage http://www.rfs.nsw.gov.au/resources/bush-fire-survival-plan

4 Recommendations

4.1 Summary of Bush Fire Protection Measures

This BFAR has assumed that the proposed development will be carried out in accordance with a number of Bush Fire Protection Measures (BFPM). The following table provides a summary of the BFMP that must be incorporated into the development to ensure it best protects the development from the effects of bushfire in accordance with the requirements of PBP and other best practice guidelines. The BFPM are also shown on **Figure 11** in **Appendix F**.

Table 7: Summary of Recommendations

Provision	Measures
Asset Protection Zone	Prior to the issue of an Occupation Certificate for the development, an Asset Protection Zone is to be provided for the entire site (excluding the tree protection zone) as shown on **Figure 11** in **Appendix F.** The APZ is to be established and maintained in perpetuity in accordance with the requirements outlined in **Appendix G**.
Landscaping	• Any future landscaping of the lots is to be established and maintained in perpetuity in accordance with the requirements outlined in **Appendix G.**
	• Any future fencing is to be made of either hardwood or non-combustible material. Where the fence is within 6m of a building or in areas of BAL-29 or greater, all fencing is to be made of non-combustible material only.
Construction Standards	Any future dwellings are to be constructed in accordance with the relevant BAL as calculated in accordance with the relevant legislative requirements at the time of the DA and/or CC.
Access	**Public Roads**
	All public roads are to be designed and constructed in accordance with the following: • Construction of the public road to a minimum sealed trafficable width of 8m, with a minimum clearance height of 4m above the road. • Crossfall of the public road is not to exceed 3 degrees. • No on street parking bays to be provided. • Maximum gradient of the public roads is not to exceed 15 degrees for sealed roads • Curves of public roads are to have a minimum inner radius of six metres. • Cross fall on the public roads are not to exceed 3 degrees. • Roads are to be designed to withstand a fully laden fire fighting vehicle (23 tonnes). • Any traffic management devices are to be designed and constructed to facilitate access by emergency service vehicles. • Turn around areas are to be provided cul-de-sacs in accordance with the requirements in **Appendix H**. • The cul de sacs are to be sign posted as a "No Through Road".
Water Supply	Prior to the issue of a Subdivision Certificate for the development, reticulated water supply is to be provided to each of the lots within the development. Fire hydrant, spacing, design, sizing, flows and pressures are to comply with the relevant clauses of Australian Standard AS 2419.1:2005. Hydrants are not to be located within any road carriageway.
Electricity	Where practicable, electrical transmission lines are underground. Where electricity transmission lines are above ground, short pole spacings are to be providing (i.e. less than 30m) and no part of a tree is closer to a power line than the distance set out in ISSC3 Guideline for Managing Vegetation Near Power Lines.

Table 7: Summary of Recommendations

Provision	Measures

Gas Supplies	• Ensure any gas supplies are provided and maintained in perpetuity as follows:
	  • Bottled gas to be installed and maintained in accordance with AS 1596;
	  • Metal piping is to be used for all connections to and from the cylinders. No Polymer sheathed flexible gas supply lines are to be sued adjacent to the building;
	  • Fixed cylinders are to be kept clear of flammable materials to a distance of 10m; and
	  • Fixed cylinders are to be shielded from the hazard.

5 Conclusion

On completion, the proposed subdivision will ensure that all habitable development is located in an area that has an acceptable bushfire hazard level (i.e. ≤BAL-29). With the implementation of the recommendations, as outlined in **Section 4** and as shown on **Figure 11** in **Appendix F**, the proposed development is considered to be appropriately protected from bushfire and complies with the requirements of PBP. The proposed development is not expected to increase the bushfire risk.

6 References

International Committee on Surveying & Mapping). nd. *ELVIS - Elevation and Depth - Foundation Spatial Data.* Accessed June 8, 2021. https://elevation.fsdf.org.au/.

Keith. 2004. *Ocean Shores to Desert Dunes: The Native Vegetation of New South Wales and the ACT.* Hurstville: NSW Department of Environment and Conservation.

NSW Rural Fire Service. 2019. *Planning for Bush Fire Protection: A guide for councils, planners, fire authorieis and developers.* Granville: NSW RFS.

Appendix A

Development Plans

AREAS OF STEEP LAND (20% OR GREATER)

SCALE 1:1000(A1)

0 10 20 40 60 80 100

SCALE 1:2000(A3)

0 10 20 40 60 80 100

(A) EASEMENT FOR TRANSMISSION LINE 30.48 WIDE (VIDE H544082)
(B) EASEMENT FOR TRANSMISSION LINE 45.72 WIDE (VIDE K357079)
(C) EASEMENT FOR TRANSMISSION LINE 30 WIDE (VIDE Z572481)
(D) EASEMENT FOR TRANSMISSION LINE VARIABLE WIDTH (VIDE Z572481)
(E) RIGHT OF CARRIAGEWAY 3 WIDE (VIDE DP1239161)
(F) EASEMENT FOR OVERHEAD POWER LINE(S) 9 WIDE (VIDE DP 1253903)
(G) EASEMENT FOR UNDERGROUND CABLES 3 WIDE (VIDE DP 1253903)
(H) EASEMENT FOR DRAINAGE OF SEWAGE 4 WIDE AND VARIABLE WIDTH (VIDE DP1253903)

NOTES

- THESE NOTES ARE AN INTEGRAL PART OF THIS PLAN . THIS PLAN SHOULD NOT BE COPIED, REPRODUCED, STORED OR TRANSMITTED WITHOUT THESE NOTES.
- THIS PLAN HAS BEEN PRODUCED FOR DEVELOPMENT APPLICATION PURPOSES ONLY. THE EXISTING BOUNDARIES SHOWN ARE BY THE CURRENT TITLE DIAGRAM(S) ONLY. NO FIELD SURVEY HAS BEEN UNDERTAKEN AS PART OF PREPARATION OF THIS PLAN.
- AERIAL IMAGERY SHOWN IS SOURCED FROM METROMAPS.
- PROPOSED BOUNDARIES, DIMENSIONS, AREAS AND PROPOSED EASEMENT LOCATIONS SHOWN ARE SUBJECT TO FINAL SURVEY. FURTHER EASEMENTS MAY BE REQUIRED TO COMPLETE THE DEVELOPMENT.
- THIS PLAN HAS BEEN PREPARED BY INTEGRATED CONSULTING PTY LTD FOR PRINTING AS AN A1 PAPER COPY OR DIGITAL PDF AS PART OF A DEVELOPMENT APPLICATION FOR A SUBDIVISION FOR THE CLIENT(S) LISTED BELOW ONLY. NO RELIANCE SHOULD BE PLACED ON THIS PLAN FOR ANY FINANCIAL DEALINGS.
- THIS PLAN HAS NOT BEEN PREPARED FOR CONTRACT PURPOSES.
- PROPOSED LOTS SHOWN ARE NOT LOTS IN A REGISTERED DEPOSITED PLAN UNTIL A DEPOSITED PLAN FOR THE DEVELOPMENT IS PREPARED AND REGISTERED AT NSW LAND REGISTRY SERVICES (LRS).

REVISIONS

REV.	DATE	BY	DESCRIPTION
D	22/06/2022	SRD	AMENDMENTS AFTER PRE LODGEMENT ADVICE FROM COUNCIL
C	31/03/2021	SRD	NOTES CHANGED, EASEMENT NOTATIONS ADDED
B	29/03/2021	SRD	LOT SIZES AMENDED
A	3/03/2021	SRD	CONCEPT FOR CLIENT DISCUSSION

MAGNET FILE: -

AUTOCAD FILE: 20037_TP_01_Concept 2_RevD.dwg

JOB REFERENCE: 20037

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PO BOX 9026 BATHURST WEST 2795
enquiries@integratedconsulting.com.au
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DATE OF SURVEY: BY OTHERS	LOCALITY: WALLERAWANG	SCALE: 1:1000 @ A1 1:2000 @ A3	CLIENT: NELSON & WAYNE CLARK
SURVEYED BY:	LGA: LITHGOW CITY	CONTOUR INTERVAL: 1m	PLAN SHOWING SUBDIVISION CONCEPT LAYOUT FOR SUBDIVISION OF LOT 1 IN DP 1253903 (WITH AERIAL IMAGE)
DRAWN BY: SRD	HORIZONTAL DATUM:	VERTICAL DATUM:	A1
CHECKED BY:	ORIGIN OF COORDS:	ORIGIN OF LEVELS:	REVISION D
			DRAWING No: 20037:TP:02 SHEET No: 1 OF 2

Document Set ID: 2079015
Version: 1, Version Date: 07/12/2022

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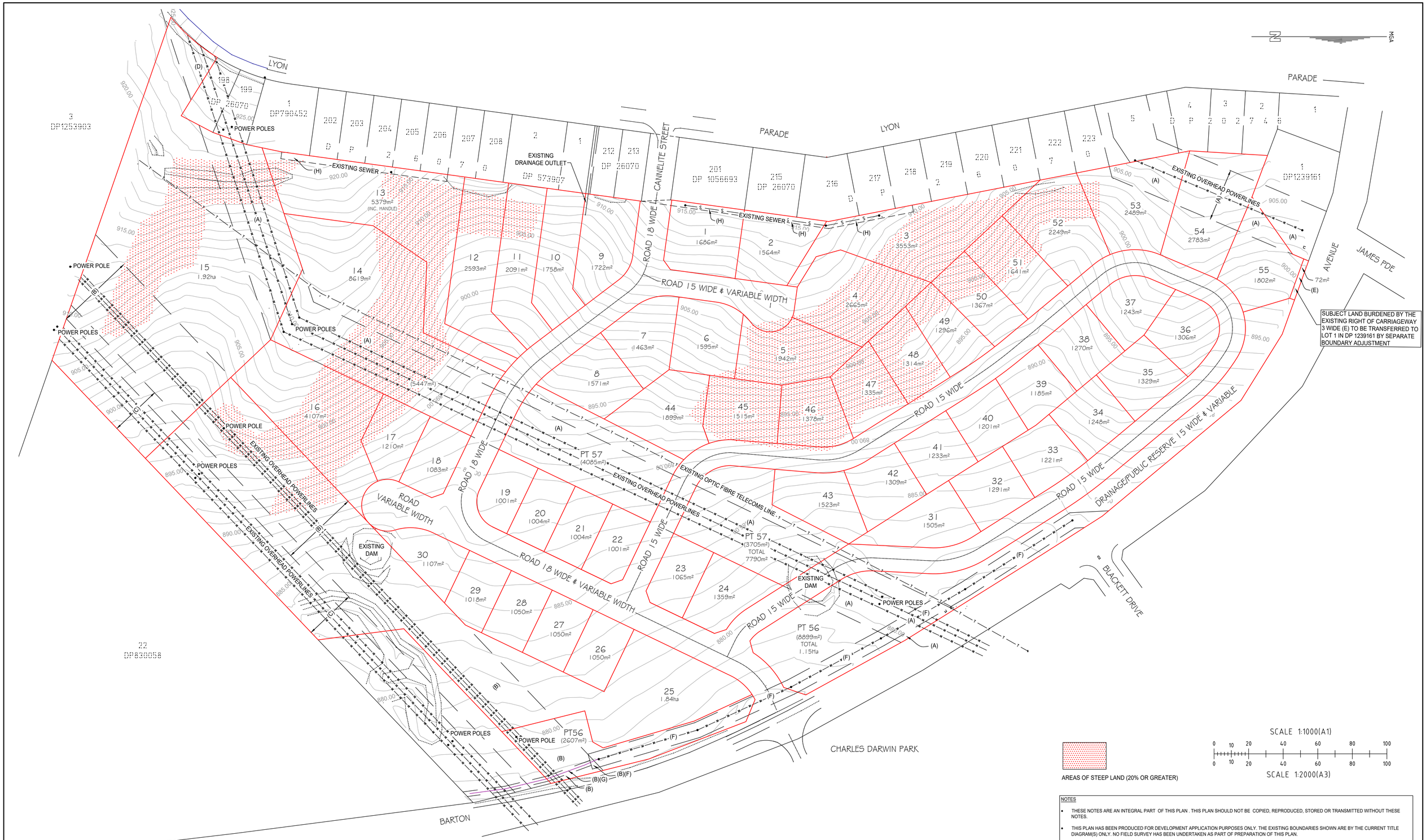

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SURVEYED BY:	LGA: LITHGOW CITY	CONTOUR INTERVAL: 1m	
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CHECKED BY:	ORIGIN OF COORDS:	ORIGIN OF LEVELS:	

CLIENT: NELSON & WAYNE CLARK

PLAN SHOWING SUBDIVISION CONCEPT LAYOUT FOR SUBDIVISION OF LOT 1 IN DP 1253903 (WITHOUT AERIAL IMAGERY)

DRAWING No: 20037:TP:02 SHEET No: 2 OF 2

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Appendix B

Biodiversity Development Assessment Report

Biodiversity Development Assessment Report, Subdivision Lot 1 DP1253903, Wallerawang, NSW

Certified by Addy Watson of AREA Environmental & Heritage Consultants Pty Ltd
BAM accredited assessor (BAAS19066)

Final Report Dec 2022

Template developed by the NSW Department of Environment and Planning

Document control

Version	Date	Author	Details
V3.0	02/12/20222	M. Glover AREA Environmental & Heritage Consultants	Final issued with development application

The document control table is to be updated only when versions of the Biodiversity Development Assessment Report are issued to the decision-makers, rather than internal versions.

Summary

Timberfix (the proponent) proposes to subdivide 17.43 hectares of land at 19 Barton Avenue, Wallerawang NSW (Lot 1 DP1253903). The proposal includes:

- 55 residential allotments
- two public open space lots for stormwater management
- internal access roads

The proposal would impact approximately 17.22 hectares of native vegetation (development footprint), with 0.10 hectares excluded to avoid impact to native vegetation. Given the impact area exceeds the area threshold under the Biodiversity Conservation Regulation 2017, a Biodiversity Development Assessment Report (BDAR) is required.

AREA Environmental & Heritage Consultants Pty Ltd (AREA) was engaged by Integrated Consulting on behalf of the proponent to prepare this BDAR. It includes an assessment of landscape, vegetation and threatened species values within the development site as well as potential matters of Serious and Irreversible Impact (SAII) listed in NSW under the *Biodiversity Conservation Act 2016* (BC Act) and or the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This BDAR uses the following terms:

Development site: the area surveyed for the assessment prior to identifying the constraints and exclusions and extends to the boundary of Lot 1 DP1253903.

Development footprint: the area of land that would be directly impacted by the proposal, including all construction, operational and decommissioning impacts. This term is equivalent to '**subject land**', generally used in a BDAR.

A combination of desktop and field-based surveys were used to inform this report. Field assessments were undertaken in September, November and December 2020 and October 2022, comprising vegetation surveys in accordance with the Biodiversity Assessment Method (BAM), transects and remote sensing techniques consistent with the relevant threatened species survey guidelines.

The development site occurs on cleared land with small patches or remnant woody vegetation. The landscape is undulating, steep, hilly with an elevation range of 880 to 922 metres Australian Hight Datum. All vegetation in the development site was mapped as Plant Community Type (PCT) 351 - *Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion* (Table E1). One BC Act and EPBC Act listed species, the vulnerable Black Gum (*Eucalyptus aggregata*), was recorded, and no Threatened Ecological Communities.

Of the native vegetation that would be impacted, 17.20 hectares is of poor condition (Zone 1) and 0.02 hectares is of moderate condition (Zone 2) (Figure E1). An offsetting requirement is triggered for impacts to Zone 2 vegetation. A summary of offset requirements is provided in Tables E2 and E3.

The proponent would avoid impact to the Black Gum by establishing a temporarily fenced tree protection zone excluding it from the development footprint thereby prohibiting tree clearing or inadvertent impact. Impacts to moderate condition PCT351 vegetation would be minimised by limiting the impact area to a 6-metre access handle and installing temporary fencing to prevent impact during construction (Figure E1). Impacts to the moderate condition PCT351 vegetation would trigger one ecosystem credit.

Figure E1

Table E1 PCTs identified within the development site

PCT ID	PCT name	Development footprint area (ha)
351	*Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion*.	17.22
	Total area	**17.22**

Table E2 Impacts that require an offset – ecosystem credits

Vegetation zone	PCT	TEC/EC	Impact area (ha)	Number of ecosystem credits required
Zone 2	351	Not a TEC or EC	0.02	1

Table E3 Impacts that require an offset – species credits

Common name	Scientific name	Loss of habitat (ha) or individuals	Number of species credits required
N/A	N/A	N/A	N/A

Contents

List of tables

List of figures

Shortened forms

APZ	asset protection zone
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BC Regulation	Biodiversity Conservation Regulation 2017 (NSW)
BDAR	Biodiversity Development Assessment Report
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
HTW	high threat weed
IBRA	Interim Biogeographic Regionalisation for Australia
LLS Act	*Local Land Services Act 2013* (NSW)
MNES	matters of national environmental significance
NSW	New South Wales
PCT	plant community type
SAII	serious and irreversible impact
SEARs	Secretary's Environmental Assessment Requirements
TBDC	Threatened Biodiversity Data Collection
TEC	threatened ecological community

Declarations

i. Certification under clause 6.15 *Biodiversity Conservation Act 2016*

I certify that this report has been prepared based on the requirements of, and information provided under, the Biodiversity Assessment Method and clause 6.15 of the *Biodiversity Conservation Act 2016* (BC Act).

Signature: 

Date: 02/12/2022

BAM Assessor Accreditation no: BSSA19066

This BDAR has been prepared to meet the requirements of BAM 2020. Appendix A provides an assessment of compliance with the minimum information requirements outlined in BAM Appendix K.

ii. Details and experience of author/s and contributors

Authors and contributors

Name	BAM Assessor Accreditation no. (if relevant)	Position/Role	Tasks performed	Relevant qualifications
Phillip Cameron	BAAS17082	Managing Director	Project management	• B.Sc. Major in Biology. Macquarie University • Ass Dip App Sci. University of Queensland • Certified Environmental Practitioner (EIANZ) and practicing member • NSW OEH BioBanking and Bio-certification Assessor: accreditation number 0117 • NSW OEH Scientific License: 101087 • NSW DPI Ethics Approval 17/459 (3) • Practicing member of the NSW Ecological Consulting Association
Addy Watson	BAAS19066	Manager Biodiversity	Fieldwork Report review Certification	• B. Env. Sc. University of New England • Diploma Project Management
Greg Bible	-	Environmental Consultant	Fieldwork	• B. Env. Sc. (Sc. Hons) University of New England
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iii. Conflict of interest

I declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest.

This declaration has been made in the interests of full disclosure to the decision-maker.

Signature:  _____

Date: _____**25/11/2022**_____

BAM Assessor Accreditation no: _____BSSA17082___

Stage 1: Biodiversity assessment

1. Introduction

1.1 Proposed development

1.1.1 Development overview

Timberfix (the proponent) proposes to subdivide the property at 19 Barton Avenue, Wallerawang NSW (Lot 1 DP 1253903) covering 17.43 hectares (Figure 1).

The proposal requires consent under Part 4 of the *Environment Planning and Assessment Act 1979*.

1.1.2 Location

The proposal is located in the Lithgow Local Government Area (Figure 2).

1.1.3 Proposed development and the development site

The proposal includes 55 residential allotments, two public open space lots that would be used for stormwater management (Section 1.1.3) (Figure 3).

The development site is 880 to 922 metres Australian Hight Datum and zoned entirely as R5 – Large Lot Residential, with a mapped land use of grazing native vegetation.

There are three first Strahler Order hydrological features within the development footprint, which terminate in Lake Wallace approximately 250 metres to the east.

Based on the Plant Community Type present (Section 4.2), soils are likely to comprise shallow, yellow to red podzolic clay to loam soils derived from sedimentary, metamorphic and igneous substrates.

The site would be managed as an Asset Protection Zone and has been designed to avoid impacts to the BC Act and EPBC Act listed vulnerable Black Gum and areas of vegetation in a moderate condition (Figure 10).

1.1.4 Other documentation

N/A

1.2 Biodiversity Offsets Scheme entry

The proposal exceeds the area threshold under the Biodiversity Conservation Regulation 2017. Entry in the Biodiversity Offset Scheme is therefore required.

1.3 Excluded impacts

There are no excluded impacts associated with this proposal.

1.4 Matters of national environmental significance

The proposal is not a controlled action and does not need a referral under the EPBC Act. A reported generated using the Commonwealth Protected Matters Search Tool identified Matters of National Environmental Significance (MNES) and other matters protected under the EPBC Act, predicted to occur within 1500 metres of the development site (Appendix B). Results relevant to this BDAR are summarised below:

Matters of National Environment Significance	Results
World Heritage Properties	0
National Heritage Places	0
Wetlands of International Importance (Ramsar Wetlands)	0
Great Barrier Reef Marine Park	0
Commonwealth Marine Area	0
Threatened Ecological Communities	2
Threatened Species	36
Migratory Species	12
Nuclear actions (including uranium mines)	0
Other matters protected under the EPBC Act	
Commonwealth Land	1
Commonwealth Heritage Places	0
Listed Marine Species	19

Whales and other cetaceans	0
Critical Habitats	0
Commonwealth Reserves Terrestrial	0
Australian Marine Parks	0
Habitat Critical to the Survival of Marine Turtles	0
Extra BDAR relevant information	
State and Territory Reserves	0
Regional Forest Agreements	0
Nationally Important Wetlands	0

1.5 Information sources

Table 1: Desktop review resources

Title	Web address
Legislation	
Commonwealth *Environment Protection & Biodiversity Conservation Act 1999*	Environment Protection and Biodiversity Conservation Act 1999 (legislation.gov.au)
Environmental Planning and Assessment Act 1979	https://www.legislation.nsw.gov.au/view/html/inforce/current/act-1979-203
Fisheries Management Act 1994	https://www.legislation.nsw.gov.au/view/html/inforce/current/act-1994-038
National Parks and Wildlife Act 1974	https://www.legislation.nsw.gov.au/view/html/inforce/current/act-1974-080_
Threatened Species Conservation Act 1995	https://legislation.nsw.gov.au/view/whole/html/inforce/2016-11-25/act-1995-101_
Water Management Act 2000	https://www.legislation.nsw.gov.au/view/html/inforce/current/act-2000-092_
Biodiversity	
BAM 2020	https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/accredited-assessors/biodiversity-assessment-method-2020
BioNet - BioNet Atlas - BioNet Vegetation Classification	https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/nsw-bionet

Title	Web address
- BioNet NSW (Mitchell) Landscapes v3.1	
Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna – Amphibians (DECCW, 2009)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/amphibians-field-survey-methods-090213.pdf
Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities – Working Draft (DEC 2004)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/draft-threatened-biodiversity-survey-guide.pdf_
Survey requirements (birds, bats, reptiles, frogs, fish and mammals) for species listed under the EPBC Act	https://www.environment.gov.au/system/files/resources/b1c6b237-12d9-4071-a26e-ee816caa2b39/files/survey-guidelines-mammals.pdf_
Guide to Surveying Threatened Plants (DPIE, 2020)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/surveying-threatened-plants-and-habitats-nsw-survey-guide-biodiversity-assessment-method-200146.pdf_
DPIE Threatened Species website	https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species_
PlantNET	http://plantnet.rbgsyd.nsw.gov.au/__
Threatened Species Assessment Guideline - The Assessment of Significance (DPI, 2008)	Threatened Species Assessment Guidelines (nsw.gov.au)
Significant Impact Guidelines 1.1 - Matters of National Environmental Significance	https://www.environment.gov.au/epbc/publications/significant-impact-guidelines-11-matters-national-environmental-significance_
Principles for the use of biodiversity offsets in NSW	https://www.environment.nsw.gov.au/biodivoffsets/oehoffsetprincip.htm_
NSW Native Vegetation Regulatory Map	https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=NVRMap_
NSW Biodiversity Values Map	https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap_

Table 2: Spatial data

GIS layer name	Reference
IBRA bioregions and subregion	NSW data portal
NSW landscape regions	Mitchell Landscapes V3
Rivers and streams	Six Viewer / SEED WMS topographic layer
Wetlands	Directory of Important Wetlands
Waterways	Waterway NSW Final
Key Fish Habitat	DPI Key Fish Habitat GIS layer
Native vegetation extent	Central Tablelands State Vegetation Plant Community Type map 4778 and ESRI Satellite

2. Methods

2.1 Site context methods

2.1.1 Landscape features

Satellite imagery and spatial data (Table 1) were used to determine landscape features of the development site. Field surveys were undertaken to ground-truth desktop results and confirm feature extent (Section 3.2).

2.1.2 Native vegetation cover

Satellite, aerial imagery and spatial data (Table 1) were used to determine native vegetation cover of the development site. Field surveys were undertaken to ground-truth desktop results and confirm extent and condition of native vegetation and to confirm any areas of excluded or exempt land under the *Local Land Services Act 2013* (LLS Act) (Section 3.3).

2.2 Native vegetation, threatened ecological communities and vegetation integrity methods

2.2.1 Existing information

A review of relevant ecological databases and literature (Section 1.5) was undertaken to characterise the development site including vegetation type, likelihood of occurrence of, and potential impacts to biodiversity values.

2.2.2 Mapping native vegetation extent

Native vegetation within the subject area was classified using the NSW vegetation classification framework.

The 'State Vegetation Type Map: Central Tablelands SVM v1p0_PCT_E_4778 spatial layer provided a baseline for determining Plant Community Types (PCT) with potential to occur within the development site. The BioNet Vegetation Classification application was used to understand community composition and any Threatened Ecological Communities (TEC) associated with PCT.

Satellite and SIX Maps historic aerial imagery were used to determine native vegetation extent of the development site.

Desktop results were ground-truthed by field assessment including plot-based vegetation surveys in accordance with Biodiversity Assessment Method (BAM) 2020 (Section 2.2.3). Areas of PCT identified within the development site were zoned according to vegetation condition.

Assessment identified the Plant Community Types and confirmed the presence/ absence of any Threatened Ecological Communities. Biodiversity Assessment Method 2017 (BAM) vegetation plots were completed.

All trees were recorded for size group, species, and potential habitat (hollows) (Table 3).

Trees size groups are allocated based on the Biodiversity Assessment Method 2017 (BAM 2017) diameter at breast height (DBH) measures.

Table 3: Tree size groups allocated based on BAM sizes

Tree Group	Size (DBH)
C1	<5
C2	5-9cm
C3	10-19cm
C4	20-29cm
C5	30-49cm
C6	40-79cm
C7	80+cm

2.2.3 Plot-based vegetation survey

BAM (2020) is approved by the NSW government as it is scientifically robust, transparent and repeatable, providing a consistent approach for assessing impacts on biodiversity values.

