



Biodiversity Development Assessment Report

344 Park Road, Wallacia, NSW, 2745

Report prepared for Benbow Environmental

August 2021



NARLA

environmental

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Report Certification

Works for this report were undertaken by:

Staff Name	Position
Alexander Graham <i>BSc</i>	Narla Environmental Accredited Biodiversity Assessor (BAAS19040) and Senior Ecologist
Jack Tatler <i>BSc (Hons) PhD</i>	Narla Environmental Accredited Biodiversity Assessor (BAAS21006) and Senior Ecologist
Sarah Cardenzana <i>BEnvSc</i>	Narla Environmental Ecologist

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Dr Jack Tatler *BSc (Hons) PhD*
General Manager / Senior Ecologist
Accredited Biodiversity Assessor (BAAS21006)
Narla Environmental Pty Ltd

Table of Contents

1.	Introduction	10
1.1	Overview	10
1.2	The Proposed Development	10
1.3	Site Location and Description	10
1.4	Sources of Information Used	14
1.5	Aim and Approach	14
2.	Landscape Features.....	16
2.1	IBRA bioregion and subregion	16
2.2	Mitchell Landscapes.....	16
2.3	Topography, geology and soils	16
2.4	Hydrology.....	16
2.5	Native Vegetation Cover and Connectivity	17
3.	Native Vegetation	26
3.1	PCT's identified within the Subject Land	26
3.1.1	PCT Selection Process	26
3.1.2	Final PCT and Vegetation Zone Selection	32
3.1.1	Threatened Ecological Communities	37
3.1	Assessing Patch Size.....	39
3.2	Vegetation Integrity Survey (VIS) Plots	39
3.2.1	Determining future vegetation integrity scores	39
4.	Threatened Species.....	43
4.1	Candidate Ecosystem Credit Species	43
4.2	Candidate Species Credit Species Summary	45
4.3	Targeted Species Credit Surveys.....	52
4.3.1	Fauna Species Credit Survey	53
4.3.1.1	Targeted Fauna Survey Effort	54
4.3.2	Flora Species Credit Survey	56
4.4	Species Polygons.....	57
5.	Avoid and Minimise Impacts.....	59
5.1	Impact Mitigation and Minimisation Measures	59
6.	Impact Summary	63
6.1	Impacts on Native Vegetation	63
6.2	Impacts on Threatened Species	63
6.3	Serious and Irreversible Impacts (SAIL)	63
6.4	Other Impacts	65

6.4.1	Indirect Impacts	65
6.4.2	Groundwater Dependent Ecosystems	73
6.4.3	Prescribed and Uncertain Impacts.....	74
6.5	Biodiversity Offset Credit Requirements	76
6.5.1	Offset Requirement for Ecosystem Credits	76
6.5.2	Offset Requirement for Species Credits	76
7.	Other Relevant Legislation and Planning Policies	77
7.1	Commonwealth Environment Protection and Biodiversity Conservation Act 1999.....	77
7.2	State Environmental Planning Policy (Koala Habitat Protection) 2019	78
7.3	State Environmental Planning Policy No 19—Bushland in Urban Areas	78
7.4	State Environmental Planning Policy (Coastal Management) 2018	79
8.	References	80
9.	Appendices	83

Figures

Figure 1.	Encroachment of the Subject Land into land mapped on the Biodiversity Values Map.	11
Figure 2.	The components and location of the Subject Property and Subject Land.	12
Figure 3.	The location of the Subject Land within the locality.....	13
Figure 4.	IBRA Bioregion and Subregion of the Subject Land.	18
Figure 5.	IBRA Bioregion and Subregion of the Subject Property, and within a 1500m buffer.	19
Figure 6.	NSW Mitchell Landscape Ecosystem of the Subject Land.	20
Figure 7.	NSW Mitchell Landscape Ecosystem of the Subject Land and within a 1500m buffer.	21
Figure 8.	Watercourses and riparian buffer zones occurring within and adjacent to the Subject Land.	22
Figure 9.	Rivers and streams (with associated riparian buffers) occurring within the 1500m buffer.....	23
Figure 10.	The extent of native vegetation, habitat connectivity and patch size within and surrounding the Subject Land.	24
Figure 11.	The extent of native vegetation, patch size and habitat connectivity occurring within and surrounding the 1500m buffer.	25
Figure 12.	Narla field validated vegetation mapping within the Subject Land.	38
Figure 13.	Management Zones within the Subject Land.	40
Figure 14.	Targeted survey effort undertaken by Narla within the Subject Land.	58
Figure 15.	Impacts on native vegetation and offset requirements.	64

Tables

Table 1. PCT Selection Criteria. Dark border indicates the selected PCT.....	27
Table 2. Vegetation identified within the Subject Land: Zone 1 & 2.....	32
Table 3. Non-native vegetation identified within the Subject Land.....	34
Table 4. Areas without vegetation identified within the Subject Land.....	34
Table 5. Vegetation integrity scores for each identified zone.....	41
Table 6. Management Zones within the Subject Land, and the relevant vegetation attributes (composition, structure and function) affecting future VI scores.....	41
Table 7. Candidate ecosystem credits predicted to occur within the Subject Land.....	43
Table 8. Candidate Fauna Credit Species predicted to occur within the Subject Land.....	45
Table 9. Candidate Flora Credit Species predicted to occur within the Subject Land.....	49
Table 10. Weather conditions taken from the nearest weather stations (Station number 067105) in the lead up and during the field survey (BOM 2019; BOM 2020). Survey dates are in bold.....	52
Table 11. Species credit fauna species requiring targeted surveys and DPIE endorsed survey periods.....	54
Table 12. Microbat targeted survey effort undertaken within the Subject Land.....	55
Table 13. Species credit flora species requiring targeted surveys. Targeted surveys were conducted within DPIE endorsed survey periods.....	56
Table 14. Table of measures to be implemented before, during and after construction to avoid and minimise the impacts of the project.....	59
Table 15. Indirect impacts associated with the proposed development.....	65
Table 16. Prescribed and uncertain impacts associated with the proposed development.....	74
Table 17. Ecosystem credits required to offset the proposed development.....	76
Table 18. Key Diagnostics Characteristics required to meet the EPBC Listing Status for Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Threatened Species Scientific Committee 2009).....	77

Plates

Plate 1. Representative photo of Zone 1 (PCT 724 – Shrubby Understorey) within the Subject Land.....	35
Plate 2. Representative photo of Zone 2 (PCT 724 – Cleared) within the Subject Land.....	36
Plate 3. Representative photo of Zone 3 (Non-native Vegetation) within the Subject Land.....	36
Plate 4. Representative photo of Zone 4 (Cleared Land) within the Subject Land.....	37

Glossary

Acronym/ Term	Definition
Accredited Biodiversity Assessor	Individuals accredited by the Department of Planning, Industry and Environment (DPIE) to apply the Biodiversity Assessment Method.
BAM	The NSW Biodiversity Assessment Method
BAMC	The NSW Biodiversity Assessment Method Calculator
BC Act	New South Wales Biodiversity Conservation Act 2016
BDAR	Biodiversity Development Assessment Report
Biodiversity credit report	The report produced by the Credit Calculator that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified.
Biodiversity Offsets	Management actions that are undertaken to achieve a gain in biodiversity values on areas of land in order to compensate for losses to biodiversity from the impacts of development.
Biodiversity values	The composition, structure and function of ecosystems, including threatened species, populations and ecological communities, and their habitats.
BOS	NSW Biodiversity Offset Scheme
CEEC	Critically Endangered Ecological Community
DA	Development Application
DPIE	NSW Department of Planning, Industry and Environment (formerly OEH)
Ecosystem credit	The class of biodiversity credit that relates to a vegetation type and the threatened species that are reliably predicted by that vegetation type (as a habitat surrogate).
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ha	Hectare
HTE	High Threat Exotic
km	Kilometre
LGA	Local Government Area
Locality	A 1500m buffer area surrounding the Subject Land
m	metres
Native Vegetation	Means any of the following types of plants native to New South Wales: (a) trees (including any sapling or shrub), (b) understorey plants, (c) groundcover (being any type of herbaceous vegetation), (d) plants occurring in a wetland.
NSW	The State of New South Wales
OEH	Office of Environment and Heritage (now DPIE)
PCT	NSW Plant Community Type
Proposal	The development, activity or action proposed.
SAII	Serious and Irreversible Impacts
SAII entity	Species and ecological communities that are likely to be the subject of serious and irreversible impacts (SAIIs)
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy

Acronym/ Term	Definition
Species credit	The class of biodiversity credit that relate to threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.
Subject Land	The footprint of the proposed development.
Subject Property	344 Park Road, Wallacia (Lot 5/DP 655046)
Threatened species, populations and ecological communities	Species, populations and ecological communities specified in Schedules 1 and 2 of the BC Act 2016.
TPZ	Tree Protection Zone: A specified area above and below ground and at a given distance from the trunk set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development
VIS Plot	Vegetation Integrity Survey Plot

Executive Summary

Narla Environmental Pty Ltd was commissioned by Benbow Environmental to prepare this Biodiversity Development Assessment Report (BDAR) to accompany a Development Application (DA) for the proposed development of a resource recovery facility at 344 Park Road, Wallacia (Lot 5/DP 655046). This BDAR has been produced in response to the Secretary's Environmental Assessment Requirements (SEARs) issued by NSW DPIE for the preparation of an Environmental Impact Statement (EIS). This proposed development is located within lands mapped on the Biodiversity Values Map (DPIE 2020d).

This BDAR has been prepared by Narla Environmental Pty Ltd to identify the potential impacts of the proposed development on biodiversity values. This assessment has been completed in accordance with the BAM Appendix 10.

The proposed development involves the construction and operation of a resource recovery facility (hereafter referred to as the 'Subject Land'), covering an area of approximately 3.72 ha. The proposed development has been purposefully designed to minimise impacts on biodiversity values, as it has been positioned within a mostly cleared area within the north of the Subject Property. The removal of vegetation within this area has largely been avoided, as the proposed development has been strategically placed to avoid the removal of as many trees as possible. The proponent has selected an area with the least biodiversity values, and has chosen to avoid higher quality bushland in the western and southern portions of the Subject Property.

The proposed development is expected to impact one (1) Plant Community Type (PCT): PCT 724 - Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion. This PCT conforms to the Endangered Ecological Community (EEC) Shale Gravel Transition Forest in the Sydney Basin Bioregion.

Four (4) ecosystem credits for PCT 724 are to be offset in order to mitigate the impacts upon biodiversity as a result of the proposed development.

In order to avoid and minimise potential impacts of the proposal on local biodiversity values, a series of mitigation and management measures have been identified, which are to be implemented as part of any Construction Environmental Management Plan (CEMP) produced for the site. This includes assigning a Project Ecologist to undertake an extensive pre-clearing survey, and to supervise the clearing of all vegetation in relation to the proposed development. The proponent will enter the majority of the undeveloped portion of the Subject Property into a Biodiversity Stewardship Agreement, which will conserve the two threatened ecological communities surrounding the Subject Land.

1. Introduction

1.1 Overview

Narla Environmental Pty Ltd (Narla) was commissioned by Benbow Environmental ('the proponent') to prepare this BDAR to accompany a DA for the proposed development of a resource recovery facility at 344 Park Road, Wallacia (Lot 5/DP 655046; hereafter referred to as the 'Subject Property'). The proposed development is considered a designated and integrated development under Part 4 of the Environmental Planning and Assessment Act 1979 and requires an approval under the Protection of the Environment Operations Act 1997. As such, the SEARs have been issued by NSW DPIE for the preparation of an EIS. The preparation of this BDAR is in response to the 'Key Issue – Biodiversity' as listed in the SEARs, which requires an assessment of the proposal in accordance with the BAM.

The proposed development is also located on lands mapped on the 'Biodiversity Values Map' (DPIE 2020d; **Figure 1**). The Biodiversity Values (BV) Map identifies land with high biodiversity value, as defined by clause 7.3(3) of the Biodiversity Conservation Regulation 2017. This assessment has therefore been completed in accordance with Appendix 10 of the BAM (OEH 2017a).

Narla have produced this report in order to assess any potential impacts associated with the DA and recommend appropriate measures to mitigate any potential ecological impacts in line with the requirements of the Consent Authority, Penrith City Council.

1.2 The Proposed Development

The Subject Land is located within the northern section of the Subject Property and is defined by the development footprint of a proposed resource recovery facility, Onsite Detention Basins, office building, irrigation area, landscaping and an Asset Protection Zone (APZ; **Figure 2**). The Subject Land covers an area of approximately 3.72 ha, which mostly contained cleared areas that are void of any vegetation. Small areas of vegetation that exist within the Subject Land included scattered occurrences of native and exotic ground layers, scattered canopy trees, as well as a shrubby patch of native vegetation in the south-western corner. The proposed development will require the removal of all vegetation in the development footprint and ongoing management of the vegetation within the APZ.

1.3 Site Location and Description

The Subject Property is situated within an agricultural landscape in the suburb of Wallacia in the Penrith Local Government Area (LGA; **Figure 3**). The Subject Property is approximately 20.2 ha, and comprises large areas of remnant native vegetation within the west and southern portions. The mostly cleared section within the north of the Subject Land will be utilised for the proposed development.



Figure 1. Encroachment of the Subject Land into land mapped on the Biodiversity Values Map.



Figure 2. The components and location of the Subject Property and Subject Land.

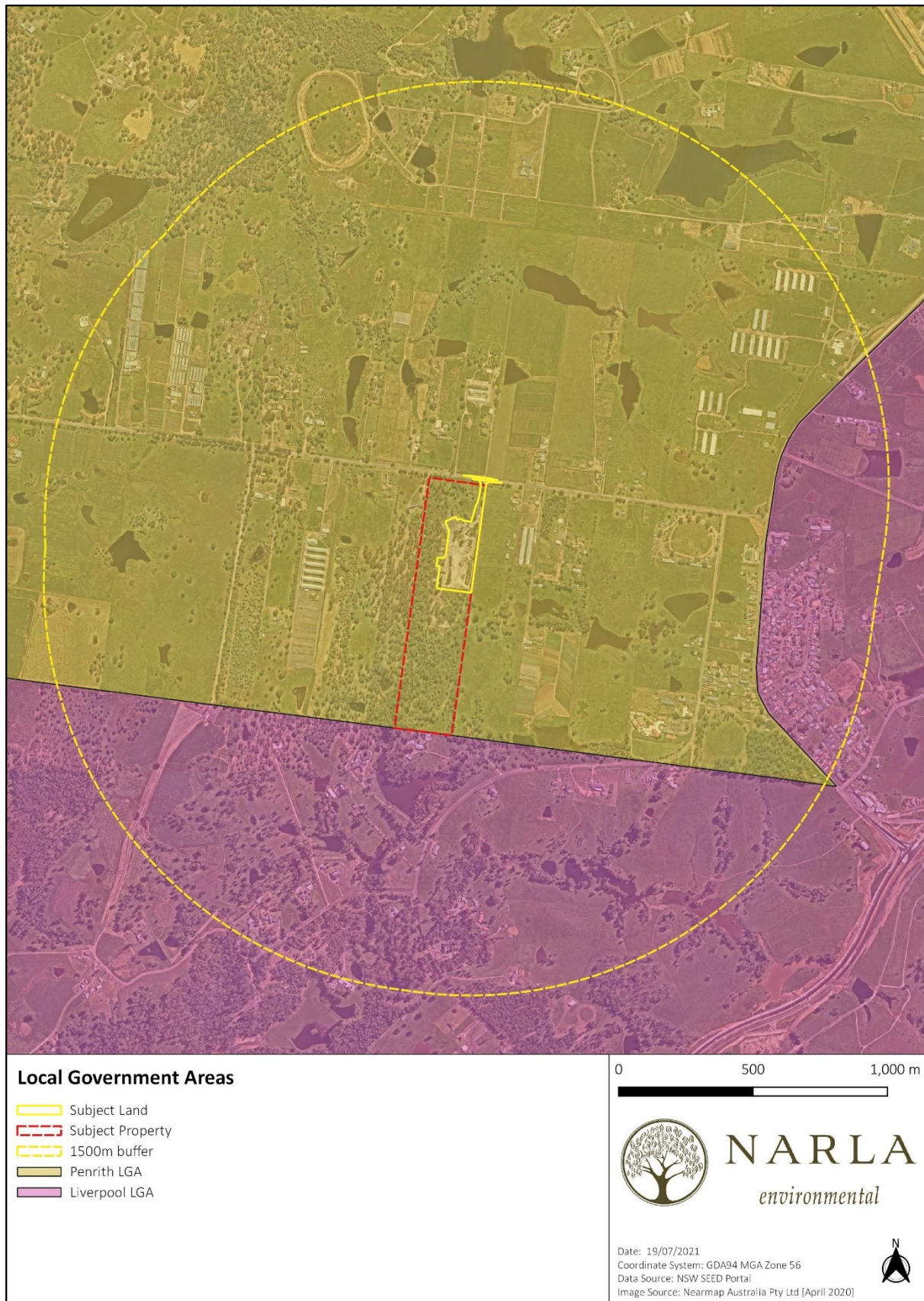


Figure 3. The location of the Subject Land within the locality.

1.4 Sources of Information Used

A thorough literature review was undertaken to gain an insight into the ecology and applicable legislation within the locality and the Penrith LGA, including:

- Relevant State and Commonwealth Databases & Datasets:
 - NSW BioNet. The website of the Atlas of NSW Wildlife (OEH 2020a)
 - NSW BioNet. Threatened Biodiversity Data Collection (OEH 2020b)
 - NSW BioNet. Vegetation Classification System (OEH 2020c)
 - NSW Government Spatial Services: Six Maps Clip & Ship
- Vegetation and Soil Mapping:
 - 'The Remnant Vegetation of the western Cumberland subregion' 2013 Update. VIS_ID 4207 (OEH 2013).
 - Soil Landscapes of the Penrith 1:100 000 Sheet (Bannerman & Hazelton 1990).
- NSW State Guidelines:
 - Guidance to assist a decision-maker to determine a serious and irreversible impact (DPIE 2019a)
 - Biodiversity Assessment Method Calculator Version 1.2.7.2 (DPIE 2019b)
 - Biodiversity Offsets and Agreement Management System (BOAMS)
 - Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method (DPIE 2020c)
 - Threatened Species Survey and Assessment: Guidelines for developments and activities. Working Draft (DEC 2004)
- Council Documents:
 - Penrith Development Control Plan (DCP) 2014
 - Penrith Local Environment Plan (LEP) 2010

Preparation of this BDAR also involved the review of the following accompanying project documents:

- Bio Engineered Solutions Pty Ltd (2020) Landscape Concept Plan: Proposed Recycling Facility, Lot 5 DP 655046, 344 Park Road, Wallacia. Plan No's 1853LAN2B and 1853LAN3B.
- Bushfire Consulting Services Pty Ltd (2020) Bush Fire Assessment Report in relation to the proposed waste recycling facility at: Lot 5 DP 655046, 344 Park Road Wallacia.

