Streamlined Biodiversity Development Assessment Report

14 Mount Vernon Road, Mount Vernon NSW 2178

Tessa Benjamin

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NARLA
environmental

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Report Certification

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Table of Contents

Figures

Tables

Plates

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 (2020)
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
CPW	Cumberland Plain Woodland in the Sydney Basin Bioregion
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
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ha	Hectares
HTE	High Threat Exotic
km	Kilometres
LALC	Local Aboriginal Land Council
LGA	Local Government Area
Locality	A 1,500m 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

Acronym/ Term	Definition
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
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	14 Mount Vernon Road, Mount Vernon NSW 2178 (Lot 1/-/DP1221353)
TEC	Threatened Ecological Community
Threatened species, populations and ecological communities	Species, populations and ecological communities specified in Schedules 1 and 2 of the BC Act 2016
VI	Vegetation Integrity
VIS Plot	Vegetation Integrity Survey Plot

Executive Summary

Narla Environmental Pty Ltd (Narla) was commissioned by Tessa Benjamin ('the proponent') to prepare a Biodiversity Development Assessment Report (BDAR) to accompany a Development Application (DA) for the proposed development at 14 Mount Vernon Road, Mount Vernon NSW 2178 (Lot 1/-/DP1221353). This BDAR has assessed the biodiversity impacts of the proposed development in accordance with the requirements of the Biodiversity Conservation Act 2016 and Biodiversity Conservation Regulation 2017. The assessment has been completed in accordance with Appendix L of the Biodiversity Assessment Method (BAM; DPIE 2020b).

The proposed development is expected to impact one (1) Plant Community Type (PCT): PCT 850: Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion. A total of one (1) ecosystem credits are required to be offset in order to mitigate the impacts upon biodiversity as a result of the development.

The vegetation within the Subject Land conforms to the BC Act listed, Critically Endangered Ecological Community (CEEC), Cumberland Plain Woodland in the Sydney Basin Bioregion (CPW). Cumberland Plain Woodland is listed as an 'SAII entity' within the BioNet Threatened Biodiversity Data Collection (DPIE 2021d). Due to the potential sensitivity of this ecological community to any impact, a determination of whether or not the impacts are serious and irreversible has been undertaken in accordance with Section 9.1 of the BAM (DPIE 2020b) 'Additional impact assessment provisions for ecological communities'.

No species credit species are required to be offset as a result of the proposed development.

In order to avoid and minimise potential impacts of the proposed development 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.

1. Introduction

1.1 Overview

Narla was commissioned by Tessa Benjamin ('the proponent') to prepare this BDAR to accompany a DA for a new dwelling, associated APZ and access (driveway) at 14 Mount Vernon Road, Mount Vernon NSW 2178 (Lot 1/-/DP1221353); hereafter referred to as the Subject Property (**Figure 1**). This BDAR is required as the works have impacted upon land that is mapped as having Biodiversity Values on the Biodiversity Values Map (**Figure 2**). This BDAR will assess the biodiversity impacts of the development in accordance with the requirements of the Biodiversity Conservation Act 2016, Biodiversity Conservation Regulation 2017 and BAM (DPIE 2020b).

1.2 Assessment Method Applied

This BDAR has been prepared as a site-based 'Streamlined assessment module – small area development that requires consent' as the works do not exceed the area clearing threshold for small area developments as outlined in the BAM (DPIE 2020b; **Table 1**).

Table 1. Area limits for application of small area development threshold. Bold indicates the threshold relevant to this report.

Minimum lot size associated with the property	Maximum area limit for application of the small area development module
Less than 1ha	≤1ha
Less than 40ha but not less than 1ha	**≤2ha**
Less than 1000ha but not less than 40ha	≤5ha
1000ha or more	≤10ha

1.3 The Proposed Development

The proposed development will involve the demolition of an existing dwelling and the construction of a modest dwelling and driveway, and an associated APZ. All works associated with the development are hereafter referred to as the Subject Land (**Figure 1**). The Subject Land covers an area of approximately 0.31ha and has been maintained as a typical residential yard (planted native and exotics, mowed grass under sporadic native and exotic canopy trees).

1.4 Site Location and Description

The Subject Property is situated within a mixed rural-residential landscape in the suburb of Mount Vernon in the Penrith Local Government Area (LGA; **Figure 3**). It is also located within the boundaries of the Deerubbin Local Aboriginal Land Council (Deerubbin LALC; Aboriginal Land Council 2021). It has an area of 0.96ha, has frontage to Mount Vernon Road to the south and is bounded by rural-residential properties to the north, east and west. The Subject Property contains an existing dwelling located near the western boundary towards Mount Vernon Road. There is no remnant bushland on the block although there are a couple of mature eucalypts, with the remaining areas dominated by exotic species.

1.5 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, 2021, NSW Bionet. The website of the Atlas of NSW Wildlife}DPIE 2021c);
    - NSW BioNet. Threatened Biodiversity Data Collection (DPIE 2021d);
    - NSW BioNet. Vegetation Classification System (DPIE 2021e); and
    - Six Maps Clip & Ship (NSW Government Spatial Services 2021).
- Vegetation and Soil Mapping:
    - Remnant Vegetation of the Western Cumberland Subregion, 2013 update, VIS_ID 4207 (OEH 2013);
    - Soil Landscapes of the Wollongong-Port Hacking 1:100,000 Sheets (Hazelton and Tille 1990).
- NSW State Guidelines:
    - Biodiversity Assessment Method (DPIE 2020b);
    - Guidance to assist a decision-maker to determine a serious and irreversible impact (DPIE 2019);
    - Biodiversity Assessment Method Calculator Version 1.3.0.00 (DPIE 2020a);
    - Biodiversity Offsets and Agreement Management System (BOAMS);
    - Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method (DPIE 2020d); and
    - Threatened Species Survey and Assessment: Guidelines for developments and activities. Working Draft (DEC 2004).

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; DPIE 2021c) 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 the Subject Land and helped inform our Ecologist on what to look for during the site assessment.

1.6 Aim and Approach

This report has been prepared in accordance with the BAM (DPIE 2020b) 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 SAIIs 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 as to the number and class of offset credits required to be purchased and retired as a result of the proposed development.

Figure 1. The components of the Subject Property.

Figure 2. Location of the Subject Land in relation to the DPIE mapped Biodiversity Values.

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

2. Landscape

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**).

2.2 Mitchell Landscapes

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 information on location and a meaningful descriptive landscape term.

The Subject Land occurs within two (2) Mitchell Landscape Ecosystems: 'Cumberland Plain' and 'Hawkesbury - Nepean Channels and Floodplains' (**Figure 5**).

The Cumberland Plain 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. This landscape is intruded by a small number of volcanic vents and partly covered by Tertiary river gravels and sands. Quaternary alluvium occurs along the main streams. Pedal uniform red to brown clays occurs on volcanic hills and red and brown texture-contrast soils on crests grade to yellow harsh texture-contrast soils in valleys.

General elevation ranges between 30 to 120m, with a local relief of 50m. Woodlands and open forest are dominated by *Eucalyptus moluccana* (Grey Box), *E. tereticornis* (Forest Red Gum), *E. crebra* (Narrow-leaved Ironbark), *E. eugenioides* (Thin-leaved Stringybark), *E. amplifolia* (Cabbage Gum) and *Angophora subvelutina* (Broad-leaved Apple). Grassy to shrubby understorey are often dominated by *Bursaria spinosa* (Blackthorn). The poorly drained valley floors, often salt affected, are dominated by *Casuarina glauca* (Swamp Oak) and *Melaleuca* sp. (Paperbark).

The Hawkesbury - Nepean Channels and Floodplains landscape is characterised by meandering channels and moderately wide floodplains of the Hawkesbury and Nepean rivers on Quaternary sand and gravel. Sand is dominant upstream of the Warragamba River junction, general elevation 0 to 20m, local relief <10m. Undifferentiated alluvial sand to poorly structured gradation profiles of sandy loam or clay loam. Forests on the river flats include *Eucalyptus baueriana* (Blue Box), *Angophora subvelutina* (Broad-leaved Apple), *Eucalyptus viminalis* (Manna Gum), *Eucalyptus elata* (River Peppermint) in upstream sectors and dominated by *Casuarina cunninghamiana* (River Oak) possibly originally with rainforest species such as *Melia azedarach* (White Cedar) in the lower sectors. *Phragmites australis* (Common Reed), *Typha orientalis* (Cumbungi) and other aquatic plants are found in the river. Deep organic loams and loamy sands on floodplain with river flat forest of *Eucalyptus saligna* (Sydney Blue Gum), *E. deanei* (Round-leaved Gum), *E. tereticornis* (Forest Red Gum), *E. amplifolia* (Cabbage Gum), Broad-leaved Apple, *Angophora floribunda* (Rough-barked Apple) and River Oak. *Tristaniopsis laurina* (Water Gum) in protected channel sections. Large swamps and lagoons on the floodplain and in tributary streams below Richmond dammed by levees on the main stream support *Eleocharis sphacelata* (Tall Spike Rush), *Juncus* sp., *Melaleuca* sp., and *Lepidosperma* sp. Below Pitt Town, the river is tidal and *Casuarina glauca* (Swamp Oak), Common Reed, *Aegiceras corniculatum* (River Mangrove), *Avicennia marina* (Grey Mangrove) and limited salt marsh are found on the muddy sands of the inter-tidal zone.

2.3 Topography, Geology and Soils

The Subject Land is on a slight slope with elevation averaging 70m above sea level (Google Earth 2021). The Subject Land is mapped as occurring on the Luddenham soil landscape, which is characterised by undulating to rolling low hills on Wianamatta Group shales, often associated with Minchinbury Sandstone. Local relief 50–80 m, slopes 5–20%. Narrow ridges, hillcrests and valleys. The Ashfield Shale consists of laminite and dark grey shale. Bringelly Shale consists of shale with occasional calcareous claystone, laminate and coal (Hazelton and Tille 1990).

The Subject Land did not contain any areas of geological significance, such as karsts, caves, cliffs or crevices. The Subject Land and wider locality (1,500m buffer) are not mapped as occurring on acid sulfate soils nor mapped as having risk/probability of exhibiting occurrence of acid sulfate soils (Naylor 1995).

2.4 Hydrology

One dam is mapped as occurring within the Subject Property, but does not intersect the Subject Land (**Figure 6**). A large number of dams and several watercourses (1st to 3rd order streams) are mapped within the 1500m buffer including Kemps Creek, approximately 1km to the west (**Figure 7**).

2.5 Native Vegetation Cover and Connectivity

Native vegetation cover and connectivity have been assessed in accordance with Section 3.1.3 and 3.2 of the BAM (DPIE 2020b). 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 1,500m buffer around the boundary of the Subject Land was calculated to determine the extent of native vegetation and habitat connectivity.

Owing to the high cover of native grass within the degraded/ cleared portion of the Subject Property, the precautionary principle was taken and all cleared grassy areas within the surrounding area were considered to be native (with the exception of obvious agriculture). Native vegetation covered approximately 640ha within the buffer circle (total area = 737ha) and was assigned to the >70% class.

Patches of bushland that may facilitate the movement of threatened species were evident within the 1,500m surrounding the Subject Land (**Figure 8**).

2.6 Areas of Outstanding Biodiversity Value

No Areas of Outstanding Biodiversity Value occur on the Subject Land or surrounding area.

Figure 4. IBRA Bioregion and Subregion of the Subject Property, Subject Land and within a 1,500m buffer.