Supported by desktop results, the development site was first assessed to broadly indicate what Plant Community Types (PCT) and zones were likely present and where to apply BAM plots. Plots were placed in representative native vegetation zones likely to be impacted by the proposal.

Species composition (Native, Exotic, High Threat Weeds (HTW), vegetation integrity, function, PCT and TEC presence were assessed using four 20 by 20 metre and 20 by 50 metre vegetation plots, in accordance with BAM 2020. The attributes measured provided an indication of the biodiversity presence and quality of habitat. Transects were also used to determine the presence of any threatened flora species (Appendix C). If the presence of a listed threatened species was detected in a plot, relevant NSW or Commonwealth guidelines were employed to find others in or next to the plot to indicate the extent of the local viable population.

Areas of non-native vegetation were also identified using the processes outlined above including areas comprising exotic species or grazed paddocks.

Effort was made to place all vegetation plots within the development site, however, some plots extended beyond the footprint to ensure vegetation representative of the same vegetation type and condition as the vegetation within the development site was captured.

Plot data collected was entered into the BAM-C and credit reports provided in Appendix D.

2.2.4 Vegetation integrity survey

See Section 2.2.3.

2.3 Threatened flora survey methods

2.3.1 Review of existing information

A list of threatened flora and associated habitat and microhabitat constraints, predicted to occur in the subject area, was automatically generated using BAM-C based on site context including IBRA region and sub region, predicted PCTs and NSW (Mitchell) Landscape.

Aerial imagery, contour maps and vegetation maps were also reviewed to identify habitat constraints and microhabitats for threatened species. The following additional resources were used to inform field and threatened species:

Databases used to identify potentially occurring threatened species and habitat constraints

Database / resource	Search area	Date accessed
NSW DPIE BioNet Atlas	Approximately 1.5-kilometre radius around the development site	September 2022
MNES Protected Matters Search Tool (DCCEEW)	A 1.5-kilometre radius around the development site	September 2022

2.3.2 Habitat constraints assessment

Using the existing information (Section 2.3.1), a field assessment was undertaken to confirm presence of associated habitat and microhabitat constraints. Hollow bearing trees were recorded, and any other potential habitat noted and used to inform targeted threatened species surveys as required.

2.3.3 Field surveys

Field surveys were conducted in three stages:

1. Initial field assessment including completion of BAM plots, targeted survey for listed species as applicable (section 2.2.3)
2. Targeted frog and arboreal mammal survey (section 2.4.3)

3. Additional, opportunistic site visit.

Figure 6 describes field survey methods and location.

2.4 Threatened fauna survey methods

2.4.1 Review of existing information

A review of relevant ecological databases and literature (section 1.5) was undertaken to characterise the development site and likelihood of occurrence of, and potential impacts to biodiversity values.

The likelihood of threatened species occurrence in the development site was informed by field surveys and suitable habitat including any habitat constraints recorded. Where threatened species were considered likely to occur, the potential impact of the proposal on these species was determined.

Opportunistic sightings of fauna were also recorded including any indirect evidence such as scats, tracks, calls, fur, feathers, sloughed skins feeding scars on trees etc.

2.4.2 Habitat constraints assessment

Using the existing information (section 2.4.1), a field assessment was undertaken to confirm presence of associated habitat and microhabitat constraints. Hollow bearing trees were recorded, and any other potential habitat noted and used to inform targeted threatened species surveys as required.

2.4.3 Field surveys

Desktop results (e.g., BioNet, predicted species and MNES records) were used to inform field surveys for threatened fauna. Targeted surveys were undertaken in September, November and December 2020 including:

- four evening frog surveys at a minimum of two hours across the two dams targeting the Gold and Green Bell Frog (*Litoria aurea*) (Endangered BC Act, Vulnerable EPBC Act), and
- four weeks of baited camera traps targeting the Vulnerable Brush-tailed Phascogale (*Phascogale tapoatafa*) and Squirrel Glider (*Petaurus norfolcensis*) under the BC Act
- one day of walking transects in September, complimented by opportunistic observations during November and December surveys for Koala (*Phascolarctos cinereus*).

Surveys followed / or was consistent with threatened species survey guidelines including:

- NSW Survey Guide for Threatened Frogs (NSW DPE 2020)
- NSW DPE BioNet Atlas for Phascogale and Squirrel Glider.
- NSW DPE Koala (Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide.

2.5 Weather conditions

The average environmental conditions experienced during surveys on the development site, taken from the nearest weather station are set out in Table 4 (BOM, 2020).

Table 4 Environmental conditions during threatened species surveys

Survey undertaken (e.g., method / targeted species)	**Date**	**Time**	**Temperature** (min. & max.)	**Wind** (light, mod…)	**Rainfall** (mm)	**Other conditions relevant to the species**
Vegetation and other threatened species as applicable during the time on the site	15/09/2020	all day	3.5 – 19.4	not available	0	
Gold and Green Bell Frog (*L. aurea*)	16-20/11/2020	night	10.3-31.5	not available	0	
Brush-tailed Phascogale (*P. tapoatafa*), Squirrel Glider (*P. norfolcensis*)	18/11-16/12/2020	night	18.9-31.5	not available	70.7	

2.6 Limitations

No limitations have been identified.

3. Site context

3.1 Assessment area

Figure 2 Location Map shows the assessment area, which includes the development site and the area of land within the 1500 metre buffer zone surrounding the footprint as required for a site-based development.

3.2 Landscape features

Landscape features identified within the development site and assessment area are shown on Figure 1 and Figure 2, respectively. The development site is undulating, steep, hilly with an elevation of 878 to 928 metres (AHD). A discussion of relevant landscape features is provided below.

3.2.1 IBRA bioregions and IBRA subregions

The development site and assessment area occur in the South Eastern Highlands Interim Biogeographic Regionalisation for Australia (IBRA) bioregion and Capertee Uplands IBRA subregion.

3.2.2 Rivers, streams, estuaries and wetlands

The development site and assessment area occur in the Warragamba catchment. A significant waterbody within the assessment area is Lake Wallace approximately 150 metres East of the development site. Numerous first to third Strahler Order waterways also occur throughout the assessment area. Three first Strahler Order waterways occur in the development site which terminate at Lake Wallace and two dams (Figure 2).

3.2.3 Habitat connectivity

There is habitat connectivity throughout the development site to grasslands adjacent to the southern boundary which may serve as movement corridors for threatened species. The proposal would cause fragmentation and loss of habitat in these areas.

There is no connectivity with habitat outside the development site along the north, north-west and north-east given the land is largely bound by Barton Avenue and residential housing.

3.2.4 Karst, caves, crevices, cliffs, rocks or other geological features of significance

No karst, caves, crevices, cliffs, rocks or other geological features of significance occur within the development site.

3.2.5 Areas of outstanding biodiversity value

Biodiverse riparian land occurs within the assessment area no less than approximately 850 metres from the development site at the closest point. No areas of outstanding biodiversity value, as identified under the BC Act, occur within the development site (

Figure 4).

3.2.6 NSW (Mitchell) landscape

The development site overlaps the Capertee Plateau NSW (Mitchell) landscape (Figure 2) and is described below:

Name	Description	Percent cleared
Capertee Plateau	Wide valleys, low rolling hills below sandstone cliffs on Permian conglomerates, sandstones, and shales with coal at the base of the Sydney Basin and exposure of underlying Devonian shale, siltstone or quartzite. Small areas of Tertiary basalt. General elevation 800 to 1000m, local relief 100-120m. Isolated flat top mountains in the valleys formed as pinnacles or remnant pieces of plateau. Shoulder slopes with stone pillars or 'pagodas' above steep canyons on tributary streams falling into gorges. Low gradient swampy streamlines. Shallow stony texture-contrast profiles, usually with gritty well drained A-horizons, over tough yellow or grey poorly drained clays. Bouldery debris with clay matrix below cliffs (talus). Organic sand in swamps. Red brown structured loams on basalt. Woodlands of; rough-barked apple (Angophora floribunda), red stringybark (*Eucalyptus macrorhyncha*), red box (*Eucalyptus polyanthemos*), yellow box (*Eucalyptus melliodora*), Blakely's red gum (Eucalyptus blakelyi) with shrubby understorey and wallaby grass (*Austrodanthonia sp.*) in open valleys. Scribbly gum (*Eucalyptus sclerophylla*), red stringybark (*Eucalyptus macrorhyncha*), red box and broad-leaved ironbark (Eucalyptus fibrosa ssp. fibrosa) on talus slopes. Silvertop ash (*Eucalyptus sieberi*) and Sydney peppermint (*Eucalyptus piperita*) on sandstone peaks. Dwarf casuarina (*Allocasuarina nana*), tea-tree (*Leptospermum sp.*), and sedge on pagoda margins.	59

3.2.7 Additional landscape features identified in SEARs

No SEARs were required for this proposal.

3.2.8 Soil hazard features

This subsection does not apply for this proposal as it does not require approval from the Native Vegetation Panel under Part 5A of the *Local Land Services Act 2013*, or the Vegetation SEPP.

3.3 Native vegetation cover

Native vegetation cover within the assessment area was estimated to be 17 percent. This was largely determined using satellite imagery and observations during the field assessment. Based on the type of vegetation observed within the subject area, upper stratum vegetation was assumed to be similar throughout the assessment area.

Treeless areas were considered non-native vegetation and treed areas were mapped as native vegetation with the exception of planted non-native species most likely *Pinus radiata* plantation. Polygons were drawn around trees and tree clusters with groundcover between trees also being included as native vegetation.

Table 5 summarises the extent of native vegetation cover within the assessment area. Figure 2 Location Map shows native vegetation cover within the assessment area.

Table 5 Native vegetation cover in the assessment area

Assessment area (ha)	1004
Total area of native vegetation cover (ha)	167

Percentage of native vegetation cover (%)	17
Class (0-10, >10-30, >30-70 or >70%)	>10-30

4. Native vegetation, threatened ecological communities and vegetation integrity

4.1 Native vegetation extent

The field assessment confirmed that native vegetation occurs throughout the entire development site and is of variable quality (Figure 7).

4.1.1 Changes to the mapped native vegetation extent

There are no significant differences between the actual native vegetation extent and that shown on the aerial imagery used in the figures.

4.1.2 Areas that are not native vegetation

The field assessment confirmed the non-native vegetation occurs within the subject area including several individual exotic Pines, approximately 200 Poplar, patches of Blackberry and African Love Grass.

4.2 Plant community types

4.2.1 Overview

Vegetation within the development site has been assessed as aligning with the BioNet Vegetation Classification PCT351 identified within Table 6, its extent is shown in Figure 8 and further described in the following subsections.

Table 6 PCTs identified within the development site

PCT ID	PCT name	Development footprint area (ha)
351	*Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion*.	17.22
	Total area	**17.22**

4.2.2 PCT351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion

4.2.2.1 PCT overview

PCT351 was assessed as occurring over 100 percent of the development site as described in Table 7 using the data contained within the BioNet Vegetation Classification.

PCT351 is widespread across western and central parts of South Eastern Highlands Bioregion from Orange to Yass. It includes a mid to tall open forest dominated by Brittle Gum (*Eucalyptus mannifera subsp. Mannifera*) often with Red Stringybark (*E. macrorhyncha*), Broad-leaved Peppermint (*E. dives*), Long-leaved Box (*E. goniocalyx*) and occasionally Argyle Apple (*E. cinerea*), a sparse shrub layer of *Dillwynia* species, *Daviesia leptophylla, Acacia gunnii, Hibbertia obtusifolia, Monotoca scoparia, Gompholobium huegelii, Pultenaea*

procumbens, and a sparse to mid-dense ground cover comprising a variety of grass species and mat-rushes, forbs and a climber (*Hardenbergia violacea*) (NSW DPIE 2022).

PCT351 occurs on shallow, yellow to red podzolic clay to loam soils derived from sedimentary, metamorphic and igneous substrates on footslopes and hillslopes in hill and plateau landform patterns on the western side of the northern half of the South Eastern highlands Bioregion with some patches in the upper NSW South-western Slopes Bioregion generally between Orange and Yass (NSW DPIE 2022).

Table 7 PCT351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion

PCT ID	351
PCT name	Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion
Vegetation formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	Southern Tableland Dry Sclerophyll Forests
Per cent cleared value (%)	60
Extent within development site (ha)	17.43

4.2.2.2 Condition states

PCT351 was recorded in two condition states within the development site, 17.20 hectares is in poor condition (Zone 1) where the upper and mid stratum have been removed, with occasional areas of young regrowth, and 0. 02 hectares is in moderate condition (Zone 2) where the upper stratum is intact including mature trees. Photo 1 and Photo 2 are representative of these condition states.

Photo 1 PCT351 – Moderate condition

Photo 2 PCT351 – Poor condition

4.2.2.3 Justification of PCT selection

At the time of writing this report, new PCTs have been described for this IBRA subregion, however they are yet to take effect, and be available for analysis.

The following steps were used to select PCT351 as the best fit PCT for this disturbed landscape.

A bulk export PCT list was filtered by:

- upper stratum species: Brittle Gum (*Eucalyptus mannifera*)
- mid stratum species: Myrtle Tea-tree (*Leptospermum myrtifolium*)
- ground stratum genus: *Poa*

These filter parameters provided a short list of two:

- PCT344 – *Argyle Apple - Acacia mearnsii valley open forest of the Yass - Rye Park region of the South Eastern Highlands Bioregion and adjoining NSW South Western Slopes Bioregion*
- PCT351 - *Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion*

The BioNet Vegetation Classification database identifies PCT351 as being associated with the Capertee Uplands IBRA subregion and the Hill End IBRA subregion which lies less than two kilometres to the southeast of the development footprint, and as being associated with this PCT, and less than eight kilometres to the west.

No such association is provided for PCT344. Further, the description for PCT344 indicates it is mainly distributed around the Yass to Rye Park region which is more than 150 kilometres from the development site.

PCT351 was concluded to be the pest fit PCT.

4.2.2.4 Alignment with TECs

Plant Community Type 351 is associated with one Threatened Ecological Community (TEC) - *Mt Canobolas Xanthoparmelia Lichen Community (*Part) which is listed as Endangered under the BC Act.

This community is restricted to Mt Canobolas, and suitable habitat for this community does not occur in the study area. This community is not present in the development site.

4.3 Threatened ecological communities

The field assessment confirmed there are no Threatened Ecological Communities in the development site.

4.4 Vegetation zones

The BAM Streamlined assessment module – Small area was used for this BDAR. Two vegetation zones were identified as occurring in the development site, representing the same PCT in two condition states. BAM Subsection 4.3.2 was used to determined patch size class and the number of vegetation integrity survey plots needed.

The field assessment determined 17.20 hectares to be in poor condition (Zone 1), and 0.02 hectares in moderate condition (Zone 2). Table 8 summarises vegetation zone and patch size class information.

Figure 8 shows the extent of each zone within the subject area.

Table 8 Vegetation zones and patch sizes

Vegetation zone ID	PCTID number and name	Condition / other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	No. vegetation integrity plots used in assessment	Plot IDs of vegetation integrity plots used in assessment
Zone 1	351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion	Poor	17.43	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	3	3	Plots1-3
Zone 2	351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion	Moderate	0.13	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	Plot 4

4.5 Vegetation integrity (vegetation condition)

4.5.1 Vegetation integrity survey plots

Vegetation composition, structure and function were assessed using the minimum number of plots per zone in accordance with the BAM Table 3.

4.5.2 Scores

The vegetation integrity scores for the vegetation within the subject area is shown in Table 9. Appendix C provides full vegetation survey data.

Table 9 Vegetation integrity scores

Vegetation zone ID	Composition condition score	Structure condition score	Function condition score (where relevant)	Vegetation integrity score	Hollow bearing trees present?
Zone 1 (PCT351)	13.8	2.1	0.2	1.7	No
Zone 2 (PCT351)	40.8	56.1	72.2	54.9	Yes

4.5.3 Use of benchmark data

Community Condition Benchmarks as per the BAM calculator (in line with the BioNet Vegetation Classification) was used to assess vegetation integrity attributes in each zone.

5. Habitat suitability for threatened species

5.1 Identification of threatened species for assessment

5.1.1 Ecosystem credit species

Table 10 lists ecosystem credit species (and their sensitivity to gain class) likely to occur on or use the development site. One ecosystem credit species (*Grantiella picta* – Painted Honeyeater) predicted to occur in the development site has been excluded as required habitat constraints are not present.

Table 10 Predicted ecosystem credit species

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCTID	Sensitivity to gain class
		BC Act	EPBC Act						
Barking Owl (foraging)	*Ninox connivens*	V	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351	High
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351	High
Diamond Firetail	*Stagonopleura guttata*	V	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351	Moderate
Dusky Woodswallow	*Artamus cyanopterus*	V	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351	Moderate

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCTID	Sensitivity to gain class
		BC Act	EPBC Act						
Flame Robin	*Petroica phoenicea*	V	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351	Moderate
Gang-gang Cockatoo (foraging)	*Callocephalon fimbriatum*	V	E	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351	Moderate
Grey-headed Flying-fox (foraging)	*Pteropus poliocephalus*	V	V	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351	High
Large Bent-winged Bat (foraging)	*Miniopterus orianae oceanensis*	V	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351	High
Little Eagle (foraging)	*Hieraaetus morphnoides*	V	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351	Moderate
Masked Owl (foraging)	*Tyto novaehollandiae*	V	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351	High

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCTID	Sensitivity to gain class
		BC Act	EPBC Act						
Powerful Owl (foraging)	*Ninox strenua*	V	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351	High
Scarlet Robin	*Petroica boodang*	V	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351	Moderate
Speckled Warbler	*Chthonicola sagittata*	V	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351	High
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351	High
Painted Honeyeater	*Grantiella picta*	V	V	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Habitat constraint: Mistletoes not present at a density of >5 per hectare.	Zone1 PCT351 Zone 2 PCT351	Moderate
Turquoise Parrot	*Neophema pulchella*	V	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351	High

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCTID	Sensitivity to gain class
		BC Act	EPBC Act						
Varied Sittella	*Daphoenositta chrysoptera*	V	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351	Moderate
White-throated Needletail	*Hirundapus caudacutus*	-	V	No	☐ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351	High
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V	-	No	☐ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351	High

5.1.2 Species credit species

Table 11 (flora) and Table 12 (fauna) list all species credit species predicted to occur in the development site as per the BAM-C and results of field survey. Ten species credit species predicted to occur in the development site have been excluded from further survey as required habitat constraints are not present.

Table 11 Predicted flora species credit species

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCTID
		BC Act	EPBC Act				
Acacia meiantha	*Acacia meiantha*	E	E	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351
Black Gum	*Eucalyptus aggregata*	V	V	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone 2 PCT351
Silver-leaved Gum	*Eucalyptus pulverulenta*	V	V	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351
Grevillea divaricata	*Grevillea divaricata*	E	-	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351
Hoary Sunray	*Leucochrysum albicans var. tricolor*	-	E	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351 Zone 2 PCT351

Table 12 Predicted fauna species credit species

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCTID
		BC Act	EPBC Act					
Gang-gang Cockatoo (breeding)	*Callocphalon fimbiatum*	V	E	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Habitat constraints: No suitable breeding habitat of 9cm hollows present within the development site.	N/A
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	V	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Habitat constraints: No suitable habitat of cliffs rocky areas,caves, overhands escarpments, outcrops or crevices within two kilometres of the development site.	N/A
Little Eagle (breeding)	*Hieraaetus morphnoides*	V	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Habitat constraints: No evidence of nest trees in the development site.	N/A
Green and Golden Bell Frog	*Litoria aurea*	E	E	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351
Booroolong Frog	*Litoria booroolongensis*	E	E	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone1 PCT351

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCTID
		BC Act	EPBC Act					
Large Bent-winged Bat (breeding)	*Miniopterus orianae oceanensis*	V	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Habitat constraints: 'Caves;Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code"IC – in cave; observation type code " nest-roost; with numbers of individuals >500'	N/A
Barking Owl (breeding)	*Ninox connivens*	V	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Habitat constraints: No suitable breeding habitat of living or dead trees with hollows greater than 20cm diameter and greater than 4m above the ground within the development site.	N/A
Powerful Owl (breeding)	*Ninox strenua*	V	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Habitat constraints: No suitable breeding habitat of living or dead trees with hollows greater than 20cm diameter within the development site.	N/A

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCTID
		BC Act	EPBC Act					
Purple Copper Butterfly/Bathurst Copper Butterfly	*Paralucia spinifera*	E	V	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Only occurs on *Bursaria spinosa subsp. lasiophylla* which was not recorded in the development site.	N/A
Squirrel Glider	*Petaurus norfolcensis*	V	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone2 PCT351
Brush-tailed Rock-wallaby	*Petrogale penicillata*	E	V	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Habitat constraints: No suitable habitat of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines within 1km of the development site.	N/A
Bruch-tailed Phascogale	*Phascogale tapoatafa*	V	-	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone2 PCT351
Koala (breeding)	*Phascolarctos cinereus*	E	E	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	N/A	Zone2 PCT351

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCTID
		BC Act	EPBC Act					
Grey-headed Flying-fox (breeding)	*Pteropus poliocephalus*	V	V	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Habitat constraints: No suitable habitat for breeding camps within the development site.	N/A
Masked Owl (breeding)	*Tyto novaehollandiae*	V	-	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Habitat constraints: No suitable breeding habitat of living or dead trees with hollows greater than 20cm diameter within the development site.	N/A

5.2 Presence of candidate species credit species

The remaining candidate species credit species requiring further survey are outlined in Table 13 and Table 14. Only one threatened species (*Eucalyptus aggregata*) was recorded during targeted species surveys (

Figure 9).

Table 13 Determining the presence of candidate flora species credit species on the development site

Common name	Scientific name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Acacia meiantha	*Acacia meiantha*	E	E	Targeted threatened species survey	No	No
Black Gum	*Eucalyptus aggregata*	V	V	Targeted threatened species survey	Yes	No
Silver-leaved Gum	*Eucalyptus pulverulenta*	V	V	Targeted threatened species survey	No	No
Grevillea divaricata	*Grevillea divaricata*	E	-	Targeted threatened species survey	No	No
Hoary Sunray	*Leucochrysum albicans var. tricolor*	-	E	Targeted threatened species survey	No	No

Table 14 Determining the presence of candidate fauna species credit species on the development site

Common name	Scientific name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Green and Golden Bell Frog	*Litoria aurea*	E	E	Targeted threatened species survey	No	No

Common name	Scientific name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Booroolong Frog	*Litoria booroolongensis*	E	E	Targeted threatened species survey	No	No
Squirrel Glider	*Petaurus norfolcensis*	V	-	Targeted threatened species survey	No	No
Bruch-tailed Phascogale	*Phascogale tapoatafa*	V	-	Targeted threatened species survey	No	No
Koala (breeding)	*Phascolarctos cinereus*	E	E	Targeted threatened species survey	No	No

5.3 Threatened species surveys

Targeted threatened species used to determine presence or absence of threatened flora and fauna species are shown the Table 15 and Table 16. Methods were consistent with species survey guidelines as described in Section 2.4.

Table 15 Threatened species surveys for candidate flora species credit species on the development site

Common name	Scientific name	Threatened flora species surveys				Present?	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Acacia meiantha	*Acacia meiantha*	Walking transects Plots	☒ Yes Sept	☐ No	1 day 2 people	No	No
Black Gum	*Eucalyptus aggregata*	Walking transects Plots	☒ Yes Sept	☐ No	1 day 2 people	Yes	No
Silver-leaved Gum	*Eucalyptus pulverulenta*	Walking transects Plots	☒ Yes Sept	☐ No	1 day 2 people	No	No
Grevillea divaricata	*Grevillea divaricata*	Walking transects Plots	☐ Yes Sept	☒ No	1 day 2 people	No	No

Common name	Scientific name	Threatened flora species surveys				Present?	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	**Timing of survey – within recommended period?** (BAM-C / TBDC)		**Effort** (hours & no. people)		
Hoary Sunray	*Leucochrysum albicans var. tricolor*	Walking transects Plots	☒ Yes Sept	☐ No	1 day 2 people	No	No

Table 16 Threatened species surveys for candidate fauna species credit species on the development site

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	**Timing of survey – within recommended period?** (BAM-C / TBDC)		**Effort** (hours & no. people)		
Green and Golden Bell Frog	*Litoria aurea*	Aural surveys	☒ Yes Nov, Dec	☐ No	4 survey nights 2hrs/night 1 person	No	No
Squirrel Glider	*Petaurus norfolcensis*	Baited camera traps Walking transects	☒ Yes Nov, Dec	☐ No	4 weeks	No	No
Bruch-tailed Phascogale	*Phascogale tapoatafa*	Baited camera traps Walking transects	☒ Yes Nov, Dec	☐ No	4 weeks	No	No
Koala (breeding)	*Phascolarctos cinereus*	SAT survey Walking transects	☒ Yes Sept	☐ No	2 days (two visits)	No	No

5.4 Expert reports

No expert reports were used.

5.5 More appropriate local data (where relevant)

No local data was used to assess habitat suitability.

5.6 Area or count, and location of suitable habitat for a species credit species (a species polygon)

The field assessment recorded one candidate flora species credit species in the development site – *Eucalyptus aggregata* (Black gum) listed as vulnerable under the BC Act and EPBC Act (Table 17). A total of one individual was identified: C7 (DBH 80+cm) tree. The C7 tree included one hollow.

Using the standards for protection of trees on development sites (AS 4970-2009), an 11.5-meter buffer was applied based on the DBH of the largest tree. This figure takes into account the root area and crown area requiring protection and would make up a Tree Protection Zone in accordance with the standard. This standard was applied due to the absence of polygon guidance in the Threatened Biodiversity Data Collection.

Figure 9 shows the extent of this species and the associated buffer which would be imposed for its protection within the development site.

Table 17 Results for present species (recorded within the development site)

Common name	**Scientific name**	**Biodiversity risk weighting** (BAM-C & TBDC*)	**SAII entity**** (BAM-C & TBDC)	**Habitat constraints / microhabitats present on the development site / vegetation zone**	**Abundance – No. individual plants present on development site** (flora with unit of measure of count)	**Extent (ha) of suitable habitat present on site** (flora or fauna with unit of measure of area)	**TBDC species specific recommendations e.g. buffers, general comments** (where relevant)	**Habitat condition** (vegetation integrity score for each vegetation zone in the polygon – area species only)
Black gum	*Eucalyptus aggregata*	High (2)	No	PCT351 Zone 2	9	0.03	Nil	Moderate

6. Identifying prescribed impacts

Table 18 summarises potential prescribed impacts in relation to the proposal.

