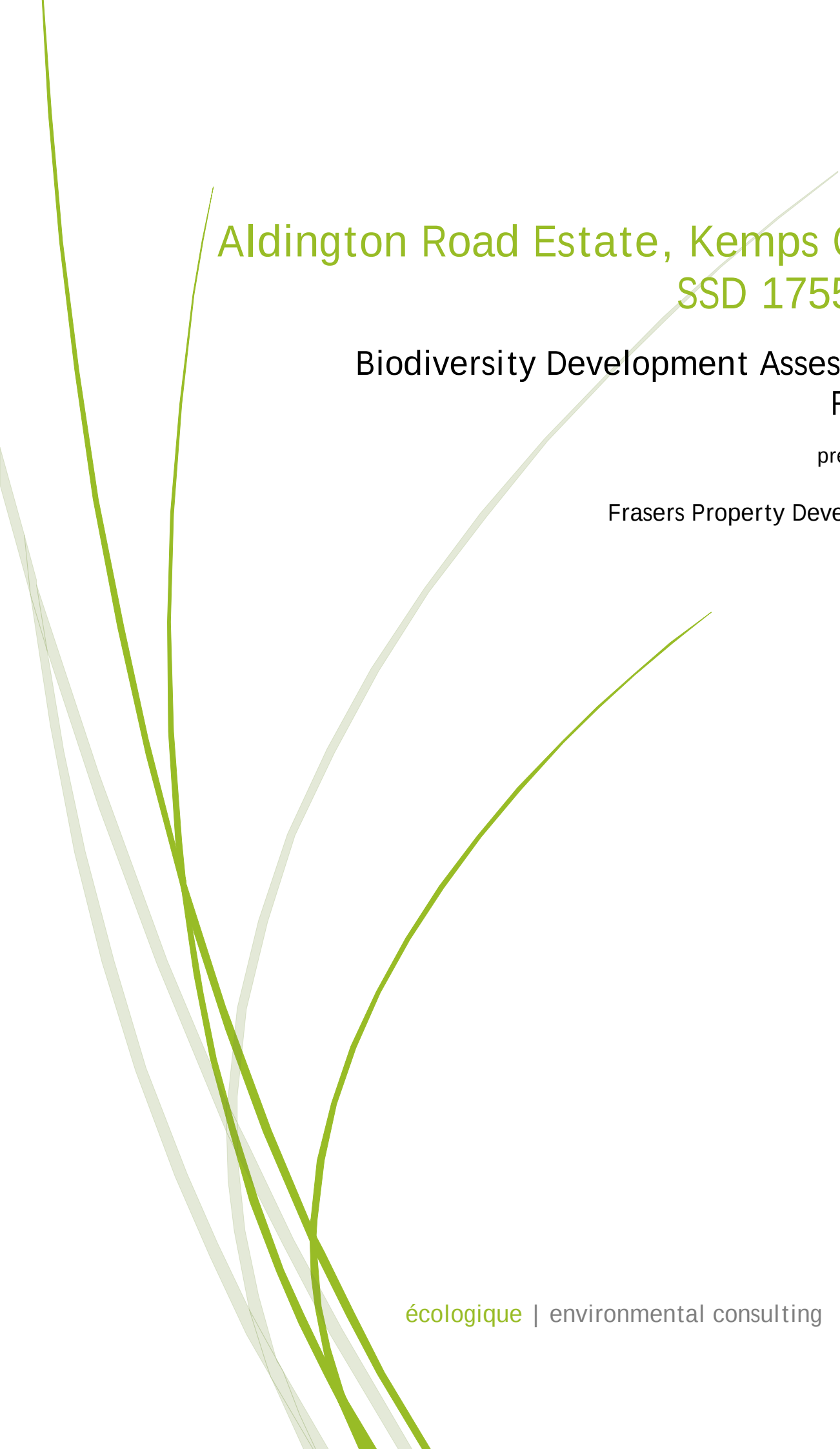




Aldington Road Estate, Kemps Creek SSD 17552047

Biodiversity Development Assessment Report

prepared for

Frasers Property Development

Aldington Road Estate, Kemps Creek SSD 17552047

prepared for

Frasers Property Development

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Certification

I, Kat Duchatel (BAAS17054), certify that this biodiversity development assessment report has been prepared on the basis of the requirements of (and information provided under) the current biodiversity assessment method (OEH 2020).

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17/06/2021

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Revision Schedule

Rev No	Date	Description	Issued to
1	26/05/2021	DRAFT Biodiversity Development Assessment Report	Frasers
2	03/06/2021	Biodiversity Development Assessment Report	Frasers
3	17/06/2021	Biodiversity Development Assessment Report - amended floor plan	Frasers

Executive Summary

Frasers Property Industrial (Frasers) is proposing to construct and operate a warehouse and logistics hub at 155 to 217 Aldington Road, Kemps Creek (the subject land) in the Penrith City Council local government area (LGA). The proposed development (the proposal) is classified as a Part 4.1 State Significant Development under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

This Biodiversity Development Assessment Report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs for SSD-17552047, which for biodiversity requires:

"An assessment of the proposal's biodiversity impacts in accordance with the Biodiversity Conservation Act 2016, including the preparation of a Biodiversity Development Assessment Report (BDAR) where required under the Act, except where a waiver for preparation of a BDAR has been granted."

Under Division 2 Section 6.7 of the *Biodiversity Conservation Act 2016* the NSW Environment Minister established the Biodiversity Assessment Method (BAM) in connection with the NSW Biodiversity Offsets Scheme. The proposal's biodiversity impacts have been assessed through application of the BAM, which is documented in this Biodiversity Development Assessment Report.

The subject land extends over approximately 43 hectares (ha) of substantially cleared land and consists of market gardens, pasture, rural housing and associated farm sheds, horse agistment and a disused harness training circuit, several farm dams and private access roads (both sealed driveways and unsealed roads).

Two plant community types (PCTs) were confidently allocated to the native vegetation present within the subject land, with a third PCT allocated to farm dam area containing native macrophytes:

1. Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 835); and
2. Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849).
3. *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion (PCT 1071), which has been allocated to farm dam areas.

Eighteen ecosystem credits will be required to offset the removal of these PCTs in accordance with the NSW Biodiversity Offset Scheme, as summarised below:

PCT	Threatened ecological community (TEC)	Area (ha)	Credits required
835 - Cumberland riverflat forest	River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and SE Corner Bioregions	0.2	3
849 - Cumberland shale plains woodland	Cumberland Plain Woodland in the Sydney Basin Bioregion	0.73	12
1071 - Coastal freshwater wetlands	Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Part); Listed BC Act, E: Sydney Freshwater Wetlands in the Sydney Basin Bioregion (Part)	3.3	3

No species credit species have been identified as requiring an offset.

Approximately 38.7 ha of the subject land does not require an offset. These areas include market gardens, cleared residential land, planted native and exotic vegetation and pasture/exotic weed areas as summarised below:

Description	Area (ha)
Market gardens	10.07
Pasture	20.81
Planted native	0.99
Planted native - exotic	0.09
Planted exotic	1.15
Weeds	2.32
Buildings / other	3.30
Total area	38.73

Serious and Irreversible Impact (SII) values have also been considered in this assessment. *Cumberland Plain Woodland of the Sydney Basin Bioregion* is listed as an SII entity, however SII thresholds for this community are still under development.

Additional matters relating to impacts on flora and fauna which are not covered by the NSW *Biodiversity Conservation Act 2017* (BC Act) must also be addressed for the proposal. Relevant and potential Matters of National Environmental Significance (MNES) listed under with the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) include two TECs as follows:

- The NSW Cumberland Plain Woodland in the Sydney Basin Bioregion (PCT 849), which is listed as the critically endangered Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest.
- The NSW River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (PCT 835), which was listed as the critically endangered *Coastal floodplain eucalypt forest of eastern Australia* (date effective 15-Dec-2020).

In order to be protected as a MNES area of the ecological community must meet both key diagnostic and minimum condition thresholds as prescribed by the Australian Government (DAWE, 2020). Neither of PCT 835 and PCT 849 within the subject land meet the criteria for consideration as a MNES under the DAWE (2020) key diagnostic and minimum condition thresholds.

Other MNES identified from the EPBC Act protected matters search for the locality include threatened flora and fauna species and migratory species. This assessment has indicated that the subject land is unlikely to provide habitat important to any of the listed species. Regardless, all listed MNES are described further in a referral being submitted for assessment by the Minister.

Mitigation of construction impacts will be specified within a project specific Construction and Environmental Management Plan (CEMP). The proposal's direct and permanent impact on 1.27 ha of native vegetation will be mitigated through a range of measures, which are to be specified in a fauna and flora management plan (FFMP). As a subplan to the CEMP, the FFMP will specify biodiversity related procedures, which at a minimum would include, the following:

- Pre-clearance and clearance management of vegetation;
- Fauna rescue and relocation protocol;
- Euthanasia protocol;
- Dam decommissioning;
- Weed and pathogen control; and
- Monitoring and reporting strategies.

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1. Introduction

1.1 Background

Frasers Property Industrial (Frasers) is proposing to construct and operate a warehouse and logistics hub at 155 to 217 Aldington Road, Kemps Creek (the subject land). The proposed development (the proposal) will involve bulk earthworks, vegetation clearing, provision of infrastructure and construction of warehouse and distribution facilities.

The subject land extends over approximately 43 hectares (ha), which is located within the Penrith City Council local government area (LGA) and comprises several allotments as identified in Table 1-1 below and shown in Figure 1-1.

Table 1-1. Subject land

Street Address	Legal Description
155-167 Aldington Road, Kemps Creek	Lot 33 DP258949
169-181 Aldington Road, Kemps Creek	Lot 28 DP255560
183-197 Aldington Road, Kemps Creek	Lot 27 DP255560
199 Aldington Road, Kemps Creek	Lot 26 DP255560
201-217 Aldington Road, Kemps Creek	Lot 25 DP255560

Zoned IN1 General Industrial under the provisions of State Environmental Planning Policy (Western Sydney Employment Area) 2009 (SEPP WSEA), the subject land is located within the more recently released Mamre Road Precinct (the Precinct) of the SEPP WSEA (see Figure 1-2). Relevantly, Council has recently exhibited a draft Development Control Plan (DCP) for the Precinct, which provides a further layer of biodiversity matters that must be considered in the proposal (refer Table 1-2 in Section 1.5).

1.2 Secretary's Environmental Assessment Requirements

This Biodiversity Development Assessment Report has been prepared by Kat Duchatel (BAAS17054) who is an Accredited Person under the NSW *Biodiversity Conservation Act 2016* and address the Secretary's Environmental Assessment Requirements (SEARs) for SSD-17552047, which for biodiversity requires:

"An assessment of the proposal's biodiversity impacts in accordance with the Biodiversity Conservation Act 2016, including the preparation of a Biodiversity Development Assessment Report (BDAR) where required under the Act, except where a waiver for preparation of a BDAR has been granted."

Under Division 2 Section 6.7 of the *Biodiversity Conservation Act 2016* the NSW Environment Minister established the Biodiversity Assessment Method (BAM) in connection with the NSW Biodiversity Offsets Scheme. The proposal's biodiversity impacts have been assessed through application of the BAM, which is documented in this Biodiversity Development Assessment Report.

1.3 Information sources

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

- Imagery:
 - Aerial imagery: NearMap 15 April 2021
- Australian Government Department of the Environment and Energy

- Protected Matters Search Tool <http://www.environment.gov.au/epbc/pmst/index.html>
- 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
 - BVMap_V102_SEED.gdb
 - Biodiversity Values Map and Threshold Tool (updated 2020)
 - Remnant Vegetation of the western Cumberland subregion, 2013 Update. VIS_ID 4207
 - BioNet Vegetation Classification Database
 - BioNet Threatened Biodiversity Data Collection
 - Biodiversity Investment Opportunities Map: Mapping Priority Investment Areas for the Cumberland Subregion (2018)
 - Department of Environment and Climate Change, 2008, Soil and Land Resources of the Hawkesbury-Nepean Catchment, Department of Environment and Climate Change, Sydney.
- NSW Spatial Services Historical Imagery Viewer:
https://www.spatial.nsw.gov.au/products_and_services/aerial_and_historical_imagery

1.4 The proposal

The subject proposal seeks Development Consent for the construction and operational use of a proposed warehouse and logistics hub. A general layout plan of the proposed development is shown in Figure 1-2. Specifically, the proposal entails the following:

- Construction, fit out and operation of two warehouse and distribution buildings with a total floor area of 142,281 m² including offices, loading docks, parking and hardstand areas, civil works and utilities servicing, and landscaping;
- Associated works including demolition and bulk earthworks involving cut and fill works;
- 9-lot Torrens Title subdivision;
- Construction of internal roads and an access road off Aldington Road;
- Clearing of native and exotic vegetation and decommissioning of several agricultural dams.

1.5 Subject land description

The subject land is bordered by Aldington Road to the east, and rural/residential properties to the north, west and south. Existing rural/residential properties to the west and along the eastern side of Aldington Road are the subject of development assessments for similar State significant development (SSD) proposals (see Figure 1-3).

The subject land is substantially cleared and comprises market gardens, pasture, rural housing and associated farm sheds, horse agistment and a disused harness training circuit, several farm dams and private access roads (both sealed driveways and unsealed roads).

Market gardens, within the subject land, have substantially decreased in extent over recent years, resulting in large areas of dense weed growth. Notably is the extent of commonly occurring ground layer weeds that have established in height matching that of a lower shrub stratum (i.e., between 1-2 m in height). It is posited that the past enrichment of the soils for growing market produce has resulted in extraordinarily large sized weed species above that normally found.

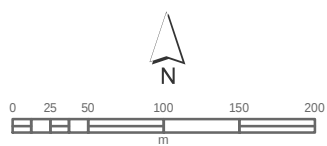


Aldington Estate, Kemp's Creek

Figure 1.1. Subject land

Legend

- Lot boundaries
- Farm dams



Coordinate System: MGA Zone 56 (GDA 2020)

Image sources: Nearmap 15 April 2021

Date prepared: 20 May 2021

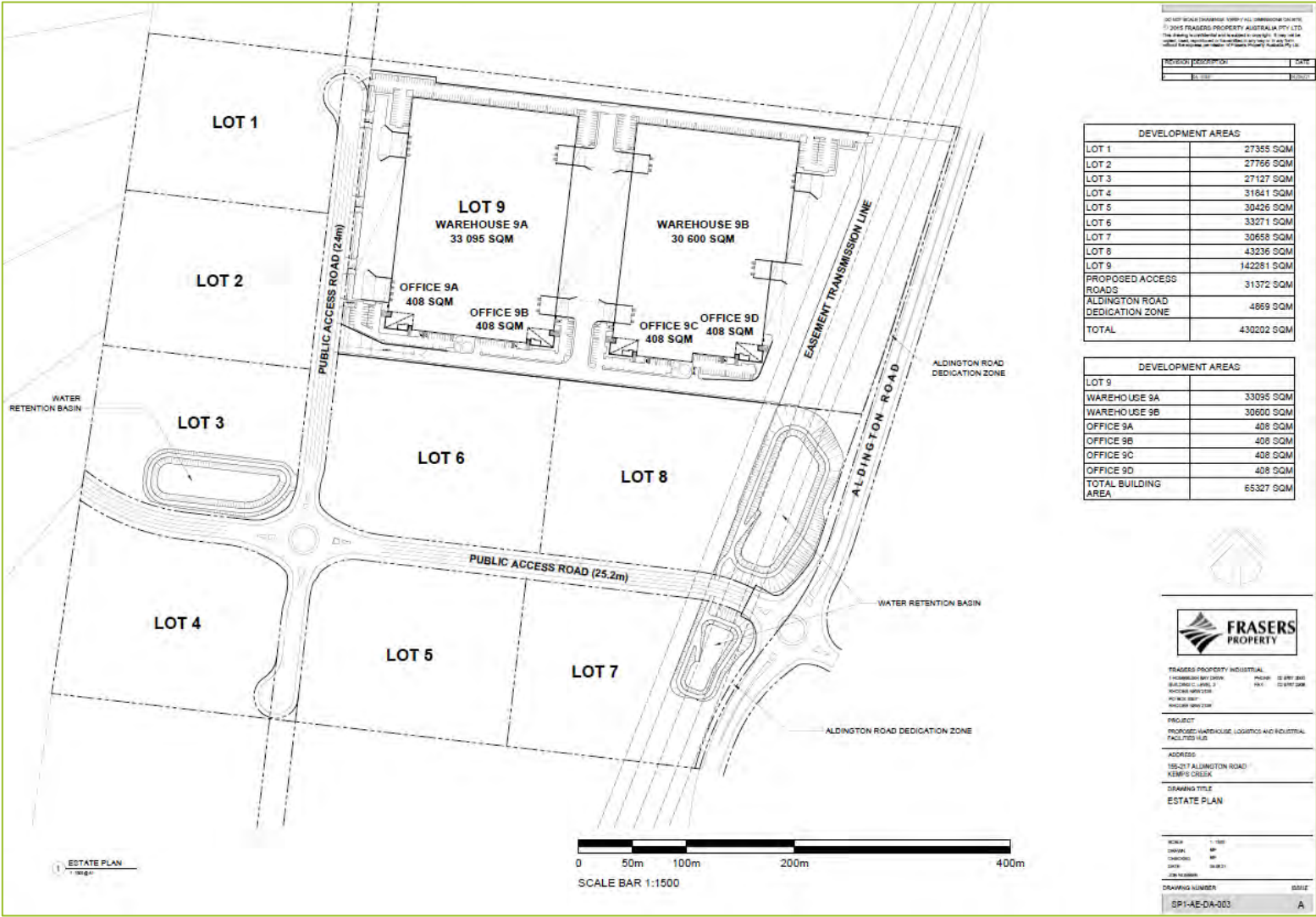
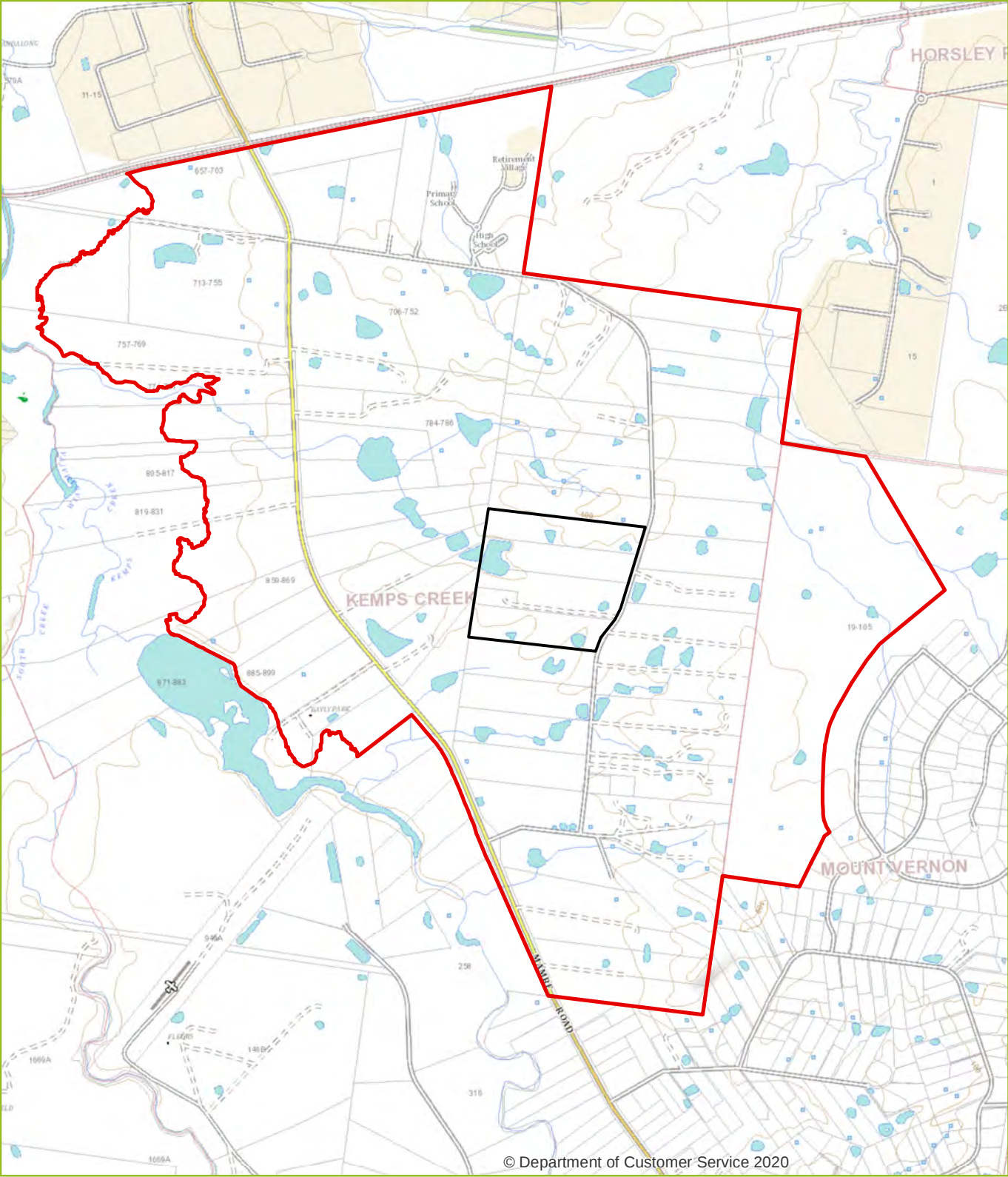


