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Biodiversity Development Assessment Report

Redbank Expansion Area (Kemsley Park)

9 July 2024

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Prepared by:
Environmental Services & Education Australia Pty Ltd
6 Heath Street, Five Dock NSW 2046, Australia

www.eseaustralia.com
T (04) 91681039
ABN 93673841257

9 July 2024

Mark Regent
Project Director
Redbank Communities
76 Arthur Phillip Drive
North Richmond NSW 2754

Via email: markregent@redbankcommunities.com.au

Dear Mark

Biodiversity Development Assessment Report – Redbank Expansion Area (Kemsley Park)

This Biodiversity Development Assessment Report has been prepared by Environmental Services & Education Australia to support a Gateway Planning Proposal for the rezoning of Redbank's Expansion Area (Kemsley Park), located at 322 Grose Vale Road, Grose Vale NSW 2753 (Lot 260 DP1237271).

The subject site is a 34 ha parcel of land that has historically been utilised as grazing paddock for cattle and possesses a single residential dwelling. The site features an undulating landform and a network of feeder drains leading to several man-made dams. Several stands of remnant native canopy vegetation are present, as well as a planted driveway grove, but the site is primarily characterised by highly grazed weedy grassland.

The subject site requires rezoning from RU4 – Rural to residential zoning, prior to the lodgement of a development application for approximately 300 residential lots. This will connect to and complete Redbank's master-planned community. Works would include the removal of native canopy trees, bulk earthworks, and the installation of roads and required infrastructure.

The removal of native vegetation from mapped Biodiversity Values areas triggers the Biodiversity Offset Scheme and as such, a Biodiversity Development Assessment Report is required to assess the impacts of the proposed development.

Vegetation within the subject site was found to be consistent with PCT 3320 - Cumberland Shale Plains Woodland. It is a poor condition representation of the threatened ecological community Cumberland Plain Woodland in the Sydney Basin Bioregion, which is listed as Critically Endangered under the *Biodiversity Conservation Act 2015*. This Critically Endangered Ecological Community cumulatively covers 8.9 ha, occurring as three distinct patches. The final offset requirements for the proposed development are outlined below.

The subject site is considered to provide habitat important to the survival of several threatened species under the *Biodiversity Conservation Act 2015*. These species have been considered within the Biodiversity Assessment Method Calculator, and the species credit requirements to offset impacts to habitat for these threatened species are outlined below.

This report recommends mitigation measures to prevent any indirect impacts on retained vegetation, native fauna, and ecosystems both within the subject site and in the surrounding environment.

Table 0-1 Ecosystem credit class and matching credit profile

Ecosystem credit	Attributes shared with matching credits							
	PCT name	Vegetation zone name	Vegetation integrity loss	Total Area (Ha) to be removed	Sensitivity to loss	Biodiversity risk weighting	Potential SAII	Ecosystem credits
	3320 - Cumberland Shale Plains Woodland	Zone 1 – Poor	19.1	4.35	Very high sensitivity to loss	2.5	True	52
	3320 - Cumberland Shale Plains Woodland	Zone 2 - Poor	14.1	2.34	Very high sensitivity to loss	2.5	True	0
	3320 - Cumberland Shale Plains Woodland	Zone 3 - Degraded	22.7	1.03	Very high sensitivity to loss	2.5	True	15
							Total	67

Table 0-2 Species credit class and matching credit profile

Species credit	Attributes shared with matching credits						
	Species/PCT/TEC Name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Biodiversity risk weighting	Potential SAII	Species credits
	Green and Golden Bell Frog		3 ha	High	2.00	False	30
	Square-tailed Kite		7.7 ha	Moderate	1.50	False	52
	Southern Myotis		5.9 ha	High	2.00	False	57
	Matted Bush-pea		7.7 ha	High	2.00	False	69

Yours sincerely

Clayton Woods
Director - Environmental Services & Education PTY LTD
cwoods@eseaustralia.com

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SHORTENED FORMS

BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BC Act	Biodiversity Conservation Act 2016 (NSW)
BC Regulation	Biodiversity Conservation Regulation 2017 (NSW)
BDAR	Biodiversity Development Assessment Report
BOAMS	Biodiversity Offsets and Agreement Management System
BOS	Biodiversity Offsets Scheme
CEEC	critically endangered ecological community
EC	ecological community listed under the EPBC Act
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cwlth)
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EEC	endangered ecological community
HTW	high threat weed
IBRA	Interim Biogeographic Regionalisation for Australia
MNES	matters of national environmental significance
NPW Act	National Parks and Wildlife Act 1974 (NSW)
NSW	New South Wales
PCT	plant community type
SAII	serious and irreversible impact
SEARs	Secretary's Environmental Assessment Requirements
TBDC	Threatened Biodiversity Data Collection
TEC	threatened ecological community
VEC	vulnerable ecological community
Vegetation SEPP	State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017 (NSW)

DECLARATIONS

Certification under clause 6.15 *Biodiversity Conservation Act 2016*

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

Signature: K.Duchatel

Date: _____

BAM Assessor Accreditation no: BAAS17054

Details and experience of author/s and contributors

Authors and contributors

Name	BAM Assessor Accreditation no. (if relevant)	Position/Role	Tasks performed	Relevant qualifications
Kat Duchatel	BAAS17054	Director / Principal Ecologist - Ecologique	BAM-C data entry and analysis Report preparation Document review	BSc Environmental Science BAM Accredited Assessor CEnvP EIANZ
Clayton Woods		Director / Principal Ecologist - ESEA	Report preparation Document review Figure preparation BAM plot surveys Targeted threatened species surveys	BSc (Hons) Ecology and Environmental Science – 1st Class, University of Edinburgh

Conflict of interest

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

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

Signature: K.Duchatel

Date: _____

BAM Assessor Accreditation no: BAAS17054

1 INTRODUCTION

1.1 Proposed Development

1.1.1 Development overview

This Biodiversity Development Assessment Report (BDAR) has been prepared by Environmental Services & Education Australia (ESEA) to support a Gateway Planning Proposal for the rezoning of Redbank's Expansion Area (Kemsley Park), located at 322 Grose Vale Road, Grose Vale NSW 2753.

The subject site requires rezoning from RU4 – Rural to residential zoning, prior to the lodgement of a Development Application for approximately 300 residential lots. This will connect to and complete Redbank's master-planned community.

The activity requires consent under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

1.1.2 Location

The subject site, known as the Redbank Expansion Area (Kemsley Park) is a 34 ha parcel of land described as Lot 260 DP1237271 (Figure 1-1). It is also identified as 322 Grose Vale Road, Grose Vale NSW 2753. It is located above the Hawkesbury River, approximately 55km northwest of Sydney CBD, 12km northwest of Windsor town centre, and 1km west of North Richmond town centre.

Redbank's Expansion Area (Kemsley Park) is in the Hawkesbury City Council local government area (LGA) and Hawkesbury City Council (Council) is the approval authority. The site occurs entirely within land zoned RU4 - Primary Production Small Lots under the *Hawkesbury Local Environmental Plan 2012* (LEP).

The subject site does not occur within a Sydney Region Growth Centre and is not within subject lands for bio-certification.

The site features an undulating landform and a network of feeder drains leading to several man-made dams. It has historically been utilised as grazing paddock for cattle and possesses a single residential dwelling. The site comprises part of the curtilage of the former Yobarnie Keyline Farm, which is listed on the State Heritage Register. The farm was one of the two properties in which the Keyline system was first developed by P. A Yeomans, a farmer and engineer. The Keyline system refers to a system of soil improvement, erosion control, water storage, cultivation and irrigation on undulating topography which has since been adopted by farmers worldwide. The elements from the Keyline system can be physically seen through the remnant dams and the interconnected feeder and irrigation drains across the subject site.

The site possesses three distinct stands of remnant native canopy vegetation, a planted driveway grove, and a dwelling house, but is primarily characterised by highly grazed weedy grassland. The area has not been subject to any environmental works such as revegetation with native species replanting.

The closest conservation lands to the proposed subject site are Redbank Creek, located approximately 200 m to the north; Belmont Park, located approximately 750 m to the east; and the Hawkesbury River, located 1.9 km southeast.

1.1.3 Proposed development and the subject land

Redbank Communities intends to lodge a Gateway Planning Proposal with Hawkesbury City Council to rezone Redbank's Expansion Area (Kemsley Park) from RU4 – Rural to residential zoning. Redbank subsequently intends to lodge a development application for approximately 300 residential lots, connecting to and completing Redbank's master-planned community (Figure 1-2 and Figure 1-3).

Redbank has been progressively subdividing the surrounding 180 ha Redbank North Richmond residential estate and constructing infrastructure to facilitate the release of approximately 1,400 dwellings since the initial rezoning for urban development in 2014. The 'Southern Valley' land was the last remaining major subdivision in the staged subdivision of the North Richmond urban release area.

The subsequent Redbank Expansion Area (Kemsley Park) subdivision development application would remove vegetation present within the site. Additional works would include cut and fill bulk earthworks; subdivision into approximately 300 lots; construction of local roads extending from the approved road network; civil works including lot benching; creation of inter-allotment drainage and construction of retaining walls; extension of utility services; and landscaping and public domain works. Temporary infrastructure would be required during construction, including construction park-up areas, stockpiles, storage zones, and temporary construction buildings.

Figure 1-1 Site Map

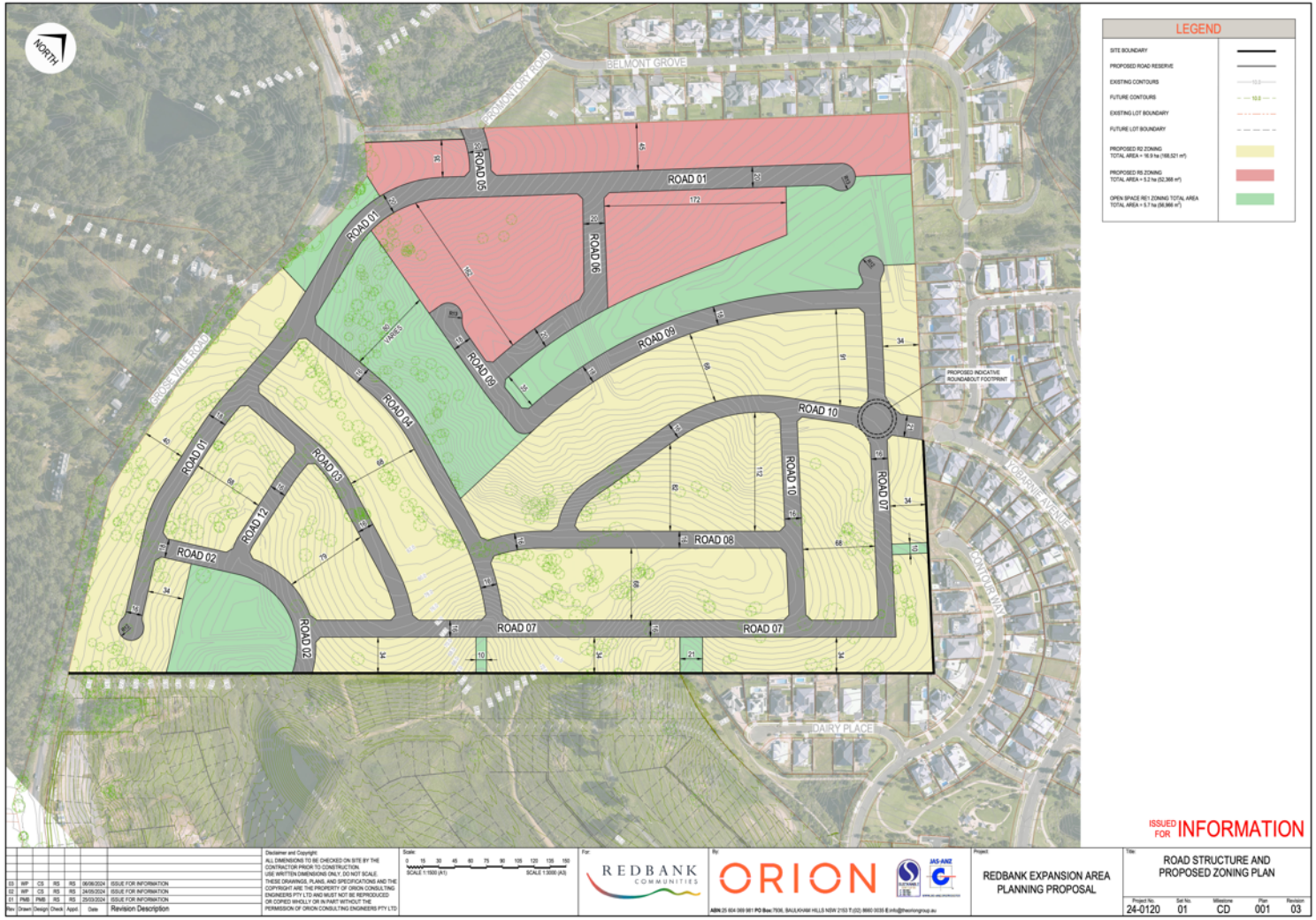


Figure 1-2 Redbank 'Kemsley Park' Structure Plan

Figure 1-3 Redbank Expansion Area (Kemsley Park) Master Plan

1.2 Biodiversity Offset Scheme Entry

The proposed development triggers entry into the Biodiversity Offsets Scheme (BOS) by exceeding both the Biodiversity Values Map threshold (Figure 1-4) and the threshold for clearing above which the BOS applies.

1.3 Excluded Impacts

Clause 6.8(3) of the *Biodiversity Conservation Act 2016* (BC Act) specifies that the BAM is to exclude the assessment of the impacts of any clearing of native vegetation and loss of habitat on category 1 - exempt land (as defined in Part 5A of the *Local Land Services Act 2013* (LLS Act)), other than prescribed impacts (as defined in clause 6.1 of the *Biodiversity Conservation Regulation 2017* (BC Regulation)).

The native vegetation regulatory map indicates that the subject site is in land excluded from the *Local Land Services Act 2013* (LLS Act); therefore exempt land does not apply to the proposal.

1.4 Matters of National Environmental Significance

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) establishes a regime for assessing and regulating the environmental impact of activities (including development) where a Matters of National Environmental Significance (MNES) may be affected. Under the EPBC Act, any action which has, will have, or is likely to have a significant impact on a matter of MNES is defined as a "controlled action", and requires approval from the Minister.

The process includes undertaking an Assessment of Significance for listed threatened species and ecological communities that represent a matter of MNES that will be impacted as a result of the proposed action. The Significant Impact Guidelines 1.1 – Matter of National Environmental Significance' published by DAWE (2009a) provide overarching guidance on determining whether an action is likely to have a significant impact on an MNES.

The following MNES were assessed in accordance with the Significant Impact Guidelines:

- *Pteropus poliocephalus* (Grey-headed Flying Fox)
- *Lathamus discolor* (Swift Parrot)

The assessment of these species against the Significant Impact Guidelines is presented in Section 10. The results of these assessments determined that the proposed development is not deemed a controlled action and does not need referral under the EPBC Act.

1.5 Information Sources

The following information sources were used in the preparation of this report:

- Imagery:
  - Aerial imagery: MetroMap 1 April 2024
- Australian Government Department of Climate Change, Energy, the Environment and Water
  - Protected Matters Search Tool: https://pmst.awe.gov.au/
  - Species Profiles and Threats Database (SPRAT): http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl
  - Significant Impact Guidelines 1.1 - Matters of National Environmental Significance (Department of the Environment, Water, Heritage and the Arts, 2013 EPBC Act Policy Statement)
  - Interim Biogeographic Regionalisation for Australia (IBRA) version 7.0

- NSW Department of Planning, Industry and Environment (DPIE), Environment, Energy and Science (EES) Group, formerly the Office of Environment and Heritage (OEH)
  - NSW (Mitchell) Landscapes - version 3.1
  - Biodiversity Values Map: https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap
  - NSW State Vegetation Type Map: https://datasets.seed.nsw.gov.au/dataset/95437fbd-2ef7-44df-8579-d7a64402d42d
  - BioNet Threatened Biodiversity Data Collection
  - BioNet Vegetation Classification
  - NSW Spatial Services Historical Imagery Viewer: https://www.spatial.nsw.gov.au/products_and_services/aerial_and_historical_imagery
- Ecological Australia (2022) Redbank Southern Valley Biodiversity Development Assessment Report.
- Ecological Australia (2022) Redbank Southern Valley – Riparian Assessment
- Molino Stewart (2022) Grose Vale Road Upgrade West Biodiversity Assessment

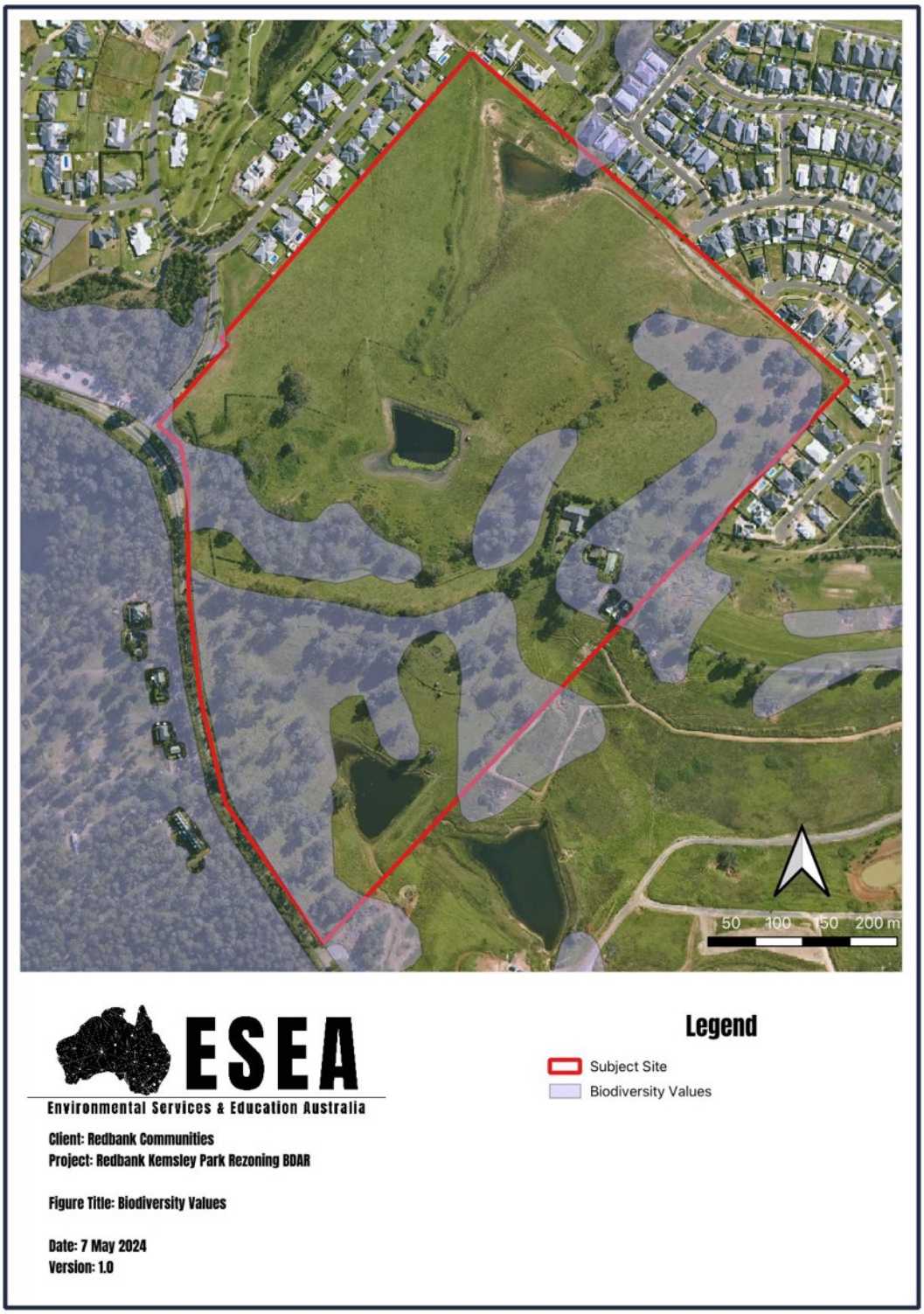


Figure 1-4 Biodiversity Values Map

2 METHODS

2.1 Site Context Methods

2.1.1 Landscape features

Landscape features relevant to the proposal have been assessed from within a 1500 m buffer zone (the BDAR assessment area) around the subject site.

In accordance with Sections 3.1 and 3.2 of the BAM (2020) assessment and mapping of the landscape features have been undertaken as summarised in Table 3-1 and shown in Figure 2-1.

2.1.2 Native vegetation cover

Native vegetation cover within the subject site must be assessed in relation to native vegetation cover across a broader BDAR assessment area. The cover of native vegetation within the BDAR assessment area is required to determine the context of the subject land. The cover of native vegetation was assessed via desktop assessment as follows:

- Clipping the NSW State Vegetation Type Map within the greater BDAR assessment area using QGIS;
- Editing the shapefile to remove areas of vegetation no longer evident, based on up-to-date satellite imagery, and the addition of new polygons identifying areas of vegetation not represented in mapping.

An on-site field assessment was then conducted to refine the result of the desktop assessment and determine the floral composition of the site. The flora survey consisted of irregular traverses within the assessment area, ensuring comprehensive coverage of all vegetation present. Physical data including plant species composition, health, and weed coverage were recorded.

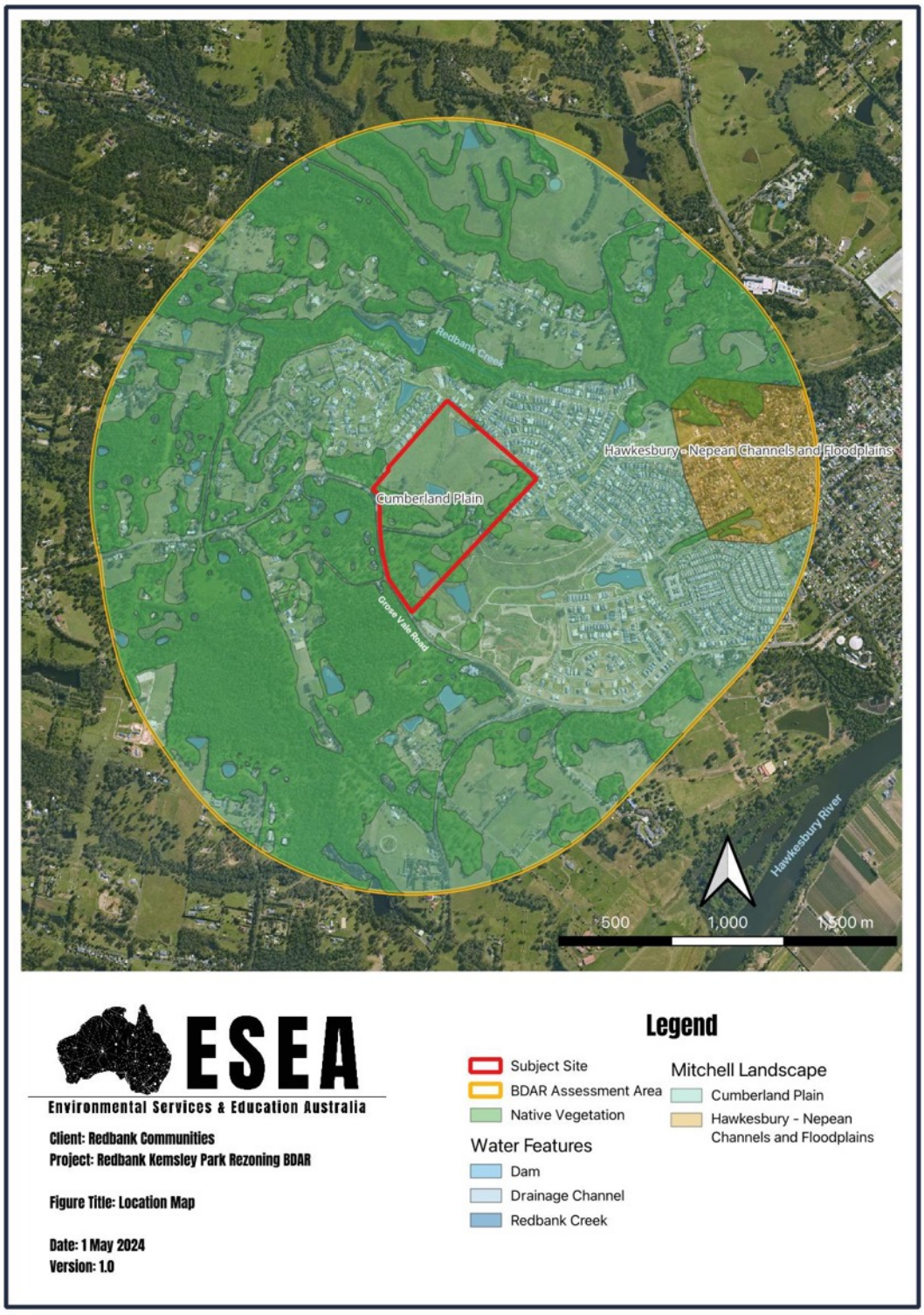


Figure 2-1 Location Map

2.2 Native Vegetation, Threatened Ecological Communities, and Vegetation Integrity Methods

2.2.1 Plot-based vegetation survey

Floristic were carried out on Monday 22nd, Tuesday 23rd and Tuesday 30th April 2024. Identification of plant community types (PCTs) within the subject land was confirmed during site surveys with reference to the BioNet Vegetation Classification database and data collected from floristic and site integrity plots/transects in accordance with Section 2 of the BAM (2020).