Section 8.3 of this BDAR summarises potential prescribed impacts associated with the proposal and Section 8.4 outlines mitigations against all residual impacts, including prescribed impacts.

Table 18 Prescribed impacts identified

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature. Where relevant, threatened species or fauna that are part of a TEC or EC, that are at risk of vehicle strike
Karst, caves, crevices, cliffs, rocks or other geological features of significance	☐Yes / ☒No	No significant geological features occur in the development site.	N/A
Human-made structures	☐Yes / ☒No	Dams occur in the development site and are addressed in the Waterbodies section of this table. No other significant human-made structures occur in the development site.	N/A
Non-native vegetation	☒Yes / ☐No	Non-native vegetation is interspersed among native vegetation throughout the development site.	No threatened entities have been recorded using non-native vegetation and therefore are unlikely to be impacted by loss of non-native vegetation.
Habitat connectivity	☐Yes / ☒No	Habitat and associated vegetation within the development site is at the extent of its range. Impacts to vegetation from the proposal would not result in fragmentation of habitat corridors nor impact to connectivity of adjacent habitat of similar composition and quality.	No threatened entities have been recorded using habitat within the development site and are therefore unlikely to be impacted by its loss.
Waterbodies, water quality and hydrological processes	☒Yes / ☐No	Two dams are present in the development site and have been for some time with evidence that they are providing habitat for aquatic species such as frogs.	No threatened entities were recorded using the farm dams therefore are unlikely to be impacted by potential changes to these dams.
Wind turbine strikes (wind farm development only)	☐Yes / ☒No	N/A	N/A
Vehicle strikes	☐Yes / ☒No	N/A	N/A

Stage 2: Impact assessment (biodiversity values and prescribed impacts)

7. Avoid and minimise impacts

7.1 Avoid and minimise direct and indirect impacts

7.1.1 Project location

The proposed development is located in a cleared landscape, with some remnant vegetation and habitat suitable for threatened species (

Figure 310).

7.1.2 Project design

The proponent has sought to reduce impacts to biodiversity values within its project design and the inclusion of excluded areas for the protection of vegetation (Figure 5 and Section 7.4).

There are two areas within the development site which would be avoided by this proposal and have therefore been considered as excluded impact. where exclusions would apply. These relate to Zone 2 moderate condition vegetation including an area containing the BC Act and EPBC Act listed vulnerable Black Gum (*Eucalyptus aggregata*). Exclusion measures for avoiding and minimising impacts include the establishment of a tree protection / vegetation protection zone on the relevant lots, prohibiting development, tree clearing or services within the designated area (Figure 5).

7.2 Avoid and minimise prescribed impacts

7.2.1 Project location

The proponent has indirectly avoided and minimised prescribed impacts in its site selection in an area that:

- does not contain geologically significant areas and human-made structures which may be used by threatened entities,
- is previously cleared and where non-native vegetation is low quality and human-made waterbodies do not support threatened species, and
- provides no habitat connectivity.

7.2.2 Project design

Although the project location contains two dams and non-native vegetation, no threatened entities were recorded as using these habitats. No project design changes are required.

7.3 Other measures considered

N/A

7.4 Summary of measures to avoid and minimise impacts

Table 19 sets out the measures that would be implemented to avoid and minimise impacts to Black Gum (*E. aggregata*) and PCT351 in moderate condition (Zone 2).

Table 19 Avoidance and minimisation measures for direct, indirect and prescribed impacts

Action	Outcome (Describe the outcome of implementing the measure, with reference to specific entities identified in Sections 4 and 5)	Timing	Responsibility
Modified project design (Figure 10) to include a fenced Tree Protection Zone (~11.5 metre buffer) established in the proposed Lot 13 prohibiting access using Tree Protection signage consistent with AS4970-2009 Protection of trees on development sites (Australian Standards)	Impacts to the BC and EPBC listed Black Gum (*E. aggregata*) are avoided.	Planning phase Prior to deployment of plant equipment and commencement of construction activities.	Proponent
Underground and aboveground utility services would avoid the Tree Protection Zone as far as reasonably practicable and undertaken in accordance with AS4970-2009 Protection of trees on development sites (Australian Standards).	Disturbance of Black Gum (*E. aggregata*) is avoided.	Construction phase	Proponent
Modified project design and limiting area of impact to a 6-metre access handle (Figure 10) and installing temporary fencing to restrict construction to this corridor.	Impacts to PCT351 Zone 2 is minimised.	Planning phase Prior to deployment of plant equipment and commencement of construction activities.	Proponent

8. Impact assessment

8.1 Direct impacts

8.1.1 Residual direct impacts

Impacts likely to occur in the development site after steps are taken to avoid and minimise impacts are set out in Table 20. Figure 10 shows areas of direct impact.

Table 20 Summary of residual direct impacts

Direct impact (Describe the impact on PCT/TEC/EC or threatened species and their habitat)	**BC Act status**	**EPBC Act status**	**SAII entity**	**Project phase/timing of impact** (e.g. construction, operation, rehabilitation)	**Extent** (ha, number of individuals)
Vegetation clearance in the development footprint would impact 0.02 hectares of moderate condition (Zone 2) and 17.20 hectares of poor condition (Zone 1) native vegetation.	N/A	N/A	No	Construction	17.22 hectares
Contamination, erosion, exposed soil and stockpiles are potential direct impacts. Soils would be disturbed where vegetation removal and construction would occur. Disturbed soils have the potential to negatively impact the environment if not appropriately managed. Regular testing, erosion and sediment control measures should be implemented.	N/A	N/A	No	Construction and operation	Within the development footprint and surrounding study area
Dust emissions during construction would potentially impact air quality which would require mitigation.	N/A	N/A	No	Construction	The development footprint and surrounding study area

8.1.2 Change in vegetation integrity score

Table 21 shows the change in vegetation integrity for residual direct impacts on native vegetation.

Table 21 Impacts to vegetation integrity

Vegetation zone	PCTID	Management zone	Area (ha)	Before development				After development				Change
				Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	Change in VI score
Zone 1	351	N/A	17.2	13.8	2.1	0.2	1.7	0	0	0	0	-1.7
Zone 2	351	N/A	0.02	40.8	56.1	72.2	54.9	0	0	0	0	-54.9

8.2 Indirect impacts

Table 22 shows residual indirect impacts which may occur on native vegetation, threatened entities and their habitat beyond the development footprint.

Table 22 Summary of residual indirect impacts

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	**Impacted entities** (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	**Extent** (ha or zone reference)	**Frequency**	**Duration** (long-term/ short-term/ medium-term)	**Project phase/ timing of impact** (e.g. construction, operation, rehabilitation)	**Likelihood and consequences**
Introduction and spread of disease and pathogens from the site to adjacent vegetation	Native vegetation surrounding the development footprint	Assessment area	Ongoing	Life of project	During construction and operation	Unlikely if adequately mitigated
Introduction and spread of weeds and pests from the site to adjacent vegetation	Native vegetation surrounding the development footprint	Assessment area	Ongoing	Life of project	During construction and operation	Unlikely if adequately mitigated
Dust, Noise and Vibration impacts to surrounding vegetation and habitat values	Native vegetation surrounding the development footprint	Assessment area	Ongoing	Life of project	During construction and operation	Unlikely if adequately mitigated

8.3 Prescribed impacts

8.3.1 Waterbodies, water quality and hydrological processes

Two dams are present in the development footprint and have been for some time with evidence that they are providing habitat for aquatic species such as frogs. One dam is located in a proposed road corridor and the other in an easement. The impact to/ removal of both dams would occur during construction activities. No threatened entities were recorded using the farm dams therefore are unlikely to be impacted by potential changes to these dams.

8.3.2 Non-native vegetation

Non-native vegetation is interspersed among native vegetation, throughout the development footprint. It comprises pine and poplar species as well as blackberry and African Love Grass which may provide habitat for threatened species. Non-native vegetation would be impacted during construction activities. No threatened entities have been recorded using non-native vegetation and therefore are unlikely to be impacted by loss of non-native vegetation.

8.4 Mitigating residual impacts – management measures and implementation

Table 23 details proposed mitigation and management measures for residual impacts.

Table 23 Summary of proposed mitigation and management measures for residual impacts (direct, indirect and prescribed)

Mitigation measure (specify if none proposed and ensure an adaptive management strategy is developed and addressed in Section Error! Reference source not found.)	**Method/technique**	**Timing**	**Frequency**	**Responsibility**	**Likely efficacy** (including risk of failure)	**MNES** (when relevant)
Staff inductions	Ensure all staff working on the project are inducted on site environmental procedures (i.e., vegetation management, sediment and erosion control, protective fencing, weeds, hygiene protocols, ethical procedures for	Prior to any employee commencing work	As required	HR officer	Likely	N/A

Mitigation measure (specify if none proposed and ensure an adaptive management strategy is developed and addressed in Section Error! Reference source not found.)	**Method/technique**	**Timing**	**Frequency**	**Responsibility**	**Likely efficacy** (including risk of failure)	**MNES** (when relevant)
	handling fauna displaced on the site, site speed limits, biodiversity considerations etc).					
Physical vegetation clearing boundary at the approved clearing limit is to be identified and effectively communicated to personnel	The delineation of such a boundary may include the use of temporary fencing or parawebbing and marked as 'No-Go Zones'. Regular inspections should be undertaken to ensure all retained vegetation/fauna habitat is clearly marked and that fencing is in place, where appropriate.	Prior to construction	As required	Project manager/ Environment Officer	Likely	N/A
Vegetation clearance occurs as per biodiversity recommendations to minimise impacts	• Preclearing inspection should be undertaken by a qualified ecologist • An ecologist or spotter/catcher should be present for the removal of hollow bearing trees, logs or stags which could contain native fauna	During and post construction	As required	Project manager/ Environment Officer	Likely	N/A

Mitigation measure (specify if none proposed and ensure an adaptive management strategy is developed and addressed in Section Error! Reference source not found.)	**Method/technique**	**Timing**	**Frequency**	**Responsibility**	**Likely efficacy** (including risk of failure)	**MNES** (when relevant)
	• Avoid clearing in Spring where possible • Implement staged habitat removal • Reuse fallen timber for habitat Compensate for the loss of large hollows using nest-boxes or creating tree hollows through pruning remaining trees					
Manage dust, stockpiles, waste rock	Devise a soil and waste rock management strategy	Prior to construction	Review as required	Project manager/ Environment Officer	Likely	N/A
Manage water (run off, wastewater etc) onsite	Devise a Water management strategy	Prior to construction	Review as required	Project manager/ Environment Officer	Likely	N/A
Manage waste onsite	Devise a Waste management strategy	Prior to construction	Review as required	Project manager/ Environment Officer	Likely	N/A
Manage dust and air quality onsite	Devise an Air quality management strategy	Prior to construction	Review as required	Project manager/ Environment Officer	Likely	N/A
Manage biodiversity onsite	Devise a Biodiversity management strategy	Prior to construction	Review as required	Project manager/ Environment Officer	Likely	N/A
Prevent bushfire	Devise a Bushfire management strategy	Prior to construction	Review as required	Project manager/ Environment Officer	Likely	N/A

Mitigation measure (specify if none proposed and ensure an adaptive management strategy is developed and addressed in Section Error! Reference source not found.)	**Method/technique**	**Timing**	**Frequency**	**Responsibility**	**Likely efficacy** (including risk of failure)	**MNES** (when relevant)
Manage noise onsite	Devise a Noise management strategy	Prior to construction	Review as required	Project manager/ Environment Officer	Likely	N/A
Prevent weed, pest and disease occurrences	Devise a Biosecurity management strategy	Prior to construction	Review as required	Project manager/ Environment Officer	Likely	N/A

For each measure listed in Table 23, further details on implementation in Table 24.

Table 24 Mitigation and management measures

Measure/action	**Monitoring and evaluation strategy** (Data, frequency, timing and reporting)	**Performance criteria** (linked to monitoring and evaluation strategy)	**Adaptive management threshold** (trigger for adaptive management plan/actions)	**Adaptive management response** (when triggered)
Staff inductions	Annual review of currency and effectiveness	Staff performance	Staff incidences	Review induction material, investigate and action response.
Demark clearing limits	Regular inspections (daily) should be undertaken to ensure all retained vegetation/fauna habitat is clearly marked and that fencing is in place, where appropriate	Clearing undertaken effectively, safely and within approved limits	Vegetation clearing or other impact outside approved limits	Cease work, report and notify, investigate and action response.
Vegetation clearance occurs as per biodiversity recommendations	Regular inspections (daily) should be undertaken to ensure vegetation	Clearing undertaken effectively, safely and within approved limits	Vegetation clearing or other impact outside approved limits,	Cease work, report and notify, investigate and action response.

Measure/action	**Monitoring and evaluation strategy** (Data, frequency, timing and reporting)	**Performance criteria** (linked to monitoring and evaluation strategy)	**Adaptive management threshold** (trigger for adaptive management plan/actions)	**Adaptive management response** (when triggered)
to minimise impacts	clearance occurs as per recommendations		injury to wildlife reported	
Manage dust, stockpiles, waste rock	Regular monitoring and inspections (monthly)	No incidence recorded or reported	Incident recorded	Report and notify, investigate and action response.
Manage water (run off, wastewater etc) onsite	Regular monitoring and inspections (monthly)	No incidence recorded or reported	Incident recorded	Report and notify, investigate and action response.
Manage waste onsite	Regular monitoring and inspections (monthly)	No incidence recorded or reported	Incident recorded	Report and notify, investigate and action response.
Manage dust and air quality onsite	Regular monitoring and inspections (monthly)	No incidence recorded or reported	Incident recorded	Report and notify, investigate and action response.
Manage biodiversity onsite	Regular monitoring and inspections (monthly)	No incidence recorded or reported	Incident recorded	Report and notify, investigate and action response.
Prevent bushfire	Regular monitoring and inspections (monthly)	No incidence recorded or reported	Incident recorded	Report and notify, investigate and action response.
Manage noise onsite	Regular monitoring and inspections (monthly)	No incidence recorded or reported	Incident recorded	Report and notify, investigate and action response.
Prevent weed, pest and disease occurrences	Regular monitoring and inspections (monthly)	No incidence recorded or reported	Incident recorded	Report and notify, investigate and action response.
Rehabilitate post exploration	TBC, would occur at the end of the life of the project	No incidence recorded or reported	Incident recorded	Report and notify, investigate and action response.

9. Serious and irreversible impacts

9.1 Assessment for serious and irreversible impacts on biodiversity values

No candidate Serious and Irreversible Impacts were identified

10. Impact summary

10.1 Determine an offset requirement for impacts

10.1.1 Impacts on native vegetation and TECs or ECs (ecosystem credits)

Impacts on native vegetation that do and do not require offsets are provided in Table 25 and Table 26.

Table 25 Impacts that do not require offset – ecosystem credits

Vegetation zone	PCT name	TEC	Impact area (ha)	TEC association	Entity at risk of an SAII?	Current VI score
Zone 1	351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion	N/A	17.2	N/A	No	1.7

Table 26 Impacts that require an offset – ecosystem credits

Vegetation zone	PCT name	TEC	Impact area (ha)	Current VI score	Future VI score	Change in VI score	Biodiversity risk weighting	Number of ecosystem credits required
Zone 2	351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion	N/A	0.02	54.9	-54.9	100	1.75	1

Vegetation zone	PCT name	TEC	Impact area (ha)	Current VI score	Future VI score	Change in VI score	Biodiversity risk weighting	Number of ecosystem credits required
							Total credits	1

10.1.2 Impacts on threatened species and their habitat (species credits)

Impacts on threatened species (species credits) that require an offset are provided in Table 27.

Table 27 Impacts that require an offset – species credits

Common name	Scientific name	BC Act status	EPBC Act status	Loss of habitat (ha) or individuals	Biodiversity risk weighting	Number of species credits required
N/A	N/A	N/A	N/A	N/A	N/A	N/A
					Total credits	N/A

10.1.3 Indirect and prescribed impacts

There are no indirect and prescribed impacts that remain after measures to avoid, minimise, and mitigate have been applied, so further offsetting is not required.

10.2 Impacts that do not need further assessment

Table 28 identifies impacts that do not need further assessment for ecosystem credits (as per BAM Section 9.3(1–2.).

Table 28 Impacts that do not need further assessment for ecosystem credits

Impact	Location within development footprint	Justification why no further assessment is required
Non-native vegetation	Figure 7	BAM Section 9.3 (1)
No vegetation – two dams	Figure 7	No listed threatened entities were recorded using dams. No further assessment is required under BAM Section 9.3 (2)

11. Biodiversity credit report

A summary of the biodiversity credits for the proposal is provided in Table 29 and Table 30. Appendix D provides the complete credit reports.

11.1 Ecosystem credits

Table 29 Ecosystem credit class and matching credit profile

Ecosystem credit	Attributes shared with matching credits						
	PCT name	**PCT vegetation class**	**PCT vegetation formation**	**Associated TEC or EC**	**Offset trading group** (BAM Section 10.2, Tables 4 & 5)	**Hollow bearing trees present?**	**IBRA subregion** (in which proposal is located)
1	351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion	Southern Tableland Dry Sclerophyll Forests. This includes PCT's: 299, 344, 349, 351, 352, 653, 701, 727, 728, 730, 888, 957, 1093, 1177	Dry Sclerophyll Forests (Shrubby sub-formation)	Not a TEC	Southern Tableland Dry Sclerophyll Forests >=50% and <70%	Yes	Captertee Uplands

11.2 Species credits

Table 30 Species credit class and matching credit profile

Species credit	Attributes shared with matching credits				
	Name of threatened species	**Kingdom**	**BC Act status**	**EPBC Act status**	**IBRA region**
N/A	N/A	N/A	N/A	N/A	N/A

12. References

Australian Standards AS4970-2009 Protection of trees on development sites, Australian Standards, viewed September 2022, 2020 pdf extract from AS4970-2009

EPBC Act Referral Guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory), Commonwealth of Australia, 2014.

NSW Department of Planning, Industry and Environment 2022, *BioNet Vegetation Classification*, viewed September 2022, https://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx.

NSW Department of Planning, Industry and Environment 2020, *NSW Survey Guide for Threatened Frogs. A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method*, State of NSW and DPIE 2020.

NSW Department of Planning, Industry and Environment 2020, BioNet Atlas, viewed October 2020, https://www.environment.nsw.gov.au/AtlasApp/UI_Modules/TSM_/ProfileEdit.aspx?pId=10613&pType=SpeciesCode and https://www.environment.nsw.gov.au/AtlasApp/UI_Modules/TSM_/ProfileEdit.aspx?pId=10604&pType=SpeciesCode.