These sources were used to gain an understanding of the natural environment and ecology of the Subject Land and its surrounds. Searches using NSW Wildlife Atlas (BioNet) were conducted to identify current threatened flora and fauna records within and surrounding the Subject Land. These data were used to assist in establishing the presence or likelihood of any biodiversity values as occurring on, or adjacent to, the Subject Land, and helped inform our Ecologist on what to look for during the site assessment.

1.5 Aim and Approach

This report has been prepared in accordance with the BAM (OEH 2017a) and aims to:

- Describe the biodiversity values present within the Subject Land, including the extent of native vegetation, vegetation integrity and the presence of Threatened Ecological Communities (TECs);
- Determine the habitat suitability within the Subject Land for candidate threatened species;
- Prepare an impact assessment in regard to potential impacts of the proposed development on biodiversity values, including potential prescribed impacts and SALLs within the Subject Land;

- Discuss and recommend efforts to avoid and minimise impacts on biodiversity values; and
- Calculate the biodiversity credits (i.e. ecosystem credits and species credits) that measure potential impacts of the development on biodiversity values. This calculation will inform the decision maker (Penrith City Council) as to the number and class of offset credits required to be purchased and retired as a result of the proposed development.

2. Landscape Features

2.1 IBRA bioregion and subregion

The Subject Land occurs within the 'Cumberland' Interim Biogeographic Regionalisation for Australia 7 (IBRA7) Subregion, which is part of the 'Sydney Basin' IBRA7 Bioregion (**Figure 4; Figure 5**).

2.2 Mitchell Landscapes

NSW Landscapes Mapping: Background and Methodology (Mitchell 2002) groups ecosystems into meso-ecosystems representing larger natural entities based on topography and geology. The naming of ecosystems and meso-ecosystems was standardised so that each name provided location information and a meaningful descriptive landscape term.

The Subject Land occurs entirely within the 'Cumberland Plain' Mitchell Landscape Ecosystem (**Figure 6; Figure 7**). This landscape is characterised by low rolling hills and valleys in a rain shadow area between the Blue Mountains and the coast on horizontal Triassic shales and lithic sandstones forming a down-warped block on the coastal side of the Lapstone monocline. Intruded by a small number of volcanic vents and partly covered by Tertiary river gravels and sands (Hawkesbury-Nepean Terrace Gravels landscape). Quaternary alluvium along the main streams. General elevation 30 to 120m, local relief 50m and sometimes affected by salt in tributary valley floors. Pedal uniform red to brown clays on volcanic hills. Red and brown texture-contrast soils on crests grading to yellow harsh texture-contrast soils in valleys. Woodlands and open forest of Grey Box (*Eucalyptus moluccana*), Forest Red Gum (*Eucalyptus tereticornis*), Narrow-leaved Ironbark (*Eucalyptus crebra*), Thin-leaved Stringybark (*Eucalyptus eugenioides*), Cabbage Gum (*Eucalyptus amplifolia*) and Broad-leaved Apple (*Angophora subvelutina*). Grassy to shrubby understorey often dominated by Australian Boxthorn (*Bursaria spinosa*), poorly drained valley floors, often salt affected with swamp oak (*Casuarina glauca*) and paperbark (*Melaleuca* sp.).

2.3 Topography, geology and soils

The Subject Land is mapped as occurring on the Blacktown soil landscape, which consists of gently undulating rises on Wianamatta Group shales. Soils are shallow to moderately deep (>100 cm) hardsetting mottled texture contrast soils; and red and brown podzolic soils on crests grading to yellow podzolic soils on lower slopes and in drainage lines. This soil landscape occurs extensively on the Cumberland Lowlands. Examples include Blacktown, Mount Druitt, Glossodia and Leppington.

The Subject Land did not contain any areas of geological significance, such as karsts, caves, cliffs or crevices. The Subject Land and wider locality (1500m buffer) are not mapped as occurring on acid sulfate soils nor mapped as having risk/probability of exhibiting occurrence of acid sulfate soils.

2.4 Hydrology

Site assessment revealed an unmapped dam and drainage line within the north of the Subject Property. The riparian buffer of the dam intersects the Subject Land (**Figure 8**). A number of mapped watercourses occur within the 1500m buffer surrounding the Subject Land, including a mapped 2nd order stream within the south of the Subject Property (**Figure 9**). The watercourses within the 1500m buffer are tributaries that form part of the Hawkesbury-Nepean Catchment.

The Subject Land and immediate surrounds (within the 1500m buffer) do not contain any areas of native vegetation identified as 'Coastal Wetlands' or 'Littoral Rainforest' as per the State Environmental Planning Policy (Coastal Management) 2018.

2.5 Native Vegetation Cover and Connectivity

Native vegetation cover and connectivity have been assessed in accordance with Section 4.2 and 4.3 of the BAM (OEH 2017a). The native vegetation cover will be used to assess the habitat suitability of the Subject Land for threatened species. Areas of connectivity will determine the extent of habitat that may facilitate the movement of threatened species across their range.

A 1500m buffer around the boundary of the Subject Land was calculated to determine the extent of native vegetation and habitat connectivity. Native vegetation covered approximately 791 ha within the buffer circle (total area = 1027 ha) and was assigned to the >70% class (**Figure 10; Figure 11**). Cleared areas totalled 237 ha, which equated to approximately 23% of the total area within the 1500m buffer. Large areas of connectivity that may facilitate the movement of threatened species were evident within the 1500m surrounding the Subject Land. This included large vegetated areas south of the Subject Land and a smaller area within the north of the 1500m buffer. These areas of connectivity ultimately link with large vegetated areas along the Nepean River and the Blue Mountains National Park (**Figure 10; Figure 11**).

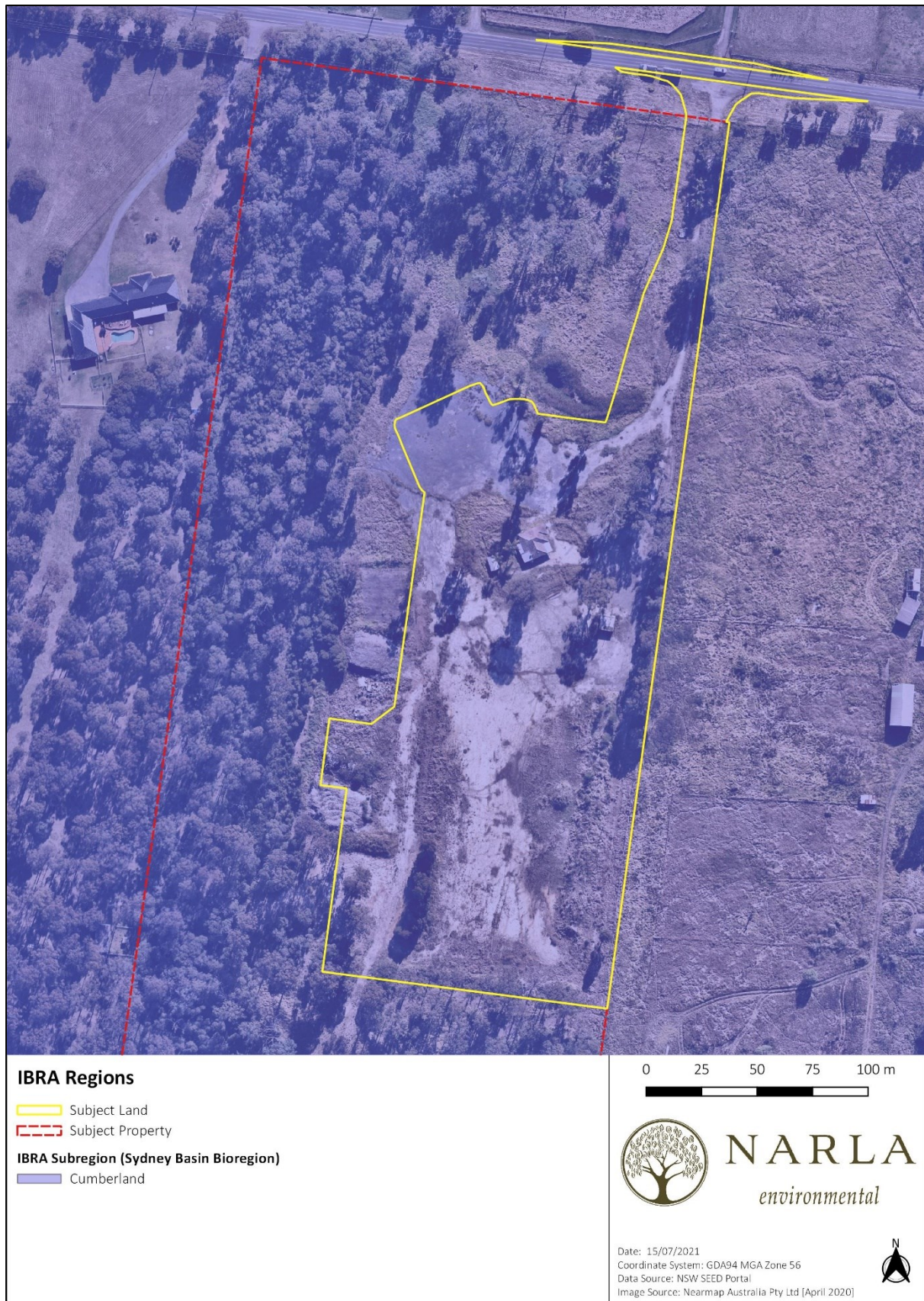


Figure 4. IBRA Bioregion and Subregion of the Subject Land.

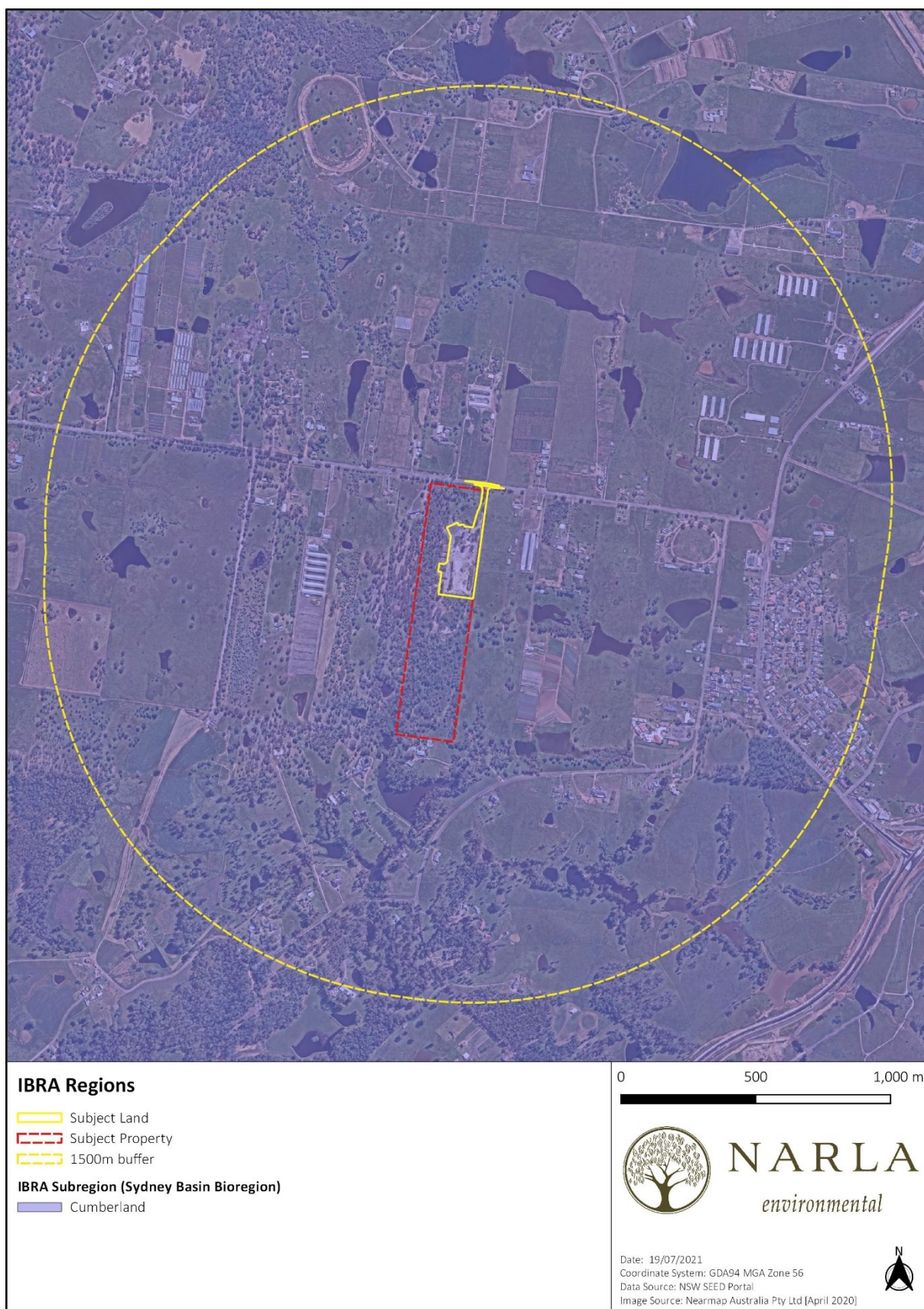


Figure 5. IBRA Bioregion and Subregion of the Subject Property, and within a 1500m buffer.

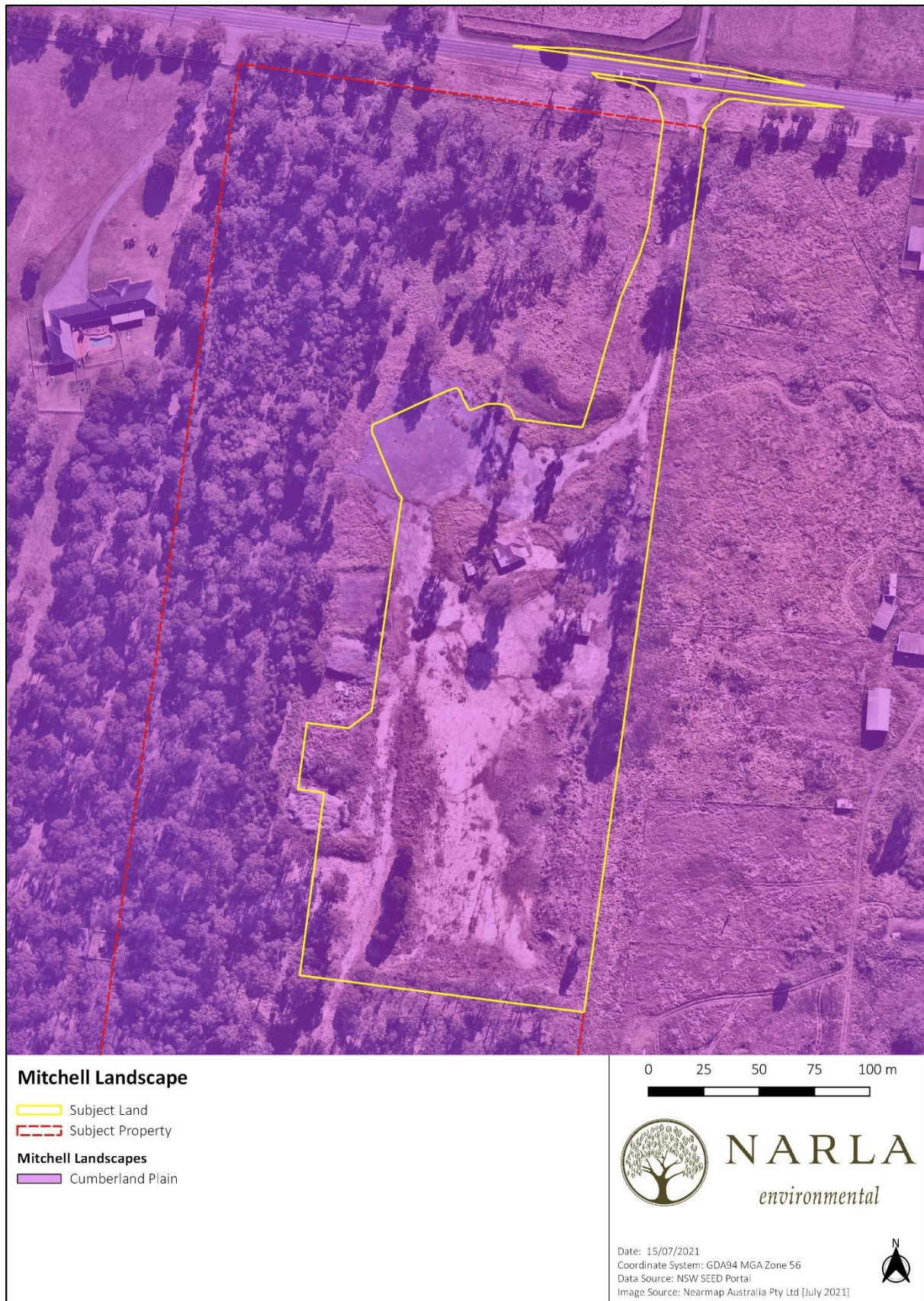


Figure 6. NSW Mitchell Landscape Ecosystem of the Subject Land.

