ecoplanning
ecology | planning | offsets

Biodiversity Development Assessment Report

75-87 Dunheved Circuit, St. Marys (Lot 2 // DP1175850)

Prepared for: Concrete Estates Pty Ltd

18 May 2021 Version: 1.2 – Final

PROJECT NUMBER	**2021-014**			
PROJECT NAME	Biodiversity Development Assessment Report			
PROJECT ADDRESS	75-87 Dunheved Circuit, St. Marys (Lot 2 // DP1175850)			
PREPARED FOR	Concrete Estates Pty Ltd			
AUTHOR/S	Jai Brien-Cooper & Bruce Mullins			
REVIEW	**Technical**	**QA**	**Version**	**Date to client**
	Bruce Mullins		1.0 - Draft	3 May 2021
			1.1 - Final	4 May 2021
			1.2 – Final	18 May 2021
BDAR CERTIFICATION	This BDAR has been prepared by Bruce Mullins, Accredited Assessor no. BAAS17024, in accordance with the BC Act, Reg and BAM.		[redacted]	

LICENCES	**Scientific Licence**	SL101557
	BioNet Sensitive Species Data Licence	1115
	Animal Research Authority Ethics Licence	Fauna Surveys and Monitoring (16/346)
	Scientific Collection - Aquatic	P19/0009-1.0 & OUT19/2602

This report should be cited as: 'Ecoplanning (2021). Biodiversity Development Assessment Report– 75-87 Dunheved Circuit, St. Marys (Lot 2 // DP1175850). Prepared for Concrete Estates Pty Ltd.'

ECOPLANNING PTY LTD | 74 HUTTON AVENUE BULLI NSW 2516 | P: (02) 4244 2736

Contents

Appendices

Figures

Tables

Glossary and abbreviations

Acronym	Description
*	Denotes exotic species
†	Denotes both native and introduced species
BAM	Biodiversity Assessment Method (DPIE 2020)
BC Act	NSW *Biodiversity Conservation Act 2016*
BC Reg	NSW *Biodiversity Conservation Regulation 2017*
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offsets Scheme
CEEC	Critically endangered ecological community
CEMP	Construction Environmental Management Plan
DA	Development Application
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DotE	Commonwealth Department of the Environment (now DAWE)
DoEE	Commonwealth Department of the Environment and Energy (now DAWE)
DPIE	NSW Department of Planning, Industry and Environment
EES	NSW Environment, Energy and Science Group (formerly OEH)
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
HBT	Hollow bearing tree
IBRA	Interim Biogeographic Regionalisation of Australia
LGA	Local Government Area
OEH	NSW Office of Environment and Heritage (now EES)
PCT	Plant Community Type
SAII	Serious and Irreversible Impacts
Subject land	Area of land which will be directly impacted by the current development proposal.
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community
TSSC	Threatened Species Scientific Committee

Acronym	Description
WM Act	NSW *Water Management Act 2000*
VI Score	Vegetation Integrity Score
VIS	Vegetation Information System

1 Introduction

1.1 Background

This Biodiversity Development Assessment Report (BDAR) has been prepared to accompany a Development Application (DA) relating to proposed industrial pipe manufacturing warehouse at 75-87 Dunheved Circuit, St. Marys (**Figure 1.1**) (DoE 2013). Note that the area of land within Lot 2 // DP1175850 that is the subject of this BDAR is not the entire Lot; this is discussed further below.

The NSW *Biodiversity Conservation Act 2016* (BC Act) establishes the biodiversity assessment requirements for proposed developments and land use change. Part of the BC Act establishes an offsets scheme that aims to ensure there is no net loss of biodiversity values. Triggers that require land clearing to enter the Biodiversity Offsets Scheme (*Biodiversity Conservation Regulation 2017* [BC Reg]) are as follows:

- **State Significant Development (SSD)** - if a future development of a site is determined to be SSD, Secretary's Environmental Assessment Requirements ('SEARs') would be issued for the project, requiring that biodiversity impacts related to the proposed development be assessed using the BAM (DPIE 2020a) and documented in a BDAR, **AND/OR**
- **Clearing thresholds** – the amount of native vegetation clearance in relation to the minimum lot size is used to determine whether entry into the BAM is triggered, **AND/OR**
- **Biodiversity Values Land Map** - proposed development is said to exceed the biodiversity threshold where it involves the clearing of native vegetation on land included in the Biodiversity Values Map, **AND/OR**
- **Significant impact** – A Test of Significance (in accordance with Part 7.3 of the BC Act) is required for development proposals that do not trigger the Biodiversity Offsets Scheme (BOS). If the Test of Significance indicates that there is likely to be a significant impact, the proponent must carry out an assessment in accordance with the BAM.

Previous surveys of the subject land (Ecoplanning 2020a) identified a small patch (0.08 ha) of the Threatened Ecological Community River-flat Eucalypt Forest and the vulnerable species *Grevillea juniperina* subsp. *juniperina* (Juniper-leaved Grevillea) (**Figure 1.2**). Given that the proposal includes impacts to these entities, there was potential for the proposal to result in a significant impact, therefore, trigger the BOS.

This BDAR has been prepared in accordance with the BAM (DPIE 2020) to document the predicted impacts to biodiversity and has been prepared by Bruce Mullins Principal Ecologist (Accredited BAM Assessor #17024), in accordance with the BC Act and NSW BC Reg. This BDAR describes the outcome of the development assessment case (00024494/BAAS17024/21/00024495) conducted consistent with the BAM.

1.2 Location and site identification

The BAM defines the land to which the BDAR applies as the subject land, which includes areas that are proposed to be directly and indirectly impacted. For the purposes of this BDAR, the subject land includes the approximately 2.07 ha land within Lot 2 // DP1175850 (**Figure**

1.1). It is noted that the subject land does not include the full extent of the Lot 2 // DP1175850 on which the development is proposed (4.02 ha).

The subject land is situated in the Penrith Local Government Area (LGA) and is zoned under the Penrith Local Environmental Plan (PLEP) 2012 as IN1 – General Industrial. The subject land is located approximately 7 km (kilometres) from Penrith CBD and Penrith Panthers Stadium. The subject land generally consists of cleared land and existing infrastructure.

1.3 Proposed development

The proposed development will include the construction of a pipe making warehouse and associated infrastructure, including; water storage, office, parking, and driveways, was well as a driveway to give access to Dunheved Circuit (**Figure 1.3** and **Figure 1.4**) (Geoscapes 2021). It is expected that areas within the subject land that will not have buildings or infrastructure constructed on it will be concreted, allowing for access and movement of semi-rigid vehicles.

The proposal will retain a small area of native vegetation, including Forest Red Gum - Rough-barked Apple grassy woodland (Plant Community Type [PCT] 835) (equivalent to River-flat Eucalypt Forest) and *Grevillea juniperina* subsp. *juniperina*, in the eastern corner of the development site. The area will be improved through weed management and revegetation of species characteristic of the PCT.

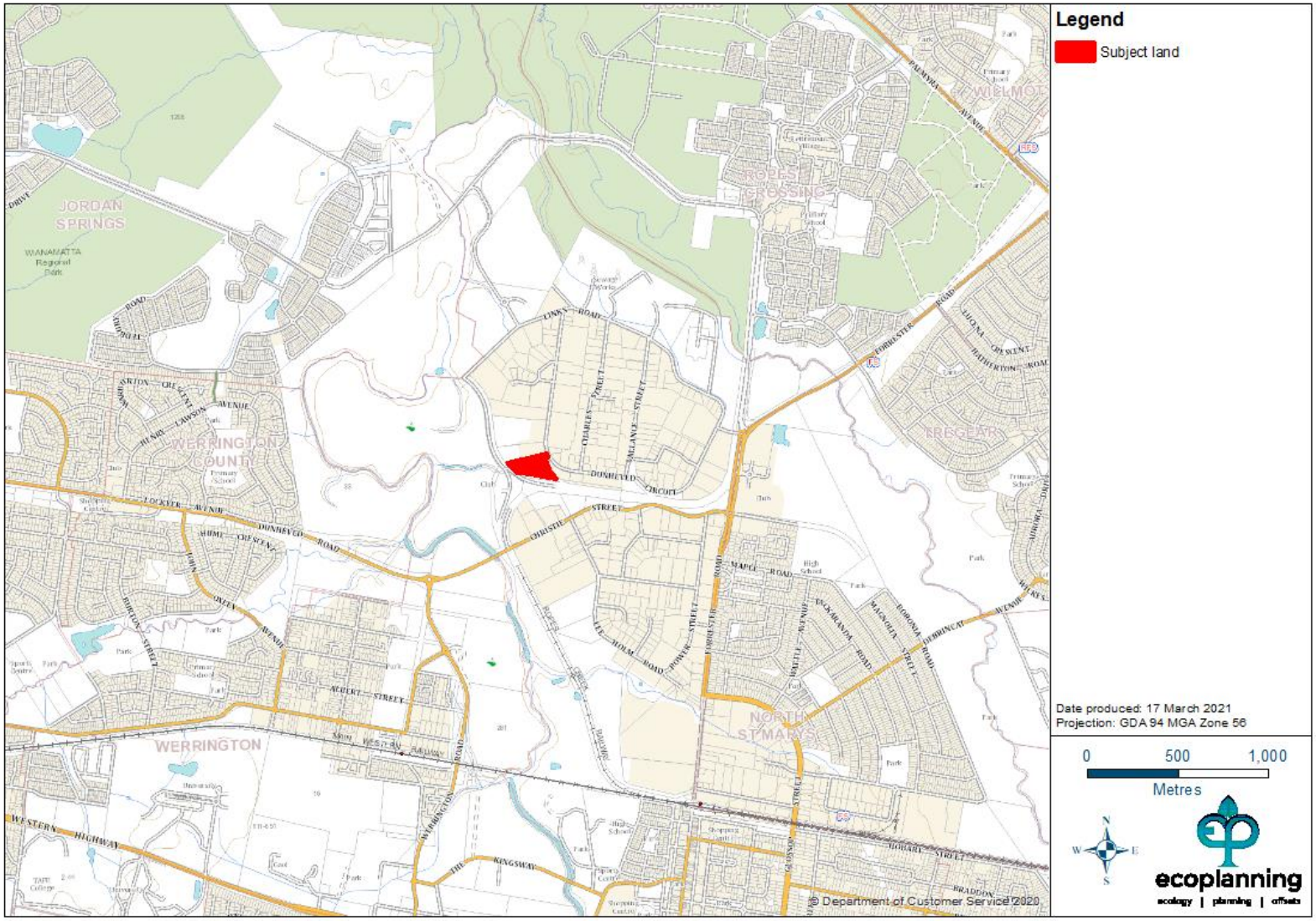

Figure 1.1: Location of the subject land.

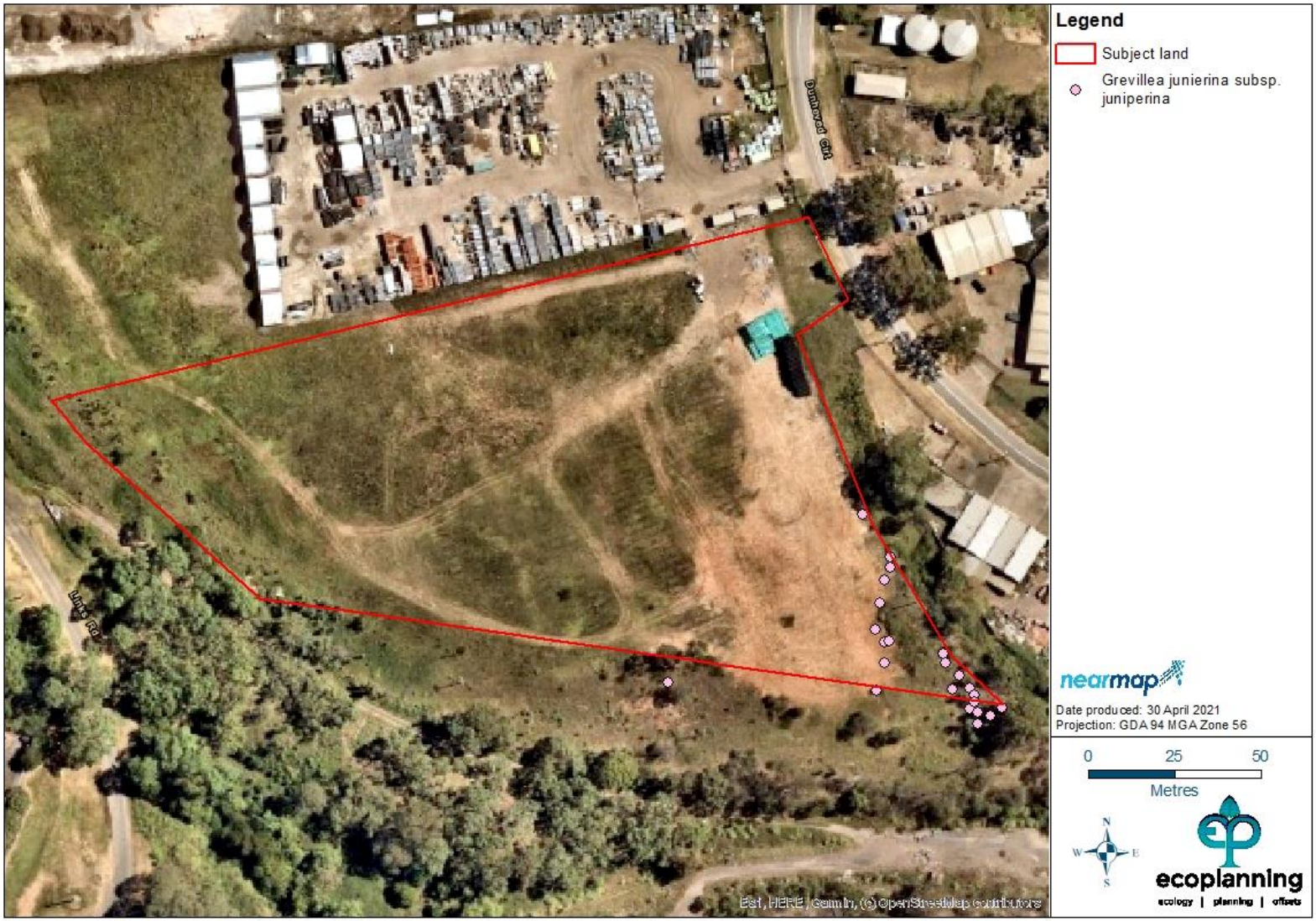

Figure 1.2: The location of the vulnerable species *Grevillea juniperina* subsp. *juniperina*.