Figure 1-2. Proposal layout



Aldington Estate, Kemps Creek

Figure 1.3. Location map

Coordinate System: MGA Zone 56 (GDA 2020)

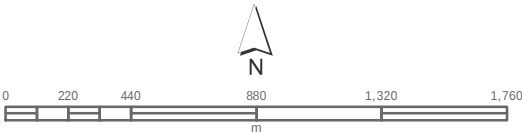
Image sources: Nearmap 15 April 2021

Date prepared: 20 May 2021

Legend

Subject land

Mamre_Road_Precinct



1.5 Legislative context

Table 1-2 provides a summary of legislation relevant to biodiversity matters on the subject land.

Table 1-2. Legislative context

Legislative mechanism	Relevance to proposal
Federal	
<i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act)	Two Matters of National Environmental Significance (MNES) have been identified on the subject land, which comprise two threatened ecological communities (TECs). Only one area of TEC meets the threshold guidelines for consideration as a TEC under the EPBC Act. MNES are discussed in Section 5 of this BDAR.
State	
<i>Environmental Planning and Assessment Act 1979</i> (EP&A Act)	The proposal is being assessed as a State Significant Development (SSD) under Part 4.1 of the EP&A Act. Secretary's Environmental Assessment Requirements (SEARS) have been issued (SSD-17552047 issued 12 May 2021), which relevant to Biodiversity require: - An assessment of the proposal's biodiversity impacts in accordance with the BC Act, including the preparation of a Biodiversity Development Assessment Report (BDAR) where required under the Act, except where a waiver for preparation of a BDAR has been granted. - Recommended policy and guidelines include: - Biodiversity Assessment Method (DPIE, 2020), - How to apply for a Biodiversity Development Assessment Report Waiver for a Major Project Application (DPIE, 2019), 'Species credit' threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Method (OEH, 2018).
<i>Biodiversity Conservation Act 2016</i> (BC Act)	The proposed development is SSD and requires the submission of a Biodiversity Development Assessment Report in accordance with Part 7 Division 2 Section 7.9 (2) of the BC Act: Any such application is to be accompanied by a biodiversity development assessment report unless the Planning Agency Head and the Environment Agency Head determine that the proposed development is not likely to have any significant impact on biodiversity values
<i>Fisheries Management Act 1994</i> (FM Act)	The development does not involve impacts to Key Fish Habitat, does not involve harm to marine vegetation, dredging, reclamation or obstruction of fish passage. A permit or consultation under the FM Act is not required.
<i>Water Management Act 2000</i> (WM Act)	The WM Act is administered by Natural Resources Access Regulator (NRAR) and establishes an approval regime for activities within waterfront land, defined as the land 40 m from the highest bank of a river, lake or estuary. The subject land does not contain any watercourses and consultation or approval from NRAR is not required.

Legislative mechanism	Relevance to proposal
SEPP (Western Sydney Employment Area) 2009	The subject landforms part of the Western Sydney Employment Area (WSEA) and is situated under the Land Application Area, Precinct 12 – Mamre Road of SEPP WSEA. The WSEA SEPP and the Mamre Road Precinct Structure Plan provide the statutory planning controls for development in the Precinct.
Mamre Road Draft Development Control Plan (DCP)	The Draft DCP has been prepared by Penrith City Council (Council) in accordance with the EP&A Act and provides additional objectives, controls and guidance for development in the Precinct. The biodiversity framework for the Precinct comprises lands zoned E2 Environmental Conservation, RE1 Public Recreation and designated riparian corridors. The subject land does not contain any lands zoned E2, RE1 or designated riparian corridors (see Figure 1-4). General Biodiversity Management clauses provided in the Draft DCP that are relevant to the proposal include the following: 11) DAs are to contain a Landscape Plan showing the location, extent and area of any existing native vegetation on the development site. 12) A Flora and Fauna Assessment is required for all subdivision DAs. 13) Avoid impacts to habitat features for threatened species and other fauna including large trees including dead trees at (>50cm DBH) and avoid impacts to soil within the dripline of the retained trees. 16) Weeds of National Significance (WONS) and on the National Environmental Alert List under the National Weeds Strategy are to be managed and eradicated. Proponent to reference NSW Weed Wise for current weed identification and management approaches. 17) All subdivision design and bulk earthworks are to consider the need to minimise weed dispersion and promote weed eradication. A Weed Eradication and Management Plan, outlining weed control measures during and after construction, is required for all subdivision DAs. 18) Pest control techniques implemented during, and post construction are to be in accordance with regulatory requirements for chemical use and address the relevant pest control strategy and are to reduce the risk of secondary poisoning. These matters are addressed within this BDAR or would otherwise be addressed in the project Construction Environmental Management Plan.



Figure 1-4. Biodiversity areas and riparian network diagram extracted from Draft DCP (November 2020)

2. Landscape Context

2.1 General description

The subject land falls in elevation over 40m from the north to southwest (95m to 55m ADH) with elevation falls from the east to west ranging between 20m (at northern end of site) to 5-10m (at southern end of site).

The subject land predominantly overlies the Luddenham soil landscape with a smaller area of Second Ponds soil landscape at lower elevation to the southwest.

Luddenham soil landscape is an erosional landscape typically occurring on hills and low hills on Wianamatta Group Bringelly Shale (shale, sandstone-lithic and siltstone/mudstone) in the Cumberland Plain and Blue Mountains Plateau. Degradation of this landscape is reported as: moderate gully erosion on steep slopes; moderate sheet erosion, with unstable slopes where mass movement may occur.

Second Ponds soil landscape is a transferral landscape, which occur on the foot slopes and plains on Colluvium/Alluvium and Wianamatta Group Shale (shale and colluvium) in the Cumberland Plain. Transferral soil landscapes are formed on deep deposits of mostly eroded parent materials washed from areas upslope. Degradation of this landscape is reported as: locally severe salt scalding and associated erosion on lower slope positions. Localised gully erosion along drainage depressions

Figure 2-1 illustrates the location of the soil landscapes with contours showing the sloping nature of the subject land.

2.2 Landscape features

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

In accordance with Sections 3.1 and 3.2 of the BAM (2020) assessment and mapping of the following landscape features are required:

- IBRA bioregions and subregions;
- NSW (Mitchell) landscapes;
- Rivers and streams classified according to stream order;
- Wetlands within, adjacent to and downstream of the site;
- Connectivity of different areas of habitat;
- Geological features such as karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, soil hazard features;
- Areas of outstanding biodiversity value occurring on the subject land and assessment area; and
- Percent native vegetation cover in the assessment area.

2.2.1 IBRA bioregions and IBRA subregions

The subject land and BDAR assessment area are wholly located within the Sydney Basin IBRA region and Cumberland IBRA subregion (Figure 2-2)

2.2.2 NSW landscape regions (Mitchell Landscapes)

The subject land is located wholly within the Cumberland Plain landscape, which covers 88.4% of the BDAR assessment area (as shown in Figure 2-3). Other NSW landscapes include: Hawkesbury Nepean Channels and Floodplains and Sydney Basin Diatreme, which cover 11.1% and 0.5% of the BDAR assessment area (respectively).

2.2.3 Rivers / streams

The subject land does not contain any watercourses. Two 3rd order creeks are located within the BDAR area, Kemps Creek to the southwest and Ropes Creek to the northeast, along with several 1st order streams (or flow paths) that are tributaries to three mapped 2nd order creeks – located northwest and south of the subject land (see Figure 2-4)

2.2.4 Wetlands

No wetlands of local, regional, national or international significance are located within the subject land or BDAR assessment area.

2.2.5 Connectivity

The subject land does not provide any continuous vegetation or drainage lines that provide connectivity. wildlife connectivity. Figure 2-5 shows the relative isolated nature of the site from corridors mapped by OEH (2018) and High Biodiversity Value mapping provided under the BC Reg.

It should also be noted that the surrounding lots are all zoned Industrial and either under assessment as-SSDAs or have requested SSD Secretary Environmental Assessment Requirements (SEARs).

2.2.6 Geological features

No karsts, caves, crevices, cliffs or areas of geological significance have been identified within the BDAR assessment area.

2.2.7 Outstanding biodiversity values

No outstanding biodiversity values occur within the BDAR assessment area. Figure 2-5 shows High Biodiversity Value mapping provided under the BC Reg.

2.3 Native vegetation in BDAR assessment area

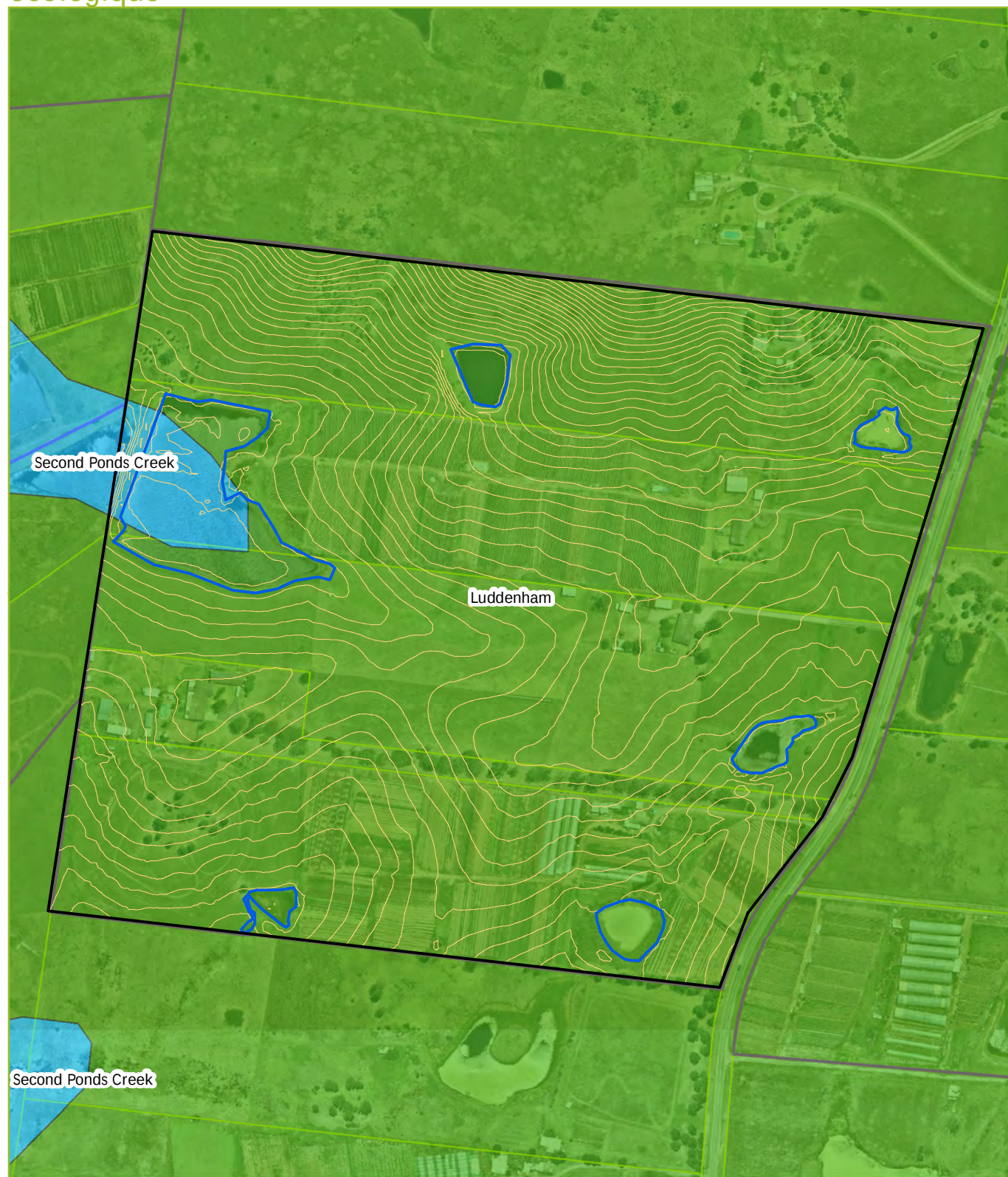
Native vegetation cover on the subject land must be assessed in relation to native vegetation cover across a broader area.

The cover of native vegetation within the BDAR assessment area is required to determine the context of the site. As there are two vegetation mapping layers that cover the BDAR assessment area, the cover of native vegetation was assessed as follows:

- Clipping the extent of Cumberland Plain Vegetation Mapping (OEH 2013) within the BDAR assessment area using ArcMap v10.8.1;
- Editing the shapefile to remove areas of vegetation no longer evident and increase the extent of vegetation, along with the addition of polygons identifying areas of vegetation not represented in mapping.

Figure 2-6 illustrates the extent of native vegetation within the BDAR assessment area.

The BDAR assessment area including the subject land is 1140.9 ha. The total of native vegetation cover within the BDAR assessment area is estimated at 111.8 ha, which equates to 9.8% and an assignment to the 0-10% cover class (in accordance with the BAM Section 3.2).