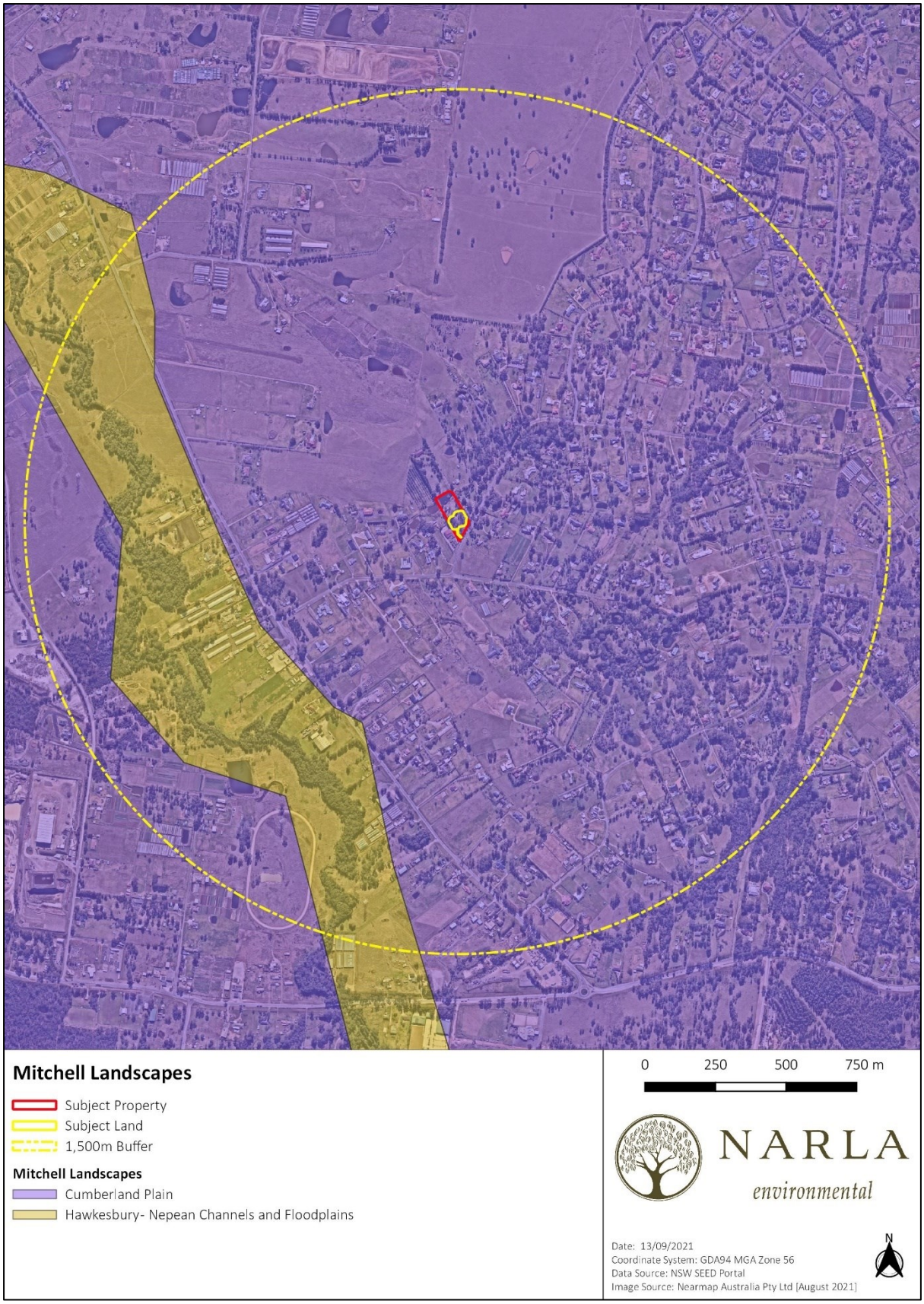

Figure 5. Mitchell Landscapes of the Subject Property, Subject Land and within a 1,500m buffer.

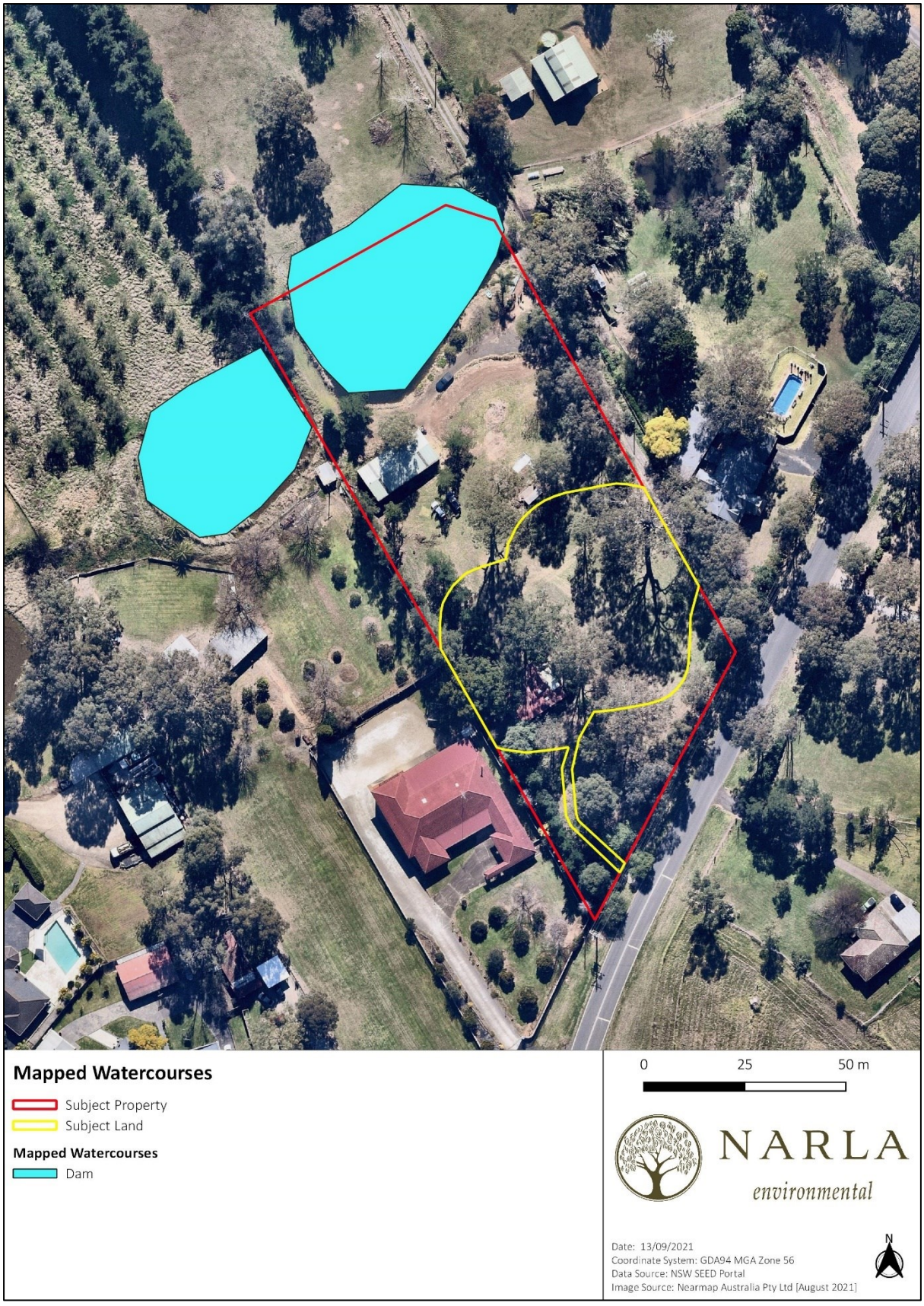

Figure 6. Watercourses occurring within and adjacent to the Subject Land.

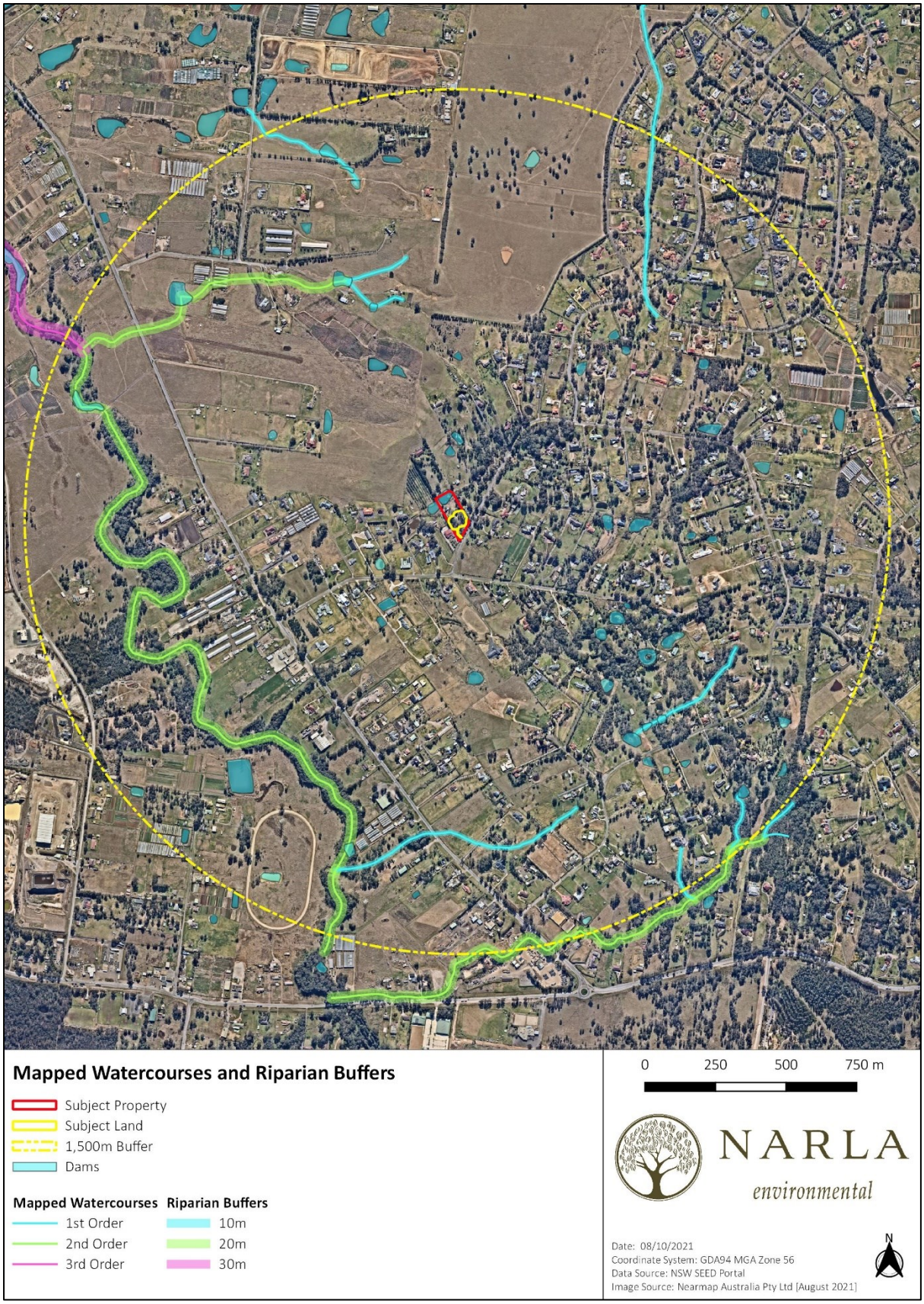

Figure 7. Rivers and streams (with associated riparian buffers) occurring within the 1,500m buffer.

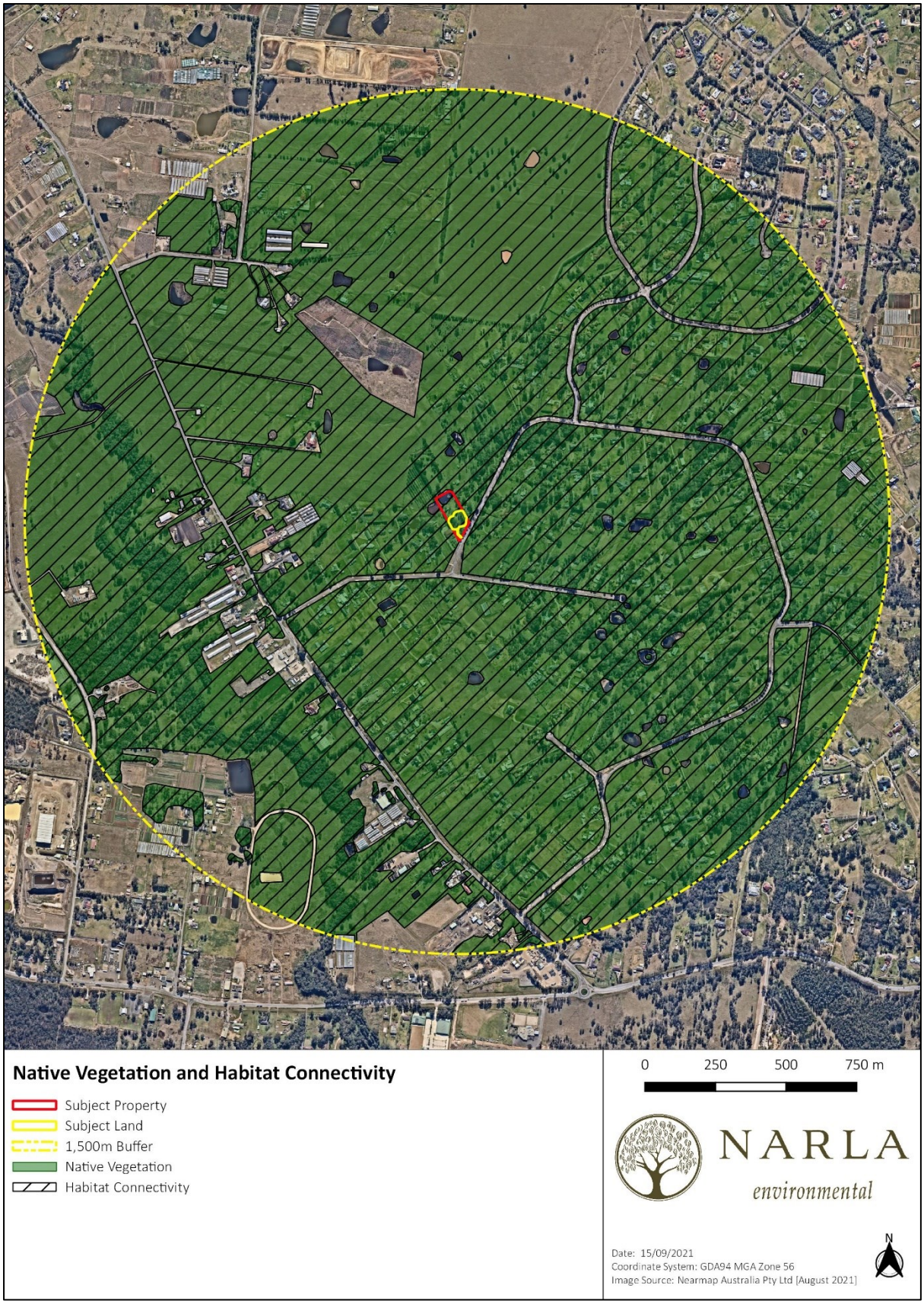

Figure 8. The extent of native vegetation and patch size within the 1,500m buffer.