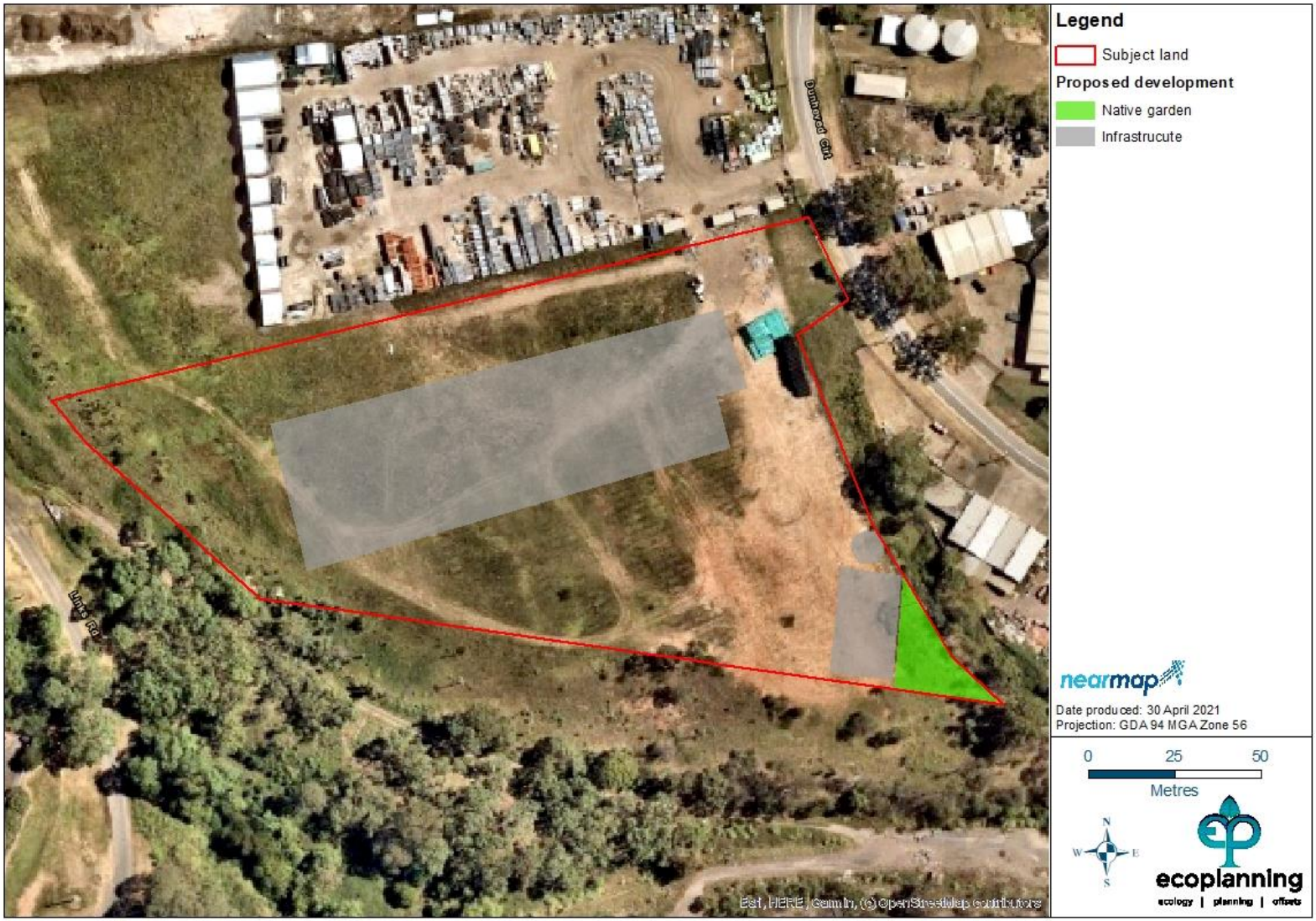

Figure 1.3: Approximate location of proposed building footprint, and associated infrastructure and retained native vegetation (see Figure 1.4 for further detail).

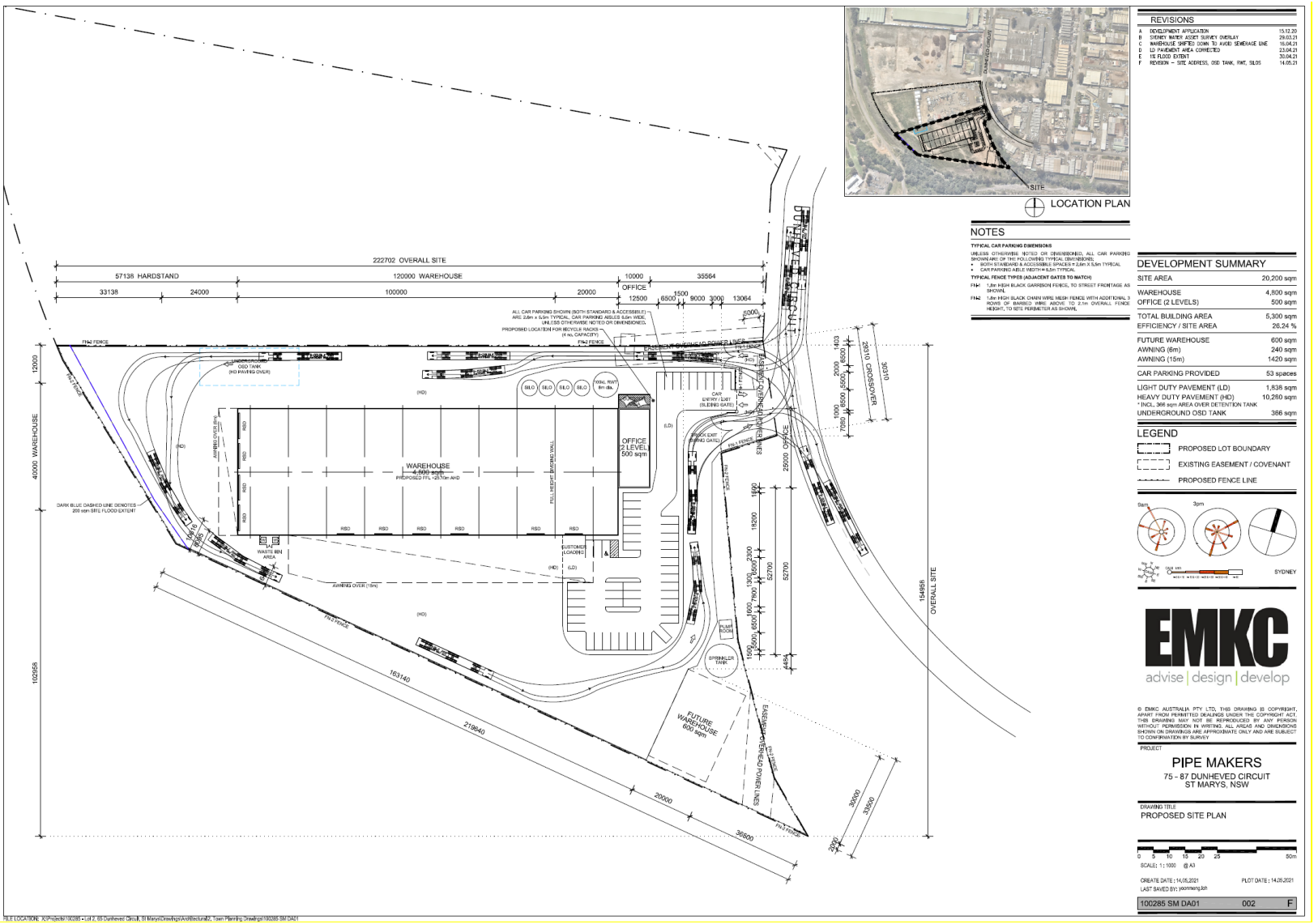

Figure 1.4: Floorplan of proposed development of 75-87 Dunheved Cct, St Marys (within Lot 2 // DP1175850) (EMKC: supplied 14/05/2021).

2 Landscape context

2.1 Identifying landscape features

In accordance with Section 3.1 of the BAM, several features are assessed within the subject land and a 1,500 m assessment circle surrounding the subject land. Provided below are details related to the Interim Biogeographic Regionalisation of Australia (DoEE 2012) regions, its associated subregions and NSW Landscape Regions (Mitchell Landscapes; DECC 2016). Other features, such as rivers, streams, estuaries, and wetlands, habitat connectivity, karst areas or areas of outstanding biodiversity value are considered, where appropriate. In accordance with Section 3.1.2 of the BAM, all relevant features are shown in **Figure 2.1**, unless otherwise stated.

2.1.1 IBRA regions and subregions

Interim Biogeographic Regionalisation of Australia (IBRA) regions represent a landscape-based approach to classifying the land surface, including attributes of climate, geomorphology, landform, lithology, and characteristic flora and fauna species present. The subject land is located entirely within the Cumberland IBRA subregion (version 7.0), which is part of the Sydney Basin IBRA region (version 7.0; **Figure 2.1**). these attributes were entered into the BAM calculator.

2.1.2 NSW landscape regions (Mitchell Landscapes)

The subject land is located within the 'Cumberland Plain' (Mitchell Landscapes v3.1; **Figure 2.1**) and this was entered into the BAM calculator. To the west of the subject land, and within the 1,500 m assessment buffer is found land located within the 'Hawkesbury-Nepean Channels and Floodplains' Mitchell Landscape.

2.1.3 Other features

Rivers, streams, and estuaries

Rivers, streams, and estuaries located within the 1,500 m assessment circle of the subject land, including the associated riparian buffers calculated in accordance with Appendix E of the BAM, are shown in **Figure 2.1**.

The subject land does not contain any mapped streams or watercourses. The nearest watercourse is an unnamed 1st Order Strahler Stream, which is located approximately 20 m south of the subject land. The Riparian Buffer associated with this 1st order stream is 10 m either side of the top of bank, which the subject land is not found within.

The NSW *Water Management Act 2000* (WM Act) defines all land within 40 m of a watercourse as waterfront land. Any activities within waterfront land require a controlled activity approval (CAA). Part of the subject land is located within the waterfront land associated with the 1st order watercourse (**Figure 2.3**) and, thus, a CAA is required.

All watercourses found within the 1,500 m assessment circle form part of the Nepean Catchment area.

Local and important wetlands

Under the BAM, a ***Local Wetland*** is identified as an area of land that is wet by surface water or ground water, or both, for long enough periods that the plants and animals in it are adapted to, and dependant on, moist conditions for at least part of their life cycle (OEH 2017). An ***Important Wetland*** is a wetland listed under the Directory of Important Wetlands of Australia (DIWA; Environment Australia 2001) or an area included under the State Environment Planning Policy (Coastal Management 2018).

No local or important wetlands are present within the subject land.

Habitat connectivity

The subject land does not form part of any recognised biodiversity corridor, flyway, or habitat connectivity feature.

Areas of geological significance and soil hazard features

No landscape features, including areas of significance (karst, caves, crevices, cliffs, etc.) or soil hazard features have been identified within the subject land and the 1,500 m assessment circle.

Areas of outstanding biodiversity values

No areas of outstanding biodiversity have been identified within the subject land. Determining site context

2.1.4 Assessing native vegetation cover

In accordance with Section 3.2 and Section 4.3.2 of the BAM, native vegetation cover must be assessed for a 1,500 m assessment circle around the subject land to assess the habitat suitability for threatened species. The extent of native vegetation on the subject land and immediate surround was mapped using vegetation mapping compiled by Office of Environment and Heritage (OEH 2002), with edits made to improve linework where obvious changes to vegetation extent had occurred using SIX Maps NSW Imagery (LPI 2021) (**Figure 2.2**).

The total area of the 1,500 m assessment circle around the subject land is ~842 ha, with the area of native vegetation mapped within the assessment circle being ~239 ha. This is a native vegetation cover of 25.2% (<30% class as defined by Section 3.2 of the BAM). This value has been entered into the BAM calculator.

2.1.5 Assessing patch size

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

- *Occurs on the development site or biodiversity stewardship site; and*
- *Includes native vegetation that has a gap of >100 m from the next area of native vegetation (or <30 m for non-woody ecosystems).*

Patch size may extend into adjoining land that is not part of the development site or biodiversity stewardship site.'

In assessing patch size, stands of native vegetation within 100 m of other areas of native vegetation, but which are separated by hard barriers (permanent artificial structures, wide roads, etc.) have been treated as separate patches. These highly modified breaks in vegetation connectivity would significantly alter ecological function of these areas of native vegetation, such that these areas warrant recognition as separate patches.

Patch size is required to be assessed as one of four classes per vegetation zone mapped, being <5 ha, 5-25 ha, 25-100 ha, or ≥100 ha. Although somewhat fragmented, separated by minor roads, and of low quality in some areas, the vegetation of the subject land is contiguous with areas of native vegetation surrounding the subject land. Portions of the contiguous patches are associated with watercourses and adjoining patches of remnant vegetation within the assessment circle. As such, the vegetation patch associated with the subject land has been identified as >100 ha, therefore, a value of 101 ha has been entered into the BAM calculator for all vegetation zones within the subject land.

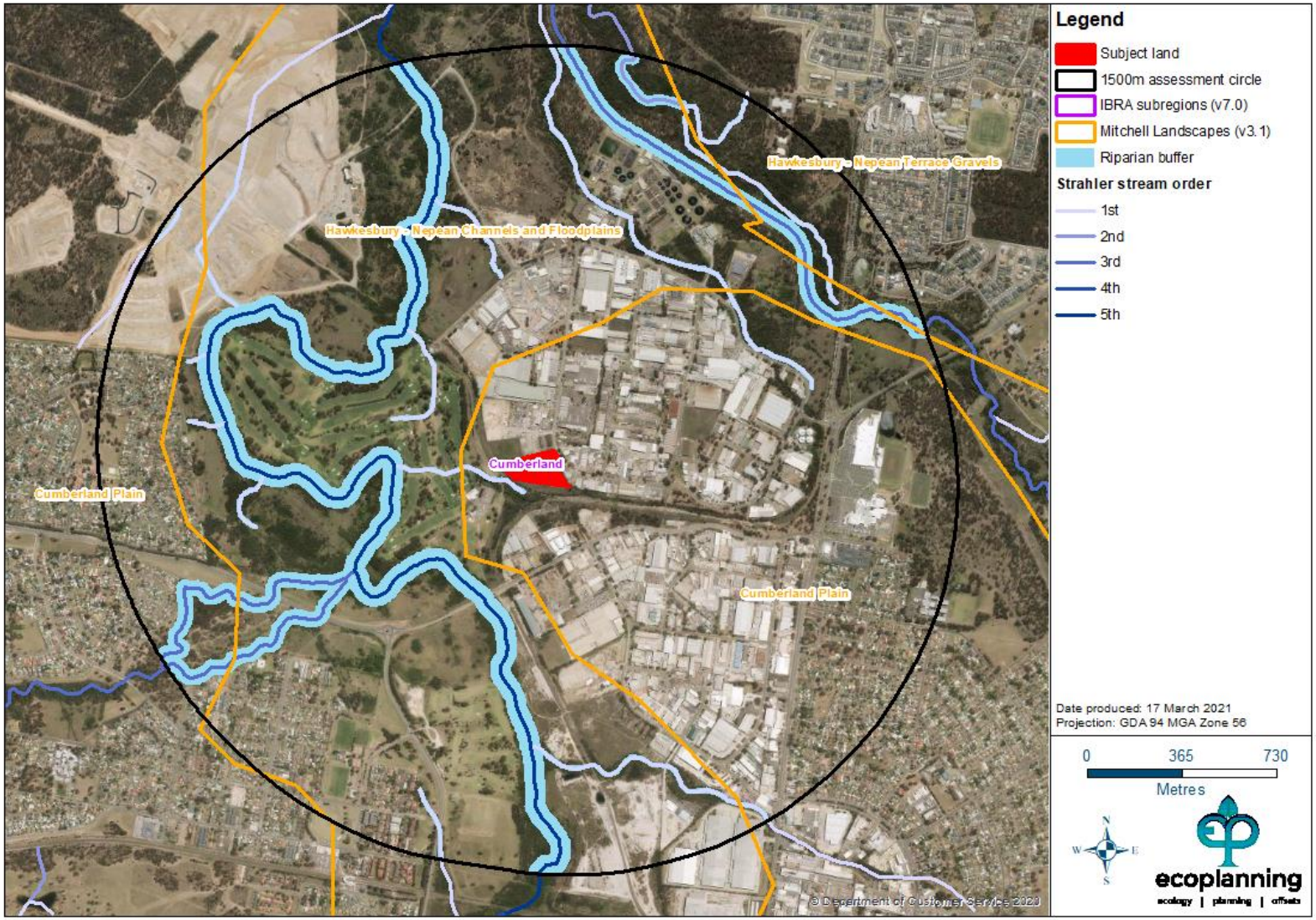

Figure 2.1: The subject land within its landscape context.