13. Figures

Figure 1 Site Map

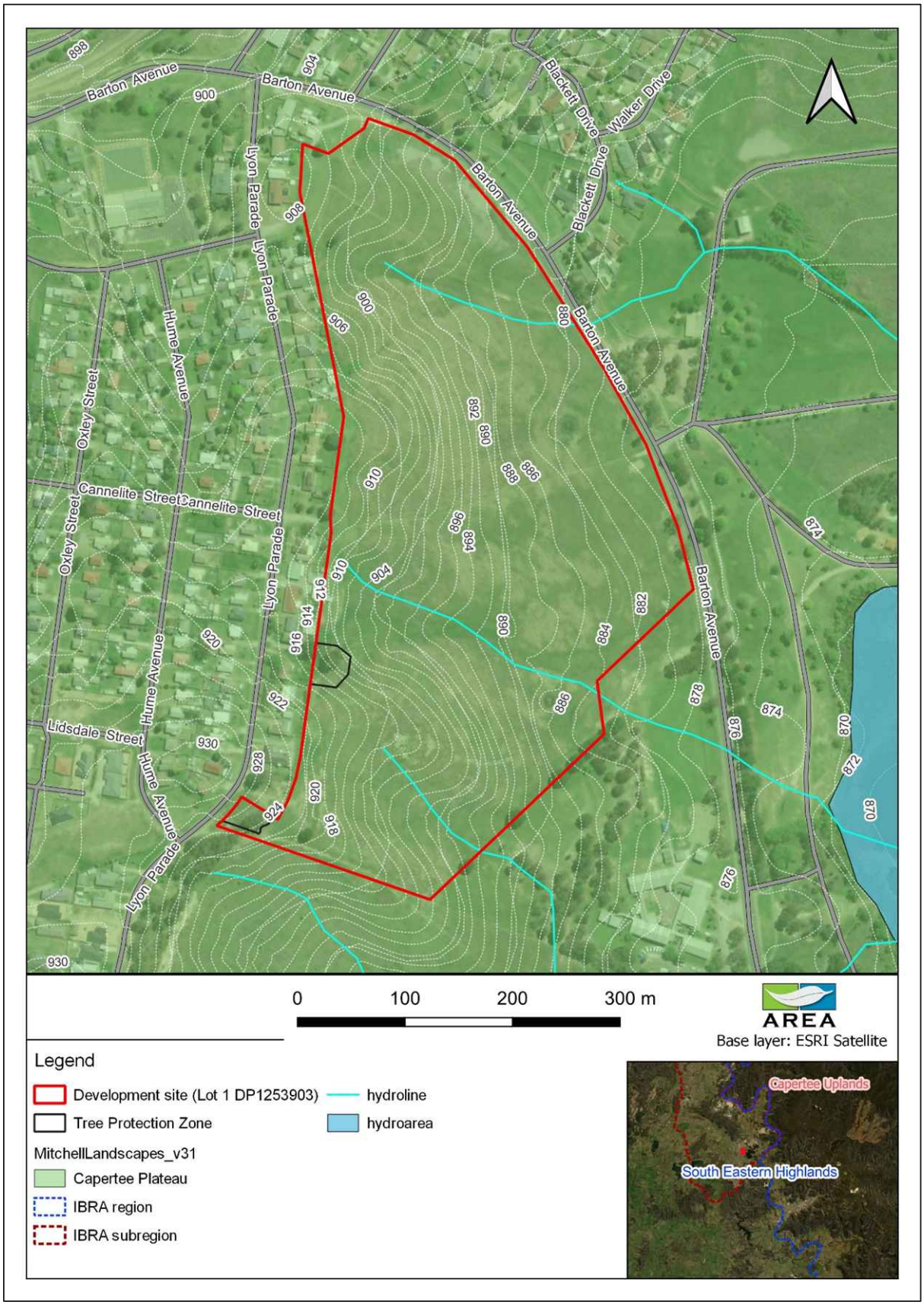

Figure 2 Location map

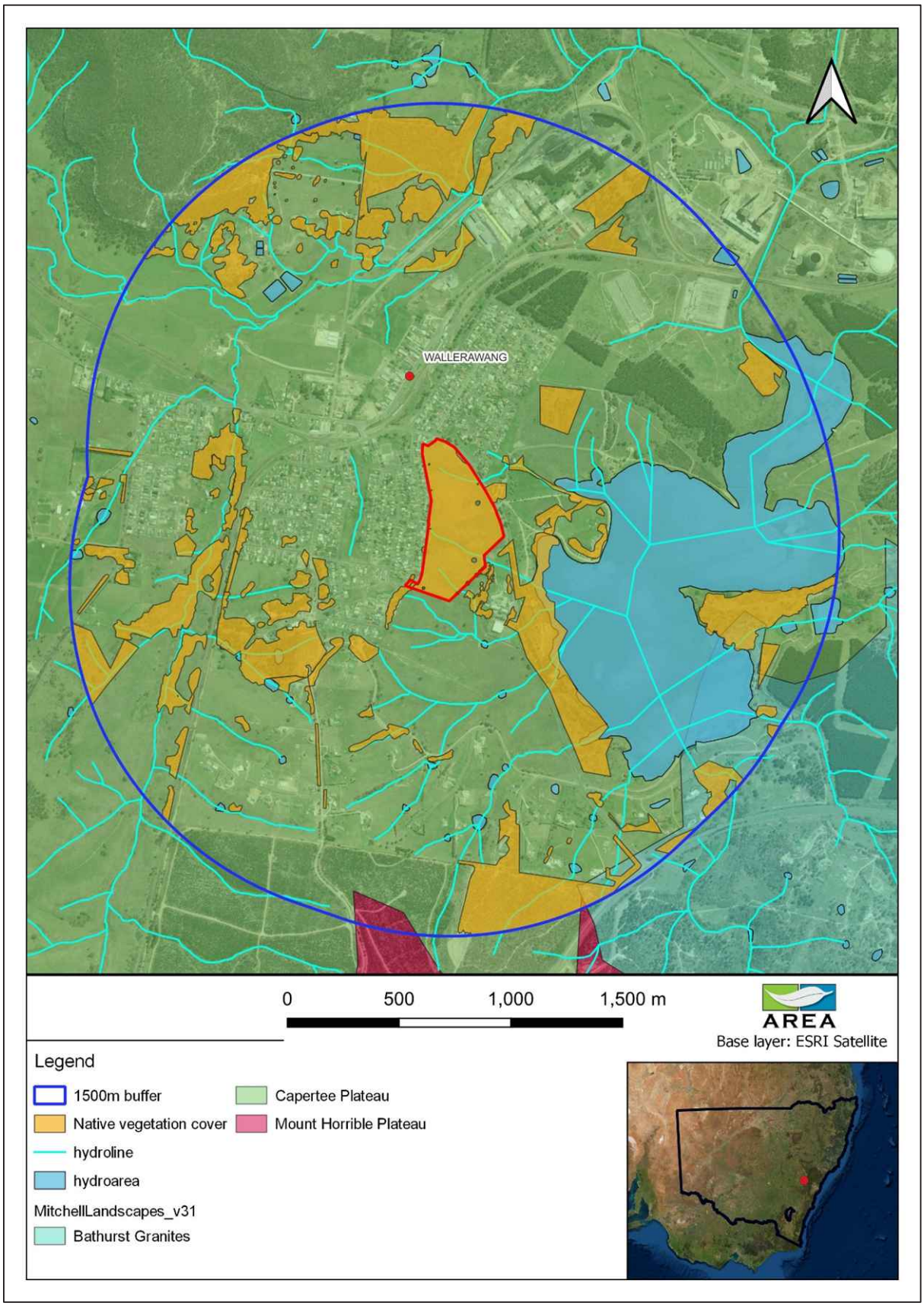

Figure 3 Development layout

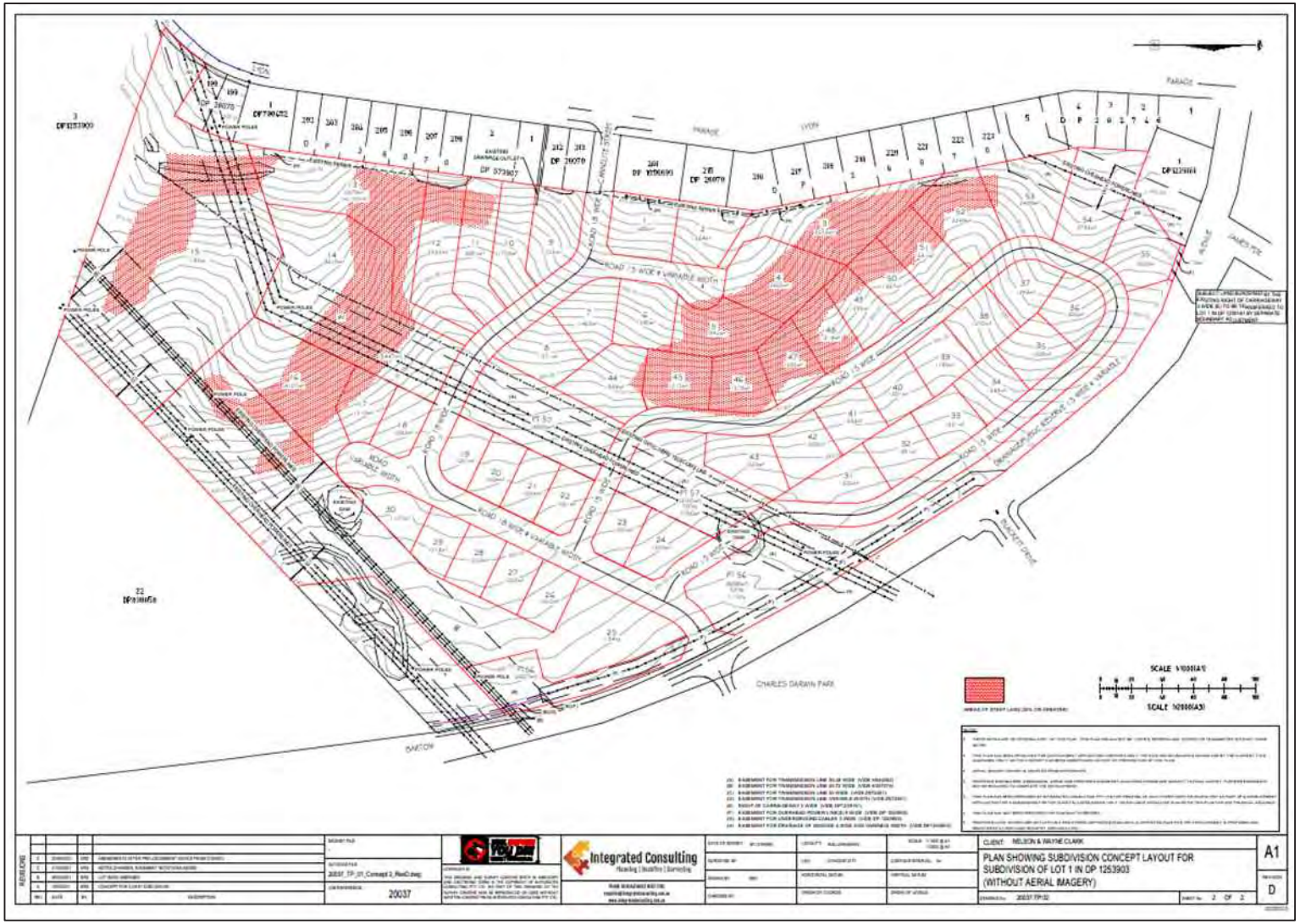

Figure 4 Biodiversity Values Map

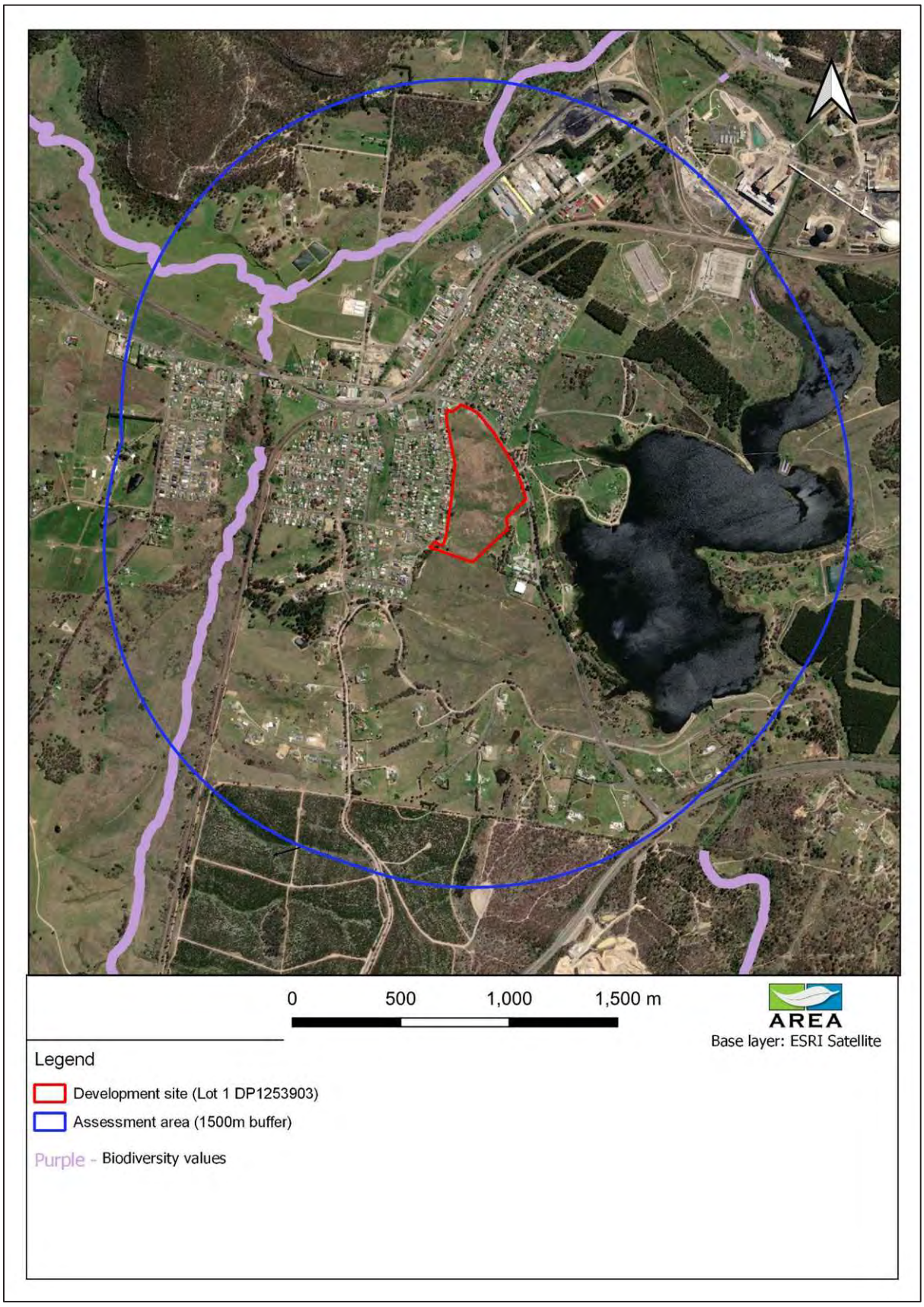

Figure 5 Excluded impacts

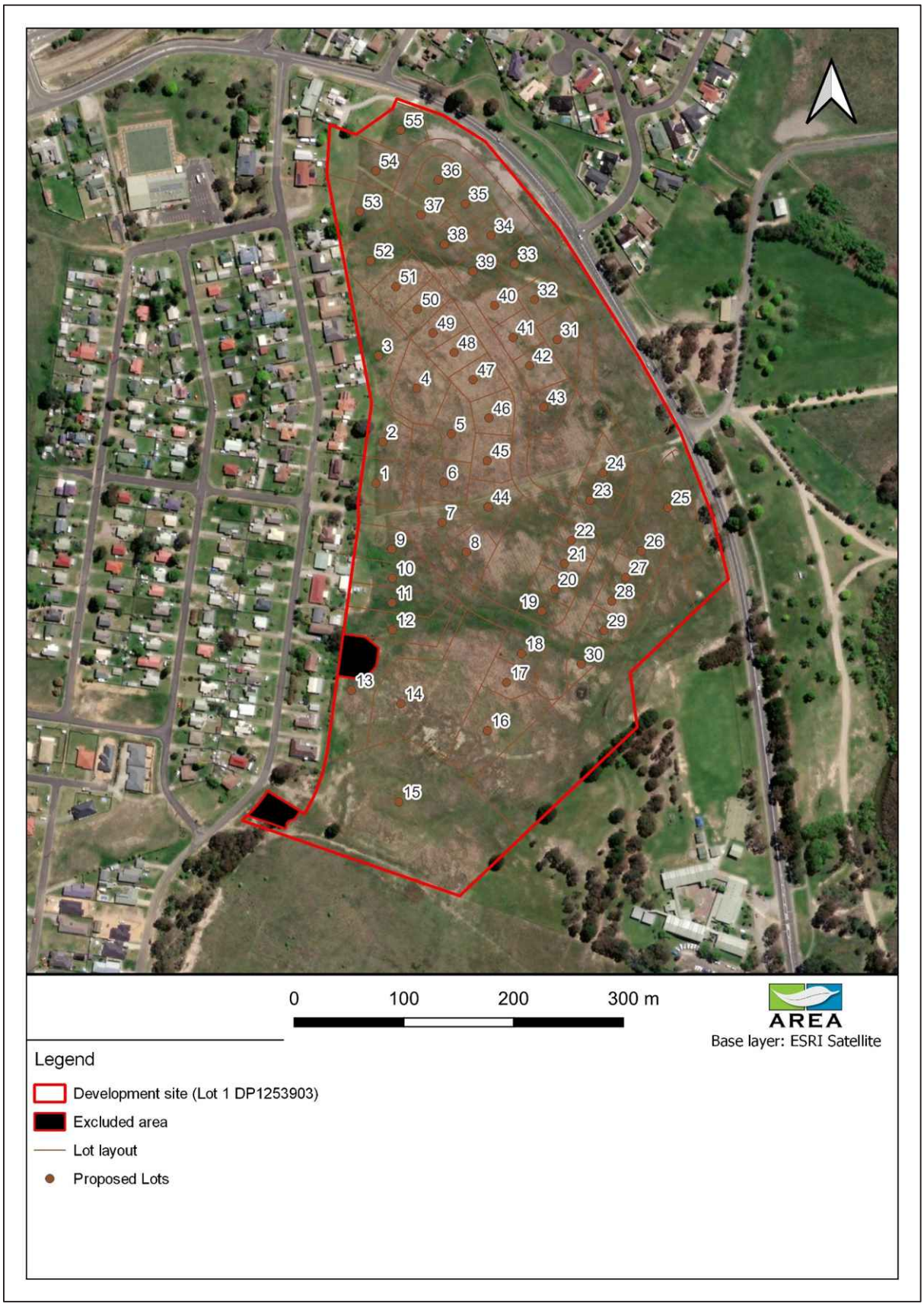

Figure 6 Field survey locations

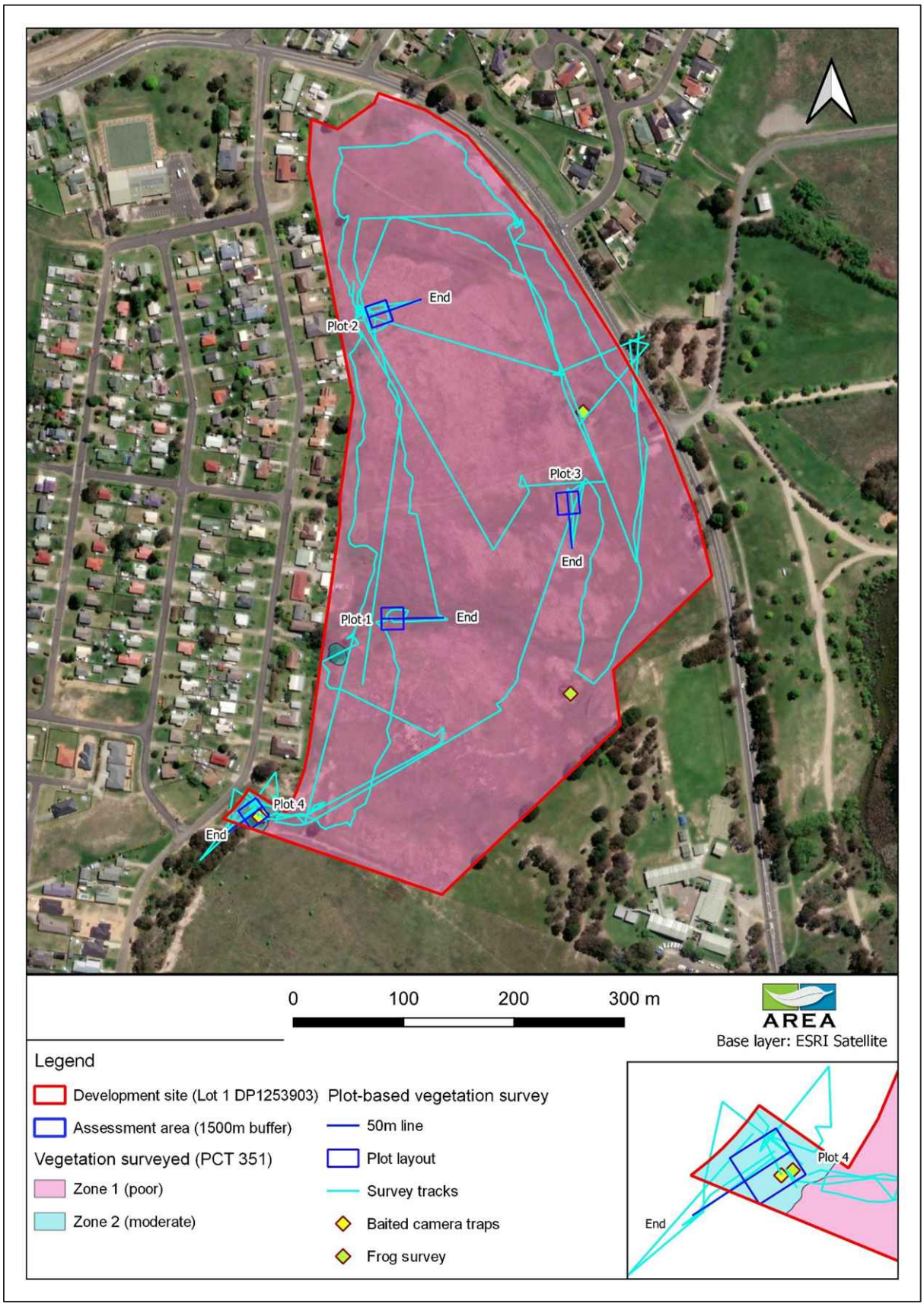

Figure 7 Native vegetation extent

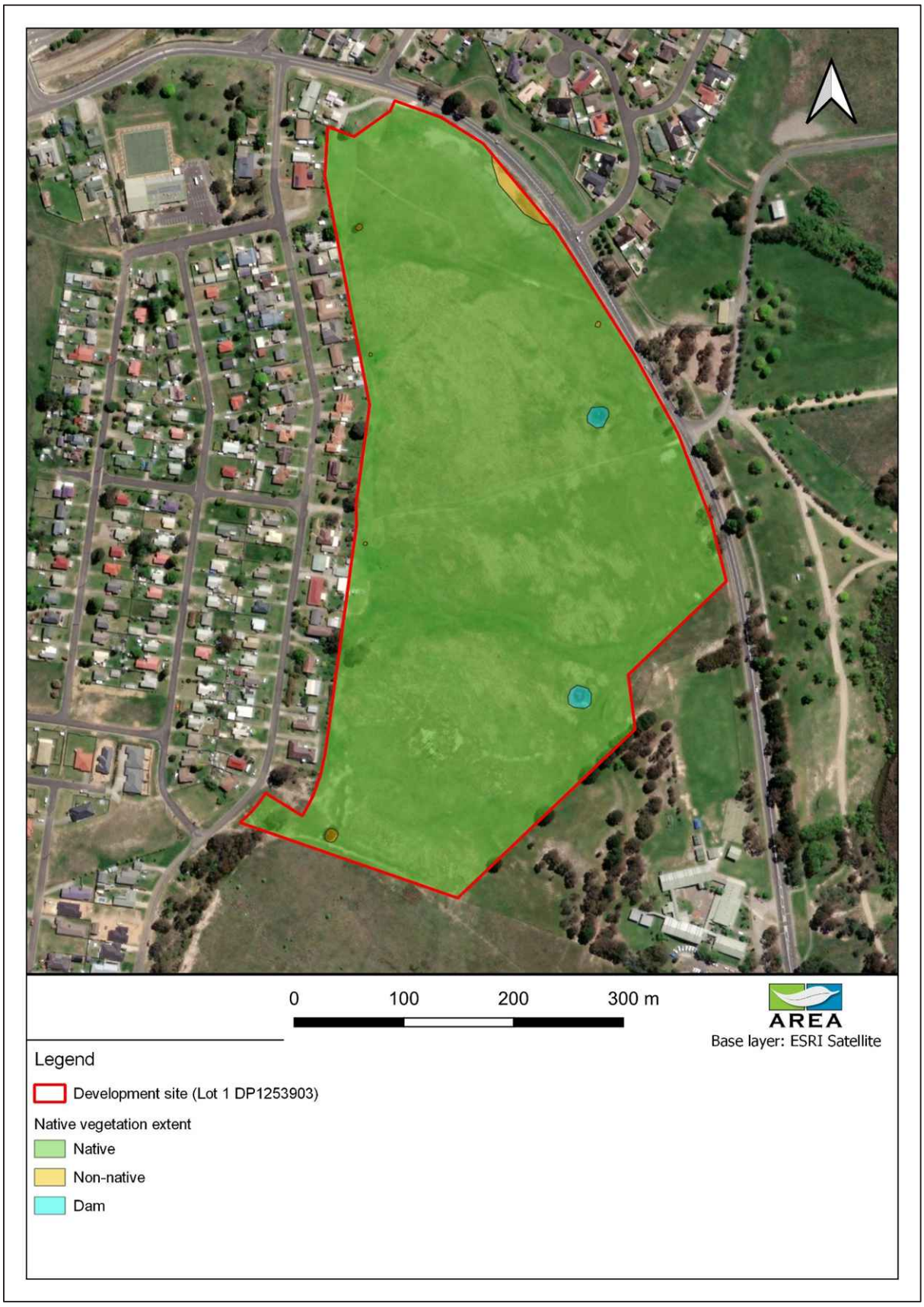

Figure 8 Plant community types and vegetation zones

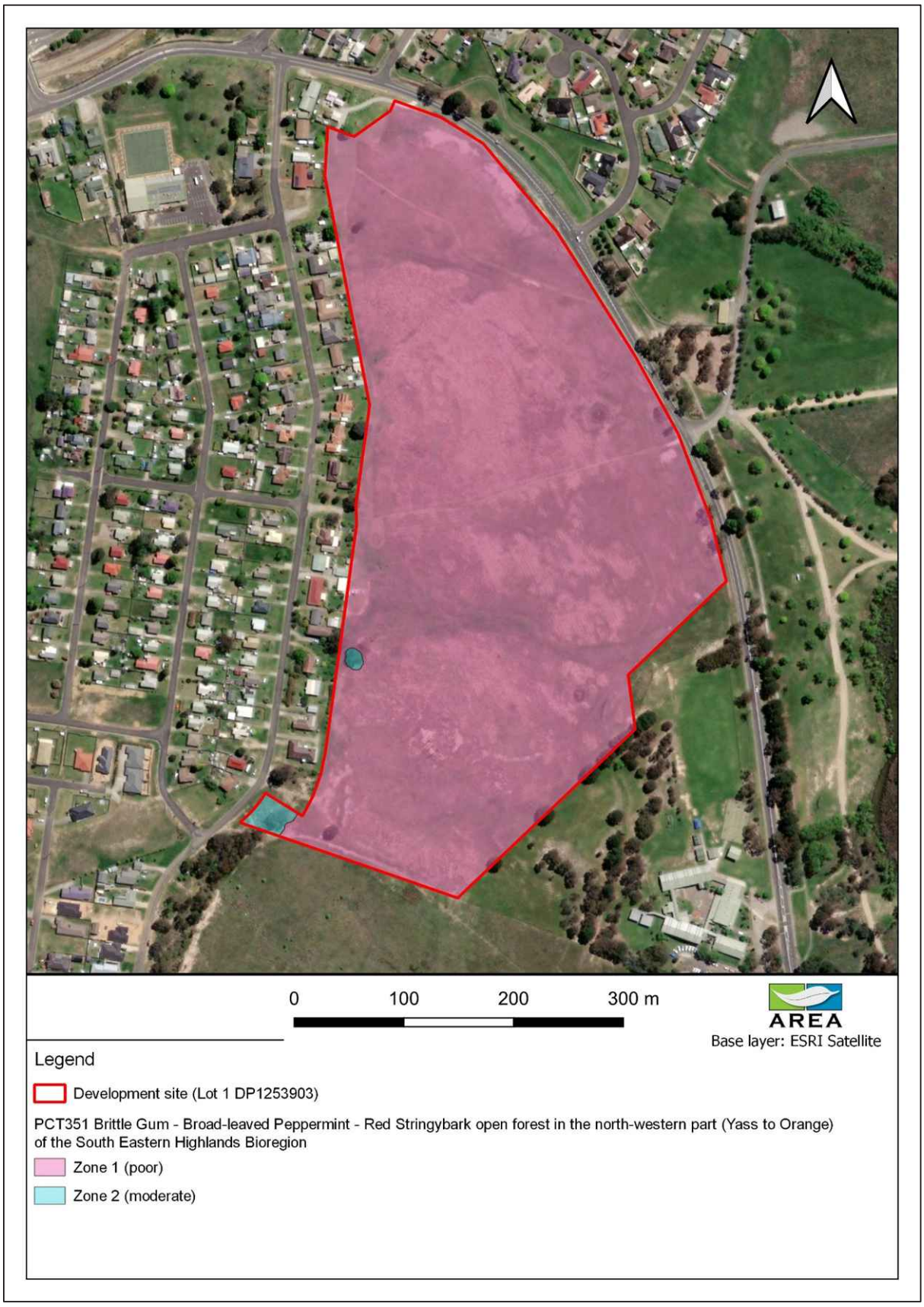

Figure 9 Candidate species credit species records and species polygons

Figure 10 Final impacts likely to occur on the development footprint

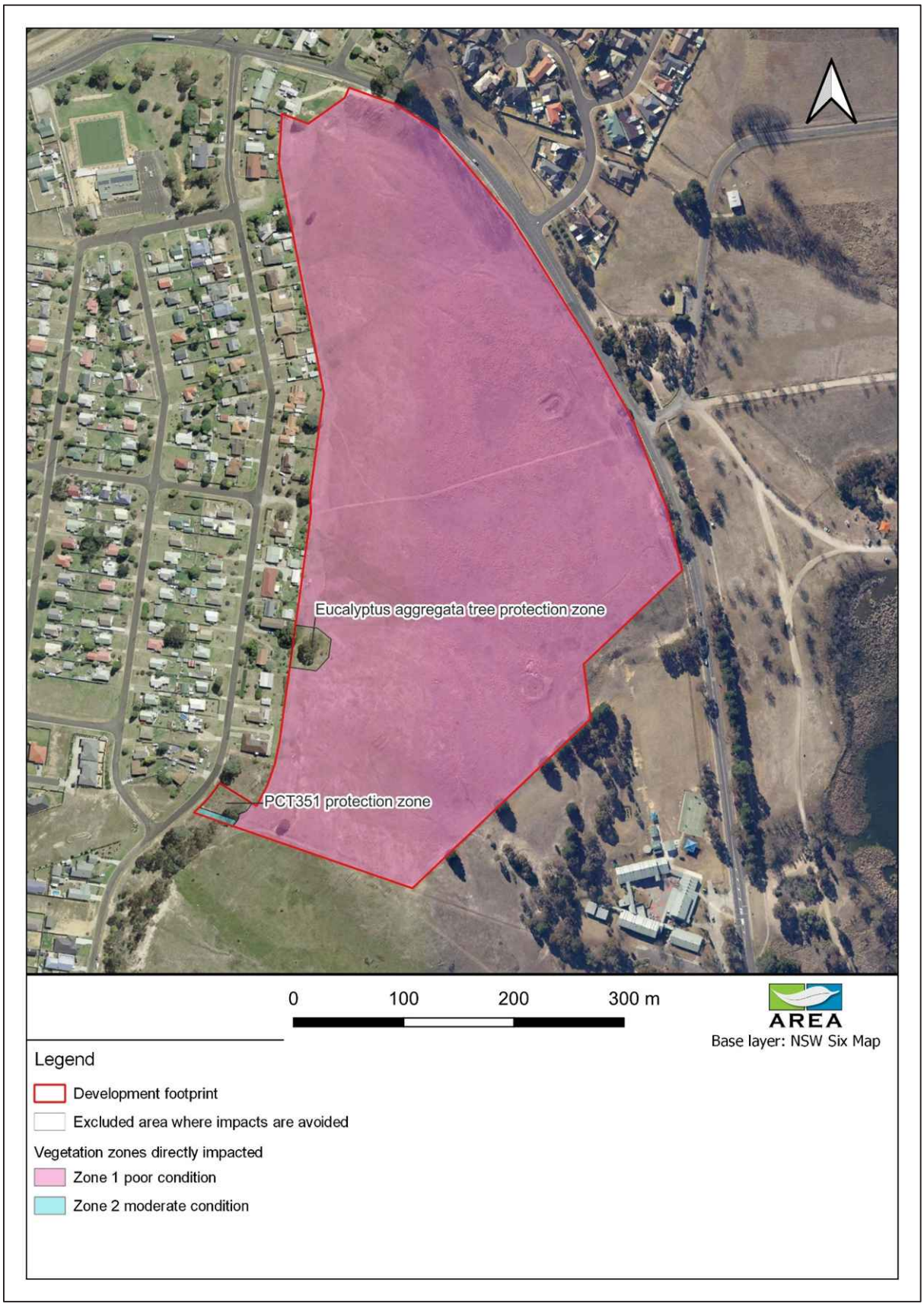

Figure 11 Thresholds for assessing and offsetting impacts

Appendix A: BDAR requirements compliance

The operational manuals (Stage 1 and Stage 2) provide further operational guidance for the preparation of a BDAR and are companion documents to the BAM. In preparing BDARs, assessors should read the operational manuals in conjunction with the BAM. Some best practice items outlined in the operational manuals that are not reflected in BAM Appendix K have been added in red within Table 31.