Legend

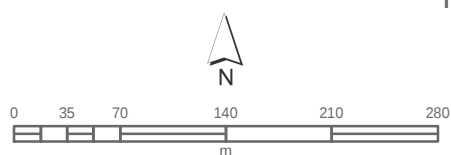
- Subject land
- Farm dams
- 1m contours

Soil landscape

- Luddenham
- Second Ponds Creek

Aldington Estate, Kemp's Creek

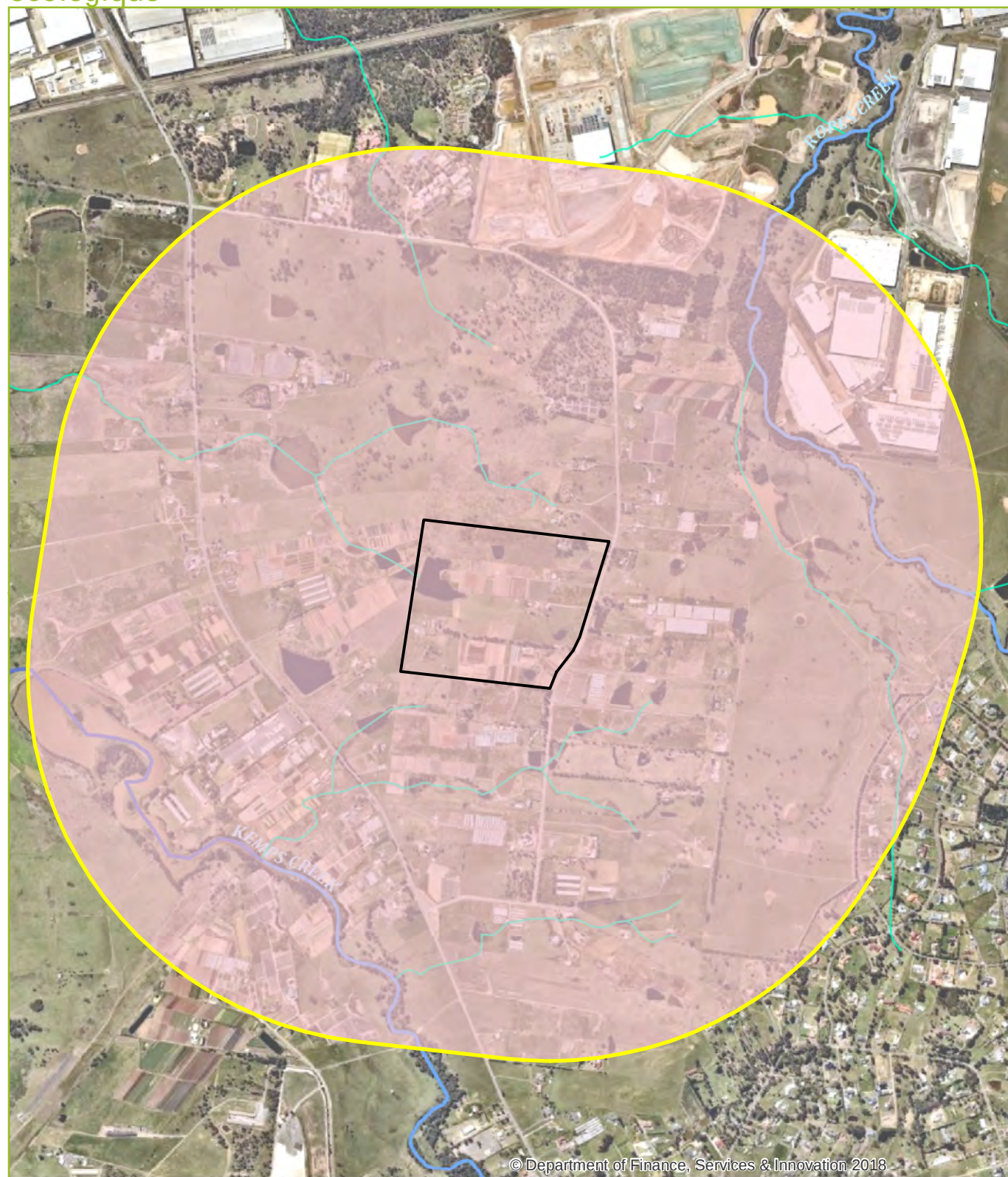
Figure 2.1. Subject land soils



Coordinate System: MGA Zone 56 (GDA 94)

Image sources: Nearmap 26 January 2021

Data sources: HNP_SLR100K_v1_1_GDA94

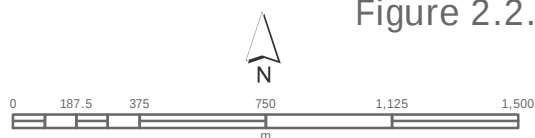


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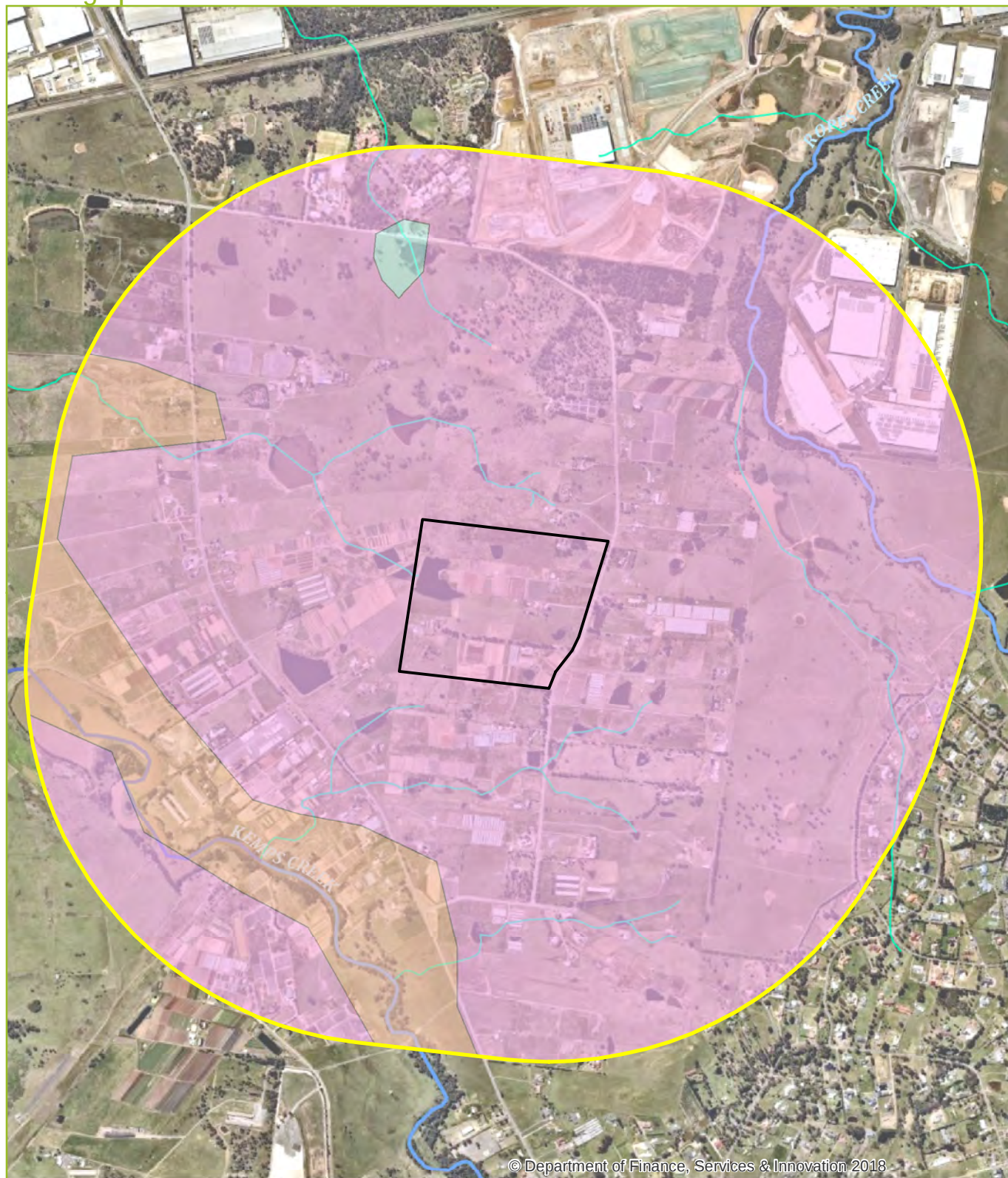
-  Subject land
-  BDAR assessment area
-  Sydney Basin, Cumberland

Aldington Estate, Kemp's Creek

Figure 2.2. IBRA region and subregion



Coordinate System: MGA Zone 56 (GDA 94)
 Image sources: Nearmap 26 January 2021
 Data sources: IBRA7_subregions

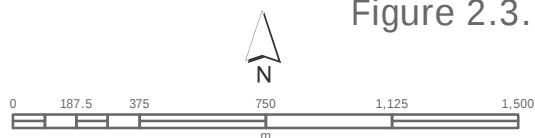


Aldington Estate, Kemp's Creek

Figure 2.3. NSW (Mitchell) landscapes

Legend

- Subject land
- BDAR assessment area
- Cumberland Plain
- Hawkesbury - Nepean Channels and Floodplains
- Sydney Basin Diatremes



Coordinate System: MGA Zone 56 (GDA 94)
Image sources: Nearmap 26 January 2021
Data sources: Mitchell landscapes_v3

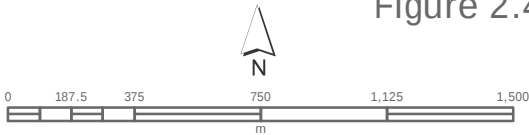


Aldington Estate, Kemp's Creek

Figure 2.4. Study area watercourses

Legend

-  BDAR assessment area
-  Subject land



Coordinate System: MGA Zone 56 (GDA 94)
Image sources: Nearmap 26 January 2021

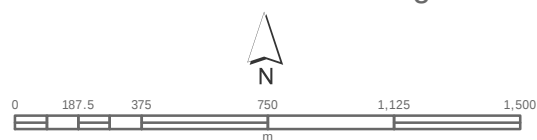


Aldington Estate, Kemp's Creek

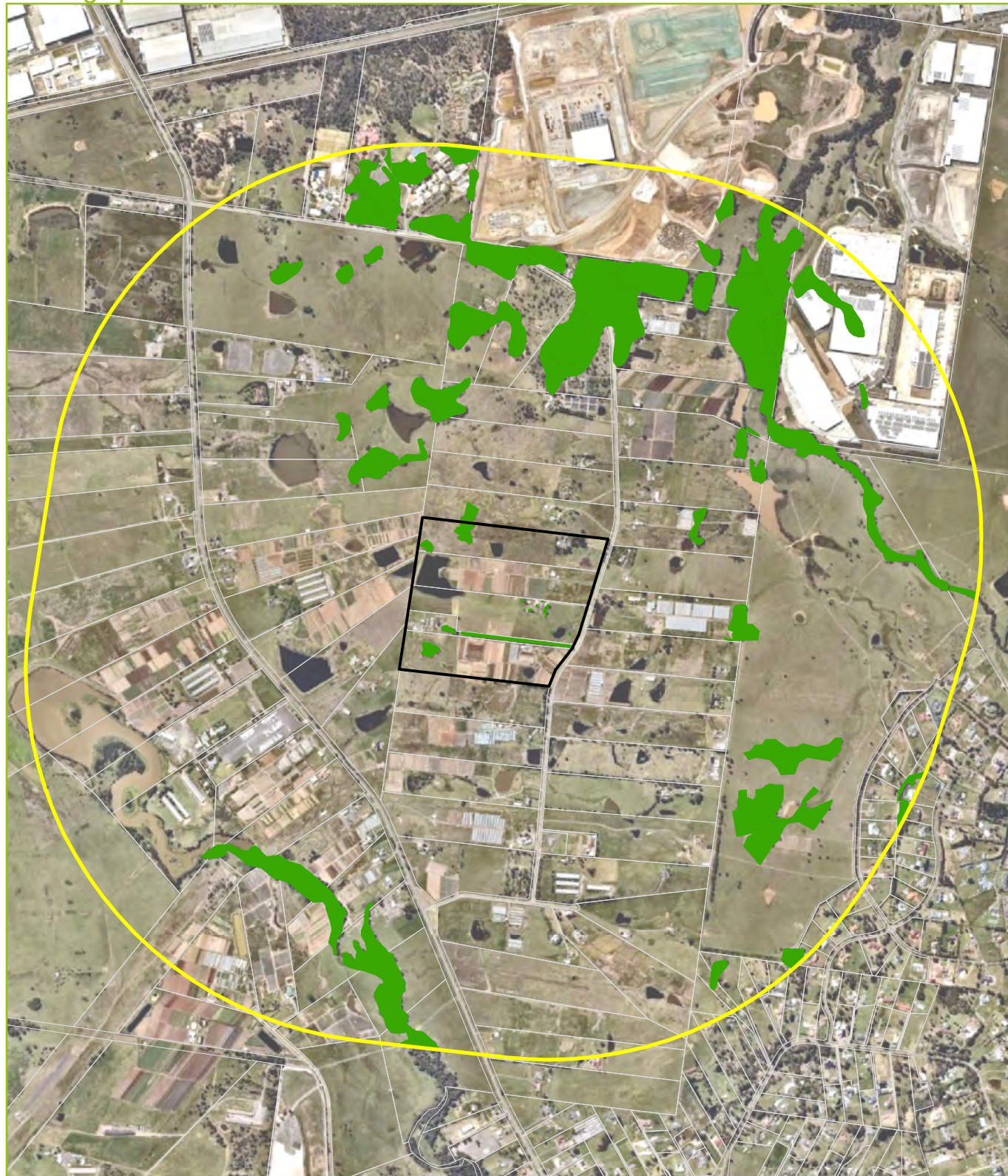
Figure 2.5. Corridors & BV mapping

Legend

-  BDAR assessment area
-  Subject land
-  High biodiversity values
-  BioMap Cumberland regional corridors
-  CPW mapping layer



Coordinate System: MGA Zone 56 (GDA 94)
 Image sources: Nearmap 26 January 2021
 Data sources:
 CumberlandPlainWest_2013_E_4207
 BVMap_V102_SEED.gdb
 BioMap Cumberland Regional Corridors

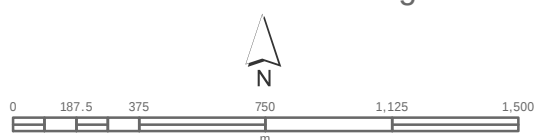


Aldington Estate, Kemp's Creek

Figure 2.6. Native vegetation cover

Legend

- BDAR assessment area
- Subject land
- CPW amended mapping layer



Coordinate System: MGA Zone 56 (GDA 94)
 Image sources: Nearmap 26 January 2021
 Data sources:
 CumberlandPlainWest_2013_E_4207 amended

3. Native Vegetation

3.1 Native vegetation extent

3.1.1 Terrestrial native vegetation

Preliminary site mapping was prepared during the assessment of native vegetation cover within the BDAR assessment area (see Section 2.3). This mapping was ground-truthed during site surveys and later amended to illustrate the current extent of exotic, planted and remnant vegetation within the subject land.

Due to the highly modified nature of the subject land, and occurrence of non-local native trees, interpretation of aerial historical imagery was undertaken to provide justification of whether existing vegetation is of remnant or planted origin. A summary of findings is provided below, and historical aerial imagery provided in Appendix C.

- Existing planted native vegetation evident by 1991 on Lot 26 and between 1991 and 2005 on Lot 28 of DP 25560;
- All existing farm dams were evident by 1986;
- Remnant native vegetation on Lot 33 DP 258949, Lot 25 and Lot 27 DP 25560 evident as scattered paddock trees from 1950 to 1986, after which regeneration is evident up until current day; and
- Planted exotic pine trees surrounding the residence and along Aldington Road street frontage on Lot 33 DP 258949 evident by 2005.

Anecdotal evidence provided by long term landowners has also been considered. In particular the current tenant of Lot 28 of DP 25560, who undertook the planting of native trees on this property and also spoke of this and parts of adjacent properties once being a golf course.

3.1.2 Aquatic and semi-aquatic native vegetation

The subject land contains six farm dams, which have been historically constructed to capture surface flows from the elevated landscape for agricultural purposes. Collectively all dams cover approximately 3.48 ha of the subject land and are variously sized. Most cover less than 0.3 ha in extent with the exception of one larger dam that is approximately 2.2 ha in extent.

Most dams comprise large open water zones surrounded by cleared pastureland, relatively small areas of commonly occurring native emergent and floating native macrophytes (see photo plates 9-14).

These macrophytes have not been planted and, despite the artificial construct of the farm dams, must be assessed and allocated to the closest matching PCT in accordance with Section of the BAM (refer Section 3.2.3).

3.2 Plant community types

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 plot/transects in accordance with Section 2 of the BAM (2020).

Two PCTs were confidently allocated to the native vegetation present within the subject land, with a third PCT allocated to native macrophytes located within the subject land's farm dams:

1. Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 835); and
2. Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849).
3. *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion (PCT 1071) - allocated to farm dam areas containing native macrophytes.

The location of floristic and site integrity plots and transects are shown in Figure 3-1 and plot/transect data provided in Appendix A.

3.2.1 PCT 835: Forest Red Gum - Rough-barked Apple grassy woodland

Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 835) occurs as one patch of approximately 2,331 m² (0.23 ha), which is located mostly on Lot 33 DP 248949 but also extends into Lot 28 DP 255560.

Within this patch PCT 835 exists as one condition state, which is relatively degraded and considered to be in a low condition due to 90% of the groundlayer covered by *Cenchrus clandestinum* (kikuyu), a high threat weed species.

Table 3-1 summarises the criteria used for allocation of native vegetation to PCT 835 and site photos are provided in photo plates 1 - 4 and the location of PCT 835 within the subject land shown in Figure 3-1.

Table 3-1. Selection process for PCT 835

Criteria	Description
IBRA Region/ Subregion	Sydney Basin / Cumberland Plain
Mitchell Landscape	Cumberland Plain
Keith Formation and Class	Forested Wetlands / Coastal Floodplain Wetlands
Confirmed in vegetation mapping	Not mapped, however coincides with the occurrence of Second Ponds soil landscape whereas elsewhere subject land overlies Luddenham soil landscape.
Landscape position	Occurs within an area where transient water accumulates, which includes the floors of tributary gullies, floodplain pockets, depressions (DAWE, 2021). Generally, occurs below 50 m elevation, but may occur on localised river flats up to 250 m above sea level (OEH threatened species profile) e.g., on floodplain pockets and plateaus above nick points (DAWE, 2021). PCT 835 within the subject land occurs between 60-64m AHD, where historical aerial photography indicates the floor of a tributary gully (towards Kemps Creek).
Percent cleared values	93%
Native species present	<i>Eucalyptus tereticornis</i> , <i>Angophora subvelutina</i> , <i>Microlaeana stipoides</i> , <i>Geranium solanderi</i> , <i>Dichondra repens</i>
TEC	In NSW, PCT 835 is listed as the endangered ecological community (EEC) "River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions" under the BC Act. Nationally PCT 835 is commensurate with the critically endangered ecological community (CEEC) "River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria" under the EPBC Act.



Photo 1. PCT 835 viewed from east side of dam



Photo 2. PCT 835 regrowth and dense kikuyu understorey



Photo 3. Hollow through to ground level, dense understorey of kikuyu



Photo 4. Hollow through to ground level, dense understorey of kikuyu

3.2.2 PCT 849 - Grey Box - Forest Red Gum grassy woodland

Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849) occurs in two patches within the subject area as follows:

- 4,323 m² (0.43 ha) on Lot 33 DP 258949; and
- 3,269 m² (0.33 ha) on Lot 25 DP 255560.

Table 3-2 summarises the criteria used for allocation of native vegetation to PCT 849 and site photos are provided in photo plates 4 to 6 and the location of PCT 849 within the subject land shown in Figure 3-1.

Table 3-2. Selection process for PCT 849

Criteria	Description
IBRA Region/ Subregion	Sydney Basin / Cumberland Plain
Mitchell Landscape	Cumberland Plain
Keith Formation and Class	Grassy Woodland / Coastal Valley Grassy Woodlands
Confirmed in vegetation mapping	CumberlandPlainWest_2013_E_4207 (OEH 2013)
Landscape position	Pasture elevation 69-78m AHD
Percent cleared values	93%,
TEC Status	In NSW, PCT 849 is listed as the CEEC “Cumberland Plain Woodland in the Sydney Basin Bioregion” under the BC Act. Nationally PCT 849 is commensurate with the CEEC “Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest” under the EPBC Act.
Native species present	<i>Eucalyptus tereticornis</i> , <i>Angophora subvelutina</i> , <i>Microlaena stipoides</i> , <i>Aristida</i> sp., <i>Botriochloa macra</i> , <i>Themeda triandra</i> (outside plot), <i>Brunonella australis</i> , <i>Glycine variabilis</i> , <i>Geranium solanderi</i> , <i>Dichondra repens</i> .