A total of four full-floristic vegetation plots were surveyed to obtain an accurate representation of the vegetation present.

2.2.2 Vegetation integrity survey

The vegetation integrity survey was conducted as per the BAM 2020 Operation Manual. Four plots were conducted within the subject site. These plots assessed three distinct patches of native vegetation within the subject site of differing apparent conditions, wherein two plots were conducted for the larger 4.4 ha patch of native vegetation, and one plot was conducted for each of the other two patches of 2.4 ha and 2.1 ha.

3 SITE CONTEXT

3.1 Assessment Area

Landscape features relevant to the proposal have been assessed from within a 1500 m buffer zone (the BDAR assessment area) around the subject land, which covers 829 ha (Figure 2-1).

3.2 Landscape Features

In accordance with Sections 3.1 and 3.2 of the BAM (2020), landscape features identified within the subject land and BDAR assessment area are described in Table 3-1 and shown in Figure 2-1.

Figure 2-1 illustrates the extent of native vegetation within the BDAR assessment area.

Table 3-1 Landscape assessment

Feature	Subject site	BDAR assessment area relevance
IBRA bioregion	Sydney Basin	Sydney Basin
IBRA subregion	Cumberland	Cumberland
NSW (Mitchell) landscapes	Cumberland Plain	The majority of the assessment area is located on the Cumberland Plain landscape type, with the exception of a small area in the east, which is located on Hawkesbury-Nepean Channels and Floodplains.
Rivers and streams	Three dams are present within the subject site. According to NSW Water Management (General) Regulation 2018 Hydroline Spatial Data, a network of 1st order drainage lines occurs within the subject site. DWE attended a site visit in 2009 and agreed that these watercourses did not meet the definition of a river under the Water Management Act 2000 and therefore could be removed as constraints to future development.	Redbank Creek, a fifth order stream, and its tributaries are mapped to the north of the subject site. The Hawkesbury River, a ninth order stream, and its tributaries are mapped to the southwest (Figure 2-1).
Wetlands	The subject site does not contain estuaries or wetlands	The BDAR assessment area does not contain estuaries, Ramsar Wetlands, or Nationally Important Wetlands.
Connectivity	The subject site is largely cleared and connectivity is limited. Some connectivity for highly mobile species may be present between the patches of remnant native vegetation and dams present within the subject site.	The subject site provides limited connectivity to the north and east due to the surrounding urbanised environment which includes established areas of the Redbank master-planned community, as well as areas which are currently undergoing bulk earthworks and infrastructure development. Some connectivity may be present for highly mobile species that can reach Redbank Creek to the north. To the south and west, connectivity is present between patches of remnant native vegetation within the subject site, and large patches of native vegetation present along the southern and southwestern boundaries. These are separated from the subject site by fences and Grose Vale

		Road. However, connectivity for highly mobile species may be present in the canopy.
Geological features	The subject site does not contain any geological features of significance, including karst, caves, crevices, or cliffs.	No karsts, caves, crevices, cliffs, or areas of geological significance have been identified within the BDAR assessment area
Areas of outstanding biodiversity value	The subject site does not contain any Areas of Outstanding Biodiversity Value.	No Areas of Outstanding Biodiversity Value occur within the BDAR assessment area.
Native vegetation cover	The subject site is approximately 34 ha and contains approximately 8.92 ha of native vegetation	The BDAR assessment area including the subject land is approximately 829 ha. The total of native vegetation cover in the BDAR assessment area is approximately 352 ha, which equates to 42%.

3.3 Native Vegetation Cover

The BDAR assessment area including the subject land is approximately 829 ha. The total native vegetation cover in the BDAR assessment area is approximately 352 ha, which equates to 42%. The subject site is approximately 34 ha and contains approximately 8.92 ha of native vegetation.

3.4 Patch Size

A patch is an area of native vegetation that occurs within the BDAR assessment area and includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or ≤ 30 m for non-woody ecosystems). Patch size was calculated using available vegetation mapping for all patches of intact native vegetation on and adjoining the subject site. Patch size was assigned to one of four classes (<5 ha, 5-24 ha, 25-100 ha or ≥100 ha).

A patch size >100 ha was determined for the subject site and entered in the BAMC for all vegetation zones.

4 NATIVE VEGETATION, THREATENED ECOLOGICAL COMMUNITIES AND VEGETATION INTEGRITY

Large patches of native canopy vegetation in poor condition are present within three distinct areas throughout the subject site, herein identified as Zones 1, 2, and 3. The subject site also contains a planted grove of trees along a driveway leading to the existing dwelling house.

4.1 Native Vegetation Extent

Table 4-1 summarises the extent of native vegetation cover within the assessment area. Figure 2-1 shows native vegetation cover within the assessment area.

Table 4-1 Native vegetation extent

Assessment area (ha)	829 ha
Total area of native vegetation cover (ha)	352 ha
Percentage of native vegetation cover (%)	42%
Class (0-10, >10-30, >30-70 or >70%)	>30-70

4.1.1 Changes to mapped native vegetation extent

According to the NSW State Vegetation Type Mapping, one PCT is mapped as occurring within the subject site (Figure 4-2):

- PCT 3320 – Cumberland Shale Plains Woodland

Native vegetation extent within the subject site has been refined based on data collected during field surveys. The extent of mapped native vegetation has been reduced to exclude areas of the subject site that contain only introduced grasses and weeds.

Native vegetation extent within the subject site covers an area of approximately 8.92 ha. The remaining 25 ha of land within the subject site is characterised by heavily grazed, weedy groundcover, or planted vegetation occurring along the residential driveway and garden areas.

4.1.2 Areas that are not native vegetation

Non-native vegetation within the subject land extends over approximately 23.2 ha of the subject site. This consists of introduced grasses and weeds that is subject to regular grazing by cattle. Table 4-2 Photo-plate 1 illustrates the nature of non-native vegetation within the subject site.

Table 4-2 Photo-plate 1: Non-native vegetation in the subject site

Non-native vegetation in north-west corner of the subject site

Non-native vegetation on northern hilltop

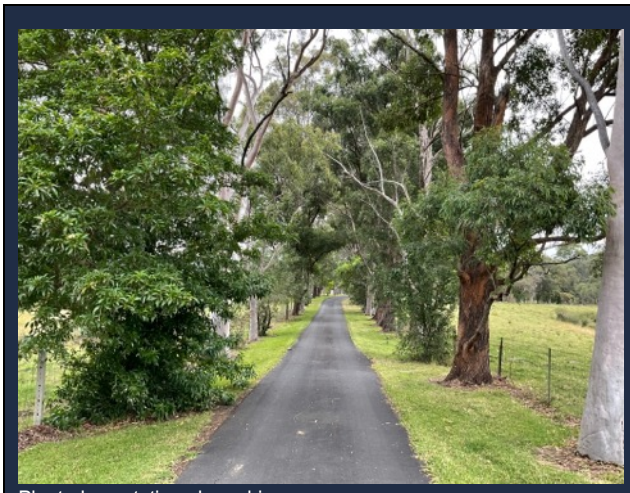
Non-native vegetation between planted grove and Vegetation Zone 3

Non-native vegetation in east of the subject site

4.1.3 Planted native and non-native vegetation

Planted vegetation within the subject land extends over approximately 1.28 ha of the subject site and occurs within a grove running the length of the driveway. It also occurs within the garden area of the existing residential dwelling. This vegetation zone consists of an assortment of introduced and native canopy tree species, introduced grasses and weed groundcover. Table 4-3 Photo-plate 2 illustrates the nature of planted vegetation within the subject site.

Table 4-3 Photo-plate 2: Planted native vegetation within the subject site



Planted vegetation along driveway grove

Planted vegetation within back garden area

Planted vegetation within front garden

Planted vegetation within front garden

Due to the presence of planted native vegetation within the development site, vegetation identified as 'Planted native and Exotic cover' was assessed under the streamlined assessment module for planted native vegetation in accordance with Appendix D of BAM 2020 (Table 4-4). This appendix contains a decision-making key that provides a framework for the assessment of planted native vegetation.

Areas of planted native vegetation were assessed for threatened species habitat using the same methods applied for the rest of the development site. These results are detailed in Section 5.

Measures to mitigate and manage impacts to planted native vegetation are provided in Section 7. No species credits are required to offset the proposed impacts to planted native vegetation.

Table 4-4 Assessment of planted native vegetation in accordance with Appendix D of the BAM 2020

Question		Response and justification
1	Does the planted native vegetation occur within an area that contains a mosaic of planted and remnant native vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal?	No - canopy species are clearly planted given their species, size and location between a fence line and driveway + forming a visual screen around the dwelling house garden. This is

	■ Yes – the planted native vegetation must be allocated to the best-fit PCT and the BAM must be applied. ■ No – Go to 2.	supported by historical imagery for the site which shows that vegetation in the area was planted sometime between 1965 and 1975 (Figure 4-1). No remnant native vegetation is present in the area. Where remnant native vegetation was adjacent to the planted native vegetation, it was mapped to a PCT rather than as part of the planted native polygon.
2	Is the planted native vegetation: ■ Planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.), and ■ The primary objective was to replace or regenerate a plant community type of a threatened plan species or its habitat? ■ Yes – the planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM ■ No – Go to 3.	No - the location of the trees indicates that they were planted for driveway amenity and landscaping around the residential dwelling.
3	Is the planted / translocated native vegetation individuals of a threatened species or other native species planted / translocated for the purpose of providing threatened species habitat under one of the following: ■ A species recovery project ■ Saving our Species project ■ Other types of government funded restoration project ■ Condition of consent for a development approval that required those species to be planted or translocated for the purpose of providing threatened species habitat ■ Legal obligation as part of a condition of ruling of court. This includes regulatory directed or ordered remedial plantings (e.g. Remediation Order for clearing without consent issued under the BC Act or the Native Vegetation Act) ■ Ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan, or ■ Approved vegetation management plan (e.g. as required as part of a Controlled Activity Approval for works on waterfront land under the NSW Water Management Act 2000)? ■ Yes – the planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM ■ No – Go to 4	No - the native species present are not threatened species and are not known to have been planted for rehabilitation purposes. It is unlikely that they were planted or translocated for the purposes outlined in Question 3.
4	Was the planted native vegetation (including individuals of a threatened flora species) undertaken voluntarily for revegetation, environmental rehabilitation or restoration within a legal obligation to secure or provide for management of the native vegetation? ■ Yes – Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied) ■ No – Go to 5.	No - the planted native vegetation forms part of the landscaping for the driveway and residential dwelling.

5	Is the planted native vegetation (including individuals of a threatened flora species) planted for functional, aesthetic, horticultural or plantation forestry purposes? This includes examples such as; windbreaks in agricultural landscapes, roadside plantings (including street trees, median stripes, roadside batters), landscaping in parks, gardens and sport fields/complexes, macadamia plantations or teatree farms? ■ Yes – Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied) ■ No – Go to 6.	Yes - the planted native vegetation appears to be amenity plantings along a driveway and surrounding the garden of the existing residential dwelling.
6	Is the planted native vegetation a species listed as a widely cultivated native species N/A on a list approved by the Secretary of the Department (or an officer authorised by the Secretary)? ■ Yes – Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied) ■ No – There may be other types of occurrences of planted native vegetation that do not easily fit into the decision-making key above.	N/A

4.1.3.1 Assessment of planted native vegetation for threatened species habitat

An assessment of the potential for the planted native vegetation to provide habitat for threatened species is required. If there is evidence that threatened species are using the planted native vegetation as habitat, Section 8.4 of the BAM must be applied to mitigate and manage impacts on these species. Species credits are not required to offset the proposed impacts.

Threatened flora and fauna species assessed under the BAM were considered throughout the entire subject land, including within areas of planted native and exotic vegetation, and human-made structures. Refer to Section 5 (Threatened Species) and Section 0 (Prescribed impacts). This assessment concluded that the planted native vegetation assessed in this section does not:

- Provide habitat for threatened species, and
- Application of BAM Section 8.4 is not required.

Photographic plates are provided in Table 4-3.

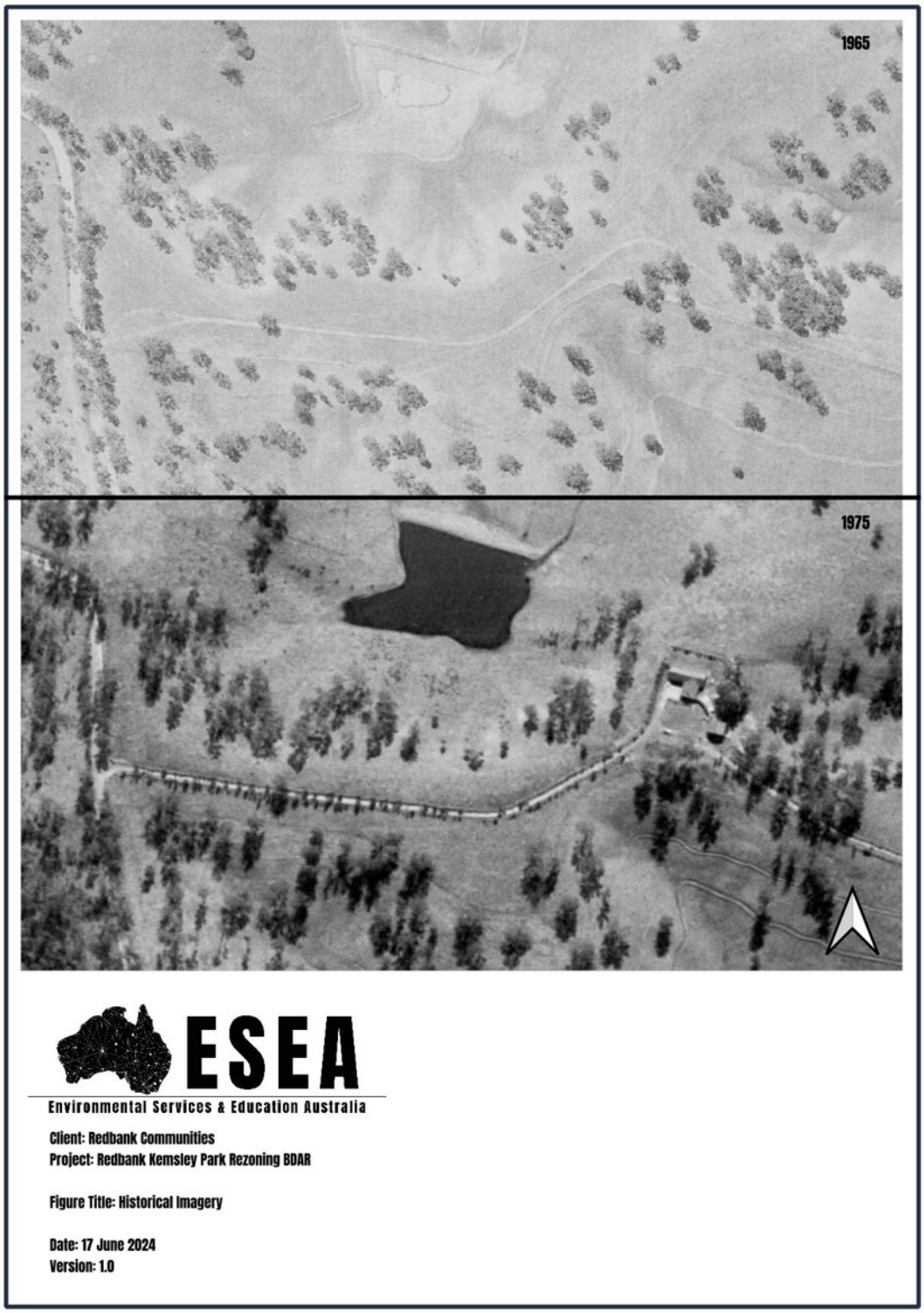


Figure 4-1 Historical Imagery Showing Planting of Vegetation Along Driveway Grove

4.2 Plant Community Types

4.2.1 Overview

Identification of plant community types (PCTs) within the subject site was confirmed during site surveys with reference to the BioNet Vegetation Classification database and data collected from floristic and site integrity plots/transects in accordance with Section 2 of the BAM (2020).

Data was collected from four plots/transects in order to obtain a representation of the vegetation present from within the patches of remnant native vegetation.

Various attributes were considered in combination to assign vegetation to the best fit PCT. This included dominant species in each stratum and relative abundance, community composition, soils and landscape position. Reference was made to the PCT descriptions in the BioNet Vegetation Classification and the final determinations for TECs.

Areas of native vegetation within the subject site were identified as PCT 3320 – Cumberland Shale Plains Woodland in varying degraded conditions.

PCT 3320 – Cumberland Shale Plains Woodland was selected for the following reasons:

- Presence of characteristic canopy species, *Eucalyptus tereticornis* (Forest Red Gum) and *Eucalyptus crebra* (Narrow-leaved Ironbark),
- Presence of regrowth *E. tereticornis* and *E. crebra* in Vegetation Zone 3,
- Soil type and landscape position typically associated with this PCT, i.e., clay/loam soils on the Cumberland Plain at altitudes mostly below 150 m.
- IBRA region and sub-region: Sydney Basin; Cumberland
- Most of the vegetation within the subject site was previously mapped as PCT 3320 (OEH 2016) and identified as similar (PCT 849) in previous ecological assessments of the locality (Ecological 2022).

PCT ID	PCT Name	Area within subject land (ha)
3320	Cumberland Shale Plains Woodland	8.92
	Total area	8.92

4.2.2 PCT 3320 Cumberland Shale Plains Woodland

4.2.2.1.1 PCT overview

PCT ID	3320
PCT name	Cumberland Shale Plains Woodland
Vegetation formation	KF_CH3 Grassy Woodlands
Vegetation class	Coastal Valley Grassy Woodlands
Per cent cleared value (%)	93.03%
Extent within subject land (ha)	8.92

PCT 3320 within the subject area generally comprises remnant canopy trees overlying grazed or disturbed exotic groundcover. Minimal / no midstratum vegetation is present (see photos 1 - 4). The extent of PCT 3320 has been revised from that depicted on the NSW State Vegetation Type Map in order to remove areas that comprise only weeds or introduced grassland.

Three condition zones have been attributed to PCT 3320 in the subject site, which extends over 8.92 ha in total. The patch size for native vegetation within the BDAR assessment area has been estimated as >100 ha.

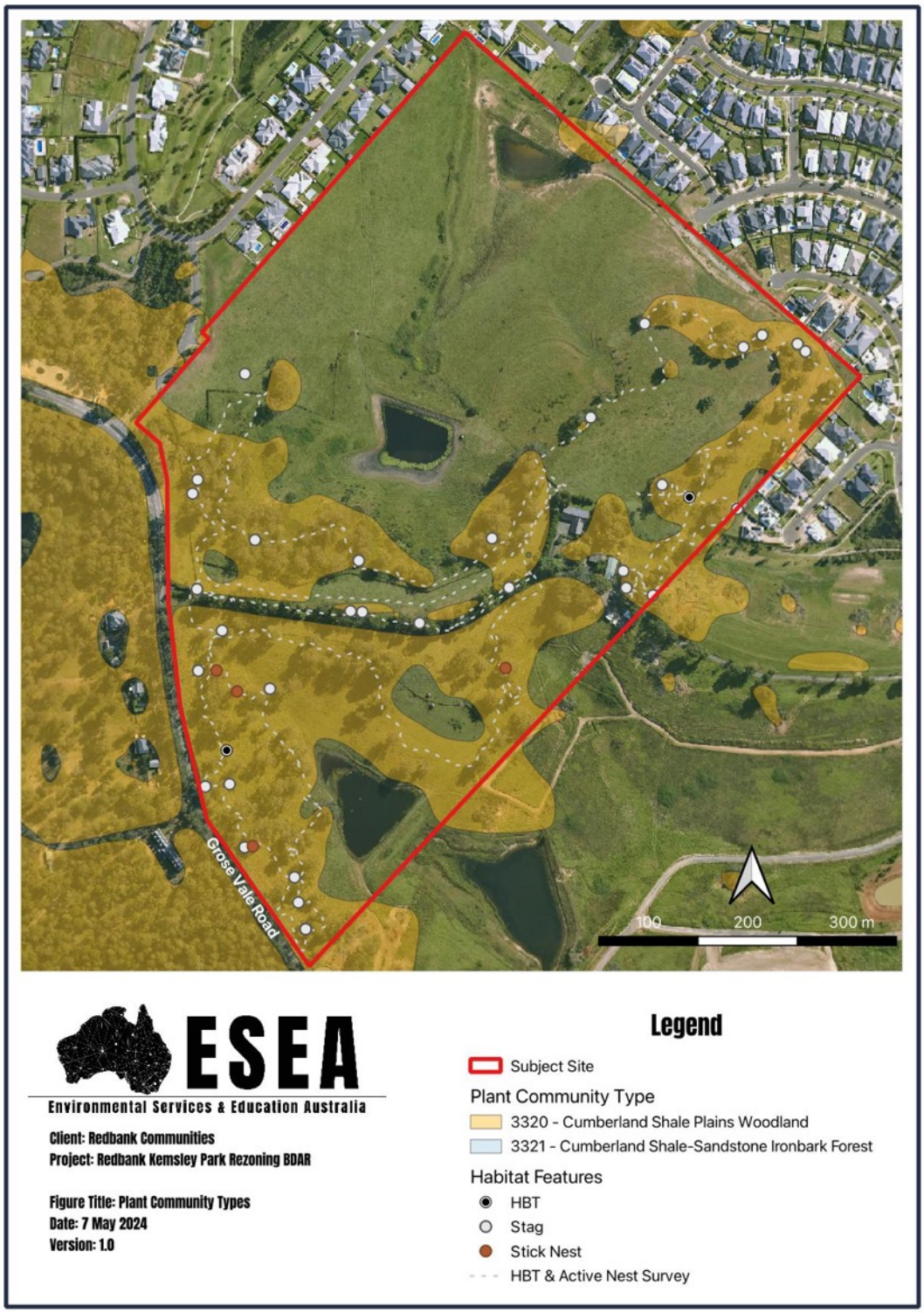


Figure 4-2 Plant Community Type Map

Table 4-5 Photo-plate 3: Location of BAM survey plots

Location of plot 1 – Vegetation Zone 1

Location of plot 2 – Vegetation Zone 1

Location of plot 3 – Vegetation Zone 2

Location of plot 4 – Vegetation Zone 3

4.3 Threatened Ecological Communities

4.3.1 Alignment with TECs

PCT 3320 – Cumberland Shale Plains Woodland may be associated with the following threatened ecological communities (TECs):

- Cumberland Plain Woodland in the Sydney Basin Bioregion (Critically Endangered, BC Act)
- Shale Gravel Transition Forest in the Sydney Basin Bioregion (Endangered, BC Act)
- Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Critically Endangered, EPBC Act).

4.3.1.1 Alignment under NSW BC Act

In accordance with Section 4.2 of the BAM, the identification of TECs must be considered against the NSW Threatened Species Scientific Committee (the Committee) Final Determination for the TEC.

Features	Relevance to subject site
Cumberland Plain Woodland is restricted to the Sydney Basin Bioregion	Applicable
Cumberland Plain Woodland is characterised by an upper-storey that is usually dominated by *Eucalyptus moluccana* (Grey Box) and *E. tereticornis* (Forest Red Gum), often with *E. crebra* (Grey Ironbark), *E. eugenioides* (Narrow-leaved Stringybark), *Corymbia maculata* (Spotted Gum) or other less frequently occurring eucalypts, including *Angophora floribunda*, *A. subvelutina* (Broad-leaved Apple), *E. amplifolia* (Cabbage Gum) and *E. fibrosa* (Broad-leaved Ironbark).	Applicable: *E. tereticornis* and *E. crebra* abundant
The community may have an open stratum of small trees that may include any of these eucalypts, as well as species such as *Acacia decurrens* (Black Wattle), *A. parramattensis* (Parramatta Wattle), *A. implexa* (Hickory Wattle) or *Exocarpos cupressiformis* (Native Cherry).	Applicable: open stratum of small *E. tereticornis* and *E. crebra* present. No Acacia species present.
Shrubs are typically scattered in the understorey but may be absent or locally dense as a result of clearing activity or changes in grazing or fire regimes. *Bursaria spinosa* (Blackthorn) is usually dominant, while other species include *Daviesia ulicifolia* (Gorse Bitter Pea), *Dillwynia sieberi*, *Dodonaea viscosa subsp. cuneata* and *Indigofera australis* (Native Indigo).	Applicable: *Bursaria spinosa* regrowth present in some areas (Vegetation Zone 3).
The ground cover is dominated by a diverse range of grasses including *Aristida ramosa* (Purple Wiregrass), *A. vagans* (Threeawn Speargrass), *Cymbopogon refractus* (Barbed Wire Grass), *Dichelachne micrantha* (Plumegrass), *Echinopogon caespitosus* (Forest Hedgehog Grass), *Eragrostis leptostachya* (Paddock Lovegrass), *Microlaena stipoides* (Weeping Grass), *Paspalidium distans* and *Themeda australis* (Kangaroo Grass), and with graminoids *Carex inversa* (Knob Sedge), *Cyperus gracilis, Lomandra filiformis subsp. filiformis* (Wattle Mat-rush) and *L. multiflorus subsp. multiflorus* (Many-flowered Mat-rush). The ground cover also includes a diversity of forbs such as *Asperula conferta* (Common Woodruff), *Brunoniella australis* (Blue Trumpet), *Desmodium varians* (Slender Tick Trefoil), *Dianella longifolia* (Blue Flax Lily), *Dichondra repens* (Kidney Weed), Opercularia diphylla, *Oxalis perennans* and *Wahlenbergia gracilis* (Australian Bluebell), as well as scramblers, *Glycine spp.* and *Hardenbergia violacea* (Native Sarsaparilla) and the fern *Cheilanthes sieberi* (Poison Rock Fern).	Applicable: In degraded state, but native forbs *Dichondra repens* (Kidney Weed), *Oxalis perennans,* and *Glycine sp.* present. Native grasses *Microlaena stipoides (Weeping Grass) and scramblers Glycine sp. present.*

All patches of PCT 3320 identified within the subject site met the description of Cumberland Plain Woodland in the Sydney Basin Bioregion, a critically endangered ecological community, as set out by the Final Determination for listing under the BC Act.