Table 31 Assessment of compliance with BDAR minimum information requirements

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
Introduction	Chapters 2 and 3	**Information**	
		Introduction to the biodiversity assessment including:	–
		☐ brief description of the proposal	<1.1.1>
		☐ identification of subject land boundary, including: ☐ operational footprint ☐ construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure	<1.1.3>
		☐ general description of the subject land	<1.1.3>
		☐ sources of information used in the assessment, including reports and spatial data	<1.5>
		☐ identification and justification for entering the BOS	<1.2>
		Maps and tables	
		☐ Map of the subject land boundary showing the final proposal footprint, including the construction footprint for any clearing associated with temporary/ancillary construction facilities and infrastructure	**<Figure 1 Site Map**

Legend

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
			>

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
Landscape	Sections 3.1 and 3.2, Appendix E	**Information**	
		Identification of site context components and landscape features, including:	–
		☐ general description of subject land topographic and hydrological setting, geology and soils	<1.1.3>
		☐ per cent native vegetation cover in the assessment area (as described in BAM Section 3.2)	
		☐ IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))	<3.2.1>
		☐ rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3(3.) and Appendix E)	<3.2.2>
		☐ wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3(3.))	<3.2.2>
		☐ connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6.))	<3.2.3>
		☐ karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(12.))	<3.2.4>
		☐ areas of outstanding biodiversity value occurring on the subject land and assessment area (as described in BAM Subsection 3.1.3(8–9.))	<3.2.5>
		☐ any additional landscape features identified in any SEARs for the proposal	<3.2.7>
		☐ NSW (Mitchell) landscape on which the subject land occurs	<3.2.6>
		☐ details of field reconnaissance undertaken to confirm the extent and condition of landscape features and native vegetation cover (as described in Operational Manual Stage 1 Section 2.4)	<2.1>
		Maps and tables	
		☐ Site Map ☐ Property boundary ☐ Boundary of subject land ☐ Cadastre of subject land (including labelling of Lot and DP or section plan if relevant) ☐ Landscape features identified in BAM Subsection 3.1.3	**<Figure 1 Site Map**

Legend

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
			>
		☐ Location Map ☐ Digital aerial photography at 1:1,000 scale or finer ☐ Boundary of subject land ☐ Assessment area (i.e. the subject land and either 1500 m buffer area or 500 m buffer for linear development) ☐ Landscape features identified in BAM Subsection 3.1.3 ☐ Additional detail (e.g. local government area boundaries) relevant at this scale	**<Error! Reference source not found.>**
		Landscape features identified in BAM Subsection 3.1.3 and to be shown on the Site Map and/or Location Map include:	–
		☐ IBRA bioregions and subregions ☐ rivers, streams and estuaries ☐ wetlands and important wetlands ☐ connectivity of different areas of habitat ☐ karst, caves, crevices, cliffs, rocks and other geological features of significance and if required, soil hazard features ☐ areas of outstanding biodiversity value occurring on the subject land and assessment area ☐ any additional landscape features identified in any SEARs for the proposal ☐ NSW (Mitchell) landscape on which the subject land occurs	**<Figure 1 Site Map**

Legend

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
			& **Error! Reference source not found.**>
		Data	
		☐ All report maps as separate jpeg files	–
		Individual digital shape files of:	–
		☐ subject land boundary	–
		☐ assessment area (i.e. subject land and 1500 m buffer area) boundary	–
		☐ cadastral boundary of subject land	–
		☐ areas of native vegetation cover	–
		☐ landscape features	–

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
Native vegetation	Chapter 4, Appendix A and Appendix H	**Information**	
		☐ Identify native vegetation extent within the subject land, including cleared areas and evidence to support differences between mapped vegetation extent and aerial imagery (as described in BAM Section 4.1(1–3.) and Subsection 4.1.1)	<4.1 & Figure 7>
		☐ Provide justification for all parts of the subject land that do not contain native vegetation (as described in BAM Subsection 4.1.2)	<0>
		☐ Review of existing information on native vegetation including references to previous vegetation maps of the subject land and assessment area (described in BAM Section 4.1(3.) and Subsection 4.1.1)	<2.2.2>
		☐ Describe the systematic field-based floristic vegetation survey undertaken in accordance with BAM Section 4.2	<0>
		☐ Where relevant, describe the use of more appropriate local data, provide reasons that support the use of more appropriate local data and include the written confirmation from the decision-maker that they support the use of more appropriate local data (as described in BAM Subsection 1.4.2 and Appendix A)	<Insert relevant reference & Appendix G>
		For each PCTwithin the subject land, describe:	–
		☐ PCTname and ID	<4.1 & Figure 7>
		☐ vegetation class	<0>
		☐ extent (ha) within subject land	<2.2.2>
		☐ evidence used to identify a PCTincluding any analyses undertaken, references/sources, existing vegetation maps (BAM Section 4.2(1–3.))	<0>
		☐ plant species relied upon for identification of the PCTand relative abundance of each species	<Insert relevant reference and Appendix G>
		☐ if relevant, TEC status including evidence used to determine vegetation is the TEC (BAM Subsection 4.2.2(1–2.))	<4.1 & Figure 7>
		☐ estimate of per cent cleared value of PCT(BAM Subsection 4.2.1(5.))	<0>
		Describe the vegetation integrity assessment of the subject land, including:	–

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☐ identification and mapping of vegetation zones (as described in BAM Subsection 4.3.1)	<4.4 & **Error! Reference source not found.**>
		☐ description of vegetation zones within the subject land (as described in Operational Manual Stage 1 Table 2 and Subsection 3.3.2)	<4.4 & **Error! Reference source not found.**>
		☐ area (ha) of each vegetation zone	<4.4>
		☐ assessment of patch size (as described in BAM Subsection 4.3.2)	<4.4>
		☐ survey effort (i.e. number of vegetation integrity survey plots) as described in BAM Subsection 4.3.4(1–2.)	<4.5.1>
		☐ use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsection 4.3.3(5.))	<4.5.3>
		Where use of more appropriate local benchmark data is proposed (as described in BAM Subsection 1.4.2, BAM Subsection 4.3.3(5.) and BAM Appendix A):	–
		☐ identify the PCTor vegetation class for which local benchmark data will be applied ☐ identify published sources of local benchmark data (if benchmarks obtained from published sources) ☐ describe methods of local benchmark data collection (if reference plots used to determine local benchmark data)	<4.5.3>
		☐ provide justification for use of local data rather than BioNet Vegetation Classification benchmark values	<4.5.3>
		☐ provide written confirmation from the decision-maker that they support the use of local benchmark data	<Appendix G>
		Maps and tables	
		☐ Map of native vegetation extent within the subject land at scale not greater than 1:10,000 including identification of all areas of native vegetation including areas that are ground cover only, cleared areas (as described in BAM Section 4.1(1–3.)) and all parts of the subject land that do not contain native vegetation (BAM Subsection 4.1.2)	<Figure 7>
		☐ Map of PCTs within the subject land (as described in BAM Section 4.2(1.))	<Figure 8>
		☐ Map of vegetation zones within the subject land (as described in BAM Subsection 4.3.1)	**<Error! Reference source not found.>**

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☐ Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCTboundaries	< Figure 6>

		☐ Map of TEC distribution on the subject land and table of TEC listing, status and area (ha)	<

Legend

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
			& **Error! Reference source not found.**>
		☐ Map of patch size locations for each native vegetation zone and table of patch size areas (as described in BAM Subsection 4.3.2)	<**Error! Reference source not found.** & Table 8>
		Table of current vegetation integrity scores for each vegetation zone within the site and including:	–
		☐ composition condition score ☐ structure condition score ☐ function condition score ☐ presence of hollow bearing trees	<Table 9>
		Data	
		☐ All report maps as separate jpeg files	–
		☐ Plot field data (MS Excel format)	
		☐ Plot field datasheets	<Appendix F>
		Digital shape files of:	–
		☐ PCTboundaries within subject land	–
		☐ TEC boundaries within subject land	–
		☐ vegetation zone boundaries within subject land	–
		☐ floristic vegetation survey and vegetation integrity plot locations	–
Threatened species	Chapter 5	**Information**	
		Identify ecosystem credit species likely to occur on the subject land, including:	–
		☐ list of ecosystem credit species derived from the BAM-C (as described in BAM Subsection 5.1.1 and Section 5.2(1.))	< >
		☐ justification and supporting evidence for exclusion of any ecosystem credit species based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2)	<5.1.1>
		☐ justification for addition of any ecosystem credit species to the list	<5.1.1>

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		Identify species credit species likely to occur on the subject land, including:	–
		☐ list of species credit species derived from the BAM-C (as described in BAM Subsection 5.1.1)	<Table 11 & Table 12>
		☐ justification and supporting evidence for exclusions based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2)	<5.1.2>
		☐ justification and supporting evidence for exclusions based on degraded habitat constraints and/or microhabitats on which the species depends (as described in BAM Subsection 5.2.2)	<5.1.2>
		☐ justification for addition of any species credit species to the list	<5.1.2>
		From the list of candidate species credit species, identify:	–
		☐ species assumed present within the subject land (if relevant) (as described in BAM Subsection 5.2.4(2.a.)) ☐ species present within the subject land on the basis of being identified on an important habitat map for a species (as described in BAM Subsection 5.2.4(2.d.)) ☐ species for which targeted surveys are to be completed to determine species presence (BAM Subsection 5.2.4(2.b.)) ☐ species for which an expert report is to be used to determine species presence (BAM Subsection 5.2.4(2.c.))	<Table 13 & Table 14>
		Present the outcomes of species credit species assessments from:	–
		☐ threatened species survey (as described in BAM Section 5.2.4)	<Table 15 & Table 16>
		☐ expert reports (if relevant) including justification for presence of the species and information used to make this determination (as described in BAM Subsection 5.2.4, Section 5.3, Box 3)	<5.4>
		Where survey has been undertaken include detailed information on:	–
		☐ survey method and effort (as described in BAM Section 5.3)	<Table 15 & Table 16>
		☐ justification of survey method and effort (e.g. citation of peer-reviewed literature) if approach differs from the department's taxa-specific survey guides or where no relevant guideline has been published	<5.3>
		☐ timing of survey in relation to requirements in the TBDC or the department's taxa-specific survey guides. Where survey was undertaken outside these guides include justification for the timing of surveys	<Table 15 & Table 16 & 5.3>

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☐ survey personnel and relevant experience	<Declarations ii>
		☐ describe any limitations to surveys and how these were addressed/overcome	<5.3>
		Where an expert report has been used in place of survey (as described in BAM Section 5.3, Box 3), include:	–
		☐ justification of the use of an expert report ☐ identify the expert, provide evidence of their expert credentials and departmental approval of expert status ☐ all requirements of Box 3 have been addressed in the expert report	<5.4>
		Where use of local data is proposed (BAM Subsection 1.4.2):	–
		☐ identify relevant species ☐ identify data to be amended ☐ identify source of information for local data, e.g. published literature, additional survey data, etc. ☐ justify use of local data in preference to VIS Classification or TBDC data	<5.5>
		☐ provide written confirmation from the decision-maker that they support the use of local data	<Appendix G>
		Species polygon completed for species credit species present within the subject land (assumed present or determined on the basis of survey, expert report or important habitat map) ensuring that:	–
		☐ the unit of measure for each species is documented	<Table 17 & **Error! Reference source not found.**>
		for species assessed by area:	–
		☐ the polygon includes the extent of suitable habitat for the target species within the subject land (as described in BAM Subsection 5.2.5)	**<Error! Reference source not found.>**
		☐ a description of, and evidence-based justification for, the habitat constraints, features or microhabitats used to map the species polygon including reference to information in the TBDC for that species and any buffers applied	<5.6>
		for species assessed by counts of individuals:	–
		☐ the number of individual plants present on the subject land (as described in BAM Subsection 5.2.5(3.))	<5.6>

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☐ the method used to derive this number (i.e. threatened species survey or expert report) and evidence-based justification for the approach taken	<5.6>
		☐ the polygon includes all individuals located on the subject land with a buffer of 30 m around the individuals or groups of individuals on the subject landimpact	**<Error! Reference source not found.>**
		☐ Identify the biodiversity risk weighting for each species credit species identified as present within the subject land (as described in BAM Section 5.4)	<Table 17 & **Error! Reference source not found.**>
		Maps and tables	
		☐ Table showing ecosystem credit species in accordance with BAM Subsection 5.1.1, and identifying:	
		☐ the ecosystem credit species removed from the list	<Table 10>
		☐ the sensitivity to gain class of each species	<Table 10>
		☐ Table detailing species credit species in accordance with BAM Section 5.2 and identifying:	<Table 11 & Table 12>
		☐ the species credit species removed from the list of species because the species is considered vagrant, out of geographic range or the habitat or microhabitat features are not present	<Table 11 & Table 12>
		☐ the candidate species credit species not recorded on the subject land as determined by targeted survey, expert report or important habitat map	<Table 13 & Table 14>
		☐ Table detailing species credit species recorded or assumed as present within the subject land, habitat constraints or microhabitats associated with the species, counts of individuals (flora)/extent of suitable habitat (flora and fauna) (as described in BAM Subsection 5.2.6) and biodiversity risk weighting (BAM Section 5.4)	<5.6 & Table 17 & **Error! Reference source not found.**>
		☐ Map indicating the GPS coordinates of all individuals of each species recorded within the subject land and the species polygon for each species (as described in BAM Subsection 5.2.5)	**<Error! Reference source not found.>**
		Data	
		☐ Digital shape files of suitable habitat identified for survey for each candidate species credit species	–
		☐ Survey locations including GPS coordinates of any plots, transects, grids	
		☐ Digital shape files of each species polygon including GPS coordinates of located individuals	–
		☐ Species polygon map in jpeg format	–

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☐ Expert reports and any supporting data used to support conclusions of the expert report	
		☐ Field datasheets detailing survey information including prevailing conditions, date, time, equipment used, etc.	

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
Prescribed impacts	Chapter 6	**Information**	
		Identify potential prescribed biodiversity impacts on threatened entities, including:	–
		☐ karst, caves, crevices, cliffs, rocks and other geological features of significance (as described in BAM Subsection 6.1.1) ☐ occurrences of human-made structures and non-native vegetation (as described in BAM Subsection 6.1.2) ☐ corridors or other areas of connectivity linking habitat for threatened entities (as described in BAM Subsection 6.1.3) ☐ waterbodies or any hydrological processes that sustain threatened entities (as described in BAM Subsection 6.1.4)	<Table 18>
		☐ protected animals that may use the proposed wind farm development site as a flyway or migration route (as described in BAM Subsection 6.1.5)	**<Error! Reference source not found.>**
		☐ where the proposed development may result in vehicle strike on threatened fauna or on animals that are part of a threatened ecological community (as described in BAM Subsection 6.1.6)	<Table 18>
		☐ Identify a list of threatened entities that may be dependent upon or may use habitat features associated with any of the prescribed impacts	
		☐ Describe the importance of habitat features to the species including, where relevant, impacts on life cycle or movement patterns (e.g. Subsection 6.1.3)	<6>
		Where the proposed development is for a wind farm:	–
		☐ identify a candidate list of protected animals that may use the development site as a flyway or migration route, including: resident threatened aerial species, resident raptor species and nomadic and migratory species that are likely to fly over the proposal area (as described in BAM Subsection 6.1.5)	**<Error! Reference source not found.>**
		☐ provide details of targeted survey for candidate species of wind farm developments undertaken in accordance with BAM Subsection 6.1.5(2–3.)	**<Error! Reference source not found.>**
		☐ predict the habitual flight paths for nomadic and migratory species likely to fly over the subject land and map the likely habitat for resident threatened aerial and raptor species (BAM Subsection 6.1.5(4.))	<Figure 1 Site Map

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
			& **Error! Reference source not found.**>

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		Where the proposal may result in vehicle strike:	–
		☐ identify a list of threatened fauna or protected fauna species that are part of a TEC and at risk of vehicle strike due to the proposal	<Table 18>
		Maps and tables	
		☐ Map showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, human-made structures, etc.)	<Figure 1 Site Map

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
			& **Error! Reference source not found.**>
		☐ Map showing location of potential vehicle strike locations	<Figure 1 Site Map

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
			>
		☐ Maps of habitual flight paths for nomadic and migratory species likely to fly over the site and maps of likely habitat for threatened aerial species resident on the site (for wind farm developments only)	<Figure 1 Site Map

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
			& **Error! Reference source not found.>**
		Data	
		☐ Digital shape files of prescribed impact feature locations	–
		☐ Prescribed impact features map in jpeg format	–
Avoid and minimise impacts	Chapter 7	**Information**	
		Demonstration of efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the proposal location in accordance with Chapter 7, including an analysis of alternative:	–
		☐ modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology	<0 & 0>
		☐ routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route	<7.1.1 & 7.2.1>
		☐ alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location	<7.1.1 & 7.2.1>
		☐ alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site	<7.1.1 & 7.2.1>
		☐ Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Sections 7.1 and 7.2)	<0 & 0>
		☐ Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal (as described in BAM Subsection 7.2.1(3.))	<7>
		☐ Detail measures or options considered but not implemented because they are not feasible and/or practical (e.g. due to site constraints)	<7.3>
		Maps and tables	
		☐ Table of measures to be implemented to avoid and minimise the impacts of the proposal, including action, outcome, timing and responsibility	<Table 19>
		☐ Map of alternative footprints considered to avoid or minimise impacts on biodiversity values; and of the final proposal footprint, including construction and operation	**<Error! Not a valid result for table.>**

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☐ Maps demonstrating indirect impact zones where applicable	**<Error! Reference source not found.>**
		Data	
		Digital shape files of:	–
		☐ alternative and final proposal footprint	–
		☐ direct and indirect impact zones	–
		☐ Maps in jpeg format	–
Assessment of impacts	Chapter 8, Sections 8.1 and 8.2	**Information**	
		☐ Determine the impacts on native vegetation and threatened species habitat, including a description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Section 8.1)	<Table 20>
		Assessment of indirect impacts on vegetation and threatened species and their habitat including (as described in BAM Section 8.2):	–
		☐ description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal	<Table 22>
		☐ documenting the consequences to vegetation and threatened species and their habitat including evidence-based justifications	<8.2>
		☐ reporting any limitations or assumptions, etc. made during the assessment	<8.2>
		☐ identification of the threatened entities and their habitat likely to be affected	<Table 22>
		Assessment of prescribed biodiversity impacts (as described in BAM Section 8.3) including:	–
		assessment of the nature, extent frequency, duration and timing of impacts on the habitat of threatened species or ecological communities associated with:	–
		☐ karst, caves, crevices, cliffs, rocks and other features of geological significance	**<Error! Reference source not found.>**
		☐ human-made structures	**<Error! Reference source not found.>**
		☐ non-native vegetation	<8.3.2>

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☐ connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	**<Error! Reference source not found.>**
		☐ movement of threatened species that maintains their life cycle	**<Error! Reference source not found.>**
		☐ water quality, waterbodies and hydrological processes that sustain threatened species and threatened ecological communities	<8.3.1>
		☐ assessment of the impacts of wind turbine strikes on protected animals	**<Error! Reference source not found.>**
		☐ assessment of the impacts of vehicle strikes on threatened species of animals or on animals that are part of a TEC	**<Error! Reference source not found.>**
		☐ evaluate the consequences of prescribed impacts	<1.1>
		☐ describe impacts that are uncertain	<8.2 & 1.1>
		☐ document limitations to data, assumptions and predictions	<8.2 & 1.1>
		Maps and tables	
		☐ Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts	<Table 21>
		Data	
		N/A	–
Mitigation and management of impacts	Chapter 8, Sections 8.4 and 8.5	**Information**	
		Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM Sections 8.4 and 8.5 including:	–
		☐ techniques, timing, frequency and responsibility ☐ identify measures for which there is risk of failure ☐ evaluate the risk and consequence of any residual impacts	<Table 23>

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☐ document any adaptive management strategy proposed	**<Error! Reference source not found.>**
		Identification of measures for mitigating impacts related to:	–
		☐ displacement of resident fauna (as described in BAM Subsection 8.4.1(2.))	<8.4>
		☐ indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1(3.))	
		☐ mitigating prescribed biodiversity impacts (as described in BAM Subsection 8.4.2)	
		☐ Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (BAM Section 8.5)	**<Error! Reference source not found.>**
		Maps and tables	
		☐ Table of measures to be implemented before, during and after construction to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility	<Table 23>
		Data	
		N/A	–
Impact summary	Chapter 9	**Information**	
		Identification and assessment of impacts on TECs and threatened species that are at risk of a serious and irreversible impacts (SAII, in accordance with BAM Section 9.1) including:	–
		☐ addressing all criteria in Subsection 9.1.1 for each TEC listed as at risk of an SAII present on the subject land	**<Error! Reference source not found. & Error! Reference source not found.>**
		☐ for each TEC, report the extent of the TEC in NSW	**<Error! Reference source not found.>**
		☐ addressing all criteria in Subsection 9.1.2 for each threatened species at risk of an SAII present on the subject land	**<Error! Reference source not found. & Error! Reference**

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
			source not found.>
		☐ for each threatened species, report the population size in NSW	**<Error! Reference source not found.>**
		☐ documenting assumptions made and/or limitations to information ☐ documenting all sources of data, information, references used or consulted ☐ clearly justifying why any criteria could not be addressed	**<Error! Reference source not found.–Error! Reference source not found.>**
		☐ Identification of impacts requiring offset in accordance with BAM Section 9.2	< Table 26 & Table 27>
		☐ Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1(3.)	<Table 25>
		☐ Identification of areas not requiring assessment in accordance with BAM Section 9.3	<Table 28>
		Maps and tables	
		☐ Map showing the extent of TECs at risk of an SAII within the subject land	**<Error! Reference source not found.>**
		☐ Map showing location of threatened species at risk of an SAII within the subject land	**<Error! Reference source not found.>**
		Map showing location of:	–
		☐ impacts requiring offset	<Figure 11>
		☐ impacts not requiring offset	<Figure 11>
		☐ areas not requiring assessment	<Figure 11>
		Data	
		Digital shape files of:	–
		☐ extent of TECs at risk of an SAII within the subject land	–
		☐ location of threatened species at risk of an SAII within the subject land	–
		☐ boundary of impacts requiring offset	–

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☐ boundary of impacts not requiring offset	–
		☐ boundary of areas not requiring assessment	–
		☐ Maps in jpeg format	–
Impact summary	Chapter 10	**Information**	
		Ecosystem credits and species credits that measure the impact of the development on biodiversity values, including:	–
		☐ future vegetation integrity score for each vegetation zone within the subject land (Equation 25 and Equation 26 in BAM Appendix H) ☐ change in vegetation integrity score (BAM Subsection 8.1.1) ☐ number of required ecosystem credits for the direct impacts of the proposal on each vegetation zone within the subject land (BAM Subsection 10.1.2)	<Table 26>
		☐ biodiversity risk weighting for each	<Table 26 & Table 27>
		☐ number of required species credits for each candidate threatened species that is directly impacted on by the proposal (BAM Subsection 10.1.3)	<Table 27>
		Maps and tables	
		☐ Table of PCTs requiring offset and the number of ecosystem credits required	<Table 26>
		☐ Table of threatened species requiring offset and the number of species credits required	<Table 27>
		Data	
		☐ Submitted proposal in the BAM Calculator	–
Biodiversity credit report	Chapter 10	**Information**	
		☐ Description of credit classes for ecosystem credits and species credits at the development or clearing site or land to be biodiversity certified (BAM Section 10.2)	<Table 29 & Table 30>
		☐ BAM credit report in pdf format	<Appendix H>
		Maps and tables	
		☐ Table of credit class and matching credit profile	<Table 30>

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		Data	
		☐ BAM credit report in pdf format	<Appendix H>

Appendix B: Matters of national environmental significance

The Commonwealth Protected Matters Search Tool was used to generate a report on Matters of National Environmental Significance predicted to occur within 1500-meter radius of the development site as set out below.

In summary, each EPBC Act listed species is either unlikely to be present and impacted or is addressed under NSW legislation. This BDAR, by implementing the burden of proof through BAM (2020), confirms MNES species and ecosystems are unlikely to occur and would not be significantly impacted, therefore a Referral under the EPBC Act is not required.

Australian Government
Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 22-Sep-2022

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	36
Listed Migratory Species:	12

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	19
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	2
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	1
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text
Natural Temperate Grassland of the South Eastern Highlands	Critically Endangered	Community may occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Callocephalon fimbriatum Gang-gang Cockatoo [768]	Endangered	Species or species habitat likely to occur within area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Erythrotriorchis radiatus		
Red Goshawk [942]	Vulnerable	Species or species habitat may occur within area
Falco hypoleucos		
Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
Grantiella picta		
Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus		
White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor		
Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Polytelis swainsonii		
Superb Parrot [738]	Vulnerable	Species or species habitat known to occur within area
Pycnoptilus floccosus		
Pilotbird [525]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
FISH		
Macquaria australasica		
Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Prototroctes maraena		
Australian Grayling [26179]	Vulnerable	Species or species habitat may occur within area
FROG		

Scientific Name	Threatened Category	Presence Text
Litoria booroolongensis		
Booroolong Frog [1844]	Endangered	Species or species habitat likely to occur within area
INSECT		
Paralucia spinifera		
Bathurst Copper Butterfly, Purple Copper Butterfly, Bathurst Copper, Bathurst Copper Wing, Bathurst-Lithgow Copper, Purple Copper [26335]	Vulnerable	Species or species habitat likely to occur within area
MAMMAL		
Chalinolobus dwyeri		
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area
Petauroides volans		
Greater Glider (southern and central) [254]	Endangered	Species or species habitat likely to occur within area
Petaurus australis australis		
Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat likely to occur within area
Pseudomys novaehollandiae		
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
PLANT		
Eucalyptus aggregata		
Black Gum [20890]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Eucalyptus pulverulenta Silver-leaved Mountain Gum, Silver-leaved Gum [21537]	Vulnerable	Species or species habitat may occur within area
Euphrasia arguta [4325]	Critically Endangered	Species or species habitat may occur within area
Leucochrysum albicans subsp. tricolor Hoary Sunray, Grassland Paper-daisy [89104]	Endangered	Species or species habitat may occur within area
Persoonia marginata Clandulla Geebung [10852]	Vulnerable	Species or species habitat may occur within area
Pomaderris brunnea Rufous Pomaderris, Brown Pomaderris [16845]	Vulnerable	Species or species habitat may occur within area
Prasophyllum petilum Tarengo Leek Orchid [55144]	Endangered	Species or species habitat may occur within area
Prasophyllum sp. Wybong (C.Phelps ORG 5269) a leek-orchid [81964]	Critically Endangered	Species or species habitat may occur within area
Pultenaea glabra Smooth Bush-pea, Swamp Bush-pea [11887]	Vulnerable	Species or species habitat may occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area
REPTILE		
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species	[Resource Information]
Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		

Scientific Name	Threatened Category	Presence Text
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus		
White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Monarcha melanopsis		
Black-faced Monarch [609]		Species or species habitat may occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State
Communications, Information Technology and the Arts - Telstra Corporation Limited	
Commonwealth Land - Australian Telecommunications Commission [12474]	NSW

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Bubulcus ibis as Ardea ibis		
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat may occur within area overfly marine area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat may occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area
Neophema chrysostoma Blue-winged Parrot [726]		Species or species habitat may occur within area overfly marine area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area overfly marine area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area

Extra Information

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed
Not controlled action (particular manner)			
Aerial baiting for wild dog control	2006/2713	Not Controlled Action (Particular Manner)	Post-Approval

Bioregional Assessments

SubRegion	BioRegion	Website
Sydney	Sydney Basin	BA website

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Appendix C: Vegetation survey data

Data from plot-based vegetation surveys and vegetation integrity survey plots across the development site is provided in Table 32 and in the JPEGs below. A separate MS Excel copy is provided to accompany submission of this BDAR.