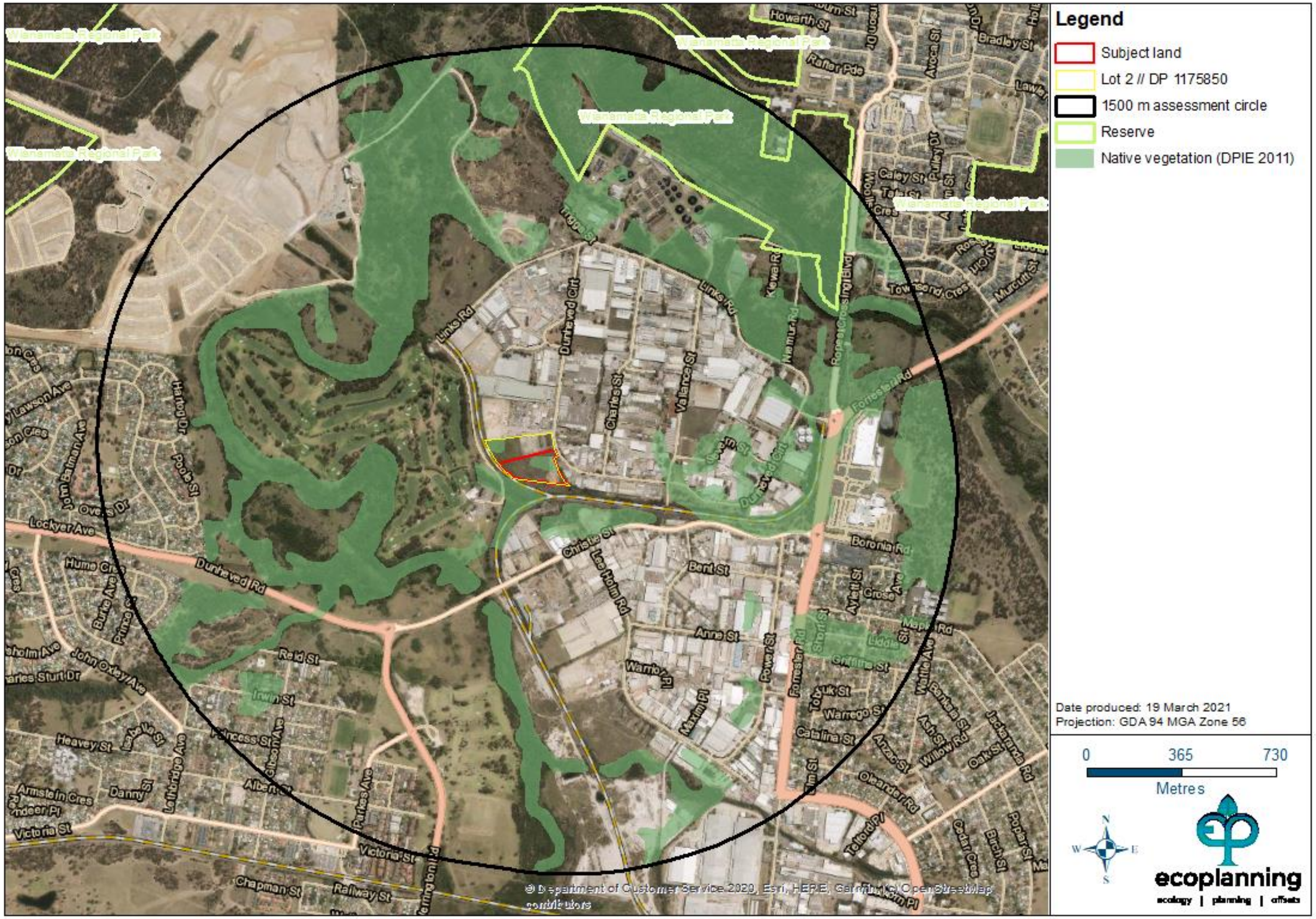

Figure 2.2: Native vegetation (OEH 2002) within the 1,500 m assessment circle, and NSW National Parks and Wildlife reserves.

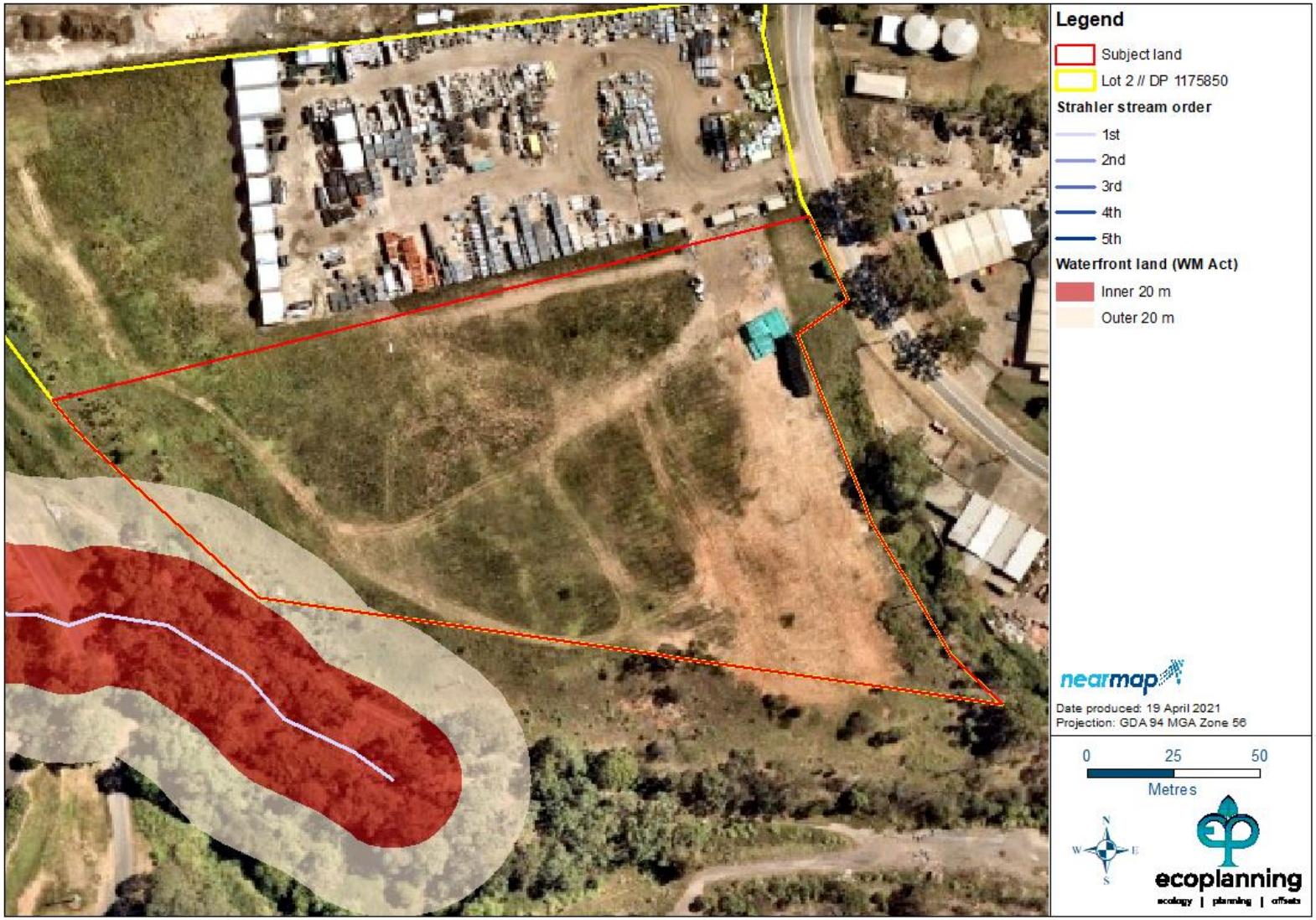

Figure 2.3: Waterfront land (WM Act).

3 Native vegetation

3.1 Plant community types (PCTs) and threatened ecological communities

3.1.1 Regional vegetation mapping

Desktop assessment of vegetation mapped by OEH (2002) identified one vegetation type within the subject land: "Cooks River Castlereagh Ironbark Forest" (**Figure 3.1**). Other PCTs, within 200 m of the subject land, mapped by OEH (2002) are found in **Figure 3.1** and **Table 3.1**.

Table 3.1: Relationship between vegetation communities, PCTs and TECs. Note, vegetation community name (DPIE 2011) and PCT number will hereby be used to refer to the PCTs unless otherwise stated.

Vegetation community (DPIE 2011)	Plant Community Type (PCT) (DPIE 2021b)	BC Act	EPBC Act
Alluvial Woodland	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 835)	Yes	Yes
Cooks River Castlereagh Ironbark Forest	Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion (PCT 725)	Yes	Yes
Shale/Gravel Transition Forest	Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion (PCT 724)	Yes	Yes

3.2 Vegetation extent

In accordance with Section 4.1 of the BAM, the extent of native vegetation was identified and mapped across the subject land. As stated above, OEH (2002) had not mapped any vegetation within the subject land, however, prior assessment of the subject land by Ecoplanning (2020) found that ~0.08 ha of the subject land had vegetation which was characteristic of Forest Red Gum - Rough-barked Apple grassy woodland (PCT 835) (**Figure 3.2**).

The remainder of the subject land (1.99 ha) was mapped as 'cleared land' and 'exotic grassland'. These non-native vegetation units are not associated with any threatened species, and have been amalgamated for the remainder of this report as 'cleared land/exotic grasses'.

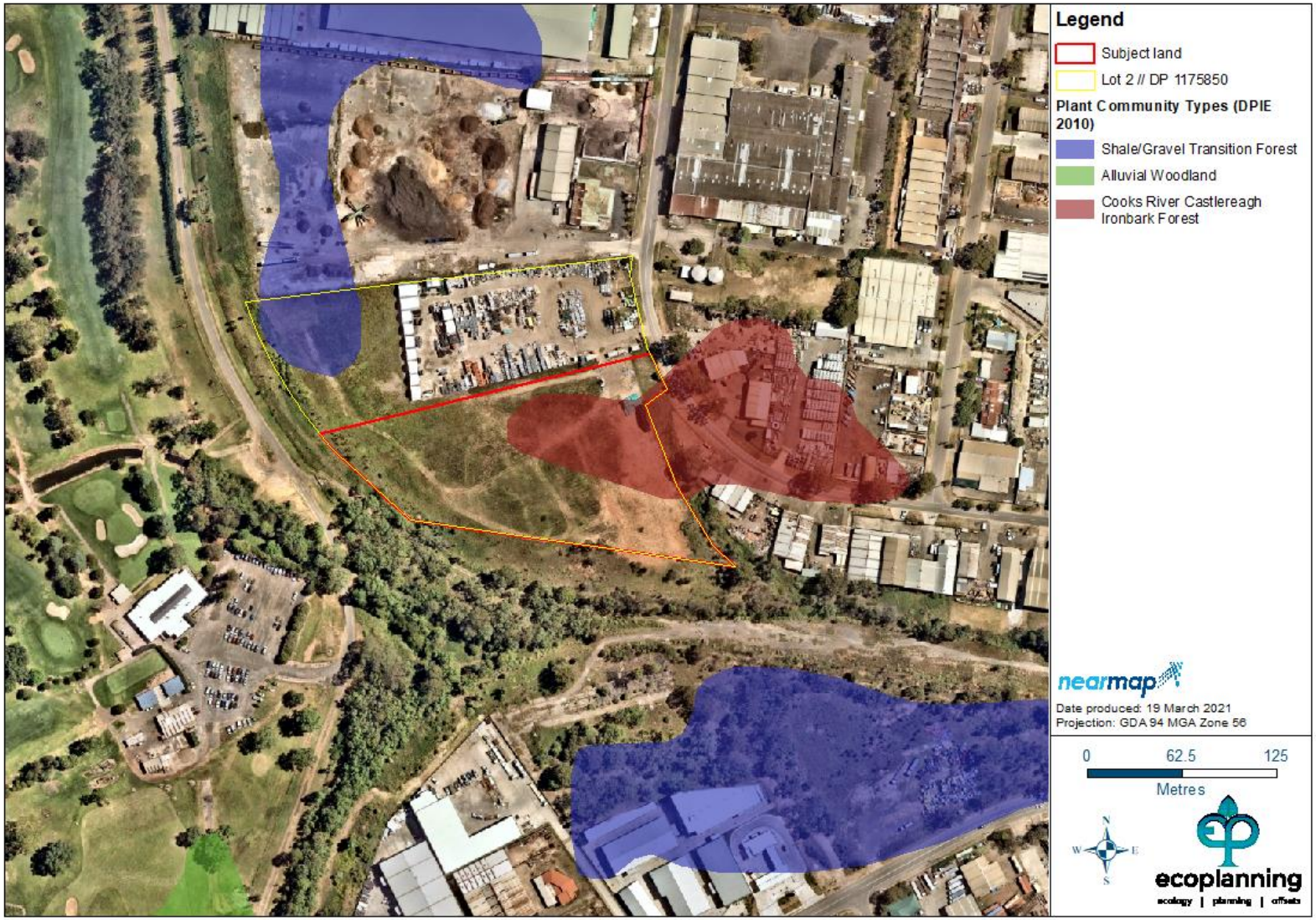

Figure 3.1: Nearest patches of native vegetation, as mapped by OEH (2002).

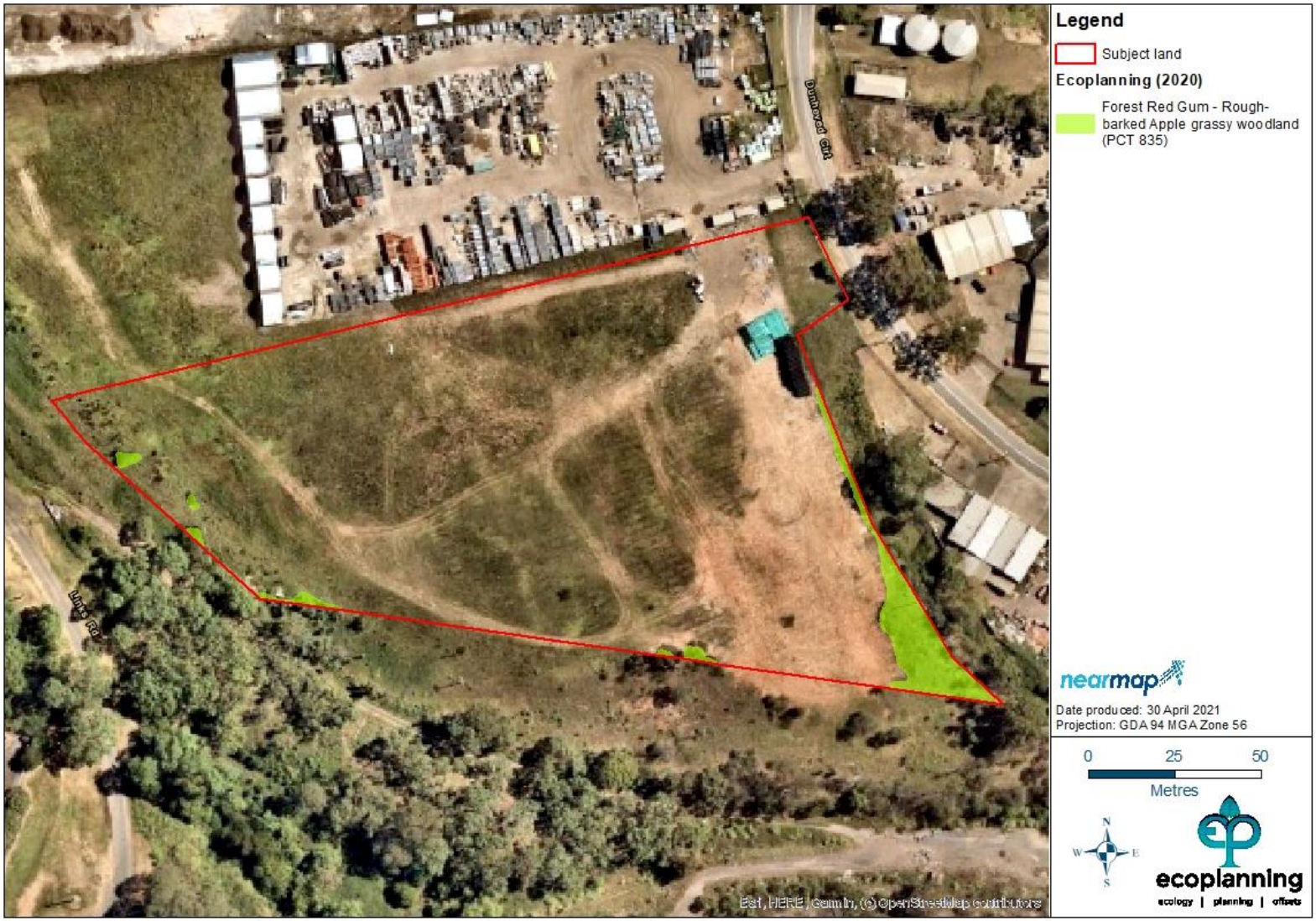

Figure 3.2: Vegetation mapped by Ecoplanning (2020).