3. Native Vegetation

3.1 Dominant Plant Community Type (PCT) Identified within the Subject Land

3.1.1 Historically Mapped Vegetation

The Remnant Vegetation of the Western Cumberland Subregion (DPIE 2015) indicates the presence one (1) PCT within the Subject Land (Figure 9):

- PCT 850: Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion.

3.1.2 Plant Community Type Selection Process

Plant Community Type selection for the vegetation community occurring on the Subject Land was undertaken using information and databases provided in the BioNet Vegetation Classification System (DPIE 2021e). The following selection criteria were used in the PCT Filter Tool to develop the PCT shortlist:

- IBRA Bioregion: Sydney Basin
- IBRA Subregion: Cumberland
- Dominant Species: *Eucalyptus tereticornis* (Forest Red Gum) and *Eucalyptus moluccana* (Grey Box).

This process delivered a selection of four (4) PCT's that occur within the Cumberland IBRA Subregion (and Sydney Basin Bioregion) that had the observed dominant species (i.e., the highest potential of occurring within the Subject Land). The geographical distribution and landscape position characterised by each shortlisted PCT was then compared against the location and landscape of the Subject Land. It was found that the Subject Land was located in the right distribution and contained the appropriate landscape attributes for two (2) candidate PCTs (Table 2). The steps taken to justify the presence/absence of the candidate PCTs within the Subject Land are detailed in Table 3.

Table 2. Output from the PCT Filter Tool (DPIE 2021e) and subsequent shortlisting of dominant PCTs. Green shading indicates the selected best fit dominant PCT

Plant Community Type (PCT)	Subject Land within known geographic distribution/ landscape position	No. of floristic Matches	*Eucalyptus tereticornis*	*Eucalyptus moluccana*
PCT 849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	No. This PCT is primarily associated with flat areas and the Subject Land was more representative of hilly terrain	2	✓	✓
PCT 850: Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Yes.	2	✓	✓
PCT 830: Forest Red Gum - Grey Box shrubby woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	No. This PCT is restricted to rugged areas at higher elevations whereas the Subject Land occurs on rolling hills.	2	✓	✓

Plant Community Type (PCT)	Subject Land within known geographic distribution/ landscape position	No. of floristic Matches	*Eucalyptus tereticornis*	*Eucalyptus moluccana*
PCT 1800: Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley	No. Found on the riverflats of the Cumberland Plain in western Sydney and in the Hunter Valley. The Subject Land is situated on an elevated landscape away from riverflats.	2	✓	✓

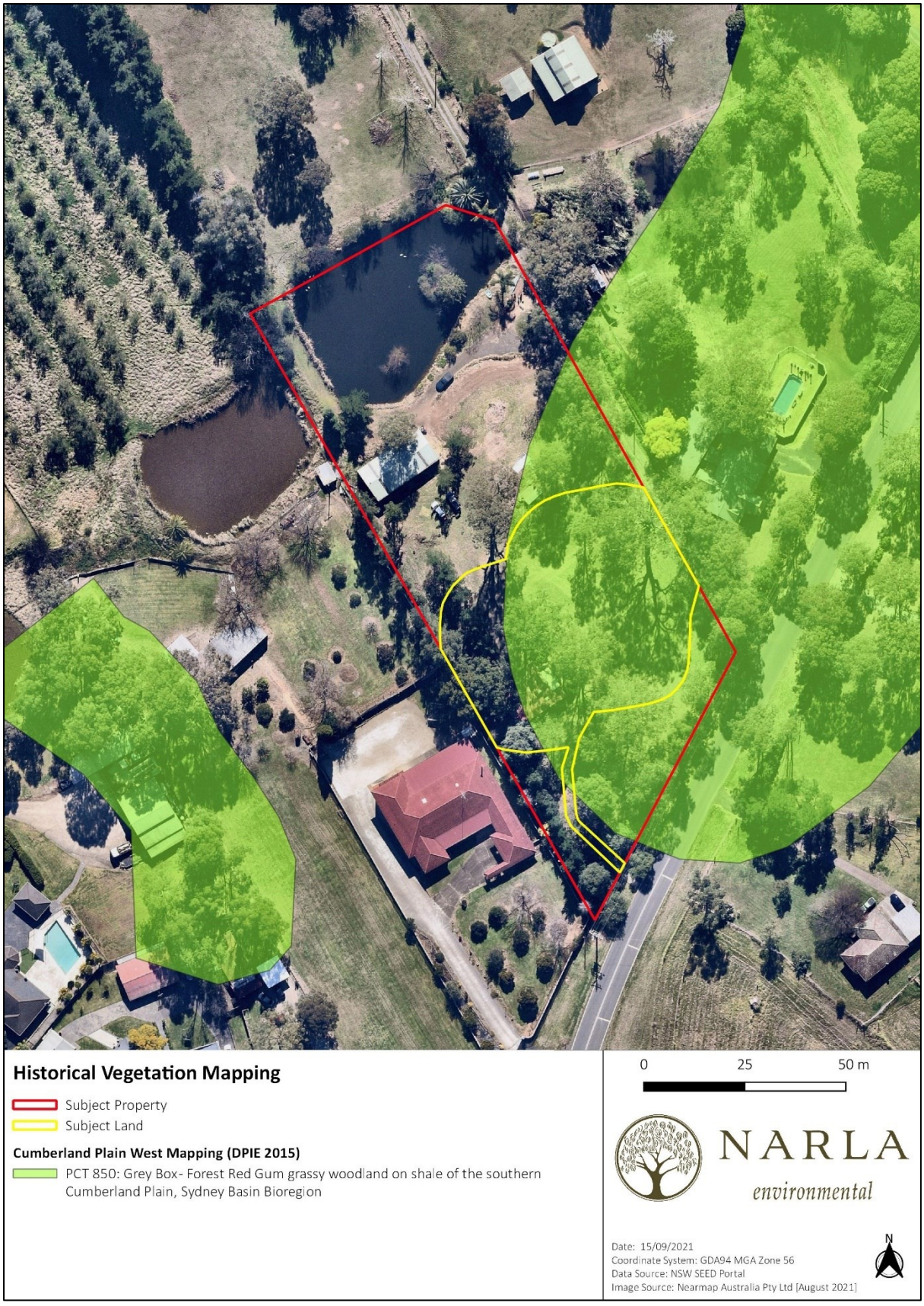

Figure 9. Historical vegetation mapping within the Subject Land.

Table 3. PCT selection criteria. Green indicates the selected PCT.

Candidate PCT	Characteristics (DPIE 2020c)	Justification
PCT 850: Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	**Landscape position/ geology**	**Justification**
	The community occupies higher elevations associated with the hills and rises south from Prospect. It is most extensive in the Campbelltown and Liverpool LGAs. It extends beyond the study area west across the Razorback range and once dominated the southern half of the Cumberland Plain. It occurs on soils derived from Wianamatta Shale and is restricted to mean annual rainfall of between 750 and 900mm and elevations between 50 and 350m above sea level.	Narla have assigned this PCT to the vegetation within the Subject Land as it fits with the landscape profile and comprises the diagnostic species. PCT 850 occupies higher elevations associated with the hills and rises south from Prospect. It occurs on soils derived from Wianamatta Shale and is restricted to elevations between 50 and 350m. The Subject Land has an elevation of approximately 70m, occurs on Wianamatta group shales and the overall topography would be characterised as hilly. Although much of the Subject Land was heavily degraded and dominated by exotic species, two diagnostic canopy species were identified within the Subject Land (*E. tereticornis* and *E. moluccana*) along with two ground layer species. PCT 850 was also historically mapped as occurring within the Subject Land. As such, PCT 850 was identified as the "best fit" PCT.
	Characteristic canopy	
	Acacia implexa, Eucalyptus moluccana, and *E. tereticornis.*	
	Characteristic mid-storey/ shrub	
	Bursaria spinosa subsp. *spinosa* and *Rubus parvifolius.*	
	Characteristic ground layer	
	Dichondra repens, Brunoniella australis, Desmodium gunnii, Aristida ramosa, Microlaena stipoides var. *stipoides, Carex inversa, Themeda australis, Cyperus gracilis, Dichelachne micrantha, Asperula conferta, Oxalis perennans, Cheilanthes sieberi* subsp. *sieberi, Desmodium brachypodum, Sporobolus creber* and *Wahlenbergia gracilis.*	

3.1.3 Final PCT and Vegetation Zone Selection

The field survey conducted by experienced Narla Ecologist Polina Zadorojnaya, confirmed that one (1) PCT was identified within the Subject Land:

- PCT 850: Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion.

Two (2) vegetation zones were identified within the Subject Land that consisted of differing condition classes:

- Zone 1: PCT 850 – Moderate condition (Degraded Woodland); and

- Zone 2: PCT 850 –Low condition (Degraded Grassland).

These vegetation zones are detailed in Table 4 and displayed in Figure 10.

Table 4. Vegetation zones identified within the Subject Land.

PCT 850: Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion		
Vegetation class	Coastal Valley Grassy Woodlands	
Total area	0.29ha	
Description in VIS		
An open grassy woodland which is dominated by *Eucalyptus moluccana* (Grey Box) and *E. tereticornis* (Forest Red Gum) with *E. crebra* (Narrow-leaved Ironbark) also common. *Acacia implexa* (Hickory Wattle) occurs amongst the small tree layer, often amongst regrowth stands. The community occupies higher elevations associated with the hills and rises south from Prospect. It is most extensive in Campbelltown and Liverpool local government areas. It is restricted to mean annual rainfall of between 750 and 900mm and elevations between 50 and 350m above sea level.		
Condition Class	**Moderate condition (Degraded Woodland)**	**Low condition (Degraded Grassland)**
Vegetation Zone	**Vegetation Zone 1**	**Vegetation Zone 2**
Extent within Subject Land (approximate)	0.17ha	0.12ha
Field survey effort	One (1) BAM plot was established	One (1) BAM plot was established.
Description of vegetation	The vegetation within this zone represented a degraded woodland, commonly seen on residential properties in western Sydney. The canopy had native species, consisting of the typical Cumberland Plain species *Eucalyptus tereticornis* and *E. moluccana*, as well as the commonly planted native *Eucalyptus microcorys*. The native shrub layer was largely absent but for *Callistemon citrinus* and the groundlayer diversity was dominated by exotics although the native	The vegetation within this zone represented a degraded, open woodland/ grassland (**Plate 2**). Native trees and shrubs were absent throughout the zone, with the groundlayer dominated by *Cynodon dactylon.* A Large number of exotic species were present in the groundlayer including three HTE's- *Ehrharta erecta*, *Senecio madagascariensis* and *Bidens bipinnata*.

PCT 850: Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion		
	Cynodon dactylon covered 85% of the plot (**Plate 1**). A low cover of two HTE species was identified within this zone.	
Structure of vegetation	Moderate canopy cover was evident within the BAM plot, with native trees totalling 35% cover. Shrub cover was low at 5%. The native groundlayer cover was comprised of 85% native grass and 0.2% native forbs. A low cover of leaf litter (18%) was also apparent and no coarse woody debris. The BAM plot contained a moderate diversity of tree stem sizes, with one (1) large tree (>50cm DBH) but no regenerating stems present. No hollow bearing trees were recorded within the BAM plot. Exotic species and HTEs were common throughout this zone.	No native canopy or shrub species were present within the BAM plot. Native grass cover was high at 85.1% whereas other groundcovers were almost absent with only 2% forbs. A very low cover of leaf litter (3%) was also apparent and no fallen logs were present. The BAM plot contained no tree stems and no hollow bearing trees. Exotic species and HTEs were present across the entirety of this zone.
Scientific Reference from VIS (DPIE 2021e)	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, Cumberland Plain Woodland in the Sydney Basin Bioregion (see **Section 3.2.1**). Does not conform to the EPBC Act listed CEEC, Cumberland Shale Plains Woodland and Shale-Gravel Transition Forest (see **Section 0**).	
TEC area (ha)	0.29ha of CEEC, Cumberland Plain Woodland in the Sydney Basin Bioregion (BC Act 2016).	
Estimate of percent cleared value of PCT in the major catchment area	88%	

Plate 1. Representative photo of Vegetation Zone 1: Moderate condition within the Subject Land.