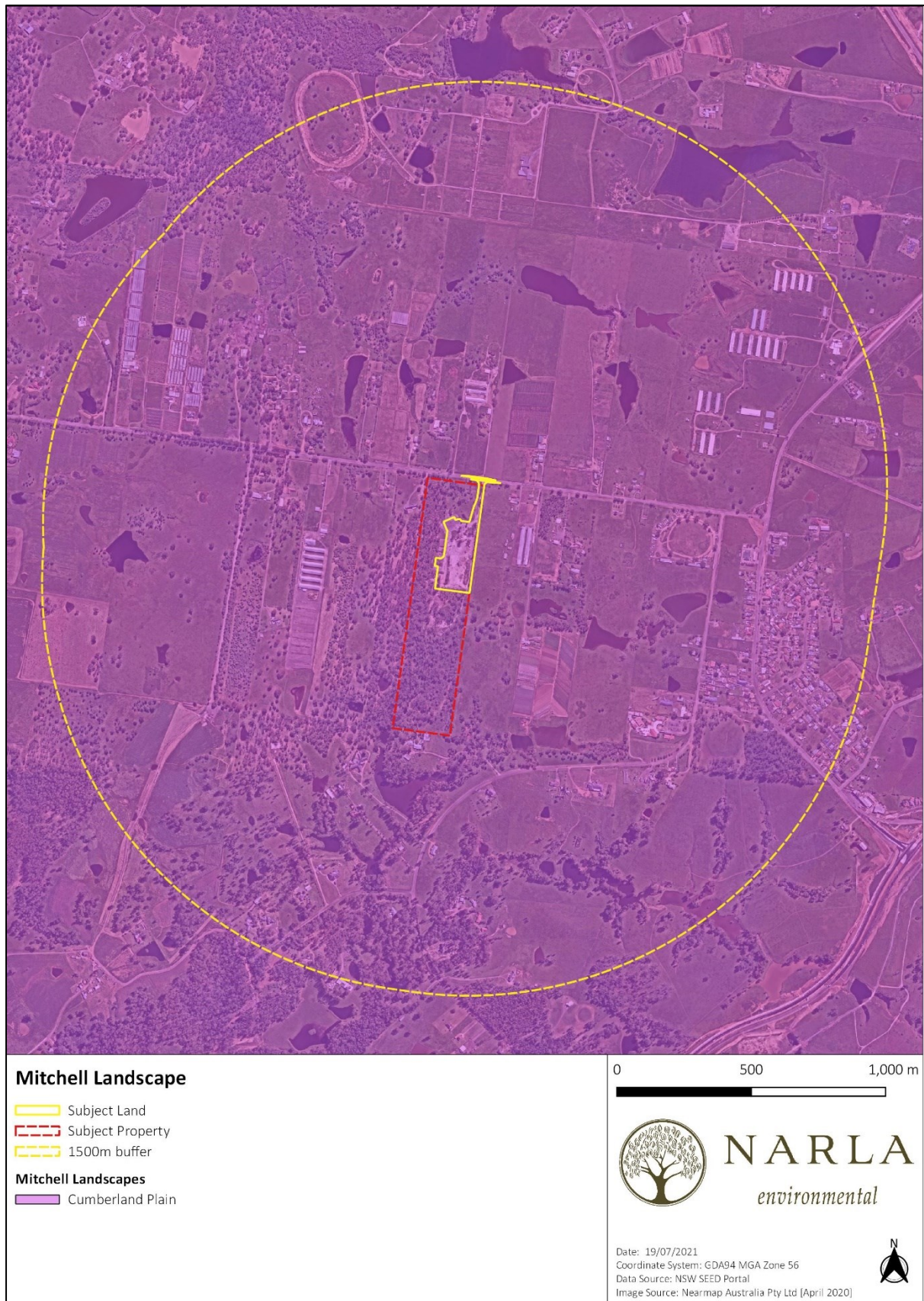


Figure 7. NSW Mitchell Landscape Ecosystem of the Subject Land and within a 1500m buffer.



Figure 8. Watercourses and riparian buffer zones occurring within and adjacent to the Subject Land.

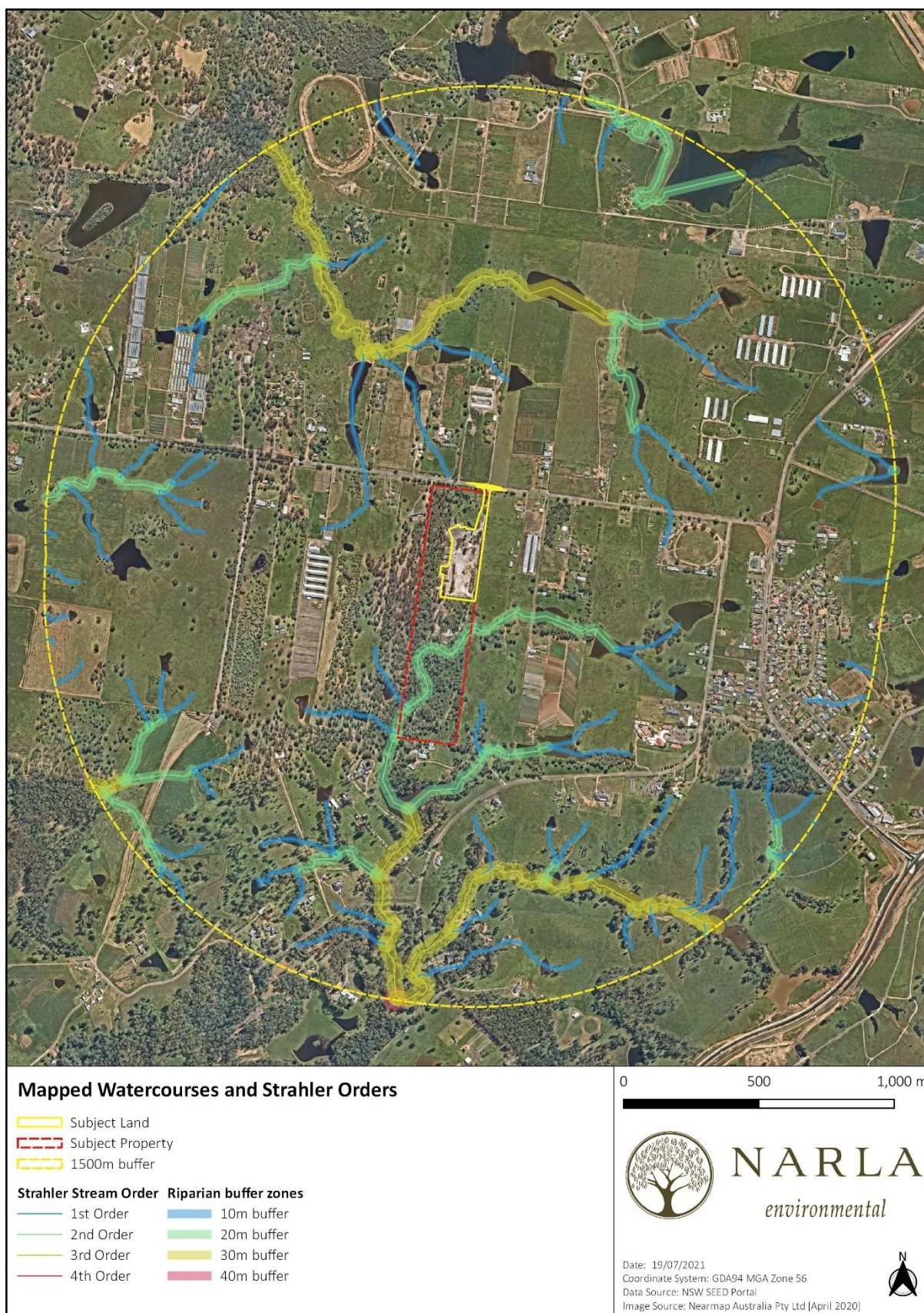


Figure 9. Rivers and streams (with associated riparian buffers) occurring within the 1500m buffer.



Figure 10. The extent of native vegetation, habitat connectivity and patch size within and surrounding the Subject Land.

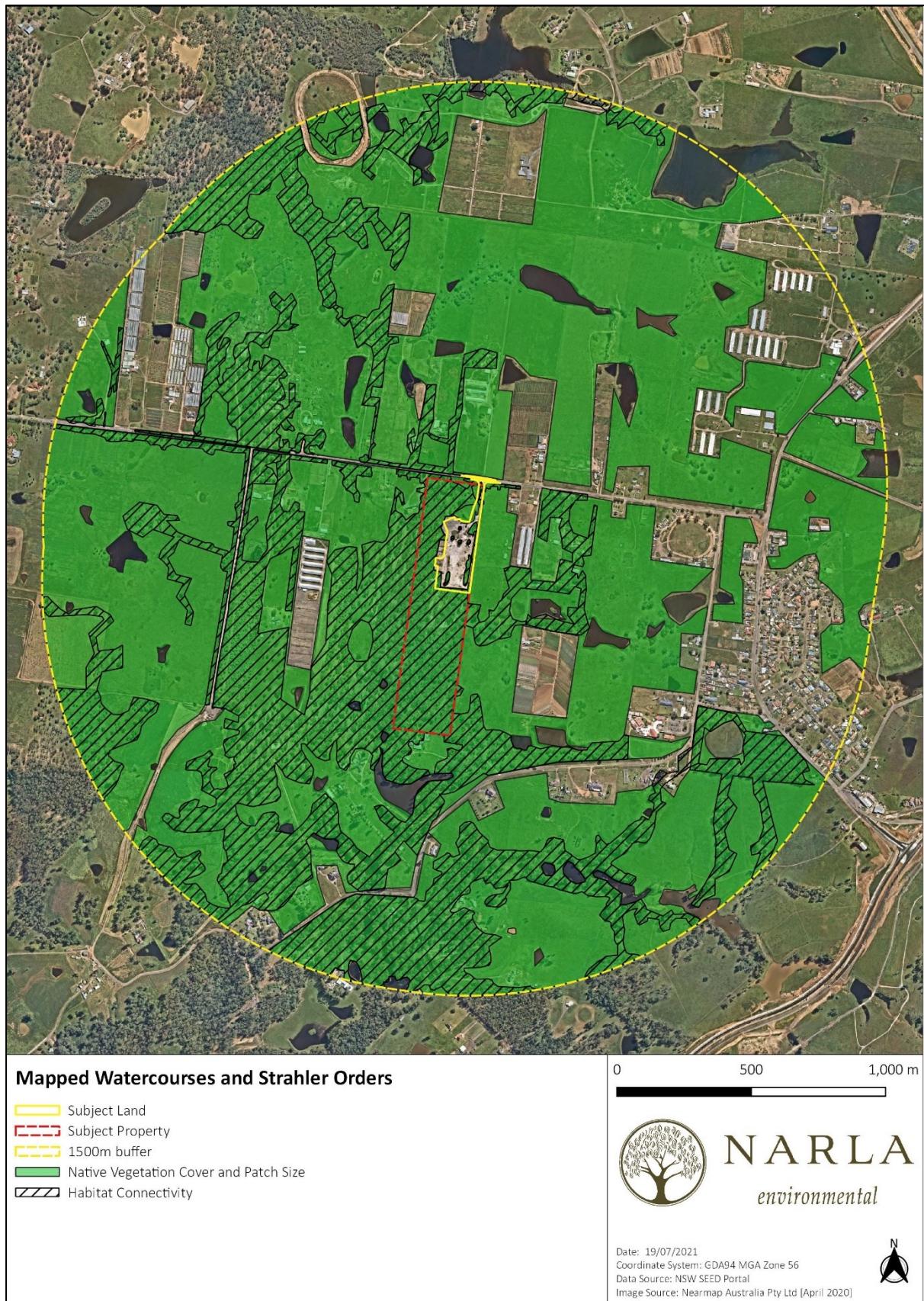


Figure 11. The extent of native vegetation, patch size and habitat connectivity occurring within and surrounding the 1500m buffer.

3. Native Vegetation

3.1 PCT's identified within the Subject Land

3.1.1 PCT Selection Process

Field surveys conducted by Narla confirmed that one (1) native vegetation community occurred within the Subject Land. PCT selection for this vegetation community was undertaken using information and databases provided in the BioNet Vegetation Classification System (OEH 2020c). The following selection criteria were used to develop the PCT shortlist:

- IBRA Bioregion: Sydney Basin
- IBRA Subregion: Cumberland
- Distribution: Penrith Region
- Dominant Upper Stratum Species: *Eucalyptus molucanna*, *Eucalyptus fibrosa* and *Melaleuca decora*.

This process delivered a selection of three (3) PCT's that could potentially occur within the Subject Land. Such PCTs contained the highest number of the selected upper stratum species. Based on historical mapping, an additional PCT (PCT 849) was added to the selection process. The steps taken to justify the presence or absence of each of these PCT's within the Subject Land is provided in **Table 1**. Note that due to the degraded nature of the vegetation within the Subject Land, similar structured bushland to the west of the Subject Land was also used as a guide to determine PCT. This bushland was dominated by *Eucalyptus fibrosa*, *Melaleuca decora* and *Melaleuca nodosa*. It was assumed that such vegetation would have historically occurred within the Subject Land.

Table 1. PCT Selection Criteria. Dark border indicates the selected PCT.

Candidate PCT	Characteristic Canopy	Characteristic Shrub / Groundcover	Landscape Position / Geology	Justification
PCT 724 - Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	<i>Eucalyptus fibrosa</i> <i>Melaleuca decora</i>	Mid Stratum Species: <i>Bursaria spinosa</i> subsp. <i>spinosa</i> , <i>Daviesia ulicifolia</i> and <i>Lissanthe strigosa</i> . Ground Stratum Species: <i>Aristida vagans</i> , <i>Brunonia australis</i> , <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <i>Desmodium gunnii</i> , <i>Dianella revoluta</i> , <i>Dichelachne micrantha</i> , <i>Dichondra repens</i> , <i>Goodenia hederacea</i> , <i>Hypericum gramineum</i> , <i>Lepidosperma laterale</i> , <i>Lomandra multiflora</i> , <i>Microlaena stipoides</i> var. <i>stipoides</i> , <i>Opercularia diphylla</i> , <i>Oxalis perennans</i> , <i>Panicum simile</i> , <i>Poranthera microphylla</i> , <i>Pratia purpurascens</i> , <i>Themeda australis</i> and <i>Wahlenbergia gracilis</i> .	Castlereagh Shale-Gravel Transition Forest is recognised as a community associated with shale-influenced sandy soils that support a component of ironstone gravels. These soils can occur in remarkably different locations. Some are associated with low-lying Tertiary alluvium overlying shale soils in the Bankstown area, whereas others occur on the northern Woronora Plateau where residual shale caps lie above bands of ironstone laterite and sandstone bedrock. The combination of the parent material produces a soil of relatively low fertility compared to the deeper Wianamatta shale soils of the Cumberland Plain. Together with a relatively low mean annual rainfall (800-900 millimetres) these conditions produce an open eucalypt forest with an understorey that may vary between dense shrubs and a low sparse shrub cover with an	Although the Subject Land is situated on the Blacktown soil landscape and comprises a higher number of species characteristic of PCT 849, Narla have assigned this PCT to the vegetation within the Subject Land. This PCT was chosen as the vegetation within the Subject Land, and directly to the west, was distinctively different from the more open Cumberland Plain Woodland that was situated to the south of the Subject Land. The dominance of <i>Eucalyptus fibrosa</i> to the west of the Subject Land, including a dense understorey of <i>Melaleuca decora</i> and <i>Melaleuca nodosa</i> , is not typical of the grassy open woodland of Cumberland Plain. In particular, the prominence of <i>Melaleuca nodosa</i> to the west of the Subject Land is much more characteristic of PCT 724 than PCT 849. The shrubby nature of the vegetation within the Subject Land, characterised by a dense Melaleuca shrub layer, led us to believe that this was more so representative of the Shale-Gravel Transition Forest to the west of the Subject Land, rather than the Cumberland Plain Woodland to the south.

Candidate PCT	Characteristic Canopy	Characteristic Shrub / Groundcover	Landscape Position / Geology	Justification
			abundant ground cover of grasses.	A total of 18 positive diagnostic species (as per Tozer et al. 2010) were present within the Subject Land. Canopy species within the Subject Land that are representative of this PCT included <i>Eucalyptus moluccana</i> and <i>Eucalyptus fibrosa</i>. Shrub and groundcover species within the Subject Land that are representative of this PCT included <i>Acacia decurrens</i>, <i>Brunoniella australis</i>, <i>Desmodium varians</i>, <i>Dichondra repens</i>, <i>Dillwynia sieberi</i>, <i>Euchiton sphaericus</i>, <i>Fimbristylis dichotoma</i>, <i>Glycine clandestine</i>, <i>Lomandra filiformis</i>, <i>Melaleuca decora</i>, <i>Melaleuca nodosa</i>, <i>Microlaena stipoides</i>, <i>Opercularia diphylla</i>, <i>Paspalidium distans</i>, <i>Polymeria calycina</i>, <i>Pratia purpurascens</i> and <i>Themeda triandra</i>. Additional species that were recorded adjacent to the Subject Land that are characteristic of this PCT include <i>Aristida vagans</i>, <i>Cheilanthes sieberi</i>, <i>Eucalyptus fibrosa</i>, <i>Oxalis perennans</i>, <i>Panicum simile</i>, <i>Solanum prinophyllum</i> and <i>Vernonia cinera</i>. Evidently the Subject Property is situated on a transition between PCT 724 and PCT 849, with PCT 724 represented to the west of the Subject Land, and PCT 849 represented directly south of the Subject Land. There is potential that a stretch of the Richmond soil landscape that lies approximately 600m

Candidate PCT	Characteristic Canopy	Characteristic Shrub / Groundcover	Landscape Position / Geology	Justification
				south of the Subject Property may have influenced the vegetation within the Subject Land, as it contains quaternary alluviums consisting of sand, silt and gravels derived from sandstone and shale. This would explain the distinct structure of vegetation within and directly to the west of the Subject Land, which significantly differs from other vegetation within the surrounding landscape.
PCT 725 - Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion	<i>Eucalyptus fibrosa</i> <i>Melaleuca decora</i> .	Mid Stratum Species: <i>Lissanthe strigosa</i>, <i>Melaleuca nodosa</i>, <i>Daviesia ulicifolia</i>, <i>Ozothamnus diosmifolius</i>, <i>Acacia falcata</i> and <i>Bursaria spinosa</i> subsp. <i>spinosa</i>. Ground Stratum Species: <i>Entolasia stricta</i>, <i>Microlaena stipoides</i> var. <i>stipoides</i>, <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>, <i>Aristida vagans</i>, <i>Pratia purpurascens</i>, <i>Lomandra multiflora</i>, <i>Opercularia diphylla</i>, <i>Dianella revoluta</i> var. <i>revoluta</i>, <i>Lepidosperma laterale</i>, <i>Goodenia hederacea</i>, <i>Paspalidium distans</i>, <i>Pomax umbellata</i>, <i>Themeda australis</i>, <i>Panicum simile</i>, <i>Laxmannia</i>	Castlereagh Ironbark Forest is one of two closely related ironbark shrub-grass forests found in western Sydney that occur on gravelly-clay soils. Castlereagh Ironbark Forest is associated with clay soils derived from Tertiary alluvial deposits. The structure ranges from a moderately tall open eucalypt forest or woodland to a low dense thicket of paperbarks with low emergent eucalypts.	This PCT does not fit the vegetation within the Subject Land. Although a number of the species within this PCT were present, a higher number of characteristic species were represented in the selected PCT. A total of eleven (11) species (as per Tozer et al. 2010) recorded within the Subject Land are positive diagnostic species of this PCT, as opposed to eighteen (18) positive diagnostic species representative of PCT 724. PCT 725 is therefore not the most appropriate PCT to represent the vegetation within the Subject Land.