Photo 4. PCT 849 viewed from south to north at GPS location



Photo 5. PCT 849 viewed from southwest to northeast at GPS location



Photo 6. PCT 849 viewed from north to south, with approximate subject land boundary denoted by red dashed line



Photo 7. PCT 849 on Lot 25 DP 255560



Photo 8. PCT 849 on Lot 25 DP 255560

3.2.3 PCT 1071 *Phragmites australia* and *Typha orientalis* wetlands

The subject land contains six farm dams, which have been historically constructed to capture surface flows from the elevated landscape for agricultural irrigation purposes. Collectively all dams cover approximately 3.48 ha of the subject land and are variously sized from 0.2 up to 2.2 ha.

Assessment of historical aerial photography confirms that the subject land has not contained any naturally occurring wetland or other areas in which habitat for these species are evident. Consequently, the subject land's farm dams are not considered representative of a naturally occurring freshwater wetland.

The dominance of *Typha orientalis* (broad leaf cumbungi) within five of the six farm dams is most closely matched to *Phragmites australia* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion (PCT 1071).

The BioNet community profile report for PCT 1071 identifies its habitat as included man-made water bodies, drainage lines and depressions across a wide variety of environments. Therefore, the existing dam vegetation has been assessed within the BAM-C as PCT 1071.

PCT 1071 is a freshwater wetland formation, which under Section 4.3.3 of the BAM requires survey to obtain to obtain a quantitative measure of the composition and structure attributes but only the high threat weed cover functional attribute.

Aquatic vegetation within the dams is predominantly variously sized patches of *Typha orientalis* (broad-leaved cumbungi). Other native species evident included commonly occurring semi-aquatic and aquatic species such as:

- *Juncus usitatus* (common rush) – scattered occurrences, with one 5m² patch next to the largest farm dam on Lot 28 DP 255560;
- *Ludwigia peploides* subsp. *montevidensis* (water primrose) – scattered occurrences;
- *Persicaria decipiens* (knotweed) - scattered occurrences;
- *Spirodela* spp. – small, isolated extent in one dam only; and
- *Azolla pinnata* – - scattered occurrences, often intermixed with widespread cyanobacteria. The latter often covering large areas of open water zones.

Table 3-3 provides a summary of the dominant native and introduced species.

Table 3-3. Farms dams within the subject land

Lot DP / Dam no	Native species	Extent (m ²)	Introduced species	Extent (m ²)
Lot 25 DP 255560 / Dam 1	<i>Typha orientalis</i> (broad-leaf cumbungi) <i>Paspalum distichum</i> (water couch) <i>Persicaria decipiens</i> (knotweed)	582	<i>Cenchrus clandestinum</i> (kikuyu) <i>Paspalum dilatatum</i> (paspalum) <i>Rumex crispus</i> (curly-leaf dock) <i>Atriplex prostrata</i> <i>Aster subulatus</i> (bushy starwort)	609
Lot 25 DP 255560 / Dam 2		0		0
Lot 33 DP 258949 / Dam 3	Cumbungi Common rush Knotweed	425	Kikuyu <i>Cyperus eragrostis</i> (umbrella sedge)	612
Lot 33 DP 258949 / Dam 4	Cumbungi Common rush <i>Azolla pinnata</i> <i>Spirodela</i> sp.	183	Kikuyu Umbrella sedge	509
Lot 28 DP 255560 / Dam 5	Cumbungi Common rush Knotweed <i>Ludwigia peploides</i> subsp. <i>montevidensis</i> (water primrose)	1,328	Kikuyu Umbrella sedge	3,982
Lot 27 DP 255560 / Dam 6	Cumbungi Common rush <i>Azolla pinnata</i>	352	Kikuyu Umbrella sedge	457



Photo 9. Lot 25 DP 255560



Photo 10. Lot 25 DP 255560



Photo 11. Lot 27 DP 255560



Photo 12. Lot 28 DP 255560



Photo 13. Lot 33 DP 258949



Photo 14. Lot 33 DP 258949

3.2.4 Planted vegetation

Approximately 1.08 ha of native trees and mixed native and exotic trees have been planted in five locations within the subject site (see Figure 3-1), which includes the following:

- Approximately 0.99 ha of planted native trees; and
- Approximately 0.09 ha of a mixed planting of native and exotic trees.

Desktop assessment of historical aerial photography provides evidence of the planted nature of this vegetation (refer Appendix C).

Anecdotal information provided by prior landowners also provides additional evidence that the 0.85 ha (of native trees and mixed native and exotic trees) have been planted and not of remnant native vegetation origin (refer Section 3.1).

Appendix D of the BAM (2020) provides a decision-making key for the assessment of planted native vegetation, which can be used for that part of the subject land that contains planted native vegetation.

In accordance with the decision-making key, the planted native vegetation within the subject land is not required to be assessed using the BAM but must still be assessed for its potential to provide threatened species habitat. This is due to the following results from the decision-making key:

1. The planted native vegetation does not 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;
2. The planted native vegetation has not been planted for:
 - a. the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.), nor

- b. to replace or regenerate a plant community type or a threatened plant species population or its habitat
- 3. The planted native vegetation has not been planted for:
 - a. a species recovery project
 - b. Saving our Species project
 - c. other types of government funded restoration project
 - d. condition of consent for a development approval that required those species to be planted or translocated for the purpose of providing threatened species habitat
 - e. legal obligation as part of a condition or 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)
 - f. ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan, or
 - g. 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)

The planted native vegetation was undertaken voluntarily for revegetation, environmental rehabilitation or restoration without a legal obligation to secure or provide for management of the native vegetation. Photo plates 15 to 18 illustrate the nature of the planted vegetation within the subject land.



Photo 15. Planted native trees along driveway of Lot 27 DP 255560



Photo 16. Planted *Callisemon viminalis* along driveway of Lot 26 DP 255560



Photo 17. Various planted native and exotic trees surrounding residence of Lot 26 DP 255560



Photo 18. Example of groundcover beneath planted native trees and shrubs surrounding residence of Lot 26 DP 255560

3.2.5 Exotic vegetation

The remaining area within the subject land comprises market gardens (10.07 ha), pasture (20.81 ha), access roads, residences and auxiliary buildings. Approximately 1.15 ha of planted exotic vegetation dominated by *Pinus radiata* (pine trees) occurs within the subject land. Areas of other dense non-pasture weeds extend over approximately 2.32 ha.

The subject land's pasture areas are dominated by introduced grasses such as: *Paspalum dilatatum* (Paspalum); *Senecio* spp. (Pigeon grass); *Chloris gayana* (Rhode's grass); *Cenchrus clandestinum* (kikuyu) and *Nassella trichotoma* (serrated tussock grass). The latter species has substantially increased in extent within the locality and its presence within the subject lands, along with the density of kikuyu and paspalum, diminishes any longer-term feasibility of native grasses to subsist.

Vast areas of the subject land's pasture areas also contain introduced species such as: *Bidens pilosa* (cobblers pegs); *Sida rhombifolia* (Paddy's lucerne); *Rubus fruticosus* (blackberry), *Conyza* spp. (fleabane) and *Verbena incompta* (purple top).

Despite the highly modified and degraded nature of the subject lands pasture, native grass species were found to persist interspersed within pasture grasses and weed species. Surveys (including 400m² floristic plots and additional GPS mapping of native grass patches) found that the extent of introduced pasture grasses and weeds (often high threat exotic species) were consistently greater than 50% cover and not representative of areas of DNG.

Photo plates 19 to 22 illustrate examples of the areas containing exotic vegetation.



Photo 19. Example of market gardens that occupy 9.84 ha of the subject site	Photo 20. Example of planted pine trees
	
Photo 21. Example of the introduced weed <i>Arundo donax</i> and kikuyu groundlayer	Photo 22. Example of the widespread kikuyu groundlayer

3.2.6 Threatened ecological communities

All PCTs shown on Figure 3-2 are listed as threatened ecological communities (TECs) under the BC Act. PCTs 835 and 849 are also listed as TECs under the EPBC Act (refer Section 5).

3.3 Patch size

A patch is an area of native vegetation that occurs on the subject land and includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or ≤ 30 m for non-woody ecosystems). A patch may extend onto adjoining land.

For each vegetation zone, the assessor must determine the patch size in hectares and assign it to one of the following classes:

- a. <5 ha, or
- b. $5- <25$ ha, or
- c. $25- <100$ ha, or
- d. ≥ 100 ha.

Each of the PCTs assessed in this BDAR are isolated from extant vegetation greater than 100m, which has resulted in patch sizes <5 ha.

Aldington Estate Kemps Creek

Figure 3.1. Subject
land vegetation



Aldington Estate Kemps Creek

Figure 3.2. Subject
land TECs



Legend

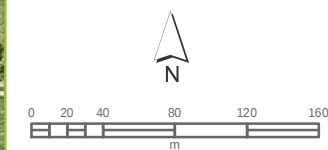
 Farm dams

TECs

 Cumberland Plain Woodland

 River-flat Eucalypt Forest

 Freshwater Wetlands



Coordinate System: MGA Zone 56 (GDA 94)
Image sources: Nearmap 15 April 2021
Date prepared: 25 May 2021

4. Threatened species

4.1 Assessing habitat suitability for threatened species

The Threatened Biodiversity Data Collection (TBDC) identifies the threatened species that are likely to occur on or use the subject land and thereby predicts the species that require assessment. This is automatically populated in the BAM-C based on the information collected from assessing the subject land.

Threatened species are categorised in the BAM-C as ecosystem, species, or dual, credit species.

4.1.1 Ecosystem credit species

Ecosystem credit species are those threatened species where the likelihood of occurrence of a species or elements of the species' habitat can be predicted by vegetation surrogates and landscape features, or for which targeted survey has a low probability of detection.

The TBDC identifies the threatened species assessed for ecosystem credits. A targeted survey is not required to identify or confirm the presence of ecosystem credit species.

4.1.2 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.

4.1.3 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).

4.2 Identify candidate species for further assessment

The BAM-C returned a total of 73 threatened entities (including dual credit species), which includes the following:

- 27 ecosystem credit species; and
- 46 species credit species.

4.2.1 Ecosystem credit species

Table 4-1 provides a list of the ecosystem credit species derived from the BAM-C and identifies the PCTs in which each species is predicted to occur in; and the ecosystem credit type, i.e., ecosystem (foraging) indicates the species is a dual species and also considered in Section 4.2.2.

Table 4-1. Ecosystem credit species

Species Name	PCTs	Credit type
Bats		
<i>Miniopterus australis</i>	835, 849	Ecosystem (foraging)
<i>Miniopterus orianae oceanensis</i>	835, 849	Ecosystem (foraging)
<i>Micronomus norfolkensis</i>	835, 849, 1071	Ecosystem
<i>Pteropus poliocephalus</i>	835, 849	Ecosystem (foraging)

Species Name	PCTs	Credit type
Birds		
<i>Anthochaera phrygia</i>	835, 849	Ecosystem (foraging)
<i>Artamus cyanopterus cyanopterus</i>	1071	Ecosystem
<i>Botaurus poiciloptilus</i>	835	Ecosystem
<i>Calidrus ferruginea</i>	1071	Ecosystem
<i>Chthonicola sagittata</i>	835, 849	Ecosystem
<i>Climacteris picumnus victoriae</i>	835, 849	Ecosystem
<i>Ephippiorhynchus asiaticus</i>	1071	Ecosystem
<i>Epthianura albifrons</i>	1071	Ecosystem
<i>Glossopsitta pusilla</i>	835, 849	Ecosystem
<i>Haliaeetus leucogaster</i>	835, 849, 1071	Ecosystem (foraging)
<i>Iredippara gallinacea</i>	1071	Ecosystem
<i>Lathamus discolor</i>	835, 849	Ecosystem (foraging)
<i>Limicola falcinellus</i>	1071	Ecosystem
<i>Limosa limosa</i>	1071	Ecosystem
<i>Melanodryas cucullata cucullata</i>	835, 849	Ecosystem
<i>Pandion cristatus</i>	835, 1071	Ecosystem (foraging)
<i>Petroica boodang</i>	835, 849	Ecosystem
<i>Petroica phoenicea</i>	835, 849	Ecosystem
<i>Rostralus australis</i>	1071	Ecosystem
<i>Stagonopleura guttata</i>	835, 849	Ecosystem
<i>Stictonetta naevosa</i>	1071	Ecosystem
Marsupials		
<i>Dasyurus maculatus</i>	835, 849, 1071	Ecosystem
<i>Phascolarctos cinereus</i>	835, 849	Ecosystem (foraging)

4.2.2 Species credit species

Table 4-2 provides a list of the species credit species derived from the BAM-C, and identifies the following:

- The PCTs in which each species is predicted to occur in;
- The species credit type, i.e., species (breeding) indicates the species is a dual species and also considered in Section 4.2.1;
- Whether they have been retained within the assessment (yes or no); and
- Justification for the species not retained within the assessment (i.e., following consideration of any habitat constraints, absence of habitat, geographic limitations, and habitat quality).

Table 4-2. Species credit species

Species name	PCTs	Credit type	Retained	Justification in BAM C if not retained
Amphibians				
<i>Litoria aurea</i>	835, 849	Species	No	Habitat degraded: microhabitats within the subject land are degraded, such that the species is unlikely to utilise the habitat. Permanent water bodies (i.e., farm dams) contain <i>Gambusia holbrookii</i> (Eastern Gambusia), which is a listed key threatening process for this species. Farm dams within the subject land are substantially isolated from each other and the subject land lacks corridor and overwintering habitat, both between farm dams and from potential habitat within the wider study area. The species is not recorded from within the BioNet database locality search and numerous surveys within the locality have failed to detect the species (see
Bats			No	
<i>Miniopterus australis</i>	835, 849	Species (breeding)	No	Habitat constraint: i.e., no caves, tunnels, mines, culverts or other known structures known or suspected to be used for breeding present.
<i>Miniopterus orianae oceanensis</i>	835, 849	Species (breeding)	No	Habitat constraint: i.e., no caves, tunnels, mines, culverts or other known structures known or suspected to be used for breeding present.
<i>Myotis macropus</i>	835, 849	Species	Yes	
<i>Pteropus poliocephalus</i>	835, 849	Species (breeding)	No	Habitat constraint: i.e., breeding camps absent.
Birds				
<i>Anthochaera phrygia</i>	835, 849	Species (breeding)	No	Geographic constraint: i.e., subject land not within a mapped breeding area for the species (which is only known to breed at three locations).
<i>Calidrus ferruginea</i>	1071	Species (breeding)	No	Geographic constraint: the subject land is not an important habitat area for the species migration.
<i>Haliaeetus leucogaster</i>	835, 849	Species (breeding)	No	Habitat constraint: no nests located, and no large trees present likely to be suitable for nesting by the species present.
<i>Lathamus discolor</i>	835, 849	Species (breeding)	No	Habitat constraint: i.e., site is not within mapped breeding area
<i>Limicola falcinellus</i>	1071	Species (breeding)	No	Geographic constraint: the subject land is not an important habitat area for the species migration

Species name	PCTs	Credit type	Retained	Justification in BAM C if not retained
<i>Limosa limosa</i>	1071	Species (breeding)	No	Geographic constraint: the subject land is not an important habitat area for the species migration
<i>Pandion cristatus</i>	835, 849	Species (breeding)	No	Habitat constraint: i.e., no stick nests in living or dead trees or artificial structures within 100 m of a floodplain
Invertebrates				
<i>Meridolum corneovirens</i>	835, 849	Species	Yes	
<i>Pommerhelix duralensis</i>	849	Species	No	Habitat constraint/degraded: No significant occurrences of leaf litter or bark and no rocky areas.
Marsupials				
<i>Cercartetus nanus</i>	835, 849	Species	No	Habitat absent/degraded: species has a preference for heathy habitats, which is not present. Key food source absent and the species is not recorded from within the BioNet database locality search.
<i>Petaurus norfolcensis</i>	835, 849	Species	No	Habitat degraded/absent: species requires mature or old growth woodland or forest with abundant hollows for refuge and nest sites.
<i>Phascolarctos cinereus</i>	835, 849	Species (breeding)	No	Habitat constraint: species requires large areas of habitat which are not present within the subject land, which only contains small patches of canopy trees, which are substantially isolated from larger and more intact vegetation within the locality. Species is also not recorded from within the BioNet database locality search.
Epiphytes / Climbers				
<i>Cynanchum elegans</i>	835, 849	Species	No	Refer to BAR: While known to occur in Forest Red Gum <i>Eucalyptus tereticornis</i> aligned open forest and woodland (which is present as a small patch within the subject land), the species usually occurs on the edge of dry rainforest vegetation. The species is a climber or twiner with a highly variable form. Mature stems have a fissured corky bark and can grow to 10 metres long and 3.5 cm thick. The only vine species observed during surveys were exotic weed species and the smaller commonly found native <i>Glycine</i> species (within the groundlayer).