Table 32 Vegetation survey data and locations

plot	pct	area	patchsize	condition class	zone	easting	northing	bearing	compTree	compShrub	compGrass	compForbs	compFerns	compOther	strucTree	strucShrub	strucGrass	strucForbs	strucFerns	strucOther	funLargeTrees	funHollowtrees	funLitterCover	funLenFallenLogs	funTreeStem5to9	funTreeStem10to19	funTreeStem20to29	funTreeStem30to49	funTreeStem50to79	funTreeRegen	funHighThreatExotic	Plot-based vegetation survey?	Vegetation integrity survey?
1	351	17.43	10000	Poor	56	227310	6298768	80	0	0	4	1	0	0	0	0	0.1	0.1	0	0	0	0	4.2	0	0	0	0	0	0	0	0.5	☒ Yes	☒ Yes
2	351	17.43	10000	Poor	56	227298	6299042	100	0	2	5	5	0	0	0	0.5	5.9	0.5	0	0	0	0	11	0	0	0	0	0	0	0	75	☒ Yes	☒ Yes
3	351	17.43	10000	Poor	56	227478	6298883	250	0	0	1	1	0	0	0	0	5	0.1	0	0	0	0	4	0	0	0	0	0	0	0	45	☒ Yes	☒ Yes
4	351	0.13	10000	Moderate	56	227202	6298598	225	1	4	6	4	0	0	20	2.2	51.4	2.3	0	0	4	1	33	3	☒ Yes	☒ Yes	3	4	4	☒ Yes	2.2	☒ Yes	☒ Yes

BAM Plot – Field Survey Form

Site Sheet no:

Survey Name	Plot Identifier	Recorders
W. Wang	1	Addy Watson

Date	15/09/20	IBRA region		Photo #		Zone ID	1
Zone 56	Datum						
Easting 227210	Northing 6298768	Plot Dimensions	20 x 20 in 20 x 50	Orientation of midline from the 0 m point.	80	Magnetic °	
Likely Vegetation Class						Confidence: H M L	
Plant Community Type	PCT 351			EEC:		Confidence: H M L	

Record easting and northing from the plot marker. If applicable, orient pioket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified; magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	4
	Forbs	1
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	4.6
	Forbs	0.1
	Ferns	0
	Other	0
High Threat Weed cover %		0.5

BAM Attribute (20 x 50 m plot)	Stem Classes and Hollows		
dbh	Euc*	Non Euc	Hollows†
80 + cm			0
50 – 79 cm			
30 – 49 cm			Hollows 20cm+
20 – 29 cm			0
10 – 19 cm			
5 – 9 cm			
< 5 cm			This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)			total 0

Record **living** eucalypt* (Euc*) and **living** native non-eucalypt (Non Euc) stems separately.

Data needed is presence only (tick) unless a 'large tree' for that veg class.

* Includes all species of *Eucalyptus, Corymbia, Angophora, Lophostemon* and *Syncarpia*.

† For **hollows** count only the presence of a stem containing hollows, not the count of hollows in it at stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

Each size class is noted as present by the **living tree stems** only. Depending on the Vegetation Class, DBH values and counts may be needed for a size class. For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate if it is required by the large tree category for that vegetation class.

Hollows at least 20cm across are recorded for the purposes of habitat of some threatened species.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	5	4	5	2	5	8	2	10	4	30	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	4.2																			

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)		
Cultivation (inc. pasture)		
Soil erosion		
Firewood / CWD removal		
Grazing (identify native/stock)		
Fire damage		
Storm damage		

Free Text Section for brief site description

Selected to be representative of drainage lines across the site

Leaf Litter and end point GPS		
ID	Easting	Northing
End point	227365	6298769

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Form version designed 15 September 2017 Printed 23 August 2020

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 15/09/20	W. wang	1	Addy Watson

ID	BAM Code	GF Code	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.		N, E or HTE	Cover	Abund	strata m	woo her	Heig ht (m)
1	—		Rubis fruticosus	Blackberry	HTE	0.5	3	m	–	0.3
2	—		Hypochaeris radicata	Flat weed	E	0.5	200	G	–	0.1
3	—		Plantago lanceolata	Ribwort	E	0.5	100	G	–	0.1
4	—		Anthoxanthum odoratum		E	90	5000	G	–	0.2
5	—		Medicago sp.		E	0.1	20	G	–	0.1
6	GG		Cyperus sp		N	1	2000	G	–	0.1
7	—		Acetosella vulgaris	Sheepsorrel	E	1	50	G	–	0.2
8	—		Gamphrena celosioides		E	0.1	5	G	–	0.1
9	—		Lactuca serriola	Prickley lettuce ?	E	0.1	15	G	–	0.1
10	—		Taraxacum sp	dandelion	E	0.1	5	G	–	0.1
11	GG	g		Grass sp	N	2	200	G	–	0.1
12	GG	r	Rush species		N	0.6	50	G	–	0.3
13	—		WEED sp.		E	0.1	10	G	–	0.1
14	FG	f	Helichrysium rutidolepis		N	0.1	5	G	–	0.1
15	GG		Carex appressa		N	1	20	G	–	0.6
16										
17										
18										

	Count	Cover
TG	0	0
SG	0	0
GG	4	4.6
FG	1	0.1
EG	0	0
OG	0	0

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

Form version designed 15 September 2017 Printed 23 August 2020

BAM Plot – Field Survey Form

Site Sheet no:

Survey Name	Plot Identifier	Recorders
W. Wang	2	Watson A. Darby

Date	Zone	Datum	IBRA region	Photo #	Zone ID
15/09/20	56	GDA			1

Easting	Northing	Plot Dimensions	Orientation of midline from the 0 m point.
227298	6299042	20 x 20 in 20 x 50	100 Magnetic °

		Confidence H M L
Likely Vegetation Class		
Plant Community Type	PCT 351	EEC: Confidence H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	2
	Grasses etc.	5
	Forbs	5
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0.5
	Grasses etc.	5.9
	Forbs	0.5
	Ferns	0
	Other	0
High Threat Weed cover %		75

BAM Attribute (20 x 50 m plot) dbh	Stem Classes and Hollows: Euc*	Non Euc	Hollows†
80 + cm			0
50 – 79 cm			
30 – 49 cm			Hollows 20cm+
20 – 29 cm			0
10 – 19 cm			
5 – 9 cm			
< 5 cm			This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)			total 0

Record **living** eucalypt* (Euc*) and **living** native non-eucalypt (Non Euc) stems separately.

Data needed is presence only (tick) unless a 'large tree' for that veg class.

* includes all species of *Eucalyptus, Corymbia, Angophora, Lophostemon* and *Syncarpia*

† For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

Each size class is noted as present by the **living tree stems** only. Depending on the Vegetation Class, DBH values and counts may be needed for a size class. For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate if it is required by the large tree category for that vegetation class.
Hollows at least 20cm across are recorded for the purposes of habitat of some threatened species.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	5 10 20 10 10	5 3 10 5 20	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	11			

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT descriptions.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)		
Cultivation (inc. pasture)		
Soil erosion		
Firewood / CWD removal		
Grazing (identify native/stock)		
Fire damage		
Storm damage		

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Free Text Section for brief site description

Leaf Litter and end point GPS	ID	Easting	Northing
	End point	227345	6299058

Form version designed 15 September 2017 Printed 23 August 2020

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 15/09/20	W. Wang	2	Addy Watson Anna Darby

ID	BAM Code	GF Code	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers	N, E or HTE	Cover	Abund	stratum	voucher	Height (m)
1	SG	S	Leptospermum myrtifolium Tea tree	N	0.3	3	m	–	0.8
2	SG	S	Lissanthe striosa heath	N	0.2	5	m	–	0.4
3	GG	r	Lomandra filiformis	N	0.5	100	G	–	0.1
4	GG	r	Dianella revoluta	N	0.1	15	G	–	0.3
5	–		Eragrostis curvula	HTE	75	5000	G	–	0.5
6	–		Hypochaeris radicata Flatweed	E	0.1	50	G	–	0.1
7	–		Anthoxanthum odoratum	E	2	50	G	–	0.3
8	–		Acetosella vulgaris Sheep Sorrel	E	0.5	100	G	–	0.1
9	FG	f	Oxalis perennans	N	0.1	10	G	–	0.1
10	–		WEED sp	E	0.1	10	G	–	0.1
11	–		WEED sp	E	0.1	15	G	–	0.1
12	GG	r	Cyperus sp	N	0.2	200	G	–	0.1
13	–		Plantago lanceolata Rib wort	E	0.1	10	G	–	0.1
14	–		wavy edge blue ish mauve Grass sp	E	2	200	G	–	0.1
15	FG	f	Crassula colorata Stone crop	N	0.1	10	G	–	0.1
16	FG	f	Forb sp long thin leaves	N	0.1	30	G	–	0.2
17	–		Weed sp hairy leaf	E	0.2	20	G	–	0.1
18	GG	g	Themeda australis Kangaroo grass	N	0.1	5	G	–	0.5
19	FG	f	Forb sp curled leaf	N	0.1	1	G	–	0.1
20	FG		Microtis unifolia	N	0.1	20	G	–	0.2
21	GG	g	other perennial grass sp	N	5	500	G	–	0.1
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									

	count	cover
TG	0	0
SG	2	0.5
GG	5	5.9
FG	5	0.5
EG	0	0
OG	0	0

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

Form version designed 15 September 2017 Printed 23 August 2020

BAM Plot – Field Survey Form

Site Sheet no:

Survey Name	Plot Identifier	Recorders
W.Wang	Plot 3	Addy Watson Anna Darby

Date	15/09/20	IBRA region		Photo #	Zone ID
Zone	Datum				
56	GDA				
Easting	Northing	Plot Dimensions	20 x 20 in 20 x 50	Orientation of midline from the 0 m point.	250 Magnetic °
227478	6298883				
Likely Vegetation Class					Confidence: H M L
Plant Community Type	PCT 351			EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	1
	Forbs	1
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	5
	Forbs	0.1
	Ferns	0
	Other	0
High Threat Weed cover %		45

BAM Attribute (20 x 50 m plot)	Stem Classes and Hollows		
dbh	Euc*	Non Euc	Hollows†
80 + cm			0
50 – 79 cm			
30 – 49 cm			Hollows 20cm+
20 – 29 cm			0
10 – 19 cm			
5 – 9 cm			
< 5 cm			This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)			total 0

Record living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately.

Data needed is presence only (tick) unless a 'large tree' for that veg class.

* Includes all species of *Eucalyptus, Corymbia, Angophora, Lophostemon* and *Syncarpia*.

† For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

Each size class is noted as present by the **living tree stems** only. Depending on the Vegetation Class, DBH values and counts may be needed for a size class. For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate if it is required by the large tree category for that vegetation class.
Hollows at least 20cm across are recorded for the purposes of habitat of some threatened species.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	5 4 2 7 2	1 1 1 1 0	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	4			

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern	Microrelief
Lithology		Soil Surface Texture		Soil Colour	Soil Depth
Slope		Aspect		Site Drainage	Distance to nearest water and type

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)		
Cultivation (inc. pasture)		
Soil erosion		
Firewood / CWD removal		
Grazing (identify native/stock)		
Fire damage		
Storm damage		

Free Text Section for brief site description

Leaf Litter and end point GPS		
ID	Easting	Northing
End point	227482	6298832

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Form version designed 15 September 2017 Printed 23 August 2020

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 15/09/20	W. Wang	3	Addy Watson Anna Darby

ID	BAM Code	GF Code	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.		N, E or HTE	Cover	Abund	stratum	vouc her	Height (m)
1	—		Eragrostis curvula	African love Grass	HTE	45	100	G	—	0.5
2	—		Hypochaeris radicata	Flat weed	E	1	200	G	-	0.1
3	—		Anthoxanthum odoratum	Sweet vernalgrass	E	50	1000	G	-	0.2
4	—		Acetosella vulgaris	Sheep sorrel	E	0.5	30	G	-	0.1
5	GG		Austrostipa sp.		N	5	1000	G	-	0.1
6	—		Plantago lanceolata		E	0.1	10	G	-	0.2
7	—		Lactuca serriola	Prickly lettuce	E	0.1	5	G	-	0.2
8	FG		Microtis unifolia		N	0.1	10	G	-	0.2
9										
10										
11			TG	0	0					
12			SG	0	0					
13			GG	1	5					
14			FG	1	0.1					
15			EG	0	0					
16			OG	0	0					
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

Form version designed 15 September 2017 Printed 23 August 2020

BAM Plot – Field Survey Form

Site Sheet no:

Survey Name	Plot Identifier	Recorders
W. Wang	4	Addy Watson Anna Dark

Date	Zone	Datum	IBRA region	Photo #	Zone ID
15/09/20	56	GDA			

Easting	Northing	Plot Dimensions	Orientation of midline from the 0 m point.	
227202	6298598	20 x 20 in 20 x 50	225	Magnetic °

		Confidence
Likely Vegetation Class		H M L
Plant Community Type	PCT 351	EEC: Confidence H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated no. points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	4
	Grasses etc.	6
	Forbs	4
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	20
	Shrubs	2.2
	Grasses etc.	51.4
	Forbs	2.3
	Ferns	0
	Other	0
High Threat Weed cover %		2.2

This table may be completed after retrieval data and available data. It is not required while in the field.

BAM Attribute (20 x 50 m plot) dbh	Stem Classes and Hollows: Euc*	Non Euc	Hollows†
80 + cm			1
50 – 79 cm	4		
30 – 49 cm	4		Hollows 20cm+
20 – 29 cm	3		0
10 – 19 cm	✓		
5 – 9 cm	✓		
< 5 cm	✓		This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)			total 3

Record living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately.

Data needed is presence only (tick) unless a 'large tree' for that veg class.

* Includes all species of *Eucalyptus, Corymbia, Angophora, Lophostemon* and *Syncarpia*

† For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

Each size class is noted as present by the **living tree stems** only. Depending on the Vegetation Class, DBH values and counts may be needed for a size class. For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate if it is required by the large tree category for that vegetation class.

Hollows at least 20cm across are recorded for the purposes of habitat of some threatened species.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	60 30 30 20 25	0 40 1 30 0	0 1 0 0 0	0 5 0 5 0
Average of the 5 subplots	33			

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern	
Lithology		Soil Surface Texture		Soil Colour	
Slope		Aspect		Site Drainage	
				Microrelief	
				Soil Depth	
				Distance to nearest water and type	

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)		
Cultivation (inc. pasture)		
Soil erosion		
Firewood / CWD removal		
Grazing (identify native/stock)		
Fire damage		
Storm damage		

Free Text Section for brief site description

Leaf Litter and end point GPS	ID	Easting	Northing
	End point	227168	6298573

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Form version designed 15 September 2017 Printed 23 August 2020

2 - 100
3 - 250
4 - 225

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 15/9/20	W. Wang	4	Addy Watson Anna Darby

ID	BAM Code	GF Code	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.	N, E or HTE	Cover	Abund	stratum	Voucher	Height (m)
1	TG	t	Eucalyptus mannifera	N	20	1	u	–	20
2	SG	s	Acacia melanoxylon	N	1	2	m	–	1
3	SG	s	Leptospermum myrtifolium Teatree	N	0.5	30	m	–	0.3
4	GG	g	Rytidosperma sp.	N	0.1	10	G	–	0.3
5	GG	g	Lomandra filiformis	N	9	2000	G	–	0.1
6	FG	f	Oxalis perennans	N	2	1000	G	–	0.1
7	—		Grass sp.	E	20	5000	G	–	0.1
8	—		Hypochaeris radicata Flatweed	E	1	1000	G	–	0.1
9	GG		Diamella revoluta	N	0.1	50	G	–	0.2
10	—		Geranium molle	E	0.2	100	G	–	0.1
11	—		Sonchus sp. Sow thistle	E	0.1	10	G	–	0.2
12	—		Vicia sp. Velch	E	0.1	10	G	–	0.3
13	FG	f	Chrysocephalum - paper daisy	N	0.1	20	G	–	0.2
14	—		Centaurium tenuiflorum Branched Century	E	0.1	10	G	–	0.2
15	—		Lactuca serriola Prickly lettuce	E	0.1	5	G	–	0.1
16	FG	f	Crassula colorata stonecrop	N	0.1	10	G	–	0.1
17	—		Eragrostis curvula African love grass	HTE	2	30	G	–	0.3
18	GG	g	Poa sp	N	45	1000	G	–	0.4
19	—		Triloba sp	E	0.1	100	G	–	0.1
20	—		Plantago lanceolata	E	0.1	50	G	–	0.2
21	—		Lepidium didymum Peppercress	E	1	50	G	–	0.1
22	SG	s		N	0.2	50	m	✓	0.3
23	—		Rosa rubiginosa Sweet briar	HTE	0.1	3	m	–	1.1
24	—		Acetosella vulgaris Sheep sorrel	E	0.1		G	–	0.1
25	GG	g	Arishda ramosa	N	0.2	50	G	–	0.3
26	GG	g	Austrostipa scabra	N	1	1000	G	–	0.1
27	SG	s	Acacia myrtifolia		0.5	30	m	–	0.3
28	—		Medicago sp	E	0.1	100	G	–	0.1
29	—		Rubis fruticosus Blackberry	HTE	0.1	1	m	–	0.1
30	—		Cirsium vulgare Spear thistle	E	0.1	1	G	–	0.1
31	FG	f	Goodenia sp	N	0.1	5	G	–	0.1
32	—		Fumaria sp.	E	0.1	1	G	–	0.2
33									
34			count / cover						
35			TG 1 / 20						
36			SG 4 / 2.2						
37			GG 6 / 51.4						
38			FG 4 / 2.3						
39			EG 0 / 0						
40			OG 0 / 0						

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); *Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

Form version designed 15 September 2017 Printed 23 August 2020

Kookaburra pipit

Appendix D: Credit reports

BAM Chapter 5 assessment reports.

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BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00022074/BAAS19066/20/00022075	Barton Avenue Wallerawang	14/10/2022
Assessor Name	Report Created	BAM Data version *
Addy Watson	02/12/2022	55
Assessor Number	BAM Case Status	Date Finalised
BAAS19066	Finalised	02/12/2022
Assessment Revision	Assessment Type	BOS entry trigger
0	Part 4 Developments (General)	BOS Threshold: Area clearing threshold

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion												
1	351_Zone 1_Poor	Not a TEC	1.7	1.7	17.2	PCT Cleared - 60%	High Sensitivity to Gain			1.75		0

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BAM Credit Summary Report

2	351_Zone 2_Mod	Not a TEC	54.9	54.9	0.02	PCT Cleared - 60%	High Sensitivity to Gain		1.75	1
									Subtotal	**1**
									Total	**1**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id 00022074/BAAS19066/20/00022075	Proposal Name Barton Avenue Wallerawang	BAM data last updated * 14/10/2022
Assessor Name Addy Watson	Assessor Number BAAS19066	BAM Data version * 55
Proponent Names	Report Created 02/12/2022	BAM Case Status Finalised
Assessment Revision 0	Assessment Type Part 4 Developments (General)	Date Finalised 02/12/2022
BOS entry trigger BOS Threshold: Area clearing threshold	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		
Species		
Nil		

Additional Information for Approval

BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Grantiella picta / Painted Honeyeater

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion	Not a TEC	17.2	1	0	1

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BAM Biodiversity Credit Report (Like for like)

351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Southern Tableland Dry Sclerophyll Forests This includes PCT's: 299, 344, 349, 351, 352, 653, 701, 727, 728, 730, 888, 957, 1093, 1177	Southern Tableland Dry Sclerophyll Forests >=50% and <70%	351_Zone1_Poor	No	0	Capertee Uplands, Capertee Valley, Hill End, Inland Slopes and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Southern Tableland Dry Sclerophyll Forests This includes PCT's: 299, 344, 349, 351, 352, 653, 701, 727, 728, 730, 888, 957, 1093, 1177	Southern Tableland Dry Sclerophyll Forests >=50% and <70%	351_Zone2_Mod	Yes	1	Capertee Uplands, Capertee Valley, Hill End, Inland Slopes and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options

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BAM Biodiversity Credit Report (Like for like)

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BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00022074/BAAS19066/20/00022075	Barton Avenue Wallerawang	14/10/2022
Assessor Name	**Report Created**	**BAM Data version ***
Addy Watson	02/12/2022	55
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS19066	Part 4 Developments (General)	Finalised
Assessment Revision	**BOS entry trigger**	**Date Finalised**
0	BOS Threshold: Area clearing threshold	02/12/2022

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Barking Owl	Ninox connivens	351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion
Diamond Firetail	Stagonopleura guttata	351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion
Dusky Woodswallow	Artamus cyanopterus cyanopterus	351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion
Flame Robin	Petroica phoenicea	351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion
Gang-gang Cockatoo	Callocephalon fimbriatum	351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion
Grey-headed Flying-fox	Pteropus poliocephalus	351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion

NSW GOVERNMENT

BAM Predicted Species Report

Large Bent-winged Bat	Miniopterus orianae oceanensis	351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion
Little Eagle	Hieraaetus morphnoides	351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion
Masked Owl	Tyto novaehollandiae	351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion
Powerful Owl	Ninox strenua	351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion
Scarlet Robin	Petroica boodang	351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion
Speckled Warbler	Chthonicola sagittata	351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion
Spotted-tailed Quoll	Dasyurus maculatus	351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion
Turquoise Parrot	Neophema pulchella	351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion
Varied Sittella	Daphoenositta chrysoptera	351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion
White-throated Needletail	Hirundapus caudacutus	351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion

Threatened species Manually Added

None added

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

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BAM Predicted Species Report

Common Name	Scientific Name	Plant Community Type(s)
Painted Honeyeater	Grantiella picta	351-Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C
Painted Honeyeater	Grantiella picta	Habitat constraints

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BAM Candidate Species Report

Proposal Details

Assessment Id 00022074/BAAS19066/20/00022075	Proposal Name Barton Avenue Wallerawang	BAM data last updated * 14/10/2022
Assessor Name Addy Watson	Report Created 02/12/2022	BAM Data version * 55
Assessor Number BAAS19066	Assessment Type Part 4 Developments (General)	BAM Case Status Finalised
Assessment Revision 0	Date Finalised 02/12/2022	BOS entry trigger BOS Threshold: Area clearing threshold

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

List of Species Requiring Survey

Name	Presence	Survey Months
Acacia meiantha Acacia meiantha	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Eucalyptus aggregata Black Gum	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Eucalyptus pulverulenta Silver-leafed Gum	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

NSW GOVERNMENT

BAM Candidate Species Report

Grevillea divaricata Grevillea divaricata	No (surveyed) *Survey months are outside of the months specified in Bionet.	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☑ Survey month outside the specified months?
Leucochrysum albicans var. tricolor Hoary Sunray	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Litoria aurea Green and Golden Bell Frog	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Petaurus norfolcensis Squirrel Glider	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?
Phascogale tapoatafa Brush-tailed Phascogale	No (surveyed) *Survey months are outside of the months specified in Bionet.	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☑ Dec ☑ Survey month outside the specified months?
Phascolarctos cinereus Koala	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

NSW GOVERNMENT

BAM Candidate Species Report

Threatened species Manually Added

None added

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Barking Owl	Ninox connivens	Habitat constraints
Booroolong Frog	Litoria booroolongensis	Habitat degraded
Brush-tailed Rock-wallaby	Petrogale penicillata	Habitat constraints
Gang-gang Cockatoo	Callocephalon fimbriatum	Habitat constraints
Grey-headed Flying-fox	Pteropus poliocephalus	Habitat constraints
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat constraints
Large-eared Pied Bat	Chalinolobus dwyeri	Habitat constraints
Little Eagle	Hieraaetus morphnoides	Habitat constraints
Masked Owl	Tyto novaehollandiae	Habitat constraints
Powerful Owl	Ninox strenua	Habitat constraints
Purple Copper Butterfly, Bathurst Copper Butterfly	Paralucia spinifera	Refer to BAR

Appendix C

Aboriginal Heritage Due Diligence Assessment

Stage 1 - Lot 1 DP 1253903, Barton Ave Wallerawang

Aboriginal Cultural Heritage Due Diligence Assessment

Lithgow City Council LGA NSW

October 2020

AREA Environmental Consultants & Communication

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AREA Environmental Consultants & Communication acknowledge Traditional Owners of the country on which we work

Document Controls

Proponent	Timberfix		
Client	Timberfix		
Document Description	Stage 1 - Lot 1 DP 1253903, Barton Ave Wallerawang Aboriginal Cultural Heritage Due Diligence Assessment		
Clients Representative Managing this Document	**AREA Person(s) Managing this Document**		
	Phil Cameron (PJC)		
Location: Clients>Integrated Consulting> lot 1 DP1253903 Barton Ave Wallerawang	AREA Job No: QU0357		
Document Status: Draft	Version	Date	Action
Series V1.X = internal edits	V1.0 V1.1 V1.2	24/09/2020 25/09/2020 11/10/2020	AD to Nick Harrop (NH) AREA Internal Edit PJC – QMS
Series V2.X = Client internal edits	V2.0 V2.1	11/10/2020 29/10/2020	AREA to Client Edits received from Client's representative
FINAL when draft is approved by client	V3.0	29/10/2020	Final submitted
Prepared For	**Prepared By**		
Nelson Clark Timberfix 30 Martini Parade Lithgow NSW 2790	Anna Darby Environmental Consultant AREA Environmental Consultants & Communication Pty Ltd 6 Belmore Street Dubbo NSW 2830 M 0413 281 439 E anna@areaenv.com.au ABN:29 616 529 867		

EXECUTIVE SUMMARY

Timberfix (the proponent) proposes to subdivide the property at 19 Barton Avenue, Wallerawang NSW (Lot 1 DP 1253903).