Candidate PCT	Characteristic Canopy	Characteristic Shrub / Groundcover	Landscape Position / Geology	Justification
		<i>gracilis</i> , <i>Austrodanthonia tenuior</i> and <i>Eragrostis brownii</i> .		
PCT 849 – Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	<i>Eucalyptus tereticornis</i> <i>Eucalyptus moluccana</i> .	Mid Stratum Species: <i>Bursaria spinosa</i> subsp. <i>spinosa</i> . Ground Stratum Species: <i>Dichondra repens</i> , <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <i>Aristida vagans</i> , <i>Microlaena stipoides</i> var. <i>stipoides</i> , <i>Themeda australis</i> , <i>Brunoniella australis</i> , <i>Desmodium gunnii</i> , <i>Opercularia diphylla</i> , <i>Wahlenbergia gracilis</i> , <i>Dichelachne micrantha</i> , <i>Paspalidium distans</i> , <i>Eragrostis leptostachya</i> , <i>Lomandra multiflora</i> , <i>Dianella longifolia</i> , <i>Oxalis perennans</i> , <i>Euchiton sphaericus</i> , <i>Goodenia hederacea</i> , <i>Aristida ramosa</i> , <i>Arthropodium milleflorum</i> , <i>Austrodanthonia tenuior</i> , <i>Cymbopogon refractus</i> and <i>Echinopogon caespitosus</i> .	The gentle topography associated with the shale plains of western Sydney carries an open grassy woodland dominated by grey box (<i>Eucalyptus moluccana</i>), forest red gum (<i>Eucalyptus tereticornis</i>) and ironbark (<i>Eucalyptus crebra</i> / <i>Eucalyptus fibrosa</i>). The primary habitat for this PCT occurs at elevations less than 150 meters above sea level with some sites occurring at higher elevations where the landscape remains gently inclined. Rainfall is restricted to a narrow band between 750 and 950 millimetres per annum. This PCT occupies the north-west and west zones of the study area but is widespread elsewhere across the Cumberland Plain	As discussed previously, the Subject Land is situated on the Blacktown soil landscape and comprises a higher number of species characteristic of PCT 849 compared to PCT 724. However, the distinct understorey dominated by <i>Melaleuca decora</i> and <i>Melaleuca nodosa</i> within the Subject Land and directly west of the Subject Land, as well as the dominance of <i>Eucalyptus fibrosa</i> to the west of the Subject Land, was noticeably different to the characteristic structure and composition of PCT 849. It was therefore concluded that PCT 849 is not the most appropriate PCT to represent the vegetation within the Subject Land.
PCT 1800 - Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley	<i>Angophora floribunda</i> <i>Casuarina glauca</i> <i>Eucalyptus baueriana</i> <i>Eucalyptus moluccana</i>	Mid Stratum Species: <i>Casuarina glauca</i> , <i>Melaleuca decora</i> , <i>Melaleuca nodosa</i> , <i>Melaleuca styphelioides</i> ,	Cumberland Swamp Oak Riparian Forest is found on the riverflats of the Cumberland Plain in western Sydney and in the Hunter Valley.	This PCT does not fit the vegetation within the Subject Land. The Subject Land did not contain many diagnostic species that are representative of this PCT. A total of nine (9)

Candidate PCT	Characteristic Canopy	Characteristic Shrub / Groundcover	Landscape Position / Geology	Justification
	<i>Eucalyptus tereticornis</i>	<i>Acacia decurrens</i> and <i>Bursaria spinosa</i>. Ground Stratum Species: <i>Brunoniella australis</i>, <i>Dianella longifolia</i>, <i>Dichondra repens</i>, <i>Lomandra longifolia</i>, <i>Maytenus silvestris</i>, <i>Ozothamnus diosmifolius</i>, <i>Polyscias sambucifolia</i>, <i>Entolasia marginata</i>, <i>Einadia hastata</i>, <i>Microlaena stipoides</i> var. <i>stipoides</i>, <i>Echinopogon ovatus</i>, <i>Pratia purpurascens</i>, <i>Commelina cyanea</i>, <i>Senecio hispidulus</i>, <i>Veronica plebeian</i> and <i>Wahlenbergia gracilis</i>.		species (as per OEH 2016) recorded within the Subject Land are positive diagnostic species of this PCT, as opposed to eighteen (18) species that are characteristic of the selected PCT. The Subject Land also did not contain any stands of <i>Casuarina glauca</i> , which is a characteristic feature of this PCT.

3.1.2 Final PCT and Vegetation Zone Selection

Field surveys conducted by Narla confirmed that one (1) PCT was identified within the Subject Land:

- PCT 724 - Broad-leaved Ironbark - Grey Box - *Melaleuca decora* grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion

Four vegetation zones were identified within the Subject Land that consisted of differing condition classes or vegetation types:

- Zone 1: PCT 724 – Shrubby understorey
- Zone 2: PCT 724 – Cleared
- Zone 3: Non-native Vegetation
- Zone 4: Cleared land

These vegetation zones are detailed in **Table 2**, **Table 3**, and **Table 4**, and displayed in **Figure 12**.

Table 2. Vegetation identified within the Subject Land: Zone 1 & 2

PCT 724: Broad-leaved Ironbark - Grey Box - <i>Melaleuca decora</i> grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion		
Vegetation class	Cumberland Dry Sclerophyll Forests	
Total area (ha)	0.48ha	
Description in VIS		
Castlereagh Shale-Gravel Transition Forest is recognised as a community associated with shale-influenced sandy soils that support a component of ironstone gravels. These soils can occur in remarkably different locations. Some are associated with low-lying Tertiary alluvium overlying shale soils in the Bankstown area, whereas others occur on the northern Woronora Plateau where residual shale caps lie above bands of ironstone laterite and sandstone bedrock. The combination of the parent material produces a soil of relatively low fertility compared to the deeper Wianamatta shale soils of the Cumberland Plain. Together with a relatively low mean annual rainfall (800-900 millimetres) these conditions produce an open eucalypt forest with an understorey that may vary between dense shrubs and a low sparse shrub cover with an abundant ground cover of grasses. Typically, the canopy includes broad-leaved ironbark (<i>Eucalyptus fibrosa</i>) along with a wide variety of other eucalypts depending on location. The taller paperbark <i>Melaleuca decora</i> may be prominent above a lower open shrub layer of blackthorn (<i>Bursaria spinosa</i>) and gorse bitter pea (<i>Daviesia ulicifolia</i>). The ground cover is a mix of grasses, sedges and herbs. Map users may experience difficulties in distinguishing this map unit from the closely related Castlereagh Ironbark Forest (S_DSFO1) on the basis of floristic composition alone. Within the Sydney area the largest stands occur within the Holsworthy defence area, with isolated remnants extending to Prospect and Bankstown.		
Condition Class	Moderate Condition	Low Condition
Vegetation Zone	Zone 1 Shrubby Understorey	Zone 2 Cleared
Extent within Subject Land (approximate)	0.26ha	0.22ha
Field survey effort	A site assessment was conducted on 25 th March 2020. One (1) BAM plot was established.	A site assessment was conducted on 25 th March 2020. One (1) BAM plot was established.

PCT 724: Broad-leaved Ironbark - Grey Box - *Melaleuca decora* grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion

Description of vegetation	This vegetation zone is comprised of a sparse native canopy layer, a dense mid-story/shrub layer, and a mixed native/exotic ground layer (Plate 1). The canopy within this zone comprised of <i>Eucalyptus moluccana</i> and <i>Eucalyptus fibrosa</i>, with a dense shrub layer dominated by <i>Melaleuca decora</i>. The ground layer comprised of a diverse native and exotic species assemblage, with high cover of <i>Chloris gayana</i>, <i>Eragrostis curvula</i>, <i>Ehrharta erecta</i>, <i>Cynodon dactylon</i>, <i>Einadia hastata</i> and <i>Solanum sisymbriifolium</i>.	This vegetation zone has been historically cleared, comprising of a fill mound that has regenerated since 2018 (Nearmap 2020). This zone contains an almost absent canopy layer, comprising regenerating <i>Acacia parramattensis</i>, and an absent shrub layer. The groundlayer within the zone was dominated by exotic species, including high cover of <i>Brassica fruticulosa</i>, <i>Chloris gayana</i>, <i>Digitaria ciliaris</i>, <i>Acacia saligna</i> and <i>Panicum maximum</i>. A low cover of native groundcover species was present within the zone, including <i>Hardenbergia violacea</i>, <i>Einadia trigonos</i> and <i>Tetragonia tetragonioides</i> (Plate 2).
Structure of vegetation	A low canopy cover was evident within the BAM plot, with native trees totalling 5.5% cover. Shrub coverage was dense in patches, and equated to 41.2% within the BAM plot. A low-moderate native ground cover was present, including 9.7% grass, 9.1% forbs and 1.7% scramblers/vines. High Threat Exotics (HTE's) also had a moderate cover within the plot, at 43.6%. A relatively moderate cover of leaf litter (43.2%) was also apparent. The BAM plot contained tree stems within three DBH classes and regenerating stems. No large trees or hollow bearing trees were present. Approximately 8m of fallen logs were recorded within the BAM plot.	A low canopy cover was evident within the BAM plot, with canopy trees totalling 0.5% cover, which comprised of a singular regenerating <i>Acacia parramattensis</i>. No shrubs were present within the zone. A low native ground cover was present, including 0.2% grass, 2.7% forbs and 2.5% scramblers/vines. High Threat Exotics (HTE's) also had a low cover within the plot, at 10.7%. An exceptionally low cover of leaf litter (0.2%) was also apparent. The BAM plot contained no tree stem classes, with the exception of one regenerating stem. No hollow bearing trees or fallen logs were recorded within the BAM plot.
Scientific Reference from VIS (OEH 2020c)	Tozer, M.G., Turner, K., Simpson, C., Keith, D.A., Beukers, P., MacKenzie, B., Tindall, D. & Pennay, C., 2010 Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands. Version 1.0	
TEC Status (BC Act 2016 and EPBC Act 1999)	Conforms to the BC Act listed CEEC Shale Gravel Transition Forest in the Sydney Basin Bioregion. Does not conform to the EPBC Act listed CEEC Cumberland Shale Plains Woodland and Shale-Gravel Transition Forest.	

PCT 724: Broad-leaved Ironbark - Grey Box - <i>Melaleuca decora</i> grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	
TEC area (ha)	0.48ha of BC Act listed CEEC Shale Gravel Transition Forest in the Sydney Basin Bioregion.
Estimate of percent cleared value of PCT in the major catchment area	75.00 %

Table 3. Non-native vegetation identified within the Subject Land.

Non-native Vegetation (Zone 3)	
Total area (ha)	0.92 ha
Field survey effort	A site assessment was conducted on 25 th March 2020. No BAM plots were required.
Description of vegetation	This vegetation zone did not contain any native canopy or mid-storey species. The groundlayer was dominated by exotic species, including <i>Eragrostis curvula</i> , <i>Chloris gayana</i> and <i>Solanum sisymbriifolium</i> (Plate 3).
Justification of vegetation assignment	The BAM (OEH 2017a) describes ground cover as not native if the native vegetation that comprises the groundcover is: i) less than 50% of the cover of indigenous species of vegetation; and ii) not less than 10% of the area is covered with vegetation (whether dead or alive); and iii) the assessment is made at the time of year when the proportion of the amount of indigenous vegetation in the area to the amount of non-indigenous vegetation in the area is likely to be at its maximum. As the vegetation within this zone contained no native canopy and mid-storey species, and a groundlayer of <50% native species, it was concluded that this zone did not constitute a PCT as was therefore classified as 'Non-native Vegetation'.

Table 4. Areas without vegetation identified within the Subject Land.

Cleared Land (Zone 4)	
Total area (ha)	2.29 ha
Field survey effort	A site assessment was conducted on 25 th March 2020. No BAM plots were required.
Description of vegetation	This zone contained driveways and cleared areas devoid of native and exotic species. Introduced gravel was present in many areas of the zone (Plate 4).
Justification of vegetation assignment	As this zone was cleared and contained no vegetation, it was concluded that this zone did not constitute a PCT and was therefore classified as 'Cleared Land'.



Plate 1. Representative photo of Zone 1 (PCT 724 – Shrubby Understorey) within the Subject Land.



Plate 2. Representative photo of Zone 2 (PCT 724 – Cleared) within the Subject Land.



Plate 3. Representative photo of Zone 3 (Non-native Vegetation) within the Subject Land.



Plate 4. Representative photo of Zone 4 (Cleared Land) within the Subject Land.

3.1.1 Threatened Ecological Communities

The native vegetation within the Subject Land conforms to the EEC Shale Gravel Transition Forest in the Sydney Basin Bioregion (SGTF; **Figure 12**). This was determined by a comprehensive desktop assessment that identified the typical SGTF landscape attributes within the Subject Land, in conjunction with a site visit that found a suite of characteristic SGTF species.

Shale Gravel Transition Forest tends to grade into Cumberland Plain Woodland as alluvial and ironstone influences decline. Although desktop analysis revealed the Subject Land occurs on Wianamatta Group shales, its vegetation is a distinct variation from the surrounding landscape. There is potential that the presence of quaternary alluviums approximately 600m south of the Subject Property may have influenced the structure and composition of such vegetation within the Subject Land.

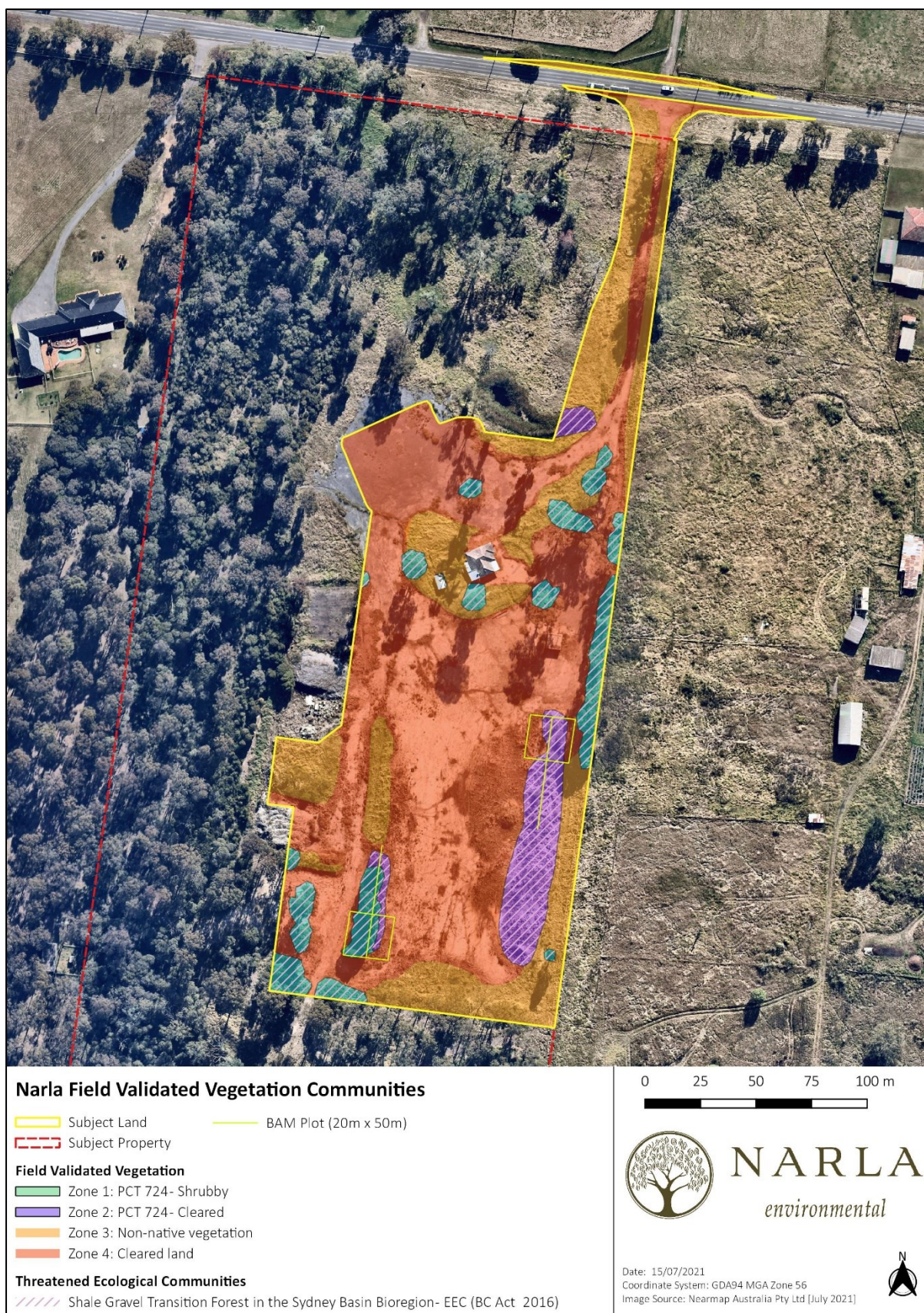


Figure 12. Narla field validated vegetation mapping within the Subject Land.