4.3.1.2 Alignment under Commonwealth EPBC Act

The Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest is a relatively well-studied ecological community and numerous detailed floristic studies have been undertaken on it. However, it has undergone a large degree of past and ongoing disturbance that has resulted in a large variability in the expression of this ecological community. This presents some challenges in prescribing detailed and specific key diagnostic attributes that would apply to every patch of the national ecological community. The attributes presented below are broad but draw upon the detailed floristic analysis by Tozer (2003):

Features	Relevance to subject site
Distribution is limited to the Sydney Basin Bioregion with most occurrences in the Cumberland sub-region.	Applicable.
Most occurrences are on clay soils derived from Wianamatta Group geology, with limited to rare occurrences on soils derived from Tertiary Alluvium, Holocene Alluvium, the Mittagong Formation, Aeolian Deposits and Hawkesbury Sandstone.	Applicable: Subject site is mapped as occurring on Wianamatta Group geology, with Podzolic Soils (Dd3.51) or massive Earthy Clays (Uf6.71).
Upper tree layer species must be present with these features: ■ The minimum projected foliage cover of canopy trees is 10% or more; and ■ The tree canopy is typically dominated by *Eucalyptus moluccana* (Grey Box), *E. tereticornis* (Forest Red Gum) and/or *E. fibrosa* (Red Ironbark). Other canopy species may occur in association with the typical dominants and may be locally dominant at some sites.	Applicable: *E. tereticornis* abundant.
A sparse lower tree layer may be present, typically with young eucalypts of upper tree canopy species and species of Acacia, Exocarpos and Melaleuca.	Applicable: Lower tree layer is sparse with young eucalypts.
The understorey typically is dominated by the ground layer and shows these features: ■ The ground layer typically comprises a variety of perennial native graminoids and forbs ■ Native graminoid species that are often present include: the grasses *Aristida ramosa* (Purple Wiregrass), *A. vagans* (Threeawn Speargrass), *Cymbopogon refractus* (Barbed Wire Grass), *Dichelachne micrantha* (Plumegrass), Echinopogon caespitosus *var. caespitosus* (Tufted Hedgehog Grass), *Eragrostis leptostachya* (Paddock Lovegrass), *Microlaena stipoides subsp. stipoides* (Weeping Grass), *Paspalidium distans* and *Themeda triandra* (Kangaroo Grass), and other graminoids *Carex inversa* (Knob Sedge), *Cyperus gracilis* (Slender Sedge), *Lomandra filiformis subsp. filiformis* (Wattle Mat-rush) and *L. multiflora subsp. multiflora* (Manyflowered Mat-rush); ■ Native forb and other herb species present include: *Asperula conferta* (Common Woodruff), *Brunoniella australis* (Blue Trumpet), *Cheilanthes sieberi* (Poison Rock-Fern), *Desmodium varians* (Slender Tick-trefoil), *Dianella longifolia* (Blue Flax-Lily), *Dichondra repens* (Kidney Weed), Glycine spp., Hardenbergia violacea (Native Sarsparilla), *Opercularia diphylla* (Stinkweed), *Oxalis perennans*, *Pratia purpurascens* (Whiteroot) and *Wahlenbergia gracilis* (Australian Bluebell); and A shrub layer may be present, to variable extent, and is often dominated by *Bursaria spinosa* (Blackthorn) while other species include: *Daviesia ulicifolia* (Gorse Bitter Pea), *Dillwynia sieberi, Dodonaea viscosa subsp. cuneata* (Wedge-leaf Hop-bush), *Indigofera australis* (Native Indigo) and *Lissanthe strigosa* (Peach Heath).	Applicable: In degraded state, but native forb *Dichondra repens* (Kidney Weed), *Oxalis perennans* and *Glycine spp.* present. Native grasses *Microlaena stipoides subsp. stipoides* (Weeping Grass) present. *Bursaria spinosa* (Blackthorn) present in Zone 3.

Despite the above, patches of PCT 3320 within the subject site did not meet the key diagnostic characteristics set out by the Commonwealth Listing Advice on Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (DAWE 2009) (Figure 4-3) for the following reasons:

- Perennial understory native vegetation (including vascular plant species of the ground and shrub layers) cover was <30% for each patch.

Therefore, the only TEC present within the subject site was Cumberland Plain Woodland in the Sydney Basin Bioregion, as listed under the BC Act (Figure 4-4).

TEC name	Profile ID (from TBDC)	BC Act status	EPBC Act status	Associated vegetation zones within the subject land	Area within the subject land (ha)
Cumberland Plain Woodland in the Sydney Basin Bioregion		Critically Endangered	-	Zone 1 Zone 2 Zone 3	8.92

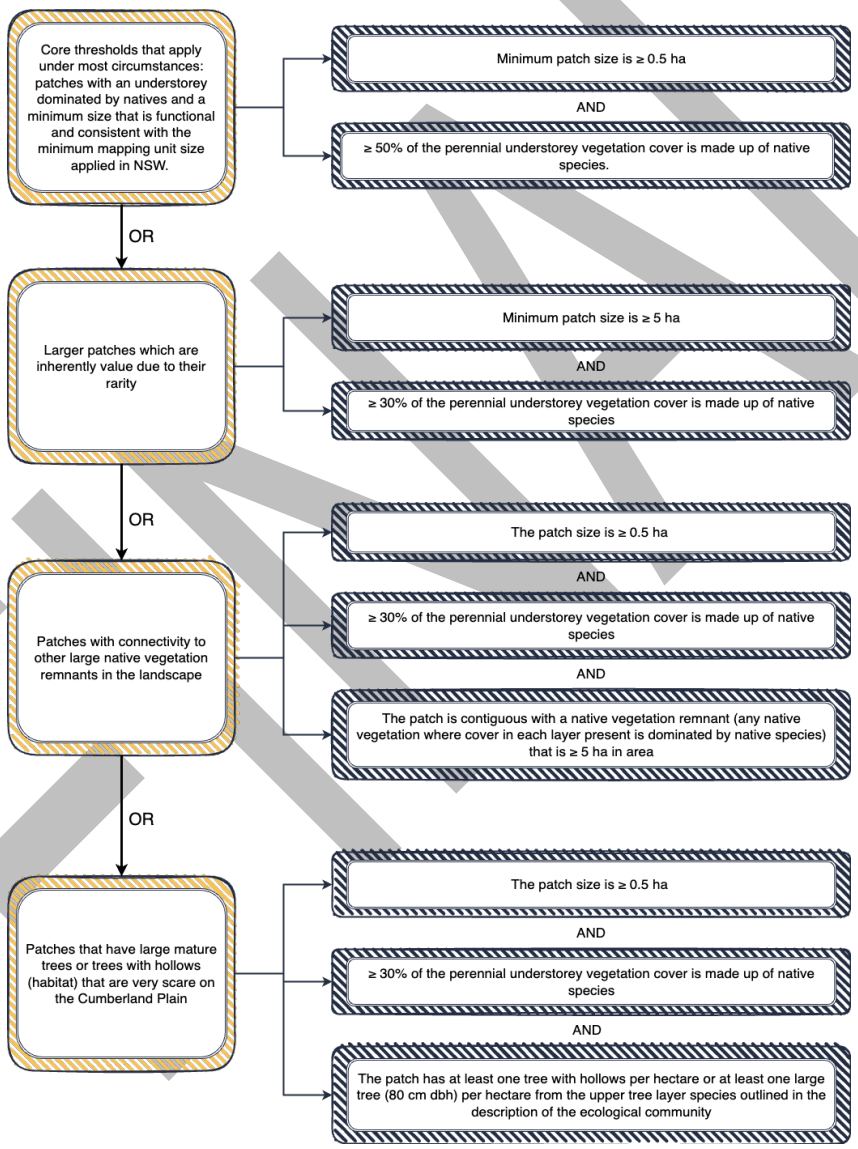


Figure 4-3 Condition thresholds for patches that meet the description for Cumberland Plain Shale Woodland CEEC

Figure 4-4 Alignment with Threatened Ecological Communities

4.4 Vegetation Zones

A total of five (5) vegetation zones were identified on the subject site based on the broad condition state of each vegetation type. A total of four (4) vegetation integrity survey plots were collected on the subject site consistent with the BAM. Descriptions of vegetation zones associated with a native PCT are provided in Table 4-9.

4.4.1 Zone 1 PCT 3320

Areas mapped as Zone 1 PCT 3320 generally contained the native canopy tree species *Eucalyptus tereticornis* (Forest Red Gum), and *E. crebra* (Narrow-leaved Ironbark). No other native canopy tree species were present. This zone lacked a visible native midstratum. Native groundcover consisted of *Dichondra repens* (Kidney Weed), *Commelina cyanea* (Scurvy Weed), *Einadia nutans* (Climbing Saltbush), *Microlaena stipoides* (Weeping Grass), *Oxalis sp*. (Wood Sorrel), and *Glycine microphylla* (Small-leaf Glycine). No other native groundcover was observed.

Canopy species may provide occasional foraging or breeding habitat for highly mobile threatened birds. One hollow-bearing tree (100 – 200 mm) is present within this zone, as well as nine dead stags. Three stick nests were observed.

This zone was in a degraded state and possessed a large number of introduced species and weeds, including several 'high-threat weed' species. Non-native species present include *Cynodon dactylon* (Bermuda Grass), *Paspalum dilatatum* (Dallis Grass), *Chloris gayana* (Rhodes Grass), *Lantana camara* (Lantana), *Bidens pilosa* (Cobbler's Pegs), *Senecio madagascariensis* (Fireweed), *Solanum sisymbriifolium* (Sticky Nightshade), *Dactylis glomerata* (Cock's-foot), *Rumex Crispus* (Curly Dock), *Commelina diffusa* (Climbing Dayflower), *Commelina cyanea* (Scurvy Weed), *Plantago lanceolata* (Ribwort Plantain), *Tagetes minuta* (Southern Cone Marigold), *Atriplex prostrata* (Fat Hen), *Sida rhombifolia* (Arrow-leaf Sida), *Solanum linnaeanum* (Devil's Apple), *Malva parviflora* (Cheeseweed), *Verbena bonariensis* (Purpletop), *Stellaria media* (Chickweed), *Trifolium repens* (White Clover), *Modiola caroliniana* (Carolina Bristlemallow), *Juncus effusus* (Common Rush), and *Oxalis corniculata* (Creeping Woodsorrel).

This vegetation zone is considered to be in poor condition. There is little variation within this zone, which consists of stands of native canopy species with a mix of native and exotic groundcover. The zone has been disturbed by extensive grazing and apparent regular clearing of Lantana growth.

Table 4-6 Photo-plate 4: Vegetation Zone 1

4.4.2 Zone 2 PCT 3320

Areas mapped as Zone 2 PCT 3320 were dominated by *E. crebra* (Narrow-leaved Ironbark). No other native canopy tree species were present. All zones lacked a defined native midstratum. Native groundcover consisted of *Dichondra repens* (Kidney Weed), *Austrostipa sp.* (Speargrass), *Desmodium varians, Glycine tabacina* (Variable Glycine), and *Microlaena stipoides* (Weeping Grass).

Canopy species may provide occasional foraging or breeding habitat for highly-mobile threatened birds. One hollow-bearing tree (50 – 100 mm) is present within this zone, as well as eleven dead stags.

In all instances, these areas were in a degraded state and possessed a large number of introduced species and weeds, including several 'high-threat weed' species. Species present include: Sporobolus indicus (Parramatta Grass), Ehrharta erecta (Panic Veldtgrass), *Stenotaphrum secundatum* (Buffalo Grass), Cenchrus clandestinus (Kikuyu Grass), *Cynodon dactylon* (Bermuda Grass), *Chloris gayana* (Rhodes Grass), *Eleusine indica* (Wiregrass), *Paspalum dilatatum* (Dallis Grass), *Phleum pratense* (Common Cat's Tail), *Lantana camara* (Lantana), *Sida rhombifolia* (Arrow-leaf Sida), *Cyperus eragrostis* (Tall Flatsedge), *Plantago lanceolata* (Ribwort Plantain), *Oxalis corniculata* (Creeping Woodsorrel), *Senecio madagascariensis* (Fireweed), *Verbena bonariensis* (Purpletop), *Axonopus fissifolius* (Carpet Grass), *Trifolium dubium* (Lesser Trefoil), *Setaria parviflora* (Marsh Bristlegrass).

This vegetation zone is considered to be in poor condition. There is little variation within this zone, which all consists of stands of native canopy species with a mix of native and exotic groundcover. The zone has been disturbed by extensive grazing.

Table 4-7 Photo-plate 5: Vegetation Zone 2

4.4.3 Zone 3 PCT 3320

Areas mapped as Zone 3 PCT 3320 were dominated by *E. crebra* and *E. tereticornis*. Regrowth *E. crebra* and *E. tereticornis* are present throughout the zone in very low quantities. No other native canopy tree species were present. All areas of this zone lacked a defined native midstratum but regrowth *Bursaria spinosa* (Sweet Bursaria) is present. Native groundcover consisted of *Dichondra repens* (Kidney Weed), *Commelina cyanea* (Scurvy Weed), *Oplismenus hirtellus* (Basket Grass), *Oxalis sp*. (Wood Sorrel) and *Glycine tabacina* (Variable Glycine).

Canopy species may provide occasional foraging or breeding habitat for highly-mobile threatened birds. No hollow-bearing trees or stick nests are present within this zone. Five dead stags are present.

In all instances, these areas were in a degraded state and possessed a large number of introduced species and weeds, including several 'high-threat weed' species. Species present include *Lantana camara* (Lantana), *Cynodon dactylon* (Bermuda Grass), *Paspalum dilatatum* (Dallis Grass), *Imperata cylindrica* (Cogon Grass), *Dactylis glomerata* (Cock's-foot), *Plantago lanceolata* (Ribwort Plantain), *Sida rhombifolia* (Arrow-leaf Sida), *Commelina cyanea* (Scurvy Weed), *Oxalis corniculata* (Creeping Woodsorrel), *Oeosporangium* sp., and *Senecio madagascariensis* (Fireweed).

This vegetation zone is considered to be in degraded condition. There is little variation within this zone, which all consists of stands of native canopy species with a mix of native and exotic groundcover. The zone has been disturbed by heavy mowing to remove Lantana.

Table 4-8 Photo-plate 6: Vegetation Zone 3

4.4.4 Zone 4 Planted native and exotic cover

Areas of planted vegetation occur over approximately 1.28 ha. This area did not correspond to any native PCTs and has been mapped as 'Planted Native and Exotic Cover' in Figure 4-5. Areas mapped as Planted Native and Exotic Cover consisted of *Jacaranda mimosifolia* (Blue Jacaranda), *E. tereticornis, E. robusta* (Swamp Mahogany), *Corymbia citriodora* (Lemon Scented Gum), *Corymbia maculata* (Spotted Gum), *Callitris columellaris* (White Cyprus Pine) and *Ligustrum lucidum* (Broad-leaved Privet) planted within a grove along a driveway and surrounding the existing dwelling house.

Canopy species may provide occasional foraging or breeding habitat for highly-mobile threatened birds. No hollow-bearing trees or stick nests are present within this zone. Five dead stags are present.

4.4.5 Zone 5 Exotic

Areas mapped as 'Exotic Grassland' occur over an area of approximately 23.4 ha and were dominated by exotic pasture species *Cynodon dactylon* (Bermuda Grass), *Paspalum dilatatum* (Dallis Grass), *Chloris gayana* (Rhodes Grass), *Lantana camara* (Lantana), *Bidens pilosa* (Cobbler's Pegs), *Senecio madagascariensis*

(Fireweed), *Solanum sisymbriifolium* (Sticky Nightshade), *Dactylis glomerata* (Cock's-foot), *Rumex Crispus* (Curly Dock), *Plantago lanceolata* (Ribwort Plantain), *Verbena bonariensis* (Purpletop). *Sida rhombifolia* (Arrow-leaf Sida), *Trifolium repens* (White Clover), and *Juncus effusus* (Common Rush).

This vegetation did not meet the description of any PCTs or threatened ecological communities.

Figure 4-5 Vegetation Zones

4.5 Vegetation Integrity (Vegetation Condition)

4.5.1 Vegetation integrity survey plots

Table 4-9 Vegetation zones and patch sizes

Vegetation zone ID	PCT ID number and name	Condition / other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	No. vegetation integrity plots used in assessment	Plot IDs of vegetation integrity plots used in assessment
Zone 1: PCT 3320 Poor	3320 - Cumberland Shale Plains Woodland	Poor condition – Minimal understorey and weedy groundcover	4.39	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	2	2	BAM Plots 1 & 2
Zone 2: PCT 3320 Poor	3320 - Cumberland Shale Plains Woodland	Poor condition – Minimal understorey and weedy groundcover	2.39	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	BAM Plot 3
Zone 3: PCT 3320 degraded	3320 - Cumberland Shale Plains Woodland	Degraded condition – Minimal understorey and weedy groundcover	2.14	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	BAM Plot 4
Planted native and exotic cover	N/A	Planted native and exotic cover	1.28	N/A	0	0	0	
Exotic	N/A	Exotic	23.20	N/A	0	0	0	

4.5.2 Scores

Table 4-10 Vegetation integrity scores

Vegetation zone ID	Composition condition score	Structure condition score	Function condition score (where relevant)	Vegetation integrity score	Hollow bearing trees present?
Zone 1: PCT 3320 Poor	8.9	22.0	35.6	19.1	No
Zone 2: PCT 3320 Poor	4.9	19.2	29.5	14.1	No
Zone 3: PCT 3320 degraded	8.4	31.8	43.8	22.7	No
Planted native and exotic cover	-	-	-	-	No
Exotic	-	-	-	-	No

5 HABITAT SUITABILITY FOR THREATENED SPECIES

5.1 Identification of Threatened Species for Assessment

5.1.1 Ecosystem credit species

Ecosystem credit species predicted to occur within the subject site are generated by the BAM-C following the input of vegetation integrity data and the PCTs identified within Section 4. Ecosystem credit species predicted to occur at the subject site, their associated habitat constraints, geographic limitations and sensitivity to gain class are included in Table 5-1. The relevant justification for the exclusion of ecosystem credit species is also included in Table 5-1.

5.1.2 Species credit species

Species credit species are threatened species for which vegetation surrogates and/or landscape features cannot reliably predict the likelihood of their occurrence or components of their habitat. These species are identified in the TBDC. A targeted survey or an expert report is required to confirm the presence of these species on the subject land. Alternatively, for a development, activity, clearing or biodiversity certification proposal only, the proponent may elect to assume the species is present.

Species credit species that require further assessment on the subject site (i.e. candidate species), their associated habitat constraints, geographic limitations and sensitivity to gain class are included in Table 5-2.

5.1.3 Dual credit species

Dual credit species are threatened species that the TBDC identifies as both ecosystem credits and species credit species. Dual credit species are generally highly mobile species that rely on particular habitat components for breeding or require particular areas in the landscape important for their survival. For dual credit species, part of the habitat is assessed as a species credit. The remaining habitat components for the species are assessed as an ecosystem credit (e.g. foraging habitat).

5.2 Threatened Flora Survey Methods

5.2.1 Field surveys

Targeted flora surveys were conducted for the following species:

- Pimelea spicata (Spiked Rice Flower)
- *Grevillea juniperina subsp. Juniperina* (Juniper-leaved Grevillea)
- *Micromyrtus minutiflora*
- *Persoonia nutans* (Nodding Geebung)

Targeted flora surveys consisted of transects within areas of suitable habitat within the subject site (Figure 5-1). Transects were undertaken on foot, with a minimum of 2 x 100 m traverses per 2 - 50 ha of stratification unit.

5.3 Threatened Fauna Survey Methods

5.3.1 Field surveys

The location of field survey efforts is presented in Figure 5-2.

5.3.1.1 Diurnal birds

Passive recording was undertaken through the deployment of three acoustic recorders (Wildlife Acoustics Song Meter Mini 2) from Tuesday 23rd till Tuesday 30th April 2024. The acoustic recorders were set to record for four hours around sunrise and sunset each day over the survey period.

Acoustic recordings were subsequently analysed and classified using cluster analysis in Kaleidoscope Pro Analysis Software.

This was supplemented with two (2) diurnal bird point count surveys. A minimum of 30 minutes of survey was undertaken at each survey point. Survey points were selected to give an unobstructed view over a section of the subject site, as well as to ensure even spread and representation across the site and its vegetation communities.

5.3.1.2 Nocturnal birds

Passive recording was undertaken through the deployment of three acoustic recorders from Tuesday 23rd to Tuesday 30th April 2024.

This survey was supplemented with two spotlighting surveys, conducted on Monday 22nd April and Friday 10th May.

5.3.1.3 Bats

Passive recording was undertaken through the deployment of two ultrasonic recorders (Wildlife Acoustics Song Meter Mini Bat 2) from Tuesday 23rd to Tuesday 30th April 2024. The acoustic recorders were set to trigger recording one hour before sunset and cease recording one hour after sunrise each day over the survey period.

This was supplemented with two spotlighting surveys conducted on Monday 22nd April and Friday 10th May.

5.3.1.4 Arboreal and terrestrial mammals

Targeted surveys for Koala were conducted using the Spot Assessment Technique (SAT) as described by Phillips & Callaghan (2008) and the Biodiversity Assessment Method Survey Guide (DPE 2022). In the field the technique is applied as follows:

- Locate and mark a centre tree that meets one or more of the following selection criteria:
  - a tree of any species beneath which one or more Koala faecal pellets have been observed and/or
  - a tree in which a Koala has been observed and/or
  - any other tree known or considered to be potentially important for Koala, or of interest for other assessment purposes
- Identify and uniquely mark the 29 nearest trees to the centre tree,
- Undertake a search for Koala faecal pellets beneath each of the 30 marked trees based on an inspection of the undisturbed ground surface within a distance of 100 centimetres around the base of each tree, followed (if no faecal pellets are initially detected) by a more thorough inspection involving disturbance of the leaf litter and ground cover within the prescribed search area.

The SAT survey was supplemented with spotlighting surveys repeated on Monday 22nd April and Friday 10th May. Three 200 m transects were surveyed. Spotlighting surveys were undertaken on foot, moving at approximately 10 m/min, using a 1000-lumen handheld torch. Remote acoustic recording was also conducted using three acoustic recorders from Tuesday 23rd to Tuesday 30th April 2024.

5.3.1.5 Cumberland Plain Land Snail

Given the presence of potentially suitable habitat for Cumberland Plain Land Snail (*Meridolum corneovirens*), target surveys for snails or shells were undertaken within three (3) search areas within the subject site.

The base of trees, logs, stumps, artificial refuse and rocks were turned over and rotten sections of logs were peeled away. Dense areas of leaf litter were also scraped using a trowel. Surveys were conducted for 30 minutes per search area, within a buffer area of 30 m.

5.4 Weather Conditions

The BAM assessment and targeted species surveys were conducted over two weeks in April and May. The weather conditions over this period ranged from warm and sunny, to cold with light rain.

Survey undertaken (e.g., method / targeted species)	Date	Time	Temperature (min. & max.)	Wind (light, moder…)	Rainfall (mm)
BAM floristics Habitat assessment	22/04/2024	8 am – 5:30 pm	10.4 – 23.8 °C	Calm	0
BAM floristics Habitat assessment	23/04/2024	8 am – 5:30 pm	9.6 – 26 °C	Light	0
BAM floristics Cumberland Plain Land Snail	30/04/2024	8 am – 5:30 pm	13.8 – 19.2 °C	Moderate	0

Koala Survey (Spotlighting & SAT)	22/04/2024	12 pm – 8:30 pm	10.4 – 23.8 °C	Calm	0
Koala Survey (Spotlighting & SAT)	10/05/2024	12 pm – 8:30 pm	13.7 – 20.9 °C	Calm	3.2
Acoustic Survey (Diurnal Birds & Koala)	23/04/2024 to 30/04/2023	4:30 am – 8:30 am 3:30 pm – 7:30 pm	7.2 – 27.3 °C	Various	0
Acoustic Survey (Bats)	23/04/2024 to 30/04/2023	4:30 pm – 7:30 am	7.2 – 27.3 °C	Various	0

Date	Preceding Rainfall (mm)			
	7 Days	14 Days	21 Days	28 Days
22/04/2024	6.8 mm	22.6 mm	221 mm	221mm

5.5 Limitations

As many fauna species are cryptic and/or nocturnal and/or wide-ranging and mobile, they are therefore unlikely to be detected even during seasonal surveys. The fauna assessment is therefore largely an assessment of the potential of the subject site as habitat for various fauna species. Due to the relatively large number of trees on site, there is a chance that some fauna habitat was missed.

The flora survey was completed over two weeks in April and May and does not assess any seasonal variation in species composition. The surveys conducted an appraisal of the vascular flora species evident above ground. No study has been undertaken in relation to those parts of the vascular plants below ground level; of the soil-stored seed bank or other forms of dormant propagules.