Plate 2. Representative photo of Vegetation Zone 2: Low condition within the Subject Land.

3.2 Threatened Ecological Communities

3.2.1 Listing under the Biodiversity Conservation Act 2016 Cumberland Plain Woodland in the Sydney Basin Bioregion - Critically Endangered Ecological Community

Cumberland Plain Woodland is the name given to the ecological community in the Sydney Basin bioregion associated with clay soils derived from Wianamatta Group geology, or more rarely alluvial substrates, on the Cumberland Plain, a rainshadow area to the west of Sydney's Central Business District. The mean annual rainfall of this area is typically in the range of 700-900 mm, and is generally lower than that received on more elevated terrain that partially surrounds the Plain. The community typically occurs on flat to undulating or hilly terrain up to about 350 m elevation but may also occur on locally steep sites and at slightly higher elevations. Cumberland Plain Woodland is characterised by a diverse assemblage of species and typically comprises an open tree canopy, a near-continuous groundcover dominated by grasses and herbs, sometimes with layers of shrubs and/or small trees. Shrubs may sometimes occur in locally dense stands. Less disturbed stands of the community may have a woodland or forest structure. Small trees or saplings may dominate the community in relatively high densities after partial or total clearing, and the groundcover may be relatively sparse, especially where densities of trees or shrubs are high. The community also includes 'derived' native grasslands which result from removal of the woody strata from the woodlands and forests.

3.2.1.1 Vegetation Zone 1: Moderate Condition (Degraded Woodland)

Vegetation Zone 1 occurs on Wianamatta Shale on hilly terrain up to 350m elevation. Furthermore, the vegetation comprises an open tree canopy containing *Eucalyptus tereticornis* (Forest Red Gum) and *E. moluccana*, and two other diagnostic groundlayer species listed in the Final Determination for Cumberland Plain Woodland in the Sydney Basin Bioregion (NSW Scientific Committee 2009). As such, Vegetation Zone 1 conforms to the BC Act listed CEEC, Cumberland Plain Woodland in the Sydney Basin Bioregion (CPW; Figure 10).

3.2.1.2 Vegetation Zone 2: Low Condition (Degraded Grassland)

Vegetation Zone 2 occurs on Wianamatta Shale on hilly terrain up to 350m elevation. Native grasslands derived from the clearing of woodland and forest are also part of Cumberland Plain Woodland in the Sydney Basin Bioregion (CPW) if they contain characteristic non-woody species listed in the Final Determination (NSW Scientific Committee 2009). The vegetation within this zone contained *Carex inversa and Dichondra repens*, species listed in the final determination for CPW (NSW Scientific Committee 2009). As such, Vegetation Zone 2 conforms to the BC Act listed CEEC, Cumberland Plain Woodland in the Sydney Basin Bioregion (Figure 10).

3.2.2 Listing under the Environment Protection and Biodiversity Conservation Act 1999 Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest - Critically Endangered

The vegetation within Zone 1 and Zone 2 does not meet the EPBC listing for Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Table 5).

Table 5. Key diagnostics characteristics required to meet the EPBC listing status for Cumberland Plain Shale Woodlands or Shale-Gravel Transition Forest (Threatened Species Scientific Committee 2009).

Key Diagnostic Characteristic	Criteria met?	
	(Vegetation Zone 1)	(Vegetation Zone 2)
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 rain shadow coastal valley in western Sydney.	Yes	Yes
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	Yes
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 *Eucalyptus moluccana* (Grey Box), *E. tereticornis* (Forest Red Gum) and/or *E. fibrosa* (Red Ironbark). Other canopy species may occur in association with the typical dominants and may be locally dominant at some sites.	Yes	No
A sparse lower tree layer may be present, typically with young eucalypts of upper tree canopy species and species of Acacia, Exocarpos and Melaleuca.	No	No
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; ▪ Native graminoid species that are often present include: the grasses *Aristida ramosa* (Purple Wiregrass), *A. vagans* (Threeawn Speargrass), *Cymbopogon refractus* (Barbed Wire Grass), *Dichelachne micrantha* (Plumegrass), *Echinopogon caespitosus* var. *caespitosus* (Tufted Hedgehog Grass), *Eragrostis leptostachya* (Paddock Lovegrass), *Microlaena stipoides* subsp. *stipoides* (Weeping Grass), *Paspalidium distans* and *Themeda triandra* (Kangaroo Grass), and other graminoids	No	No

Key Diagnostic Characteristic	Criteria met?	
	(Vegetation Zone 1)	(Vegetation Zone 2)
Carex inversa (Knob Sedge), *Cyperus gracilis* (Slender Sedge), *Lomandra filiformis* subsp. *filiformis* (Wattle Mat-rush) and *L. multiflora* subsp. *multiflora* (Manyflowered Mat-rush); ▪ Native forb and other herb species present include: *Asperula conferta* (Common Woodruff), *Brunoniella australis* (Blue Trumpet), *Cheilanthes sieberi* (Poison Rock-Fern), *Desmodium varians* (Slender Tick-trefoil), *Dianella longifolia* (Blue Flax-Lily), *Dichondra repens* (Kidney Weed), *Glycine* spp., *Hardenbergia violacea* (Native Sarsparilla), *Opercularia diphylla* (Stinkweed), *Oxalis perennans, Pratia purpurascens* (Whiteroot) and *Wahlenbergia gracilis* (Australian Bluebell); and ▪ A shrub layer may be present, to variable extent, and is often dominated by *Bursaria spinosa* (Blackthorn) while other species include: *Daviesia ulicifolia* (Gorse Bitter Pea), *Dillwynia sieberi*, *Dodonaea viscosa* subsp. *cuneata* (Wedge-leaf Hop-bush), *Indigofera australis* (Native Indigo) and *Lissanthe strigosa* (Peach Heath).		

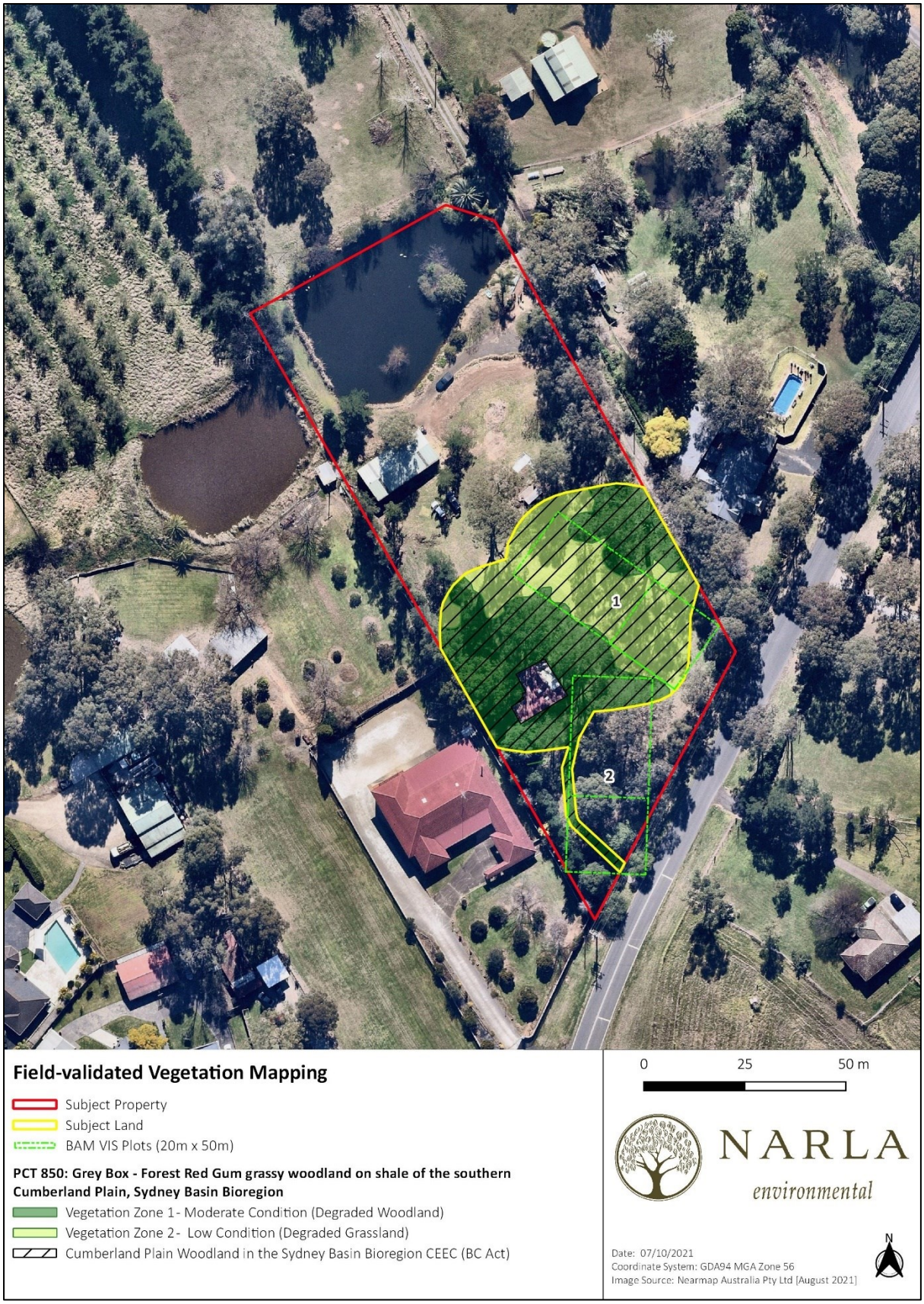

Figure 10. Narla field validated vegetation mapping and location of BAM VIS plots within the Subject Property.

3.3 Assessing Patch Size

As defined by the BAM, a patch is an area of native vegetation that occurs on the Subject Land and includes native vegetation that has a gap of less than 100m from the next area of native vegetation (or ≤ 30m for non-woody ecosystems). A patch may extend onto adjoining land. For each vegetation zone, the assessor must determine the patch size in hectares and assign it to one of the following classes:

- <5ha;
- 5 – <25ha;
- 25 – <100 ha; or
- ≥100 ha.

The patch size class is used to assess habitat suitability on the Subject Land for threatened species. The assessor may assign more than one patch size class to the vegetation zone if both of the following apply:

- A vegetation zone comprises two or more discontinuous areas of native vegetation, and
- The areas of discontinuous native vegetation have more than one patch size class.

As areas outside of the Subject Property were not assessed as part of the scope of this assessment, the vegetation zones identified within the Subject Land were separated into the following categories to allow for aerial mapping of patch size within the broader area (**Table 6**; **Figure 11**):

- Woody Ecosystems:
    - Zone 1: PCT 850 – Degraded Woodland;
    - Zone 2: PCT 850 – Degraded Grassland.

Table 6. Patch size classes of each PCT and associated vegetation zones.

Plant Community Type	Category	Vegetation Zone	Patch Size Class
PCT 850	Woody Ecosystems	Zone 1	>100ha
PCT 850	Woody Ecosystems	Zone 2	>100ha

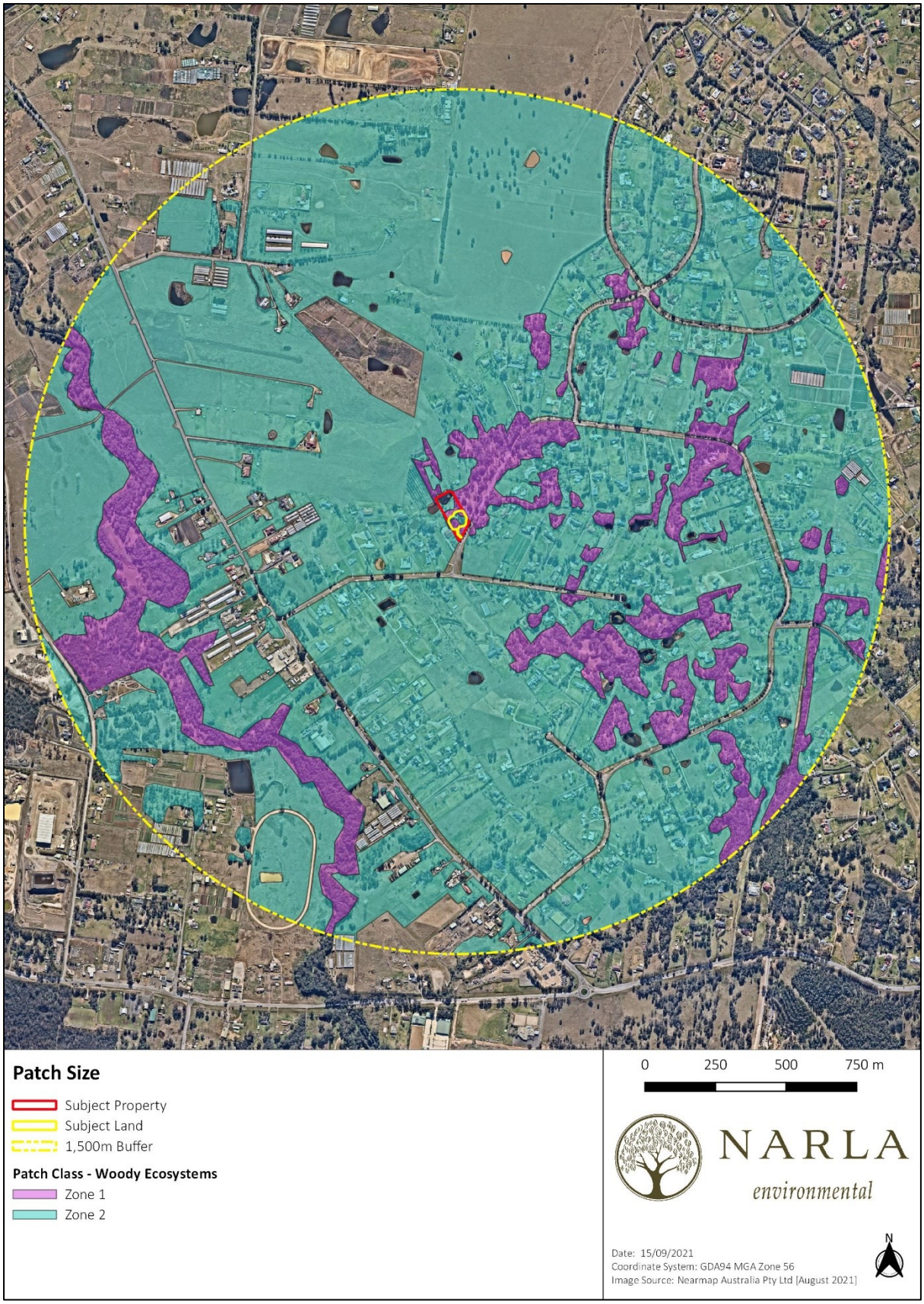

Figure 11. Patch size within the 1,500m buffer for each vegetation zone identified within the Subject Land.