3.1 Assessing Patch Size

Patch size is defined by the BAM as 'an area of native vegetation that:

- occurs on the development site or biodiversity stewardship site, and
- includes native vegetation that has a gap of less than 100m from the next area of moderate to good condition native vegetation (or $\leq 30\text{m}$ for non-woody ecosystems)

Patch size may extend onto adjoining land that is not part of the development site or biodiversity stewardship site' (OEH 2017a).

Patch size was calculated according to the above guidelines, and equated to >100 ha (**Figure 10**; **Figure 11**).

3.2 Vegetation Integrity Survey (VIS) Plots

Two (2) BAM VIS Plots were undertaken within the Subject Land. Plot data gathered for each attribute used to assess the function of the Subject Land vegetation is detailed in **Appendix A**. Vegetation Integrity (VI) Scores represented by existing vegetation within each vegetation zone are detailed in **Table 5**.

3.2.1 Determining future vegetation integrity scores

Most projects will result in complete clearing of vegetation and threatened species habitat within the development footprint. In this scenario, the assessor must assess the proposed future value of each of the VI attributes as zero in the BAMC. However, in circumstances where partial clearing of vegetation is proposed and remaining vegetation will be maintained, the assessor may determine that the future value of the relevant VI attributes are greater than zero (DPIE 2019c).

The Subject Land will be exposed to varying degrees of clearing, including full clearing within the proposed building envelope and partial clearing within the APZ. Subsequently, each vegetation zone within the Subject Land has been divided into management zones to account for the varying clearing levels (**Figure 13**). The attributes influencing future vegetation scores within each of these management zones are detailed in **Table 6**.



Figure 13. Management Zones within the Subject Land.

Table 5. Vegetation integrity scores for each identified zone.

PCT	Vegetation Zone	Management Zone	Area (ha)	Survey Effort	Composition Condition Score	Structure Condition Score	Function Condition Score	VI Score	Future VI Score	Change in VI Score	Total change in VI score	Hollow bearing trees
PCT 724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	Zone 1 (Shrubby understorey)	1.1 Total Impact	0.08	One 1000m ² (20m x 50m) VIS Plot	72	38.1	42.7	48.9	0	-48.9	-33.1	Absent
		1.2 IPA	0.18						22.8	-26.1		
	Zone 2 (Cleared)	2.1 Total Impact	0.22	One 1000m ² (20m x 50m) VIS Plot	10.7	4.2	15	8.7	0	-8.7	-8.7	Absent

Table 6. Management Zones within the Subject Land, and the relevant vegetation attributes (composition, structure and function) affecting future VI scores.

Vegetation Zone	Management Zone	Changes in current vegetation attributes	Vegetation attributes not changed	Justification
Zone 1 (Shrubby understorey)	Zone 1.1 Total Impact	All vegetation will be removed	NA	All vegetation within the proposed development footprint will be removed.
	Zone 1.2 IPA	Vegetation Composition Shrub composition.	- Canopy composition. - Grass and forb composition.	- No changes in canopy composition is expected as canopy cover is currently 5.5% and therefore does not require any reduction. - Shrub composition is expected to decrease as shrub cover is to be reduced to 10%. It is expected that one (1) shrub species will however remain viable. - All grasses, forbs, ferns and other (vines/scramblers) are expected to remain viable within the IPA whilst maintained at a low height (<100mm). It is expected that such species can survive at <100mm if

Vegetation Zone	Management Zone	Changes in current vegetation attributes	Vegetation attributes not changed	Justification
				the mitigation and minimisation measures listed in Table 14 under 'APZ' are adhered to. It is expected that all HTE's will be removed from the IPA.
		Vegetation Structure		
		Reduction in shrub cover to <10%.	Canopy, grass, forb and other (vines/scramblers) cover.	- Tree canopy cover should be less than 15% at maturity as per RFS (2019). Trees currently cover 5.5% and as such will not be impacted. - Shrubs should not form more than 10% ground cover as per RFS (2019). - The cover of all grasses, forbs and other (vines/scramblers) are expected to remain unchanged whilst maintained at a low height (<100mm). It is expected that such species can survive within the IPA if the mitigation and minimisation measures listed in Table 14 under 'APZ' are adhered to. - It is expected that all HTE's will be removed from the IPA.
		Vegetation Function		
		- Removal of regenerating stems. - Removal of all leaf litter and coarse woody debris.	Retention of all tree stem sizes (excluding regenerating stems).	- No canopy trees will require removal within the IPA. All stem size classes (excluding regenerating stems) can therefore be retained. - Regenerating stems will not remain viable as the groundcover is maintained to a height of <100mm. - Leaves and vegetation debris require complete removal from the IPA (as per RFS 2019).
Zone 2 (Cleared)	Zone 2.1 Total Impact	All vegetation will be removed	NA	All vegetation within the proposed development footprint will be removed.

4. Threatened Species

4.1 Candidate Ecosystem Credit Species

Ecosystem credit species associated with the Subject Land are listed below in **Table 7**. Two (2) species predicted by the BAM calculator as potential ecosystem credits were excluded from the assessment due to habitat constraints.

Table 7. Candidate ecosystem credits predicted to occur within the Subject Land.

Scientific Name	BC Act Status	Excluded from Assessment	Reason for Exclusion from Assessment
<i>Anthochaera phrygia</i> Regent Honeyeater (Foraging)	Critically Endangered	No	-
<i>Artamus cyanopterus cyanopterus</i> Dusky Woodswallow	Vulnerable	No	-
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo (Foraging)	Vulnerable	No	-
<i>Calyptorhynchus lathami</i> Glossy Black-Cockatoo (Foraging)	Vulnerable	Yes	Habitat constraints: the Subject Land does not contain <i>Allocasuarina</i> and <i>Casuarina</i> species
<i>Chthonicola sagittata</i> Speckled Warbler	Vulnerable	No	-
<i>Climacteris picumnus victoriae</i> Brown Treecreeper (eastern subspecies)	Vulnerable	No	-
<i>Daphoenositta chrysoptera</i> Varied Sittella	Vulnerable	No	-
<i>Dasyurus maculatus</i> Spotted-tailed Quoll	Vulnerable	No	-
<i>Falsistrellus tasmaniensis</i> Eastern False Pipistrelle	Vulnerable	No	-
<i>Glossopsitta pusilla</i> Little Lorikeet	Vulnerable	No	-
<i>Grantiella picta</i> Painted Honeyeater	Vulnerable	No	-
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle (Foraging)	Vulnerable	No	-
<i>Hieraaetus morphnoides</i> Little Eagle (Foraging)	Vulnerable	No	-
<i>Lathamus discolor</i> Swift Parrot (Foraging)	Endangered	No	-
<i>Lophoictinia isura</i> Square-tailed Kite (Foraging)	Vulnerable	No	-
<i>Melanodryas cucullata cucullata</i>	Vulnerable	No	-

Scientific Name	BC Act Status	Excluded from Assessment	Reason for Exclusion from Assessment
Hooded Robin (south-eastern form)			
<i>Melithreptus gularis gularis</i> Black-chinned Honeyeater (eastern subspecies)	Vulnerable	No	-
<i>Micronomus norfolkensis</i> Eastern Coastal Free-tailed Bat	Vulnerable	No	-
<i>Miniopterus australis</i> Little Bent-winged Bat (Foraging)	Vulnerable	No	-
<i>Miniopterus orianae oceanensis</i> Large Bent-winged bat (Foraging)	Vulnerable	No	-
<i>Neophema pulchella</i> Turquoise Parrot	Vulnerable	No	-
<i>Ninox connivens</i> Barking Owl (Foraging)	Vulnerable	No	-
<i>Ninox strenua</i> Powerful Owl (Foraging)	Vulnerable	No	-
<i>Pandion cristatus</i> Eastern Osprey (Foraging)	Vulnerable	No	-
<i>Petaurus australis</i> Yellow-bellied Glider	Vulnerable	Yes	Habitat constraints: the Subject Land does not contain hollow-bearing trees.
<i>Petroica boodang</i> Scarlet Robin	Vulnerable	No	-
<i>Petroica phoenicea</i> Flame Robin	Vulnerable	No	-
<i>Phascolarctos cinereus</i> Koala (Foraging)	Vulnerable	No	-
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox (Foraging)	Vulnerable	No	-
<i>Saccolaimus flaviventris</i> Yellow-bellied Sheath-tail-bat	Vulnerable	No	-
<i>Scoteanax rueppellii</i> Greater Broad-nosed Bat	Vulnerable	No	-
<i>Stagonopleura guttata</i> Diamond Firetail	Vulnerable	No	-
<i>Tyto novaehollandiae</i> Masked Owl (Foraging)	Vulnerable	No	-
<i>Varanus rosenbergi</i> Rosenberg's Goanna	Vulnerable	No	-

4.2 Candidate Species Credit Species Summary

This section provides a summary of the candidate species credit fauna and flora species for the Subject Land derived from BAMC (DPIE 2019b). A summary of the targeted survey effort applied to each species is provided along with the results of the survey effort, specifically whether or not the species credit needs to be offset through retiring of Biodiversity Offset Credits (**Table 8; Table 9**).

Table 8. Candidate Fauna Credit Species predicted to occur within the Subject Land

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
<i>Anthochaera phrygia</i> Regent Honeyeater (Breeding)	No, the Subject Land is not included on the map of important areas for Regent Honeyeaters (DPIE 2020e).	No	NA	Very High – 3	No
<i>Burhinus grallarius</i> Bush Stone-curlew	This species is known to occupy areas where there is adequate fallen/standing dead timber including logs. Potential suitable habitat was present within the Subject Land and therefore this species was included in the assessment.	Yes	No	High - 2	No
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo (Breeding)	This species requires Eucalypt trees with hollows greater than 9cm diameter for breeding. As such habitat constraints are not present within the Subject Land, this species was excluded from the assessment.	No	NA	High - 2	No
<i>Calyptorhynchus lathamii</i> Glossy Black-Cockatoo (Breeding)	This species requires living or dead tree with hollows greater than 15cm diameter and greater than 5m above ground. As such habitat constraints are not present within the Subject Land, this species was excluded from the assessment.	No	NA	High - 2	No
<i>Chalinolobus dwyeri</i> Large-eared Pied Bat	This species is known to occur within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels. Such geological features were not observed within or adjacent to the Subject Land. Furthermore, as the Subject Land and surrounds are located within a flat terrain with little	No	NA	Very High - 3	No

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
	topographical variation, it is highly unlikely such habitat features would occur within the area surrounding the Subject Land. As such, this species was excluded from the assessment.				
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle (Breeding)	This species requires live large old trees within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines for breeding. As large trees are present within Zone 1 of the Subject Land, this species was included in the assessment.	Yes	No	High - 2	No
<i>Heleioporus australiacus</i> Giant Burrowing Frog	This species is dependent on hanging swamps on the top of sandstone plateaus and deeply dissected gullies that occur as erosion features in the Sydney Basin. As such habitat was not present in the Subject Land, this species was excluded from the assessment.	No	NA	Moderate - 1.5	No
<i>Hieraaetus morphnoides</i> Little Eagle (Breeding)	This species requires live (occasionally dead) large old trees within vegetation for nesting. As large trees are present within Zone 1 of the Subject Land, this species was included in the assessment.	Yes	No	Moderate - 1.5	No
<i>Lathamus discolor</i> Swift Parrot (Breeding)	No, the Subject Land is not included on the map of important areas for Swift Parrot (DPIE 2020e).	No	No	Very High - 3	No
<i>Litoria aurea</i> Green and Golden Bell Frog	This species is known to occur within semi-permanent/ephemeral wet areas, and within 1km of wet areas (swamps and waterbodies). As a number of waterbodies are present within 1km of the Subject Land, this species was included in the assessment.	Yes	No	High – 2	No
<i>Lophoictinia isura</i> Square-tailed Kite (Breeding)	This species requires live, large old trees within vegetation for nesting. As large trees are present within Zone 1 of the Subject Land, this species was included in the assessment.	Yes	No	Moderate - 1.5	No

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
<i>Meridolum corneovirens</i> Cumberland Plain Land Snail	The species is reliant on a good cover of coarse woody debris. As such habitat was present within the Subject Land, this species was included in the assessment.	Yes	No	High - 2	No
<i>Miniopterus australis</i> Little Bent-winged Bat (Breeding)	This species is known to breed in caves, tunnels, mines and culverts. As such habitat constraints are not present within the Subject Land, this species was excluded from the assessment.	No	NA	Very High - 3	No
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat (Breeding)	This species is known to breed in caves, tunnels, mines and culverts. As such habitat constraints are not present within the Subject Land, this species was excluded from the assessment.	No	NA	Very High - 3	No
<i>Myotis macropus</i> Southern Myotis	As the Subject Land occurs within 200m of a waterbody with pools/stretchers of 3m or wider, this species was included in the assessment.	No	No	High - 2	No
<i>Ninox connivens</i> Barking Owl (Breeding)	This species is known to breed in living or dead trees with hollows greater than 20cm diameter and greater than 4m above the ground. As such habitat was not present within the Subject Land, this species was excluded from the assessment.	No	NA	High - 2	No
<i>Ninox strenua</i> Powerful Owl (Breeding)	This species is known to breed in living or dead trees with hollows greater than 20cm diameter. As such habitat was not present within the Subject Land, this species was excluded from the assessment.	No	NA	High - 2	No
<i>Pandion cristatus</i> Eastern Osprey (Breeding)	This species requires living and dead trees (>15m) or artificial structures within 100m of a floodplain for nesting. As the Subject Land was not located within 100m of a floodplain, this species was excluded from the assessment.	No	NA	Moderate - 1.5	No

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
<i>Petauroides volans</i> Greater Glider	This species requires abundant tree hollows for refuge and nest sites. As such habitat was not present within the Subject Land, this species was excluded from the assessment	No	NA	High - 2	No
<i>Petaurus norfolcensis</i> Squirrel Glider	This species requires abundant tree hollows for refuge and nest sites. As such habitat was not present within the Subject Land, this species was excluded from the assessment	No	NA	High - 2	No
<i>Phascolarctos cinereus</i> Koala (Breeding)	Potential feed trees were present within the Subject Land and therefore, this species was included in the assessment.	Yes	No	High - 2	No
<i>Pommerhelix duralensis</i> Dural Land Snail	The species requires leaf litter, shed bark and logs, and can occur within 50m of such habitat requirements. As such habitat was present within and adjacent to the Subject Land, this species was included in the assessment.	Yes	No	High - 2	No
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox (Breeding)	This species is known to breed within breeding camps. As such habitat constraints are not present within the Subject Land, this species was excluded from the assessment.	No	NA	High - 2	No
<i>Tyto novaehollandiae</i> Masked Owl (Breeding)	This species is known to breed in living or dead trees with hollows greater than 20cm diameter. As such habitat was not present within the Subject Land, this species was excluded from the assessment.	No	NA	High - 2	No

Table 9. Candidate Flora Credit Species predicted to occur within the Subject Land.

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
<i>Acacia bynoeana</i> Bynoe's Wattle	This species is known to occur in dry sclerophyll forests. As such habitat was present within the Subject Land, this species was included in the assessment.	Yes	No	High - 2	No
<i>Acacia pubescens</i> Downy Wattle	This species is known to occur within Shale/Gravel Transition Forest. As such vegetation was present within the Subject Land, this species was included in the assessment.	Yes	No	High - 2	No
<i>Allocasuarina glareicola</i>	This species is known to occur in association with <i>Eucalyptus fibrosa</i> and <i>Melaleuca nodosa</i> , which were present within the Subject Land. As such, this species was included in the assessment.	Yes	No	Very High - 3	No
<i>Caladenia tessellata</i> Thick Lip Spider Orchid	This species is found in grassy sclerophyll woodland on clay loam or sandy soils. As such habitat is present within the Subject Land, this species was included in the assessment.	Yes	No	Very High - 3	No
<i>Callistemon linearifolius</i> Netted Bottle Brush	This species grows in dry sclerophyll forest on the coast and adjacent ranges. As such habitat was present within the Subject Land, this species was included in the assessment.	Yes	No	Moderate - 1.5	No
<i>Dillwynia tenuifolia</i>	This species is known to occur in Shale Gravel Transition Forest on tertiary alluvium or laterised clays. As such habitat was present within the Subject Land, this species was included in the assessment.	Yes	No	High - 2	No
<i>Dillwynia tenuifolia</i> - endangered population <i>Dillwynia tenuifolia</i> , Kemps Creek	This population is bounded by Western Road, Elizabeth Drive, Devonshire Road and Cross Street, Kemps Creek in the Liverpool LGA. As the Subject Land does not occur within this location, this population was excluded from the assessment.	No	NA	High - 2	No
<i>Grevillea juniperina</i> subsp. <i>juniperina</i> Juniper-leaved Grevillea	This species is known to occur in Shale Gravel Transition Forest. As such habitat was present within the Subject Land, this species was included in the assessment.	Yes	No	Moderate - 1.5	No

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
<i>Grevillea parviflora</i> subsp. <i>parviflora</i> Small-flower Grevillea	This species occurs in a range of vegetation types from heath and shrubby woodland to open forest. As such habitat was present within the Subject Land, this species was included in the assessment.	Yes	No	High - 2	No
<i>Gyrostemon thesioides</i>	This species is known to occur on sandy, alluvial or colluvial soil within 50 m of a water course. As such habitat constraints are not present within the Subject Land, this species was excluded from the assessment.	No	NA	Very High - 3	No
<i>Hibbertia fumana</i>	This species is known to occur in association with <i>Eucalyptus fibrosa</i> and <i>Melaleuca decora</i> , which were present within the Subject Land. As such, this species was included in the assessment.	Yes	No	Very High - 3	No
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i> - endangered population Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	This population is geographically limited to the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith LGA's. As the Subject Land is situated within the Penrith LGA, this population was included in the assessment.	Yes	No	High - 2	No
<i>Micromyrtus minutiflora</i>	This species is known to occur in Shale Gravel Transition Forest. As such habitat was present within the Subject Land, this species was included in the assessment.	Yes	No	High - 2	No
<i>Persoonia nutans</i> Nodding Geebung	This species is known to occur in range of sclerophyll forest and woodland vegetation communities, including those on tertiary alluvium and shale sandstone transition communities.	Yes	No	High - 2	No

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
	As the Subject Land contains Shale Gravel Transition Forest, this species was included in the assessment.				
<i>Pimelea curviflora</i> var. <i>curviflora</i>	This species is known to occur on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. As the Subject Land contains Shale Gravel Transition Forest, this species was included in the assessment.	Yes	No	High - 2	No
<i>Pultenaea parviflora</i>	This species is known to occur within Shale Gravel Transition Forest. As such habitat was present within the Subject Land, this species was included in the assessment.	Yes	No	High - 2	No
<i>Pultenaea pedunculata</i> Matted Bush-pea	This species is known to occur in association with <i>Eucalyptus moluccana</i> , <i>Eucalyptus fibrosa</i> and <i>Melaleuca decora</i> , and favours sites in clay or sandy-clay soils (Blacktown Soil Landscape) on Wianamatta Shale-derived soils, usually close to patches of Tertiary Alluvium. As such habitat occurs within the Subject Land, this species was included in the assessment.	Yes	No	High - 2	No

4.3 Targeted Species Credit Surveys

Targeted surveys were undertaken for a number of species credit species considered likely to have suitable habitat within the Subject Land. These surveys were implemented in accordance with Section 6.5 of the BAM and all relevant DPIE threatened species survey guidelines.