AREA Environmental Consultants & Communication (AREA) have been engaged by Timberfix to conduct an Aboriginal cultural heritage Due Diligence assessment for the proposed subdivision. The assessment has been conducted in accordance with *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010) for the proposed subdivision of 19 Barton Avenue.

No Aboriginal objects or areas of potential archaeological depots were identified during the site inspection, within the study area.

Due diligence has been applied through a desktop assessment and field survey. Further assessment is not considered to be a reasonable step. Works can procced to Stage 2 of the proposal.

If any objects of suspected Aboriginal heritage origin are encountered during the proposed work, work in the area of the find should cease and the unanticipated finds protocol (Appendix B) should be followed.

Table of Contents

FIGURES

TABLES

1 Introduction

1.1 Background

Timberfix (the proponent) proposes to subdivide the property at 19 Barton Avenue, Wallerawang NSW (Lot 1 DP 1253903).

AREA Environmental Consultants & Communication (AREA) have been engaged by Timberfix (the client) to conduct an Aboriginal cultural heritage Due Diligence assessment for the proposed subdivision. The assessment has been conducted in accordance with *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010) for the proposed subdivision of 19 Barton Avenue (study area;

).

Figure 1-1: Locality of the study area

1.2 Project description

19 Barton Avenue (Lot 1 DP 1253903) is in Wallerawang approximately 10 km north west of Lithgow in the Central Tablelands of NSW. The study area is bounded by Barton Avenue to

the north and east, Wallerawang Public School to the south and residential housing fronting Lyon Parade to the west.

The project will be conducted in two stages.

- Stage 1 will involve an initial constraints assessment in the form of a due diligence investigation to identify whether or not Aboriginal objects are in the study area and determine whether or not the proposed subdivision is likely to harm Aboriginal objects (if present).
- Stage 2 will involve further assessment if Aboriginal objects are identified in stage 1. This report will be intended to provide supporting documentation for the DA application.

This report outlines the due diligence report process conducted under stage 1.

1.3 Local environment

The study area is located within the village of Wallerawang in the Central tablelands NSW. The landscape of the study area and surrounds are typically broad rolling hills and rises with wide valleys and low gradient swampy streamlines.

Vegetation within the surrounding landscape consists of extensively cleared open-woodland. Small isolated remnants of the original vegetation contain, most commonly, scribbly gum (*Eucalyptus rossii),* snow gum (*Eucalyptus pauciflora ssp. pauciflora),* brittle gum (*Eucalyptus mannifera ssp.mannifera*), broad-leaved peppermint (*Eucalyptus dives*), and red stringybark (*Eucalyptus macrorhyncha ssp. macrorhyncha*). Grass understoreys are characteristic with common species including tussock grass (*Poa labillardieri*), blown grass (*Agrostis avenacea*), wallaby grass (*Danthonia spp*.) and kangaroo grass (*Themeda australis*). Shrubs of wattle (*Acacia spp*.), guinea flower (*Hibbertia spp.)* and tea-tree (*Leptospermum spp*.) are also present (King 1993). The study area is located approximately 200 metres from Lake Wallace which is fed by the Cox River. A regional context is provided in **Error! Reference source not found.**.

Table 1-1: Regional context of the study area

Criteria	Value
Interim Biogeographic Regionalisation for Australia (IBRA Region)	Sydney Basin, Capertee Sub Region
State	New South Wales
Local Government Area	Lithgow Council LGA
Nearest town / locality	Wallerawang
Accessed from nearest town by	Barton Road
Land use / disturbance	Vacant lot
Nearest Waterway	200 m Lake Wallace
Australian Height Datum (AHD)	900 AHD
Surrounding land use	Grazing, state forests, coalmining, power stations, shale quarries and residential urban use.
Local Aboriginal Land Council (LALC)	Bathurst LALC
Parish	Lidsdale
County	Cook

1.4 Project personnel

This due diligence assessment has been prepared by Anna Darby, Environmental Consultant AREA. Nick Harrop Project Manager AREA provided project management and reviewed this report. The qualifications of the project personnel are listed in Table 1-2.

Table 1-2: AREA staff contributing to this risk assessment

Name	Position	CV Details
Nick Harrop	Project Manager	Bachelor of Arts (Hons) in Prehistoric and Historic Archaeology. University of Sydney Master of Teaching. University of New England National Railtrack Safety Induction (ARTC and John Holland Inductions) WHS White Card Cert 4 in 4WD training (Nationally recognised training)
Anna Darby	Environmental consultant	Bachelor of Arts and Bachelor of Science (Archaeology, Paleoanthropology and Forensic Science). University of New England Bachelor of Science (Honours). University of New England WHS White Card RIW Card

2 Archaeological Context

2.1 Local archaeological context

The results of cultural heritage database searches are presented in this section. The objective of these searches is to identify any existing, recorded Aboriginal heritage within the subject site and to provide archaeological context for the proposal.

2.1.1 Database search results

The results of the database searches are summarised in Table 2-1. No sites of Aboriginal heritage are recorded within the study area. The study area is within the Warrabinga-Wiradjuri #7 native title claim.

A search of the Aboriginal Heritage Information Management System (AHIMS) was conducted on 28 August 2020 (Client ID: 531192). The AHIMS search provides archaeological context for the area and identifies whether any previously recorded Aboriginal sites are located within or near the study area. A total of 18 Aboriginal sites were recorded within the search area, with most sites recorded as the site type, ‘Artefact’ (n=12). The distribution of recorded sites is shown in

Figure 2-1. The full list of results is provided in Appendix A.

Table 2-1: Summary of database searches for Aboriginal cultural heritage

Database	Date of Search	Parameters	Results
Aboriginal Heritage Information Management System (AHIMS) Client ID: 526588	28/08/20	GDA94 Zone 55 225418 – 229418 mE 6296894 – 6300894 mS	A total of 18 recorded sites are within the search area (**Error! Not a valid result for table.**). No sites are within the study area; one site is located 250 m west of the study area.
Lithgow LEP 2014	19/08/20	Schedule 5: Environmental Heritage	No items relevant to Aboriginal heritage within the study area are listed on the LEP.
Native Title Vision https://nntt.maps.arcgis.com/	19/08/20	NSW	The study area is within the Warrabinga-Wiradjuri #7 native title claim (Tribunal No. Nc2018/002)
State Heritage Register http://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx	19/08/20	Lithgow LGA	No items relevant to Aboriginal heritage within the study area are listed on the State Heritage Register

Figure 2-1: Aboriginal sites recorded on AHIMS within 2 km of the study area

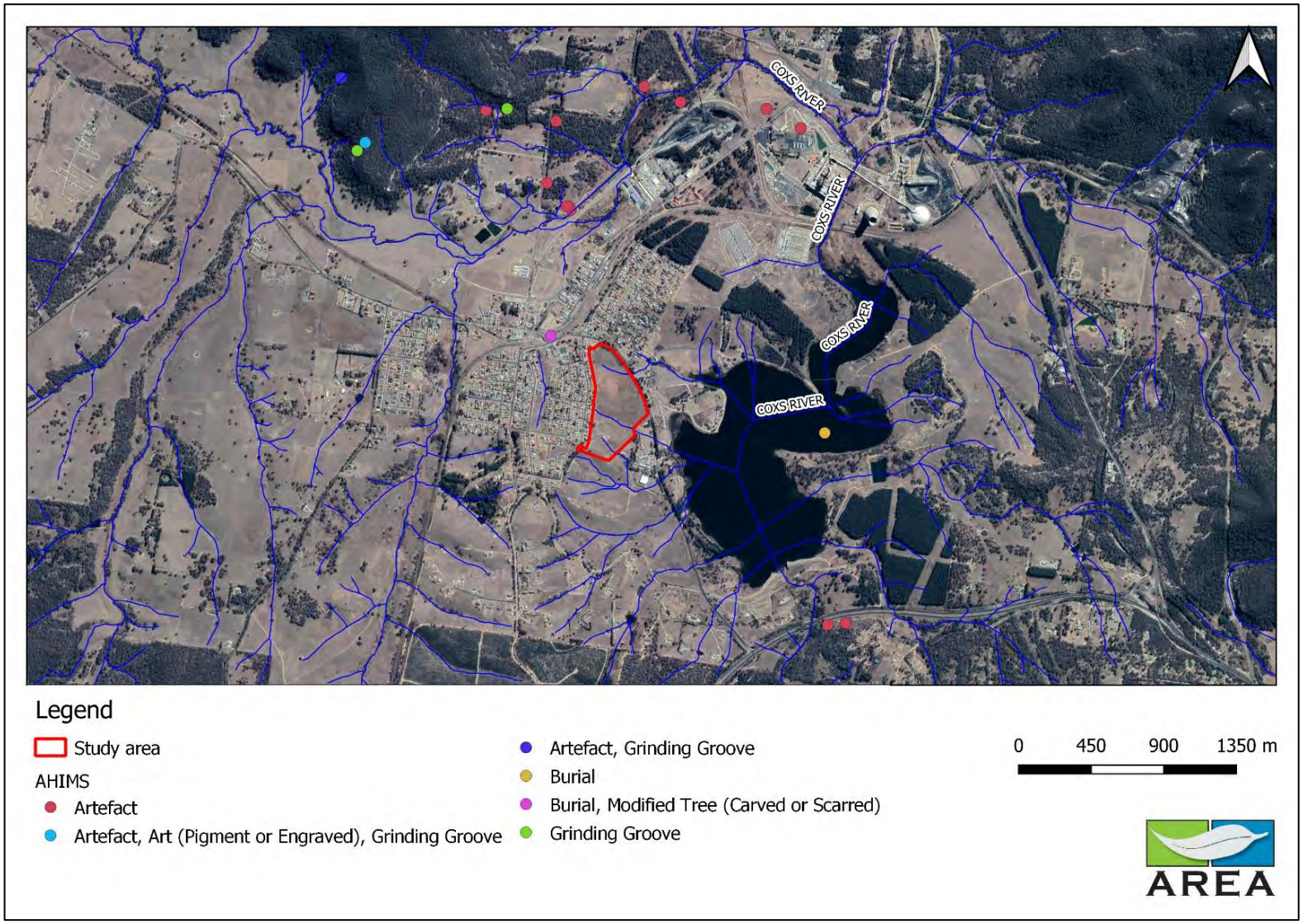
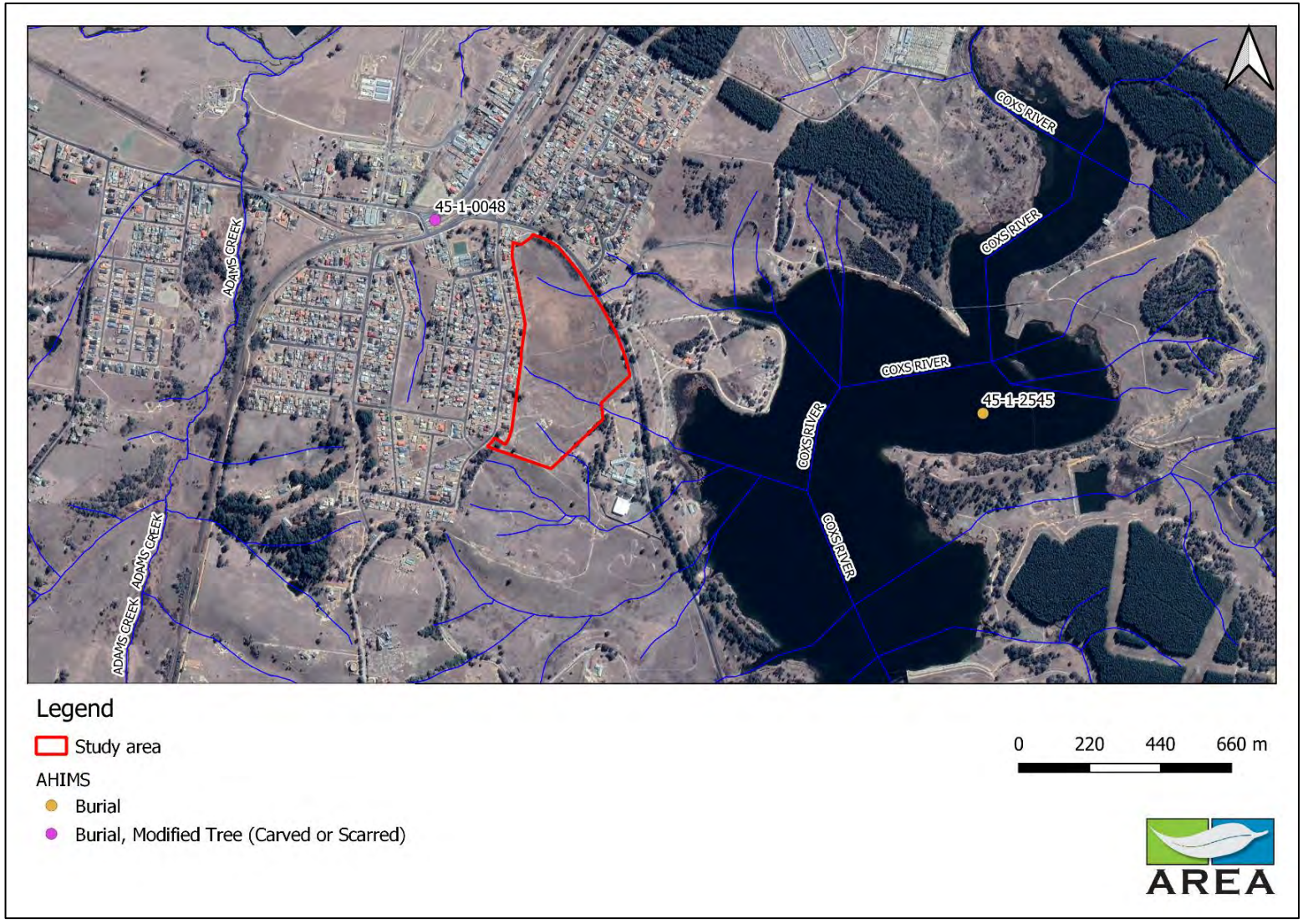


Figure 2-2: Aboriginal sites in close proximity to the study area



2.2 Predictive modelling

Areas of archaeological potential are regarded as any sensitive landform with a reasonable level of intactness (i.e. little to no disturbance or minor ground surface disturbance only and in areas not on self-mulching soils). The definition of disturbance used here follows that of the *NPW Regulation 2009* (Clause 80B, Subclause 4). Sensitive landforms follow the definitions supplied in the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010):

- within 200m of waters
- located within a sand dune system
- located on a ridge top, ridge line or headland
- located within 200m below or above a cliff face
- within 20m of or in a cave, rock shelter, or a cave mouth.

Areas nearby to waterways are typically more likely to contain Aboriginal archaeological remains. Any sections within 200 metres of waterways exposed to little or no previous impacts are more likely to contain intact sites. The eastern section of the study area is defined as a sensitive landform as defined by the Due Diligence code of practice as it is within 200 m of Lake Wallace which is a manmade post European occupation lake. Lake Wallace is fed by the Cox River which is part of the Hawkesbury-Nepean Catchment area.

The most common site within the AHIMS extensive search, 'Artefact', may occur within the study area in areas with ground surface exposures and little disturbance. Culturally modified scarred trees may occur within the study area in areas that contain remnant mature native trees. However, they may be indirectly or incidentally impacted without management and so the possibility of culturally-modified trees needs to be considered.

3 Fieldwork Results

3.1 Background to fieldwork

The fieldwork component of this assessment was undertaken on 15 September 2020 by Anna Darby of AREA. The purpose of the field assessment was to support the desktop research and to identify Aboriginal objects. Addy Watson of AREA conducted the ecological assessment simultaneously.

3.2 Methods

The study area was inspected by pedestrian survey. Particular attention was paid to exposed ground surfaces to increase the chances of locating any stone artefact scatters. All mature trees were inspected to identify culturally scars. Ground surface visibility and existing levels of disturbance were noted.

Recordings were made of ground surface visibility and existing levels of disturbance. Recording included photographs, mapping, written records and GPS coordinates.

3.2.1 Limitations

Potential sub-surface archaeological sites cannot be directly detected and the detectability of Aboriginal sites with surface remains is contingent on ground surface visibility (GSV). GSV was generally low (less than 5%) across the study area (Figure 3-5).

Wildlife within the study area was also prominent with the south east corner containing nesting magpies that were swooping. A mob of kangaroos were also present in the study area and were avoided during the field survey.

3.3 Results

The landscape within the study area consisted of moderate to steep slopes with crests appearing along the western edge of the study area (Figure 3-1: Example of low GSV in the study area

Figure 3-2 and Figure 3-3). The area adjacent to the western boundary of the study area has been built up for residential development. The south west corner of the study area almost protrudes to Lyon Parade (Figure 3-4).

Heavy disturbance was observed throughout the study area in the form of two dams, three separate powerlines, an underground cable and clearing along the north east boundary fence (Figure 3-5). Vegetation within the study area consisted of dense grasses, brambles, a small grouping of non-native trees along the north east boundary and some remnant Eucalyptus trees, including a large Black Gum (*Eucalyptus aggregate)*. A scar was observed on the southern face of the Black Gum and contained a beehive. The beehive made close inspection of the scar impossible. The tree contained some certain attributes that would identify it as an Aboriginal cultural scar i.e. mature and native tree species (Long 2005). However, the overgrown nature of the scar and the lack of evidence for the affirmative it was determined not to be a culturally modified scar tree (Figure 3-7 and Figure 3-8).

No Aboriginal objects or areas of potential archaeological depots were identified during the site inspection, within the study area.

Figure 3-1: Example of low GSV in the study area

Figure 3-2: View south west across the study area from the northern boundary

Figure 3-3: View south across the study area

Figure 3-4: View north west at the section of the study area adjacent to Lyon parade

Figure 3-5: View south across the study area showing the powerlines and underground cable

Figure 3-6: View north west across the middle of the study area

Figure 3-7: View north towards the Black Gum, arrow indicates scar

Figure 3-8: Close up of the scar, facing north

3.4 Discussion

The study area contained moderate to high amounts of disturbance as evidenced by the large-scale clearing of the open woodland, powerlines and underground cable.

The results of the field work were consistent with the predictive model outlined in section 2.2. GSV was low across the study area making it difficult to identify stone artefacts. There is an ever-present possibility of stone artefacts remaining undetected where GSV is not total. It is possible that there are undetected Aboriginal sites within the subject site based on the results of the field survey and desktop assessment, however, less likelihood for intact sites. Subsurface remains are unlikely due to the high level of disturbance along much of the study area.

The Black Gum containing the scar and beehive was determined to not be of cultural origin. Close inspection of the scar was not possible due to the beehive. However, a closer inspection is unlikely to provide conclusive evidence of the origin of the scar.

No Aboriginal objects or areas of potential archaeological depots were identified within the study area.

4 Recommendations

The following recommendations are based on the on the consideration of:

- The requirements of the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010)
- The results of the background research and fieldwork
- The likely impacts of the proposed development.

No Aboriginal objects or areas of potential archaeological depots were identified within the study area.

Based on the assessment, the following recommendations are made:

- No further assessment is required, and works can progress to Stage 2
- If any objects of suspected Aboriginal heritage origin be encountered during the proposed works, work in the area of the find should cease and the unexpected finds protocols (Appendix B) should be implemented
- If suspected human remains are located during any stage of the proposed works, work must stop immediately, and the NSW police must be notified.

5 References

Department of Environment, Climate Change and Water (DECCW). (2010). *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*. DECCW.

Long, A. (2005). *Aboriginal Scarred Trees in New South Wales, a Field Manual*. Department of Environment and Conservation, NSW.

King, D. P & New South Wales. (1993). *Soil landscapes of the Wallerawang 1:100 000 sheet (Lithgow, Wallerawang, Cullen Bullen, Glen Davis)*. Dept. of Conservation and Land Management, [Sydney]

Appendix A: AHIMS Search Results

Results of AHIMS extensive search within 2 km of the subject site

Office of Environment & Heritage

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Wallerwang 2km

Client Service ID : 531192

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-1-2716	SU1a - A5	GDA	56	227585	6300837	Open site	Valid	Artefact : 19		
	Contact	**Recorders**	Ms.Cheng-Yen Loo,RPS East Australia Pty Ltd - Echuca Victoria					**Permits**		
45-2-2539	SU1a - A7	GDA	56	227122	6300093	Open site	Valid	Artefact : 4		
	Contact	**Recorders**	Ms.Cheng-Yen Loo,RPS East Australia Pty Ltd - Echuca Victoria					**Permits**		
45-1-2717	SU1a - A8	GDA	56	227130	6300072	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Ms.Cheng-Yen Loo,RPS East Australia Pty Ltd - Echuca Victoria					**Permits**		
45-1-2718	SU1a - A9	GDA	56	226981	6300239	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Ms.Cheng-Yen Loo,RPS East Australia Pty Ltd - Echuca Victoria					**Permits**		
45-1-2719	SU1a - A6	GDA	56	227105	6300095	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Ms.Cheng-Yen Loo,RPS East Australia Pty Ltd - Echuca Victoria					**Permits**		
45-1-2799	Brays Lane AS1	GDA	56	227039	6300622	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
45-1-2800	WPS-IF1	GDA	56	228556	6300579	Open site	Valid	Artefact : -		104157,104158
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**		
45-1-0211	S2;Wallerawang;	GDA	56	227811	6300741	Open site	Valid	Artefact : -	Open Camp Site	2300
	Contact	**Recorders**	Mr.Neville Baker,Elizabeth Rich,Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats					**Permits**	467	
45-1-0247	Wallerawang Schoolhouse;	AGD	56	228240	6300510	Open site	Valid	Artefact : -	Open Camp Site	3818
	Contact	**Recorders**	Ms.Elizabeth White					**Permits**		
45-1-0110	W4;	AGD	56	228620	6297310	Open site	Valid	Artefact : -	Open Camp Site	1515
	Contact	**Recorders**	Rex Silcox					**Permits**		
45-1-0111	W3;	AGD	56	228730	6297320	Open site	Valid	Artefact : -	Open Camp Site	1515
	Contact	**Recorders**	Rex Silcox					**Permits**	78	
45-1-0010	Pipers Flat Creek;	AGD	56	225600	6300700	Closed site	Valid	Artefact : -, Grinding Groove : -	Axe Grinding Groove,Shelter with Deposit	1515
	Contact	**Recorders**	D Miller					**Permits**		
45-1-0020	Pipers Flat Creek;	AGD	56	225750	6300300	Closed site	Valid	Artefact : -, Art (Pigment or Engraved) : -, Grinding Groove : -	Axe Grinding Groove,Shelter with Art,Shelter with Deposit	
	Contact	**Recorders**	R Miller					**Permits**		
45-1-0021	Pipers Flat Creek;	AGD	56	225700	6300250	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	
	Contact	**Recorders**	R Miller					**Permits**		
45-1-0022	Pipers Flat Creek;Bald Rock;	AGD	56	226630	6300510	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	

Report generated by AHIMS Web Service on 28/08/2020 for Anna Darby for the following area at Datum :GDA, Zone : 56, Eastings : 225418 - 229418, Northings : 6296894 - 6300894 with a Buffer of 0 meters. Additional Info : site visit. Number of Aboriginal sites and Aboriginal objects found is 18

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Page 1 of 2

Office of Environment & Heritage

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Wallerwang 2km

Client Service ID : 531192

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	Recorders	R Miller					Permits		
45-1-0023	Pipers Flat Creek;Bald Rock;	AGD	56	226500	6300500	Closed site	Valid	Artefact : -	Shelter with Deposit	
	Contact	Recorders	R Miller					Permits		
45-1-0048	Wallerawang; Lithgow;	AGD	56	226900	6299100	Open site	Valid	Burial : -, Modified Tree (Carved or Scarred) : -	Burial/s,Carved Tree	
	Contact	Recorders	David Bell,NPWS - Blackheath Office,Betty Meehan					Permits	473	
45-1-2545	Wallerowong Station Massacre	AGD	56	228600	6298500	Open site	Valid	Burial : -	Burial/s	
	Contact	Recorders	Ms.Adrienne Howe-Piening					Permits		

Report generated by AHIMS Web Service on 28/08/2020 for Anna Darby for the following area at Datum :GDA, Zone : 56, Eastings : 225418 - 229418, Northings : 6296894 - 6300894 with a Buffer of 0 meters. Additional Info : site visit. Number of Aboriginal sites and Aboriginal objects found is 18

Appendix B: Unanticipated Finds Protocol

Unanticipated Finds Protocol

The protocol to be followed in the event previously unrecorded or unanticipated Aboriginal object(s) are encountered during the proposed works is as follows:

- All ground surface disturbance in the area of the finds should cease immediately the finds are uncovered.
- If the finds are of human remains, contact the local police.
- Seek verification of the finds from a suitably qualified person, such as a heritage consultant.
- If the finds are verified or very likely to be Aboriginal in origin notify NSW Heritage, Department of Premier and Cabinet and the relevant local Aboriginal community representatives.
- All finds should be professionally recorded and registered on appropriate databases.
- A management strategy will be required according to best practice and consultation with the local Aboriginal community. All management will require approval from the relevant determining authority.