Sufficient survey and assessment effort was made to make professional judgements of the likelihood of presence of threatened species during the assessed time of day and year. Whilst all reasonable attempts have been made to discern the vascular flora present, there is no assurance that other threatened species will not be encountered in the proposed development area.

Except for species definitely recorded from the site, or for which targeted surveys have been conducted, there is no certainty as to the presence or absence of the species discussed. Therefore, it is important to adopt the precautionary principle such that it is assumed that any threatened species is likely to occur at the site if suitable habitat exists.

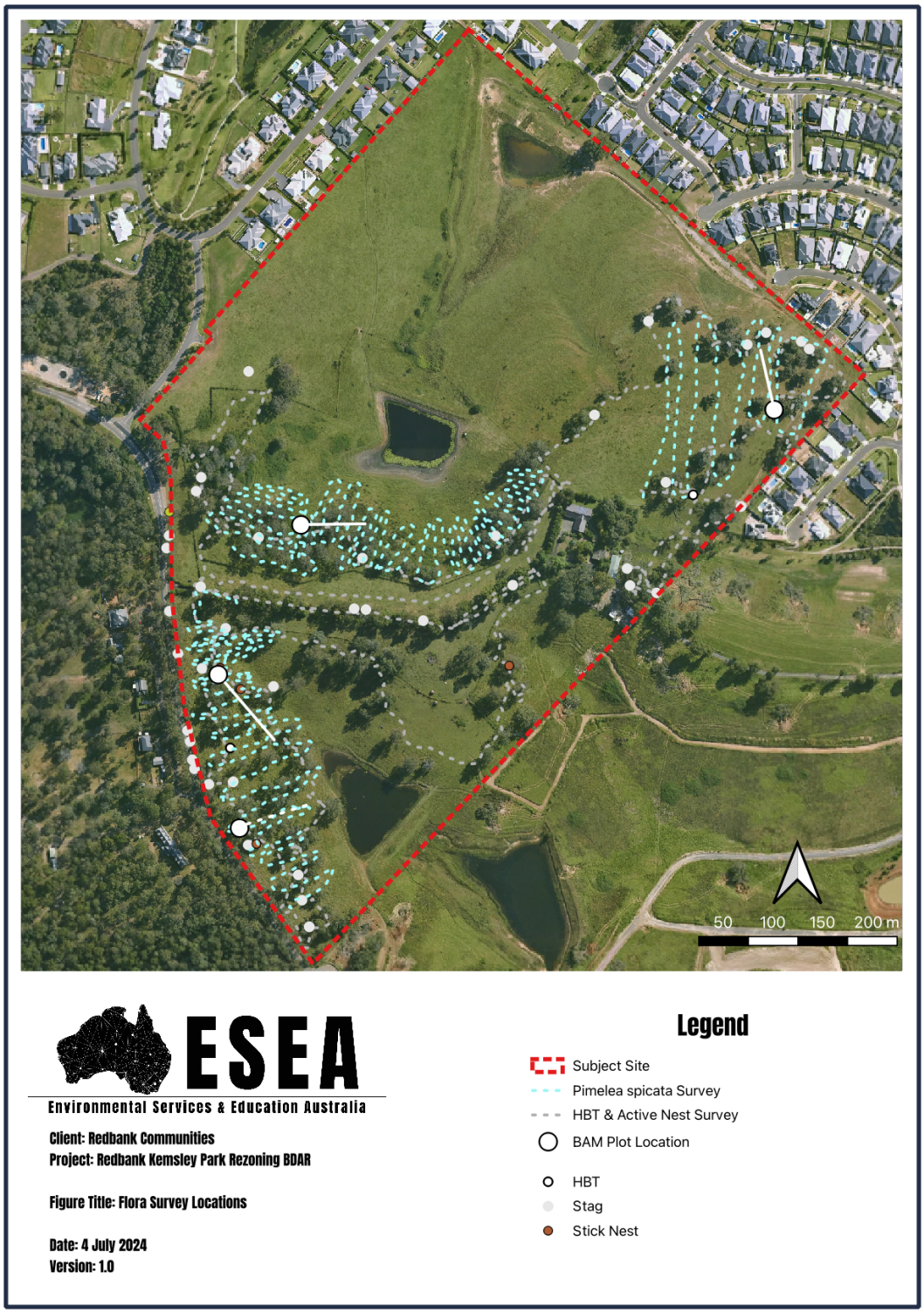


Figure 5-1 Flora Survey Tracks

Figure 5-2 Field Survey Locations

Table 5-1 Predicted ecosystem credit species

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Regent Honeyeater	*Anthochaera phrygia*	Critically Endangered	Critically Endangered	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	High
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	Vulnerable	Not Listed	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	Moderate
Gang-gang Cockatoo	*Callocephalon fimbriatum*	Vulnerable	Endangered	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	Moderate
South-eastern Glossy Black-Cockatoo	*Calyptorhynchus lathami lathami*	Vulnerable	Vulnerable	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Habitat constraints – No Allocasuarina and casuarina species present within the subject site		
Speckled Warbler	*Chthonicola sagittata*	Vulnerable	Not Listed	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	High
Spotted Harrier	*Circus assimilis*	Vulnerable	Not Listed	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	Moderate

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	Vulnerable	Not Listed	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	High
Varied Sittella	*Daphoenositta chrysoptera*	Vulnerable	Not Listed	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	Moderate
Spotted-tailed Quoll	*Dasyurus maculatus*	Vulnerable	Endangered	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	High
Black-necked Stork	*Ephippiorhynchus asiaticus*	Endangered	Not Listed	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	Moderate
Black Falcon	*Falco subniger*	Vulnerable	Not Listed	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	Moderate
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	Vulnerable	Not Listed	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	High

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Little Lorikeet	*Glossopsitta pusilla*	Vulnerable	Not Listed	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	High
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	Vulnerable	Not Listed	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	High
Little Eagle	*Hieraaetus morphnoides*	Vulnerable	Not Listed	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	Moderate
White-throated Needletail	*Hirundapus caudacutus*	Not Listed	Vulnerable	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	High
Swift Parrot	*Lathamus discolor*	Endangered	Critically Endangered	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	Moderate
Square-tailed Kite	*Lophoictinia isura*	Vulnerable	Not Listed	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	Moderate

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Black-chinned Honeyeater (eastern subspecies)	*Melithreptus gularis gularis*	Vulnerable	Not Listed	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	Moderate
Eastern Coastal Free-tailed Bat	*Micronomus norfolkensis*	Vulnerable	Not Listed	No	☒ BAM-C ☐ TBDC ☒ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	High
Little Bent-winged Bat	*Miniopterus australis*	Vulnerable	Not Listed	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	High
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	Vulnerable	Not Listed	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	High
Turquoise Parrot	*Neophema pulchella*	Vulnerable	Not Listed	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	High
Barking Owl	*Ninox connivens*	Vulnerable	Not Listed	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	High

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Eastern Osprey	*Pandion cristatus*	Vulnerable	Not Listed	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Habitat constraint – Feeding habitat is not present within the subject site. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes		
Scarlet Robin	*Petroica boodang*	Vulnerable	Not Listed	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	Moderate
Flame Robin	*Petroica phoenicea*	Vulnerable	Not Listed	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	Moderate
Grey-headed Flying-fox	*Pteropus poliocephalus*	Vulnerable	Vulnerable	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	High
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	Vulnerable	Not Listed	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	High
Greater Broad-nosed Bat	*Scoteanax rueppellii*	Vulnerable	Not Listed	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	High

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Diamond Firetail	*Stagonopleura guttata*	Vulnerable	Not Listed	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	Moderate
Rosenberg's Goanna	*Varanus rosenbergi*	Vulnerable	Not Listed	No	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes		Vegetation zones 1, 2 and 3	High

5.5.1.1 Species Credit Species

Table 5-2 lists all predicted species credit species (e.g. automatically populated in BAM-C, recently listed under the BC Act and not yet added to the TBDC). It identifies and justifies species added to the BAM-C list or removed from the list.

Table 5-2 Candidate species credit species

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Downy Wattle	*Acacia pubescens*	Vulnerable	Vulnerable	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Not identified in subject site. The development site is substantially degraded and does not possess habitat for the species.	N/A
Regent Honeyeater (breeding)	*Anthochaera phrygia*	Critically Endangered	Critically Endangered	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	The development site is not included in the DPIE BAM – Regent Honeyeater Important Areas Map.	N/A

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Bush Stone-curlew	*Burhinus grallarius*	Endangered	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	The development site is substantially degraded. Grasslands present within the development site are subject to frequent mowing and lack fallen timber.	N/A
Gang-gang Cockatoo	*Callocephalon fimbriatum*	Vulnerable	Endangered	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	The development site is substantially degraded such that old growth forest attributes, which the species favours for nesting, are absent.	N/A
South-eastern Glossy Black-Cockatoo	*Calyptorhynchus lathami lathami*	Vulnerable	Vulnerable	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	The development site is substantially degraded such that old growth forest attributes, which the species favours for nesting, are absent.	N/A
Eastern Pygmy Possum	*Cercartetus nanus*	Vulnerable	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	The development site is substantially degraded such that suitable habitat features for this species (i.e., a dense midstorey) are not present. Previous surveys in the locality for arboreal mammals returned no indication of this species' presence.	N/A
Large-eared Pied Bat	*Chalinolobus dwyeri*	Vulnerable	Vulnerable	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	BAM habitat constraint. No cliffs, caves, overhangs, escarpments, outcrops or crevices in proximity (2km) of the subject site.	N/A

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
	Deyeuxia appressa	Endangered	Endangered	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	The development site is substantially degraded by historic grazing by cattle, and regular mowing to remove Lantana. Highly restricted NSW endemic known only from two pre-1942 records in the Sydney area. Was first collected in 1930 at Herne Bay, Saltpan Creek, off the Georges River, south of Bankstown. Was then collected in 1941 from Killara, near Hornsby. Has not been collected since and may now be extinct in the wild due to the level of habitat loss and development that has occurred within these areas.	N/A
	Dillwynia tenuifolia	Vulnerable	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Lack of suitable habitat. This species may be locally abundant within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland. The subject site does not possess these habitat features.	N/A

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Camden White Gum	*Eucalyptus benthamii*	Critically Endangered	Vulnerable	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Not observed during site assessments.	N/A
Slaty Red Gum	*Eucalyptus glaucina*	Vulnerable	Vulnerable	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Not observed during site assessments.	N/A
Juniper-leaved Grevillea	*Grevillea juniperina subsp. juniperina*	Vulnerable	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Targeted surveys conducted. Species was not observed during site assessments. The development site is substantially degraded.	N/A
White-bellied Sea-Eagle (Breeding)	*Haliaeetus leucogaster*	Vulnerable	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Breeding habitat absent. i.e., no large emergent trees containing stick nests.	N/A
	Hibbertia puberula	Endangered	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Habitat absent: i.e., the species occurs on sandy soil often associated with sandstone, or on clay.	N/A
Little Eagle (Breeding)	*Hieraaetus morphnoides*	Vulnerable	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Breeding habitat absent. i.e., Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	N/A
Swift Parrot (Breeding)	*Lathamus discolor*	Endangered	Critically Endangered	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	BAM constraint i.e. subject site is not located on Important Areas Map for the species.	N/A

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Green and Golden Bell Frog	*Litoria aurea*	Endangered	Vulnerable	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha spp.*) or spikerushes (*Eleocharis spp.*). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region, occur in highly disturbed areas.	Exotic
Square-tailed Kite (Breeding)	*Lophoictinia isura*	Vulnerable	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	The Square-tailed Kite will forage around suburban trees and shrubs, and nest in urban bushland. The species builds a large stick platform in a living tree, in open forest or woodland or near edges or openings in forest. Eucalypt-dominated open forests and woodlands, and inland riparian woodland are preferred nesting habitat.	Vegetation zones 1 and 2
Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	*Marsdenia viridiflora subsp. viridiflora - endangered population*	Endangered	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	BAM geographic constraint. Subject site is not located within any of the relevant LGAs.	N/A

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Cumberland Plain Land Snail	*Meridolum corneovirens*	Endangered	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Not found during targeted surveys.	N/A
	Micromyrtus minutiflora	Endangered	Vulnerable	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Not observed during site assessments. The development site is substantially degraded.	N/A
Little Bent-winged Bat (Breeding)	*Miniopterus australis*	Vulnerable	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	BAM habitat constraint - No caves, tunnels, mines, culverts or other structures present within the subject site that could be used for breeding.	N/A
Large Bent-winged Bat (Breeding)	*Miniopterus orianae oceanensis*	Vulnerable	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	BAM habitat constraint - No caves, tunnels, mines, culverts or other structures present within the subject site that could be used for breeding.	N/A
Southern Myotis	*Myotis macropus*	Vulnerable	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	Recorded as occurring within subject site (ESEA 2024), and adjacent sites (EcoLogical 2022).	Vegetation zones 1, 2 and 3
Barking Owl	*Ninox connivens*	Vulnerable	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	The development site does not contain suitable hollow-bearing trees.	N/A

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Powerful Owl	*Ninox strenua*	Vulnerable	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	The development site does not contain suitable hollow-bearing trees. Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old.	N/A
Eastern Osprey (Breeding)	*Pandion cristatus*	Vulnerable	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Targeted diurnal bird surveys conducted + active nest surveys. The species was not observed during site assessments.	N/A
Nodding Geebung	*Persoonia nutans*	Endangered	Endangered	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Targeted surveys conducted. Species was not observed during site assessments. The development site is substantially degraded.	N/A

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Southern Greater Glider	*Petauroides volans*	Endangered	Endangered	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	The development site is substantially degraded and does not contain suitable habitat. The species shelters in tree hollows, with a particular selection for large hollows in large, old trees. The density of hollow-bearing trees within the subject site is less than required by the species – In the Grafton/Casino FMA, the Greater Glider was absent from surveyed sites with fewer than six tree hollows per hectare. In southern Queensland, Greater Gliders require at least 2-4 live den trees for every 2 ha of suitable forest habitat.	N/A
Squirrel Glider	*Petaurus norfolcensis*	Vulnerable	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	*Petaurus sp.* opportunistically observed by Ecological Australia (2022) while undertaking vegetation plots.	Vegetation zones 1, 2 and 3
Koala	*Phascolarctos cinereus*	Endangered	Endangered	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Not observed during targeted species surveys.	N/A
	Pimelea curviflora var. curviflora	Vulnerable	Vulnerable	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	The development site is substantially degraded and does not contain potential habitat (Confined to coastal areas around Sydney on sandstone).	N/A

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Spiked Rice Flower	*Pimelea spicata*	Endangered	Endangered	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	Targeted surveys conducted. The species was not observed during assessments.	N/A
Brown Pomaderris	*Pomaderris brunnea*	Endangered	Vulnerable	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	The development site is substantially degraded and does not contain suitable habitat for the species i.e. (*E. amplifolia, E. elata, E. piperita* or *E. punctata* growing in association with Allocasuarina spp. and *Bursaria spinosa*).	N/A
P. prunifolia in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas	*Pomaderris prunifolia - endangered population*	Endangered	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	BAM geographic constraint. The development site is not located within any of the relevant LGAs.	N/A
Grey-headed Flying Fox (Breeding)	*Pteropus poliocephalus*	Vulnerable	Vulnerable	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	BAM habitat constraint. The development site does not contain breeding camps.	N/A
Sydney Plains Greenhood	*Pterostylis saxicola*	Endangered	Endangered	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	The development site is substantially degraded and does not contain habitat for the species (i.e., sandstone rock shelves above cliff lines). The subject site is not within one of the known localities for the species (Georges River National Park (near Yeramba Lagoon), Ingleburn, Holsworthy, Peter Meadows Creek and St Marys Towers near Douglas Park).	N/A

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
	Pultenaea parviflora	Endangered	Vulnerable	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	The development site is substantially degraded. It does not possess well-developed or regenerating low shrub layer, or associated dominant canopy species (*E. fibrosa, E. globoidea, E. longifolia, E. parramattensis, E. sclerophylla* and *E. sideroxylon*).	N/A
Matted Bush-pea	*Pultenaea pedunculata*	Endangered	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Yes	In the Cumberland Plain the species favours sites in clay or sandy-clay soils (Blacktown Soil Landscape) on Wianamatta Shale-derived soils, usually close to patches of Tertiary Alluvium (Liverpool area) or at or near the Shale-Sandstone interface (Appin). All sites have a lateritic influence with ironstone gravel (nodules) present. On the Cumberland Plain the species is recorded from Cumberland Plain Woodlands, the shale-soil form of Shale Sandstone Transition Forests and Cooks River/Castlereagh Ironbark Forest.	Vegetation zones 1, 2 and 3
Masked Owl	*Tyto novaehollandiae*	Vulnerable	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	The development site does not contain suitable hollow-bearing trees.	N/A

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield	*Wahlenbergia multicaulis - endangered population*	Endangered Population	Not Listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	No	BAM geographic constraint. The development site is not located within any of the relevant LGAs.	N/A

5.6 Threatened Species Surveys

Targeted surveys for species credit species undertaken at the subject site in accordance with relevant survey guidelines are detailed in Table 5-3. The locations of targeted surveys are shown in Figure 5-2.

A summary of surveys undertaken within the subject site and surrounding areas by ESEA (2024), Molino Stewart (2018) and Ecological Australia (2022) are presented in Table 5-4.

Table 5-3 Targeted surveys

Common name	Scientific name	Threatened flora species surveys				Results	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Microbats		Remote acoustic + spotlighting	☐ Yes	☒ No	Remote Acoustic Tuesday 23rd – Tuesday 30th April Total recorder hours = 80 Spotlighting: Monday 22nd April and Friday 10th May Total hours = 4 No. People = 1	Likely Calls: Southern Myotis Eastern Coastal Free-tailed Bat Eastern False Pipistrelle Large-eared Pied Bat Potential Calls: Large-footed Myotis Little Forest Bat	No
Squirrel Glider	*Petaurus norfolcensis*	Spotlighting + Remote acoustic	☒ Yes	☐ No	Spotlighting: Monday 22nd April and Friday 10th May Total hours = 4 No. People = 1 Remote Acoustic: Tuesday 23rd – Tuesday 30th April Total recorder hours = 64	None observed	No
Koala	*Phascolarctos cinereus*	SAT Assessment Technique + Spotlighting + Remote acoustic	☒ Yes	☐ No	Spotlighting: Monday 22nd April and Friday 10th May Total hours = 4	None observed	No

Common name	Scientific name	Threatened flora species surveys				Results	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
					No. People = 1 SAT Technique Wednesday 1st May Total hours = 3 No. people = 1		
Cumberland Plain Land Snail	*Meridolum corneovirens*	Litter Search	☒ Yes	☐ No	Litter Search Wednesday 1st May Total hours = 1.5 No. people = 1	None observed	No
	Grevillea juniperina subsp. Juniperina	Transect search	☒ Yes	☐ No	Transect Search Friday 10th May Total hours = 2 No. people = 1	None observed	No
	Persoonia nutans	Transect search	☒ Yes	☐ No	Transect Search Friday 10th May Total hours = 2 No. people = 1	None observed	No
	Pimelea spicata	Transect search	☒ Yes	☐ No	Transect Search Friday 10th May + Fri 21st June + Thu 4th July Total hours = 12 No. people = 1	None observed	No
	Micromyrtus minutiflora	Transect search	☒ Yes	☐ No	Transect Search Friday 10th May Total hours = 2 No. people = 1	None observed	No

Table 5-4 Targeted surveys previously conducted in the locality

Common name	Scientific name	Surveys conducted by	Location	Effort	Timing	Results
Microbats		Ecological (2022)	Redbank Southern Valley Site	Three detectors were set to passively record ultrasonic microbat calls from 30 minutes before sunset to 30 minutes after sunrise at three different locations for a total of 18 survey nights.	29 March 2021 – 6 April 2021	Definite calls: Large- eared Pied Bat Eastern Coastal Free- tailed Bat Large Bent- winged Bat Southern Myotis Greater Broad- nosed Bat Potential calls: Eastern Cave Bat Eastern False Pipistrelle Little Bent- winged Bat
Microbats		Molino Stewart (2018)	Redbank Southern Valley Site	One Anabat was deployed for three survey nights.	6th and 9th September 2018	Large- eared Pied Bat Eastern Coastal Free- tailed Bat
Squirrel Glider	*Petaurus norfolcensis*	Ecological (2022)	Redbank Southern Valley Site	Hollow-bearing tree inspection by a suitably qualified climbing arborist; Remote cameras; Hair tape.	Hollow inspection: 20 May and 18 June 2021. Remote cameras: 1 June – 18 June 2021. Hair tape: 20 May – 18 June 2021.	No fauna was observed using the hollows and no hair was collected on tape
Arboreal Mammals		Molino Stewart (2018)	Redbank Southern Valley Site	Spotlighting and search for scratch marks within trees.	6th and 9th September 2018	No fauna observed
Koala	*Phascolarctos cinereus*	Ecological (2022)	Redbank Southern Valley Site	SAT searches were undertaken in patches of PCT 849 within the site boundary.	14th April 2021	No scats observed
Koala	*Phascolarctos cinereus*	Molino Stewart (2018)	Redbank Southern Valley Site	Scat searches beneath eucalypts.	6th and 9th September 2018	No scats observed

Common name	Scientific name	Surveys conducted by	Location	Effort	Timing	Results
Cumberland Plain Land Snail	*Meridolum corneovirens*	Ecological (2022)	Redbank Southern Valley Site	Searches targeted areas of most appropriate habitat, i.e. around the base of Eucalyptus spp. within the site boundary.	29th March 2021	No shells or live specimen observed
Cumberland Plain Land Snail	*Meridolum corneovirens*	Molino Stewart (2018)	Redbank Southern Valley Site	Snail and shell searches conducted beneath eucalypts.	6th and 9th September 2018	No shells or live specimen observed
Flora		Molino Stewart (2018)	Redbank Southern Valley Site	Random meander within patches of native vegetation.	6th and 9th September 2018	No threatened specimen observed
Frogs		Molino Stewart (2018)	Redbank Southern Valley Site	Spotlighting and call playback for five person hours over two nights.	6th and 9th September 2018	None
Diurnal birds		Molino Stewart (2018)	Redbank Southern Valley Site	Bird species were recorded between 4pm and 6pm.	6th and 9th September 2018	No threatened species observed

5.7 Presence of Candidate Species Credit Species

Table 5-5 identifies species determined to be present within the subject land in accordance with BAM Subsection 5.2.4 based on:

- assumed presence within the subject land
- an important habitat map (for dual credit species)
- targeted threatened species surveys, or
- an expert report

Table 5-5 Candidate species credit species

Common name	Scientific name	Listing status		Method used to determine presence	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act		
Green and Golden Bell Frog	*Litoria aurea*	Endangered	Vulnerable	Assumed presence	Yes (see Section 10)
Square-tailed Kite	*Lophoictinia isura*	Vulnerable	-	Assumed presence	No
Southern Myotis	*Myotis macropus*	Vulnerable	-	Surveyed	No
Matted Bush-pea	*Pultenaea pedunculata*	Endangered	-	Assumed presence	No

Table 5-6 Species credit species included in the assessment

Common name	Scientific name	Species presence	Geographic limitations	Area of habitat within subject site (ha)	Area of impacted habitat (ha)	Biodiversity risk weighting	Species polygon justification
Green and Golden Bell Frog	*Litoria aurea*	Assumed presence	Semi-permanent/ephemeral wet areas within 1 km of wet areas. Within 1 km of swamps or waterbodies.	18.3	14.8	2.00	The species polygon boundary should align with aquatic habitats linked directly to the record and a buffer, incorporating the PCTs with which the species is associated, of 200 metres radius from the top of bank. The polygon should include minimum 50 metre wide corridors of native and non-native vegetated

							areas linking the available waterbodies, where relevant. Terrestrial habitat consists of grassy areas and vegetation no higher than woodlands.
Square-tailed Kite	*Lophoictinia isura*	Assumed presence	Nest trees	8.9	7.72	1.50	The Square-tailed Kite will forage around suburban trees and shrubs, and nest in urban bushland. It builds a large stick platform in a living tree, in open forest or woodland or near edges or openings in forest.
Southern Myotis	*Myotis macropus*	Surveyed	Hollow-bearing trees. Waterbodies with permanent pools/stretches 3 m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200 m of the site.	6.3	5.85	2.00	The NSW survey guide for 'Species credit' threatened bats and their habitats (OEH 2018) specify that the species polygon for Southern Myotis should incorporate associated PCTs within 200 m of water bodies.
Matted Bush-pea	*Pultenaea pedunculata*	Assumed presence	Nil	8.9	7.72	2.00	NSW populations are generally among woodland vegetation. On the Cumberland Plain the species is recorded from Cumberland Plain Woodlands.