3.4 Vegetation Integrity Survey (VIS) Plots

Two (2) BAM VIS plots were undertaken within the Subject Property. 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 is detailed in **Table 7**.

3.4.1 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 is greater than zero (DPIE 2020b). The Subject Land will experience both complete clearing (for the driveway and proposed dwelling) and partial clearing (for APZ compliance). As a result, each vegetation zone has been divided into the following management zones (**Figure 12**):

- Vegetation Zone 1: Moderate Condition (Degraded Woodland):
    - Management Zone 1: Total Impact.
    - Management Zone 2: Partial Impact.
- Vegetation Zone 2: Low Condition (Degraded Grassland)
    - Management Zone 3: Total Impact.
    - Management Zone 4: Partial Impact.

The attributes influencing future vegetation scores within each of these management zones are detailed in **Table 8** & **Table 9**.

3.4.1.1 Partial Impacts

Impacts associated with managing the APZ as an Inner Protection Area (IPA) will be relatively low. Managing the IPA requires (PBP 2019):

- Trees
    - tree canopy cover should be less than 15% at maturity;
    - trees at maturity should not touch or overhang the building; lower limbs should be removed up to a height of 2m above the ground;
    - tree canopies should be separated by 2 to 5m; and
    - preference should be given to smooth barked and evergreen trees.
- Shrubs
    - create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided;
    - shrubs should not be located under trees;
    - shrubs should not form more than 10% ground cover; and
    - clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.
- Grass
    - grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and
    - leaves and vegetation debris should be removed.

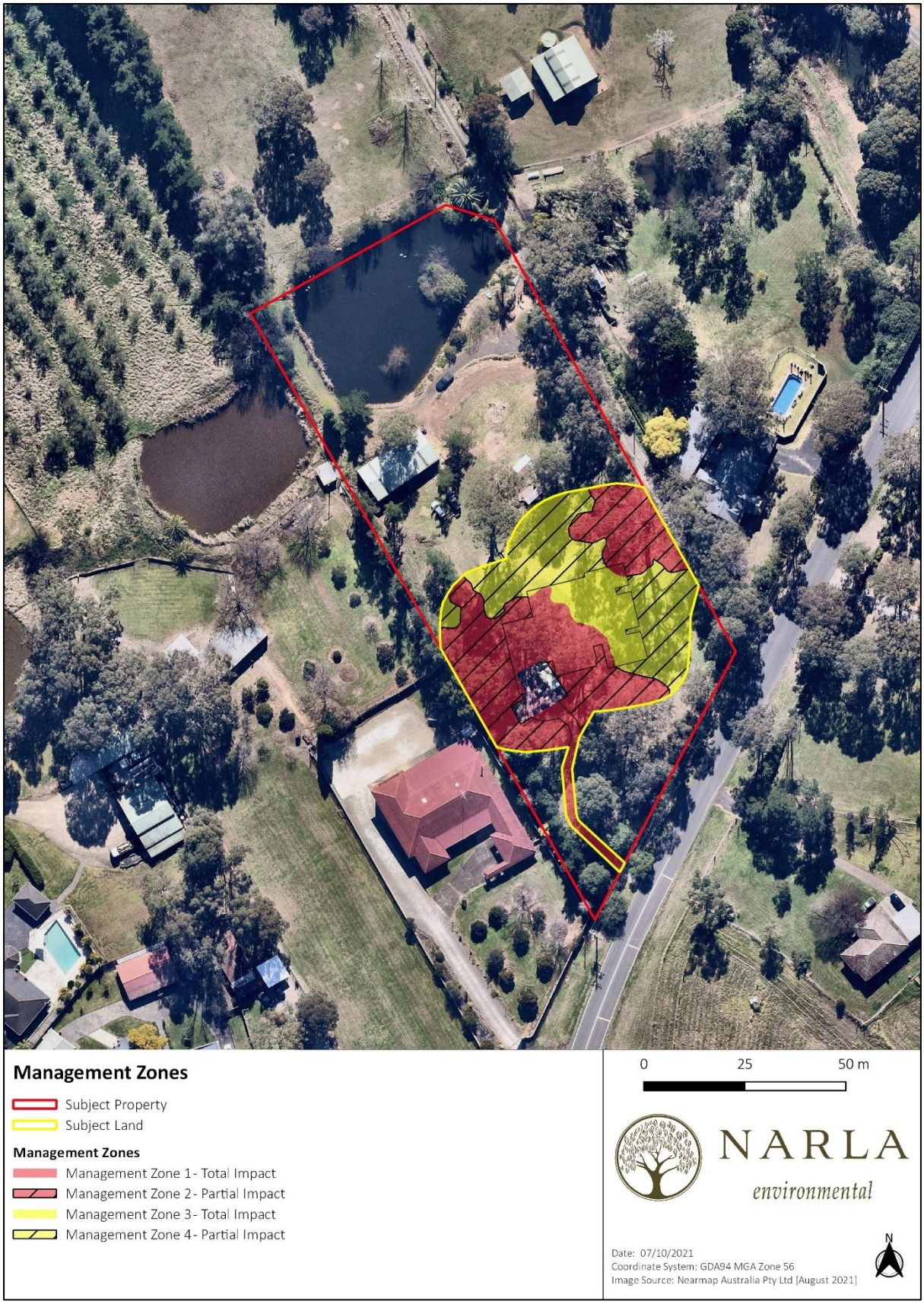

Figure 12. Management zones within the Subject Land.

Table 7. Vegetation integrity scores for each identified vegetation zone.

PCT 850: Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion							
Vegetation Zone	Area (ha)	Survey Effort	Composition Condition Score	Structure Condition Score	Function Condition Score	VI Score	Hollow bearing trees
Zone 1: Moderate Condition (Degraded Woodland)	0.17	1 x 1000m^2 (20m x 50m) VIS Plot	9	63.4	32.7	26.5	0
Zone 2: Low Condition (Degraded Grassland)	0.12	1 x 1000m^2 (20m x 50m) VIS Plot	1.6	42.1	0.2	2.2	0

Table 8. Future vegetation integrity scores after different types of impacts are taken into account.

PCT 850: Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion								
Vegetation Zone	Management Zone	Area (ha)	Composition Condition Score	Structure Condition Score	Function Condition Score	Future VI Score	Change in VI Score	Total VI Loss
Zone 1: Moderate Condition (Degraded Woodland)	Management Zone 1 – Total Impact	0.05	0	0	0	0	-26.5	-10.9
	Management Zone 2 – Partial Impact	0.12	9	50.9	23.4	22	-4.5	
Zone 2: Low Condition (Degraded Grassland)	Management Zone 3 – Total Impact	0.03	0	0	0	0	-2.2	0.8
	Management Zone 4 – Partial Impact	0.09	1.6	42.1	0	4.1	1.9	

Table 9. Management zones within the Subject Land and relevant vegetation attributes (composition, structure and function) affecting future VI scores.

Vegetation Zone	Management Zone	Changes in Current Vegetation Attributes	Vegetation Attributes Not Changed	Future Vegetation Scores and Justification
Zone 1: Moderate Condition (Degraded Woodland)	Management Zone 1 – Total Impact	All vegetation, leaf litter and coarse woody debris will be removed	N/A	▪ All vegetation has been removed as a result of the works; and ▪ Future composition, structure and function score is 0.
	Management Zone 2 – Partial Impact	Canopy cover will be reduced; leaf litter and coarse woody debris will be removed	Diversity of all growth forms, cover of grasses and forbs, stem size classes	▪ Select trimming/removal of the trees can enable the diversity to be maintained whilst achieving <15% cover; ▪ Only one species of shrub was identified and it does not need to be impacted for APZ management; and ▪ Extant grasses and forbs can survive when maintained <100mm in height.
Zone 2: Low Condition (Degraded Grassland)	Management Zone 3 – Total Impact	All vegetation, leaf litter and coarse woody debris will be removed	N/A	▪ All vegetation has been removed as a result of the works; and ▪ Future composition, structure and function score is 0.
	Management Zone 4 – Partial Impact	Canopy cover will be reduced; leaf litter and coarse woody debris will be removed	Diversity of all growth forms, cover of grasses and forbs	▪ No trees or shrubs occur within this zone; and ▪ Extant grasses and forbs can survive when maintained <100mm in height.

4. Threatened Species

4.1 Candidate Ecosystem Credit Species

Ecosystem credit species associated with the Subject Land are listed below in **Table 10.** No species predicted by the BAM calculator as potential ecosystem credits were excluded from the assessment due to habitat constraints.

Table 10. Candidate ecosystem credits predicted to occur within the Subject Land

Scientific Name	BC Act Status	Excluded from Assessment	Reason for Exclusion from Assessment
Anthochaera phrygia Regent Honeyeater (Foraging)	Critically Endangered	No	-
Artamus cyanopterus cyanopterus Dusky Woodswallow	Vulnerable	No	-
Callocephalon fimbriatum Gang-gang Cockatoo (Foraging)	Vulnerable	No	-
Chthonicola sagittata Speckled Warbler	Vulnerable	No	-
Circus assimilis *Spotted Harrier*	Vulnerable	No	-
Climacteris picumnus victoriae Brown Treecreeper (eastern subspecies)	Vulnerable	No	-
Daphoenositta chrysoptera Varied Sittella	Vulnerable	No	-
Dasyurus maculatus Spotted-tailed Quoll	Vulnerable	No	-
Falsistrellus tasmaniensis Eastern False Pipistrelle	Vulnerable	No	-
Glossopsitta pusilla Little Lorikeet	Vulnerable	No	-
Grantiella picta Painted Honeyeater	Vulnerable	No	-
Haliaeetus leucogaster White-bellied Sea-Eagle (Foraging)	Vulnerable	No	-
Hieraaetus morphnoides Little Eagle (Foraging)	Vulnerable	No	-
Hirundapus caudacutus White-throated Needletail	Vulnerable	No	-
Lathamus discolour Swift Parrot (Foraging)	Endangered	No	-
Lophoictinia isura Square-tailed Kite (Foraging)	Vulnerable	No	-
Melanodryas cucullata cucullata Hooded Robin (south-eastern form)	Vulnerable	No	-
Melithreptus gularis gularis	Vulnerable	No	-

Scientific Name	BC Act Status	Excluded from Assessment	Reason for Exclusion from Assessment
Black-chinned Honeyeater (eastern subspecies)			
Micronomus norfolkensis Eastern Coastal Free-tailed Bat	Vulnerable	No	-
Miniopterus australis Little Bent-winged Bat (Foraging)	Vulnerable	No	-
Miniopterus orianae oceanensis Large Bent-winged bat (Foraging)	Vulnerable	No	-
Neophema pulchella Turquoise Parrot	Vulnerable	No	-
Ninox connivens Barking Owl (Foraging)	Vulnerable	No	-
Ninox strenua Powerful Owl (Foraging)	Vulnerable	No	-
Petaurus australis Yellow-bellied Glider	Vulnerable	No	-
Petroica boodang Scarlet Robin	Vulnerable	No	-
Petroica phoenicea Flame Robin	Vulnerable	No	-
Phascolarctos cinereus Koala (Foraging)	Vulnerable	No	-
Pteropus poliocephalus Grey-headed Flying-fox (Foraging)	Vulnerable	No	-
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat	Vulnerable	No	-
Scoteanax rueppellii Greater Broad-nosed Bat	Vulnerable	No	-
Stagonopleura guttata Diamond Firetail	Vulnerable	No	-
Tyto novaehollandiae Masked Owl (Foraging)	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 2020a). A summary whether or not the species credit needs to be offset through retiring of Biodiversity Offset Credits (Table 11; Table 12).