Appendix D

Bush Fire Safety Authority Checklist

Table 8: Clause 45 Rural Fires Regulations 2022 Considerations

Requirement	Section of Report where addressed	Compliance		
		Yes	No	N/A
(1) For the purposes of the Act, section 100B(4), an application for a bush fire safety authority must be made in writing.	This report is to form part of that application			
(2) An application for a bush fire safety authority must include the following—				
(a) a description, including the address, of the property on which the development the subject of the application is proposed to be carried out,	Section 1.3	☒	☐	☐
(b) a classification of the vegetation on and surrounding the property, out to a distance of 140 metres from the boundaries of the property, in accordance with the system for classification of vegetation contained in Planning for Bush Fire Protection,	Section 2.2.	☒	☐	☐
(c) an assessment of the slope of the land on and surrounding the property, out to a distance of 100 metres from the boundaries of the property,	Section 2.3	☒	☐	☐
(d) identification of significant environmental features on the property,	Section 1.3.3	☒	☐	☐
(e) the details of a threatened species or threatened ecological community under the Biodiversity Conservation Act 2016 that the applicant knows to exist on the property,	Section 1.3.4	☒	☐	☐
(f) the details and location of an Aboriginal object or place, within the meaning of the National Parks and Wildlife Act 1974, that the applicant knows to be situated on the property,	Section 1.3.5	☒	☐	☐
(g) a bush fire assessment for the proposed development, including the methodology used in the assessment, that addresses the following matters—	Section 2	☒	☐	☐
i. the extent to which the development is to provide for setbacks, including asset protection zones,	Section 2.5 and 3.4.1	☒	☐	☐
ii. the siting and adequacy of water supplies for fire fighting,	Section 3.4.3	☒	☐	☐
iii. the capacity of nearby public roads to handle increased volumes of traffic when a bush fire emergency occurs,	Section 3.4.3	☒	☐	☐
iv. whether or not nearby public roads that link with the fire trail network have two-way access,	No fire trail network	☐	☐	☒

Table 8: Clause 45 Rural Fires Regulations 2022 Considerations

Requirement	Section of Report where addressed	Compliance		
		Yes	No	N/A
v. the adequacy of arrangements for access to and egress from the development site for the purposes of an emergency response,	Section 3.4.2	☒	☐	☐
vi. the adequacy of bush fire maintenance plans and fire emergency procedures for the development site,	Section 3.4.4	☒	☐	☐
vii. the construction standards to be used for building elements in the development,	Nil required at this stage as there is no built form.	☐	☐	☒
viii. the adequacy of sprinkler systems and other fire protection measures to be incorporated into the development,	Nil required/proposed.	☐	☐	☒
ix. registered fire trails on the property,	Nil.	☐	☐	☒
(h) an assessment of the extent to which the proposed development conforms with or deviates from Planning for Bush Fire Protection.	Section 3.4	☒	☐	☐
(3) An application for a bush fire safety authority must also be accompanied by the prescribed information if—				
(a) the proposed development is subdivision for the purposes of dwelling houses, dual occupancies or secondary dwellings on property in an urban release area, and	Not an URA.	☐	☐	☒
(b) the application includes a request by the applicant that the Commissioner, when deciding the application, considers whether it would be appropriate for the erection of the dwelling houses, dual occupancies or secondary dwellings concerned to be excluded from the application of the Environmental Planning and Assessment Act 1979, section 4.14.	Not an URA.	☐	☐	☒
(4) In this section— ***prescribed information*** means the following— (a) a plan of subdivision that shows— x. (i) the bush fire attack levels that will apply to the property on completion of clearing of vegetation proposed to be carried out as part of subdivision work, within the meaning of the Environmental Planning and Assessment Act 1979, and xi. (ii) proposed setbacks of buildings that may in future be erected on the property, including asset protection zones, and (b) other information about the proposed development that the Commissioner may require.				

Table 8: Clause 45 Rural Fires Regulations 2022 Considerations

Requirement	Section of Report where addressed	Compliance		
		Yes	No	N/A
Note— *More information about bush fire attack levels, including the flame zone, can be found in Planning for Bush Fire Protection, ISBN 978 0 646 99126 9, Table A1.7, published by the NSW Rural Fire Service in November 2019.* ***urban release area*** has the same meaning as in the Environmental Planning and Assessment Regulation 2021, section 270. ***dual occupancy, dwelling house and secondary dwelling*** have the same meanings as in the standard instrument prescribed by the Standard Instrument (Local Environmental Plans) Order 2006.				

Appendix E

Classified Vegetation Map

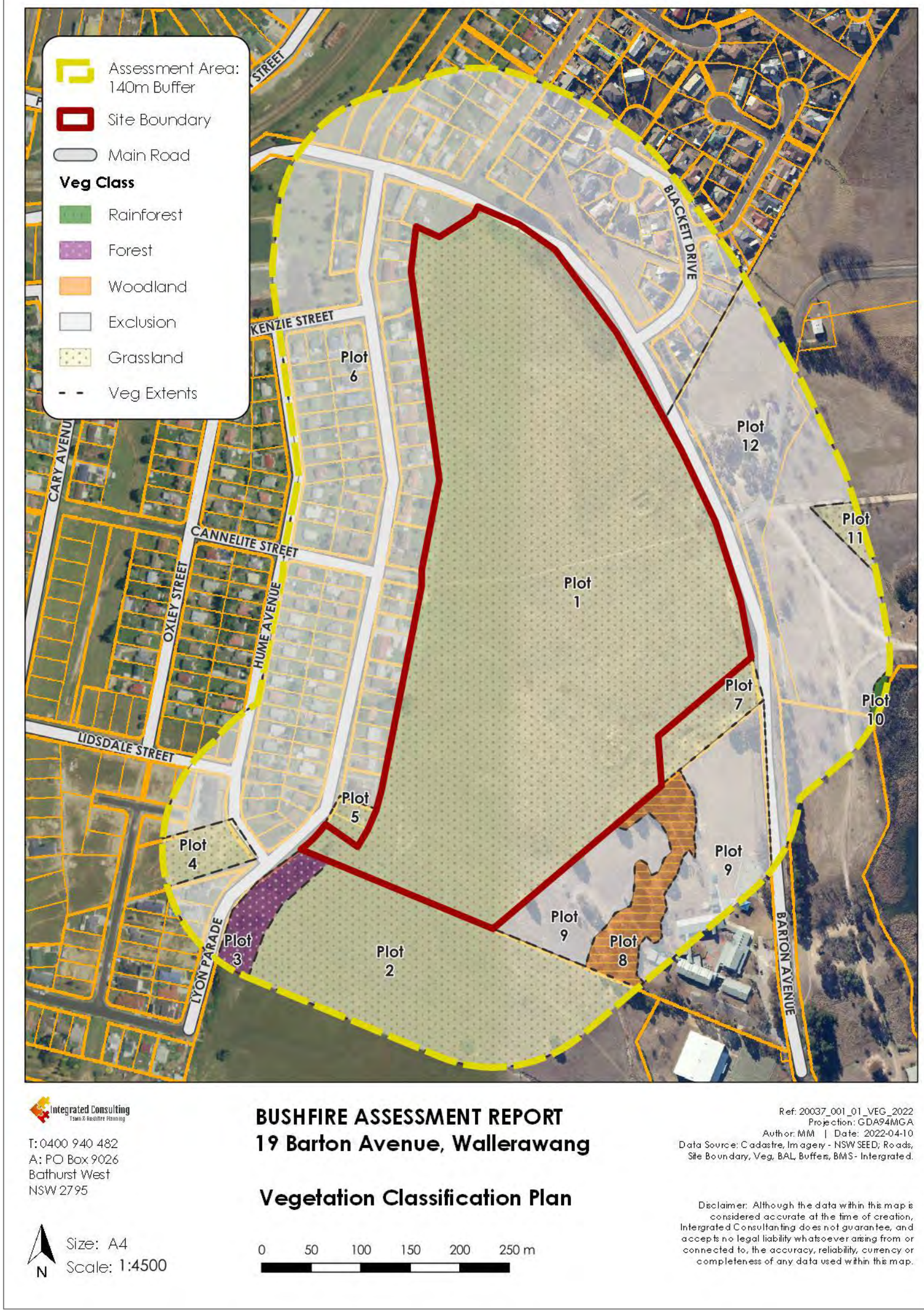


Figure 10: Vegetation Classification

Appendix F

Bush Fire Protection Measures Plan

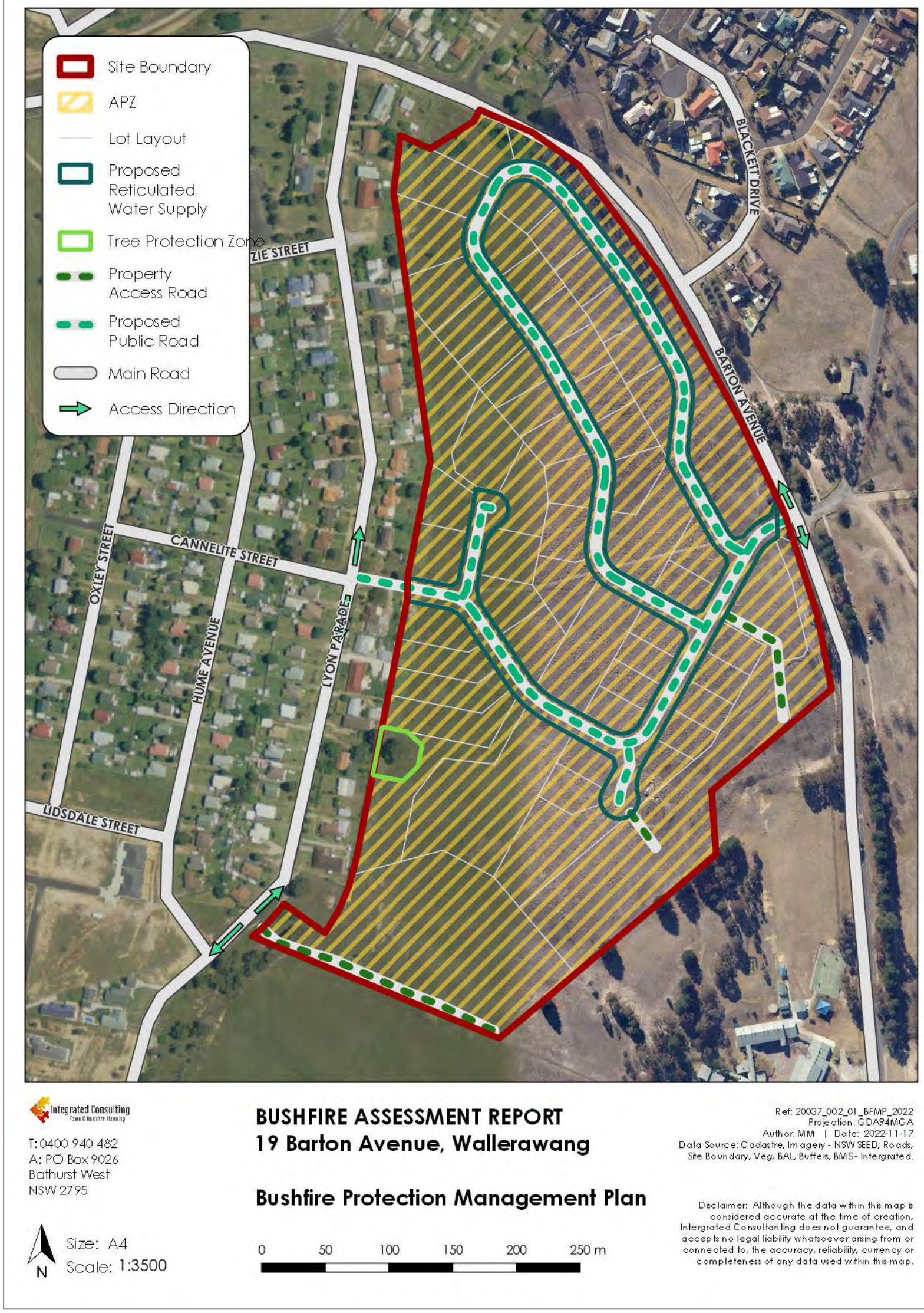


Figure 11: Bush Fire Protection Measures

Appendix G

APZ & Landscaping Measures

APPENDIX 4

ASSET PROTECTION ZONE REQUIREMENTS

In combination with other BPMs, a bush fire hazard can be reduced by implementing simple steps to reduce vegetation levels. This can be done by designing and managing landscaping to implement an APZ around the property.

Careful attention should be paid to species selection, their location relative to their flammability, minimising continuity of vegetation (horizontally and vertically), and ongoing maintenance to remove flammable fuels (leaf litter, twigs and debris).

This Appendix sets the standards which need to be met within an APZ.

A4.1 Asset Protection Zones

An APZ is a fuel-reduced area surrounding a building or structure. It is located between the building or structure and the bush fire hazard.

For a complete guide to APZs and landscaping, download the NSW RFS document *Standards for Asset Protection Zones* at the NSW RFS Website www.rfs.nsw.gov.au.

An APZ provides:

- a buffer zone between a bush fire hazard and an asset;
- an area of reduced bush fire fuel that allows for suppression of fire;
- an area from which backburning or hazard reduction can be conducted; and
- an area which allows emergency services access and provides a relatively safe area for firefighters and home owners to defend their property.

Bush fire fuels should be minimised within an APZ. This is so that the vegetation within the zone does not provide a path for the spread of fire to the building, either from the ground level or through the tree canopy.

An APZ, if designed correctly and maintained regularly, will reduce the risk of:

- direct flame contact on the building;
- damage to the building asset from intense radiant heat; and
- ember attack.

The methodology for calculating the required APZ distance is contained within Appendix 1. The width of the APZ required will depend upon the development type and bush fire threat. APZs for new development are set out within Chapters 5, 6 and 7 of this document.

In forest vegetation, the APZ can be made up of an Inner Protection Area (IPA) and an Outer Protection Area (OPA).

A4.1.1 Inner Protection Areas (IPAs)

The IPA is the area closest to the building and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and act as a defendable space. Vegetation within the IPA should be kept to a minimum level. Litter fuels within the IPA should be kept below 1cm in height and be discontinuous.

In practical terms the IPA is typically the curtilage around the building, consisting of a mown lawn and well maintained gardens.

When establishing and maintaining an IPA the following requirements apply:

Trees

- tree canopy cover should be less than 15% at maturity;
- trees at maturity should not touch or overhang the building;
- lower limbs should be removed up to a height of 2m above the ground;
- tree canopies should be separated by 2 to 5m; and
- preference should be given to smooth barked and evergreen trees.

Shrubs

- create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided;
- shrubs should not be located under trees;
- shrubs should not form more than 10% ground cover; and
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

Grass

- grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and
- leaves and vegetation debris should be removed.

A4.1.2 Outer Protection Areas (OPAs)

An OPA is located between the IPA and the unmanaged vegetation. It is an area where there is maintenance of the understorey and some separation in the canopy. The reduction of fuel in this area aims to decrease the intensity of an approaching fire and restricts the potential for fire spread from crowns; reducing the level of direct flame, radiant heat and ember attack on the IPA.

Because of the nature of an OPA, they are only applicable in forest vegetation.

When establishing and maintaining an OPA the following requirements apply:

Trees

- tree canopy cover should be less than 30%; and
- canopies should be separated by 2 to 5m.

Shrubs

- shrubs should not form a continuous canopy; and
- shrubs should form no more than 20% of ground cover.

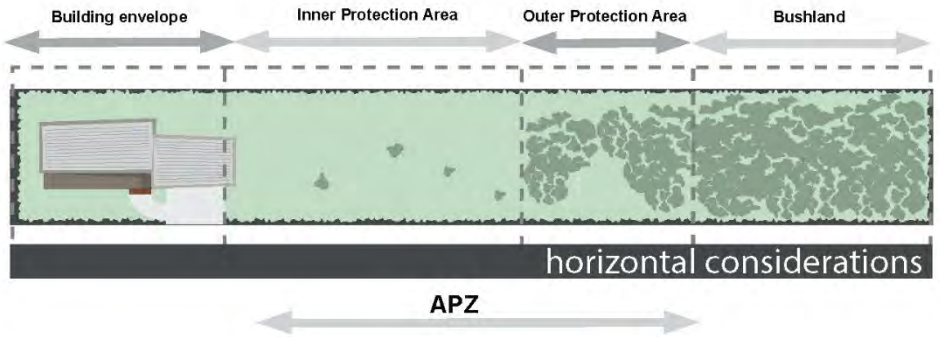
Grass

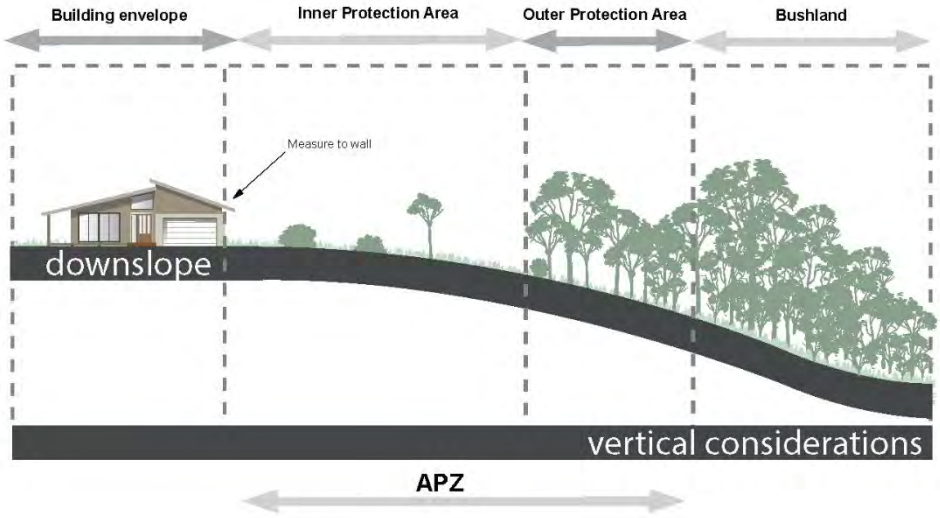
- grass should be kept mown to a height of less than 100mm; and
- leaf and other debris should be removed.

An APZ should be maintained in perpetuity to ensure ongoing protection from the impact of bush fires. Maintenance of the IPA and OPA as described above should be undertaken regularly, particularly in advance of the bush fire season.

Figure A4.1

Typical Inner and Outer Protection Areas.





Appendix H

Access Standards

APPENDIX 3

ACCESS

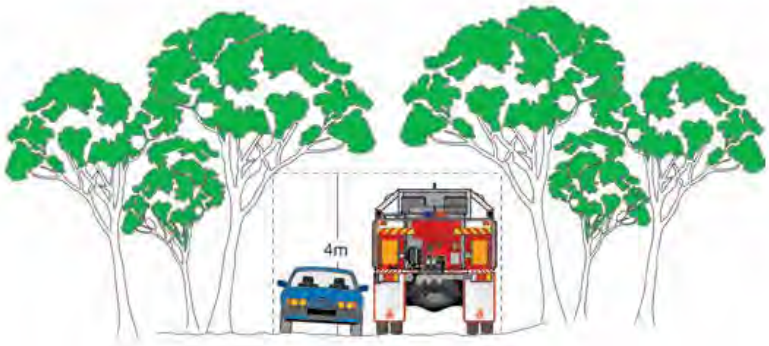
This appendix provides design principles for emergency service vehicle access.

A3.1 Vertical clearance

An unobstructed clearance height of 4 metres should be maintained above all access ways including clearance from building construction, archways, gateways and overhanging structures (e.g. ducts, pipes, sprinklers, walkways, signs and beams). This also applies to vegetation overhanging roads.

Figure A3.1

Vertical clearance.



A3.2 Vehicle turning requirements

Curved carriageways should be constructed using the minimum swept path as outlined in Table A3.2.

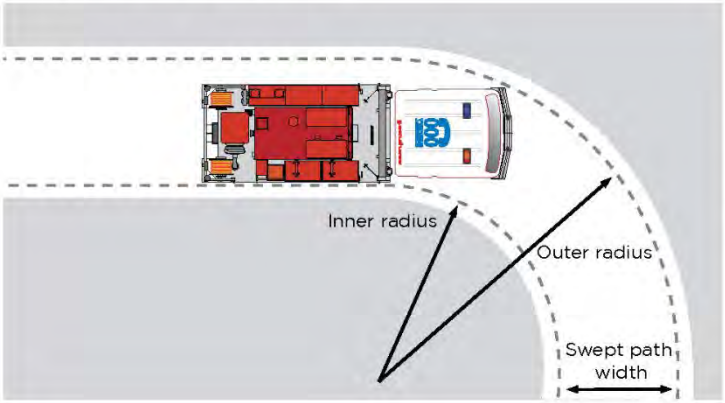
Table A3.2

Minimum curve radius for turning vehicles.

Curve radius (inside edge in metres)	Swept path (metres width)
< 40	4.0
40 - 69	3.0
70 - 100	2.7
>100	2.5

Figure A3.2a

Swept path width for turning vehicles.



The radius dimensions given are for wall to wall clearance where body overhangs travel a wider arc than the wheel tracks (vehicle swept path). The swept path shall include an additional 500mm clearance either side of the vehicle.

Figure A3.2b

Roundabout swept path.

Example of a swept path as applied to a roundabout. The distance between inner and outer turning arcs allows for expected vehicle body swing of front and rear overhanging sections (the swept path).

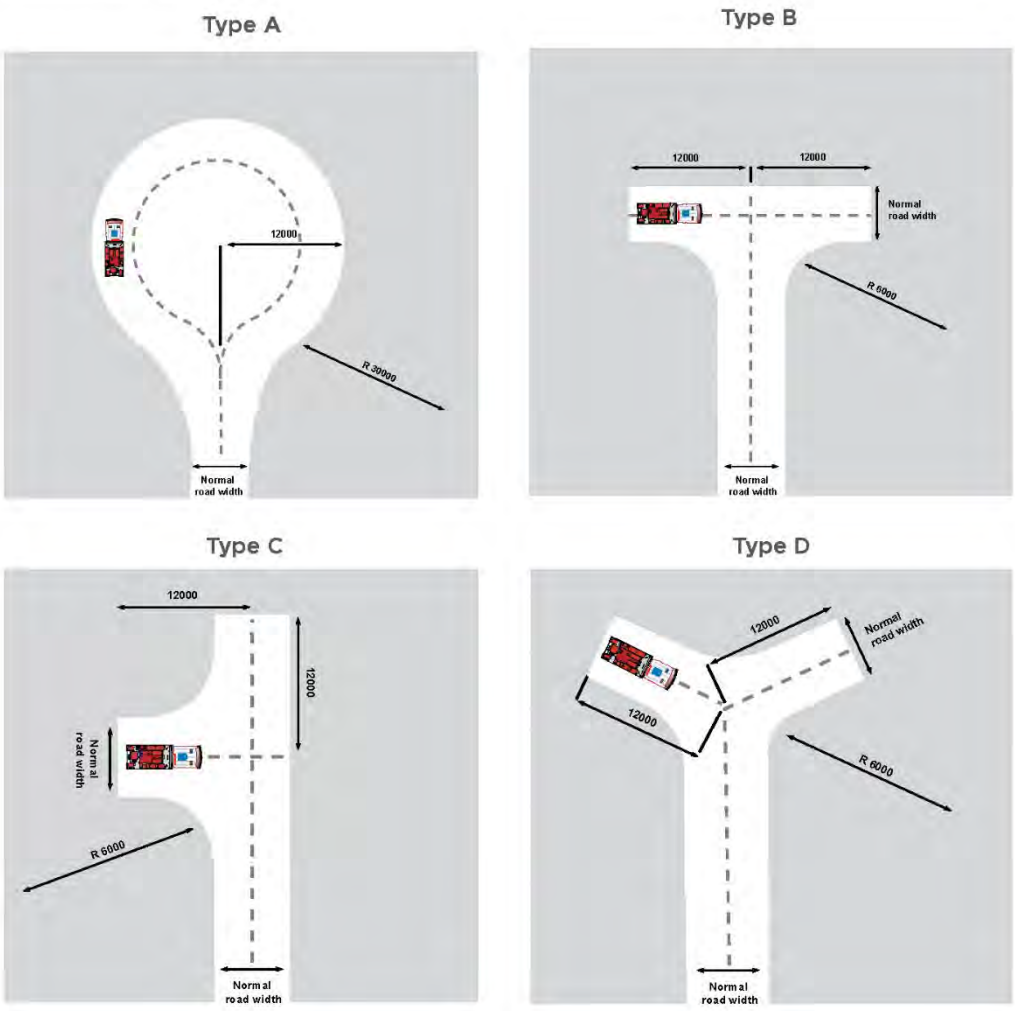
A3.3 Vehicle turning head requirements

Dead ends that are longer then 200m must be provided with a turning head area that avoids multipoint turns. "No parking" signs are to be erected within the turning head.

The minimum turning radius shall be in accordance with Table A3.2. Where multipoint turning is proposed the NSW RFS will consider the following options:

Figure A3.3

Multipoint turning options.



A3.4 Passing bays

The construction of passing bays, where required, shall be 20m in length and provide a minimum trafficable width at the passing point of 6m.

Figure A3.4

Passing bays can provide advantages when designed correctly. Poor design can and does severely impede access.

A3.5 Parking

Parking can create a pinch point in required access. The location of parking should be carefully considered to ensure fire appliance access is unimpeded. Hydrants shall be located outside of access ways and any parking areas to ensure that access is available at all times.

Figure A3.5

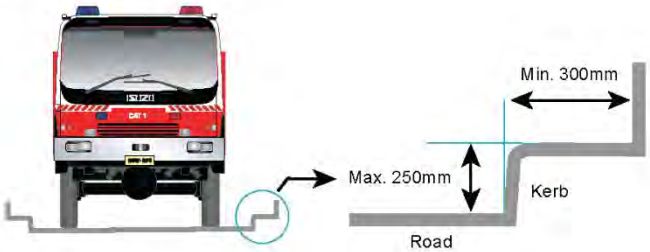
Hydrants and parking bays.

A3.6 Kerb dimensions

All kerbs constructed around access roads should be no higher than 250mm and free of vertical obstructions at least 300mm back from the kerb face to allow clearance for front and rear body overhang.

Figure A3.6

Carriageway kerb clearance dimensions.



A3.7 Services

Hydrant services should be located outside the carriageway and parking bays to permit traffic flow and access. Setup of standpipes within the carriageway may stop traffic flow. Hydrant services shall be located on the side of the road away from the bush fire threat where possible.

A3.8 Local Area Traffic Management (LATM)

The objective of LATM is to regulate traffic an acceptable level of speed and traffic volume within a local area.

Traffic engineers and planners should consider LATM devices when planning for local traffic control and their likely impact on emergency services. LATM devices by their nature are designed to restrict and impede the movement of traffic, especially large vehicles.

Where LATM devices are provided they are to be designed so that they do not impede fire vehicle access.

A3.9 Road types

A3.9.1 Perimeter Roads

Perimeter roads are to be provided with a minimum clear width of 8m. Parking and hydrants are to be provided outside of carriageways. Hydrants are to be located outside of carriageways and parking areas.

Figure A3.9a

Perimeter road widths.

A3.9.2 Non-perimeter Roads

Non-perimeter roads shall be provided with a minimum clear width of 5.5m. Parking is to be provided outside of the carriageway and hydrants are not to be located in carriageways or parking areas.

Figure A3.9b

Non-perimeter road widths.

A3.9.3 Property access

Property access roads are to be a minimum of 4m wide.

Figure A3.9c

Property access road widths.