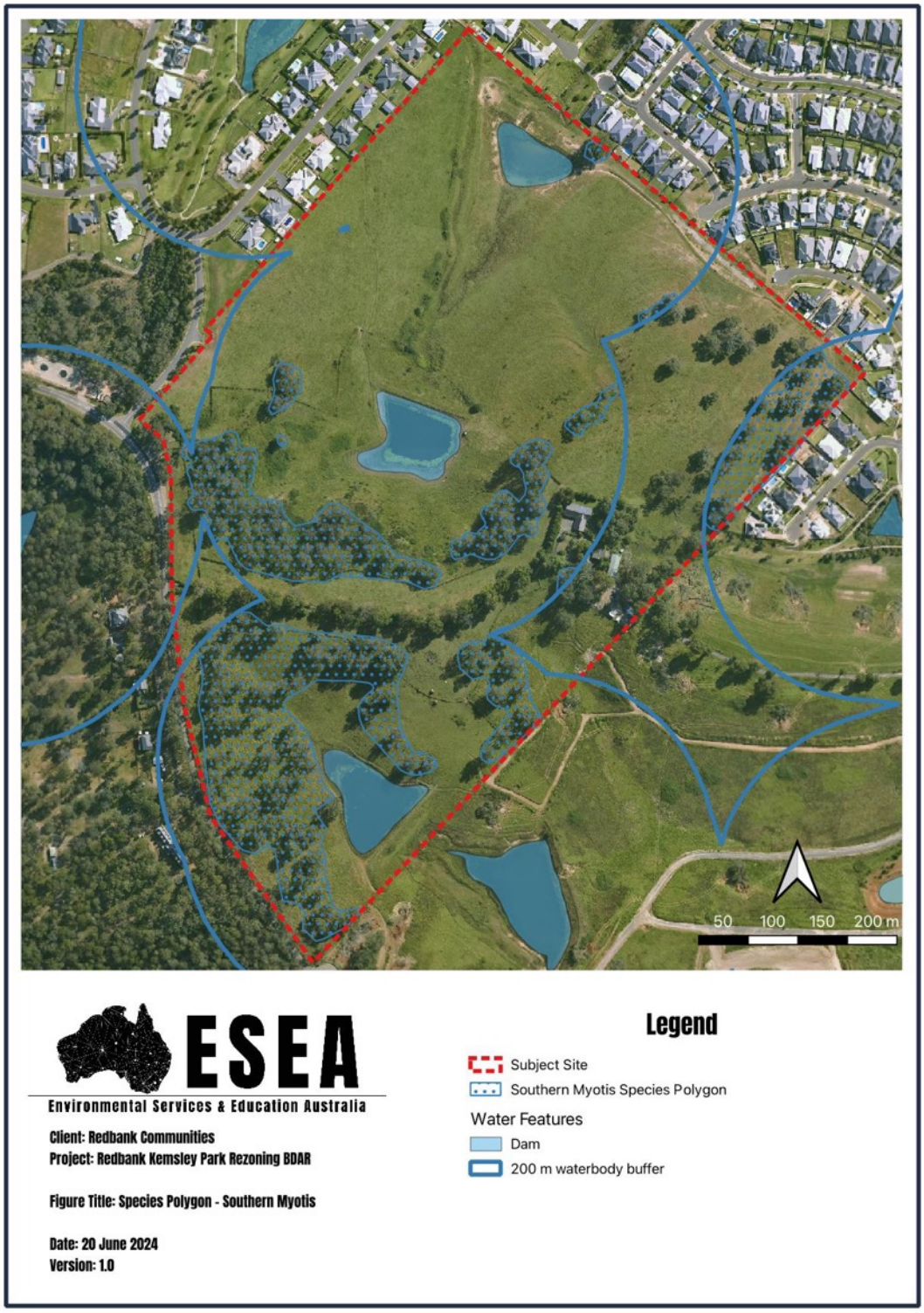


Figure 5-3 Species Polygon - Southern Myotis

Figure 5-4 Species Polygon - Green and Golden Bell Frog

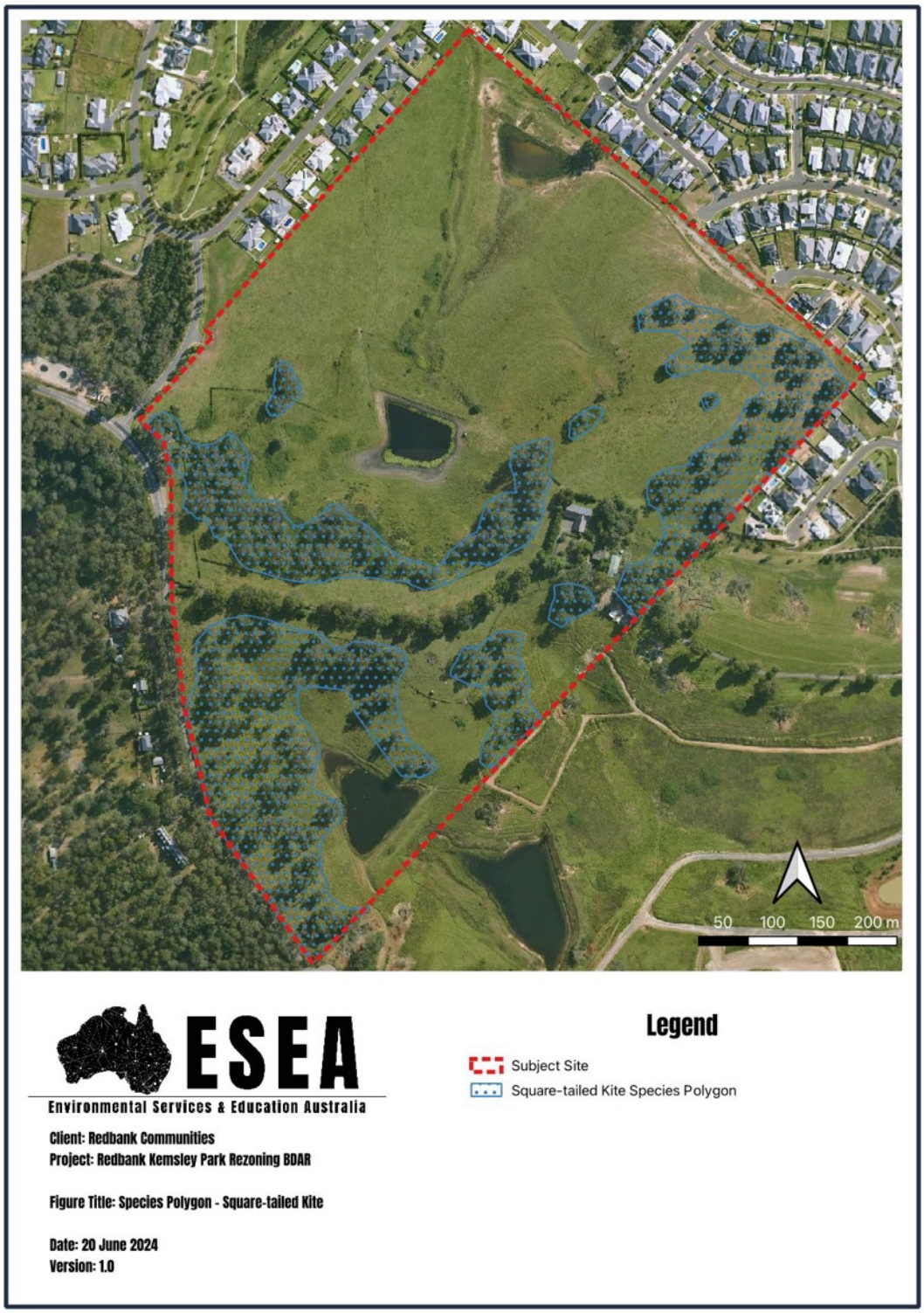


Figure 5-5 Species Polygon - Square-tailed Kite

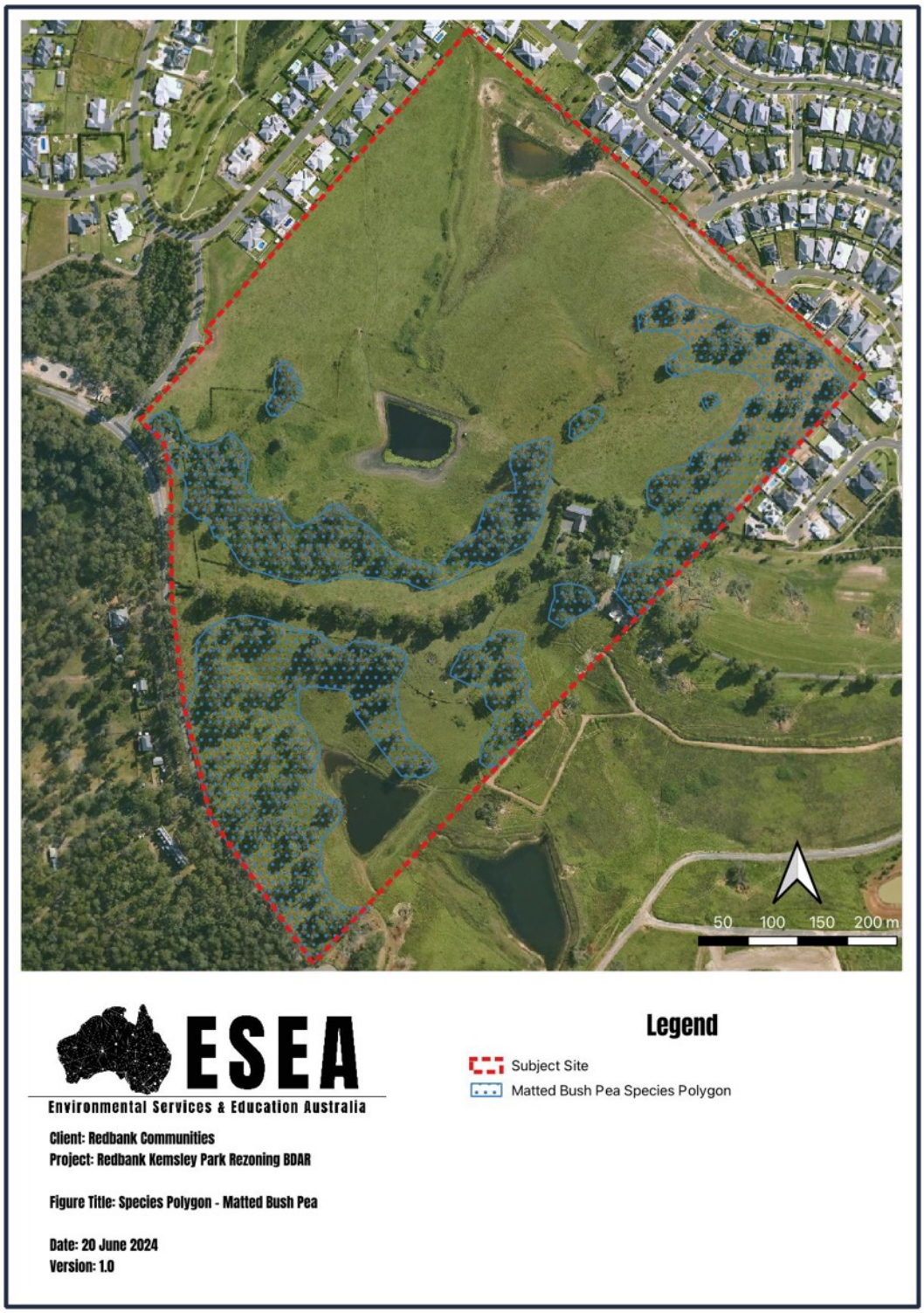


Figure 5-6 Species Polygon - Matted Bush Pea

6 IDENTIFYING PRESCRIBED IMPACTS

Table 6-1 Identification of prescribed additional biodiversity impact entities

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature.
Karst, caves, crevices, cliffs, rocks or other geological features of significance	☐Yes / ☒No	The subject site does not contain any geological features of significance.	N/A
Human-made structures	☒Yes / ☐No	The subject site contains one residential dwelling and several sheds. All human-made structures are in good condition and continue to be used / maintained.	Nil
Non-native vegetation	☒Yes / ☐No	Non-native vegetation, particularly exotic pasture, was dominant throughout the subject site and was not identified as potential habitat for any threatened species.	Nil
Habitat connectivity	☒Yes / ☐No	The subject site is largely cleared, and connectivity is limited. Some connectivity for highly mobile species may be present between the scattered trees and dams present within the subject site. Tracts of native vegetation present along the southern boundaries may also provide some connectivity for highly mobile species. These areas of vegetation are separated from the subject site by fences and Grose Vale Road.	Highly mobile, threatened birds and bats that are likely to use native vegetation and dams within the development site (mostly while foraging) were included as ecosystem credit species.
Waterbodies, water quality and hydrological processes	☒Yes / ☐No	The subject site contains a mapped network of watercourses and three dams. The proposed development would remove these dams	Species with waterbodies as habitat constraints, include: - Southern Myotis. Dams present within the subject site may provide occasional foraging habitat for the Southern Myotis. Similar habitat for this species would still be present within the assessment area in the form of dams, the Hawkesbury River and Redbank Creek.
Wind turbine strikes (wind farm development only)	☐Yes / ☒No	This prescribed impact is not relevant to the proposed development.	N/A
Vehicle strikes	☒Yes / ☐No	It is considered highly unlikely for fauna other than highly mobile species to be present within the subject site. Therefore, the proposed development would be unlikely to result in vehicle strike during construction or during operation as a residential subdivision.	Nil

7 AVOID AND MINIMISE IMPACTS

7.1 Avoid and Minimise Direct and Indirect Impacts

7.1.1 Project location

The BAM requires locating and designing a project to avoid and minimise direct and indirect impacts on biodiversity values and prescribed biodiversity impacts.

Most of the subject site (23.4 ha) consists of exotic vegetation within cleared grazing pasture which lacks biodiversity values. An additional 1.28 ha of the subject site consists of planted native and exotic species occurring within a planted driveway grove. This area also lacks any biodiversity value and does not contain any fauna habitat features.

The subject site contains 8.6 ha of remnant native vegetation that is consistent with PCT 3320 - Cumberland Shale Plain Woodland in poor or degraded condition. This occurs within three distinct patches with vegetation integrity scores of 19.1, 14.1 and 18.2 respectively. The proposed development would remove 7.72 ha of Cumberland Plain Woodland, a TEC that is highly cleared (93%) and an entity of risk of an SAII. Patches of the TEC are degraded and isolated. The majority of impacts (4.35 ha) are proposed for Zone 1 - PCT 3320 in poor condition, which has a low vegetation integrity score of 19.1. An additional 2.34 ha of native vegetation is proposed for removal from Zone 2 (vegetation integrity score of 14.1), and 1.03 ha from Zone 3 (vegetation integrity score of 22.7)

The development site does not contain nest trees or caves. No caves were identified within 2 km of the site during a desktop assessment.

7.1.2 Project design

The development has been designed in a way that avoids and minimises impacts. This includes the creation of open space corridors, zoned RE1 – Public Recreation, which form an integral part of the design and character of the precinct. These corridors would include native vegetation and waterbodies and would provide connectivity between other stages of the Redbank release area.

The proposed development will be designed to allow for approximately 300 lots whilst retaining 5.21 ha of land within open space corridors. These areas will be subject to environmental management works including weeding and native species replanting using locally endemic species. The open space corridors will encapsulate Stream O, as well as Dams 3, 5, and 11.

Of the retained area, 1.2 ha is native vegetation consistent with PCT 3320 - Cumberland Shale Plain Woodland, the majority of which (1.15 ha) occurs within Zone 3. A small section within Zone 1 is also being retained. This makes up approximately 0.05 ha.

The retained patches of native vegetation will contribute to connectivity throughout the landscape and will form a connectivity corridor between remnant native vegetation to the south of the development area, with native vegetation along Redbank Creek.

In total, the proposed development would remove 7.72 ha of Cumberland Plain Woodland, a Critically Endangered ecological community that is an entity at risk of an SAII. Patches of this ecological community are already in a degraded and isolated state. The proposed development would avoid direct impacts on 1.2 ha of the ecological community.

The proposed development would remove habitat for several threatened species, including:

- Green and Golden Bell Frog (14.8 ha),

- Square-tailed Kite (7.72 ha),
- Southern Myotis (5.85 ha), and
- Matted Bush-pea (7.72 ha)

Green and Golden Bell Frog, Southern Myotis and Matted Bush-pea are species credit species with a high biodiversity risk weighting (2.00). Square-tailed Kite has a moderate biodiversity risk weighting (1.50).

The proposed development would avoid direct impacts on some areas of habitat for these species by retaining habitat in open space zoned RE1 – Public Recreation.

- Green and Golden Bell Frog (~3.45 ha retained)
- Square-tailed Kite (~1.10 ha retained)
- Southern Myotis (~1.10 ha retained)
- Matted Bush-pea (~1.10 ha retained)

7.2 Avoid and Minimise Prescribed Impacts

7.2.1 Project location

Habitat connectivity and waterbodies were identified as prescribed impacts.

The location of the project does not interfere with corridors connecting different areas of habitat, migratory flight paths to important habitat, or preferred local movement pathways. Given that the subject site is already substantially degraded, connectivity is limited and only available for highly mobile species. The subject site is not known to form part of important or preferred flight paths for migratory birds.

Corridors considered in the broader context of the entire Redbank subdivision would improve connectivity throughout the landscape (Appendix D).

7.2.2 Project design

Dams 3, 5 and 11, and Stream O will all be retained within open space corridors, zoned RE1 – Public Recreation. These dams and streams provide foraging habitat for Southern Myotis and Green and Golden Bell Frog. The unshaded grassy areas surrounding these waterbodies also provide potential habitat for Green and Golden Bell Frog.

Additional areas of open space will retain 1.2 ha of remnant native canopy vegetation that is consistent with PCT 3320 – Cumberland Shale Plain Woodland. This remnant woodland provides roosting habitat for Southern Myotis and potential nesting habitat for Square-tailed Kite. It is also potential habitat for Mattered Bush Pea.

Given that the development site is substantially degraded, connectivity is limited and only available for highly mobile species. About 1.2 ha of native vegetation would be retained. Corridors of connectivity will still be available through proposed areas of open space. Corridors considered in the broader context of the entire Redbank subdivision would improve connectivity throughout the landscape.

8 IMPACT ASSESSMENT

8.1 Direct Impacts

The direct impacts of the development on native vegetation, threatened ecological communities, and threatened species habitat are outlined in Table 8-1 and Table 8-2.

8.1.1 Residual direct impacts

Table 8-1 Residual direct impacts

Direct impact (Describe the impact on PCT/TEC/EC or threatened species and their habitat)	BC Act status	EPBC Act status	SAII entity	Project phase/timing of impact (e.g. construction, operation, rehabilitation)	Extent (ha, number of individuals)
Removal of native vegetation – PCT 3320; Cumberland Plain Woodland in the Sydney Basin Bioregion	Endangered	-	Yes	Construction	7.72
Removal of habitat for Green and Golden Bell Frog	Endangered	Vulnerable	False	Construction	14.8
Removal of habitat for Square-tailed Kite	Vulnerable		False	Construction	7.72
Removal of habitat for Southern Myotis	Vulnerable		False	Construction	5.85
Removal of habitat for Matted Bush Pea	Endangered		False	Construction	7.72

Table 8-2 Change in vegetation integrity score

Vegetation zone	PCT ID	Management zone	Area of impact (ha)	Before development			After development			Change		
				Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	Change in VI score
Zone 1: PCT 3320 Poor	3320	1	4.35	8.9	22.0	35.6	19.1	0	0	0	0	-19.1
Zone 2: PCT 3320 Poor	3320	2	2.34	4.9	19.2	29.5	14.1	0	0	0	0	-14.1
Zone 3: PCT 3320 degraded	3320	3	1.03	8.4	31.8	43.8	22.7	0	0	0	0	-22.7

Vegetation zone	PCT ID	Management zone	Area of impact (ha)	Before development			After development			Change		
				Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	Change in VI score
Planted native and exotic cover	N/A	4	1.28	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Exotic	N/A	5	23.40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

8.2 Indirect Impacts

Indirect impacts associated with the proposal are summarised in Table 8-3.

Table 8-3 Indirect impacts of the proposed development

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation, rehabilitation)	Consequences
Inadvertent impacts on adjacent habitat or vegetation (accidental damage or removal of vegetation or habitat)	PCT 3320 Cumberland Plain Woodland in the Sydney Basin Bioregion	Connective vegetation to the south of the subject site	Occasionally during construction period	Potentially long-term impacts	Construction – sporadic through construction period	Low
Reduced viability of adjacent habitat due to edge effects	PCT 3320 Cumberland Plain Woodland in the Sydney Basin Bioregion	Connective vegetation to the south of the subject site	Daily during construction and operation	Potentially long-term impacts	Construction and operation	Moderate
Transport of weeds and pathogens from the site to adjacent vegetation	PCT 3320 Cumberland Plain Woodland in the Sydney Basin Bioregion	Connective vegetation to the south of the subject site	Daily during construction and operation	Potentially long-term impacts	Construction and operation	Moderate
Reduced viability of adjacent habitat due to noise, dust or light spill	PCT 3320 Cumberland Plain Woodland in the Sydney Basin Bioregion	Connective vegetation to the south of the subject site	Daily during construction period	Potentially long-term impacts	Construction and operation	Low
Potentially increased soil salinity caused by runoff during construction works	Subject site	Entire subject site	During heavy rainfall or storm events	Short term	Construction	Low

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	Impacted entities (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation, rehabilitation)	Consequences
Fertiliser drift	PCT 3320 Cumberland Plain Woodland in the Sydney Basin Bioregion	Connective vegetation to the south of the subject site	Daily during construction period and operation	Potentially long-term impacts	Construction and operation	Low
Wood collection	PCT 3320 Cumberland Plain Woodland in the Sydney Basin Bioregion	Connective vegetation to the south of the subject site	Potential to occur at any time during operation phase	Potentially long-term impacts	Operation period	Low
Increase in predators	PCT 3320 Cumberland Plain Woodland in the Sydney Basin Bioregion	Connective vegetation to the south of the subject site	Potential to occur at any time during operation phase	Potentially long-term impacts	Operation period	Moderate

8.3 Mitigating and Managing Direct and Indirect Impacts

Measures proposed to mitigate and manage impacts at the subject site before, during and after construction are outlined in Table 8-4.

Table 8-4 Measures proposed to mitigate and manage impacts

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Timing works to avoid critical life cycle events such as breeding or nursing.	Moderate	Low	Carry out pre-clearing surveys to ensure fauna is not present prior to clearing.	Impacts to fauna during nesting / nursing avoided.	During clearing works	Project manager / contractor
Instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed wildlife handler during clearing events.	Moderate	Low	Pre-clearance survey of trees to be removed and identification/location of active nests by a suitably qualified ecologist.	Any fauna utilising habitat within the subject site will be identified and managed to ensure clearing works minimise	During clearing works	Project manager / ecologist

				the likelihood of injuring resident fauna.		
Installing artificial habitats for fauna in adjacent retained vegetation and habitat or human made structures to replace the habitat resources lost and encourage animals to move from the impacted site, e.g. nest boxes.	High	Low	Nest boxes should be installed in the retained vegetation to replace hollows removed at a minimum ratio of 1:1 (i.e. one nest box for each hollow removed). Boxes should be chosen to match the likely target species of each hollow. Boxes should be installed prior to clearing works to allow fauna to move/be relocated to nest boxes prior to removal of hollow-bearing trees and be maintained and monitored for five years.	Provide fauna with compensatory roosting/nesting habitat to replace removed hollow-bearing trees.	Prior to clearing works	Project manager / ecologist
Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chain-saw, rather than heavy machinery, is preferable in situations where partial clearing is proposed.	High	Low	Boundaries of the impact area to be clearly delineated with fencing, retained areas marked with "No Go" signage. Both patches of native vegetation to be retained part of larger patches in which some trees are proposed for removal. These trees should be removed by chain-saw to reduce disturbance to vegetation to be retained.	Protection of retained vegetation. Reduction of soil disturbance where partial clearing is proposed.	During clearing works	Project manager
Sediment barriers or sedimentation ponds to control the quality of water released from the site into the receiving environment.	Moderate	Low	Install sediment barriers and erosion control during and post construction to prevent runoff into adjacent streams/dams. Maintain controls throughout construction and undertake weekly inspections. Detailed stormwater controls should be designed and implemented during the DA stage which manages quality and quantity of stormwater into the	Control of erosion, sedimentation and runoff of contaminated substances into adjacent vegetation and waterbodies.	Throughout life of project	Project Manager

			adjacent vegetation and aquatic habitats.			
Noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise.	Low	Very Low	Daily timing of construction activities is recommended in accordance with Table 1 of Interim Noise Guidelines (2009).	Noise impacts associated with the development will be managed to minimise disturbance to fauna during construction.	During construction	Project manager / contractor
Light shields of daily / seasonal timing of construction and operational activities to reduce impacts of light spill.	Low	Very Low	Conduct construction works during daylight hours. Lights should operate on a timer system during construction.	Avoid light disturbance to native fauna during construction and operation.	Throughout life of project	Project manager / contractor
Adaptive dust monitoring programs to control air quality.	Low	Very Low	Dust management controls should be implemented during construction. Dust is unlikely to be a long-term and significant issue during the operational phase.	Control dust and maintain air quality during construction.	During construction	Project manager / contractor
Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas.	Medium	Low	Vehicles, machinery and building refuse should remain only within the subject site and disposed of at an appropriate waste management facility. Weed management to be undertaken where required. Vehicles should be washed down before entering and exiting the site to prevent the spread of weeds to or from the site boundary. In particular, machinery work on or nearby dams are required to be washed down in order to prevent the potential spread of chytrid fungus into the subject site.	Prevent spread of disease to/from the site.	During construction	Project manager / contractor
Staff training and site briefing to communicate environmental features	Low	Very Low	All staff working on the development will undertake an environmental induction as part of their site	All staff entering the site are fully aware of all environmental aspects	To occur for all staff entering / working at the site and when	Project manager / all staff

to be protected and measures to be implemented.			familiarisation. Site briefings should be updated based on phase of the work.	relating to the development and know what to do in case of any environmental emergencies.	environmental issues become apparent	
Making provision for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on or adjacent to the subject site.	Medium	Low	Ongoing maintenance should be undertaken to ensure retained vegetation is not degraded over time as a result of edge effects and weed incursion. Planted vegetation should include Cumberland Plain Woodland species.	Ongoing maintenance of retained vegetation.	Following construction	Project manager

8.4 Mitigating Prescribed Impacts

The measures proposed to mitigate and manage prescribed biodiversity impacts resulting from dam removal during construction are outlined in Table 8-5.