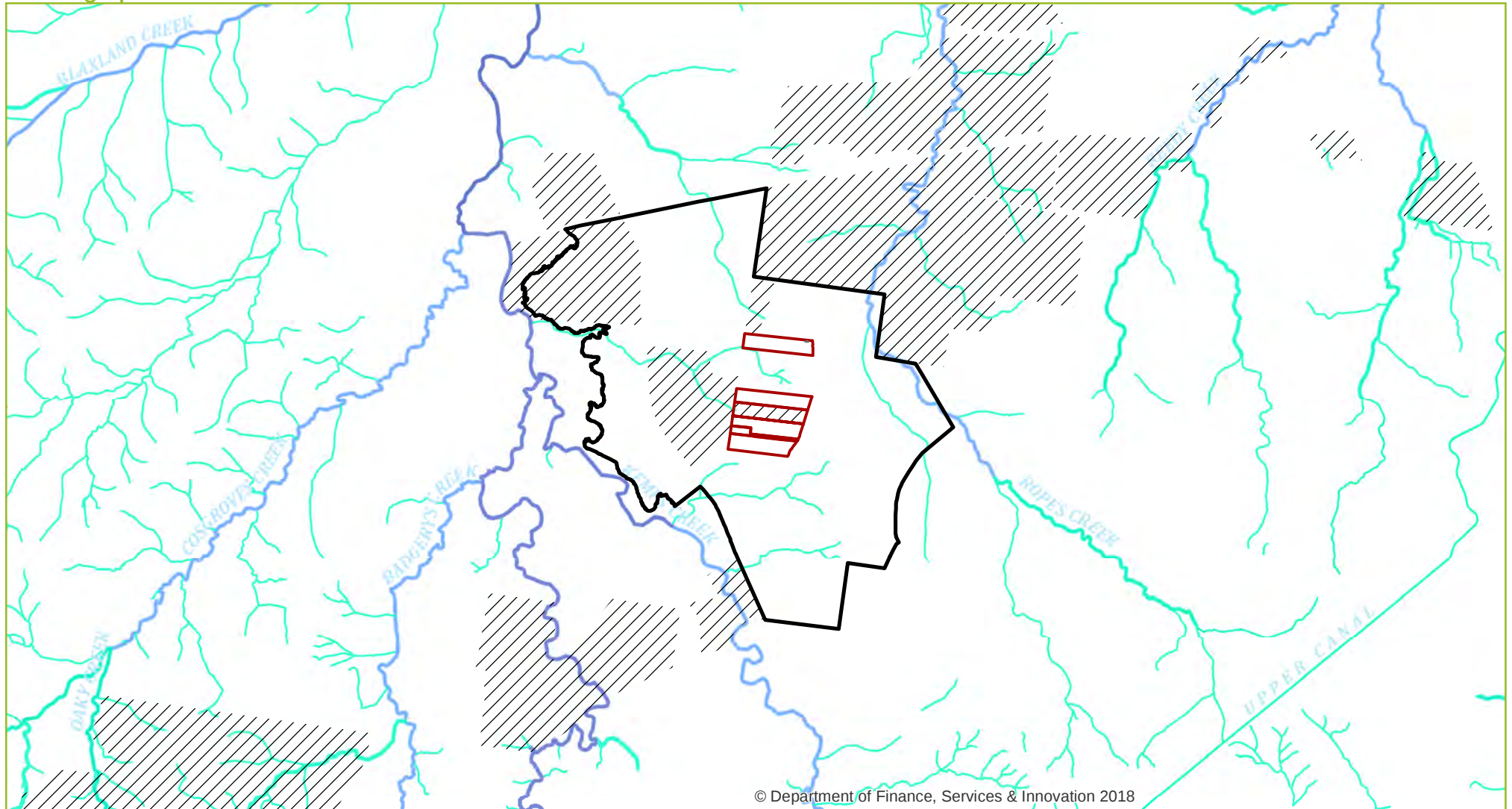
Species name	PCTs	Credit type	Retained	Justification in BAM C if not retained
<i>Marsdenia viridiflora</i> subsp. - endangered population	849	Species	No	Habitat absent: i.e., grows in vine thickets and open shale woodlands, open scrub and forest. This species is a climber with twining stems to 4m high, which was not identified during surveys. The only vine species observed during surveys were exotic weed species and the smaller commonly found native <i>Glycine</i> species (within the groundlayer).
Ferns and Cycads				
<i>Pilularia novae-hollandiae</i>	835, 849	Species	No	Habitat degraded: the species grows in shallow swamps and waterways, often among grasses and sedges. Most often recorded in drying mud as this is when it is most conspicuous. The subject land's farm dams mostly lack gently sloping embankments in which habitat for the species would occur.
Herbs and Forbs				
<i>Hibbertia</i> sp. Bankstown	849	Species	No	Habitat degraded
<i>Maundia triglochinoides</i>	835, 1071	Species	No	Refer to BAR: This species is restricted to coastal NSW and extends into southern Queensland. The current southern limit is Wyong; former sites around Sydney are now extinct. Regardless, the species was not observed within the farm dams within the subject land.
<i>Persicaria elatior</i>	835, 1071	Species	No	Habitat constraint: the species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance. This habitat is absent from the subject land. The subject land has been historically disturbed but not recently and the farm dams present were established by 1986 (35 yrs ago) and are not associated with watercourses. The species has not been recorded from within the Bionet database locality search. NSW records are from south-eastern NSW (an old record from Mt Dromedary), Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW it is known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). Only the commonly occurring <i>Persicaria decipiens</i> was found during site surveys.
<i>Thesium australe</i>	849	Species	No	Refer to BAR: The species was originally described from material collected in the SW Sydney area, but populations have not been seen in a long time.

Species name	PCTs	Credit type	Retained	Justification in BAM C if not retained
				While it could still persist in some areas in the broader region, the species has not been recorded from within the Bionet database locality search. The subject land is substantially degraded to the extent that native grasses are mostly absent with widespread and dense growth of pasture grasses, Kikuyu and herbaceous and shrubby weeds. The species most common host <i>Themeda triandra</i> is only very sparsely present in small areas of the subject land.
<i>Wahlenbergia multicaulis</i> - endangered population	835, 849	Species	No	Geographic limitation/habitat degraded: there are 13 known sites, none that occur in the subject land's LGA. While there are likely to be more sites, Western Sydney most sites are closely aligned with poorly drained, yellow podsolic extensively permeated with fine, concretionary ironstone (laterite) soils (which are not representative of the subject land). Typically occurs in damp, disturbed sites (with natural or human disturbance of various forms), typically amongst other herbs rather than in the open (the subject land lacks an herb understorey). The species responds favourably to disturbance of soil in some situations with high exposure to sunlight (however, too much disturbance can eventually exhaust the seedbank and lead to local extinctions). The level of disturbance within the subject land is considered to be 'too much disturbance' with very few herbs and forbs contributing to the groundlayer. Only the commonly found <i>Wahlenbergia gracilis</i> was found during surveys.
<i>Zannichellia palustris</i>	1071	Species	No	Habitat constraint: In NSW, the species is known from the lower Hunter and in Sydney Olympic Park, growing in fresh or slightly saline stationary or slowly flowing water. The subject land does not provide habitat for this species.
Orchids				
<i>Caladenia tessellata</i>	849	Species	No	Habitat degraded: the species is generally found in grassy sclerophyll woodland on clay loam or sandy soils, which is absent from the subject land. While small patches of grassy woodland formations are present, these patches have only recently increased in extent through natural regeneration. The species is known only from old records in the Sydney area and not recorded from within the Bionet database locality search.

Species name	PCTs	Credit type	Retained	Justification in BAM C if not retained
<i>Pterostylis saxicola</i>	849	Species	No	Refer to BAR: the species is most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The vegetation communities above the shelves where the species occurs are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils. This habitat is absent from the subject land.
Shrubs				
<i>Acacia bynoeana</i>	849	Species	No	Habitat absent: Species requires sandstone soils, occurring in heath or dry sclerophyll forest on sandy soils. The subject land is situated on Wianamatta derived shale clays. Associated overstorey species include Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrow-leaved Apple, which are also not present on the subject land.
<i>Acacia pubescens</i>	849	Species	Yes	
<i>Callistemon linearifolius</i>	835	Species	No	Refer to BAR: the species is recorded from the Georges River to Hawkesbury River in the Sydney area. For the Sydney area, recent records are limited to the Hornsby Plateau area near the Hawkesbury River. A conspicuous shrub (up to 3-4 m tall) which was not located during surveys during floristic surveys pre- BAMC generation of Candidate Species Report.
<i>Commersonsia prostrata</i>	1071	Species	No	Refer to BAR: the species appears to require protected and shaded damp situations in riparian habitats, which is absent from the subject land. Is known to occur in four widely scattered localities in eastern NSW (the Central Coast, South Coast and Northwestern Slopes botanical subdivisions of NSW), which the subject land is not located within.
<i>Dillwynia tenuifolia</i>	849	Species	No	Refer to BAR: The core distribution of this species is the Cumberland Plain from Windsor and Penrith east to Dean Park near Colebee, with other populations recorded from Voyager Point and Kemps Creek in the Liverpool LGA, Luddenham, Penrith LGA and South Maroota, the Hills Shire. In western Sydney, the species is thought to potentially be locally abundant within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays; and also, where these communities adjoin Castlereagh Scribbly Gum Woodland. The subject land does not fall within any of these areas, and the species is not recorded from within the Bionet database locality search. Despite such, no <i>Dillwynia</i> species were recorded during surveys

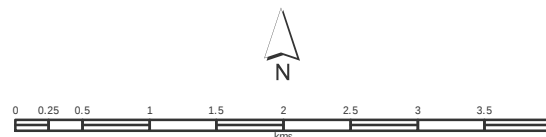
Species name	PCTs	Credit type	Retained	Justification in BAM C if not retained
<i>Dillwynia tenuifolia</i> endangered population	849	Species	No	Refer to BAR: as above
<i>Grevillea juniperina</i> subsp. <i>juniperina</i>	849	Species	Yes	
<i>Haloragia exalata</i> subsp. <i>exalata</i>	1071	Species	No	Refer to BAR: the specie is a shrub that reaches 1.5 m tall with distinctive square, four-ribbed stems, which occurs in 4 widely scattered localities in eastern NSW. It is disjunctly distributed in the Central Coast, South Coast and Northwestern Slopes botanical subdivisions of NSW. The subject land is located outside of these locations.
<i>Persoonia bargoensis</i>	849	Species	No	Habitat absent: found on sandy soils in dry sclerophyll open forest, woodland and heath on sandstone. A conspicuous shrub distinguished by its hairiness and not found on the subject land during floristic surveys pre- BAMC generation of Candidate Species Report.
<i>Persoonia hirsuta</i>	835	Species	No	Geographical limitation: This species is restricted to a small area south-west of Sydney on the western edge of the Woronora Plateau and the northern edge of the Southern Highlands. The historical limits are Picton and Douglas Park (northern), Yanderra (southern), Cataract River (eastern) and Thirlmere (western). The subject land is located outside of these areas. No <i>Persoonia</i> species were located within the subject land during floristic surveys pre-BAMC generation of Candidate Species Report.
<i>Pimelea curviflora</i> var. <i>curviflora</i>	849	Species	No	Habitat absent: A much-branched subshrub or shrub 20 to 120cm high, which occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. The subject land is outside of the species' known range from North Sydney to Maroota.
<i>Pimelea spicata</i>	849	Species	Yes	

Species name	PCTs	Credit type	Retained	Justification in BAM C if not retained
<i>Pomaderris brunnea</i>		Species	No	Refer to BAR: the species is a conspicuous shrub to 3 m tall that has distinctively hairy stems, which grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines. Found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden (also occurring near Walcha on the New England tablelands and in far eastern Gippsland in Victoria). Habitat for the species is not present within the subject land.
<i>Pultenaea pedunculata</i>	849	Species	No	Habitat absent: While one of three disjunct populations is known from the Cumberland Plain all sites have a lateritic influence with ironstone gravel (nodules) present and recorded from the shale-soil form of Shale Sandstone Transition Forests and Cooks River/Castlereagh Ironbark Forest (which are absent from the subject land). The subject land lacks a shrub layer, and the species was not located during surveys during floristic surveys pre- BAMC generation of Candidate Species Report.
Trees				
<i>Eucalyptus benthamii</i>	835, 849	Species	No	Refer to BDAR: the species is a conspicuous tree not identified by both Cumberland Ecology (2019) and écologique (2020) during floristic surveys pre-BAMC generation of Candidate Species Report. The species is not recorded from within the Bionet database locality search and only known from a number of specific locations along the Nepean River and tributaries (outside of the subject land).
<i>Melaleuca biconvex</i>	835, 1071	Species	No	Refer to BDAR: the species is a conspicuous shrub or small tree, usually up to 10 m tall, though occasionally as high as 20 m, which is only found in NSW, with scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Not recorded from the locality. The species generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects. This habitat is absent from the subject land.



Legend

- Mamre_Road_Precinct
- Lot_boundaries
- GGBF investigations



Aldington Road Estate, Kemps Creek

Figure 4.1. Green & golden bell frog surveys

Coordinate System: MGA Zone 56 (GDA 94)
Image sources: Nearmap 15 April 2021
Date created: 17 June 2021

4.3 Targeted field surveys

4.3.1 Threatened flora species

Four threatened flora species were not discounted from having a marginal potential to occur within the subject lands.

- *Acacia bynoeana*
- *Acacia pubescens*
- *Grevillea juniperina* subsp. *juniperina*
- *Pimelea spicata*

Searches of potential habitat areas for these species were conducted within the appropriate seasonal time. As each area of potential habitat is relatively small, and is mostly regenerating woodland, visibility was optimal for detection of emergent growth of each species, with none detected.

Figure 4-1 illustrates the areas in which threatened species surveys were undertaken, noting that each of the potential areas of habitat are relatively small and lack a diverse shrub and groundlayer strata.

4.3.2 Threatened fauna species

Methods employed included the following:

- Dedicated ground debris searches for the *Meridolum corneovirens* - Cumberland Plain land snail:
 - o Most vegetated areas were considered unsuitable for occupation by the Cumberland Plain Land Snail. Regardless 20-40 person minutes within each vegetated area in the subject land was undertaken, with only the introduced *Helix aspersa* (common garden snail) the only mollusc recorded during searches. No living or discarded characteristic Cumberland Plain Land Snail shells were found.
- Bird surveys:
 - o To determine those birds present, 20-minute dedicated surveys were conducted within each native vegetation patch and each farm dam from dusk on the 17th and 30th of March, 7th and 8th April, 2021. These surveys involved a research employing the point count method (DEC 2004). During these surveys, any birds heard calling or observed were recorded. In addition, any evidence to suggest the presence of a bird (e.g., whitewash, crushed eucalypt fruit, nest site) were targeted and recorded if found.
 - o Opportunistic sightings of birds were also recorded throughout field surveys on all days.
- Amphibian surveys:
 - o The likelihood of the threatened green and golden bell frog was discounted as suitable microhabitat is absent from the subject land and the species has not been detected despite a number of targeted surveys for the species in the locality (see Section 4.2.2);
 - o Regardless, to determine amphibian species present, 30-60-minute listening surveys were conducted at farm dams containing reasonably sized patches of emergent cumbungi from dusk within the subject land on the 17th, 30th and 7th and 8th April, 2021.
- Microchiropteran surveys:
 - o Anabat ExpressTM echolocation detectors were placed within the subject land and wider study area during the month of March to determine those microchiropterans that may occur within or utilise the study area.
 - o Each unit employed was placed on a tree at a height of between 3 m AGL. Being programmable, the unit was set to nocturnal only. Upon collection, each unit was noted to still be operating.
 - o Sites selected for the placement of the echolocation detector units were chosen as they corresponded to those habitats likely to be used by microchiropterans as a roosting site (i.e.,

proximity to hollow-bearing trees) and/or during their foraging and dispersal periods (i.e., possible flyway).

- o 36 nights of echolocation detection had been accumulated.
- o Any calls recorded were analysed in house using Anabat 6.3 computer software.
- Incidental recording of fauna species was also undertaken throughout the duration of surveys.

4.3.3 Results

Those animals observed during the course of the site inspection, or indicated as utilising the subject land on occasion, are identified in Table 4-3.

Table 4-3. Species observed during site inspections.

Species name	Common name	Status	
		BC Act	EPBC Act
Bats			
<i>Chalinolobus dwyeri</i>	Large-eared pied bat	V	V
<i>Falsistrellus tasmaniensis</i>	Eastern false pipistrelle	V	
<i>Micronomus norfolkensis</i>	Eastern coastal free-tailed bat	V	
<i>Miniopterus orianae oceanensis</i>	Large bent-winged bat	V	
<i>Saccolaimus flaviventris</i>	Yellow-bellied sheathtail bat	V	
Birds			
<i>Acanthiza lineata</i>	Striated thornbill		
<i>Anas superciliosa</i>	Pacific black duck		
<i>Ardea ibis</i>	Cattle egret		
<i>Corvus coronoides</i>	Australian raven		
<i>Cracticus tibicen</i>	Australian magpie		
<i>Egretta novaehollandiae</i>	White-faced heron		
<i>Eolophus roseicapillus</i>	Galah		
<i>Hirundo neoxena</i>	Welcome swallow		
<i>Manorina melanocephala</i>	Noisy miner		
<i>Neochmia temporalis</i>	Red browed finch		
<i>Psephotus haematonotus</i>	Red-rumped parrot		
<i>Trichoglossus haematodus</i>	Rainbow lorikeet		
<i>Vanellus miles</i>	Masked lapwing		
Mammals			
<i>Felis cattus</i>	Feral cat		

V = Vulnerable

Mig = Migratory

Four species listed under the BC Act and one species listed under both the BC and EPBC Acts were detected within the subject land, which are discussed below.

Ecosystem credit species:

- *Micronomus norfolkensis* (eastern coastal free-tailed bat)
- *Falsistrellus tasmaniensi* (eastern false pipistrelle)
- *Saccolaimus flaviventris* (yellow-bellied sheath-tail bat)

The eastern coastal free-tailed bat has been maintained as an ecosystem credit species within the BAM-C.

Both the eastern false pipistrelle and yellow-bellied sheath-tail bat were added to the predicted species list for inclusion as ecosystem credit species within the BAM-C.

Species credit species:

The large-eared pied bat was added to the candidate species list within the BAM-C (as not returned in the BAM-C generated list). Due to breeding habitat constraints, this species was not indicated as requiring survey.

Calls were recorded from an Anabat (ID no.6) deployed within Lot 37 DP 258949 to the north of the subject land. This location is proximal to larger patches of timbered vegetation, which are continuous with intact riparian vegetation associated with Ropes Creek to the northeast (Figure 4-1).

The subject land does not provide any continuity with this area (approximately 525 m of cleared pastureland between survey sites) and the species was not detected from Anabats deployed within the subject land.

The threatened species profile indicates the species is found in well-timbered areas containing gullies; roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*); frequenting low to mid-elevation dry open forest and woodland close to these features.

These habitat features are absent from the subject land, and the very small extent of PCTs and associated patch sizes are presumed to be the reason that this species was not identified by the BAM-C as requiring assessment.