Targeted surveys were undertaken in March, October and November 2020. Weather conditions taken from the nearest weather station (Badgerys Creek AWS; Station No. 067108) in the lead up and during the field survey are outlined in **Table 10**.

Pre-survey weather conditions were generally conducive for identifying threatened species should they occur within the Subject Land. Although no rainfall occurred in the week prior to the initial targeted flora survey, moderate falls earlier in March provided ideal conditions for the emergence and/or flowering of threatened species should they occur within the Subject Land. Such rainfall also allowed for optimal conditions for the emergence of shrubs and groundcovers within the Subject Land, which ensured maximum species diversity was observed during the site visit. Optimal conditions were also experienced prior to and during subsequent targeted surveys.

Table 10. Weather conditions taken from the nearest weather stations (Station number 067105) in the lead up and during the field survey (BOM 2019; BOM 2020). Survey dates are in bold.

Timing/activities	Date	Day	Temperature		Rainfall (mm)
			Min	Max	
Lead up to the survey	18/03/2020	Wednesday	11.4	26.5	0
	19/03/2020	Thursday	13.2	31.6	0
	20/03/2020	Friday	16.1	33.5	0
	21/03/2020	Saturday	13.5	25.9	0
	22/03/2020	Sunday	14.5	29.3	0
	23/03/2020	Monday	15.7	22.8	0
	24/03/2020	Tuesday	14.2	22.8	0
Site Assessment (Vegetation Mapping; BAM Plots; Targeted Flora Survey)	25/03/2020	Wednesday	14.8	25.9	0
Lead up to the survey	19/10/2020	Monday	13.7	22.5	2
	20/10/2020	Tuesday	14.5	23.2	0.2
	21/10/2020	Wednesday	10.7	27.4	0
	22/10/2020	Thursday	14.2	26.8	0
	23/10/2020	Friday	14.8	30.3	0
	24/10/2020	Saturday	17.5	24.6	6.6
	25/10/2020	Sunday	12.8	15.6	15.8
Site Assessment (Targeted Flora and Fauna Survey)	26/10/2020	Monday	12	19.9	31.4
Lead up to the survey	9/11/2020	Monday	13.4	25.5	0
	10/11/2020	Tuesday	11.6	28.2	0
	11/11/2020	Wednesday	13.6	31.8	0
	12/11/2020	Thursday	16.9	33	0
	13/11/2020	Friday	18.7	32	4

	14/11/2020	Saturday	13.3	30.4	12.4
	15/11/2020	Sunday	15.2	33.9	0.2
Site Assessment (Targeted Flora and Fauna Survey, SM4BAT)	16/11/2020	Monday	17.1	40.6	0
Site Assessment (Targeted Fauna Survey, SM4BAT)	17/11/2020	Tuesday	16.8	27.1	0
	18/11/2020	Wednesday	17.3	No data	0.2
Site Assessment (SM4BAT)	19/11/2020	Thursday	No data	No data	0.2
	20/11/2020	Friday	No data	37.3	No data
	21/11/2020	Saturday	14.6	27	0
	22/11/2020	Sunday	14.8	28.5	0
	23/11/2020	Monday	18.9	27.3	0
	24/11/2020	Tuesday	14.1	No data	0
	25/11/2020	Wednesday	16.9	No data	0
	26/11/2020	Thursday	13.7	No data	0
	27/11/2020	Friday	16.3	No data	0
	28/11/2020	Saturday	17.9	No data	0
	29/11/2020	Sunday	26.1	39.3	0
	30/11/2020	Monday	No data	No data	0
	01/12/2020	Tuesday	No data	No data	0
	02/12/2020	Wednesday	No data	No data	0

4.3.1 Fauna Species Credit Survey

A total of twenty-four (24) threatened fauna species were identified within the BAMC (DPIE 2019b) as having the potential to occur within the Subject Land. Targeted fauna surveys were conducted for nine (9) of those species within the DPIE endorsed survey period (**Table 11**), as they were identified as having the potential to occur within the Subject Land due to suitable habitat. Details of each targeted fauna survey technique are outlined in **Section 4.3.1.1**.

The remaining eighteen (18) species were not surveyed for due to the following:

- Species are considered unlikely to occur and no further assessment is required for that species if it is determined that no habitat constraints are present on the entire Subject Land for the threatened species (as per Section 6.4.1.13 of the BAM) (OEH 2017a).

Table 11. Species credit fauna species requiring targeted surveys and DPIE endorsed survey periods.

Candidate Fauna Species	Survey Period (BAMC)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Burhinus grallarius</i> Bush Stone-curlew											✓	
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle (Breeding)										✓		
<i>Hieraaetus morphnoides</i> Little Eagle (Breeding)										✓		
<i>Litoria aurea</i> Green and Golden Bell Frog											✓	
<i>Lophoictinia isura</i> Square-tailed Kite (Breeding)										✓		
<i>Meridolum corneovirens</i> Cumberland Plain Land Snail										✓		
<i>Myotis macropus</i> Southern Myotis										✓	✓	
<i>Phascolarctos cinereus</i> Koala (Breeding)											✓	
<i>Pommerhelix duralensis</i> Dural Land Snail										✓		
Key	✓ = Surveyed					= Optimum Survey Period						

4.3.1.1 Targeted Fauna Survey Effort

The following species credit species were identified by the BAMC as having the potential to utilise the habitat within the Subject Land:

- *Burhinus grallarius* (Bush Stone-curlew)
- *Haliaeetus leucogaster* (White-bellied Sea-Eagle - breeding)
- *Hieraaetus morphnoides* (Little Eagle – breeding)
- *Litoria aurea* (Green and Golden Bell Frog)
- *Lophoictinia isura* (Square-tailed Kite - breeding)
- *Meridolum corneovirens* (Cumberland Plain Land Snail)
- *Myotis macropus* (Southern Myotis)
- *Phascolarctos cinereus* (Koala – breeding)
- *Pommerhelix duralensis* (Dural Land Snail)

Targeted surveys for these species were required to determine their presence or absence. Targeted surveys were undertaken in accordance with the following guidelines:

- Species credit threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method (OEH 2018a);

- Threatened species survey and assessment guidelines: field survey methods for fauna – Amphibians (DECC 2009); and
- Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft) (DEC 2004).

The targeted survey effort undertaken for these species is detailed in **Table 12** and displayed in **Figure 14**.

One (1) threatened fauna species, *Meridolum corneovirens* (Cumberland Plain Land Snail), was found in the Cumberland Plain Woodland to the south of the Subject Land, although not found within the Subject Land. Impact mitigation measures for the Cumberland Plain Land Snail are detailed in **Section 5.1**.

Table 12. Microbat targeted survey effort undertaken within the Subject Land.

Target Species	Survey Technique	Survey Effort and Timing	Target Species Identified?
<i>Burhinus grallarius</i> Bush Stone-curlew	Call playback	Call playback and spotlighting was conducted one (1) hour after dark across three (3) nights.	No
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle (Breeding)	Stick nest search	Thorough searches of potential habitat over the course of one (1) day. Habitat searches focused on areas containing mature trees.	No
<i>Hieraaetus morphnoides</i> Little Eagle (Breeding)	Stick nest search	Thorough searches of potential habitat over the course of one (1) day. Habitat searches focused on areas containing mature trees.	No
<i>Litoria aurea</i> Green and Golden Bell Frog	Call playback and habitat search	Call playback and habitat searches were conducted for one (1) hour after dark across three (3) nights. Survey focussed on the dam that is situated just outside the Subject Land.	No
<i>Lophoictinia isura</i> Square-tailed Kite (Breeding)	Stick nest search	Thorough searches of potential habitat over the course of one (1) day. Habitat searches focused on areas containing mature trees.	No
<i>Meridolum corneovirens</i> Cumberland Plain Land Snail	Habitat search	Thorough searches of potential habitat over the course of one (1) day. Habitat searches focused on areas containing leaf litter, shed bark and logs.	No, although present within the bushland to the south of the Subject Land.
<i>Myotis macropus</i> Southern Myotis	SM4BAT	One (1) device deployed for sixteen (16) nights between approximately 8pm and 5am. The device was located adjacent to the dam that is situated just outside the Subject Land.	No
<i>Phascolarctos cinereus</i> Koala (Breeding)	Call playback	Call playback and spotlighting was conducted one (1) hour after dark across three (3) nights.	No
<i>Pommerhelix duralensis</i> Dural Land Snail	Habitat search	Thorough searches of potential habitat over the course of one (1) day. Habitat searches focused on areas containing leaf litter, shed bark and logs.	No

4.3.2 Flora Species Credit Survey

A total of fifteen (15) threatened flora species were identified within the BAMC (DPIE 2019b) as having the potential to occur within the Subject Land. Targeted surveys were undertaken within the DPIE endorsed survey period (**Table 13**). Targeted surveys were undertaken using parallel field traverses in accordance with the 'Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method' (DPIE 2020c; **Figure 14**).

The remaining two (2) flora species were not surveyed for due to the following:

- Species are considered unlikely to occur and no further assessment is required for that species if it is determined that no habitat constraints are present on the entire Subject Site for the threatened species (as per Section 6.4.1.13 of the BAM) (OEI 2017a).

No threatened flora species were observed within the Subject Land during the targeted surveys.

Table 13. Species credit flora species requiring targeted surveys. Targeted surveys were conducted within DPIE endorsed survey periods.

Candidate Fauna Species	Survey Period (BAMC)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Acacia bynoeana</i> Bynoe's Wattle			✓									
<i>Acacia pubescens</i> Downy Wattle			✓									
<i>Allocasuarina glareicola</i>			✓									
<i>Caladenia tessellata</i> Thick Lip Spider Orchid										✓		
<i>Callistemon linearifolius</i> Netted Bottle Brush										✓		
<i>Dillwynia tenuifolia</i>										✓		
<i>Grevillea juniperina</i> subsp. <i>juniperina</i> Juniper-leaved Grevillea			✓									
<i>Grevillea parviflora</i> subsp. <i>parviflora</i> Small-flower Grevillea										✓		
<i>Hibbertia fumana</i>										✓		
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i> - endangered population											✓	
<i>Micromyrtus minutiflora</i>			✓									
<i>Persoonia nutans</i> Nodding Geebung			✓									
<i>Pimelea curviflora</i> var. <i>curviflora</i>			✓									
<i>Pultenaea parviflora</i>										✓		

Candidate Fauna Species	Survey Period (BAMC)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Pultenaea pedunculata</i> Matted Bush-pea										✓		
Key	✓ = Surveyed						= Optimum Survey Period					

4.4 Species Polygons

No species credit species were present within the Subject Land. Therefore, no species polygons were assigned.

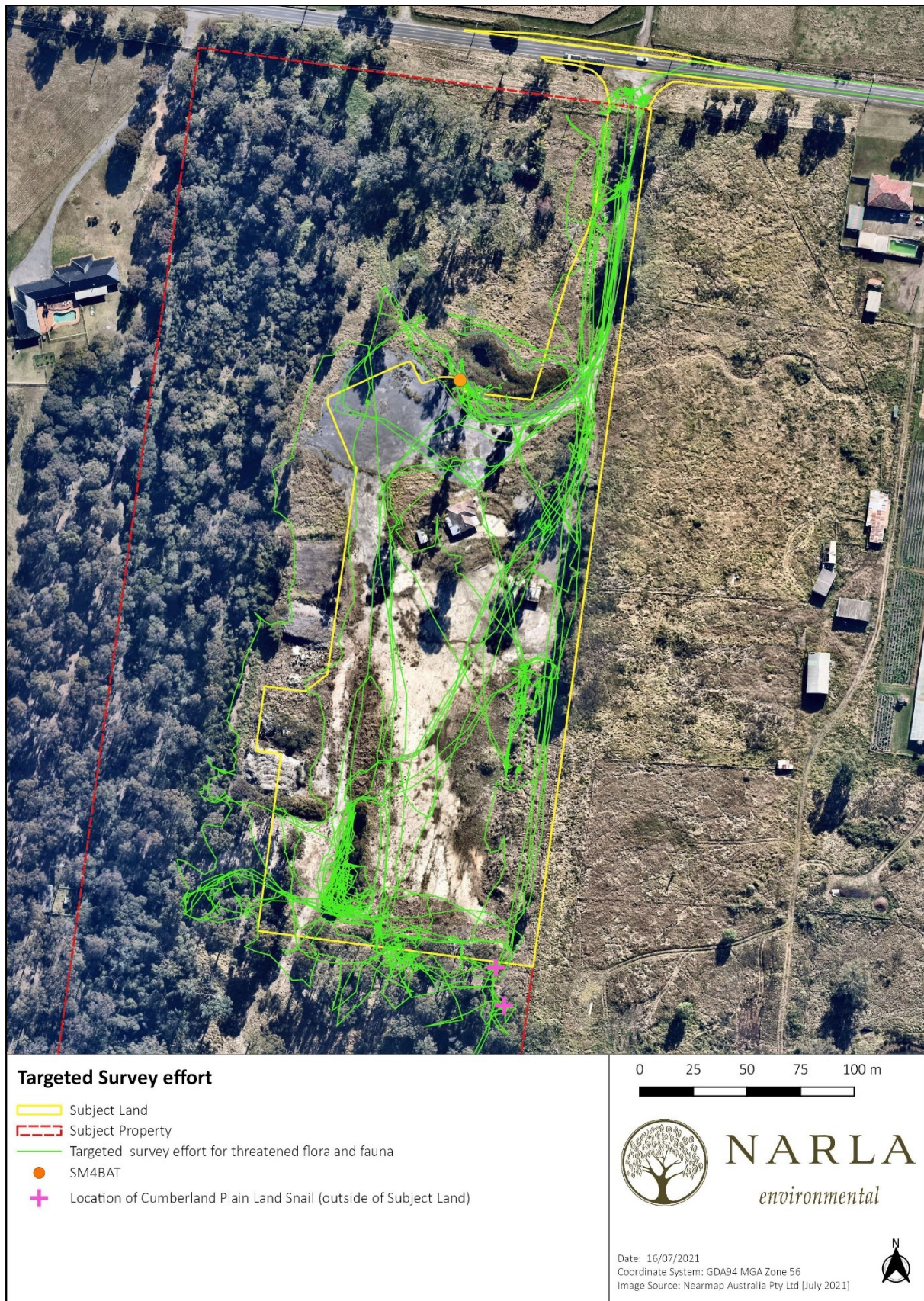


Figure 14. Targeted survey effort undertaken by Narla within the Subject Land.

5. Avoid and Minimise Impacts

5.1 Impact Mitigation and Minimisation Measures

This section details the measures to be implemented before, during and post construction to avoid and minimise the impacts of the project (Table 14).

Table 14. Table of measures to be implemented before, during and after construction to avoid and minimise the impacts of the project.