Table 8-5 Mitigation measures for prescribed biodiversity impacts

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Implementing a dam dewatering procedure	Moderate	Low	During dewatering, an aquatic ecologist should be on site to handle aquatic fauna. A suitable aquatic fauna handling procedure is provided below.	Impacts of fauna minimised	Prior / during dam dewatering	Project manager / aquatic ecologist
Providing for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native	Moderate	Low	During operation, any retained native vegetation should be maintained and improved through restoration and rehabilitation	Retained habitat can continue to provide connectivity for highly mobile species	Throughout the life of the project	Project manager

vegetation within the subject site						

9 SERIOUS AND IRREVERSIBLE IMPACTS

9.1 Assessment for Serious and Irreversible Impacts on Biodiversity Values

The development has one candidate Serious and Irreversible Impacts (SAII) values as outlined in Table 9-1 as listed in the Threatened Biodiversity Data Collection. Detailed consideration of whether impacts on this TEC is included in Table 9-2.

Table 9-1 Entities at risk of an SAII

Common name	Scientific name	Reason for inclusion in assessment
Cumberland Plain Woodland in the Sydney Basin Bioregion	N/A	TEC subject to removal of 7.72 ha

Table 9-2 Additional impact assessment provisions for TECs at risk of an SAII

Criteria	Data / information	Data sources	Details of data deficiency, assumptions, and reasons for low confidence in information.
Current total geographic extent (ha) of the TEC in NSW	Cumberland Plain Woodland is highly restricted to the Sydney Basin Bioregion. According to the TSSC Final Determination, it was estimated to occur within an extent of 2,810 km^2. The total extent of Cumberland Plain Woodland was estimated to be ~8.8% of the community's pre-European distribution by Tozer in 2003 based on aerial photography from 1998.	NSW Threatened Species Scientific Committee Final Determination Cumberland Plain Woodland in the Sydney Basin Bioregion	
Estimated reduction in geographic extent of the TEC since 1970	An update of Tozer's (2003) map, based on interpretation of imagery flown in January-March 2007 shows that the extent of Cumberland Plain Woodland east of the Hawkesbury – Nepean River had declined by 442±46 ha, a reduction of 5.2±0.6% in 9 years (NSW Scientific Committee & Simpson 2008). These estimates indicate that the geographic distribution of the community has undergone a very large reduction over a time frame appropriate to the life cycle and habitat characteristics of its component species.	NSW Threatened Species Scientific Committee Final Determination Cumberland Plain Woodland in the Sydney Basin Bioregion	
Extent of reduction in ecological function, describing the degree of environmental degradation or disruption to biotic processes (Principle 2)			
The extent of reduction in ecological function for the TEC is also found in the TEC Final Determination, as follows: ■ The community structure has changed such that almost all of the remaining Cumberland Plain Woodland is considered to be regrowth forest and woodland from past clearing activities. ■ Species composition has changed such that remnants are largely degraded by weed invasion and regrowth stands with high densities of saplings or shrubs may supress ground flora.			

■ Ecological processes have been disrupted by the chemical and structural modification associated with agricultural land uses and more recent expansion of urban land uses which the Cumberland Plain has historically been subjected to. ■ The TEC has been identified as severely fragmented.			
Evidence of restricted geographic distribution (Principle 3) based on the TEC's geographic range in NSW			
Extent of occurrence (ha)	Cumberland Plain Woodland is highly restricted to the Sydney Basin Bioregion. According to the TSSC Final Determination, it was estimated to occur within an extent of 2,810 km^2 and is known from the Auburn, Bankstown, Baulkham Hills, Blacktown, Camden, Campbelltown, Fairfield, Hawkesbury, Holroyd, Liverpool, Parramatta, Penrith and Wollondilly LGAs. These locations are all subject to threats to the TEC, including weed invasion and clearing of native vegetation	NSW Threatened Species Scientific Committee Final Determination Cumberland Plain Woodland in the Sydney Basin Bioregion	
Area of occupancy (ha)	Using map data from Tozer (2003), Cumberland Plain Woodland was estimated to occur within an extent of occurrence of 2810 km^2, and an area of occupancy of just under 2 100 km^2 (210,000 ha) based on 2 x 2 km grid cells, the spatial scale recommended by IUCN (2008) for assessing areas of occupancy for species.	NSW Threatened Species Scientific Committee Final Determination Cumberland Plain Woodland in the Sydney Basin Bioregion	
Impact on the geographic extent of the TEC (Principles 1 and 3)			
Area of TEC to be impacted by the proposal (ha)	7.72 ha	This report	
Area of TEC to be impacted by the proposal as a % of the current geographic extent in NSW (%)	0.000037%	This report	Based on Tozer (2003) estimate of Cumberland Plain Woodland extent of occurrence.
Direct/indirect impacts likely as a result of the proposal to contribute to loss of flora/fauna species characteristic of the TEC (BAM Subsection 9.1.1(4.a.ii.))	The proposed impact will result in the loss of potential habitat for several threatened species that are assumed to be present within the subject site, and one threatened species that is known to occur within the subject site. These include: Green and Golden Bell Frog (assumed present) Square-tailed Kite (assumed present) Southern Myotis (known to occur) Matted Bush-pea (assumed present) The proposed development is not considered likely to result in a significant negative impact on any of these species, as the subject area contains only a small, degraded portion of potential habitat that is not	This report	

	considered high-quality potential habitat. In addition, native vegetation is being retained within open space public recreation zoned areas which form connectivity corridors between surrounding patches of higher quality native vegetation within the surrounding area.		
Impacts likely to contribute to further environmental degradation or disruption of biotic processes (Principle 2)			
Remaining extent of isolated areas of TEC (ha)	1.2 ha of Cumberland Plain Woodland will be retained within open space RE1 – Public Recreation zoned areas.	This report	
Average distance between remaining remnants – remnant is retained (m)	Retained vegetation within the subject site is separated by surrounding patches of native vegetation only by Grose Vale Road at the east of the subject site, and may be further isolated by the construction of Road01, as per the Redbank Subdivision Layout Plans. The greatest distance of separation from nearby patches of native vegetation would be approximately 60 m.		
Estimated maximum dispersal distance of species associated with the TEC (km)	Credit species assumed as being present within the subject site generally are highly mobile species i.e., Square-tailed Kite has a home range of roughly 50 km^2 Species with lower dispersal distance include the Green and Golden Bell Frog and Matted Bush Pea. Green and Golden Bell Frog will be able to move between areas of suitable habitat through open space connectivity corridors which connect through to Redbank Creek.	NSW Scientific Committee Square-tailed Kite *Lophoictinia isura* Review of Current Information	

10 SIGNIFICANT IMPACT ASSESSMENT

The EPBC Act establishes a regime for assessing and regulating the environmental impact of activities (including development) where Matters of National Environmental Significance (MNES) may be affected. Under the EPBC Act, any action which has, will have, or is likely to have a significant impact on a matter of MNES is defined as a "controlled action", and requires approval from the Minister.

The process includes undertaking an Assessment of Significance for listed threatened species and ecological communities that represent an MNES that may be impacted as a result of the proposed action. The Significant Impact Guidelines published by DAWE (2009a) provide overarching guidance on determining whether an action is likely to have a significant impact on an MNES.

The following MNES were assessed in accordance with the Significant Impact Guidelines:

- *Litoria aurea* (Green and Golden Bell Frog)
- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Lathamus discolor* (Swift Parrot)

10.1 *Litoria aurea* (Green and Golden Bell Frog)

This species is assumed to be present within the subject site due to suitable habitat being present.

Table 10-1 Significant Impact Assessment for Green and Golden Bell Frog

Criteria	Question	Response
An action is likely to have a significant impact on an endangered species if there is a real chance or possibility that it will:		
1	lead to a long-term decrease in the size of a population	Green and Golden Bell Frog inhabit marshes, dams and stream-sides, particularly those containing bullrushes (*Typha sp.*) or spikerushes (*Eleocharis sp.*). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. Green and Golden Bell Frogs need various habitats for different aspects of their life cycle including foraging, breeding, over-wintering and dispersal. Terrestrial habitat consists of grassy areas and vegetation no higher than woodlands. The species is not known to occur within the subject site, and has not been previously recorded in proximity to the subject site. However, the species' presence must be assumed based on the presence of potentially suitable habitat. No targeted surveys have been conducted for this species. The proposed works are not considered likely to result in the death or injury of any Green and Golden Bell Frogs.
2	reduce the area of occupancy of the species	The Green and Golden Bell Frog is not known to occupy the development site but is assumed to be present based on suitable habitat being present. The development action would affect 14.8 ha of potentially suitable habitat for Green and Golden Bell Frog, the majority of which is terrestrial habitat comprising un-shaded exotic groundcover. Area to be removed as part of the proposed development are terrestrial habitat on the outer boundary of the species polygon / suitable habitat area. Approximately 3.5 ha of potential habitat for the species will be retained within RE1 – Public Recreation zoned open space as part of the proposed development. This will include the three dams. The open area will also

		encapsulate open terrestrial land surrounding these dams, which is the highest quality area of potential habitat for the species within the development site. The retained open space areas will provide a connectivity corridor between the dams, allowing for movement and connectivity for the species.
3	fragment an existing population into two or more populations	The species is not known to occur within the subject site, and has not been previously recorded in proximity to the subject site. However, the species' presence must be assumed based on the presence of potentially suitable habitat. No targeted surveys have been conducted for this species. The proposed development is not considered likely to result in the fragmentation of any existing population. The proposed development seeks to retain 3.8 ha of the suitable habitat for the species within RE1 – Public Recreation Zoned open space area. This will include the three dams. The open area will also encapsulate open terrestrial land surrounding these dams, which is the highest quality area of potential habitat for the species within the development site. The retained open space areas will provide a connectivity corridor between the dams, allowing for movement and connectivity for the species.
4	adversely affect habitat critical to the survival of a species	The proposed development is not considered likely to affect habitat critical to the survival of the species. The species is not known to occur within the subject site and has not been previously recorded in proximity to the subject site. However, the species' presence must be assumed based on the presence of potentially suitable habitat. No targeted surveys have been conducted for this species. The development action would affect 14.8 ha of potentially suitable habitat for Green and Golden Bell Frog, the majority of which is terrestrial habitat comprising un-shaded exotic groundcover. Area to be removed as part of the proposed development are terrestrial habitat on the outer boundary of the species polygon / suitable habitat area. The proposed development seeks to retain 3.8 ha of the suitable habitat for the species within RE1 – Public Recreation Zoned open space area. This will include the three dams. The open area will also encapsulate open terrestrial land surrounding these dams, which is the highest quality area of potential habitat for the species within the development site. The retained open space areas will provide a connectivity corridor between the dams, allowing for movement and connectivity for the species.
5	disrupt the breeding cycle of a population	The proposed action would not disrupt the breeding cycle of the Green and Golden Bell Frog given that 3.8 ha of suitable habitat for the species is proposed to be retained within RE1 – Public Recreation Zoned open space area. This will include the three dams. The open space will also encapsulate open terrestrial land surrounding these dams, which is the highest quality area of potential habitat for the species within the development site.
6	modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The development action would affect 14.8 ha of potentially suitable habitat for Green and Golden Bell Frog, the majority of which is terrestrial habitat comprising un-shaded exotic groundcover. Area to be removed as part of the proposed development are terrestrial habitat on the outer boundary of the species polygon / suitable habitat area. The proposed development seeks to retain 3.8 ha of the suitable habitat for the species within RE1 – Public Recreation Zoned open space area. This will include the three dams. The open area will also encapsulate open terrestrial land surrounding these dams, which is the highest quality area of potential habitat for the species within the development site. The retained open space areas will provide a connectivity corridor between the dams, allowing for movement and connectivity for the species. The proposed development will enhance potential habitat for the species via the management and improvement of waterbodies within the subject site.

		This will include replanting with native aquatic species, and management of surrounding terrestrial grassland.
7	result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	The proposed action is unlikely to result in the establishment of an invasive species that is harmful to the Green and Golden Bell Frog.
8	introduce disease that may cause the species to decline	Green and Golden Bell Frog may be impacted by Chytrid fungus. Chytrid fungus is transferred by direct contact between frogs and tadpoles or through exposure to infected water. The disease may not kill frogs immediately, and they can swim or hop to other areas before they die, spreading fungal spores to new ponds and streams. Wet or muddy boots and tyres, fishing, camping, gardening or frog-survey equipment may also be contributing to the spread of the disease. The risk of disease transmission is extremely low and rare, therefore the proposed action would not increase the incidence of this disease.
9	interfere with the recovery of the species	The proposed development will enhance potential habitat for the species via the management and improvement of waterbodies within the subject site. This will include replanting with native aquatic species, and management of surrounding terrestrial grassland.
Conclusion	Is there likely to be a significant impact	The proposed action is unlikely to have a significant impact on the Green and Golden Bell Frog for the following reasons: ■ No individuals are likely to be harmed during the proposed works and the species is not considered highly likely to occur within the subject site. Species presence is assumed due to the presence of suitable habitat and lack of targeted species surveys. ■ An abundance of potential habitat would still be available within the surrounding locality. ■ The proposed action would retain 3.8 ha of connective potential habitat for the species. ■ The proposed development will enhance potential habitat for the species via the management and improvement of waterbodies within the subject site. This will include replanting with native aquatic species, and management of surrounding terrestrial grassland.

10.2 *Pteropus poliocephalus* (Grey-headed Flying Fox)

This species was not identified within the development site during surveys; however, vegetation within the development site has the potential to provide occasional seasonal foraging habitat. No camps were identified within the development site. The closest Grey-headed Flying-fox camp is located approximately 4.1 km to the south at Yarramundi. Significant Impact Criteria are applied in Table 10-2.

Table 10-2 Significant Impact Assessment for Grey-headed Flying Fox

Criteria	Question	Response
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
1	lead to a long-term decrease in the size of a population	No roosting habitat (camps) will be affected by the proposed development.

		The development action would affect 7.72 ha of native vegetation, which comprises marginal foraging habitat for the Grey-headed Flying-fox. The Grey-headed Flying-fox is recorded as travelling long distances (up to 20 km) on feeding forays. Given the proximity of similar habitat within the assessment area and the retention of 1.8 ha of native vegetation within the development site, the removal of this potential foraging habitat would not lead to the long-term decrease in the size of an important population of Grey-headed Flying-fox. The closest known Grey-headed Flying-fox camp is located approximately 4.1 km to the south.
2	reduce the area of occupancy of the species	The proposed action would affect 7.72 ha of potential foraging habitat for this species. The Grey-headed Flying- fox is not known to occupy the development site in the form of a camp but may occasionally forage within the development site, the nearest known camp is located 4.1 km to the south. About 1.8 ha of native vegetation would be retained within the development site. The Grey- headed Flying-fox is recorded as travelling long distances on feeding forays and could utilise similar foraging habitat outside of the development site.
3	fragment an existing population into two or more populations	According to the National Recovery Plan for the Grey- headed Flying-fox 2021, "the Grey-headed Flying-fox is considered to be a single, mobile population with individuals distributed across Queensland, New South Wales, Victoria, South Australia, Tasmania and the ACT." The proposed action would not fragment an existing important population into two or more populations. The nearest camp is 4.1 km away. There is an abundance of foraging habitat available within 20 km, therefore reduction by 7.72 ha would not fragment habitat for the nearest camp.
4	adversely affect habitat critical to the survival of a species	The National Recovery Plan for the Grey-headed Flying-fox 2021 identifies 'a continuous temporal sequence of productive foraging habitats, linked by migration corridors or stopover habitats, and suitable roosting habitat within nightly commuting distance of foraging areas' as habitat critical to the survival of the species. The proposed action would affect 7.72 ha of native vegetation, some of which may represent habitat critical survival to this species. However, this impact is considered unlikely to have an adverse effect given that the species is recorded as travelling long distances (20 km) on feeding forays and similar habitat is available adjacent to the development site.
5	disrupt the breeding cycle of a population	The proposed action would not disrupt the breeding cycle of the Grey-headed Flying-fox given that no camps would be affected by the proposed action and suitable foraging habitat is available adjacent to the development site. Therefore, the nearest known camp would not be isolated from foraging habitat.
6	modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed action would remove 7.72 ha of vegetation, including marginal foraging habitat for the Grey-headed Flying-fox. It is unlikely that the extent of this vegetation removal would cause the species to decline because suitable habitat is available adjacent to the development site.
7	result in invasive species that are harmful to a critically endangered or endangered species becoming established in the	The proposed action is unlikely to result in the establishment of an invasive species that is harmful to the Grey-headed Flying-fox.

	endangered or critically endangered species' habitat	
8	introduce disease that may cause the species to decline	Grey-headed Flying-fox are reservoirs for the Australian bat lyssavirus, Hendra Virus and Menangle virus, which can cause clinical disease and mortality in Grey-headed Flying- fox. The risk of disease transmission is extremely low and rare, therefore the proposed action would not increase the incidence of this disease.
9	interfere with the recovery of the species	The proposed action would remove suitable foraging habitat for this species; however, this would not interfere substantially with recovery objectives listed in the National Recovery Plan for the Grey-headed Flying-fox 2021. The proposed action would not affect any camps and suitable foraging habitat is available adjacent to the development site.
Conclusion	Is there likely to be a significant impact	The proposed action is unlikely to have a significant impact on the Grey-headed Flying-fox for the following reasons: ■ No camps would be removed by the proposed action. ■ An abundance of foraging habitat would still be available within 20 km of the nearest Nationally Important camp. ■ The proposed action would retain 1.8 ha of connective native vegetation.

10.3 *Lathamus discolor* (Swift Parrot)

This species was not identified within the development site during surveys; however, vegetation within the development site has the potential to provide occasional seasonal foraging habitat. BAM Important Areas for the species are mapped approximately 1.35 km to the north of the site boundary. Significant Impact Criteria are applied in Table 10-3.

Table 10-3 Significant Impact Assessment for Swift Parrot

Criteria	Question	Response
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
1	lead to a long-term decrease in the size of a population	A 'population of a species' refers to a population, or collection of local populations, that occurs within a particular bioregion. The proposed works would remove 7.72 ha of native vegetation, containing potential foraging habitat for the Swift Parrot. No breeding habitat would be impacted as part of the proposed works. Given that the species is highly mobile and can continue to access foraging habitat retained within the development site and surrounds, the proposed works would not lead to a long-term decrease in populations of the species.
2	reduce the area of occupancy of the species	The proposed action would reduce the area of occupancy of the species through the direct removal of 7.72 ha of potential foraging habitat. More foraging habitat would be retained within the subject land and similar habitat is available adjacent to the development site. No breeding habitat would be removed.
3	fragment an existing population into two or more populations	The proposed action would remove 7.72 ha of potential foraging habitat for the species to use seasonally and sporadically. No breeding habitat would be removed. Subsequently, the proposed works would not fragment populations of the species.
4	adversely affect habitat critical to the survival of a species	The National Recovery Plan for the Swift Parrot identifies critical habitat as those with a "level of site fidelity or possessing phenological characteristics

		likely to be of importance to the Swift Parrot, or are otherwise identified by the recovery team". The proposed works would not impact critical habitat for the species because the development site has not been identified as having site fidelity or been identified by the recovery team.
5	disrupt the breeding cycle of a population	The Swift Parrot breeds only in Tasmania.
6	modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed action would remove 7.72 ha of potential foraging habitat available for the species within the development site. The highly mobile species would still be able to access foraging habitat retained within the development site and surrounds.
7	result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	The proposed action is unlikely to result in the establishment of an invasive species that is harmful to the Swift Parrot.
8	introduce disease that may cause the species to decline	Psittacine Beak and Feather Disease may cause the species to decline. This spread through food sharing, excrement, feather and skin particles. The proposed action would reduce the area of occupancy of the species and is therefore unlikely to introduce the disease.
9	interfere with the recovery of the species	One threat activity identified within the National Recovery Plan for the Swift Parrot 2011 is relevant to the proposed development, habitat loss and alteration. The proposed action would remove 7.72 ha of potential foraging habitat for this species. However, this threat is considered minimal given that similar habitat would still be available for the highly mobile species within and adjacent to the site boundary, therefore not fragmenting foraging habitat or movement corridors.
Conclusion	Is there likely to be a significant impact	No. The proposed activity is unlikely to have a significant impact on the Swift Parrot for the following reasons: ■ No breeding habitat would be removed by the proposed action. ■ No habitat mapped under the Important Areas Map would be removed by the proposed action. ■ Similar foraging habitat for this highly mobile species is available adjacent to the development site and throughout the region.

11 IMPACT SUMMARY

11.1 Determine an Offset Requirement for Impacts

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

Table 11-1 identifies impacts that require an offset (as per BAM Subsection 9.2.1(1.)).

Table 11-1 Impacts that require an offset – ecosystem credits

Vegetation Zone	PCT name	TEC	Total area (ha)	Impact area (ha)	Current VI score	Future VI score	Change in VI score	Biodiversity risk weighting	Number of ecosystem credits required
Zone 1	3320 - Cumberland Shale Plains Woodland	Cumberland Plain Woodland in the Sydney Basin Bioregion (Critically Endangered, BC Act)	4.4	4.35	19.1	0	-19.1	2.5	52
Zone 2	3320 - Cumberland Shale Plains Woodland	Cumberland Plain Woodland in the Sydney Basin Bioregion (Critically Endangered, BC Act)	2.4	2.34	14.1	0	-14.1	2.5	0
Zone 3	3320 - Cumberland Shale Plains Woodland	Cumberland Plain Woodland in the Sydney Basin Bioregion (Critically Endangered, BC Act)	2.1	1.03	22.7	0	-22.7	2.5	12

11.1.2 Impacts on threatened species and their habitats (species credits)

Table 11-2 Impacts that require an offset – species credits

Common name	Scientific name	BC Act status	EPBC Act status	Loss of habitat (ha) or individuals	Biodiversity risk weighting	Number of species credits required
Green and Golden Bell Frog	*Litoria aurea*	Endangered	Vulnerable	24.5	2.00	30
Square-tailed Kite	*Lophoictinia isura*	Vulnerable	-	7.72	1.50	52
Southern Myotis	*Myotis macropus*	Vulnerable	-	5.85	2.00	57
Matted Bush Pea	*Pultenaea pedunculata*	Endangered	-	7.72	2.00	69

11.2 Impacts That Do Not Need Further Assessment

Offsets for impacts to planted native vegetation are not required. Impacts to dams are considered under prescribed impacts, which also do not require offsets.

12 BIODIVERSITY CREDIT REPORT

The following tables present information required on the ecosystem and species credits and matching credit profiles. The BAM-C credit report identifies the numbers and classes of biodiversity credits required to be retired in accordance with the like-for-like requirements of the offset rules. The BDAR must be submitted to the decision-maker within 14 days of the date the BAM-C credit report is finalised. The full credit report is provided in Appendix C.

12.1 Ecosystem Credits

Table 12-1 Ecosystem credit class and matching credit profile

Ecosystem credit	Attributes shared with matching credits							
	PCT name	Vegetation zone name	Vegetation integrity loss	Area (Ha)	Sensitivity to loss	Biodiversity risk weighting	Potential SAII	Ecosystem credits
	3320 - Cumberland Shale Plains Woodland	Zone 1	-19.1	4.35	Very high sensitivity to loss	2.5	True	52
	3320 - Cumberland Shale Plains Woodland	Zone 2	-14.1	2.34	Very high sensitivity to loss	2.5	True	0
	3320 - Cumberland Shale Plains Woodland	Zone 3	-22.7	1.03	Very high sensitivity to loss	2.5	True	12
							Total	64

12.2 Species Credits

Table 12-2 Species credits

Species credit	Attributes shared with matching credits						
	Species name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Biodiversity risk weighting	Potential SAII	Species credits
	Litoria aurea / Green and Golden Bell Frog (Fauna)	-	24.5 ha	High	2.00	False	30
	Lophoictinia isura / Square-tailed Kite (Fauna)		7.72 ha	Moderate	1.50	False	52

Species credit	Attributes shared with matching credits						
	Species name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Biodiversity risk weighting	Potential SAII	Species credits
	Myotis macropus / Southern Myotis (Fauna)		5.85 ha	High	2.00	False	57
	Pultenaea pedunculata / Matted Bush-pea (Flora)		7.72 ha	High	2.00	False	69

13 CONCLUSION

Environmental Services & Education Australia (ESEA) was engaged by Redbank Communities to prepare a BDAR to meet the requirements of the *Biodiversity Assessment Method 2020* and to accompany the Gateway Planning Proposal for the rezoning of Redbank's Expansion Area (Kemsley Park), located at 322 Grose Vale Road, Grose Vale NSW 2753 (Lot 260 DP1237271).

Redbank Communities intends to lodge a Gateway Planning Proposal with Hawkesbury City Council to rezone 'Kemsley Park' from RU4 – Rural to residential zoning. Redbank subsequently intends to lodge a development application for approximately 300 residential lots, connecting to and completing Redbank's master-planned community.

The subdivision development application would remove vegetation present within the site. Additional works would include cut and fill bulk earthworks; subdivision into approximately 300 lots; construction of local roads extending from the approved road network; civil works including lot benching; creation of inter-allotment drainage and construction of retaining walls; extension of utility services; and landscaping and public domain works. Temporary infrastructure would be required during construction, including construction park-up areas, stockpiles, storage zones, and temporary construction buildings.