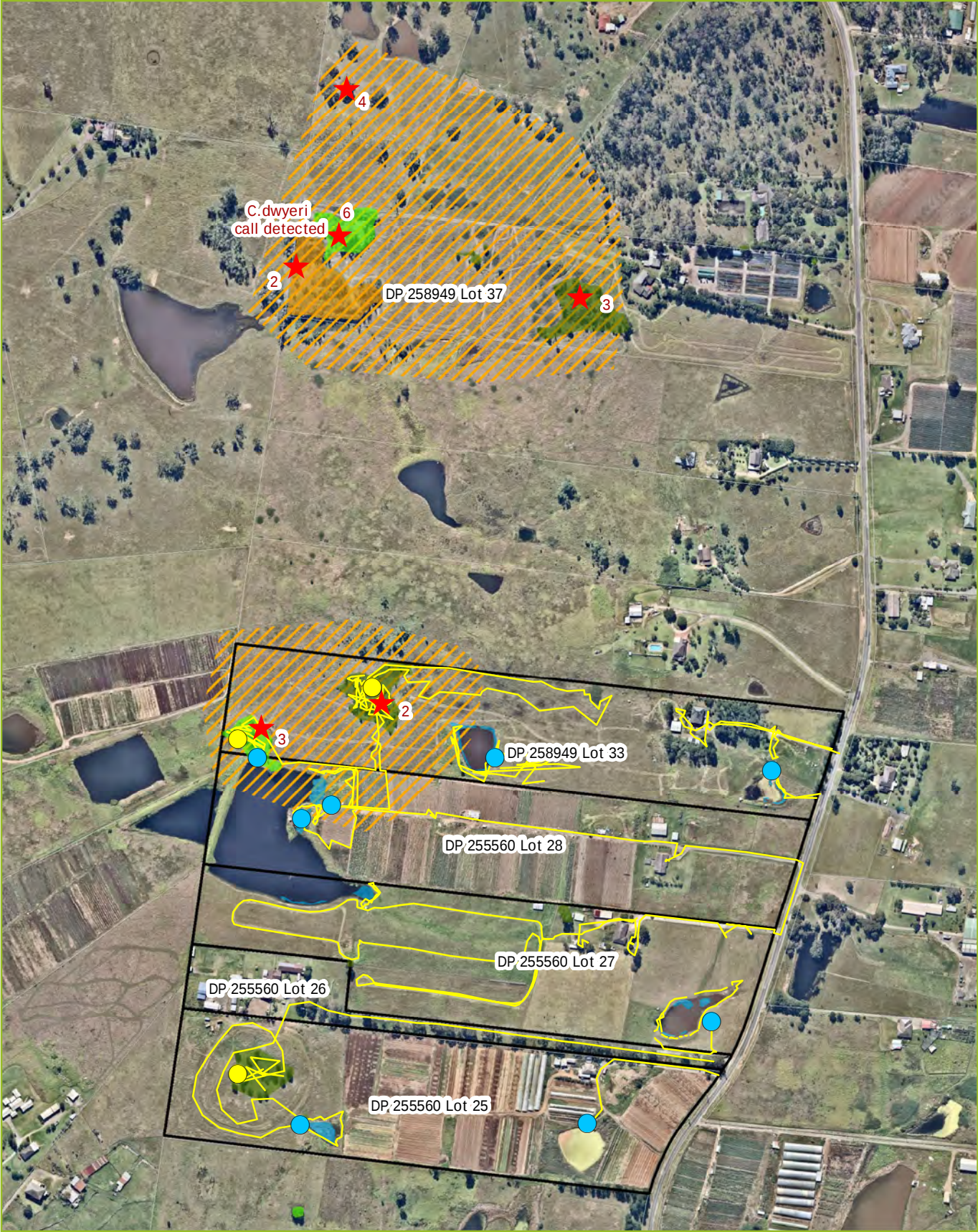
Given the absence of habitat within the subject land for the species (inclusive of foraging, roosting and breeding) it is concluded that clearing of native vegetation as a result of the proposal should not result in an offsetting obligation for this species. This species is also assessed in a referral under the EPBC Act being submitted for the proposal (see Section 5.3).

Dual credit species:

The large bent-winged bat is a dual credit species, which has been maintained as an ecosystem credit species within the BAM-C assessment.

This species categorisation as a candidate species credit species requires assessment of breeding habitat only.

Breeding habitat for the large bent-winged bat has been discounted due to its reliance on caves, tunnels, mines, culverts or other known structures known or suspected to be used for breeding present – which are absent from the subject land.

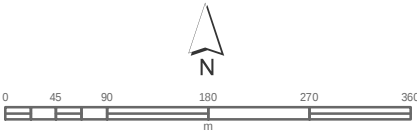


Legend

- | | | | |
|---|----------------------------|---|----------|
|  | Anabat site | PCT_ID | |
|  | Frog / dam surveys |  | PCT 1800 |
|  | Gastropod survey |  | PCT 835 |
|  | Survey searches |  | PCT 849 |
|  | Microchopteran study areas |  | PCT 1071 |

Aldington Estate Kemp's Creek

Figure 4.2. Threatened species surveys



Coordinate System: MGA Zone 56 (GDA 94)
Image sources: Nearmap 15 April 2021
Date created: 17 June 2021

5. Matters of NES

Additional matters relating to impacts on flora and fauna which are not covered by the BC Act must also be addressed for the proposal. Relevant and potential MNES listed under the EPBC Act include two TECs as follows:

5.1 Threatened ecological communities

5.1.1 Cumberland Plain Woodland

The NSW Cumberland Plain Woodland in the Sydney Basin Bioregion (PCT 849) is listed as the critically endangered Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest.

The area of PCT 849 within the subject land are less than 0.5 ha in size, however PCT 849 on Lot 33 DP 258949 is contiguous with PCT 849 on the neighbouring allotment, which results in a patch size greater than 0.5 ha. This patch has been assessed against the diagnostic features and condition thresholds for the community and was found to not meet the criteria for consideration as a MNES due to the low percentage of perennial understory vegetation (see Figure 5-1).

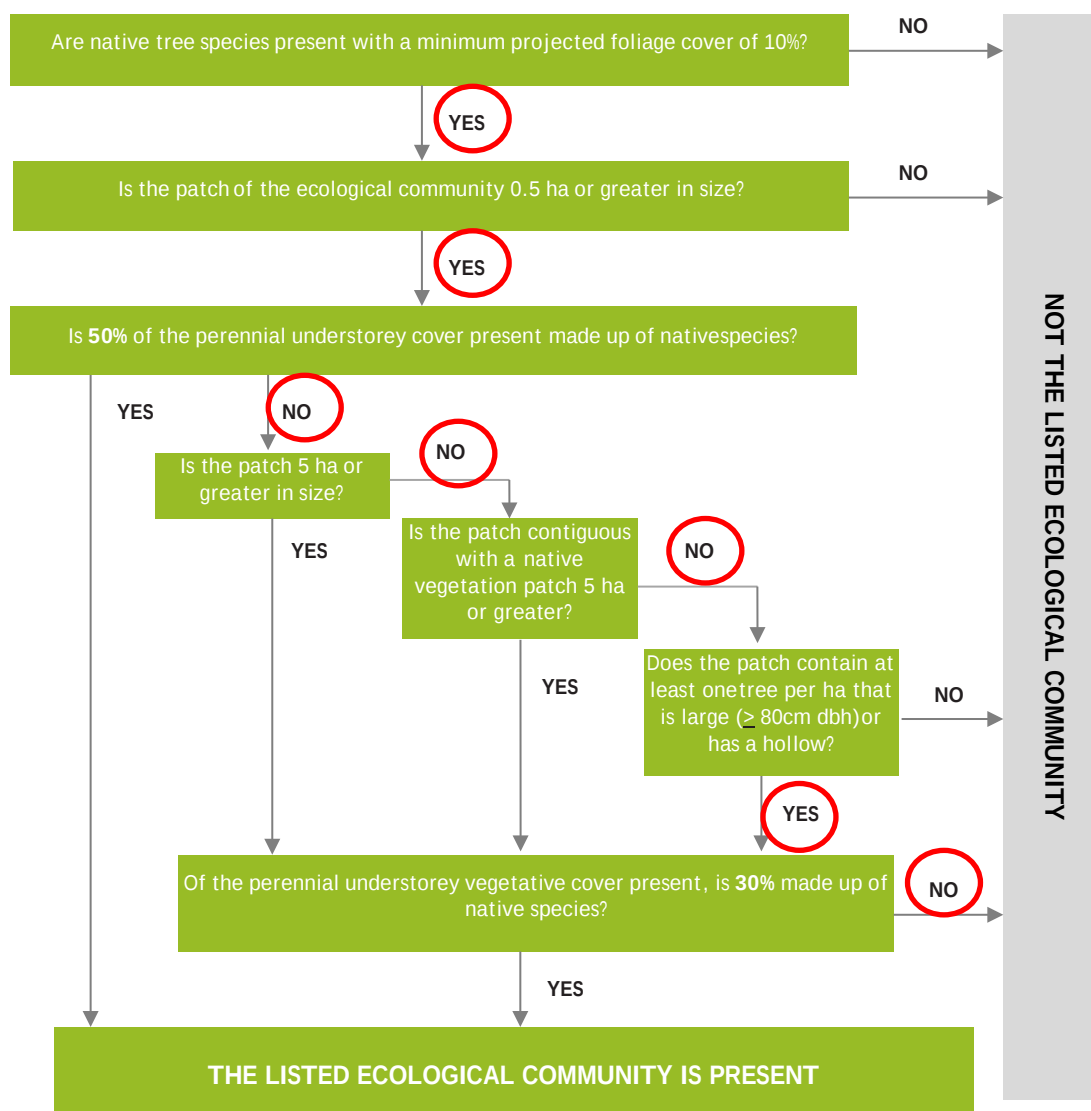


Figure 5-1. CPW diagnostic features and condition thresholds (adapted from DAWE guidelines, 2010)

5.1.2 River-Flat Eucalypt Forest

The NSW River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (PCT 835) was listed as the critically endangered *Coastal floodplain eucalypt forest of eastern Australia* (date effective 15-Dec-2020).

In order to be protected as a MNES area of the ecological community must meet both key diagnostic and minimum condition thresholds as prescribed by the Australian Government (DAWE, 2020).

The area of PCT 835 within the subject land (0.23 ha) does not meet the criteria for consideration as a MNES, which in this case is the key diagnostic characteristic:

- The smallest patch size that can be identified is 0.5 ha.

5.2 Threatened species

Threatened and migratory species identified from the EPBC Act protected matters database search for the locality have been assessed for the likelihood of their occurrence within the subject land.

Most listed matters have already been discounted in the BAM-C, or found to be not present during surveys, or habitat important to the species is absent from the subject land (see Table 5-1).

Table 5-1. Threatened and migratory species returned from protected matters search report

Species name	Common name	Status	Justification
Flora			
<i>Acacia bynoeana</i>	Bynoes's wattle	V	Not found during surveys
<i>Acacia pubescens</i>	Downy wattle	V	Not found during surveys
<i>Allocasuarina glareicola</i>		E	Lack of suitable habitat and not found during surveys. Not recorded from locality
<i>Cynanchum elegans</i>	Whiteflowered wax plant		Discounted in BAM-C
<i>Grevillea parviflora</i> subsp. <i>parviflora</i>	Small-flower grevillea	V	Not found during surveys
<i>Genoplesium baueri</i>	Bauer's midge orchid	E	Lack of suitable habitat and not recorded from locality
<i>Haloragis exalata</i> subsp. <i>exalata</i>	Square raspwort	V	Discounted in BAM-C
<i>Isotoma fluviatilis</i> subsp. <i>fluviatilis</i>		X	Lack of suitable habitat and not recorded from locality
<i>Macadamia integrifolia</i>	Queensland nut, macadamia nut, bush nut	V	A medium sized tree that grows to 20 m in height, not present in subject land
<i>Persicaria elatior</i>	Tall knotweed	`	Discounted in BAM-C
<i>Persoonia hirsuta</i>	Hairy geebung	E	Lack of suitable habitat and not found during surveys
<i>Persoonia nutans</i>	Nodding geebung	E	An erect to spreading shrub to 2.5 m high, not found during surveys
<i>Pimelea curviflora</i> var. <i>curviflora</i>		V	Discounted in BAM-C
<i>Pimelea spicata</i>	Spiked rice-flower	E	Not found during surveys
<i>Pomaderris brunnea</i>	Brown pomaderris	V	Discounted in BAM-C
<i>Pterostylis gibbosa</i>	Illawarra greenhood	E	Lack of suitable habitat and not recorded from locality

Species name	Common name	Status	Justification
<i>Pterostylis saxicola</i>	Sydney Plains greenhood	E	Lack of suitable habitat and not recorded from locality
<i>Pultenea parviflora</i>		V	Lack of suitable habitat and not recorded from locality
<i>Syzygium paniculatum</i>	Magenta lilly pilly	E	Lack of suitable habitat and not found during surveys
<i>Thesium australe</i>	Austral toadflax	V	Discounted in BAM-C
Amphibians			
<i>Heleioporus australiacus</i>	Giant burrowing frog	V	Lack of suitable habitat and not recorded from locality
<i>Litoria aurea</i>	Green and golden bell frog	E	Lack of suitable habitat, not recorded during surveys and not recorded from locality
<i>Litoria raniformis</i>	Growling grass frog	V	Lack of suitable habitat and not recorded from locality
Aves			
<i>Actitis hypoleucos</i>	Common sandpiper	Mig	Lack of suitable habitat and not recorded from locality
<i>Anthochaera phrygia</i>	Regent honeyeater	CE	Habitat important to the species not present
<i>Apus pacificus</i>	Fork-tailed swift	Mig	Not observed during surveys, habitat absent
<i>Botaurus poiciloptilus</i>	Australasian bittern	E	Lack of suitable habitat and not recorded from locality
<i>Calidris acuminata</i>	Sharp-tailed sandpiper	Mig	Not observed during surveys, habitat absent
<i>Calidris ferruginea</i>	Curlew sandpiper	CE, Mig	Discounted in BAM-C
<i>Calidris melanotos</i>	Pectoral sandpiper	Mig	Habitat important to the species not present
<i>Dasyornis brachypterus</i>	Eastern bristlebird	E	Habitat important to the species not present
<i>Gallinago hardwickii</i>	Latham's snipe	Mig	Not observed during surveys, habitat absent
<i>Grantiella picta</i>	Painted honeyeater	V	Lack of suitable habitat and not recorded from locality
<i>Haliaeetus leucogaster</i>	White bellied sea-eagle	Mig	Habitat important to the species not present
<i>Hirundapus caudacutus</i>	White throated needletail	Mig	Habitat important to the species not present
<i>Lathamus discolor</i>	Swift parrot	Mig	Potential foraging habitat, but not important to the species
<i>Monarcha melanopsis</i>	Black-faced monarch	Mig	Habitat important to the species not present
<i>Motacilla flava</i>	Yellow wagtail	Mig	Habitat important to the species not present
<i>Myiagra cyanoleuca</i>	Satin flycatcher	Mig	Habitat important to the species not present

Species name	Common name	Status	Justification
<i>Numenius madagascariensis</i>	Eastern curlew	CE, Mig	Habitat important to the species not present
<i>Rostratula australis</i>	Australian painted snipe	E	Not observed during surveys, habitat absent
<i>Rhipidura rufifrons</i>	Rufous fantail	Mig	Habitat important to the species not present
<i>Tringa nebularia</i>	Common greenshank	Mig	Habitat important to the species not present
Insects			
<i>Synemon plana</i>	Golden sun moth	CE	Lack of suitable habitat and not recorded from locality
Mammals			
<i>Chalinolobus dwyeri</i>	Large-eared pied bat	V	Discounted in BAM-C
<i>Dasyurus maculatus</i>	Spotted-tailed quoll	E	Discounted in BAM-C
<i>Petauroides volans</i>	Greater glider	V	Lack of suitable habitat and not recorded from locality
<i>Petrogale penicillata</i>	Brush-tailed rock wallaby	V	Lack of suitable habitat and not recorded from locality
<i>Phascolarctos cinereus</i>	Koala	V	Discounted in BAM-C
<i>Pseudomys novaehollandiae</i>	New Holland mouse	V	Lack of suitable habitat and not recorded from locality
<i>Pteropus poliocephalus</i>	Grey-headed flying-fox	V	Potential foraging habitat, but not important to the species

5.3 EPBC Act referral process

A person must not take an action that has, will have or is likely to have a significant impact on any of the MNES without approval from the Australian Government Minister for the Environment (the Minister).

Section 5.1 has concluded that the vegetation communities on the subject land do not meet the criteria for consideration as a MNES and Section 5.2 has indicated that the subject land is unlikely to provide habitat important to any threatened or migratory species.

Regardless, all listed MNES are described further in a referral being submitted for assessment by the Minister.

6. Prescribed Impact Identification

Prescribed additional biodiversity impacts (prescribed impacts) must be assessed as part of the BOS, as per clause 6.1 of the BC Regulation. Prescribed impacts include those impacts on the habitat of threatened species or ecological communities from development that is not directly caused as a result of vegetation clearing.

Table 6-1 lists the prescribed impacts, which are identified in Clause 6.1 of the *Biodiversity Conservation Regulation 2017* and the relevance of each prescribed impact in relation to the proposal.

Table 6-1. Prescribed and Uncertain Impacts

Will there be impacts on any of the following	Yes/No	If Yes, address the assessment questions from section 9.2.1 of the BAM
(a) Development on the habitat of threatened species or ecological communities associated with: i. karst, caves, crevices, cliffs, rock outcrops and other geological features of significance; ii. human-made structures; iii. non-native vegetation;	NO	i. no karst, caves, crevices, cliffs and other features of geological significance occur on or near the subject land. ii. no human-made structures would be disturbed as a result of the proposal. iii. Non-native vegetation within the subject land is unlikely to provide habitat for threatened species or ecological communities.
(b) on areas connecting threatened species habitat, such as movement corridors	NO	The subject land is not mapped within any connecting threatened species habitat of movement corridors.
(c) that affect water quality, water bodies and hydrological processes that sustain threatened entities (including from subsidence or upsidence from underground mining)	NO	The proposal will not result in impacts to water quality, water bodies and hydrological processes that sustain threatened entities. The subject land does not contain any watercourses.
(d) on threatened and protected animals from turbine strikes from a wind farm	NO	No wind turbines are proposed
(e) on threatened species or fauna that are part of a TEC from vehicle strikes	NO	The proposal is not anticipated to impact on any threatened or other fauna as a result of vehicle strikes. The subject land does not provide habitat for any land dwelling threatened fauna species. Due to the presence of feral cats and European fox, the subject land is also limited in providing habitat for non-threatened native fauna species.

7. Avoid or Minimise Impacts

7.1 Avoiding or minimising impacts on biodiversity values

7.1.1 Direct impacts

The proposal will unavoidably impact on very small areas of native vegetation that has been assessed as in low condition.

Avoiding direct impacts on native vegetation is not possible due to the earthworks required to provide level ground surfaces for industrial development as is intended via zoning under both the WSEA SEPP and Mamre Road Precinct Draft DCP and for the construction of public access roads and the widening of Aldington Road as required under the Mamre Road Precinct Structure Plan.

7.1.2 Indirect impacts

The proposal will ensure any indirect impacts are avoided, minimised and mitigated through the implementation of best management practices, which would include the following, but not be limited to:

- Staging of construction to minimise material stockpiling, cleaning (water suppression) of access roads and speed restrictions for management of potential dust impacts;
- Preparation and adherence to an Erosion and Sediment Control Plan;
- Pre-clearance and clearance processes, which aim to achieve the following, but not limited to:
 - protection of retained native vegetation and habitat
 - prevention of injury/mortality to all fauna
 - prevention of the spread and/or introduction of weeds and pathogens

Refer Sections 7 and 8 for further detail on the avoidance, minimisation and mitigation measures of indirect impacts.