Table 11. 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?
Anthochaera phrygia Regent Honeyeater (Breeding)	No, the Subject Land is not included on the map of important areas for Regent Honeyeaters.	N/A	No	Very High – 3	No
Chalinolobus dwyeri Large-eared Pied Bat	No. 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 relatively flat terrain with little 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.	N/A	No	Very High - 3	No
Lathamus discolour Swift Parrot (Breeding)	No, the Subject Land is not included on the map of important areas for Swift Parrots.	N/A	No	Very High - 3	No
Miniopterus australis Little Bent-winged Bat (Breeding)	No. 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.	N/A	No	Very High - 3	No

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
Miniopterus orianae oceanensis Large Bent-winged Bat (Breeding)	No. 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.	N/A	No	Very High - 3	No

Table 12. 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?
Caladenia tessellata Thick Lip Spider Orchid	Yes. This species is generally found in grassy sclerophyll woodland on clay loam or sandy soils. As potential habitat is present within the Subject Land, this species was included in the assessment.	Yes	No	Very High – 3	No

4.3 Species Credit Habitat Surveys

Species credit habitat surveys were undertaken for any SAII species credit species considered likely to have suitable habitat within the Subject Land (**Figure 13**). These surveys were implemented in accordance with Section 5.3 of the BAM and all relevant OEH and DPIE threatened species survey guidelines.

Habitat surveys were undertaken on the 27th of August 2021 by experienced Narla Ecologist, Polina Zadorojnaya, within the Subject Land and the areas immediately adjacent. Weather conditions taken from the nearest weather station (Badgerys Creek, station no. 067108) in the lead up and during the field survey are outlined in **Table 13**.

Pre-survey weather conditions were generally conducive for identifying threatened species and their habitats should they occur within the Subject Land. Large amounts of rainfall in the week prior to the targeted flora surveys provided ideal conditions for the flowering and/or emergence of the targeted flora species. 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.

Table 13. Weather conditions taken from the nearest weather stations (Station number 061078) in the lead up and during the field survey (BOM 2021). Survey date is in bold

Timing/activities	Date	Day	Temperature		Rainfall (mm)
			Min	Max	
Lead up to the survey	20/08/2021	Friday	3.6	23.8	0
	21/08/2021	Saturday	8.2	23.9	0
	22/08/2021	Sunday	4.1	27.7	0
	23/08/2021	Monday	6.1	27.1	26.0
	24/08/2021	Tuesday	8.4	10.9	21.6
	25/08/2021	Wednesday	8.1	17.2	0
	26/08/2021	Thursday	3.7	19.5	0
Site Assessment & Habitat Survey	**27/08/2021**	**Friday**	**3.8**	**20.8**	**0**

4.3.1 Fauna Species Credit Survey

A total of five (5) threatened fauna species were identified within the BAMC (DPIE 2020b) as having the potential to occur within the Subject Land. Following the site assessment, none of the species were identified as having the potential to occur within the Subject Land due to the following (BAM Section 5.2.2, DPIE 2020b):

- The assessor determines that microhabitats required by a species are absent from the Subject Land (or specific vegetation zone) [(Section 5.2.3(2ai) of the BAM (DPIE 2020b)]

4.3.2 Flora Species Credit Survey

A total of one (1) threatened flora species was identified within the BAMC (DPIE 2020b) as having the potential to occur within the Subject Land. To determine whether this species credit species is present on the Subject Land, the following was undertaken:

- Targeted flora surveys were conducted for one (1) species within the DPIE endorsed survey period (**Table 14**). The targeted survey effort undertaken for these species is detailed in **Section 4.3.2.1**.

Table 14. Species credit flora 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
Caladenia tessellata										✓		
Key	✓ = Time of Site Assessment						= Optimum Survey Period					

4.3.2.1 Targeted Flora Survey Effort

A targeted survey was undertaken in accordance with the "Surveying Threatened Plants and Their Habitats: NSW survey guide for the Biodiversity Assessment Method" (DPIE 2020d) for the following species credit species that were identified within the BAMC (DPIE 2020a) as having the potential to occur within the Subject Land:

- *Caladenia tessellata* (Thick Lip Spider Orchid)

A targeted survey for this species was required to determine its presence or absence. The DPIE Threatened Species Officer for *Caladenia tessellata* confirmed that it was flowering (at other local populations) when the targeted survey was undertaken. The targeted survey effort undertaken for this species is detailed in **Table 15** and displayed in **Figure 13**.

Table 15. Targeted flora survey effort undertaken within the Subject Land.

Target Species	Survey Technique	Survey Effort and Timing	Identified?
Caladenia tessellata (Thick Lip Spider Orchid)	Parallel transverse across the entire Subject Land	One day on Friday 1st October 2021	No

4.4 Species Polygons

No threatened species were identified within the Subject Land or assumed present and therefore no species polygons were created.

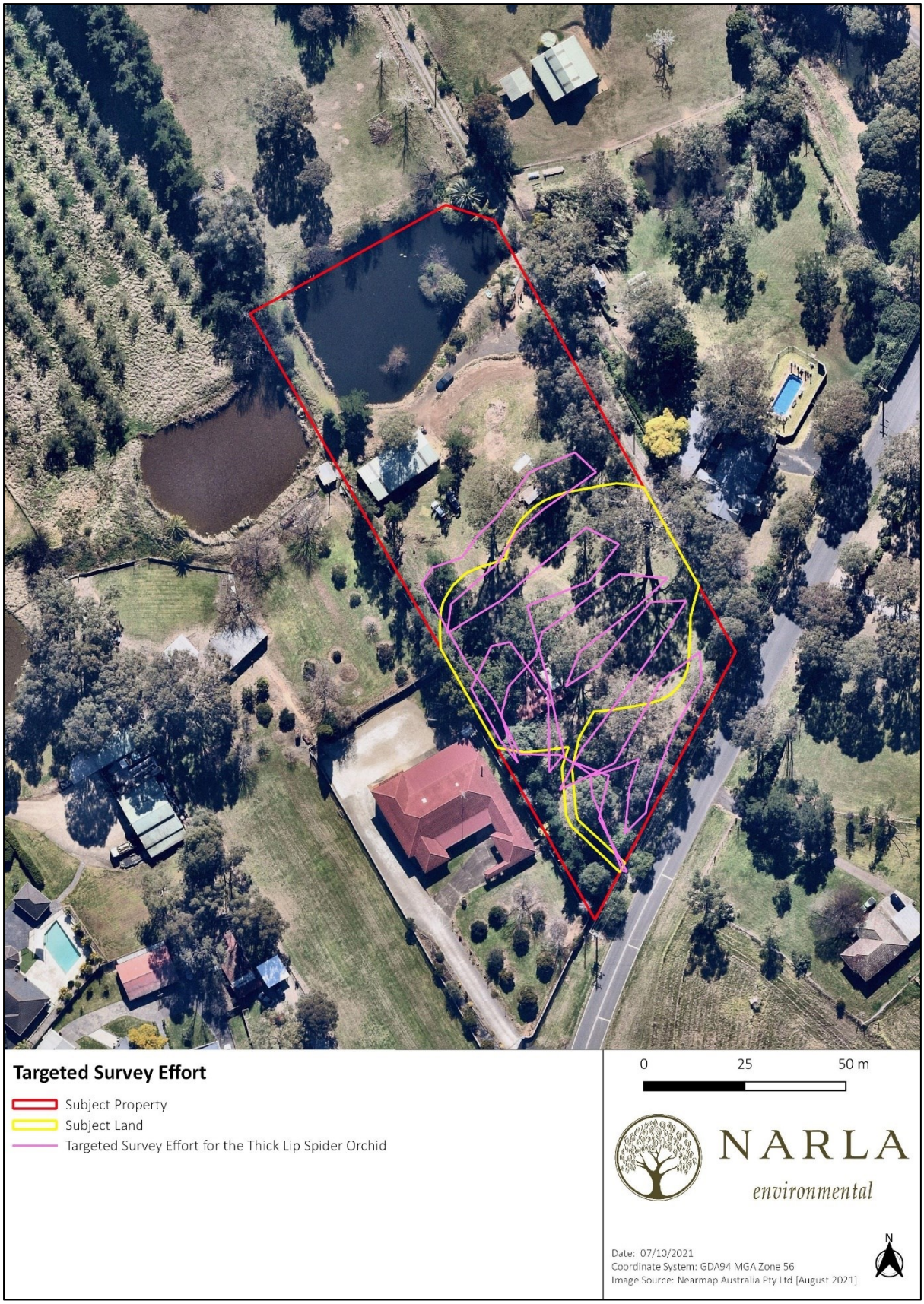

Figure 13. Targeted survey effort for species credit species (Thick Lip Spider Orchid) and their habitats within the Subject Land.

5. Prescribed Impacts

Certain projects may have impacts on biodiversity values in addition to, or instead of, impacts from clearing vegetation and/or loss of habitat. For many of these impacts, the biodiversity values may be difficult to quantify, replace or offset, making avoiding and minimising impacts critical. Prescribed biodiversity impacts require an assessment of the impacts of the development on the habitat of threatened species or ecological communities. This is discussed in **Table 16**.

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

Will there be impacts on any of the following?	Yes/No	Justification for further assessment
Habitat of threatened entities including: ▪ karst, caves, crevices, cliffs, rocks and other geological features of significance, or ▪ human-made structures, or ▪ non-native vegetation.	Yes	There are no karsts, caves, crevices, cliffs, rocks and other features of geological significance on or near the Subject Land. Non-native vegetation was present within the Subject Land; however, it only existed in the form of exotic grasses and woody weeds, the removal of which is not expected to impact any threatened species. The Subject Land contains an existing dwelling that will be demolished as part of the proposed development. Although unlikely, a number of threatened microbat species may utilise this human-made structure for roosting and breeding, including: ▪ *Falsistrellus tasmaniensis* (Eastern False Pipistrelle) ▪ *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat) ▪ *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat). ▪ *Scoteanax rueppellii* (Greater Broad-nosed Bat).
On areas connecting threatened species habitat, such as movement corridors.	No	It is unlikely the 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.
That affect water quality, water bodies and hydrological processes that sustain threatened entities (including from subsidence or upsidence from underground mining).	No	There are no confirmed threatened species and ecological communities within the Subject Land that are sustained by water bodies and hydrological processes. It is also not expected that the removal of vegetation within the Subject Land will have impacted upon any groundwater processes within the surrounding landscape.

Will there be impacts on any of the following?	Yes/No	Justification for further assessment
On threatened and protected animals from turbine strikes from a wind farm.	No	No wind farms are associated with the proposed development.
On threatened species or fauna that are part of a TEC from vehicle strikes.	No	Although the development has resulted in an increase of vehicular traffic, it is highly unlikely that it would result in an increase in vehicle strikes to threatened fauna given the low likelihood threatened fauna use the area. Moreover, the existing property had a moderate level of vehicle traffic prior to the development.

6. Avoid, Minimise and Mitigate Impacts

6.1 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 17**).

Table 17. Mitigation and management of impacts associated with the proposed development.

Action	Outcome	Timing	Responsibility
Avoid and Minimise Impact - Project Location and Design	The proponent has situated the majority of the development on cleared land with the access track winding through the degraded woodland vegetation to avoid impacting the trees. The overall condition of the vegetation that requires clearing/management is low, with a large number of environmental weeds and some high threat exotic weeds present. The proponent has also chosen to use part of the existing dwelling footprint for the proposed development, which further reduces the amount of native vegetation being impacted. The proponent will conduct select trimming of canopy trees where required to reduce their cover.	N/A	Proponent
Erosion and Sedimentation	Appropriate erosion and sediment control must be erected and maintained at all times during operation in order to avoid 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).	N/A	Proponent Construction Contractor
Landscaping	Wherever possible the proponent should use plants representative of CPW in the landscaping of the proposed development.	N/A	Proponent
Erection of temporary fencing	Temporary fencing should be erected around retained native vegetation that may incur indirect impacts on biodiversity values due to an increase of large vehicles in the area.	N/A	Proponent Construction Contractor

7. Assessment of Impacts

7.1 Direct Impacts

7.1.1 Total Impacts

The development has resulted in the complete clearing of approximately 0.08ha of PCT 850 across the following vegetation zones and condition classes:

- 0.05ha of Vegetation Zone 1 – Moderate Condition (Degraded Woodland); and
- 0.03ha of Vegetation Zone 2 – Low Condition (Degraded Grassland).