Native vegetation within the development site was identified as being representative of PCT 3320 - Cumberland Shale Plains Woodland and met the criteria to be considered Cumberland Plain Woodland in the Sydney Basin Bioregion – a critically endangered ecological community and candidate SAII entity under the *NSW Biodiversity Conservation Act 2016*.

This vegetation present within the subject site is considered to provide habitat for several threatened species, including the Green and Golden Bell Frog, Square-tailed Kite, Southern Myotis, and Matted Bush-pea. Whilst Southern Myotis has been recorded as present within the subject site during targeted species assessments, the Green and Golden Bell Frog, Square-tailed Kite, and Matted Bush-pea have been assumed present using the precautionary principle based on the presence of suitable habitat and lack of targeted surveys conducted during the appropriate survey periods.

Significant Impact Criteria were applied for relevant ecosystem credit species included in this assessment and listed as MNES under the EPBC Act. It was concluded that the proposed action would not result in a significant impact to either the Green and Golden Bell Frog, Grey-headed Flying-fox, or Swift Parrot.

The ecosystem and species credit requirements to offset the impacts of the proposed development are outlined below.

Table 13-1 Ecosystem Credits

Ecosystem credit	Attributes shared with matching credits							
	PCT name	Vegetation zone name	Vegetation integrity loss	Area (Ha)	Sensitivity to loss	Biodiversity risk weighting	Potential SAII	Ecosystem credits
	3320 - Cumberland Shale Plains Woodland	Zone 1	19.1	4.35	Very high sensitivity to loss	2.5	True	52
	3320 - Cumberland Shale Plains Woodland	Zone 2	14.1	2.34	Very high sensitivity to loss	2.5	True	0
	3320 - Cumberland Shale Plains Woodland	Zone 3	22.7	1.03	Very high sensitivity to loss	2.5	True	15
							Total	67

Table 13-2 Species Credits

Species credit	Attributes shared with matching credits						
	Species name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Biodiversity risk weighting	Potential SAII	Species credits
	Litoria aurea / Green and Golden Bell Frog (Fauna)	-	24.5 ha	High	2.00	False	66
	Lophoictinia isura / Square-tailed Kite (Fauna)		7.72 ha	Moderate	1.50	False	50
	Myotis macropus / Southern Myotis (Fauna)		5.85 ha	High	2.00	False	57
	Pultenaea pedunculata / Matted Bush-pea (Flora)		7.72 ha	High	2.00	False	66

14 REFERENCES

- Department of Agriculture, Water and the Environment (2009). Advice to the Minister for the Environment, Heritage and the Arts from the Threatened Species Scientific Committee (the Committee) on an Amendment to the List of Threatened Ecological Communities under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). Available: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/112-listing-advice.pdf
- Department of Agriculture, Water and the Environment (2021). National Flying-fox monitoring viewer. Available: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/112- listing-advice.pdf
- Department of Climate Change, Energy, the Environment and Water (2024) Protected Matters Search Tool. Accessed 17/06/2024. Available at: https://pmst.awe.gov.au/#/map?lng=131.52832031250003&lat=-28.671310915880834&zoom=5&baseLayers=Imagery,ImageryLabels
- Department of Environment and Conservation (2004). Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft). New South Wales Department of Environment and Conservation, Hurstville, NSW. Available: https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/draft-threatened-biodiversity-survey-guide.pdf
- Department of Planning and Environment (2022) Cumberland Plain Conservation Plan. Accessed 15/06/2024. Available at: https://shared-drupal-s3fs.s3.ap-southeast-2.amazonaws.com/master-test/fapub_pdf/Lisa+Drupal+Documents/Cumberland-Plain-Conservation-Plan-202208.pdf
- Department of Planning, Industry and Environment (2020). Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method. Available: https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/surveying-threatened-plants-and-habitats-nsw-survey-guide-biodiversity-assessment-method-200146.pdf
- EcoLogical (2021) Redbank Southern Valley Biodiversity Development Assessment Report, Prepared for Redbank Communities.
- EcoLogical (2022) Redbank Southern Valley - Riparian Assessment. Prepared for Redbank Communities.
- GDH (2013) LEP Planning Proposal Report Update. North Richmond Release Area - Redbank Review of Riparian Report (2009) and Consultation with 'NOW'.
- Hawkesbury City Council (2012) Haweskbury Local Environment Plan (LEP) 2012. Accessed 17/06/2024. Available at: https://legislation.nsw.gov.au/view/html/inforce/current/epi-2012-0470
- Hawkesbury City Council (2023) Haweskbury Development Control Plan (DCP) 2023. Accessed 17/06/2024. Available at: https://www.hawkesbury.nsw.gov.au/plan-and-build/planning-policies/development-control-plan
- Molino Stewart (2021) Grose Vale Road East Upgrade Biodiversity Assessment
- Molino Stewart (2022) Grose Vale Road Upgrade West Biodiversity Assessment
- NSW National Parks & Wildlife Service (2000). Environmental Impact Assessment Guidelines Cumberland Plain Large Land Snail Meridolum corneovirens (Pfeiffer, 1851) Available: https://www.environment.nsw.gov.au/resources/nature/McorneovirensEia0500.pdf

- NSW Office of Environment & Heritage (2024) BioNet NSW Wildlife Atlas records. Accessed 17/06/2024. Available at: https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/nsw-bionet/about-bionet-atlas/species-sightings-data
- NSW Office of Environment & Heritage (2024) SEED Vegetation Mapping. Accessed 17/06/2024. Available at: https://www.seed.nsw.gov.au/
- Office of Environment & Heritage (2018). 'Species credit' threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Method. https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/species-credit-threatened-bats-survey-guide-180466.pdf
- Orion (2024) Redbank Expansion Area Planning Proposal – Structure Plan
- Phillips, S. S. and Callaghan J. 2011. The Spot Assessment Technique: A tool for determining localised levels of habitat use by Koalas Phascolarctos cinereus. Australian Zoologist 35(3).
- Urbis (2021) Due Diligence Report Kemsley Park, 322 Grose Vale Road, North Richmond

APPENDIX A - SPECIES LIST

FAUNA

Species	Common name	Notes
Gymnorhina tibicen	Australian Magpie	
Manorina melanocephala	Australian Noisy Miner	
Corvus coronoides	Australian Raven	
Geopelia humeralis	Bar-shouldered Dove	
Elanus axillaris	Black-shouldered Kite	
Turdus merula	Common Blackbird	
Crinia signifera	Common Eastern Froglet	
Acridotheres tristis	Common Myna	
Micronomus norfolkensis	Eastern Coastal Free-tail Bat	Threatened
Eudynamys orientalis	Eastern Koel	
Eopsaltria australis	Eastern Yellow Robin	
Cracticus torquatus	Grey Butcherbird	
Chalinolobus dwyeri	Large-eared Pied Bat	Threatened
Myotis adversus	Large-footed Myotis	
Vespadelus vulturnus	Little Forest Bat	
Grallina cyanoleuca	Magpie Lark	
Vanellus miles	Masked Lapwing	
Strepera graculina	Pied Currawong	
Trichoglossus moluccanus	Rainbow Lorikeet	
Litoria verreauxii	Whistling Tree Frog	
Lichenostomus chrysops	Yellow-faced honeyeater	

FLORA

Species	Common name	Native / Introduced
Austrostipa sp.	Speargrass	Native
Axonopus fissifolius	Common Carpetgrass	Introduced
Bidens pilosa	Cobbler's Pegs	Introduced
Bursaria spinosa	Sweet Bursaria	Native
Cenchrus clandestinus	Kikuyu	Introduced
Chloris gayana	Rhodes Grass	Introduced
Commelina cyanea	Scurvy Weed	Native
Commelina diffusa	Climbing Dayflower	Introduced
Cynodon dactylon	Couch Grass	Introduced
Cyperus eragrostis	Nutgrass	Introduced
Cyperus mindorensis	White-head Spike Sedge	Introduced
Dactylis glomerata	Cock's Foot	Introduced
Desmodium varians	Slender Trick-Trefoil	Introduced
Dichondra repens	Kidneyweed	Native
Einadia nutans	Climbing Saltbush	Native
Eleusine indica	Wiregrass	Introduced
Ehrharta erecta	Panic Veldtgrass	Introduced
Eucalyptus crebra	Narrow-leaved Ironbark	Native
Eucalyptus tereticornis	Forest Red Gum	Native
Glycine microphylla	Small-leaf Glycine	Native
Glycine tabacina	Variable Glycine	Introduced
Imperata cylindrica	Cogon Grass	Introduced
Juncus effusus	Soft Rush	Introduced
Lantana camara	Lantana	Weed of National Significance
Lysimachia foemina	Blue Pimpernel	Introduced
Malva parviflora	Dwarf Mallow	Introduced
Microlaena stipoides	Weeping Grass	Native
Modiola caroliniana	Carolina Bristlemallow	Introduced
Oeosporangium sp.		Introduced
Oplismenus hirtellus	Basket Grass	Native
Oxalis corniculata	Creeping Woodsorrel	Introduced
Paspalum dilatatum	Dallis Grass	Introduced
Phleum pratense	Common Cat's Tail	Introduced
Plantago lanceolata	Ribwort Plantain	Introduced
Rumex crispus	Curly Dock	Introduced
Senecio madagascariensis	Fireweed	Weed of National Significance
Setaria parviflora	Marsh Bristlegrass	Introduced
Sida rhombifolia	Arrow-leaf Sida	Introduced
Solanum linnaeanum	Devil's Apple	Introduced
Solanum sisymbriifolium	Sticky Nightshade	Introduced
Sporobolus indicus	Smut Grass	Introduced
Stellaria media	Checkweed	Introduced
Stenotaphrum secundatum	Buffalo Grass	Introduced
Tagetes minuta	Southern Cone Marigold	Introduced
Taraxacum officinale	Common Dandelion	Introduced
Trifolium dubium	Lesser Trefoil	Introduced
Trifolium repens	White Clover	Introduced
Verbena bonariensis	Purpletop	Introduced

APPENDIX B- FIELD SURVEY SHEETS

Numbers [1-8] on this page correlate with the numbers and explanatory notes on page 3

Site sheet #	1 of 4	**Date**	22 / 4 / 24	**Survey name**	Kemsley Park CPW Plot 1	**Plot identifier**			
Recorders	Clayton Woods			**IBRA region**	Sydney Basin	**Veg zone ID**	3320		
[1]Datum	GDA 94	**Coordinate system**	□ Projected ● Geographic	**MGA zone**	54	**[1]X coordinate**	-33.583111	**[1]Y coordinate**	150.689580
Location description	Adjacent grass vale Road, down valley towards dam								
[1] Plot dimensions	For communities & structure (400m²): 20 m x 20 m For function (1000m²): 20 m x 50 m 50x20					**[1] Orientation of midline from 0 m point**	121 SE	**Photo #**	

Datum: AGD66, WGS84, GDA94, GDA2020 or Other (specify). **MGA Zone** (for Projected coordinate. system only): 56 (Coastal NSW), 55 (Central NSW or 54 (Western NSW). **X/Y coordinate**: Long/Lat (for Projected coordinate. system), Easting/Northing (for geographic coordinate. system)

Vegetation integrity

Composition and structure sum values may be completed after entering data into available tools. It is not required while in the field

Composition (400 m² plot)			**Structure** (400 m² plot)			**Function** (1000 m² plot)	
		Sum values			Sum values (%) (may sum to >100%)	[3] Tree stem size class (DBH)	If data are to be used as more appropriate local data i.e. to generate local benchmarks, stems must be counted
Total count of native plant species **(richness)** in each growth form group (not individual plants within each growth form)	Trees (TG)	1	Sum of [2] **foliage cover** of native plant species by growth form group	Trees (TG)	15 %	80 + cm	Count Nil
	Shrubs (SG)	0		Shrubs (SG)	0 %	50 – 79 cm	Count (best practice)/tick. If large tree benchmark size ≥50 cm, count IIII
	Grasses etc. (GG)	1		Grasses etc. (GG)	0.1 %	30 – 49 cm	Count (best practice)/tick. If large tree benchmark size ≥ 30 cm, count Nil
	Forbs (FG)	4		Forbs (FG)	0.7 %	20 – 29 cm	Count (best practice)/tick. If large tree benchmark size ≥ 20 cm, count Nil
	Ferns (EG)	0		Ferns (EG)	0 %	10 – 19 cm	Count (best practice)/tick Nil
	Other (OG)	0		Other (OG)	0.%	5 – 9 cm	Count (best practice)/tick Nil
						[4]Tree regeneration <5 cm	Tick Nil
			Total high threat weed cover		%	[5] Length of fallen logs	Tally space 0 Total 0m m
						[6] Hollow bearing trees	Tick Nil

Vegetation integrity - function cont. (five 1 m²) **plots)**	[7] Litter cover (%)	**Bare ground cover (%)**	**Cryptogam cover (%)**	**Rock cover (%)**
Subplot score (% in each)	2 4 1 0 2	0 0 0 4 5	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	1.8 %	1.8 %	0 %	0 %

These attributes require consideration of site observations and may be completed after field work:

Vegetation class		[8] **Large tree benchmark size**	20/ 30/ 50/ 80 DBH	Confidence	H/ M/ L
Plant community type (PCT)		**EEC**	Tick	Confidence	H/ M/ L

Physiography and site features that may help in determining PCT and management zone (optional) or for BioNet systematic flora survey purposes:

Morphological type		Landform element		Landform pattern		Microrelief	
Lithology		Soil surface texture		Soil colour		Soil depth	
Slope	moderate	Aspect	North	Site drainage		Distance to nearest water and type	80m to dam

Disturbance	Severity code	Age code
Clearing (inc. logging)	2	R
Cultivation (inc. pasture)	0	
Soil erosion	0	
Firewood / CWD removal	0	
Grazing (id. native/stock)	2	R
Fire damage	0	
Storm damage	0	
Weediness	3	R
Other		

Brief site description or other notes

On hill sloping down to the North
Recently mowed/cleared of thick Lantana/Bidens growth
Currently grazed by cattle

Emergents heights			Upper stratum heights			Middle stratum heights			Lower stratum heights		
Top	Mid	Bottom	Top	Mid	Bottom	Top	Mid	Bottom	Top	Mid	Bottom
m	m	m	20 m	m	m	— m	— m	— m	m	m	m

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

400 m² floristics plot:	Survey name	Plot identifier	Recorders
Date 22 / 04 / 24	Kemsley PK Plot 1	Plot 1	Clayton Woods

GF code	Species name Full species name, or a unique means of identifying separate taxa within a survey is mandatory. Data from here will be used to assign growth form richness and cover.	N, HTW or non-HTW	² Foliage cover	Abund-ance	Voucher
FG	1 Plantago lancelota (Ribwort plantain)		3		
SG	2 lantana camara		9		
GG	3 Cynodon dactylon (Couch grass)		60		
GG	4 Chloris gayana (Rhodes grass)		15		
FG	5 Bidens Pilosa (cobblers Peg)		4		
GG	6 Dactylis glomerata (cocksfoot)		5		
FG	7 Dichondra repens	N	0.4		
T	8 E. Creba	N	15	5	
FG	9 commelina cyanea (scurvey weed)	N	0.1		
FG	10 Rumex crispus (Curly dock)		0.4		
FG	11 Modiola caroliniana		0.1		
GG	12 Juncus effusus (common Rush)		0.1		
FG	13 Cyperus eragrostis (Drain Flat sedge)		0.1		
FG	14 Stellaria media (chickweed)		0.1		
FG	15 Senecio madagascarense (Fireweed)		0.2		
FG	16 Tagetes minuta (Marigold)		0.1		
FG	17 Taraxacum officinale (dandelion)		0.2		
FG	18 Einadia nutans (climbing Saltbush)	N	0.1		
FG	19 Commelina diffusa		0.1		
FG	20 Commeliaa Cyanea (Scurvy Weed)		0.1		
FG	21 Trifolium repens (white clover)		0.1		
GG	22 Microlaena stipoides (Weeping grass)	N	0.1		
FG	23 Oxalis corniculata		0.1		
FG	24 Glycine Microphylla (Small leaf glycine)	N	0.1		
	25				
	26				
	27				
	28				
	29				
	30				
	31				
	32				
	33				
	34				
	35				

Print more copies of this page to allow for higher species counts at a plot. All vascular plant species in a plot need to be recorded.

GF Code: see growth form definitions in BAM 2020 Appendix F. **N:** native, **HTW:** high threat weed.

² **Foliage cover:** 0.1, 0.2, 0.3, …, 1, 2, 3, 4, 5, 10, 15, 20, 25, ...100%; Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately *1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m.* Note the top 3 dominant native species within each GF group.

Abundance: Count 1, 2, 3 …, when ≤10, estimate when >10, 20, 30 … 100, 200, 300 …, 1000, 2000, 3000 … (as integer values).

Numbers [1-8] on this page correlate with the numbers and explanatory notes on page 3

Site sheet #	2/4	**Date**	23/09/24	**Survey name**	Kemsley Park Plot 2	**Plot identifier**	Plot 2		
Recorders	Clayton Woods			**IBRA region**	Sydney Basin	**Veg zone ID**			
[1]Datum	GDA94	**Coordinate system**	□ Projected ■ Geographic	**MGA zone**	56	**[1]X coordinate**	-33.584500	**[1]Y coordinate**	150.689812
Location description	Veg Condition Zone 2 – down towards dam								
[1] Plot dimensions	For compositional structure (400m²): 20 m x 20 m For function (1000m²): 20 m x 50 m					**[1] Orientation of midline from 0 m point**	66 NE	**Photo #**	

Datum: AGD66, WGS84, GDA94, GDA2020 or Other (specify). **MGA Zone** (for Projected coordinate. system only): 56 (Coastal NSW), 55 (Central NSW or 54 (Western NSW). **X/Y coordinate**: Long/Lat (for Projected coordinate. system), Easting/Northing (for geographic coordinate. system)

Vegetation integrity

Composition and structure sum values may be completed after entering data into available tools. It is not required while in the field

Composition (400 m² plot)			**Structure** (400 m² plot)			**Function** (1000 m² plot)	
		Sum values			Sum values (%) (may sum to >100%)	[3] Tree stem size class (DBH)	If data are to be used as more appropriate local data i.e. to generate local benchmarks, stems must be counted
Total count of native plant species **(richness)** in each growth form group (not individual plants within each growth form)	Trees (TG)	2	Sum of [2] **foliage cover** of native plant species by growth form group	Trees (TG)	37 %	80 + cm	Count
	Shrubs (SG)	0		Shrubs (SG)	0 %	50 – 79 cm	Count (best practice)/tick. If [8] large tree benchmark size ≥50 cm, count |||| |
	Grasses etc. (GG)	1		Grasses etc. (GG)	0.1 %	30 – 49 cm	Count (best practice)/tick. If [8] large tree benchmark size ≥ 30 cm, count ||
	Forbs (FG)	4		Forbs (FG)	0.6 %	20 – 29 cm	Count (best practice)/tick. If [8] large tree benchmark size ≥ 20 cm, count
	Ferns (EG)	0		Ferns (EG)	0 %	10 – 19 cm	Count (best practice)/tick
	Other (OG)	0		Other (OG)	0 %	5 – 9 cm	Count (best practice)/tick
						[4]Tree regeneration <5 cm	Nil
			Total high threat weed cover		%	[5] Length of fallen logs	Tally space: Nil — Total: m
						[6] Hollow bearing trees	Tick: Nil

Vegetation integrity - function cont. (five 1 m²) **plots)**	[7] Litter cover (%)	**Bare ground cover (%)**	**Cryptogam cover (%)**	**Rock cover (%)**
Subplot score (% in each)	12 3 1 8 6	1 0 0 3 15	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	6 %	3.8 %	0 %	0 %

These attributes require consideration of site observations and may be completed after field work:

Vegetation class		[8] **Large tree benchmark size**	20/ 30/ 50/ 80 DBH	Confidence	H/ M/ L
Plant community type (PCT)		**EEC**	Tick	Confidence	H/ M/ L

Physiography and site features that may help in determining PCT and management zone (optional) or for BioNet systematic flora survey purposes:

Morphological type		Landform element		Landform pattern		Microrelief	
Lithology		Soil surface texture		Soil colour		Soil depth	
Slope	moderate	Aspect	N	Site drainage	good	Distance to nearest water and type	30m N to dam

Disturbance	Severity code	Age code
Clearing (inc. logging)	2	R
Cultivation (inc. pasture)	–	
Soil erosion	–	
Firewood / CWD removal	–	
Grazing (id. native/stock)	2	R
Fire damage	–	
Storm damage	–	
Weediness	3	R
Other	–	

Brief site description or other notes

Recently cleared of midstratum lantana area grazed by cattle

Emergents heights			Upper stratum heights			Middle stratum heights			Lower stratum heights		
Top	Mid	Bottom	Top	Mid	Bottom	Top	Mid	Bottom	Top	Mid	Bottom
m	m	m	20 m	m	m	m	m	m	m	m	m

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

400 m² floristics plot:	Survey name	Plot identifier	Recorders
Date 23/04/24	Kemsley Park 2	BAM Plot 2	Clayton Woods

GF code		Species name Full species name, or a unique means of identifying separate taxa within a survey is mandatory. Data from here will be used to assign growth form richness and cover.	N, HTW or non-HTW	[2] Foliage cover	Abund-ance	Voucher
TG	1	E. tericornis	N	30	9	
TG	2	E. creba	N	7	2	
GG	3	Cynodon dactylon (couch grass)		60		
FG	4	Bidens pilosa		3		
FG	5	Solanum sisymbriifolium (nightshade)		0.2		
G	6	Dactylis glomerata		3		
FG	7	Commelina cyanea	N	0.2		
G	8	Paspalum dilatatum		0.2		
G	9	Chloris gayana (Rhodes grass)		4		
FG	10	Plantago lancelota		0.4		
SG	11	Lantana camara		5		
FG	12	Senecio madagascalense		0.1		
FG	13	Tagetes minuta		0.1		
FG	14	Einadia nutans (climbing saltbush)	N	0.1		
FG	15	Sida rhombifolia		0.1		
FG	16	Solanum linnaeanum		0.1		
FG	17	Malva parviflora		0.1		
FG	18	Dichondra repens	N	0.2		
FG	19	Verbena		0.1		
FG	20	Stellaria media		0.1		
FG	21	Trifolium repens		0.2		
FG	22	Modiola caroliniana		0.1		
FG	23	Oxalis corniculata		0.1		
FG	24	Paspalum dilatatum		0.5		
	25					
FG	26	Glycine microphylla (small-leaf glycine)	N	0.1		
GG	27	Microlaena stipoides (weeping grass)	N	0.1		
	28					
	29					
	30					
	31					
	32					
	33					
	34					
	35					

Print more copies of this page to allow for higher species counts at a plot. All vascular plant species in a plot need to be recorded.

GF Code: see growth form definitions in BAM 2020 Appendix F. **N:** native, **HTW:** high threat weed.

[2] **Foliage cover:** 0.1, 0.2, 0.3, …, 1, 2, 3, 4, 5, 10, 15, 20, 25, ...100%; Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately *1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m.* Note the top 3 dominant native species within each GF group.

Abundance: Count 1, 2, 3 …, when ≤10, estimate when >10, 20, 30 … 100, 200, 300 …, 1000, 2000, 3000 … (as integer values).

Numbers [1-8] on this page correlate with the numbers and explanatory notes on page 3

Site sheet #	3/4	**Date**	23/04/24	**Survey name**	Kemsly Park BAM 3	**Plot identifier**	Plot 3
Recorders	Clayton Woods			**IBRA region**	Sydney Basin	**Veg zone ID**	
[1]Datum	GDA94	**Coordinate system**	□ Projected ◪ Geographic	**MGA zone**	56	**[1]X coordinate**	-33.580714
[1]Y coordinate	150.675618						
Location description	Back paddock adjacent existing development area						
[1] Plot dimensions	50×20	For composition & structure (400m²): 20 m x 20 m For function (1000m²): 20 m x 50 m			**[1] Orientation of midline from 0 m point**	9° N	**Photo #**

Datum: AGD66, WGS84, GDA94, GDA2020 or Other (specify). **MGA Zone** (for Projected coordinate. system only): 56 (Coastal NSW), 55 (Central NSW or 54 (Western NSW). **X/Y coordinate**: Long/Lat (for Projected coordinate. system), Easting/Northing (for geographic coordinate. system)

Vegetation integrity

Composition and structure sum values may be completed after entering data into available tools. It is not required while in the field

Composition (400 m² plot)			**Structure** (400 m² plot)			**Function** (1000 m² plot)	
		Sum values			Sum values (%) (may sum to >100%)	[3] Tree stem size class (DBH)	If data are to be used as more appropriate local data i.e. to generate local benchmarks, stems must be counted
Total count of native plant species **(richness)** in each growth form group (not individual plants within each growth form)	Trees (TG)	1	Sum of [2] **foliage cover** of native plant species by growth form group	Trees (TG)	12%	80 + cm	Count
	Shrubs (SG)	0		Shrubs (SG)	0%	50 – 79 cm	Count (best practice)/tick. If [8] large tree benchmark size ≥50 cm, count 1
	Grasses etc. (GG)	2		Grasses etc. (GG)	22%	30 – 49 cm	Count (best practice)/tick. If large tree benchmark size ≥ 30 cm, count Nil
	Forbs (FG)	2		Forbs (FG)	0.2%	20 – 29 cm	Count (best practice)/tick. If large tree benchmark size ≥ 20 cm, count Nil
	Ferns (EG)	0		Ferns (EG)	0%	10 – 19 cm	Count (best practice)/tick Nil
	Other (OG)	1		Other (OG)	0.1%	5 – 9 cm	Count (best practice)/tick Nil
						[4]Tree regeneration <5 cm	Tick Nil
			Total high threat weed cover		%	[5] Length of fallen logs	Tally/space Nil Total 0 m
						[6] Hollow bearing trees	Tally/space Nil

Vegetation integrity - function cont. (five 1 m²) **plots)**	[7] Litter cover (%)	**Bare ground cover (%)**	**Cryptogam cover (%)**	**Rock cover (%)**
Subplot score (% in each)	0 0 1 0 0	0 1 0 0 4	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	0.2%	1%	0%	0%

These attributes require consideration of site observations and may be completed after field work:

Vegetation class		[8] **Large tree benchmark size**	20/ 30/ 50/ 80 DBH	Confidence	H/ M/ L
Plant community type (PCT)		**EEC**	Tick	Confidence	H/ M/ L

Physiography and site features that may help in determining PCT and management zone (optional) or for BioNet systematic flora survey purposes:

Morphological type		Landform element		Landform pattern		Microrelief	
Lithology		Soil surface texture		Soil colour		Soil depth	
Slope	Moderate	Aspect	NE	Site drainage	good	Distance to nearest water and type	~250m

Disturbance	Severity code	Age code
Clearing (inc. logging)	–	
Cultivation (inc. pasture)	–	
Soil erosion	–	
Firewood / CWD removal	–	
Grazing (id. native/stock)	2	R
Fire damage	–	
Storm damage	–	
Weediness	2	R
Other	–	

Brief site description or other notes

scattered native canopy trees within a highly grazed cattle paddock surrounded to N & E by existing residential development.