3.2.1 Field assessment of vegetation communities

Assessment and validation of the vegetation communities within Lot 2 // DP1175850, was undertaken on 26 March 2021 by James Schlunke (Principal Ecologist/Botanist, Axis Ecological Services, Accredited BAM Assessor No. BAAS18148) and Jai Brien-Cooper (Ecologist). The subject land was traversed whilst recording the vegetation structure and dominant species within each layer. The distribution of each vegetation polygon mapped by Ecoplanning (2020) was traversed to sample any spatial or structural variation between PCT boundaries to identify and map vegetation zones (variation in the broad condition state of vegetation polygons) in accordance with the BAM.

Based on field assessment of the subject land, vegetation communities present were identified, and their boundaries were mapped. The floristics of each of the vegetation communities were then sampled with 0.04 ha plot based floristic vegetation surveys, consistent with Section 4.3.4 of the BAM. These 400 m^2 vegetation survey plots were also the location of the Vegetation Integrity (VI) plots.

In ideal circumstances, the location of the VI plots is to be placed randomly within each vegetation zone and to avoid, where possible, edge effects (i.e. located close to edges of vegetation extent) or ecotones with adjacent vegetation zones. With regards to Lot 2 // DP1175850, there was only one possible placement of the VI plot, due to the small size and irregular shape of the vegetation zone. Additionally, as noted above, the VI plot is commonly 20 × 20 m, however, in the case of Lot 2 // DP1175850, the VI plot was required to be 40 × 10 m, to conform to the irregular shape of the vegetation zone, while still satisfying the 400 m^2 requirement for a VI plot.

The identification of PCTs was conducted in accordance with the NSW PCT classification as described in the BioNet Vegetation Classification (DPIE 2021b). Determination of the most appropriate PCT for vegetation communities within the subject land used the BioNet Vegetation Classification database to identify PCT types which matches the geographic distribution (based on IBRA subregions), vegetation formation, and vegetation assemblage and structure within the subject land. The data for each potential PCT including vegetation formation, descriptive attributes, and distribution information where then reviewed to determine the most appropriate PCT for each of the vegetation communities sampled within the subject land. Observations of vegetation structure and composition made during the traverse of the subject land as well as adjacent areas also informed the determination of the most appropriate PCT for the vegetation communities within the subject land.

Vegetation within the subject land was also assessed against the final determinations for TECs listed under the BC Act and EPBC Act to determine whether the vegetation within the subject land formed part of a TEC.

In accordance with Section 4.1.2 of the BAM, areas which are not native vegetation do not require further assessment, accept where they represent habitat for threatened species.

In accordance with Section 4.1 of the BAM, the extent of native vegetation was identified and mapped across the subject land. PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland occupied an area of 0.09 ha. The mapping in this report differed slightly to previous mapping (Ecoplanning 2020), increasing the area of PCT 835 by 0.01 ha (**Figure 3.5**). The remaining 1.98 ha was covered by “Exotic grassland” (1.56 ha) and “Cleared land” (0.42 ha). Patches that did not support native vegetation included areas of exotic grasses in areas where

clearing had historically occurred. It is noted that the areas identified as being dominated by exotic grasses have not been included in the assessment of the native vegetation extent.

In accordance with Section 4.1.2 of the BAM, areas which are not native vegetation do not require further assessment, except where they represent habitat for threatened species. No further assessment of the vegetation within 'exotic grasses' has been undertaken. Unless specifically referenced, the vegetation zones identified as "Exotic grasses" and "Cleared land" will be amalgamated into a single vegetation zone.

3.2.2 Plant Community Types (PCTs)

Based on the floristic composition of the vegetation in the subject land, one native vegetation community was identified (**Table 3.2**):

- Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 835)

The Forest Red Gum - Rough-barked Apple grassy woodland extant within the subject land was found in a disturbed state.

Table 3.2: Details of PCTs within the subject land.

Plant Community Type (PCTs)	Vegetation Formation & class	Vegetation zones	Area (ha)*
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 835)	Disturbed	1	0.09
Total native vegetation			**0.09**
-	Exotic grasses	0**	1.56
-	Cleared land	0**	0.42
Total exotic vegetation			**1.98**
Total vegetation			**2.07**

*subject to rounding errors.

** not entered into the BAM-C.

Disturbed – Forest Red Gum - Rough-barked Apple grassy woodland (PCT 835)

Field assessment determined the vegetation in the subject land to be consistent with the PCT Forest Red Gum - Rough-barked Apple grassy woodland (PCT 835). Although Forest Red Gum - Rough-barked Apple grassy woodland was identified within the subject land, it was in a highly degraded condition. Forest Red Gum - Rough-barked Apple grassy woodland was only found in a highly degraded condition. The current condition of this PCT within the subject land is likely due to the historic land clearing.

Forest Red Gum - Rough-barked Apple grassy woodland was characterised as being highly degraded within the subject land based on two criteria: the lack of a canopy and a high

coverage of exotic grasses (*viz. Eragrostis curvula** [African Love Grass]) and other weeds, such as *Cortaderia selloana** (Pampas Grass).

Dominant mid-storey native vegetation identified within areas mapped as Forest Red Gum - Rough-barked Apple grassy woodland in the subject land included *Dillwynia sieberi*, *Grevillea juniperina* subsp. *juniperina* (Juniper-leaved Grevillea), *Bursaria spinosa* (Blackthorn), and *Acacia falcata* (Sickle Wattle). However, over half of the area mapped as Forest Red Gum - Rough-barked Apple grassy woodland in the subject land had the invasive *E. curvula** growing.

The condition of this vegetation zone was relatively constant across the subject land.

A summary of the PCT 835 profile from the Vegetation Information System (VIS) (DPIE 2021b) is provided in **Table 3.3**. Species recorded onsite within this patch are highlighted in bold text. The distribution of this vegetation zone can be seen in **Figure 3.5**.

Figure 3.3: PCT 835 – Forest Red Gum - Rough-barked Apple grassy woodland in a highly disturbed state.

Table 3.3: VIS plant community type profile (DPIE 2021b) **– Forest Red Gum - Rough-barked Apple grassy woodland (PCT 835).**

Plant Community Type (PCT)	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
PCT and BioMetric veg type (BVT) ID	PCT 835; HN526 & ME018
Vegetation formation	Forest wetlands
Vegetation class	Coastal floodplain wetland
Upper stratum	*Eucalyptus tereticornis* (Forest Red Gum), *Angophora floribunda* (Rough-barked Apple), *E. amplifolia* subsp. *amplifolia* (Cabbage Gum)
Middle stratum	*Acacia parramattensis* (Parramatta Wattle), *Bursaria spinosa* subsp. *spinosa* (Native Blackthorn), *Sigesbeckia orientalis* (Indian Weed)
Ground stratum	*Microlaena stipoides* subsp. *stipoides* (Weeping Meadow-grass), *Oplismenus aemulus* (Basket Grass), *Dichondra repens* (Kidney Weed), *Entolasia marginata* (Bordered Panic), *Solanum prinophyllum* (Forest Nightshade), *Pratia purpurascens* (Whiteroot), *Desmodium gunnii* (Slender Tick-trefoil), *Echinopogon ovatus* (Forest Hedgehog-grass), *Commelina cyanea* (Scurvy Weed), *Veronica plebeia* (Trailing Speedwell)
Landscape position	Broad alluvial flats of the Hawkesbury and Nepean river systems and narrower ribbons alongside streams and creeks that drain the Cumberland Plain.
Profile source	FOW 33 (Tindall et al. 2004)
Full reference details	Tindall, D., Pennay, C., Tozer, M., Turner, K. and Keith, D. (2004). Native vegetation map report series No. 4. The Araluen, Batemans Bay, Braidwood, Burragorang, Goulburn, Jervis Bay, Katoomba, Kiama, Moss Vale, Penrith, Port Hacking, Sydney, Taralga 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 OEH (2013). The Native Vegetation of the Sydney Metropolitan Area Version 2.0 NSW Office of Environment and Heritage Sydney;
Estimate remaining pre-European extent rounded to nearest 5%	5%
TEC Name (Listing status)	River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin, and South East Corner Bioregions (Equivalent; BC Act) River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin, and South East Corner Bioregions (Equivalent; EPBC Act)

Non-native vegetation – Cleared land/exotic grasses

The majority of the subject land was dominated by exotic grasses which could not be assigned a native vegetation community or PCT. Traverses of this vegetation zone and a rapid assessment of the species assemblage estimated a >95% coverage of exotic flora, mainly *Eragrostis curvula** (African Love Grass).

The area mapped as cleared land was dominated by *E. curvula** which covered >90% of this vegetation zone. Other species found in this vegetation zone included *Cynodon dactylon*‡ (Common Cooch), *Verbena bonariensis** (Purple Top), and a *Erythrina crista-galli** (Cockspur Coral Tree.

Given the high modification of this vegetation zone and the absence of any significant proportion of native vegetation, this vegetation zone was not required to be assigned to a PCT under the BAM and was not included from the calculator.

Figure 3.4: Cleared land dominated by exotic grasses found as a contiguous patch in the majority if the subject land.

3.2.3 Threatened Ecological Communities

Disturbed - PCT 835 – Forest Red Gum - Rough-barked Apple grassy woodland

Within the subject land, PCT 835 was identified in a disturbed state. PCT 835 forms part of the River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (RFEF) under both the BC Act (NSW Scientific Committee 2011) and the EPBC Act (TSSC 2020). The criteria for listing under the BC Act differ from the EPBC Act listing, which focuses on capturing the most valuable stands of the TEC, whilst largely excluding the heavily degraded patches which do not meet the condition thresholds for listing under the EPBC Act. The BC Act captures all stands of RFEF regardless of condition.

The Commonwealth Conservation Advice for RFEF (TSSC 2020) provides key diagnostic characteristics, which includes geographical, topographical, structural and compositional elements, amongst other things. The community must occur as a forest or woodland with a crown cover of at least 20% to be part of the TEC. The absence of a canopy or a canopy with a crown cover less than 20% is not part of the listed community (Section 5.1.1; TSSC (2020)).

Therefore, RFEF within the subject land is in a disturbed state without a canopy, therefore, does not meet the key diagnostic characteristics to be categorised as a Matter of National Environmental Significance and will not require assessment in accordance with the Significant Impact Guidelines (DoE 2013).

3.3 Vegetation zones

3.3.1 Vegetation integrity survey plots

One (1) VI plot was completed to meet the requirements of the BAM. This VI plot was undertaken within areas previously mapped as PCT 835 (**Figure 3.1**). **Table 3.4** gives a summary of the vegetation zones within the subject land and their respective VI plots.

Due to the dimensions of the vegetation zone in the subject land, the dimensions of the VI plot was changed to a 10 × 40 m plot, which still satisfies the required 0.4 ha plot area for the vegetation assessment.

The location of the VI plot was determined to capture the most representative vegetation and structural attributes of the native vegetation zone within the subject land.

No VI plots were deemed necessary within the vegetation zone 'exotic grasses' given the dominance of exotic species. As noted above, this vegetation zone has not been assigned a PCT.

Table 3.4: Number of VI plots required for each vegetation zone base on their respective sizes.

PCT Name	Vegetation Zone	Area	Number of plots required (completed)*
PCT 835 – Forest Red Gum - Rough-barked Apple grassy woodland	1	0.09	1 (BAM01)
Nil (cleared land/exotic)	0	1.98	0

3.3.2 Current and future vegetation integrity scores

VI scores were calculated based on the VI survey plot data collected within the subject land. Data collected for the plot is included in **Appendix A**. The VI score for all vegetation zones is provided in **Table 3.5**. The current VI score for vegetation zone 1 was 19.3/100.

Table 3.5: Vegetation Integrity scores.

Veg Zone	Plant Community Types	Condition Class	Area Impacted (ha)	Vegetation Integrity Score	
				Before Development	After Development
1	PCT 835 – Forest Red Gum - Rough-barked Apple grassy woodland	Disturbed	0.09	19.3	0.0
0*	Nil	Exotic grasses and cleared land	1.98	-*	-*

* Not assessed

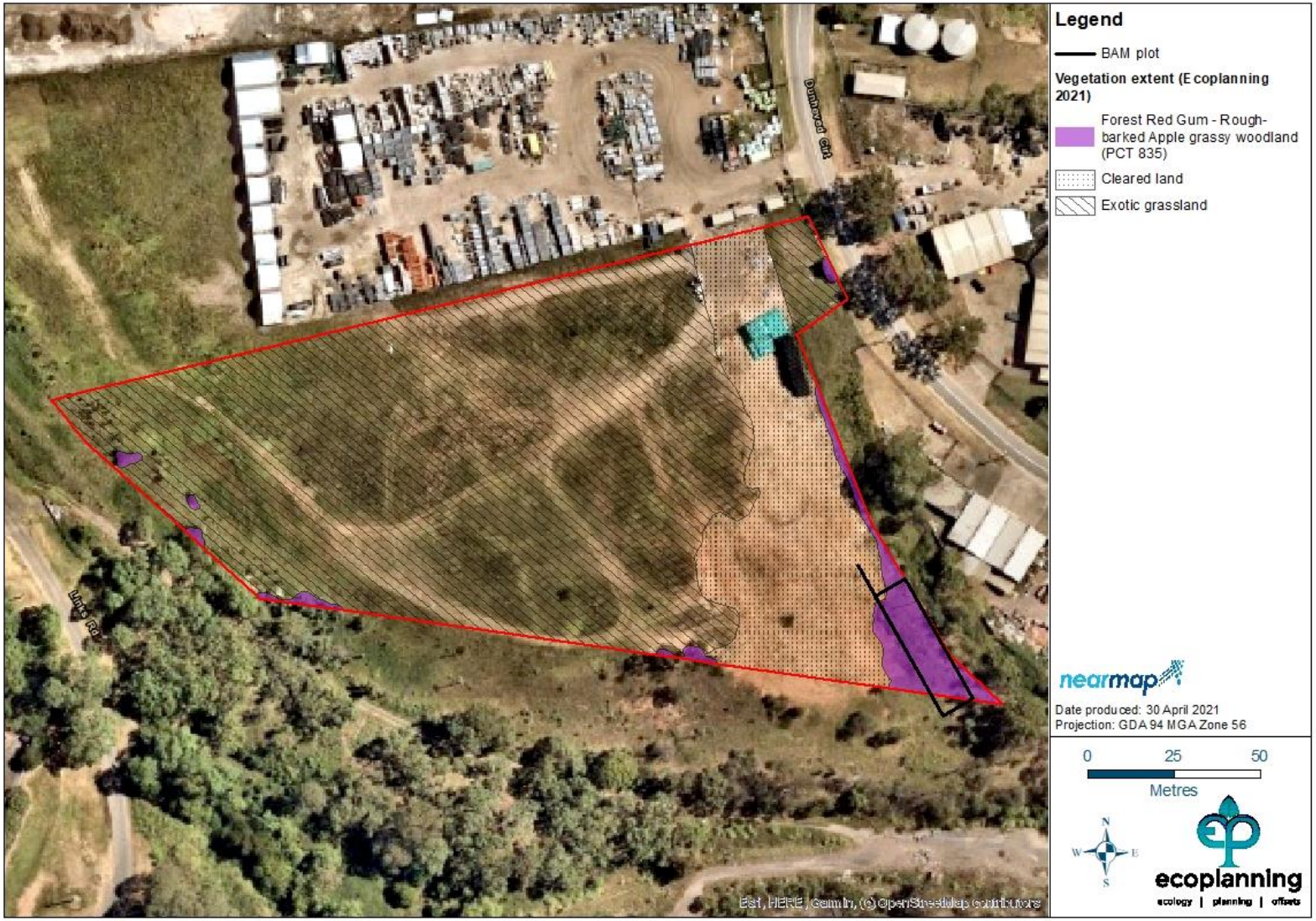

Figure 3.5: Location of the survey plot within the largest patch of Forest Red Gum - Rough-barked Apple grassy woodland (PCT 835) in the subject land.