7.2 Avoiding and minimising prescribed impacts

Not applicable as no prescribed impacts would result from the proposal.

8. Assessing the impacts of the proposal on biodiversity values

8.1 Impacts on native vegetation and habitat

8.1.1 Direct impacts

The proposal will directly impact on approximately 1.27 ha of native vegetation (commensurate with two PCTs and attributed to a third PCT) as summarised in Table 8-1.

Table 8-1. Native vegetation clearing

PCT	Area		Location
	(m ²)	(ha)	
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 835)	2,331	0.23	Lot 33 DP 258949
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion planted (PCT 849)	4,323	0.43	Lot 33 DP 258949
	3,269	0.33	Lot 25 DP 255560
	7,592	0.76	
Phragmites australia and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion (PCT 1071)	582	0.06	Lot 25 DP 255560
	425	0.04	Lot 33 DP 258949
	183	0.02	Lot 33 DP 258949
	1,260	0.13	Lot 28 DP 255560
	330	0.03	Lot 27 DP 255560
	2,780	0.28	
Total all PCTs	12,703	1.27	

8.1.2. Change in Vegetation Integrity Score

Table 8-2 provides a summary of the changes in vegetation integrity scores for each PCT management zone, as calculated in the BAM-C.

Table 8-2. Change in vegetation integrity scores

Zone	PCT ID	PCT name	PCT zone name	Vegetation integrity score		
				Current	Future	Change
1	835	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	835_Low	29.3	0	-29.3
2	849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	849_Low	29.5	0	-29.5
3	849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	849_Low01	21.2	0	-21.2

Zone	PCT ID	PCT name	PCT zone name	Vegetation integrity score		
				Current	Future	Change
4	1071	Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion	1800_Low01	32.7	0	-32.7
5			1800_Low02	9.4	0	-9.4
6			1800_Low03	5.4	0	-5.4
7			1800_Low04	1.1	0	-1.1
8			1800_Low05	6.4	0	-6.4

8.1.3 Indirect impacts

Indirect impacts are generally those that affect areas outside of the development footprint but occur as a result of the development, and which impact on native vegetation, threatened ecological communities, threatened species and their habitat.

The BAM requires that the following aspects be assessed:

- a. the nature, extent, frequency, duration and timing of indirect impacts of the proposal, inclusive of the following:
 - i. during construction
 - ii. during operation
 - iii. arising from a change in land-use patterns
- b. the consequences of indirect impacts on biodiversity values;
- c. any limitations to data, assumptions and predictions about impacts on biodiversity; and
- d. reduced viability of adjacent habitat due to noise, dust or light spill.

The proposal is largely contained within existing cleared pastoral or other highly modified land.

Table 8-3 provides a summary of indirect impacts identified in the BAM that must be considered:

Table 8-3. Assessment of indirect impacts

Indirect impact	Duration	Biodiversity values impacted	Consequence
Inadvertent impacts on adjacent habitat or vegetation, such as:			
Increased sedimentation	Short term during construction	General environment	Vegetation clearing and earthworks can expose soils and subsoils, which following rainfall may erode and mobilise soils in runoff, potentially smothering ground layer vegetation (in turn affecting health through a decrease in photosynthesis) or impact on water quality in downstream aquatic ecosystems (in turn affecting aquatic organisms that may provide a food resource for native fauna). Providing that best practices in erosion and sedimentation management are implemented in accordance with the project's Erosion and Sediment Control Plan (ESCP) the consequence of this impact is considered to be a low risk.
Introduction of weeds and pathogens	Short term during construction	General environment	Construction activities have the potential to both spread existing weed infestations, introduce new weed species, and introduce or spread soil borne pathogens on machinery and equipment. As a consequence, the condition (e.g., site integrity values) of retained and neighbouring vegetation could be decreased.
Trampling or other damage to remnant vegetation, including threatened species	Short term during construction	N/A	No remnant vegetation, including threatened species would be at risk of trampling or other damage.
Fertiliser drift	N/A	N/A	Fertiliser will not be used
Rubbish dumping, wood collection, removal and disturbance of rocks, including bush rock	N/A	N/A	The subject lands are not accessible by the public and consequence considered low risk.

Indirect impact	Duration	Biodiversity values impacted	Consequence
Reduced viability of adjacent habitat due to:			
Noise, dust or light spill	Long term (noise or light spill) Short term during construction (dust)	General environment	The existing surrounding environment does not contain areas of biodiversity value that will be retained that would be affected by future noise or light spill. Dust generation during construction activities will be managed under the project's Air Quality Impact Assessment guidelines: • Construction staging, • Minimising material stockpiles, • Cleaning (water suppression) of haul roads, • Speed restrictions, and • Implementation of the project's ESCP. The proposal is considered unlikely to reduce viability of any native vegetation or habitat within the locality.
Increased risk of starvation, exposure, loss of shade or shelter	N/A	N/A	The proposal would not result in any significant changes to existing food resources, shade or shelter.
Loss of breeding habitat	N/A	N/A	Breeding habitat for threatened species is absent from subject land
Habitat connectivity			
Habitat connectivity	N/A	N/A	The subject land does not contain any habitat connectivity.
Water bodies, water quality and hydrological processes			
Water bodies, water quality and hydrological processes	Short and long term	N/A	The subject land does not contain any watercourses.

9. Mitigating and managing impacts

9.1 Flora and fauna management

Mitigation of construction impacts will be specified within a project specific Construction and Environmental Management Plan (CEMP). The following general areas are included in a CEMP but will vary depending on a site's environment and as required by consent conditions:

- Air quality;
- Construction noise and vibration;
- Fill importation;
- Waste management;
- Soil and water plan;
- Erosion and sediment control; and
- Flora and fauna management

The proposal's direct and permanent impact on 1.27 ha of native vegetation will be mitigated through a range of measures, which are to be specified in a fauna and flora management plan (FFMP).

As a subplan to the CEMP, the FFMP will specify biodiversity related procedures, which would include, but may not be limited to, the following:

- Pre-clearance and clearance management;
- Fauna rescue and relocation protocol;
- Euthanasia protocol;
- Dam decommissioning;
- Weed and pathogen control;
- Unexpected finds protocol; and
- Monitoring and reporting strategies

9.1.1 Pre-clearance

The pre-clearing process provides a final check for the presence of flora and fauna species and habitat on a site immediately before clearing begins. Pre-clearing surveys are required to:

- Delineate the extent of clearing permitted and prepare site map(s) identifying exclusion zones;
- Identify and record the details of all habitat features (including where applicable: GPS location; species or type of habitat feature) for inclusion on site map(s);
- Mark habitat features that will be cleared, using suitable methods; and
- Locate nearby habitat suitable for the release of fauna that may be encountered during the pre-clearing or clearing stages;
- Locate suitable areas for relocation of habitat features if any (e.g., large woody debris).

9.1.2 Clearing

Where habitat features are identified in pre-clearing surveys, a two-staged clearance process shall be undertaken and an experienced ecologist present to supervise the process, act as a fauna spotter and relocate any fauna captured.

This shall include sufficient notification to proximal veterinarian surgeons and wildlife carers of the intent to commence clearance works and determining nearby locations where any injured or otherwise immature and susceptible fauna may be released.

9.1.3 Dam decommissioning

Dam decommissioning requires a range of management and mitigation measures to comply with the following legislation:

- *Protection of the Environment Operations Act 1997* (POEO Act)
- *Fisheries Management Act 1994* (FM Act);
- *Prevention of Cruelty to Animals Act 1979* (PCA Act); and
- *Biosecurity Act 2015* (Biosecurity Act)

Table 9-1 provides a summary of management and mitigation measures that should be detailed within the FFMP for implementation pre-construction and during the decommissioning process.

Table 9-1. Dam decommissioning requirements

Item	Requirements
Proposed method	• Options for dam water disposal include irrigating onto land, reuse on site, reuse during construction, removal to an authorised waste management facility, and discharge into the stormwater drainage system or local creek. • As there is no watercourse within the subject land, it is most likely that dewatering would be staged in line with development progress and provide a source of water for initial dust suppression and soil conditioning.
Environmental protection measures	• Details including a plan of all sediment and erosion control measures that will be in place during the dewatering of each dam.
Water quality	• The quality of the dam water is to be assessed against ANZECC Guidelines, specifically freshwater 95% level of protection trigger values, but may also require additional values depending on the method of disposal. • Water quality of potential receiving waters in which aquatic fauna will be relocated to, will also need to be assessed to ensure relocation sites provide suitable habitat for aquatic fauna.
Water quantity	• Should discharge to the stormwater drainage system be proposed, details of quantity and flow rate of discharge will be required. • Water levels in each dam will also need to be monitoring to ensure refuge habitat for aquatic fauna is maintained at all times up until the dam is ready for decommissioning and a program in place to capture and relocate aquatic fauna.
Sediment quality	• Prior to disturbing the sediment of the dam, the sediment within the dam walls and bed must be assessed against the National Environmental Protection Measure (NEPM) 2013.
Aquatic fauna	• Details on the methods that will be used to capture and rescue fauna residing in and around the dam. • Details on how fauna will be rescued from dam sediments or allowed to relocate from the dam. • Proposed relocation sites for native species including a permit under Section 37 of the FM Act for the relocation of fin fish (i.e., introduction of fin fish into watercourses).

Item	Requirements
	- Detailed description on the methods for fauna transportation and release. - Methods to prevent injury to fauna during pumping of water from the dam. - Protocols for dealing with any injured native fauna and euthanasia.
Biosecurity risks	- Protocols to prevent the spread of diseases and aquatic weed species (depending on the location of the release site). - Details of how exotic pest species will be humanely euthanased in a manner consistent with the PCA Act. - Methods for disposing of dam water and preventing the spread of carp eggs and juvenile pest species into natural waterways.
Reporting	Details on reporting of actions undertaken with tallies of fauna removed from the dam with details of their relocation destination or euthanasia.

9.2. Adaptive management for uncertain impacts

Not applicable as the proposal is considered unlikely to result in any uncertain impacts that require adaptive management.

10. Thresholds for Assessment

Section 9 of the BAM sets out the impact thresholds that must be applied, which include:

1. Impacts on an entity that is at risk of a serious and irreversible impact;
2. Impacts for which the assessor is required to determine an offset requirement;
3. Impacts for which the assessor is not required to determine an offset requirement; and
4. Impacts that do not require further assessment by the assessor.

10.1. Impacts on serious and irreversible impacts

Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849) is identified in the TBDC as a serious and irreversible impact (SAIL) entity.

PCT 849 is one of two grassy woodland communities that are included in the critically endangered Cumberland Plain Woodland (CPW). The other community being Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT 850).

CPW along with Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin (PCT 724) comprise the nationally listed Cumberland Plain Shale Woodlands and Shale Gravel Transition Forest, which is also a critically endangered community under the EPBC Act.

The following information addresses the criteria set out in Subsection 9.1.1 of the BAM, which must be provided to assist the decision maker to evaluate the extent and severity of the impact on the SAIL. Much of the following information is described in the following documentation:

- The native vegetation of the Cumberland Plain, western Sydney: systematic classification and field identification of communities (Tozer, 2003);
- Recovering Bushland on the Cumberland Plain: Best practice guidelines for the management and restoration of bushland (DEC, 2005);
- The final determination to list CPW as a critically endangered ecological community (DPIE, 2008-2010);
- Tozer et al (2010) Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands; and
- The approved CPW recovery plan (DECCW, 2011).

(1) The action and measures taken to avoid the direct and indirect impact on the potential entity for an SAIL

Areas of PCT 849 that would be cleared as a result of the proposal are relatively small and isolated patches of low condition vegetation.

It should be noted that under the Draft Cumberland Plain Conservation Plan, the subject land is identified as land that will be certified for development.

(2) Current status of the SAIL

(a) Evidence of reduction in geographic distribution (Principle 1. Clause 6.7(2)(a) BC Reg. as the current total geographic extent of the TEC in NSW and the estimated reduction since 1970 (excluding impacts from proposed development):

Table 9-1 summarises estimates of pre-European and later dated extent sourced from relevant CPW literature.

At the time of preparing this BDAR, an estimate of reduction since 1970 was not available.

Table 10-1. Evidence of geographic distribution

PCT	Estimated extent (ha)		Percent reduction	Source/year of estimate
	Pre-European	Current		
849	87,175	6,745 (±968)	7.7% (1.1)	Tozer (2003) / 1997
850	38,274	4,309 (±596)	11.3% (1.5)	
849 + 850	125,449	11,054 (±1,564)	8.8% (±1.2)	
CPW (A,B & C) ¹		10,612		DECCW (2011) CPW recovery plan / assume circa.1997
CPW (TX & TXR) ²		13,918		
CPW (all)	125,449	24,530	8%	
849		6,800	5-25%	Tozer et al (2010)
850		4,400	10-25%	
849 + 850		11,200		
CPW		29,813		Cumberland Ecology (2019) / 2010-2016 ³
CPW		29,813		
849	44,000	6,800	7%	Bionet Vegetation Classification / 2020 ⁴
850	27,200	4,400	12%	
849 + 850	71,200	11,200	8%	

¹ A,B & C: relatively intact canopy

² TX & TXR: scattered canopy

³ Derived from mapped areas included within OEH (2016), OEH (2013), and Tozer et al. (2010).

⁴ The measured or estimated current extent of the plant community within NSW is stated as based on the best available information including mapping, modelling.

As shown in Table 9-1, the pre-European and later dated estimates provided are inconsistent, but the percent reduction remains relatively constant and provides evidence of the reduction of geographic extent.

(b) Extent of reduction in ecological function (describing the degree of environmental degradation or disruption of biotic processes (Principle 2. Clause 6.7(2)(b) BC Reg.

Table 9-2 provides a response to the biotic processes listed in Subsection 9.1.1 of the BAM.

Table 10-2. Evidence of reduced ecological function

Indicator	Extent / degree of reduction in ecological function
Change in community structure	Changes in structure contribute to a very large reduction in the ecological function of CPW. Almost all of the remaining area of CPW is regrowth forest and woodland from past clearing activities. Mean tree densities in contemporary stands of the community have been found to be substantially higher than historical estimates and tree sizes thought to be smaller. Large trees approximating the stature of the community prior to European settlement occur very sparsely within remnant patches of vegetation or remain as isolated individuals within paddocks or urban areas (DPIE, 2008-2010).

Indicator	Extent / degree of reduction in ecological function
	Other structural changes to the community include the removal of fallen woody debris and standing dead trees, the removal of woody understorey plants, or conversely the development of regrowth stands with very high densities of eucalypt saplings or shrubs, notably <i>Bursaria spinosa</i> , which may suppress the ground flora (DPIE, 2008-2010).
Change in species composition	Changes in species composition are referred to in the above structural changes and the below invasion and establishment of exotic species and degradation of habitat. In particular: - Increased native shrub layer; - Weed infestations of exotic shrub and ground layers; - Pastural grasses; and - Reduced genetic diversity through disruption to pollination and dispersal of fruits or seeds.
Invasion and establishment of exotic species	The characteristics of a grassy understorey, relatively fertile soils and past land uses make many of the Cumberland Plain plant communities highly vulnerable to weed invasion. Weeds such as African Lovegrass, Rhodes Grass, Bridal Veil Creeper, Paddy's Lucerne, African Olive and Boxthorn, have been able to establish widely (DEC, 2005). Weed species have established themselves widely in CPW, displacing native plants and affecting the regeneration of communities (DECCW, 2011).
Degradation of habitat	Clearing for rural and residential developments, industry, and agricultural land uses has led to increasingly isolated small remnants which are more susceptible to degradation, provide less habitat values and support fewer species (DECCW, 2011). The integrity and survival of small, isolated stands is impaired by the small population size of many species, enhanced risks from environmental stochasticity, disruption to pollination and dispersal of fruits or seeds, and likely reductions in the genetic diversity of isolated populations (DPIE, 2008-2010).
Fragmentation of habitat	CPW is severely fragmented, with more than half of the remaining tree cover mapped by Tozer (2003) and based on 1997 data occurring in patches of less than 80 ha and half of all mapped patches being smaller than 3 ha.

(c) Evidence of restricted geographic distribution (Principle 3. Clause 6.7(2)(c) BC Reg. based on the TEC's geographic range in NSW according to the:

- i. extent of occurrence
- ii. area of occupancy
- iii. number of threat-defined locations

CPW as the name implies is restricted to the Cumberland Plain IBRA subregion. The geographic location of the Cumberland Plain encompasses a 275,693-ha area containing a broad shale basin in western Sydney and across 16 local government areas (pre-amalgamation of many local government areas).

The CPW geographic location also coincides with major growth centres within the region, including the South West and North West growth areas, the Wilton Growth Area, the Greater Macarthur Growth area, the Western Sydney Employment Area (WSEA) and the Western Sydney Aerotropolis.

In accordance with Clause 4.21 of the BC Reg. the NSW Scientific Committee (the Committee) published guidelines for interpreting listing criteria for species, populations and ecological communities under the BC Act.

Subclause 4.10f of the BC Reg. requires an estimate of the number of threat-defined locations that are occupied relative to the extent of serious plausible threats. For the purpose of interpreting Clause

4.10f, the Committee has recommended the thresholds used by the IUCN (Bland et al., 2017) be used (see Table 9-3).

Table 10-3. Corresponding thresholds for threat defined locations

Category of threat	No. of locations required under Clause 4.10f of BC Reg.	No. of locations threshold under IUCN Red List for ecosystems criteria
Critically endangered	Extremely low	One location
Endangered	Very low	No more than 5 locations
Vulnerable	Low	No more than 10 locations

For the purpose of this assessment, it is assumed that all threats to CPW as identified above in (a) and (b) have and continue to impact on CPW, with the potential exception of those areas of CPW retained in conservation areas.

As CPW is critically endangered one threat-defined location applies.

(d) Evidence that the TEC is unlikely to respond to management (Principle 4. Clause 6.7(2)(d) BC Reg.

Management of CPW loss is now regulated under the BC Act and BC Reg. and is also a major consideration under the DRAFT Cumberland Plain Conservation Plan (DPIE 2020). The Draft Cumberland Plain Conservation Plan (CPCP, DPIE 2020) has been prepared for the specific purpose of arresting further development impacts on CPW and other PCTs within the Cumberland Plain. This is intended to be done through a combination of bio-certification and the reservation of additional dedicated areas in which CPW will be conserved.

To this end, it is currently difficult to provide evidence that CPW is unlikely to respond to management, given the NSW government's current incentives that aim to do otherwise.