Emergents heights			Upper stratum heights			Middle stratum heights			Lower stratum heights		
Top	Mid	Bottom	Top	Mid	Bottom	Top	Mid	Bottom	Top	Mid	Bottom
m	m	m	m	m	m	m	m	m	m	m	m

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

400 m² floristics plot:	Survey name	Plot identifier	Recorders
Date 23 04 24	Kemsley Park	Plot 3	Clayton Woods

GF code		Species name Full species name, or a unique means of identifying separate taxa within a survey is mandatory. Data from here will be used to assign growth form richness and cover.	N, HTW or non-HTW	[2] Foliage cover	Abund-ance	Voucher
TG	1	E. creba	N	12	2	
GG	2	Stenotaphrum secundatum (Buffalo grass)		40		
GG	3	Chloris gayana		18		
FG	4	lysimachia foeminia		0.1		
FG	5	Sida rhombifolia		0.2		
GG	6	Paspalum dilatatum		8		
FG	7	Cyperus mindorensis		0.1		
FG	8	Plantageo lanceolata		0.4		
FG	9	Oxalis corniculata		0.2		
FG	10	senecio Madagascarense		0.2		
GG	11	cenchrus clandestinus		20		
GG	12	Phleum pratense		2		
FG	13	Verbena (purpletop		6		
FG	14	Dichondra repens	N	0.1		
GG	15	Axonopus fissifolius		4		
GG	16	Cynodon dactylon		6		
GG	17	Eleusine indica		4.		
FG	18	Glycine tabacina (variable glycine)	N	0.1		
GG	19	Exharta erecta (Panic veldtgrass)		0.4		
SG	20	lantana camara		0.4		
FG	21	Trifolium dubium		0.1		
GG	22	Setaria parviflora		0.1		
GG	23	Sporobolus indicus		0.1		
GG	24	Austrostipa sp. (Speargrass)	N	12		
OG	25	Desmodium varians	N	0.1		
GG	26	Microlaena stipoides	N	10		
	27					
	28					
	29					
	30					
	31					
	32					
	33					
	34					
	35					

Print more copies of this page to allow for higher species counts at a plot. All vascular plant species in a plot need to be recorded.

GF Code: see growth form definitions in BAM 2020 Appendix F. **N:** native, **HTW:** high threat weed.

[2] **Foliage cover:** 0.1, 0.2, 0.3, …, 1, 2, 3, 4, 5, 10, 15, 20, 25, ...100%; Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately *1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m.* Note the top 3 dominant native species within each GF group.

Abundance: Count 1, 2, 3 …, when ≤10, estimate when >10, 20, 30 … 100, 200, 300 …, 1000, 2000, 3000 … (as integer values).

Numbers [1-8] on this page correlate with the numbers and explanatory notes on page 3

Site sheet #	4 of 4	**Date**	30/4/24	**Survey name**	Kemsley Park BAM Plot 4	**Plot identifier**	Plot 4		
Recorders	Clayton Woods			**IBRA region**	Sydney Basin	**Veg zone ID**			
[1]Datum	GDA 94	**Coordinate system**	□ Projected ☒ Geographic	**MGA zone**	94	**[1]X coordinate**	-37.581757	**[1]Y coordinate**	150.690479
Location description	Wooded hillside leading down to dam & cleared grazing areas (note nearest locate site name, grid reference)								
[1] Plot dimensions	50x20 — For composition & structure (400m²): 20 m x 20 m; For function (1000m²): 20 m x 50 m					**[1] Orientation of midline from 0 m point**	Magnetic ° 87° E	**Photo #**	

Datum: AGD66, WGS84, GDA94, GDA2020 or Other (specify). **MGA Zone** (for Projected coordinate. system only): 56 (Coastal NSW), 55 (Central NSW or 54 (Western NSW). **X/Y coordinate**: Long/Lat (for Projected coordinate. system), Easting/Northing (for geographic coordinate. system)

Vegetation integrity

Composition and structure sum values may be completed after entering data into available tools. It is not required while in the field

Composition (400 m² plot)			**Structure** (400 m² plot)			**Function** (1000 m² plot)	
		Sum values			Sum values (%) (may sum to >100%)	[3] Tree stem size class (DBH)	If data are to be used as more appropriate local data i.e. to generate local benchmarks, stems must be counted
Total count of native plant species **(richness)** in each growth form group (not individual plants within each growth form)	Trees (TG)	2	Sum of [2] **foliage cover** of native plant species by growth form group	Trees (TG)	35.2	80 + cm	Count Nil
	Shrubs (SG)	1		Shrubs (SG)	1	50 – 79 cm	Count (best practice)/tick. If large tree benchmark size ≥50 cm, count Nil
	Grasses etc. (GG)	1		Grasses etc. (GG)	0.1	30 – 49 cm	Count (best practice)/tick. If large tree benchmark size ≥ 30 cm, count Nil
	Forbs (FG)	3		Forbs (FG)	0.3	20 – 29 cm	Count (best practice)/tick. If large tree benchmark size ≥ 20 cm, count Nil
	Ferns (EG)	0		Ferns (EG)	0	10 – 19 cm	Count (best practice)/tick 1
	Other (OG)	0		Other (OG)	0	5 – 9 cm	Count (best practice)/tick 111
						[4]Tree regeneration <5 cm	Tick ✓
			Total high threat weed cover		%	[5] Length of fallen logs	Tally/Trace Nil — Total m
						[6] Hollow bearing trees	Tick Nil

Vegetation integrity - function cont. (five 1 m²) **plots)**	[7] Litter cover (%)	**Bare ground cover (%)**	**Cryptogam cover (%)**	**Rock cover (%)**
Subplot score (% in each)	65 75 75 50 65	20 12 5 7 7	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	66 %	10.2 %	0 %	0 %

These attributes require consideration of site observations and may be completed after field work:

Vegetation class		[8] **Large tree benchmark size**	20/ 30/ 50/ 80 DBH	Confidence	H/ M/ L
Plant community type (PCT)		**EEC**	Tick	Confidence	H/ M/ L

Physiography and site features that may help in determining PCT and management zone (optional) or for BioNet systematic flora survey purposes:

Morphological type		Landform element		Landform pattern	hilly	Microrelief	
Lithology		Soil surface texture		Soil colour		Soil depth	
Slope	Moderate/ Steep	Aspect	North	Site drainage	good	Distance to nearest water and type	60m dam

Disturbance	Severity code	Age code
Clearing (inc. logging)	3	R
Cultivation (inc. pasture)		
Soil erosion		
Firewood / CWD removal		
Grazing (id. native/stock)	2	R
Fire damage		
Storm damage		
Weediness	3	R
Other		

Brief site description or other notes

site recently mowed to clear dense lantana growth - groundcover is highly disturbed

Emergents heights			Upper stratum heights			Middle stratum heights			Lower stratum heights		
Top	Mid	Bottom	Top	Mid	Bottom	Top	Mid	Bottom	Top	Mid	Bottom
m	m	m	m	m	m	m	m	m	m	m	m

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

400 m² floristics plot:	Survey name	Plot identifier	Recorders
Date _ _ / _ _ / _ _			

	GF code		Species name Full species name, or a unique means of identifying separate taxa within a survey is mandatory. Data from here will be used to assign growth form richness and cover.	N, HTW or non-HTW	[2] Foliage cover	Abund-ance	Voucher
1	SG	1	lantana camara		80		
2	GG	2	Cynodon dactylon		0.2		
3	FG	3	Sida rhombifolia		0.1		
4	FG	4	Dichondra repens	N	0.1		
5	FG	5	Commelina cyanea	N	0.1		
6	GG	6	Oplismenus hirtellus	N	0.1		
7	FG	7	Oxalis corniculata		0.2		
8	FG	8	Glycine tabacina	N	0.1		
9	FG	9	Plantago lancelota		0.1		
10	EG	10	Oeosporangium sp.		0.1		
11	SG	11	Bursaria spinosa	N	1		
12	FG	12	Trifolium sp.		0.1		
13	TG	13	E. tericornis	N	15		
14	TG	14	E. tericornis regrowth	N	0.1	4	
15	TG	15	E. Creba	N	20	4	
16	TG	16	E. Creba regrowth	N	0.1		
17	FG	17	Senecio Madagascarense		0.1		
18	GG	18	Imperata cylindrica		0.3		
19	GG	19	dactylis glomerata		2		
20	GG	20	Paspalum dilatatum		4		
21		21					
22		22					
23		23					
24		24					
25		25					
26		26					
27		27					
28		28					
29		29					
30		30					
31		31					
32		32					
33		33					
34		34					
35		35					

Print more copies of this page to allow for higher species counts at a plot. All vascular plant species in a plot need to be recorded.

GF Code: see growth form definitions in BAM 2020 Appendix F. **N:** native, **HTW:** high threat weed.

[2] **Foliage cover:** 0.1, 0.2, 0.3, …, 1, 2, 3, 4, 5, 10, 15, 20, 25, ...100%; Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately *1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m.* Note the top 3 dominant native species within each GF group.

Abundance: Count 1, 2, 3 …, when ≤10, estimate when >10, 20, 30 … 100, 200, 300 …, 1000, 2000, 3000 … (as integer values).

APPENDIX C – BAMC CREDIT REPORT

BAM Credit Summary Report

Proposal Details

Assessment Id 00049699/BAAS17054/24/00049700	Proposal Name Redbank Expansion Area Kemsley Park	BAM data last updated * 14/03/2024
Assessor Name Kat Duchatel	Report Created 10/07/2024	BAM Data version * 67
Assessor Number BAAS17054	BAM Case Status Open	Date Finalised To be finalised
Assessment Revision 0	Assessment Type Part 4 Developments (General)	BOS entry trigger BOS Threshold: Biodiversity Values Map and area clearing threshold

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

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

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Cumberland Shale Plains Woodland												
1	3320_Classname1	Cumberland Plain Woodland in the Sydney Basin Bioregion	19.1	19.1	4.4	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	52

2	3320_Classname101	Cumberland Plain Woodland in the Sydney Basin Bioregion	14.1	14.1	2.3	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	0
3	3320_Classname102	Cumberland Plain Woodland in the Sydney Basin Bioregion	22.7	22.7	1	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	15
											Subtotal	**67**
											Total	**67**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Litoria aurea / Green and Golden Bell Frog (Fauna)									
3320_Classname1	19.1	19.1	2	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Vulnerable	False	19
3320_Classname102	22.7	22.7	1	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Vulnerable	False	11

								Subtotal	**30**
Lophoictinia isura / Square-tailed Kite (Fauna)									
3320_Classname1	19.1	19.1	4.4	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Vulnerable	Not Listed	False	31
3320_Classname101	14.1	14.1	2.3	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Vulnerable	Not Listed	False	12
3320_Classname102	22.7	22.7	1	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Vulnerable	Not Listed	False	9
								Subtotal	**52**
Myotis macropus / Southern Myotis (Fauna)									
3320_Classname1	19.1	19.1	4.4	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	41
3320_Classname101	14.1	14.1	0.5	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	4

3320_Classname102	22.7	22.7	1	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	12
								Subtotal	**57**
Pultenaea pedunculata / Matted Bush-pea (Flora)									
3320_Classname1	19.1	19.1	4.4	Biodiversity Conservation Act listing status	Ability to colonise improved habitat	Endangered	Not Listed	False	41
3320_Classname101	14.1	14.1	2.3	Biodiversity Conservation Act listing status	Ability to colonise improved habitat	Endangered	Not Listed	False	16
3320_Classname102	22.7	22.7	1	Biodiversity Conservation Act listing status	Ability to colonise improved habitat	Endangered	Not Listed	False	12
								Subtotal	**69**

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00049699/BAAS17054/24/00049700

Proposal Name
Redbank Expansion Area Kemsley Park

BAM data last updated *
14/03/2024

Assessor Name
Kat Duchatel

Assessor Number
BAAS17054

BAM Data version *
67

Proponent Names

Report Created
10/07/2024

BAM Case Status
Open

Assessment Revision
0

Assessment Type
Part 4 Developments (General)

Date Finalised
To be finalised

BOS entry trigger
BOS Threshold: Biodiversity Values Map and area clearing threshold

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

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered Ecological Community	3320-Cumberland Shale Plains Woodland

Species
Nil

BAM Biodiversity Credit Report (Like for like)

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo
Pandion cristatus / Eastern Osprey

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3320-Cumberland Shale Plains Woodland	Cumberland Plain Woodland in the Sydney Basin Bioregion	7.7	0	67	67

BAM Biodiversity Credit Report (Like for like)

3320-Cumberland Shale Plains Woodland	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 3319, 3320	-	3320_Classname1	No	52	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 3319, 3320	-	3320_Classname101	No	0	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 3319, 3320	-	3320_Classname102	No	15	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

BAM Biodiversity Credit Report (Like for like)

Species	Vegetation Zone/s	Area / Count	Credits
Litoria aurea / Green and Golden Bell Frog	**3320_Classname1, 3320_Classname102**	3.0	30.00
Lophoictinia isura / Square-tailed Kite	**3320_Classname1, 3320_Classname101, 3320_Classname102**	7.7	52.00
Myotis macropus / Southern Myotis	**3320_Classname1, 3320_Classname101, 3320_Classname102**	5.9	57.00
Pultenaea pedunculata / Matted Bush-pea	**3320_Classname1, 3320_Classname101, 3320_Classname102**	7.7	69.00

Credit Retirement Options

Like-for-like credit retirement options

Litoria aurea / Green and Golden Bell Frog	Spp	IBRA subregion
	Litoria aurea / Green and Golden Bell Frog	Any in NSW
Lophoictinia isura / Square-tailed Kite	Spp	IBRA subregion
	Lophoictinia isura / Square-tailed Kite	Any in NSW
Myotis macropus / Southern Myotis	Spp	IBRA subregion
	Myotis macropus / Southern Myotis	Any in NSW

Pultenaea pedunculata / Matted Bush-pea	Spp	IBRA subregion
	Pultenaea pedunculata / Matted Bush-pea	Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id

00049699/BAAS17054/24/00049700

Proposal Name

Redbank Expansion Area Kemsley Park

BAM data last updated *

14/03/2024

Assessor Name

Kat Duchatel

Assessor Number

BAAS17054

BAM Data version *

67

Proponent Name(s)

Report Created

10/07/2024

BAM Case Status

Open

Assessment Revision

0

Assessment Type

Part 4 Developments (General)

Date Finalised

To be finalised

BOS entry trigger

BOS Threshold: Biodiversity Values Map and area clearing threshold

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

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered Ecological Community	3320-Cumberland Shale Plains Woodland

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

BAM Biodiversity Credit Report (Variations)

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo
Pandion cristatus / Eastern Osprey

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3320-Cumberland Shale Plains Woodland	Cumberland Plain Woodland in the Sydney Basin Bioregion	7.7	0	67	67.00

3320-Cumberland Shale Plains Woodland

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 3319, 3320	-	3320_Class name1	No	52	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 3319, 3320	-	3320_Classname101	No	0	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 3319, 3320	-	3320_Classname102	No	15	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Litoria aurea / Green and Golden Bell Frog	**3320_Classname1, 3320_Classname102**	3.0	30.00
Lophoictinia isura / Square-tailed Kite	**3320_Classname1, 3320_Classname101, 3320_Classname102**	7.7	52.00
Myotis macropus / Southern Myotis	**3320_Classname1, 3320_Classname101, 3320_Classname102**	5.9	57.00
Pultenaea pedunculata / Matted Bush-pea	**3320_Classname1, 3320_Classname101, 3320_Classname102**	7.7	69.00

Credit Retirement Options

Like-for-like options

Litoria aurea/ Green and Golden Bell Frog	Spp		IBRA region
	Litoria aurea/Green and Golden Bell Frog		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Endangered	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Lophoictinia isura/ Square-tailed Kite	Spp		IBRA region
	Lophoictinia isura/Square-tailed Kite		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Myotis macropus/ Southern Myotis	Spp		IBRA region
	Myotis macropus/Southern Myotis		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Pultenaea pedunculata/ Matted Bush-pea	Spp		IBRA region
	Pultenaea pedunculata/Matted Bush-pea		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Flora	Endangered	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Vegetation Zones Report

Proposal Details

Assessment Id	Assessment name	BAM data last updated *
00049699/BAAS17054/24/00049700	Redbank Expansion Area Kemsley Park	14/03/2024
Assessor Name	**Report Created**	**BAM Data version ***
Kat Duchatel	10/07/2024	67
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS17054	Part 4 Developments (General)	Open
Assessment Revision	**Date Finalised**	**BOS entry trigger**
0	To be finalised	BOS Threshold: Biodiversity Values Map and area clearing threshold

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

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones

1	3320_Classname1	3320-Cumberland Shale Plains Woodland	Classname1	4.35	2	
2	3320_Classname101	3320-Cumberland Shale Plains Woodland	Classname101	2.34	2	
3	3320_Classname102	3320-Cumberland Shale Plains Woodland	Classname102	1.03	1	

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00049699/BAAS17054/24/00049700	Redbank Expansion Area Kemsley Park	14/03/2024
Assessor Name	**Report Created**	**BAM Data version ***
Kat Duchatel	10/07/2024	67
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS17054	Part 4 Developments (General)	Open
Assessment Revision	**BOS entry trigger**	**Date Finalised**
0	BOS Threshold: Biodiversity Values Map and area clearing threshold	To be finalised

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

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

Common Name	Scientific Name	Vegetation Types(s)
Black Falcon	Falco subniger	3320-Cumberland Shale Plains Woodland
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis	3320-Cumberland Shale Plains Woodland
Black-necked Stork	Ephippiorhynchus asiaticus	3320-Cumberland Shale Plains Woodland
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	3320-Cumberland Shale Plains Woodland
Diamond Firetail	Stagonopleura guttata	3320-Cumberland Shale Plains Woodland
Dusky Woodswallow	Artamus cyanopterus cyanopterus	3320-Cumberland Shale Plains Woodland
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	3320-Cumberland Shale Plains Woodland
Eastern False Pipistrelle	Falsistrellus tasmaniensis	3320-Cumberland Shale Plains Woodland
Flame Robin	Petroica phoenicea	3320-Cumberland Shale Plains Woodland
Gang-gang Cockatoo	Callocephalon fimbriatum	3320-Cumberland Shale Plains Woodland

Greater Broad-nosed Bat	Scoteanax rueppellii	3320-Cumberland Shale Plains Woodland
Grey-headed Flying-fox	Pteropus poliocephalus	3320-Cumberland Shale Plains Woodland
Large Bent-winged Bat	Miniopterus orianae oceanensis	3320-Cumberland Shale Plains Woodland
Little Bent-winged Bat	Miniopterus australis	3320-Cumberland Shale Plains Woodland
Little Eagle	Hieraaetus morphnoides	3320-Cumberland Shale Plains Woodland
Little Lorikeet	Glossopsitta pusilla	3320-Cumberland Shale Plains Woodland
Regent Honeyeater	Anthochaera phrygia	3320-Cumberland Shale Plains Woodland
Rosenberg's Goanna	Varanus rosenbergi	3320-Cumberland Shale Plains Woodland
Scarlet Robin	Petroica boodang	3320-Cumberland Shale Plains Woodland
Speckled Warbler	Chthonicola sagittata	3320-Cumberland Shale Plains Woodland
Spotted Harrier	Circus assimilis	3320-Cumberland Shale Plains Woodland
Spotted-tailed Quoll	Dasyurus maculatus	3320-Cumberland Shale Plains Woodland
Square-tailed Kite	Lophoictinia isura	3320-Cumberland Shale Plains Woodland
Swift Parrot	Lathamus discolor	3320-Cumberland Shale Plains Woodland
Turquoise Parrot	Neophema pulchella	3320-Cumberland Shale Plains Woodland
Varied Sittella	Daphoenositta chrysoptera	3320-Cumberland Shale Plains Woodland
White-bellied Sea-Eagle	Haliaeetus leucogaster	3320-Cumberland Shale Plains Woodland
White-throated Needletail	Hirundapus caudacutus	3320-Cumberland Shale Plains Woodland
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	3320-Cumberland Shale Plains Woodland

Threatened species Manually Added

None added

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

Common Name	Scientific Name	Plant Community Type(s)
Eastern Osprey	Pandion cristatus	3320-Cumberland Shale Plains Woodland

South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	3320-Cumberland Shale Plains Woodland

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

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C
Eastern Osprey	Pandion cristatus	Refer to BAR
South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	Habitat constraints

BAM Candidate Species Report

Proposal Details

Assessment Id 00049699/BAAS17054/24/00049700	Proposal Name Redbank Expansion Area Kemsley Park	BAM data last updated * 14/03/2024
Assessor Name Kat Duchatel	Report Created 10/07/2024	BAM Data version * 67
Assessor Number BAAS17054	Assessment Type Part 4 Developments (General)	BAM Case Status Open
Assessment Revision 0	Date Finalised To be finalised	BOS entry trigger BOS Threshold: Biodiversity Values Map and area clearing threshold

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

List of Species Requiring Survey

Name	Presence	Survey Months
Acacia pubescens Downy Wattle	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☑ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Eucalyptus benthamii Camden White Gum	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☑ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Eucalyptus glaucina Slaty Red Gum	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☑ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Grevillea juniperina subsp. juniperina Juniper-leaved Grevillea	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☑ May ☑ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Litoria aurea Green and Golden Bell Frog	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Lophoictinia isura Square-tailed Kite	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Meridolum corneovirens Cumberland Plain Land Snail	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☑ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Micromyrtus minutiflora Micromyrtus minutiflora	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☑ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Myotis macropus Southern Myotis	Yes (surveyed) *Survey months are outside of the months specified in Bionet.	☐ Jan ☐ Feb ☐ Mar ☑ Apr ☑ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☑ Survey month outside the specified months?
Pandion cristatus Eastern Osprey	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Persoonia nutans Nodding Geebung	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☑ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Petaurus norfolcensis Squirrel Glider	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☑ Apr ☑ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Phascolarctos cinereus Koala	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☑ Apr ☑ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Pimelea spicata Spiked Rice-flower	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☑ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Pultenaea pedunculata Matted Bush-pea	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Threatened species Manually Added

None added

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Barking Owl	Ninox connivens	Habitat constraints
Brown Pomaderris	Pomaderris brunnea	Habitat degraded
Bush Stone-curlew	Burhinus grallarius	Habitat degraded Habitat constraints
Deyeuxia appressa	Deyeuxia appressa	Habitat degraded
Dillwynia tenuifolia	Dillwynia tenuifolia	Refer to BAR
Eastern Pygmy-possum	Cercartetus nanus	Habitat degraded
Gang-gang Cockatoo	Callocephalon fimbriatum	Habitat degraded Habitat constraints
Grey-headed Flying-fox	Pteropus poliocephalus	Habitat constraints
Hibbertia puberula	Hibbertia puberula	Refer to BAR
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat constraints
Large-eared Pied Bat	Chalinolobus dwyeri	Habitat constraints
Little Bent-winged Bat	Miniopterus australis	Habitat constraints
Little Eagle	Hieraaetus morphnoides	Refer to BAR
Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	Marsdenia viridiflora subsp. viridiflora - endangered population	Refer to BAR

Masked Owl	Tyto novaehollandiae	Habitat constraints
P. prunifolia in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas	Pomaderris prunifolia - endangered population	Refer to BAR
Pimelea curviflora var. curviflora	Pimelea curviflora var. curviflora	Habitat degraded
Powerful Owl	Ninox strenua	Habitat constraints
Pultenaea parviflora	Pultenaea parviflora	Habitat degraded
Regent Honeyeater	Anthochaera phrygia	Habitat constraints
South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	Habitat degraded Habitat constraints
Southern Greater Glider	Petauroides volans	Habitat degraded
Swift Parrot	Lathamus discolor	Habitat constraints
Sydney Plains Greenhood	Pterostylis saxicola	Habitat degraded
Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield	Wahlenbergia multicaulis - endangered population	Refer to BAR
White-bellied Sea-Eagle	Haliaeetus leucogaster	Habitat constraints