Action	Outcome	Timing	Responsibility
Avoid and Minimise Impact - Project Location and Design	The development has been strategically positioned to minimise impacts on native vegetation and habitat as much as possible. The proponent has chosen a mostly cleared area within the north of the Subject Property for the proposed development. This area has been historically and continues to be exposed to varying disturbances, including weed invasion and vehicular access. The removal of vegetation within this area has largely been avoided, as the proposed development has been strategically placed to avoid the removal of as many trees as possible. Note that larger areas of higher quality bushland in the west and south of the Subject Property will not be affected as part of the proposed development. Any temporary structures required for construction works should be located within the Subject Land or areas containing no native vegetation. This will avoid unnecessary impacts on native vegetation and habitat elsewhere within the Subject Property.	Pre-construction phase	Proponent
Preparation of a Construction Environmental Management Plan (CEMP)	A CEMP will be required for the construction phase of the project, and will be prepared prior to issue of the Construction Certificate. The CEMP would include, as a minimum, industry-standard measures for the management of soil, surface water, weeds and pollutants, as well as site-specific measures, including the procedures outlined below. The proposed mitigation measures would include environmental safeguards for protection of neighbouring properties and nearby waterways in accordance with relevant policy documentation and Government guidelines. In order to address the potential impacts of the proposal on biodiversity, the mitigation and management measures outlined within this table would be implemented as part of the CEMP for the site.	Pre-construction phase	Proponent Project Ecologist Construction Contractor

Action	Outcome	Timing	Responsibility
Tree Protections	Australian Standard 4970 (2009) Protection of Trees on Development Sites (AS-4970) outlines that a Tree Protection Zone (TPZ) is the principal means of protecting trees on construction sites. It is an area isolated from construction disturbance so that the tree remains viable. Ideally, works should be avoided within the TPZ. A Minor Encroachment is less than 10% of the TPZ and is outside the SRZ. A Minor Encroachment is considered acceptable by AS-4970 when it is compensated for elsewhere and contiguous within the TPZ. A Major Encroachment is greater than 10% of the TPZ or inside the SRZ. Major Encroachments generally require root investigations undertaken by non-destructive methods or the use of tree sensitive construction methods.	Pre-construction phase	Proponent Arborist
Assigning a Project Ecologist for vegetation clearing	Prior to construction, the applicant should commission the services of a qualified and experienced Ecologist Consultant (minimum 3 years' experience) with a minimum tertiary degree in Science, Conservation, Biology, Ecology, Natural Resource Management, Environmental Science or Environmental Management. The Ecologist must be licensed with a current Department of Primary Industries Animal Research Authority permit and New South Wales Scientific License issued under the BC Act. The Ecologist will be commissioned to: ▪ Undertake any required targeted searches for threatened flora prior to vegetation clearing; ▪ Undertake targeted searches for Cumberland Plain Land Snail to ensure it is not located within the Subject Land; ▪ Undertake an extensive pre-clearing survey, delineating habitat-bearing trees and shrubs to be retained/removed; and ▪ Supervise the clearance of trees and shrubs (native and exotic) in order to capture, treat and/or relocate any displaced fauna.	Prior to and during vegetation clearance works	Proponent Project Ecologist
Preparation of a VMP	A VMP may be required to outline the extent, nature, method and timeframes for vegetation modification required to establish and/or maintain the APZ within the Subject Land. The VMP will detail on-going habitat management including management of the APZ, weed	Pre-construction phase	Proponent Project Ecologist

Action	Outcome	Timing	Responsibility
	management, native flora plantings and maintenance. The VMP may also ensure the enhancement of Cumberland Plain Land Snail habitat adjacent to the Subject Land.		
Riparian vegetation	The Subject Land intersects a small section of unmapped artificial waterbody and its associated riparian buffer. Impacts to the riparian zone will primarily involve the removal of exotic vegetation, including infestations of the priority weed <i>Ludwigia peruviana</i> in the riparian zone. Priority weeds must be managed in accordance with the Biosecurity Act 2015. The following 'Regional Recommended Measure' applies to this priority weed within the Greater Sydney region: Land managers mitigate the risk of the plant being introduced to their land. Land managers prevent spread from their land where feasible. Land managers reduce the impact on priority assets. The plant should not be bought, sold, grown, carried or released into the environment. Local Control Authority is notified if the plant is found on the land. Prior to vegetation clearing works in the riparian zone, a Project Ecologist will be commissioned to undertake any required targeted searches for threatened flora.	Prior to and during vegetation clearance works	Proponent Project Ecologist
Biodiversity Stewardship Agreement	The proponent has chosen to enter into a Biodiversity Stewardship Agreement in order to conserve and increase the condition of the two TECs surrounding the Subject Land.	Prior to and during vegetation clearance works	Proponent Ecologist
APZ	The APZ within the Subject Land must be maintained to meet the vegetation attributes as outlined in Table 6 to uphold future vegetation integrity scores. This includes: Conducting the trimming/slashing of native groundcovers and grasses post-seeding to allow for continued regeneration.	Construction phase and post-construction phase	Proponent
Relocation of woody debris	Any woody debris (fallen trees and logs) within the Subject Land are to be relocated to an area of native vegetation adjacent to the Subject Land.	Construction phase	Project Ecologist Proponent Bush regeneration contractor

Action	Outcome	Timing	Responsibility
Erosion and Sedimentation	Appropriate erosion and sediment control must be erected and maintained at all times during construction in order to avoid the potential of incurring indirect impacts on biodiversity values. As a minimum, such measures should comply with the relevant industry guidelines such as 'the Blue Book' (Landcom 2004).	Construction phase	Proponent Construction Contractor
Erection of temporary fencing	Temporary fencing should be erected around retained native vegetation that may incur indirect impacts on biodiversity values due to the construction works. As Cumberland Plain Land Snails were found in the area to the south of the Subject Land, access to all areas of native vegetation not within the Subject Land should be prevented during construction and operation, as to not incur indirect impacts to this species.	Construction phase	Proponent Construction Contractor
Storage and Stockpiling (Soil and Materials)	Allocate all storage, stockpile and laydown sites away from any native vegetation that is planned to be retained. Avoid importing any soil from outside the site as this can introduce weeds and pathogens to the site in order to avoid the potential of incurring indirect impacts on biodiversity values.	Construction phase	Construction Contractors
Stormwater	Potential impacts relating to stormwater and runoff will be managed during construction and operation phases. The CEMP will guide stormwater management during the construction phase of development.	Post-construction phase	Proponent Construction Contractors/ Architect

6. Impact Summary

6.1 Impacts on Native Vegetation

The following native vegetation within the Subject Land is proposed to be impacted as a result of the proposed development:

- 0.48ha representative of PCT 724 - Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion.

The purchase and retirement of Biodiversity Offset Credits will be required for the following native vegetation within the Subject Land:

- 0.26 ha within Vegetation Zone 1 (Shrubby Understorey), representative of PCT 724 (**Figure 15**).

6.2 Impacts on Threatened Species

No threatened species are predicted to be impacted as a result of the proposed development.

6.3 Serious and Irreversible Impacts (SAIL)

No SAIL ecological communities or species are predicted to be impacted as a result of the proposed development.



Figure 15. Impacts on native vegetation and offset requirements.

6.4 Other Impacts

6.4.1 Indirect Impacts

Indirect impacts occur when the proposal or activities relating to the construction or operation of the proposal affect native vegetation, threatened ecological communities and threatened species habitat beyond the Subject Land. Impacts may also result from changes to land-use patterns, such as an increase in vehicular access and human activity on native vegetation, threatened ecological communities and threatened species habitat. The indirect impacts of this proposed development are outlined in **Table 15**.

Table 15. Indirect impacts associated with the proposed development.

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
(a) inadvertent impacts on adjacent habitat or vegetation	Vegetation and habitat directly adjacent to the Subject Land has the potential to experience ongoing indirect impacts as a result of the proposed development. Although unlikely given the disturbed history of the Subject Land, the disturbance caused during construction may increase weed infestations within adjacent vegetation, which in turn may decrease its habitat value. Furthermore, the proposed development has the potential to alter the natural hydrology occurring within the area, due to an increase in hard surfaces. This in turn may negatively impacting vegetation downslope of the Subject Land by altering natural runoff.	Two TECs occur adjacent to the Subject Land - Cumberland Plain Woodland and Shale Gravel Transition Forest. In addition, the Cumberland Plain Land Snail was located adjacent to the Subject Land. There is also the potential that other threatened species occur in areas adjacent to Subject Land that may be impacted by a decrease in habitat condition or hydrological changes.	While changes to vegetation condition and hydrology may have a localised impact to threatened species, threatened ecological communities and their habitats, this is not expected to impact on their bioregional persistence.

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
(b) reduced viability of adjacent habitat due to edge effects	The proposed construction and on-going operation may lead to an increase in weed infiltration into adjacent habitat due to enhanced edge effects. This may in turn reduce the viability of such habitats, with the impact expected to be restricted to a couple of metres into adjacent vegetation.	Two TECs occur adjacent to the Subject Land - Cumberland Plain Woodland and Shale Gravel Transition Forest. In addition, the Cumberland Plain Land Snail was located adjacent to the Subject Land. There is also the potential that other threatened species occur in areas adjacent to Subject Land These TECs and species may be impacted by edge effects leading to a reduced viability in habitat.	While edge effects may have a localised impact to TECs and threatened species, this is not expected to impact on their bioregional persistence, considering the large habitat connectivity within the surrounding areas.
(c) reduced viability of adjacent habitat due to noise, dust or light spill	An increase in noise is to be expected during and post-construction. As the Subject Land is located in a semi-rural area, this may have an impact on any species roosting adjacent to the site during the day that are not adapted to such noises, as would be expected with typical urban species. It is not expected that construction and operation of the resource facility would not occur throughout the night, and as such would not impact on nocturnal species that may utilise adjacent habitat, or diurnal species that roost in adjacent habitat.	Two TECs occur adjacent to the Subject Land - Cumberland Plain Woodland and Shale Gravel Transition Forest, and may be impacted by increases in noise and dust spill. In addition, the Cumberland Plain Land Snail was located adjacent to the Subject Land. There is also the potential that	While the construction and operation of the facility may have a localised impact to TECs and threatened species, this is not expected to impact on their bioregional persistence, considering large areas of habitat connectivity within the surrounding area.

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
	The construction and operation of the facility may increase dust in adjacent habitat. Dust can impact on a plants ability to photosynthesise and may increase plant mortality in the adjacent vegetation. It is however not expected that this would have such an impact to decrease the viability of adjacent habitat. It is expected that the construction and operation of the facility would occur during normal working hours, and as such light spill is not expected to affect adjacent habitat.	other threatened species occur in areas adjacent to Subject Land. Such species may be impacted by an increase in noise and dust spill into adjacent habitats.	
(d) transport of weeds and pathogens from the site to adjacent vegetation	As previously discussed, the proposed construction and on-going operation may lead to an increase in weed infiltration into adjacent habitat due to enhanced edge effects. It is however not expected that weeds will be transported via human or vehicular traffic into surrounding areas during construction and operation of the resource management facility. Temporary fencing will be erected around retained native vegetation to avoid such indirect impacts occurring during construction. It is not expected that such areas would be accessible post-construction.	N/A	N/A
(e) increased risk of starvation, exposure and loss of shade or shelter	It is highly unlikely that any threatened fauna would be exposed to increased risks from starvation, exposure, and loss of shade and shelter as a result of the proposed development	N/A	N/A

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
	given the majority of it is already completely cleared and unsuitable for habitation. No habitat is to be removed beyond the Subject Land, although disturbances from noise during construction and operation may deem such habitats unsuitable for certain species. However, due to the large areas of habitat connectivity adjoining the Subject Land, it is unlikely that this impact will be significant as such habitats will continue to provide food resources and shelter for fauna species.		
(f) loss of breeding habitats	No habitat is proposed to be removed beyond the Subject Land. However, an increase in noise is to be expected during and post-construction. As such, there is potential for disturbance to breeding habitats directly adjacent to the Subject Land. However, due to the large areas of habitat connectivity adjoining the Subject Land, it is not expected for this to significantly impact on species inhabiting such areas.	The Cumberland Plain Land Snail was located adjacent to the Subject Land. As no habitat is to be removed beyond the Subject Land, no loss of breeding habitat is to be expected as a result of the proposed development. There is also the potential that other threatened species occur in areas adjacent to Subject Land. Such species may be impacted by an increase in noise into adjacent habitats, which	This impact is expected to be localised and will not have an overall impact on the bioregional persistence of threatened species.

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
		may in turn impact on their breeding habitat.	
(g) trampling of threatened flora species	No threatened flora species were recorded within the Subject Land. Although no threatened flora species have been historically recorded directly adjacent to the Subject Land, there is still the potential for such species to exist in these areas, as these areas were not surveyed. In order to prevent the trampling of threatened flora species that could potentially occur within adjacent habitat, such habitats will be delineated with temporary fencing to avoid such impacts occurring during construction. It is not expected that such areas would be accessible post-construction.	N/A	N/A
(h) inhibition of nitrogen fixation and increased soil salinity	It is unlikely that the inhibition of nitrogen fixation will affect vegetation adjacent to the Subject Land. Increased soil salinity may result due to clearing of vegetation leading to the rising of the water table. However, clearing will be limited to the Subject Land and as such is not expected to affect vegetation directly adjacent to the Subject Land.	N/A	N/A
(i) fertiliser drift	This issue is not likely to affect the vegetation within or surrounding the Subject Land. No fertiliser is expected to be used during construction and operation of the resource management facility.	N/A	N/A

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
(j) rubbish dumping	An increase in traffic on Park Road as a result of the construction and operation of the facility may lead to an increase in rubbish dumping (including littering) within vegetated areas adjacent to the Subject Land. The dumping/littering of food resources may provide a food source for fauna, including threatened species. However, this may also encourage invasive species into such foxes. This can be mitigated by preventing access to adjacent vegetated areas.	Two TECs occur adjacent to the Subject Land - Cumberland Plain Woodland and Shale Gravel Transition Forest, and both of these may be impacted by rubbish dumping. In addition, the Cumberland Plain Land Snail was located adjacent to the Subject Land. The dumping of rubbish may decrease suitable habitat for this species. There is also the potential that other threatened species occur in areas adjacent to Subject Land. Such species may be impacted by the dumping of rubbish, particularly food resources. This may result in both positive (food source) and negative impacts (increase in predators) to such species.	This impact is expected to be localised and will not have an overall impact on the bioregional persistence of the TECs or threatened species.
(k) wood collection	An increase in traffic on Park Road as a result of the construction and operation of the resource management	Two TECs occur adjacent to the Subject Land - Cumberland Plain	This impact is expected to be localised and will not have an overall

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
	facility may lead to an increase in wood collection from adjacent vegetated areas. In turn, this will negatively impact on species that rely on logs for shelter. This can be mitigated by preventing access to adjacent vegetated areas.	Woodland and Shale Gravel Transition Forest, and both of these may be impacted by wood collection. In addition, the Cumberland Plain Land Snail was located adjacent to the Subject Land. The removal of logs may have a significant impact on this species as they are reliant on a good cover of coarse woody debris. There is also the potential that other threatened species occur in areas adjacent to Subject Land. The collection of wood from such habitat may impact on threatened species that rely on such habitat for survival.	impact on the bioregional persistence of the TECs or threatened species.
(l) bush rock removal and disturbance	This issue is not likely to affect the vegetation surrounding the Subject Land. No bush rock was observed within or adjacent to the Subject Land.	N/A	N/A

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
(m) increase in predatory species populations	There is potential that predatory species, such as foxes and cats, already inhabit areas within and surrounding the Subject Land. There is the possibility that other indirect impacts, such as an increase in rubbish dumping, may encourage predatory species into the area.	The Cumberland Plain Land Snail was located adjacent to the Subject Land. There is also the potential that other threatened species occur in areas adjacent to Subject Land. Such species may be impacted by an increase in predatory species populations.	An increase in predatory species adjacent to the Subject Land may have widespread ramifications for any locally occurring threatened species. In particular, the large areas of habitat connectivity adjacent to the Subject Land will allow for the movement of predatory species across the wider landscape.
(n) increase in pest animal populations	There is potential that pest animal populations already inhabit areas within and surrounding the Subject Land. There is the possibility that other indirect impacts, such as an increase in rubbish dumping, may encourage an increase in pest animal populations.	The Cumberland Plain Land Snail was located adjacent to the Subject Land. There is also the potential that other threatened species occur in areas adjacent to Subject Land. Such species may be impacted by an increase in pest animal populations.	An increase in pest animal species adjacent to the Subject Land may have widespread ramifications for any locally occurring threatened species. In particular, the large areas of habitat connectivity adjacent to the Subject Land will allow for the movement of pest animal species across the wider landscape.
(o) increased risk of fire	The Subject Land is identified by Penrith City Council as occurring within bushfire prone land. The proposed development has been positioned to comply with the RFS guidelines for bushfire protection without any further land	N/A	N/A

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
	management. It is not expected that this will alter the bushfire risk of vegetation surrounding the Subject Land.		
(p) disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	No specialist breeding and foraging habitat was identified within or adjacent to the Subject Land. It is therefore not expected that the proposed development will disturb any specialist breeding and foraging habitat.	N/A	N/A

6.4.2 Groundwater Dependent Ecosystems

The Australian Government Atlas of Groundwater Dependent Ecosystems (GDE; BOM 2019a) was reviewed and it was identified that the Subject Land contains a high potential terrestrial GDE. Terrestrial GDE's are terrestrial ecosystems that rely on the subsurface presence of groundwater, which includes all vegetation ecosystems (BOM 2019a). Such reliance can vary from complete to partial reliance (DPIE 2020d). An increase in groundwater levels that occurs through land clearing are threats to GDE's (DPIE 2020d). Approximately 0.3 ha of native vegetation is proposed for removal within the Subject Land. All other vegetation surrounding the Subject Land that are dependent on GDE's will be retained. It is not expected that the clearing within the Subject Land will impact on such GDE's.

6.4.3 Prescribed and Uncertain Impacts

This list of impacts includes all of those impacts on biodiversity values not caused by direct vegetation clearing or development that have been prescribed by the Biodiversity Conservation Regulation 2017. Prescribed biodiversity impacts require an assessment of the impacts of development on the habitat of threatened species or ecological communities associated with karst, caves, crevices, cliffs and other features of geological significance. This is discussed in **Table 16** below.

Table 16. Prescribed and uncertain impacts associated with the proposed development.

Will there be impacts on any of the following	Yes/No	If Yes, Address all of the assessment questions from section 9.2.1 of the BAM
Species or ecological communities associated with karst, caves, crevices, cliffs and other features of geological significance	No	There are no karsts, caves, crevices, cliffs and other features of geological significance on or near the Subject Land.
Habitat of threatened species or ecological communities associated with rocks	No	No threatened species or ecological communities associated with rocks were located on the Subject Land.
Habitat of threatened species or ecological communities associated with human made structures	No	There are no threatened species or ecological communities located within the Subject Land that are associated with human made structures.
Habitat of threatened species or ecological communities associated with non-native vegetation	No	There will be no impact to the habitat of threatened species or ecological communities associated with non-native vegetation. Non-native vegetation exists in the form of herbaceous weeds and exotic grasses.
Connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	No	It is unlikely the proposed development will interrupt connectivity for any threatened species, as extensive areas of habitat connectivity will continue to exist in vegetated areas surrounding the Subject Land.

Will there be impacts on any of the following	Yes/No	If Yes, Address all of the assessment questions from section 9.2.1 of the BAM
Movement of threatened species that maintains their life cycle	No	It is unlikely that the area of impact will interrupt the movement of threatened fauna or flora species that maintains their life cycle, considering the degraded nature of the habitat and the extensive areas of habitat connectivity surrounding the Subject Land.
Water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including subsidence or upsidence resulting from underground mining or other development)	No	The Subject Land is mapped as containing a high potential terrestrial GDE. It is however not expected that the removal of vegetation within the Subject Land will impact upon any groundwater processes within the surrounding landscape.
Wind turbine strikes on protected animals	No	There are no wind turbines proposed on the Subject Land.
Vehicle strikes on threatened species of animals or on animals that are part of a TEC	No	The Subject Land has the potential to support threatened species. However, due to the nature of the proposed development, it is highly unlikely that vehicle strikes will be an issue given the slow speed requirements of vehicles within the property.

6.5 Biodiversity Offset Credit Requirements

The preferred approach to offset the residual impacts of the proposal is to purchase and retire the appropriate species credits from registered Biodiversity Stewardship Sites that comply with the trading rules of the NSW BOS in accordance with the 'like for like' report generated by the BAM calculator. If such credits are unavailable, credits would be sourced in accordance with the 'variation report' generated by the BAMC.

A payment to the Biodiversity Conservation Trust (BCT) would be considered as a contingency option if a suitable number and type of biodiversity credits cannot be secured.