4 Threatened species

Section 5 of the BAM details the process for determining the habitat suitability for threatened species.

Under the BAM, threatened species are separated into two classes, 'ecosystem' and 'species' credit species. Those threatened species where the likelihood of occurrence of a species or elements of the species habitat can be predicted by vegetation surrogates and landscape features, or which a target survey has a low probability of detection, are identified as 'ecosystem' credit species. Target surveys are not required for ecosystem credit species and potential impacts to these species are assessed in conjunction with impacts to PCTs.

Threatened species where the likelihood of occurrence of a species or elements of suitable habitat for the species cannot be predicted by vegetation surrogates and landscape features and can be reliably detected by survey are identifiable as species credit species. A targeted survey or an expert report is required to confirm the presence or absence of these species on the subject land.

For some threatened species, they are identifiable as both ecosystem and species credit species, with different aspects of the habitat and life cycle representing different credit types. Commonly, threatened fauna species foraging habitat as an ecosystem credit, whilst their breeding habitat represents a species credit.

The following section of this report outline the process for determining the habitat suitability for threatened species within the subject land, and the results of the targeted surveys for species credit species.

4.1 Threatened species for assessment

Threatened species that require assessment are initially identified based upon the following criteria:

- the distribution of the species including the IBRA subregion in which the subject land occurs,
- the species is associated with any of the PCTs identified within the subject land,
- the native vegetation cover within the assessment area, including the 1,500 m assessment circle, is equal to or greater than the minimum required for that species,
- the patch size that each vegetation zone is part of is equal to or greater than the minimum required for that species,
- the species is identified as an ecosystem or species credit species in the Threatened Biodiversity Data Collection.

The process for identifying threatened species which meet the above criteria is completed through the BAM calculator. The PCT identified within the subject land, patch size, and native vegetation cover, as outlined in Section 3, were entered into the BAM calculator and a preliminary list of ecosystem and species credit species was tabulated.

4.1.1 Geographic and habitat features

Selected ecosystem credit species and species credit species are predicted following assessment of geographic and habitat features in the credit calculator, such as site location (IBRA subregion), PCTs and their condition, patch size, and area of vegetation within the assessment circle. Some species require further assessment of habitat constraints and/or geographic limitations before being confirmed as an ecosystem credit species or candidate species for assessment.

4.1.2 Ecosystem credit species

Selected ecosystem credit species and species credit species are predicted following assessment of geographic and habitat features in the BAM calculator, such as the site location (IBRA subregion), PCTs and their condition, patch size, and area of vegetation within the assessment circle. Some species require further assessment of habitat constraints and/or geographic limitations before being confirmed as an ecosystem credit species or candidate species for assessment. **Table 4.1** and **Table 4.2** show the candidate ecosystem and species credit species, respectively, and the species identified for further assessment. The state and Commonwealth listings (BC Act and EPBC Act, respectively) for each species can be found in **Appendix B**.

4.1.3 Ecosystem credit species

Twenty-six (26) ecosystem credit species predicted on site have been retained, apart from five (5) species that were removed as the subject land did not conform with the habitat constraint. The ecosystem credit species retained for the subject land are listed in **Table 4.1**.

Table 4.1: Assessment of habitat constraints and geographic limitations of ecosystem credits species.

Scientific Name Common Name	Habitat Constraints OR Geographic Limitations	Maintained as an Ecosystem Credit Species	Listing	
			BC Act	EPBC Act
Anthochaera phrygia Regent Honeyeater (foraging)		Yes	CE	CE
Artamus cyanopterus cyanopterus Dusky Woodswallow		Yes	V	-
Botaurus poiciloptilus Australasian Bittern	• Waterbodies • Brackish or freshwater wetlands	No	E	E

Scientific Name Common Name	Habitat Constraints OR Geographic Limitations	Maintained as an Ecosystem Credit Species	Listing	
			BC Act	EPBC Act
Callocephalon fimbriatum Gang-gang Cockatoo		No	V	-
Chthonic sagittata Speckled Warbler		No	V	-
Climacteris picumnus victoriae Brown Treecreeper (eastern subspecies)		Yes	V	-
Daphoenositta chrysoptera Varied Sittella		Yes	V	-
Dasyurus maculatus Spotted-tailed Quoll		No	v	E
Glossopsitta pusilla Little Lorikeet		Yes	V	-
Grantiella picta Painted Honeyeater	• Other • Mistletoes present at a density of greater than 5 mistletoes per hectare	No	V	V
Haliaeetus leucogaster While-bellied Sea-Eagle (Foraging)	• N/A | Waterbodies • Within 1 km of a river, lake, large dam, or creek, wetland, or coastline.	Yes	V	-
Hieraaetus morphnoides Little Eagle (Foraging)		Yes	V	-

Scientific Name Common Name	Habitat Constraints OR Geographic Limitations	Maintained as an Ecosystem Credit Species	Listing	
			BC Act	EPBC Act
Ixobrychus flavicollis Black Bittern	• Waterbodies • Land within 40 m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation	Yes	V	-
Lathamus discolor Swift Parrot (Foraging)		Yes	E	CE
Lophoictinia isura Square-tailed Kite (Foraging)		Yes	V	-
Melanodryas cucullata Cucullata Hooded Robin (south-eastern form)		Yes	V	-
Melithreptus gularis gularis Black-chinned Honeyeater (eastern subspecies)		Yes	V	-
Micronumus norfolkensis Eastern Coastal Free-tailed Bat		Yes	V	-
Miniopterus australis Little Bent-winged Bat (Foraging)		Yes	V	-
Miniopterus orianae oceanensis		Yes	V	-

Scientific Name Common Name	Habitat Constraints OR Geographic Limitations	Maintained as an Ecosystem Credit Species	Listing	
			BC Act	EPBC Act
Large Bent-winged Bat				
Neophema pulchella Turquoise Parrot		Yes	V	-
Ninox connivens Barking Owl (Foraging)		Yes	V	-
Ninox strenua Powerful Owl (Foraging)		Yes	V	-
Pandion cristatus Eastern Osprey (Foraging)		Yes	V	-
Petroica boodang Scarlett Robin		Yes	V	-
Petroica phoenicea Flame Robin		Yes	V	-
Phascolarctos cinereus Koala (Foraging)		Yes	V	V
Pteropus poliocephalus Grey-headed Flying-fox (Foraging)		Yes	V	V
Saccolaimus flaviventris Yellow-bellied Sheath-tail Bat		Yes	V	-
Stagonopleura guttata Diamond Firetail		Yes	V	-

Scientific Name Common Name	Habitat Constraints OR Geographic Limitations	Maintained as an Ecosystem Credit Species	Listing	
			BC Act	EPBC Act
Tyto novaehollandiae Masked Owl (Foraging)		Yes	V	-

4.2 Identify candidate species credit species

In accordance with Section 5.2.1 of the BAM, a predicted species credit species can be considered unlikely to occur within the subject land (or specific vegetation zones) where:

- microhabitats required for the candidate species credit species are absent (Section 5.2.3 2.(a)(i)), **OR**
- habitat is substantially degraded such that the species is unlikely to use the area (Section 5.2.3 2.(a)(ii)) **OR**
- an expert report states that the species is unlikely to be present on the subject land or specific vegetation zones (Section 5.2.3 2.(b)).

A predicted species credit species that is not considered to have suitable habitat on the subject land (or specified vegetation zones) in accordance with Section 5.2.3 of the BAM, does not require further assessment. The reasons for determining that a predicted species credit species is unlikely to have suitable habitat on the subject land (or specific vegetation zones) is provided in **Table 4.2**, this table also includes justification for this decision.

Table 4.2: Assessment of habitat constraints and geographic limitations of candidate credit species, species highlighted green have been added to the BAM calculator based on previous sightings.

Scientific Name / Common Name	Habitat Constraints and/or Geographic Limitations	Justification for rejection
Anthochaera phrygia Regent Honeyeater (Breeding)	• Other • As per mapped areas	No - This species is found in dry open woodlands. These woodlands tend to have a high number of large trees (eucalypts), high canopy cover, and a high abundance of mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, White Box, and Swamp Mahogany. Other local Eucalypt species are important. There is two known breeding location in NSW, Capertee Valley and Bundarra-Barraba regions. As the subject land is not located in either breeding location, *A. Phrygia* has been rejected as a candidate species (Section 5.2.3 2.(a)(i) of the BAM).
Burhinus grallarius Bush Stone-Curlew	• Fallen/standing dead timber including logs	No - This tall, mostly nocturnal, bird is often found on the ground rather than in flight. It is expected to be found throughout most of NSW, however, it is only common in the northern Australia, and is either rare or extinct in the remainder of its expected range (including NSW). It is found in woodland and forest with a sparse ground layer and fallen timber. As the subject land is degraded, including the absence of fallen timber, in accordance with Section 5.2.3 2.(a)(ii) of the BAM, this species has been omitted from the species credit species list
Callistemon linearifolius Needle Bottle Brush		No – this species is known from the Georges to Hawkesbury River within the Sydney area, mainly on the Hornsby Plateau near the Hawkesbury River. In accordance with Section 5.2.3 2.(a)(ii) of the BAM - the subject land has been subject to considerable disturbance and modification in the past. While this species is associated with PCTs of the subject land, the nature of the disturbance within the subject land is such that this species is unlikely to occur. Therefore, the subject land does not contain potential habitat for this species.
Callocephalon fimbriatum Gang-gang Cockatoo	• Hollow bearing trees Eucalypt tree species with hollows greater than 9 cm diameter	No - This species breeds in spring and summer months in tall mountain forests and woodlands, particularly heavily wooded and mature wet sclerophyll forests. In autumn and winter, this species moves to lower altitudes and dryer forests, particularly box-gum and box-ironbark forests. Nests are in hollows >10 cm in diameter and >9 m above the ground.

Scientific Name / Common Name	Habitat Constraints and/or Geographic Limitations	Justification for rejection
		As there are not tree hollows large enough for this species to nest and the subject land is not located in woodland that is conducive to this species breeding habitat, therefore, it has been rejected as a candidate species (Section 5.2.3 2.(a)(i) of the BAM).
Cercartetus nanus Eastern Pygmy-possum		No - This tiny arboreal mammal is mostly nocturnal and can be found in a broad range of habitats on the east coast of Australia, from southeast Queensland to eastern Victoria and Tasmania. Within NSW its range extends inland from the coast to Pilliga, Dubbo, Parkes, and Wagga Wagga. Within the Sydney basin, the Eastern Pygmy Possum is found in a broad range of woodland and heath communities but can also be found in rainforest and sclerophyll forests. The Eastern Pygmy Possum feed on nectar producing sclerophyll plants from the families Myrtaceae an Proteaceae. This species shelters in a diversity of structures including tree hollows, rotten stumps, holes in the ground, abandoned bird nests, Ringtail Possum drays, and thickets of vegetation, and when no one of the listed structures are present, breeding females can constructure spherical nests. In accordance with Section 5.2.3 2.(a)(ii) of the BAM - the subject land has been subject to considerable disturbance and modification in the past. While this species is associated with PCTs of the subject land, the nature of the disturbance within the subject land is such that this species is unlikely to occur. Therefore, the subject land does not contain potential habitat for this species.
Chalinolobus dwyeri Large-eared Pied Bat	• Cliffs • Within 2 km of rocky areas containing cliffs, overhangs, escarpments, outcrops, or crevices, or within 2 kms of old mines or tunnels	No – this species requires caves, abandoned anthropogenic infrastructure, and other geological structures as its roost sites. As there is no habitat within the subject land that could be utilised by this species, as per Section 5.2.3 2.(a)(i) of the BAM, this species has been removed from the candidate species credit species list.
Cynanchum elegans White-flowered Wax Plant		No – this climbing vine is found along the entire coast of NSW. It can be found in vegetation types that include *Eucalyptus tereticornis* and *Corymbia maculata*.

Scientific Name / Common Name	Habitat Constraints and/or Geographic Limitations	Justification for rejection
		In accordance with Section 5.2.3 2.(a)(ii) of the BAM - the subject land has been subject to considerable disturbance and modification in the past. While this species is associated with PCTs of the subject land, the nature of the disturbance within the subject land is such that this species is unlikely to occur.
Eucalyptus benthamii Camden White Gum		No – this species distribution is formed of several isolated subpopulations and a number of scattered trees along Nattai and Nepean Rivers and associated tributaries. In accordance with Section 5.2.3 2.(a)(ii) of the BAM - the subject land has been subject to considerable disturbance and modification in the past. While this species is associated with PCTs of the subject land, the nature of the disturbance within the subject land is such that this species is unlikely to occur.
Grevillea juniperina subsp. *juniperina* Juniper-leaved Grevillea		Yes
Haliaeetus leucogaster White-bellied Sea-Eagle (Breeding)	• Other • Living mature or dead trees within suitable vegetation within 1 km of a river, dam, lake, or large dam, creek, wetland, and coastline	No - In inland NSW, this species is associated with waterbodies, particularly rivers and wetlands. Its breeding habitat consists of tall mature open forest close to foraging habitat. Nest trees tend to be emergent living eucalypts or stags. Nests are conspicuous structures built from sticks and grass. This species has been omitted as the subject land does not support the required tall mature forest, nor were any nesting structures found on site (Section 5.2.3 2.(a)(i) of the BAM).
Hibbertia sp. Bankstown (syn. *Hibbertia puberula* subsp. *glabrescens*)		No - This small shrub known to naturally occur within one locality, adjacent to Bankstown Airport, with other populations replanted as part of the SOS effort (). As none of the known populations of *H. puberula* subsp. *glabrescens* are found within the subject land, and the locations of the species is thoroughly understood, it has been omitted from the species credit species list (Section 5.2.3 2.(a)(i) of the BAM).