7.1.2 Partial Impacts

The development has resulted in the partial clearing of approximately 0.21ha of PCT 850 across the following vegetation zones and condition classes:

- 0.12ha of Vegetation Zone 1 – Moderate Condition (Degraded Woodland); and
- 0.09ha of Vegetation Zone 2 – Low Condition (Degraded Grassland).

The works have resulted in the removal of 0.29ha of vegetation that conforms to the BC Act listing for the CEEC, Cumberland Plain Woodland in the Sydney Basin Bioregion. The VI scores for each zone are relatively low, with the vegetation in Vegetation Zone 2 scoring only 2.2.

7.2 Prescribed Impacts

As there is potential for the Subject Land to contain habitat for a number of threatened microbat species in the form of human-made structures, an assessment of this prescribed impact must be undertaken in accordance with Section 8.3 of the BAM (DPIE 2020b). This is discussed in Table 18.

Table 18. Prescribed and uncertain impacts associated with the proposed development.

Prescribed Impact	Nature, Extent and Duration	Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts on Threatened Entities
Habitat of threatened entities: ▪ human-made structures.	There is the low potential that threatened microbat species use buildings (in particular, roof cavities) within the Subject Land for roosting and breeding. The demolition of this building is expected to temporarily displace individuals and therefore only have a low impact of short duration. These species are highly mobile and there is ample suitable roosting/breeding habitat nearby.	▪ *Falsistrellus tasmaniensis* (Eastern False Pipistrelle); ▪ *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat); ▪ *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat); and ▪ *Scoteanax rueppellii* (Greater Broad-nosed Bat).	While the demolition of potential roost/breeding sites may have a temporary displacement-impact to local populations of threatened microbats, these species are highly mobile and as such, any impacts are likely to be temporary if the mitigation measures in this report are followed. Large areas of habitat connectivity will continue to exist, which would provide alternative and potentially higher quality roost/breeding sites for these species.

7.3 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 that have the potential to occur as a result of the development are outlined in **Table 19.**

Table 19. Indirect impacts associated with the proposed development

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	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 development; although these indirect impacts are likely to be minor given the degraded nature of the Subject Property. The disturbance caused during construction may increase weed infestations or dust coverage within adjacent vegetation, which in turn may decrease its habitat value.	One (1) TEC occurs within the Subject Land – Cumberland Plain Woodland in the Sydney Basin Bioregion (PCT 850). There is also the potential that threatened species occur in areas adjacent the Subject Land that may be impacted by a decrease in habitat condition.	While changes to vegetation condition may have a small and localised impact to threatened species, threatened ecological communities and their habitats, this is not expected to impact on their bioregional persistence.
(b) reduced viability of adjacent habitat due to edge effects	The proposed construction and on-going human-use of the Subject Land may lead to a minor increase in weed infiltration into adjacent habitat due to enhanced edge effects. This impact is likely to be restricted to the immediate area surrounding the Subject Land to a couple of metres.	One (1) TEC occurs within the Subject Land – Cumberland Plain Woodland in the Sydney Basin Bioregion (PCT 850). There is also the potential that threatened species occur in areas adjacent the Subject Land that may be impacted by a decrease in habitat condition.	While edge effects may have a small and localised impact to TECs and threatened species, this is not expected to impact on their bioregional persistence, considering the habitat connectivity within the surrounding areas.

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts for the Bioregional Persistence of the Threatened Species, Threatened Ecological Communities and Their Habitats.
(c) reduced viability of adjacent habitat due to noise, dust or light spill	An increase in noise is to be expected during construction and human-use. As the Subject Land is located in a semi-rural area, this may have an impact on any species foraging or roosting adjacent to the site during the day/night that are not adapted to such noises. It is not expected that construction would 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. The construction may increase dust in adjacent habitat. Dust can impact on a plant's ability to photosynthesise and may increase plant mortality in the adjacent vegetation. It is expected that the construction would occur during normal working hours and as such, light spill is not expected to affect adjacent habitat. Occupation of the area following construction, may result in a decrease in the viability of the adjacent habitat due to increases in noise and light associated with dwellings.	One (1) TEC occurs within the Subject Land – Cumberland Plain Woodland in the Sydney Basin Bioregion (PCT 850). There is also the potential that threatened species occur in areas adjacent the Subject Land that may be impacted by a decrease in habitat condition.	While the occupation of the proposed dwelling may have a small and localised impact to the TEC and threatened species, this is not expected to impact on their bioregional persistence, considering large areas of habitat connectivity allowing their movement away from impacted areas.

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts for the Bioregional Persistence of the Threatened Species, Threatened Ecological Communities and Their Habitats.
(d) transport of weeds and pathogens from the site to adjacent vegetation	As previously discussed, the proposed construction and utilisation of the Subject Land 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. Temporary fencing will be erected around retained native vegetation to avoid the introduction of weeds as well as pathogens (Myrtle Rust) from spreading into the adjacent vegetation.	One (1) TEC occurs within the Subject Land – Cumberland Plain Woodland in the Sydney Basin Bioregion (PCT 850). There is also the potential that threatened species occur in areas adjacent the Subject Land that may be impacted by a decrease in habitat condition. The TEC and threatened species may be impacted by weed and pathogen transportation leading to a reduced viability in habitat.	While weeds and pathogens may have a small and localised impact to TECs and threatened species, this is not expected to impact on their bioregional persistence considering the habitat connectivity within the surrounding areas.
(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 development 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 operation may deem such habitats unsuitable for certain species. However, due to the 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.	N/A	N/A

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts for the Bioregional Persistence of the Threatened Species, Threatened Ecological Communities and Their Habitats.
(f) loss of breeding habitats	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 areas of habitat connectivity in the broader landscape and no habitat removal proposed beyond the Subject Land, it is not expected for this to significantly impact on species inhabiting such areas.	There is potential that threatened fauna species use habitat adjacent to the Subject Land for breeding. Such species may be impacted by an increase in noise into adjacent habitats, which may in turn impact on their breeding habitat.	This impact is expected to be small and localised and will not have an overall impact on the bioregional persistence of threatened species.
(g) trampling of threatened flora species	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. In order to prevent the trampling of threatened flora species that could potentially occur within adjacent habitat, retained vegetation will be demarcated with temporary fencing to avoid impacts associated with construction.	There is potential that threatened flora species occur in habitat adjacent to the Subject Land.	Any potential impacts to threatened species adjacent to the Subject Land is expected to be localised and will not have an overall impact on the bioregional persistence of threatened species.
(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

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts for the Bioregional Persistence of the Threatened Species, Threatened Ecological Communities and Their Habitats.
(i) fertiliser drift	This issue is not likely to affect the vegetation within or surrounding the Subject Land.	N/A	N/A
(j) rubbish dumping	There is the possibility that rubbish dumping (including littering) in adjacent vegetation already occurs although it was not observed during the site assessment. This indirect impact is not likely to occur as a result of the proposed development.	N/A	N/A
(k) wood collection	This issue is not likely to affect the vegetation surrounding the Subject Land during and post-operation, particularly as the majority of vegetation surrounding the Subject Land cannot be accessed as it is private property.	N/A	N/A
(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
(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. This indirect impact is not likely to occur as a result of the proposed development.	N/A	N/A

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts for the Bioregional Persistence of the Threatened Species, Threatened Ecological Communities and Their Habitats.
(n) increase in pest animal populations	There is potential that pest animal populations already inhabit areas within and surrounding the Subject Land. This indirect impact is not likely to occur as a result of the proposed development.	N/A	N/A
(o) increased risk of fire	The removal of vegetation as a result of the development is not expected to increase the bushfire risk of vegetation surrounding the Subject Land. The establishment of an APZ will most likely reduce the risk of bushfire.	N/A	N/A
(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. Therefore, it is not expected that the development will disturb any specialist breeding and foraging habitat.	N/A	N/A

8. Threshold for Assessing and Offsetting

8.1 Impacts on Native Vegetation

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

- 0.29ha representative of PCT 850: Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion.

The purchase and retirement of Biodiversity Offset Credits will not be required for the vegetation within Zone 2 due to the low VI score (**Figure 14**).

8.2 Impacts on Threatened Species

There will be no impacts on threatened species as a result of the proposed development.

Figure 14. Impacts on native vegetation and offset requirements.

8.3 Serious and Irreversible Impacts (SAII's)

One (1) threatened ecological community has been identified as an entity at risk of an SAII in the Threatened Biodiversity Data Collection (DPIE 2021d):

- Cumberland Plain Woodland in the Sydney Basin; and

8.3.1 Cumberland Plain Woodland in the Sydney Basin

The threshold for consideration of SAII for Cumberland Plain Woodland in the Sydney Basin Bioregion is currently under development. This means that any impact on the potential habitat for this ecological community could be considered 'serious and irreversible'. Due to the potential sensitivity of this ecological community to any impact, a determination of whether or not the impacts are serious and irreversible is to be undertaken in accordance with Section 9.1 of the BAM (DPIE 2020b). This is outlined in **Table 20**.

Table 20. Additional impact assessment provisions for ecological communities that are associated with a serious and irreversible impact.

Serious and Irreversible Impact (SAII) Impact assessment provisions for ecological communities: Cumberland Plain Woodland in the Sydney Basin Bioregion	
BC Act Status: Critically Endangered	
a) the action and measures taken to avoid the direct and indirect impact on the potential entity for a SAII	The development has taken a number of measures to avoid direct and indirect impacts on Cumberland Plain Woodland in the Sydney Basin Bioregion (CPW) where possible including strategically placing the dwelling to encompass some cleared areas and winding the access through the trees to avoid their removal. The development resulted in the removal of degraded CPW (0.29ha) that has been historically exposed to various disturbances, including weed invasion and mowing.
b) the area (ha) and condition of the threatened ecological community (TEC) to be impacted directly and indirectly by the proposed development. The condition of the TEC is to be represented by the vegetation integrity score for each vegetation zone	The development has impacted on approximately 0.29ha of CPW. This includes impacts to 0.18ha within Vegetation Zone 1 and 0.11ha within Vegetation Zone 2. All zones were of low condition. Vegetation Zone 1 comprised a moderate native canopy layer, a near absent mid-story/shrub layer, and a mixed native/exotic ground layer (VI Score = 27.9). Vegetation Zone 2 was comprised of an absent canopy and shrub layer and a large number of exotic species in the ground layer and a monoculture of the common turf grass Couch (VI Score = 2.2). There is the low potential for the development to have an indirect impact on CPW not being removed that surrounds the Subject Land (<1ha). However, these areas are already heavily altered. Issues such as increased weed invasion that may result from the proposed development would already be apparent in these areas.
c) a description of the extent to which the impact exceeds the threshold for the potential entity that is specified in the Guideline for determining an SAII	The impact thresholds for this community are currently under development.

Serious and Irreversible Impact (SAII) Impact assessment provisions for ecological communities: Cumberland Plain Woodland in the Sydney Basin Bioregion		
BC Act Status: Critically Endangered		
d) the extent and overall condition of the potential TEC within an area of 1,000ha, and then 10,000ha, surrounding the proposed development footprint	The Remnant Vegetation of the Western Cumberland Subregion vegetation mapping (DPIE 2015) indicates the presence of approximately 128ha of CPW within an area of 1,000ha surrounding the Subject Land, and 902ha of CPW within an area of 10,000ha surrounding the Subject Land. This vegetation mapping is outdated and considerable amounts of CPW have been since cleared; however, this is the most recent mapping for the area and has thus been used. The CPW within these areas largely comprises fragmented patches of varying sizes. The conditions of these patches cannot be determined without ground truthing, although are expected to be partially degraded due to their positioning within a semi-urban landscape.	
e) an estimate of the extant area and overall condition of the potential TEC remaining in the IBRA subregion before and after the impact of the proposed development has been taken into consideration	The Remnant Vegetation of the Western Cumberland Subregion (DPIE 2015) and Native Vegetation of the Sydney Metropolitan Area (OEH 2016b) vegetation mapping indicate approximately 22,543.6ha of CPW occurs within the Cumberland IBRA Subregion. This comprises fragmented patches of varying sizes. The conditions of these patches cannot be determined without ground truthing. This vegetation mapping is outdated and considerable amounts of CPW have been since cleared; however, this is the most recent mapping for the area and has thus been used. Overall, the impact of the proposed development will result in the removal of 0.29ha, accounting for 0.001% of the extant area of CPW in the Cumberland IBRA Subregion. This will result in approximately 22,543.3ha of CPW remaining within the Cumberland IBRA Subregion after the development.	
f) an estimate of the area of the candidate TEC that is in the reserve system within the IBRA region and the IBRA subregion	The Remnant Vegetation of the Western Cumberland subregion (DPIE 2015 Native Vegetation of the Sydney Metropolitan Area (OEH 2016) and Native Vegetation of Southeast NSW (Tozer et al. 2010) vegetation mapping indicate the presence of 1,293.4ha of CPW within the reserve system in the Cumberland IBRA Subregion, and 1,300.7ha within the reserve system within the IBRA Region.	
g) the development, clearing or biodiversity certification proposal's impact on:	**i) abiotic factors critical to the long-term survival of the potential TEC; for example, how much the impact will lead to a reduction of groundwater levels or the substantial alteration of surface water patterns**	The development has the potential to alter the natural hydrology occurring within and surrounding the Subject Land due to an increase in compacted surfaces. This may alter water runoff levels and increase nutrients into adjacent areas of CPW, causing an increase in weed infestations. However, it is unlikely that the development will significantly exacerbate such factors given that weed infestations already occur within the area of CPW surrounding the Subject Land.
	ii) characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding	The areas of CPW within the Subject Land are of a low quality with patches of remnant canopy over native/exotic groundcovers and areas of historically