Estimated costs to purchase these credits, or alternatively, to allocate offset funds directly into the NSW BCT are available in the NSW Biodiversity Offsets Payment Calculator (DPIE 2020a).

6.5.1 Offset Requirement for Ecosystem Credits

A total of four (4) ecosystem credits are required to offset the biodiversity impacts of the proposed development (Table 17).

Table 17. Ecosystem credits required to offset the proposed development.

PCT	BC Act Status	Zone	Total Area (ha)	Ecosystem Credits Required
PCT 724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	Critically Endangered Ecological Community	Zone 1 (Shrubby understorey)	0.26	4
		Zone 2 (Cleared)	0.22	0
Total Ecosystem Credits				4

6.5.2 Offset Requirement for Species Credits

No candidate species credit species will require offsetting through the retiring of biodiversity offset species credits under the BOS as a result of the proposed development.

7. Other Relevant Legislation and Planning Policies

7.1 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The native vegetation within the Subject Land in Zone 1 and Zone 2 does not conform to the EPBC Act 1999 listed CEEC Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest. The vegetation within Zone 1 does not conform to this listed CEEC as it does not meet all of the key diagnostic characteristics as outlined in **Table 18**. That is, as the upper tree layer species present within the Subject Land have <10% canopy cover, the entire criteria within **Table 18** has not been met. It is however noted that the vegetation to the south and west of the Subject Land is likely to conform to the EPBC listing.

The vegetation within Zone 2 does not meet the EPBC listed community as vegetation derived from grasslands and shrublands are not included as part of the nationally listed CEEC.

Table 18. Key Diagnostics Characteristics required to meet the EPBC Listing Status for Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Threatened Species Scientific Committee 2009).

Key Diagnostic Characteristic	Criteria met? (Vegetation Zone 1)
Distribution is limited to the Sydney Basin Bioregion with most occurrences in the Cumberland Sub-region. This covers a geographic area commonly known as the Cumberland Plain, a rainshadow coastal valley in western Sydney.	Yes, the Subject Land is situated within the Cumberland IBRA Subregion.
Most occurrences are on clay soils derived from Wianamatta Group geology, with limited to rare occurrences on soils derived from Tertiary Alluvium, Holocene Alluvium, the Mittagong Formation, Aeolian Deposits and Hawkesbury Sandstone	Yes, the Subject Land occurs on Wianamatta Group shales.
Upper tree layer species must be present with these features: - The minimum projected foliage cover of canopy trees is 10% or more; and - The tree canopy is typically dominated by <i>Eucalyptus moluccana</i> (Grey Box), <i>E. tereticornis</i> (Forest Red Gum) and/or <i>E. fibrosa</i> (Red Ironbark). Other canopy species may occur in association with the typical dominants and may be locally dominant at some sites.	No, the minimum projected foliage cover of canopy trees (<i>Eucalyptus moluccana</i> and <i>Eucalyptus fibrosa</i>) is <10%.
A sparse lower tree layer may be present, typically with young eucalypts of upper tree canopy species and species of Acacia, Exocarpos and Melaleuca.	Yes, lower tree layer comprises <i>Melaleuca decora</i> , <i>Melaleuca styphelioides</i> and <i>Melaleuca nodosa</i> .
The understorey typically is dominated by the ground layer and shows these features: The ground layer typically comprises a variety of perennial native graminoids and forbs;	Yes, understorey comprises a diversity of native forbs and grasses. Native shrub layer is also present.

Key Diagnostic Characteristic	Criteria met? (Vegetation Zone 1)
- Native graminoid species that are often present include: the grasses <i>Aristida ramosa</i> (Purple Wiregrass), <i>A. vagans</i> (Threeawn Speargrass), <i>Cymbopogon refractus</i> (Barbed Wire Grass), <i>Dichelachne micrantha</i> (Plumegrass), <i>Echinopogon caespitosus</i> var. <i>caespitosus</i> (Tufted Hedgehog Grass), <i>Eragrostis leptostachya</i> (Paddock Lovegrass), <i>Microlaena stipoides</i> subsp. <i>stipoides</i> (Weeping Grass), <i>Paspalidium distans</i> and <i>Themeda triandra</i> (Kangaroo Grass), and other graminoids <i>Carex inversa</i> (Knob Sedge), <i>Cyperus gracilis</i> (Slender Sedge), <i>Lomandra filiformis</i> subsp. <i>filiformis</i> (Wattle Mat-rush) and <i>L. multiflora</i> subsp. <i>multiflora</i> (Manyflowered Mat-rush); - Native forb and other herb species present include: <i>Asperula conferta</i> (Common Woodruff), <i>Brunoniella australis</i> (Blue Trumpet), <i>Cheilanthes sieberi</i> (Poison Rock-Fern), <i>Desmodium varians</i> (Slender Tick-trefoil), <i>Dianella longifolia</i> (Blue Flax-Lily), <i>Dichondra repens</i> (Kidney Weed), <i>Glycine</i> spp., <i>Hardenbergia violacea</i> (Native Sarsparilla), <i>Opercularia diphylla</i> (Stinkweed), <i>Oxalis perennans</i>, <i>Pratia purpurascens</i> (Whiteroot) and <i>Wahlenbergia gracilis</i> (Australian Bluebell); and - A shrub layer may be present, to variable extent, and is often dominated by <i>Bursaria spinosa</i> (Blackthorn) while other species include: <i>Daviesia ulicifolia</i> (Gorse Bitter Pea), <i>Dillwynia sieberi</i>, <i>Dodonaea viscosa</i> subsp. <i>cuneata</i> (Wedge-leaf Hop-bush), <i>Indigofera australis</i> (Native Indigo) and <i>Lissanthe strigosa</i> (Peach Heath).	

7.2 State Environmental Planning Policy (Koala Habitat Protection) 2019

This SEPP seeks to address the declining status of koalas in NSW through better conservation and management of koala habitat as part of the planning and assessment process. The overarching aim of the SEPP is to “... encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline” (DPIE 2020b).

This SEPP applies to local government areas that are listed in Schedule 1 ‘Local government areas’ of the SEPP. As City of Penrith LGA is not included in Schedule 1, this SEPP does not apply to the Subject Land.

7.3 State Environmental Planning Policy No 19—Bushland in Urban Areas

SEPP 19 – Bushland in Urban Areas applies to the areas and parts of areas specified in Schedule 1 of the SEPP that adjoin bushland zoned or reserved for public open space purposes. Although Penrith is listed in Schedule 1 of the SEPP, the Subject Land does not adjoin any bushland zoned or reserved for public open space purposes. As such, this SEPP does not apply to the Subject Land.

7.4 State Environmental Planning Policy (Coastal Management) 2018

State Environmental Planning Policy (Coastal Management) 2018 applies to land within the coastal zone. The coastal zone means the area of land comprised of the following coastal management areas:

- the coastal wetlands and littoral rainforests area;
- the coastal vulnerability area;
- the coastal environment area; or
- the coastal use area.

As the Subject Land does not occur within any of these listed areas, this SEPP does not apply.

8. References

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Biodiversity Conservation Act (2016) <https://legislation.nsw.gov.au/#/view/act/2016/63/full>

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Department of Environmental Conservation (DEC) (2004) Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft), New South Wales Department of Environment and Conservation, Hurstville, NSW.

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9. Appendices

Appendix A. BAM Site - Field Survey Forma (copied directly from Electronic Data Sheet).

Appendix B. BAMC Generated Biodiversity Credit Report.

Appendix A. BAM Site - Field Survey Form (copied directly from Electronic Data Sheet).

BAM Site – Field Survey Form					
Date:	25/03/2020	Plot ID:	Plot 1	Photo #:	-
Zone:	56	Plot Dimensions:	20 x 50m	Easting:	285235.67 E
Datum:	GDA94	Middle bearing from 0m:	355°	Northing:	6249259.82 S
PCT:	PCT 724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion [Vegetation Zone 1: Shrubby understorey]				
Growth Form	Scientific Name		Cover	Abundance	
Tree (TG)	<i>Acacia decurrens</i>		0.5	1	
Forb (FG)	<i>Alternanthera denticulata</i>		0.2	20	
Exotic	<i>Aster subulatus</i>		0.1	1	
HTE	<i>Bidens pilosa</i>		0.1	15	
Forb (FG)	<i>Brunoniella australis</i>		0.2	30	
Forb (FG)	<i>Centella asiatica</i>		0.1	5	
HTE	<i>Chloris gayana</i>		15	N/A	
Grass & grasslike (GG)	<i>Chloris truncata</i>		0.1	2	
Exotic	<i>Cirsium vulgare</i>		0.1	10	
Forb (FG)	<i>Commelina cyanea</i>		1	50	
Exotic	<i>Conyza bonariensis</i>		1	15	
Grass & grasslike (GG)	<i>Cynodon dactylon</i>		8	N/A	
Exotic	<i>Cyperus brevifolius</i>		0.1	5	
HTE	<i>Cyperus eragrostis</i>		3	40	
Other (OG)	<i>Desmodium varians</i>		0.1	5	
Forb (FG)	<i>Dichondra repens</i>		0.1	10	
Shrub (SG)	<i>Dillwynia sieberi</i>		0.1	2	
Shrub (SG)	<i>Dodonaea viscosa</i>		0.1	1	
Exotic	<i>Echinochloa crus-galli</i>		0.5	10	
HTE	<i>Ehrharta erecta</i>		10	N/A	
Forb (FG)	<i>Einadia hastata</i>		5	N/A	
Forb (FG)	<i>Einadia nutans</i> subsp. <i>linifolia</i>		1	15	
Forb (FG)	<i>Einadia trigonos</i>		1	15	

BAM Site – Field Survey Form			
HTE	<i>Eragrostis curvula</i>	15	N/A
Grass & grasslike (GG)	<i>Eriochloa pseudoacrotricha</i>	0.1	5
Tree (TG)	<i>Eucalyptus moluccana</i>	5	N/A
Forb (FG)	<i>Euchiton sphaericus</i>	0.1	1
Grass & grasslike (GG)	<i>Fimbristylis dichotoma</i>	0.1	5
Other (OG)	<i>Glycine clandestina</i>	1	30
Other (OG)	<i>Glycine tabacina</i>	0.5	20
Grass & grasslike (GG)	<i>Juncus</i> spp.	0.1	1
Grass & grasslike (GG)	<i>Lomandra filiformis</i>	0.1	10
Exotic	<i>Lysimachia arvensis</i>	0.1	5
Shrub (SG)	<i>Melaleuca decora</i>	35	N/A
Shrub (SG)	<i>Melaleuca nodosa</i>	1	1
Shrub (SG)	<i>Melaleuca styphelioides</i>	5	N/A
Grass & grasslike (GG)	<i>Microlaena stipoides</i>	0.1	10
Exotic	<i>Modiola caroliniana</i>	0.1	10
Forb (FG)	<i>Opercularia diphylla</i>	0.1	1
Grass & grasslike (GG)	<i>Oplismenus aemulus</i>	0.5	30
Exotic	<i>Oxalis corniculata</i>	1	50
Grass & grasslike (GG)	<i>Paspalidium distans</i>	0.1	1
HTE	<i>Paspalum dilatatum</i>	0.5	20
Exotic	<i>Paspalum urvillei</i>	0.5	1
Forb (FG)	<i>Phyllanthus virgatus</i>	0.1	1
Exotic	<i>Phytolacca octandra</i>	0.1	1
Other (OG)	<i>Polymeria calycina</i>	0.1	10
Forb (FG)	<i>Pratia purpurascens</i>	0.1	10
Exotic	<i>Richardia stellaris</i>	0.1	1
Exotic	<i>Setaria</i> spp.	1	50
Exotic	<i>Sida rhombifolia</i>	0.5	25
Forb (FG)	<i>Sigesbeckia orientalis</i>	0.1	5
Exotic	<i>Solanum nigrum</i>	0.5	10
Exotic	<i>Solanum sisymbriifolium</i>	5	N/A
Exotic	<i>Sonchus oleraceus</i>	0.1	10

BAM Site – Field Survey Form			
Grass & grasslike (GG)	<i>Themeda triandra</i>	0.5	10
Exotic	<i>Verbena bonariensis</i>	0.1	10
DBH	# Tree Stems Count	# Hollow Bearing Trees	
80+cm	0	0	
50-79cm	0		
30-49cm	Absent		
20-29cm	Present		
10-19cm	Present		
5-9cm	Present		
<5cm	Present		
Length of Logs (m)	8		
BAM Attribute (1x1m)	Litter Cover (%)		
1 (5m)	80		
2 (15m)	25		
3 (25m)	30		
4 (35m)	80		
5 (45m)	1		
Average	43.2		
Growth Form	Composition Data (count of native cover)	Structure Data (sum of cover)	
Tree	2	5.5	
Shrub	5	41.2	
Grass	10	9.7	
Forb	13	9.1	
Fern	0	0	
Other	4	1.7	
High Threat Exotics	6	43.6	

BAM Site – Field Survey Form					
Date:	25/03/2020	Plot ID:	Plot 2	Photo #:	-
Zone:	56	Plot Dimensions:	20 x 50m	Easting:	285151.89 E
Datum:	GDA94	Middle bearing from 0m:	185°	Northing:	6249149.62 S
PCT:	PCT 724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion [Vegetation Zone 2: Cleared]				
Growth Form	Scientific Name		Cover	Abundance	
Tree (TG)	<i>Acacia parramattensis</i>		0.5	1	
Exotic	<i>Acacia saligna</i>		5	N/A	
HTE	<i>Bidens pilosa</i>		0.1	20	
Exotic	<i>Bidens subalternans</i>		0.1	50	
Exotic	<i>Brassica fruticulosa</i>		15	N/A	
HTE	<i>Chloris gayana</i>		7	N/A	
Exotic	<i>Cirsium vulgare</i>		0.5	20	
Exotic	<i>Conyza bonariensis</i>		0.1	10	
Grass & grasslike (GG)	<i>Cynodon dactylon</i>		0.2	20	
Exotic	<i>Digitaria ciliaris</i>		5	N/A	
Exotic	<i>Echinochloa crus-galli</i>		0.1	10	
Forb (FG)	<i>Einadia nutans</i> subsp. <i>linifolia</i>		0.1	1	
Forb (FG)	<i>Einadia trigonos</i>		2	5	
HTE	<i>Eragrostis curvula</i>		3	20	
Other (OG)	<i>Hardenbergia violacea</i>		2	10	
Exotic	<i>Hypochaeris radicata</i>		0.1	1	
Other (OG)	<i>Kennedia rubicunda</i>		0.5	5	
Exotic	<i>Malva</i> spp.		0.1	5	
Exotic	<i>Medicago</i> spp.		1	50	
Exotic	<i>Modiola caroliniana</i>		0.5	20	
Exotic	<i>Panicum maximum</i>		4	10	
HTE	<i>Paspalum dilatatum</i>		0.5	10	
Exotic	<i>Paspalum urvillei</i>		0.2	3	
Exotic	<i>Plantago lanceolata</i>		0.1	15	
Forb (FG)	<i>Portulaca oleracea</i>		0.1	5	

BAM Site – Field Survey Form			
HTE	<i>Senecio madagascarensis</i>	0.1	10
Exotic	<i>Sida rhombifolia</i>	0.5	15
Exotic	<i>Solanum nigrum</i>	1	20
Exotic	<i>Sonchus oleraceus</i>	0.2	15
Forb (FG)	<i>Tetragonia tetragonioides</i>	0.5	5
Exotic	<i>Verbena bonariensis</i>	0.1	5
DBH	# Tree Stems Count	# Hollow Bearing Trees	
80+cm	0	0	
50-79cm	0		
30-49cm	Absent		
20-29cm	Absent		
10-19cm	Absent		
5-9cm	Absent		
<5cm	Present		
Length of Logs (m)	0		
BAM Attribute (1x1m)	Litter Cover (%)		
1 (5m)	0		
2 (15m)	1		
3 (25m)	0		
4 (35m)	0		
5 (45m)	0		
Average	0.2		
Growth Form	Composition Data (count of native cover)	Structure Data (sum of cover)	
Tree	0	0	
Shrub	0	0	
Grass	1	0.2	
Forb	4	2.7	
Fern	0	0	
Other	2	2.5	
High Threat Exotics	5	10.7	

Appendix B. BAMC Generated Biodiversity Credit Report.



BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00022139/BAAS21006/20/00022140	344 Park Road Wallacia	10/06/2021
Assessor Name	Assessor Number	BAM Data version *
Jack Tatler	BAAS21006	45
Proponent Names	Report Created	BAM Case Status
Carlo Ranieri	05/08/2021	Finalised
Assessment Revision	Assessment Type	Date Finalised
1	Part 4 Developments (General)	05/08/2021
BOS entry trigger	* 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.	
BOS Threshold: Biodiversity Values Map		

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

Assessment Id	Proposal Name	Page 1 of 3
00022139/BAAS21006/20/00022140	344 Park Road Wallacia	



BAM Biodiversity Credit Report (Like for like)

PCTs With Customized Benchmarks

PCT

No Changes

Predicted Threatened Species Not On Site

Name

Calyptrorhynchus lathamii / Glossy Black-Cockatoo

Petaurus australis / Yellow-bellied Glider

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
724-Castlereagh shale - gravel transition forest	Shale Gravel Transition Forest in the Sydney Basin Bioregion	0.5	0	4	4

Assessment Id

00022139/BAAS21006/20/00022140

Proposal Name

344 Park Road Wallacia

Page 2 of 3



BAM Biodiversity Credit Report (Like for like)

724-Castlereagh shale - gravel transition forest	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Shale Gravel Transition Forest in the Sydney Basin Bioregion This includes PCT's: 724, 808	-	724_Zone1_Shrubby	No	4	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Shale Gravel Transition Forest in the Sydney Basin Bioregion This includes PCT's: 724, 808	-	724_Zone2_Cleared	No	0	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. 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

Assessment Id

00022139/BAAS21006/20/00022140

Proposal Name

344 Park Road Wallacia

Page 3 of 3



NARLA

environmental

Eastern Sydney Office

Unit 2, 6-7/8 Apollo Street
Warriewood
NSW 2102

Western Sydney Office

7 Twentyfifth Avenue
West Hoxton
NSW 2171

Hunter Valley Office

10/103 Glenwood Drive
Thornton
NSW 2322

www.narla.com.au

Ph: 02 9986 1295