Scientific Name / Common Name	Habitat Constraints and/or Geographic Limitations	Justification for rejection
Hieraaetus morphnoides Little Eagle (Breeding)	• Other • Nest trees – live (occasionally dead) large of trees within vegetation	No - This medium-size bird of prey is found throughout NSW, occurring as a single population. It prefers eucalypt forest, woodland, and open woodland, but can also be found in sheoak and acacia woodland and riparian areas. It has conspicuous stick nests which are used from winter through early summer. From the information gleaned from site visits, including surveys for hollow-bearing trees (HBTs), no stick nests were identified. Therefore, this species has been omitted from the species credit species list (Section 5.2.3 2.(a)(i) of the BAM).
Lathamus discolor Swift Parrot (Breeding)	• Other • As per mapped areas	No - This small parrot breeds in Tasmania during spring and summer. As the subject land is located wholly within NSW, it cannot be considered potential breeding habitat, and, therefore, the Swift Parrot has been omitted from the species credit species list (Section 5.2.3 2.(a)(i) of the BAM).
Litoria aurea Green and Golden Bell Frog	• N/A | Semi-permanent wet areas • Within 1 km of swamp • Within 1 km if waterbody	No - This relatively large frog has a range from Gippsland to Brunswick Heads, and as far west as Bathurst and the ACT. Large populations are isolated and are in coastal or near-coastal areas., however, one population has been recorded in the NSW southern tablelands. The habitat for this species is marshes, dams, and stream banks, with ideal habitat being unshaded waterbodies with nearby grassland and sheltering sites. As no water bodies are found within the subject land, and the vegetation of the subject land is somewhat degraded, in accordance with Section 5.2.3 2.(a)(ii) of the BAM - the subject land has been subject to considerable disturbance and modification in the past. While this species is associated with PCTs of the subject land, the nature of the disturbance within the subject land is such that this species is unlikely to occur. Therefore, the subject land does not contain potential habitat for this species.
Lophoictinia isura Square-tailed Kite (Breeding)	• Other • Nest trees	No - The Square-tailed Kite is found in a variety of timbered habitats, showing commonly found in dry woodlands and open forests, with a particular preference for timbered watercourses. It is a specialist predator of passerine birds namely honeyeaters. Hunting ranges are >100 km^2. It is somewhat migratory, flying to southwest NSW to breed during

Scientific Name / Common Name	Habitat Constraints and/or Geographic Limitations	Justification for rejection
		July to February. Nesting structures are found in the forks of branches or along large horizontal branches. As there are no suitable breeding trees within the subject land, this species cannot be considered a species credit species, and has, therefore, been omitted form the species credit species list (Section 5.2.3 2.(a)(i) of the BAM).
Marsdenia viridiflora subsp. *Viridiflora* -endangered population	• Blacktown, Camden, Campbelltown, Canterbury-Bankstown, Cumberland, Fairfield, Liverpool, and Penrith LGAs	No - This vine can grow to 4 m tall It tends to grow in thickets and on open shale woodlands. The southern limit of this species range is the Razorback Range. In accordance with Section 5.2.3 2.(a)(ii) of the BAM - the subject land has been subject to considerable disturbance and modification in the past. While this species is associated with PCTs of the subject land, the nature of the disturbance within the subject land is such that this species is unlikely to occur. Therefore, the subject land does not contain potential habitat for this species.
Meridolum corneovirens Cumberland Plain Land Snail		No - In accordance with Section 5.2.3 2.(a)(ii) of the BAM - the subject land has been subject to considerable disturbance and modification in the past. While this species is associated with PCTs of the subject land, the nature of the disturbance within the subject land is such that this species is unlikely to occur.
Miniopterus australis Little Bent-winged Bat (Breeding)	• Caves • Cave, tunnel, mine, culvert. Or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' • Observation type code 'E – nest-roost'	No - The Little Bent-winged Bat ranges from Cape York in Queensland to Wollongong in NSW and can be found in a range of habitats including rainforest, and wet and dry sclerophyll forest. Breeding colonies are well known in NSW, and have a finite characterises including a narrow high temperature range. Only five breeding sites are known in Australia. This species roosts in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges, and sometimes buildings. As breeding sites for this species are well known in NSW, and none are found in or near the subject land, this species has been omitted from the species credit species list (Section 5.2.3 2.(a)(i) of the BAM).

Scientific Name / Common Name	Habitat Constraints and/or Geographic Limitations	Justification for rejection
	• With numbers of individuals >500 • or from the scientific literature.	
Miniopterus orianae oceanensis Large Bent-winged Bat (Breeding)	• Caves • cave, tunnel, mine, culvert, or other structure known or suspected to be used for breeding including species records with microhabitat code 'IC – in cave' • observation type 'E – nest roost' • with numbers >500	No - This species of microbat occurs in coastal NSW and forms discrete populations that are centred around maternity caves. These maternity caves are found in caves, derelict mines, stormwater tunnels, abandoned buildings, and other manmade structures. As the subject land does not contain any structure that could be utilised as breeding roosts, this species has been removed from species credit species list (Section 5.2.3 2.(a)(i) of the BAM).
Myotis macropus Southern Myotis	• Hollow bearing trees • Within 200 m of riparian zone • Waterbodies including rivers, creeks, billabongs, lagoons, dams, and other waterbodies on or within 200 of the site.	No – this species distribution is correlated with permanent bodies of water, as its main source of food is aquatic. When not feeding, this species roots in HBTs, caves and other geological structures, and abandoned anthropogenic infrastructure. As the subject land does not contain any habitat feature required for this species (*viz.* HBTs), under Section 5.2.3 2.(a)(i) of the BAM, this species has been omitted from the candidate species credit species list.
Ninox connivens Barking owl (Breeding)	• Hollow bearing trees • Living or dead trees with hollow greater than 20 cm in diameter	No - This medium sized owl is found throughout NSW. Since its ideal habitat has been cleared, it has diversified its habitat and can now be found in riparian corridors which are often somewhat isolated. Barking Owls perennially hunt arboreal mammals but can switch to birds and ground-dwelling mammals. When breeding it nests in large old trees or stags

Scientific Name / Common Name	Habitat Constraints and/or Geographic Limitations	Justification for rejection
		and requires large hollows with a diameter of >20 cm and >4 m above the forest floor. As there were no hollow bearing trees which suit the breeding habits of this species, the Barking Owl has been omitted from the candidate species list (Section 5.2.3 2.(a)(i) of the BAM).
Ninox strenua Powerful owl (Breeding)	• Hollow bearing trees • Living or dead trees with hollow greater than 20 cm in diameter and greater than 4 m above the ground	No - The largest of Australia owls inhabits a wide range of forested landscapes, commonly large tracts of remnant forest but can also be found in fragmented urban landscapes if required roosts and prey are present. They preferred prey species is medium sized arboreal mammals, including greater gliders, ring tailed possums, sugar gliders, and joey koalas (pers obs.), and Grey-Headed Flying Foxes. Hollows are a significant ecosystem structure in the life history of Powerful Owls, most prey species use them as nesting habitat, as well as the owls themselves. Ranges for breeding pairs of Powerful Owls can range from 400 ha in prime habitat to 4 000 ha in highly degraded habitat. Tree hollows utilised by Powerful Owls are found in large eucalypts (>80 cm DBH) , with the hollows themselves being >0.5 m deep and having a diameter of >30 cm. As no hollow bearing trees are present, the subject land cannot be considered as breeding habitat, and the Powerful Owl has, therefore, been omitted from the species credit species list (Section 5.2.3 2.(a)(i) of the BAM).
Pandion cristatus Eastern Osprey (Breeding)	• Other •Presence of stick nests in living or dead trees (>15 cm) or artificial structures within 100 m of a floodplain for nesting)	No - This large bird of prey is found throughout coastal NSW, though its area of occurrence is highly dependent on bodies of water. These waterbodies include, but are not limited to, estuaries, lagoons, and lakes. This is a specialist predator, feeding on fish in clear open water. Sighting of this species are uncommon in urbanised areas. Nest are made high up in the dead crown of large trees, within 1 km of the sea. As the subject land is highly degraded, is not near the sea, and has no habitat that would suit breeding Eastern Osprey, this species has been omitted from the species credit species list (Section 5.2.3 2.(a)(i) of the BAM).

Scientific Name / Common Name	Habitat Constraints and/or Geographic Limitations	Justification for rejection
Persicaria elatior Tall Knotweed	• Within 50 m of semi-permanent/ephemeral wet area • or within 50 m of waterbodies, including wetlands • or within 50 m of swamps	No – this species has three distinct ranges across coastal NSW, including the Sydney Basin. This species grows in damp places, particularly beside streams and rivers. In accordance with Section 5.2.3 2.(b)(ii) of the BAM - the subject land has been subject to considerable disturbance and modification in the past. While this species is associated with PCTs of the subject land, the nature of the disturbance within the subject land is such that this species is unlikely to occur (Section 5.2.3 2(a)(ii) of the BAM).
Persoonia hirsuta Hairy Geebung		No – this species has a fragmented distribution, centring on the Sydney Basin. In accordance with Section 5.2.3 2.(b)(ii) of the BAM - the subject land has been subject to considerable disturbance and modification in the past. While this species is associated with PCTs of the subject land, the nature of the disturbance within the subject land is such that this species is unlikely to occur (Section 5.2.3 2.(a)(ii) of the BAM).
Petaurus norfolcensis Squirrel Glider		No - In NSW, Squirrel Gliders sparsely inhabit the eastern third of the state. Their habitat includes a range of forest types, but all are similarly old growth forests. To the east of the Great Dividing Range, it prefers Blackbutt-Bloodwood forests with a heathy understory. The localised areas its refuge and nesting sites have a high abundance of hollows. As the subject land is neither old growth forest nor has a high abundance of suitable tree hollows, this species has been omitted from the candidate species list (Section 5.2.3 2.(a)(i) of the BAM).
Phascolarctos cinereus Koala (Breeding)	• other • areas identified via survey as important habitat (see comments)	No - As the subject land does not contain any habitat feature required for this species (see **Section 5.2.1**), under Section 5.2.3 2(a)(i) of the BAM, this species has been omitted from the candidate species credit species list.
Pilularia novae-hollandiae Austral Pillwort		No - This semi-aquatic fern grows in shallow swamps and waterways, often conspicuous among grasses and sedges. However, most of this species sightings are outside the Sydney Basin, and the only known extant populations in NSW are found in Lake Cowal

Scientific Name / Common Name	Habitat Constraints and/or Geographic Limitations	Justification for rejection
		and Oolambeyan National Park. As no known populations are known from the Sydney Basin, it can be assumed that the subject land is outside of this species current range, and it can be omitted form the species credit species list (Section 5.2.3 2.(a)(i) of the BAM).
Pomaderris brunnea Brown Pomaderris		No – this species has a fragmented distribution, centring on the Sydney Basin. In accordance with Section 5.2.3 2.(a)(ii) of the BAM - the subject land has been subject to considerable disturbance and modification in the past. While this species is associated with PCTs of the subject land, the nature of the disturbance within the subject land is such that this species is unlikely to occur.
Pteropus poliocephalus Grey-headed Flying-fox (Breeding)	• other • breeding camps	No - The GHFF is the largest of Australia's bats and is found within 200 km of NSW coast. Roosting camps are commonly found in areas within a dense canopy that are close to gullies, and within 20 km of regular food sources. Although the subject land is located 2.4 km from a GHFF camp with a population between 2, 500 and 9, 999, the subject land is not expected to become amalgamated into this camp as the canopy is mostly scattered. Therefore, in accordance with Section 5.2.3 2.(a)(ii) of the BAM - the subject land has been subject to considerable disturbance and modification in the past. While this species is associated with PCTs of the subject land, the nature of the disturbance within the subject land is such that this species is unlikely to occur. Therefore, the subject land does not contain potential habitat for this species.
Tyto novaehollandiae Masked Owl (Breeding)	• Hollow bearing trees • living or dead trees with hollows greater than 20 cm diameter	No - A medium size owl, the Masked Owl can be found throughout NSW in a range of habitats that can be characterised as dry eucalypt forests and woodlands up to 1 100 m above sea level. This species hunts along forest edges and roadsides, with its diet consisting of small arboreal mammals and ground dwelling mammals (*viz.* rats). Its roosting and breeding sites are found in moist eucalypt forest gullies where it selects large tree hollows, but cave have also been recorded as breeding sites. As the subject land does not contain any structures that could be used as breeding sites, this species has been omitted from the species credit species list (Section 5.2.3 2.(a)(i) of the BAM).

Scientific Name / Common Name	Habitat Constraints and/or Geographic Limitations	Justification for rejection
Wahlenbergia multicaulis – endangered population Tadgell's Bluebell in the LGA of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta, and Strathfield		No – this small herb is found in 13 known sites from northern and western Sydney (*viz.* the suburbs of Thornleigh, Mt Ku-Ring-Gai, Rookwood, Chullora, Bass Hill, Bankstown, Georges Hall, Campsie, South Granville, and Greenacre). It is generally found on disturbed sites that are found on the Villawood Soil Series or the Hawkesbury soil landscape, neither of these soil groups are found within the subject land. This species has been omitted from the species credit species list as its microhabitat is not present in the subject land (Section 5.2.3 2.(a)(i) of the BAM).

* Habitat information for all species is sourced from DPIE (2021c), and, where necessary, has been supplemented with information from Anstis (2013) - amphibians, Higgins (1999) – birds, Harden (1990) – flora, and Cogger (2014) – reptiles.

4.3 Determine presence or absence of candidate species credit species

Confirmed species credit species were assessed consistent with steps 1-6 of Section 5.2 of the BAM. Targeted surveys for species credit species were undertaken in accordance with Section 5.3 of the BAM, including undertaking surveys during the nominated survey period specified for each species credit species and in accordance with OEH threated species survey guidelines (following DPIE [2020b]). The survey effort, timing, and locations for threatened flora and fauna are outlined in the remainder of **Section 4**.

Species not identified as species credit species for further assessment do not require formal site surveys, however, informal surveys were opportunistically conducted (if possible) whilst undertaking other surveys.

4.3.1 Targeted field surveys – flora

Targeted surveys for candidate species credit species were conducted in accordance with DPIE (2020b). Targeted surveys were undertaken by James Schlunke (Principal Ecologist/Botanist, Axis Ecological Services, Accredited BAM Assessor No. BAAS18148) and Stephanie Cerato (Ecologist) 28 October 2020, these observations were then reaffirmed by James Schlunke and Jai Brien-Cooper (Ecologist) on 26 March 2021 over approximately 4 person hours.

One species of threatened flora was identified as having a presence within the subject land and, therefore, required further assessment. The targeted survey periods for the one (1) threatened species (*Grevillea juniperina* subsp. *juniperina*) are given in **Table 4.3**, and the survey effort is presented in **Figure 4.1**.

Table 4.3: Nominated survey months for candidate threatened flora species.

Candidate species	Survey period (BAM Calculator)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Grevillea juniperina subsp. *juniperina*	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Targeted surveys initially involved identification of areas of potential habitat for candidate threatened flora species within the subject land. Areas of suitable habitat were then surveyed along parallel field-traverses with approximately 15-20 m separation, consistent with the requirements of DPIE (2020b) for shrubs in open vegetation. Areas of 'exotic vegetation' and 'cleared' land were not assessed as areas of potential habitat for threatened flora.