Serious and Irreversible Impact (SAII) Impact assessment provisions for ecological communities: Cumberland Plain Woodland in the Sydney Basin Bioregion		
BC Act Status: Critically Endangered		
	regimes, removal of understorey species or harvesting of plants	cleared native/exotic ground layer. Fire and flood regimes have been largely altered due to past land management practices and surrounding development. Therefore, it is highly unlikely that the proposed development will exacerbate impacts on characteristic and functionally important species as the area is already highly altered. It is not expected that the development will impact any characteristic and functionally important species outside of the Subject Land.
	iii) the quality and integrity of an occurrence of the potential TEC through threats and indirect impacts including, but not limited to, assisting invasive flora and fauna species to become established or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species in the potential TEC	The development may enhance weed infiltration into adjacent habitat by an increase in edge effects. However, the abundance of exotic species within the Subject Land and adjacent properties is already apparent. It is therefore not expected that the quality and integrity of adjacent CPW will be significantly altered by the proposed development.
h) direct or indirect fragmentation and isolation of an important area of the potential TEC	The CPW within the Subject Land and surrounds occurs within a 'Priority Management Area' as defined under the Saving our Species Program (OEH 2009). However, the nature of the development is unlikely to directly or indirectly fragment or isolate an important area of CPW owing to the degraded nature of the vegetation.	
i) the measures proposed to contribute to the recovery of the potential TEC in the IBRA subregion.	The Saving our Species Program (OEH 2009) has identified various measures proposed to manage key threats to conserve this ecological community, including: ▪ Determine any impacts from foxes and cats and identify sites prior to undertaking any control; ▪ Liaise with the NSW Roads and Maritime Authority, local Council, private developers, consultants and ecologists to consider the impacts on the TEC when designing cuttings and to include it in their technical guidelines. This may include workshops with engineers and other relevant people to increase awareness and consideration of the TEC when designing and building works including impacts on surface and sub-surface hydrology and the use of wildlife sensitive crossings; ▪ Consult with landholders about participating in conservation agreements (preferably long-term in perpetuity) to protect the TEC on their property;	

Serious and Irreversible Impact (SAII) Impact assessment provisions for ecological communities: Cumberland Plain Woodland in the Sydney Basin Bioregion	
BC Act Status: Critically Endangered	
	▪ Retrofit the design of existing culverts to improve habitat for fauna. Discourage the use of fences that prevent wildlife movement. Encourage land managers to consider incorporating wildlife corridors, avenues and crossings when designing new infrastructure; ▪ Identify blackspots on roads and install signage which includes the number of a local wildlife rescue group; ▪ Revegetate cleared areas of the TEC following Australian Native Plant Conservation guidelines and update the NSW Government publication "Recovering Bushland on the Cumberland Plain". Promote the NSW Government Environment Line to report any unauthorised clearing or damage to the TEC; ▪ To prevent damage and disturbance by visitors, manage access to tracks (including vehicular and pedestrian) through the installation of deterrent signage, bollards, gates, and/or fencing at strategic locations. Encourage natural re-vegetation or re-vegetate following any track closure; ▪ Undertake mosaic burning with larger patches not small ones. Fire intensity should be variable, depending on the site as should the fire interval; ▪ Provide residents with the TEC on their property with information about fauna that depend on the woodland as well as threats to the community such as human disturbance, weeds, psyllids, fire and grazing. This may be done through the distribution of relevant publications, erecting interpretive signs at strategic locations, school programs and establishing a demonstration site for Cumberland Plain Woodland; ▪ Encourage local nurseries to stock Cumberland Plain Woodland species, particularly flowering varieties suitable to gardens. Provide advice with maps on topography and soil information for landscaping approaches. Continue Council native plant giveaways and distribution of species lists; ▪ Liaise with land managers to provide advice on bush regeneration contracts so that they take into account maintaining plantings during dry periods. This may include watering plantings or over-planting and/or direct seeding; ▪ Discourage the use of chemical treatment (as it kills beneficial insects also) and instead use target spray diatomaceous earth if control is required. Encourage retaining leaf litter, ground-covers and shrubs under one meter; ▪ Implement best practice measures to control, prevent and restore Bell Miner Associated Dieback. Follow recommendations in "An independent review of bell miner associated dieback - Final Report, June 2017" by Knowledge Ecology commissioned by NSW government; ▪ Opportunistically monitor sites with spotted gum for signs of the disease. Encourage landholders to monitor and report any outbreaks to the Saving our Species mailbox;

Serious and Irreversible Impact (SAII) Impact assessment provisions for ecological communities: Cumberland Plain Woodland in the Sydney Basin Bioregion	
BC Act Status: Critically Endangered	
	▪ Continue investigations into the death of trees caused by fungus following borers and develop options for prevention and/or treatment. ▪ Undertake ecological burns where possible following weed removal. Investigate options of cultural burning; ▪ Encourage land managers to use periodic grazing by cattle and goats in weed affected areas to exhaust the seedbanks of appropriate weeds (e.g. use cattle as follow up to primary weed control of *Olea europaea* subsp. *cuspidata*); ▪ Work with transport infrastructure providers and landholders to restrict the spread of weeds, particularly along railway lines and roadsides, and to control weeds on their properties; and ▪ Undertake weed control using the most appropriate methods to suit differing conditions and schedule regular follow up work. North of the M4 is a priority area to target for *Olea europaea* subsp. *cuspidata* weed control to limit its spread and undertake early cost-effective intervention. Some impact mitigation measures are to be implemented by the proponent to avoid and minimise the impacts of the proposed development on CPW (see Table 17).

9. 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).

9.1 Offset Requirement for Ecosystem Credits

One (1) ecosystem credit is required to offset the biodiversity impacts of the proposed development (**Table 21**).

Table 21. Ecosystem credits required to offset the development.

PCT	BC Act Status	Zone	Total Area (ha)	Ecosystem Credits Required
PCT 850: Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Critically Endangered Ecological Community	Zone 1: Low Condition (Degraded Woodland)	0.17	1
		Zone 2: Low Condition (Degraded Grassland)	0.12	0
Total Ecosystem Credits				**1**

9.2 Offset Requirement for Species Credits

No species credit species require offsetting as a result of the proposed development.

10. Other Relevant Legislation and Planning Policies

10.1 State Environmental Planning Policy (Koala Habitat Protection) 2021

This Policy aims 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. This SEPP applies to LGAs that are listed in Schedule 1 'Local government areas' of the SEPP. As the Penrith LGA is not included in Schedule 1, this SEPP does not apply to the Subject Land.

10.2 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 the Penrith LGA 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.

10.3 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.

10.4 Water Management Act 2000

Controlled activities carried out in, on, or under waterfront land are regulated by the Water Management Act 2000 (WM Act). The NRAR administers the WM Act and is required to assess the impact of any proposed controlled activity to ensure that no more than minimal harm will be done to waterfront land as a consequence of carrying out the controlled activity.

No controlled activities will be carried out on waterfront land within the Subject Land.

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12. 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 Forma (copied directly from Electronic Data Sheet).

BAM Site – Field Survey Form					
Date:	27/08/2021	**Plot ID:**	1	**Photo #:**	0
Zone:	56H	**Plot Dimensions:**	20x50m	**Easting:**	296840.65m E
Datum:	0	**Middle bearing from 0m:**	308	**Northing:**	6250573.43m N
PCT:	Zone 2: PCT 850 - historically cleared				

Growth Form	Scientific Name	Cover	Abundance
Forb (FG)	*Dichondra repens*	2	250
Grass & grasslike (GG)	*Cynodon dactylon*	85	2000
Grass & grasslike (GG)	*Carex inversa*	0.1	60
HTE	*Ehrharta erecta*	0.2	40
HTE	*Senecio madagascariensis*	0.1	3
HTE	*Bidens bipinnata*	0.1	50
Exotic	*Stellaria media*	0.5	200
Exotic	*Gamochaeta sp.*	0.5	100
Exotic	*Plantago lanceolata*	3	200
Exotic	*Medicago lupulina*	0.2	75
Exotic	*Soliva sessilis*	0.1	50
Exotic	*Modiola caroliniana*	0.1	60
Exotic	*Oxalis corniculata*	0.1	35
Exotic	*Cardamine hirsuta*	0.1	20
Exotic	*Conyza sumatrensis*	0.2	50
Exotic	*Taraxacum officinale*	0.1	5
Exotic	*Cerastium glomeratum*	0.1	20
Exotic	*Citrus aurantium*	2	1
Exotic	*Stachys arvensis*	0.1	30
Exotic	*Conyza canadensis*	0.3	75
Exotic	*Cirsium vulgare*	0.2	10
Exotic	*Vulpia bromoides*	0.2	60
Exotic	*Briza minor*	0.1	10
	0	0	0

DBH	# Tree Stems Count	# Hollow Bearing Trees
80+cm	0	0
50-79cm	0	0
30-49cm	0	0
20-29cm	0	0
10-19cm	0	0
5-9cm	0	0
<5cm	0	0

Length of Logs (m)	0

BAM Attribute (1x1m)	Litter Cover (%)
1 (5m)	5
2 (15m)	0
3 (25m)	0
4 (35m)	10
5 (45m)	0
Average	3

Growth Form	Composition Data (Count of Native Cover)	Structure Data (Sum of Cover)
Tree	0	0
Shrub	0	0
Grass	2	85.1
Forb	1	2
Fern	0	0
Other	0	0
High Threat Exotics	3	0.4

BAM Site – Field Survey Form					
Date:	27/08/2021	**Plot ID:**	2	**Photo #:**	N/A
Zone:	0	**Plot Dimensions:**	20x50m	**Easting:**	296830.80m E
Datum:	0	**Middle bearing from 0m:**	331	**Northing:**	6250544.92m N
PCT:	Zone 1: PCT 850 - Modified Bushland				

Growth Form	Scientific Name	Cover	Abundance
Forb (FG)	*Dichondra repens*	0.2	100
Grass & grasslike (GG)	*Cynodon dactylon*	85	2000
HTE	*Ehrharta erecta*	2	80
HTE	*Asparagus aethiopicus*	1	20
Shrub (SG)	*Callistemon citrinus*	5	1
Tree (TG)	*Eucalyptus tereticornis*	20	3
Tree (TG)	*Eucalyptus microcorys*	10	1
Tree (TG)	*Eucalyptus moluccana*	5	1
Exotic	*Plantago lanceolata*	0.3	45
Exotic	*Modiola caroliniana*	0.1	75
Exotic	*Plumbago auriculata*	5	2
Exotic	*Taraxacum officinale*	0.1	15
Exotic	*Stellaria media*	0.1	10
Exotic	*Cirsium vulgare*	0.1	1
Exotic	*Oxalis corniculata*	0.1	25
Exotic	*Jasminum polyanthum*	2	25
Exotic	*Aloe maculata*	0.2	2
	0	0	

	# Tree Stems Count	# Hollow Bearing Trees
80+cm	0	0
50-79cm	1	0
30-49cm	2	0
20-29cm	1	0
10-19cm	1	0
5-9cm	0	0
<5cm	0	0

Length of Logs (m)	0

BAM Attribute (1x1m)	Litter Cover (%)
1 (5m)	10
2 (15m)	15
3 (25m)	20
4 (35m)	40
5 (45m)	5
Average	18

Growth Form	Composition Data (Count of Native Cover)	Structure Data (Sum of Cover)
Tree	3	25
Shrub	1	5
Grass	1	85
Forb	1	0.2
Fern	0	0
Other	0	0
High Threat Exotics	2	3

Appendix B. BAMC Generated Biodiversity Credit Report.

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id 00027813/BAAS21006/21/00027814	Proposal Name 14 Mt Vernon Road	BAM data last updated * 10/06/2021
Assessor Name Jack Tatler	Assessor Number BAAS21006	BAM Data version * 45
Proponent Names Theresa Benjamin	Report Created 14/10/2021	BAM Case Status Finalised
Assessment Revision 0	Assessment Type Part 4 Developments (Small Area)	Date Finalised 14/10/2021
BOS entry trigger BOS Threshold: Biodiversity Values Map	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered Ecological Community	850-Cumberland shale hills woodland

Species
Nil

Additional Information for Approval

BAM Biodiversity Credit Report (Like for like)

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
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
850-Cumberland shale hills woodland	Cumberland Plain Woodland in the Sydney Basin Bioregion	0.3	0	1	1

BAM Biodiversity Credit Report (Like for like)

850-Cumberland shale hills woodland	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 849, 850	-	850_Moderate	No	1	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.
	Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 849, 850	-	850_Low	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

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