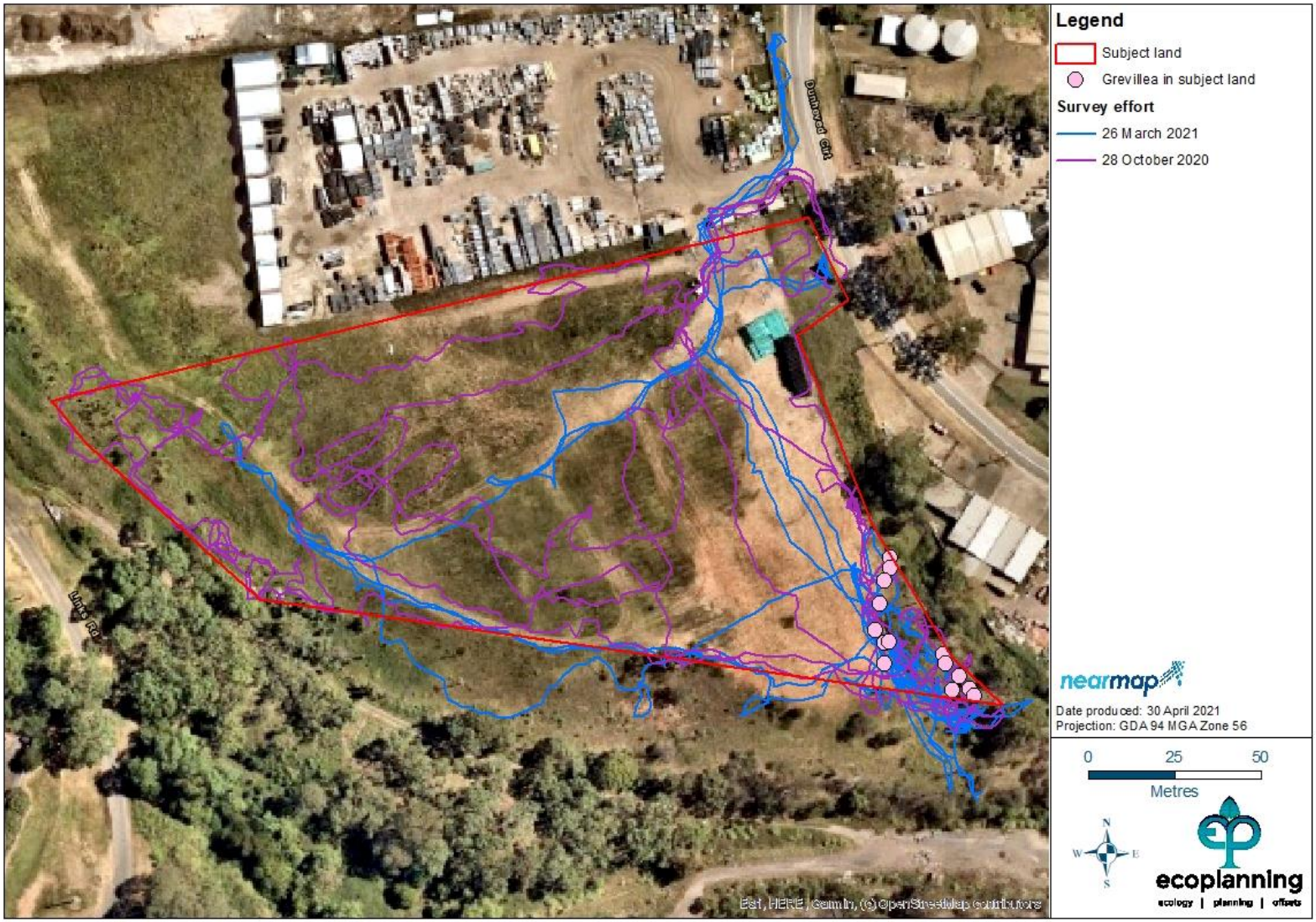

Figure 4.1: Locations of *Grevillea juniperina* subsp. *juniperina* within the subject land.

4.4 Identifying potential prescribed biodiversity impacts on threatened species

The presence of biodiversity values prescribed by the BC Reg have been considered in context of the subject land (**Table 4.4**).

Table 4.4: Prescribed Biodiversity Impacts

Prescribed Biodiversity Impacts	Presence within the Subject Land
(a) the impacts of development on the following habitat of threatened species or ecological communities: (i) karst, caves, crevices, cliffs and other geological features of significance, (ii) rocks, (iii) human made structures, (iv) non-native vegetation,	No karst or cave systems were identified in the subject land, however, several piles sandstone blocks and Non-native vegetation within the subject land includes areas mapped as 'cleared land'. Non-native vegetation within the subject land does not conform to any ecological community, nor is it likely to support any threatened species with the potential to occur. Hence, do not constitute a prescribed biodiversity impact.
(b) the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range,	No identifiable areas of habitat connectivity have been identified within the subject land. As the subject land is found on the edge of a potential habitat corridor, development within the subject land is not likely to impact any potential movement of threatened species. In addition, the subject land is on the edge of the nearest patch of native vegetation, and any clearing within the subject land will not modify its connectivity.
(c) the impacts of development on movement of threatened species that maintains their lifecycle,	
(d) the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development),	No watercourses have been identified in the subject land. Changes to drainage of the subject land may impact downstream ecosystems, but impacts can be mitigated if appropriate measures are enacted (see **Section 6**)
(e) the impacts of wind turbine strike on protected animals,	Not applicable.
(f) the impacts of vehicle strike on threatened species of animals or on animals that are part of a threatened ecological community.	The greatest risk of vehicle strike within the subject land is associated with the adjacent Dunheved Circuit. Risk of vehicle strike on Dunheved Circuit will remain, regardless of the approval of the current development.

5 Avoiding and minimising impacts on biodiversity

5.1 Avoiding and minimising impacts on native vegetation and habitat during project planning

In accordance with Section 7.1.1 of the BAM, actions taken to avoid and minimise impacts through locating the project must be documented and justified in the BDAR. Additionally, Section 7.1.1 of the BAM states that in selecting a project location, the following should be addressed, as they apply to the project;

- alternative modes or technologies that would avoid or minimise impacts on biodiversity values,
- alternative routes that would avoid or minimise impacts on biodiversity,
- alternative locations that would avoid or minimise impacts on biodiversity values,
- alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values.

Alternative designs were discussed with the client to retain as much native vegetation within the subject land as possible, however, the proposed development has been configured to ensure that vehicle movement has a minimal impact from infrastructure placement. It is anticipated that any reconfiguration of the proposed development will detrimentally impact vehicle movement.

The native vegetation identified as Forest Red Gum - Rough-barked Apple grassy woodland (PCT 835) within the retained vegetation in the east of the development site (see **Figure 1.3**) will enhanced through weed control and revegetation. Enhancement of Forest Red Gum - Rough-barked Apple grassy woodland (PCT 835) within the native garden would include removal of all exotic species (*viz. Eragrostis curvula** [African Love Grass] and *Cortaderia selloana** [Pampas Grass]) and planting of native vegetation which are characteristic of Forest Red Gum - Rough-barked Apple grassy woodland (PCT 835). Native flora species that are characteristic of Forest Red Gum - Rough-barked Apple grassy woodland (PCT 835) and that could be used for revegetating the retain vegetation include, but is not limited to:

- *Bursaria spinosa*
- *Dichondra repens*
- *Lomandra longifolia*
- *Lobelia purpurea*
- *Angophora floribunda*
- *Angophora bakeri*
- *Dianella longifolia*
- *Eucalyptus tereticornis*
- *Eucalyptus amplifolia* subsp. *amplifolia*
- *Veronica plebeia*
- *Melaleuca styphelioides*
- *Melaleuca linariifolia*
- *Casuarina glauca*
- *Breynia oblongifolia*
- *Brunoniella australis*
- *Dillwynia sieberi*
- *Hibbertia diffusa*
- *Acacia falcata*

Additional to those species listed above, it is recommended that seed is collected and propagated from individuals of *G. juniperina* subsp. *juniperina* to be cleared from the subject land for use in revegetation of the retained vegetation and other local revegetation programs.

The proposed development is located on land which has been heavily modified from its initial state. In its current location, the proposed development will impact 0.09 ha of native vegetation.

5.2 Avoiding and minimising prescribed biodiversity impacts during project planning

Prescribed biodiversity impacts are defined under Clause 6.1 of the BC Reg and include impacts on biodiversity values in addition to, or instead of, impacts from clearing vegetation and/or loss of habitat prescribed biodiversity impacts are outlined within **Section 4.4** including their relevance to the proposal.

6 Assessing and offsetting impacts

6.1 Assessment of impact

6.1.1 Assessing impacts to native vegetation and habitat

The proposed development will include direct impacts to 0.09 ha of PCT 835 – Forest Red Gum - Rough-barked Apple grassy woodland in a 'disturbed' state. The direct clearing and subsequent development of the subject land would represent a permanent impact. In accordance with Section 8.1.1 of the BAM, the future VI score for all vegetation within the subject land has been assigned a VI score of zero (0).

6.1.2 Assessing indirect impacts on native vegetation

It is difficult to quantify the indirect impacts associated with the project. Indirect impacts may include, but are not limited to, noise pollution and erosion associated with the construction of the proposed development. The project is considered unlikely to reduce viability of any adjacent native vegetation or habitat due to edge effects, noise, dust, or light spill as these impacts are already occurring within the area, as much of the area has been cleared and developed as an industrial estate. Further, within adjacent areas of native bushland and habitat, the project is considered unlikely to cause any increase in trampling of flora, rubbish dumping, firewood or bushrock collection, or introduce any pests, weeds, or pathogens.

Indirect impacts will be managed through the development of a Construction Environmental Management Plan (CEMP), whereby statement and erosion controls will be put in place.

Changes to the drainage and hydrology of the subject land have the potential to impact on downstream habitats through erosion, sedimentation, and bank scour. These impacts are difficult to quantify, however, mitigation measures such as the inclusion of appropriately buffered Vegetated Riparian Zones.

Further information regarding mitigation measures which would aim to avoid any indirect impacts are included in **Section 5**.

Indirect impacts will be managed through the development of a Construction Environmental Management Plan (CEMP), whereby sediment and erosion controls will be put in place.

6.2 Assessing prescribed biodiversity impacts

As described in **Table 4.4,** no prescribed biodiversity impacts are anticipated from the proposed development. Impacts to habitat associated with native vegetation are calculated an included in **Section 7**.

6.3 Mitigating and managing impacts on biodiversity values

The complete avoidance of impacts is considered impractical. Multiple measures will be implemented to mitigate and manage direct and indirect impacts where possible, including preparation of a Construction Environmental Management Plan (CEMP) and appropriate preclearance protocols. Details are provided in the following sections.

6.3.1 Pre-clearance protocols

It is recommended that the preclearance protocol for *G. juniperina* subsp. *juniperina* include providing local native nurseries with the opportunity to harvest seed and the gathering of viable cuttings from these plants to be removed. Collecting seed from threatened plants scheduled to be cleared will help to retain the genetic diversity of the species. It is expected that the seed collection from *G. juniperina* subsp. *juniperina* be undertaken by a suitably trained and experienced ecologist/botanist or horticulturalist.

6.3.2 Construction Environmental Management Plan (CEMP)

To avoid potential indirect offsite impacts during construction, an appropriate erosion and sedimentation control plan should be in place following best proactive protocols such as Landcom (2004). It is recommended that this is included in a site-specific CEMP prior to any construction works commencing.

The CEMP will be required to span the pre, during, and post construction periods, and will include the above pre-clearance and fauna management protocols.

6.4 Adaptive management for uncertain impacts

Impacts associated with the proposal are largely certain and associated with the direct impacts due to vegetation clearing as documented in **Section 6.1**. Uncertain impacts associated with the proposal would be limited to potential impacts to downstream environments, although the risk of these impacts is relatively low and can be mitigated measures. During the construction phase of this project, the works should be undertaken in accordance with best practice sediment and erosion controls and in accordance with any license issued under the NSW *Protection of the Environment Operations Act 1997*.

Excluding the need for a CEMP, no additional adaptive management measures are proposed.

6.5 Thresholds for the assessment and offsetting of impacts of development

6.5.1 Serious and Irreversible Impacts (SAII)

Section 6.7 of the BC Reg defines Serious and Irreversible Impacts (SAII) as impacts likely to contribute significantly to the risk of threated species or ecological communities becoming extinct due to the following:

a) It will cause a further decline of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to be in a rapid rate of decline, or

b) it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred, or reasonable suspected to have a very small population size, or

c) it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very small population size, or

d) the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are replaceable.

Neither *Grevillea juniperina* subsp. *juniperina* nor River-flat Eucalypt Forest are considered at risk of SAIIs.

6.5.2 Impacts which require an offset

Section 9.2.1 of the BAM states that the following vegetation zones will require offsets:

a) a vegetation zone with a VI score ≥15 and the PCT is representative of an EEC or CEEC,
b) a vegetation zone with a VI score ≥17 and the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community,
c) a vegetation zone with a VI score ≥20 and the PCT does not represent a TEC and is not associated with a threatened species habitat.

Vegetation zone 1 (associated with PCT 835) **WILL** require offsetting as it is associated with category A listed in Section 9.2.1 of the BAM. The land associated with vegetation zone 1 is represented by Forest Red Gum - Rough-barked Apple grassy woodland (PCT 835) and occupies 0.09 ha of the subject land.

Additionally, in accordance with Section 9.2.2 of the BAM, the species polygon associated with *Grevillea juniperina* subsp. *juniperina* **WILL** require offsetting, this area totals 0.09 ha.

6.5.3 Impacts that do not require further assessment

Impacts to areas identified as ‘exotic dominant’ within the subject land were not assessed in this report because they cannot be characterised as a native vegetation community, no native vegetation community has a description which includes exotic or invasive species.

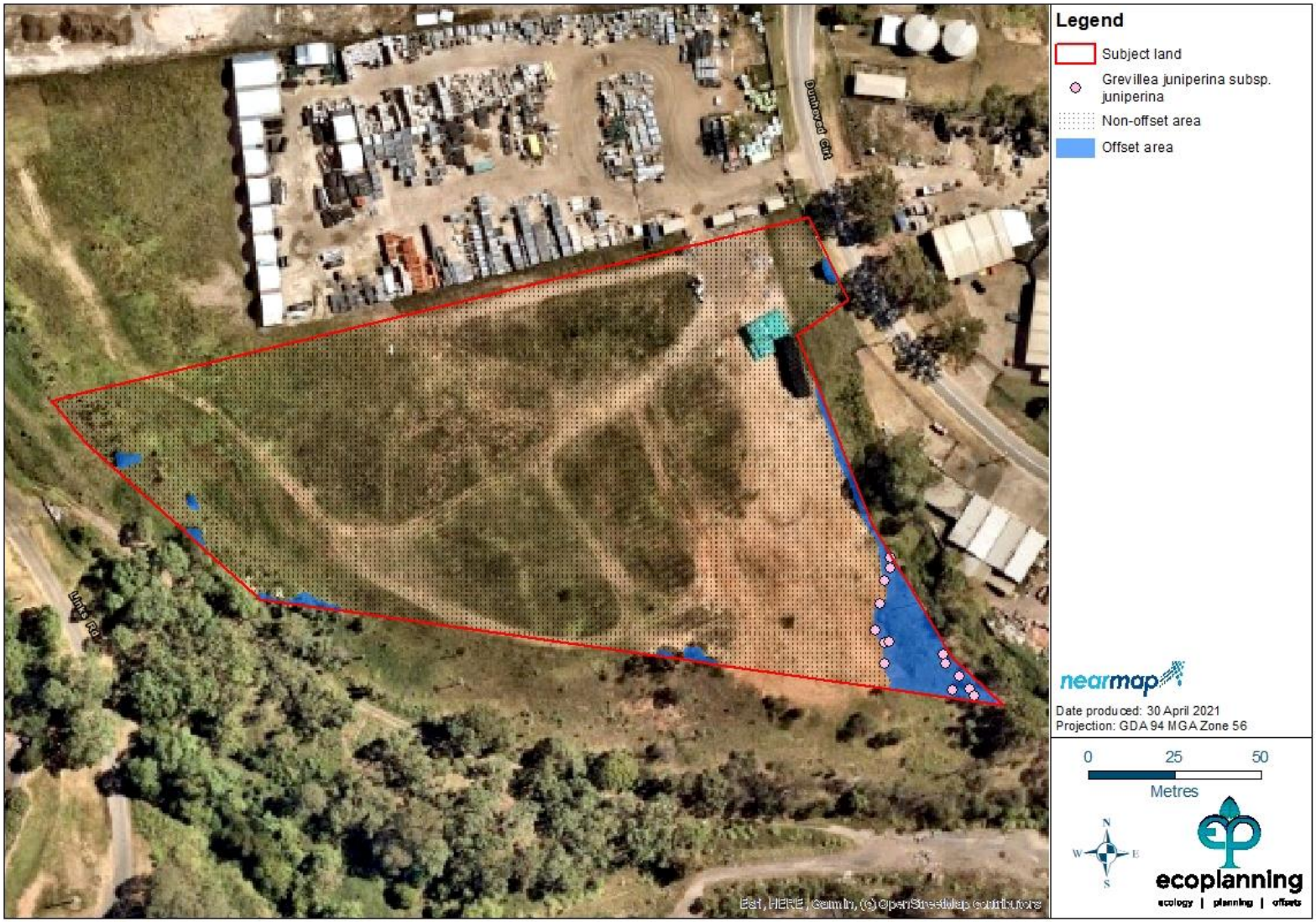

Figure 6.1: Species polygon for *Grevillea juniperina* subsp. *juniperina*, represented by the polygon for Forest Red Gum - Rough-barked Apple grassy woodland (PCT 835), as per the requirements of DPIE (2020).

7 Final credit calculations

A biodiversity offset requirement for residual impacts of a proposed development must be calculated in accordance with **Section 10.1** and **Section 10.2** of the BAM. The following section outlines the credit requirements for the development to achieve the 'no net loss standard' as established by the BAM.

7.1 Credit calculations and classes

7.1.1 Ecosystem credits

The ecosystem credits required to offset the proposal are provided in **Table 7.1** and **Appendix D**. A total of one (1) ecosystem credits are required to offset the proposed development impacting 0.09 ha of PCT 835. The total cost of impacts to PCT 835, should the Biodiversity Conservation Trust (BCT) be used to offset the impacts, are currently (18 May 2021) is estimated to be $24,307.14 (inc. GST and admin. costs).

Table 7.1: Ecosystem credits summary and credit profiles.

Veg zone	Plant community type	Price per credit	Credits required	Total credit cost (inc. GST)
1	PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland	$22,097.40	1	$22,097.40
Total (inc. GST)			**1**	**$24,307.14**

7.1.2 Species credits

A total of one (1) credit for *Grevillea juniperina* subsp. *juniperina* (Juniper-leaved Grevillea) is required to offset impacts to the habitat of this species within the subject land. The total cost of *G. juniperina* subsp. *juniperina*, should the Biodiversity Conservation Trust (BCT) be used to offset the impacts, are currently (18 May 2021) estimated to be $54.59 (ex. GST).

Table 7.2: Species credits summary and credit profiles

Species	Price per credit	No. of credits	Final credit cost (inc. GST)
Grevillea juniperina subsp. juniperina Juniper-leaved Grevillea	$145.88	1	$145.88
Total (inc. GST & admin. costs)			**$160.47**

8 References

Anstis, M. (2013). Tadpoles and Frogs of Australia (1st edn.). New Holland Press

Cogger, GC (2014), Reptiles & Frogs of Australia (7th edn.), CSIRO Publishing, VIC

NSW Department of Environment and Climate Change (DECC) (2016). NSW Mitchell Landscapes – version 3.1. Available online: https://datasets.seed.nsw.gov.au/dataset/nsw-mitchell-landscapes-version-3-1

Commonwealth Department of the Environment (DotE 2013). Matters of National Environmental Significance: Significant impact guidelines 1.1. Commonwealth of Australia.

Commonwealth Department of the Environment and Energy (DoEE) (2012). Interim Biogeographic Regionalisation for Australia, Version 7. Available at: https://www.environment.gov.au/land/nrs/science/ibra/australias-bioregions-maps.

Geoscapes (2021) Lot 2/65 Dunheved Circuit, St Marys, NSW 2760: Landscape Documentation for Documentation Application. Supplied 25 April 2021

Natural Resources Access Regulator (NRAR) (2018). Guidelines for controlled activities on waterfront land. Available online: https://www.industry.nsw.gov.au/__data/assets/pdf_file/0004/156865/NRAR-Guidelines-for-controlled-activities-on-waterfront-land-Riparian-corridors.pdf

NSW Department of Planning Industry and Environment (DPIE) (2019a). Guidance to assist a decision-maker to determine a serious and irreversible impact. Published by Environment, Energy and Science, Sydney.

NSW Department of Planning, Industry and Environment (2020a). Biodiversity Assessment Method. Department of Planning, Industry and Environment, Sydney.

NSW Department of Planning, Industry, and Environment (DPIE) (2021b). NSW BioNet. Online database accessed at: http://www.bionet.nsw.gov.au/

NSW Department of Planning, Industry and Environment (DPIE) (2021b). NSW Vegetation Information Sydney (VIS) Classification Database VIS 2.1, logged in as public user at: http://www.environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx?ReturnUrl=%2fNSWVCA20PRapp%2fdefault.apx.

Ecoplanning (2020), “Due Diligence Assessment, 65 Dunheved Circuit (Lot 2 // DP 1175850), St Marys, NSW”, Ecoplanning.

Harden, GJ (1990), Flora of New South Wales. New South Wales University Press, NSW.

Higgins, P.J. (Ed) (1999). Handbook of Australian, New Zealand, and Antarctic Birds. Oxford University Press, Melbourne, VIC

NSW Office of Environment and Heritage (OEH) 2002. Aerial Photographic Interpretation (API), Remnant Vegetation of the Cumberland Plain, OEH, Sydney.

NSW Office of Environment and Heritage (OEH) (2016). NSW Guide to Surveying Threatened Plants. Office of Environment and Heritage for the NSW Government, Sydney.

NSW Scientific Committee. 2011. “River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions - Endangered Ecological Community.”

Threateneed Sepceis Scientific Committee (TSSC) 2020. “Conservation Advice for the River-Flat Eucalypt Forest on Coastal Floodplains of Southern New South Wales and Eastern Victoria.”

Appendix A Plot data collected

Plot No.	PCT	Area (ha)	Condition class	Zone	Easting	Northing	Bearing
1	835	0.09	Degraded	1	293146	6263803	

Plot No.	Composition score					
	Tree	Shrub	Grass	Forb	Fern	Other
1	6	7	8	9	0	3

Plot No.	Structure score					
	Tree	Shrub	Grass	Forb	Fern	Other
1	2.1	6.2	2.2	0.9	0	0.4

Plot No.	Function										
	Large trees	Hollow trees	Litter cover	Fallen logs	Tree regen. <5 cm	Tree stem 5-10 cm	Tree stem 10-20 cm	Tree stem 20-30 cm	Tree steam 30-50 cm	Tree stem 50-80 cm	High threat exotic
1	0	0	6 %	0 m	Present	Not present	Not present	Not present	Not present	Not present	61.1%

Appendix B Flora and fauna species inventories

B.1 Flora

Family	Scientific name	Common name	Native Exotic	Cover (%)
Apiaceae	*Centella asiatica*	Indian Pennywort	Native	0.1
Apocynaceae	*Nerium oleander*	Oleander	Exotic	0.2
Apocynaceae	*Araujia sericifera*	Moth Vine	Exotic	0.1
Asteraceae	*Bidens pilosa*	Cobbler's Pegs	Exotic	0.2
Asteraceae	*Ambrosia artemisiifolia*	Annual Ragweed	Exotic	0.4
Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane	Exotic	0.2
Asteraceae	*Senecio madagascariensis*	Fireweed	Exotic	0.1
Asteraceae	*Epaltes australis*	Spreading Nut-heads	Native	0.1
Asteraceae	*Cirsium vulgare*	Spear Thistle	Exotic	0.1
Asteraceae	*Gamochaeta* spp.		Exotic	0.1
Asteraceae	*Coreopsis lanceolata*	Coreopsis	Exotic	0.1
Asteraceae	*Lactuca serriola*	Prickly Lettuce	Exotic	0.1
Asteraceae	*Aster subulatus*	Wild Aster	Exotic	0.1
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	Exotic	0.1
Campanulaceae	*Wahlenbergia gracilis*	Sprawling Bluebell	Native	0.1
Casuarinaceae	*Allocasuarina littoralis*	Black She-Oak	Native	0.2
Convolvulaceae	*Polymeria calycina*		Native	0.2
Cyperaceae	*Carex inversa*	Knob Sedge	Native	0.1
Cyperaceae	*Fimbristylis dichotoma*	Common Fringe-sedge	Native	0.1
Euphorbiaceae	*Chamaesyce drummondii*	Caustic Weed	Native	0.1
Fabaceae (Caesalpinioideae)	*Senna pendula* var. *glabrata*		Exotic	0.1
Fabaceae (Faboideae)	*Dillwynia sieberi*		Native	3
Fabaceae (Faboideae)	*Daviesia ulicifolia* subsp. *ulicifolia*		Native	0.4
Fabaceae (Faboideae)	*Vicia sativa*	Common vetch	Exotic	0.1
Fabaceae (Faboideae)	*Glycine microphylla*	Small-leaf Glycine	Native	0.1
Fabaceae (Faboideae)	*Hardenbergia violacea*	False Sarsaparilla	Native	0.1
Fabaceae (Faboideae)	*Bossiaea prostrata*		Native	0.1
Fabaceae (Mimosoideae)	*Acacia parramattensis*	Parramatta Wattle	Native	0.8
Fabaceae (Mimosoideae)	*Acacia falcata*		Native	0.2
Fabaceae (Mimosoideae)	*Acacia binervata*	Two-veined Hickory	Native	0.2
Goodeniaceae	*Goodenia hederacea* subsp. *hederacea*		Native	0.1
Goodeniaceae	*Goodenia paniculata*		Native	0.1
Juncaceae	*Juncus usitatus*		Native	0.1
Linaceae	*Linum trigynum*	French Flax	Exotic	0.1
Lomandraceae	*Lomandra filiformis*	Wattle Matt-rush	Native	0.1
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne	Exotic	0.1
Myrtaceae	*Eucalyptus moluccana*	Grey Box	Native	0.5
Myrtaceae	*Angophora floribunda*	Rough-barked Apple	Native	0.1
Myrtaceae	*Eucalyptus amplifolia*	Cabbage Gum	Native	0.3

Family	Scientific name	Common name	Native Exotic	Cover (%)
Oleaceae	*Ligustrum sinense*	Small-leaved Privet	Exotic	0.1
Oleaceae	*Ligustrum lucidum*	Large-leaved Privet	Exotic	0.2
Oxalidaceae	*Oxalis perennans*		Native	0.1
Pittosporaceae	*Bursaria spinosa*	Native Blackthorn	Native	0.2
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	Exotic	0.2
Poaceae	*Arundo donax*	Giant Reed	Exotic	0.2
Poaceae	*Eragrostis curvula*	African Lovegrass	Exotic	60
Poaceae	*Paspalum dilatatum*	Paspalum	Exotic	0.3
Poaceae	*Cynodon dactylon*	Common Couch	Native	0.7
Poaceae	*Setaria parviflora*		Exotic	0.1
Poaceae	*Chloris gayana*	Rhodes Grass	Exotic	0.2
Poaceae	*Paspalidium distans*		Native	0.6
Poaceae	*Eragrostis brownii*	Brown's Lovegrass	Native	0.4
Poaceae	*Entolasia stricta*	Wiry Panic	Native	0.1
Poaceae	*Dichanthium sericeum* subsp. *sericeum*	Queensland Bluegrass	Native	0.1
Proteaceae	*Grevillea juniperina* subsp. *juniperina*	Juniper-leaved Grevillea	Native	2
Rubiaceae	*Richardia stellaris*		Exotic	0.1
Rubiaceae	*Opercularia diphylla*	Stinkweed	Native	0.1
Sapindaceae	*Dodonaea triangularis*	Hopbush	Native	0.3
Sapindaceae	*Dodonaea viscosa* subsp. *angustifolia*		Native	0.1
Solanaceae	*Solanum sisymbriifolium*		Exotic	0.1
Solanaceae	*Solanum nigrum*	Black-berry Nightshade	Exotic	0.1
Verbenaceae	*Verbena bonariensis*	Purpletop	Exotic	0.2

B.2 Fauna

Species	Common Name	Exotic	Seen/Heard
Aves			
Corvus coronoides	Australian Raven	No	Both
Trichoglossus moluccanus	Rainbow Lorikeet	No	Both
Meliphagidae melanocephala	Noisy Miner	No	Both
Alauda arvensis	Eurasian Skylark	Yes	Seen
Amphibia			
Crinia signifera	Eastern Common Toadlet	No	Heard

Appendix C Biodiversity payment summary report

Biodiversity payment summary report

NSW GOVERNMENT

Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00024494/BAAS17024/21/00024495		0	18/05/2021

Assessor Name	Assessor Number	Proposal Name	BAM Case Status
Bruce Mullins	BAAS17024	2021-014 - St Marys Dunheved Cct	Finalised

Assessment Type	Date Finalised	BOS entry trigger
Part 4 Developments (General)	18/05/2021	Test of significance

PCT list

Price calculated	PCT common name	Credits
Yes	**835 -** Cumberland riverflat forest	1

Species list

Price calculated	Species	Credits
Yes	***Grevillea juniperina subsp. juniperina*** (Juniper-leaved Grevillea)	1

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

Biodiversity payment summary report

IBRA sub region	PCT common name	Threat status	Offset trading group	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Cumberland	**835** - Cumberland riverflat forest	Yes	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	15.82%	$737.69	2.3979	$ 22,097.40	1	$22,097.40

Subtotal (excl. GST)	**$22,097.40**
GST	**$2,209.74**
Total ecosystem credits (incl. GST)	**$24,307.14**

Species credits for threatened species

Biodiversity payment summary report

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price
10367	***Grevillea juniperina subsp. juniperina*** (Juniper-leaved Grevillea)	Vulnerable	$54.59	20.6900%	$80.00	1	$145.88

Subtotal (excl. GST)	**$145.88**
GST	**$14.59**
Total species credits (incl. GST)	**$160.47**
Grand total	**$24,467.61**

BAM Credit Summary Report

NSW GOVERNMENT

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00024494/BAAS17024/21/00024495	2021-014 - St Marys Dunheved Cct	29/03/2021
Assessor Name	**Report Created**	**BAM Data version ***
Bruce Mullins	18/05/2021	38
Assessor Number	**BAM Case Status**	**Date Finalised**
BAAS17024	Finalised	18/05/2021
Assessment Revision	**Assessment Type**	**BOS entry trigger**
0	Part 4 Developments (General)	Test of significance

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

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

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	BC Act Listing status	EPBC Act listing status	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAII	Ecosystem credits

NSW GOVERNMENT

BAM Credit Summary Report

Cumberland riverflat forest											
1	835_Disturbed	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	19.3	19.3	0.09	Endangered Ecological Community	Not Listed	High Sensitivity to Potential Gain	2.00		1
										Subtotal	**1**
										Total	**1**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Species credits
Grevillea juniperina subsp. juniperina / Juniper-leaved Grevillea (Flora)								
835_Disturbed	19.3	19.3	0.09	Vulnerable	Not Listed	1.5	False	1
							Subtotal	**1**