(3) Record where the TBDC indicates data is 'unknown' or 'data deficient' for a TEC for a criterion.

The TBDC currently indicates that the SAIL thresholds and condition of CPW is still in progress.

4. In relation to the impacts from the proposal on the TEC at risk of an SAIL, the following data and information is required:

(a) The impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal:

- i. in hectares, and
- ii. as a percentage of the current geographic extent of the TEC in NSW.

Collectively up to 0.76 ha of PCT 849 (in two separate locations) will be directly impacted as a result of the proposal.

This equates to a minimum and maximum of 0.006% and 0.003% (respectively) of the minimum (11,200 ha) and maximum (29,813 ha) of estimated geographic extent of the TEC in NSW (refer Table 9-1).

b. the extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by:

- i. estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the development footprint or equivalent area for other types of proposals

Only a small area of PCT 849 to the north of the subject land, which is less than 0.5 ha in extent

- ii. describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:
 - o distance between isolated areas of the TEC, presented as the average distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and

- o estimated maximum dispersal distance for native flora species characteristic of the TEC, and
- o other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development

There will be negligible if any impact on the distance between isolated areas of the TEC or dispersal distance for native flora species (characteristic of the TEC), and any impact on connectivity, fragmentation or perimeter ratio for the remaining areas of the TEC as a result of the development.

iii. describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s)

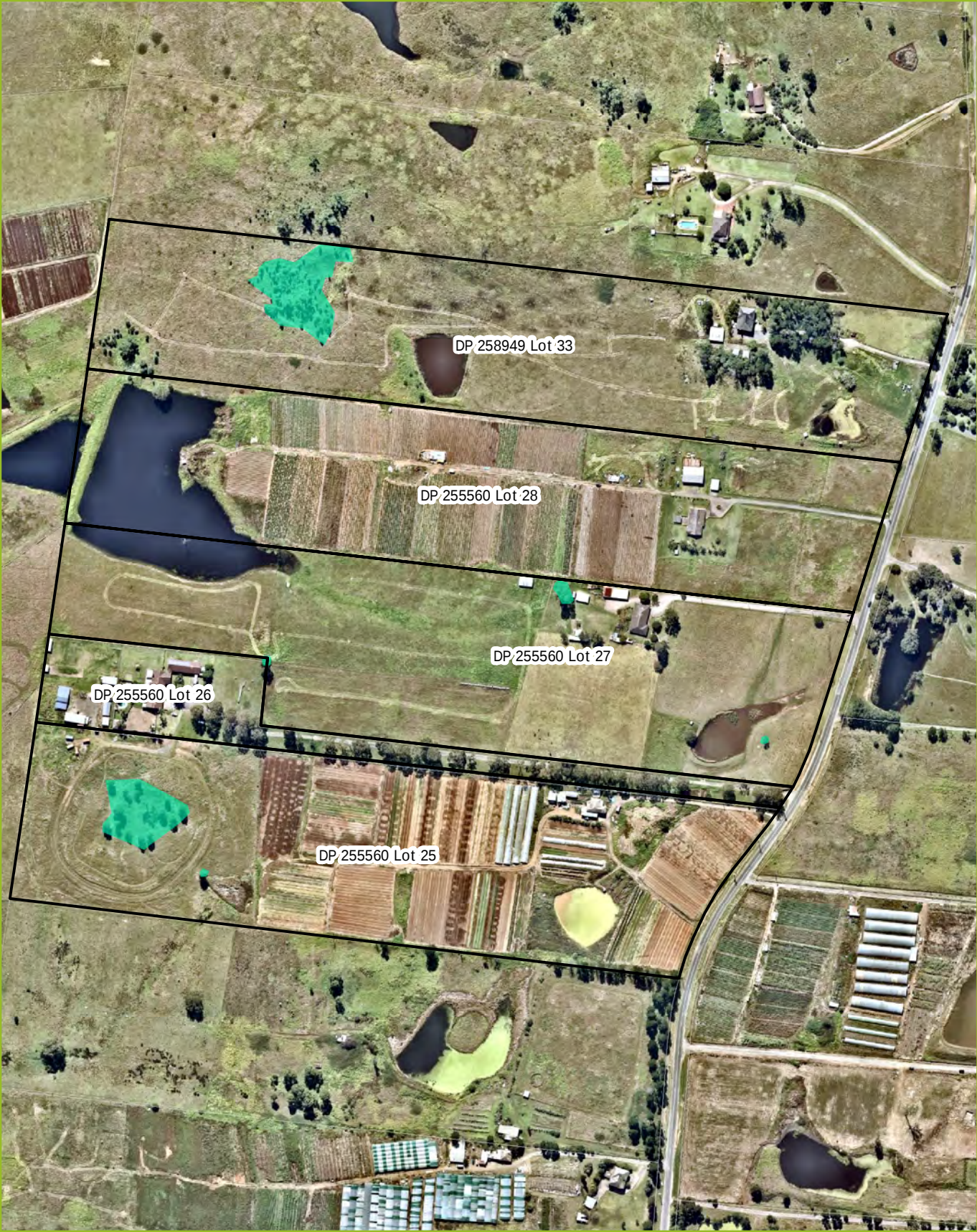
Vegetation integrity scores for each zone of PCT 849 are 26.1 and 20.7. Table 9-4 provides a summary of the attributes that contributed to the integrity scores compared against PCT 849's benchmark data. The location of SAI entities are shown in Figure 10-1.

Table 10-4. Vegetation integrity scores for PCT 849

Attribute	Benchmark	Zone 1	Zone 2
Tree Richness	5	2	2
Shrub Richness	8	0	1
Grass and Grass Like Richness	12	3	4
Forb Richness	14	4	2
Fern Richness	2	0	0
Other Richness	5	1	0
Tree Cover	53	45	25
Shrub Cover	16	0	1
Grass and Grass Like Cover	58	9	4.75
Forb Cover	9	1.65	1.65
Fern Cover	1	0	0
Other Cover	4	0.5	0
Total length of fallen logs	40	5	1.5
Litter Cover	40	0.3	4
Number of Large Trees	3	1	1
High Threat Weed Cover	0	41	68

(5) Accuracy of risk to SAI

The assessor has not elected to provide new information that demonstrates that the principle identifying that the TEC is at risk of an SAI is not accurate.

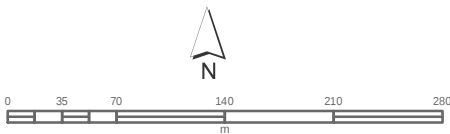


Aldington Estate Kemp's Creek

Figure 10.1. Location of SAIL entities

Legend

-  Lot boundaries
-  SAIL (PCT 849)



Coordinate System: MGA Zone 56 (GDA 94)
Image sources: Nearmap 15 April 2021
Date created: 23 May 2021

10.2 Impacts that require an offset

10.2.1 Ecosystem credits

Table 10-5 summarises the impacts that the proposal requires an offset for, and the BAM-C credit summary report provided in Appendix B.

Table 10-5. Ecosystem credit offsetting requirements

PCT	TEC	Area of impact (ha)	Credits required
835 - Cumberland riverflat forest	River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and SE Corner Bioregions	0.2	3
849 - Cumberland shale plains woodland	Cumberland Plain Woodland in the Sydney Basin Bioregion	0.73	12
1071 - Coastal freshwater wetlands	Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Part); Listed BC Act, E: Sydney Freshwater Wetlands in the Sydney Basin Bioregion (Part)	3.3 [#]	3

[#] Total estimated area of all farm dams (including open water zones), whereas previous areas for PCT 1071 represent areas of native vegetation present in farm dams.

10.2.2 Species credits

No species credit species have been identified as requiring an offset.

10.3. Impacts that do not require an offset

Approximately 38.7 ha of the subject land does not require an offset. This area includes market gardens, cleared residential land, planted native and exotic vegetation and pasture/exotic weed areas (see Table 10-6).

Table 10-6. Subject land that does not require offsetting

Description	Area (ha)
Market gardens	10.07
Pasture	20.81
Planted native	0.99
Planted native - exotic	0.09
Planted exotic	1.15
Weeds	2.32
Buildings / other	3.30
Total area	38.73

11. References

Department of Agriculture, Water and Environment (DAWE) (2020) Conservation Advice for the River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria.

Department of Agriculture, Water and Environment (DAWE) (2010) Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest. A guide to identifying and protecting the nationally threatened ecological community Environment Protection and Biodiversity Conservation Act 1999 Policy Statement 3.31

Department of Environment and Conservation (DEC) (2005) Recovering Bushland on the Cumberland Plain: Best practice guidelines for the management and restoration of bushland. Department of Environment and Conservation (NSW), Sydney.

Department of Environment, Climate Change and Water (DECCW) (2011) Cumberland Plain Recovery Plan

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Appendix A. Transect/plot data



Survey Name: Aldington

07.04.2021

Zone ID: Lot 33 DP 258949

Plot no: 1

Location:	Zone	Easting	Northing	Bearing
	56H	295602	6252965	140

Vegetation formation:	Vegetation class:	PCT (if known)
Forested Wetlands	Coastal Floodplain Wetlands	835

CONDITION (400m² plot)

Composition:	Tree	Shrub	Grass grasslike	Forb	Fern	Other
Native Richness count:	1	0	3	2	0	0

Structure:	Tree	Shrub	Grass grasslike	Forb	Fern	Other
Cover of each group:	38	0	4.5	0.3	0	0

High Threat Weed cover %: 97.6

FUNCTION (1,000m² plot)

Tree regeneration (<5cm)		Stem classes	
Present	Yes	5-9	YES
		10-19	YES
Absent		20-29	YES
		30-49	YES

No large trees (>50cm DBH)	No. of HBTs	Length of LWD (m):
2	2	7.1

FUNCTION (50m transect)

Litter cover	5m	15m	25m	35m	45m	Average
	5	80	75	2	0	32.4

Survey Name: Aldington

Date: 07.04.2021

Zone Lot 33 DP 258949
ID:

Plot no: 1

[illegible]

GF Code: growth form

N: native, **E:** exotic, **HTE:** high threat exotic

TG tree

OS: overstorey, MS: midstorey, US: understorey

SG shrub

GG grass like

FG forb

OG other (e.g. vine)

Survey Name: Aldington

07.04.2021

Zone ID: Lot 33 DP 258949

Plot no: 1

Location:	Zone	Easting	Northing	Bearing
	56H	295754	6252968	350

Vegetation formation:	Vegetation class:	PCT (if known)
Grass Woodland (GW)	Coastal Valley GW	849

CONDITION (400m² plot)

Composition:	Tree	Shrub	Grass grasslike	Forb	Fern	Other
Native Richness count:	2	0	3	4	0	1

Structure:	Tree	Shrub	Grass grasslike	Forb	Fern	Other
Cover of each group:	45	0	9	1.65	0	0.5

High Threat Weed cover %: 60.25

FUNCTION (1,000m² plot)

Tree regeneration (<5cm)		Stem classes	
Present	Yes	5-9	YES
		10-19	YES
Absent		20-29	0
		30-49	0

No large trees (>50cm DBH)	No. of HBTs	Length of LWD (m):
1	1	4.9

FUNCTION (50m transect)

Litter cover	5m	15m	25m	35m	45m	Average
	5	80	75	3	0	33

Survey Name: Aldington

Date: 07.04.2021

Zone
ID: Lot 33 DP 258949

Plot no: 1

GF code	Scientific Name	Common Name	N, E or HTE	Cover (400m ²)			Stratum
				%	(m ²)	Abund	
TG	<i>Eucalyptus tereticornis</i>	Forest red gum	N	21		1	OS
TG	<i>Angophora subvelutina</i>	Broad-leaved apple	N	24		40	OS & MS
		subtotal		45			
GG	<i>Cyndon dactylon</i>	Common couch	N	2.5	10		US
GG	<i>Microlaena stipoides</i>	Weeping grass	N	5	20	>150	US
GG	<i>Aristida ramosa</i>	Purple wiregrass	N	1.5	6	15	US
		subtotal		9			
FG	<i>Asperula conferta</i>	Common woodruff	N	0.2		10	US
FG	<i>Dichondra repens</i>	Kidney weed	N	1.25	5		US
FG	<i>Geranium solanderi</i>	Native geranium	N	0.1		1	US
FG	<i>Brunoniella australis</i>	Blue trumpet	N	0.1		1	US
		subtotal		1.65			
OG	<i>Glycine clandestina</i>		N	0.5	2	6	US
		subtotal		0.5			
WEED	<i>Nassella trichotoma</i>	Serrated tussock	HTE	0.75	3		US
WEED	<i>Cenchrus clandestinum</i>	Kikuyu	HTE	37.5	150	>2000	US
WEED	<i>Paspalum dilatatum</i>	Paspalum	HTE	20		>200	US
WEED	<i>Bidens pilosa</i>	Cobblers Pegs	HTE	1.75	7	17	US
WEED	<i>Araujia sericifera</i>	Moth vine	HTE	0.25	1	4	US
		subtotal		60.25			
WEED	<i>Sida rhombifolia</i>	Paddy's Lucerne	E	0.75	3	5	US
WEED	<i>Plantago lanceolata</i>	Lambs tongue	E	0.75	3	8	US
WEED	<i>Cirsium vulgare</i>	Spear thistle	E	0.25	1	3	US
WEED	<i>Verbena incompta</i>	Purpletop	E	0.25	1	10	US
WEED	<i>Senecio pterophorus</i>		E	1.5	6	3	MS
		subtotal		3.5			

GF Code: growth form

N: native, E: exotic, HTE: high threat exotic

TG tree

OS: overstorey, MS: midstorey, US: understorey

SG shrub

GG grass like

FG forb

OG other (e.g. vine)

Survey Name: Aldington

07.04.2021

Zone ID: Lot 35 DP 255560

Plot no: 2

Location:	Zone	Easting	Northing	Bearing
	56H	295650	6252517	280

Vegetation formation:	Vegetation class:	PCT (if known)
Grass Woodland (GW)	Coastal Valley GW	849

CONDITION (400m² plot)

Composition:	Tree	Shrub	Grass grasslike	Forb	Fern	Other
Native Richness count:	2	1	3	4	0	0

Structure:	Tree	Shrub	Grass grasslike	Forb	Fern	Other
Cover of each group:	25	1	4.75	1.65	0	0

High Threat Weed cover %: 68

FUNCTION (1,000m² plot)

Tree regeneration (<5cm)		Stem classes	
Present	YES	5-9	
		10-19	
Absent		20-29	YES
		30-49	YES

No large trees (>50cm DBH)	No. of HBTs	Length of LWD (m):
1	1	1.5

FUNCTION (50m transect)

Litter cover	5m	15m	25m	35m	45m	Average
	10%	0%	15%	15%	20	4.08

Survey Name: Aldington

Date: 07.04.2021

Zone
ID: Lot 33 DP 258949

Plot no: 2

GF code	Scientific Name	Common Name	N, E or HTE	Cover (400m ²)			Stratum
				%	(m ²)	Abund	
TG	<i>Eucalyptus tereticornis</i>	Forest red gum	N	20		2	OS
TG	<i>Eucalyptus</i> sp?	Planted	N	5		2	OS
		subtotal		25			
SG	<i>Einadia nutans subsp.</i>	Climbing saltbush	N	1	4		US
		subtotal		1			
GG	<i>Cyndon dactylon</i>	Common couch	N	2.5	10		US
GG	<i>Microlaena stipoides</i>	Weeping meadow grass	N	1.25	5		US
GG	<i>Botriochloa macra</i>	Red-leg grass	N	1	4		US
		subtotal		4.75			
FG	<i>Asperula conferta</i>	Common woodruff	N	0.2		10	US
FG	<i>Dichondra repens</i>	Kidney weed	N	1.25	5		US
FG	<i>Fimbristylis dichotoma</i>	Common fringe-sedge	N	0.1		2	US
FG	<i>Geranium solanderi</i>	Native geranium	N	0.1		1	US
		subtotal		1.65			
WEED	<i>Nassella trichotoma</i>	Serrated tussock	HTE	0.75	3		US
WEED	<i>Cenchrus clandestinum</i>	Kikuyu	HTE	35		>2000	US
WEED	<i>Paspalum dilatatum</i>	African lovegrass	HTE	30	120	>2000	US
WEED	<i>Eragrostis curvula</i>	Cobblers Pegs	HTE	1.75		5	US
WEED	<i>Senecio madagascariensis</i>	Fireweed	HTE	0.5		20	US
		subtotal		68			
WEED	<i>Aster subulatus</i>	Bushy starwort	E	0.1		3	US
WEED	<i>Cirsium vulgare</i>	Spear thistle	E	0.1	<1	4	US
WEED	<i>Cyperus brevifolius</i>	Mullumbimby couch	E	0.1	<1		US
WEED	<i>Sida rhombifolia</i>	Paddy's Lucerne	E	20	80		US
WEED	<i>Phytolacca octandra</i>	Ink weed	E	0.5	3	5	US
WEED	<i>Setaria</i> sp	Pigeon grass	E	1.25	5		US
WEED	<i>Solanum nigra</i>	Nightshade	E	0.1	<1		US
WEED	<i>Solanum linnaeanum</i>	Apple of sodom	E	30			MS
				52.15			
		subtotal		82.25			

GF Code: growth form

N: native, E: exotic, HTE: high threat exotic

TG tree

OS: overstorey, MS: midstorey, US: understorey

SG shrub

GG grass like

FG forb

OG other (e.g. vine)

Appendix B. BAM summary report



Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00025508/BAAS17054/21/00025509	Aldington Estate	10/06/2021
Assessor Name	Report Created	BAM Data version *
Kat Duchatel	17/06/2021	45
Assessor Number	BAM Case Status	Date Finalised
BAAS17054	Finalised	17/06/2021
Assessment Revision	Assessment Type	
0	Major Projects	

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

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

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

BAM Credit Summary Report

Cumberland riverflat forest											
1	835_Low	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	29.3	29.3	0.2	Endangered Ecological Community	Not Listed	High Sensitivity to Potential Gain	2.00		3
									Subtotal		3
Cumberland shale plains woodland											
2	849_Low	Cumberland Plain Woodland in the Sydney Basin Bioregion	29.5	29.5	0.43	Critically Endangered Ecological Community	Critically Endangered	High Sensitivity to Potential Gain	2.50	TRUE	8
3	849_Low01	Cumberland Plain Woodland in the Sydney Basin Bioregion	21.2	21.2	0.3	Critically Endangered Ecological Community	Critically Endangered	High Sensitivity to Potential Gain	2.50	TRUE	4
									Subtotal		12

Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion										
4	1071_Low01	Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	32.7	32.7	0.2	Endangered Ecological Community	Not Listed	High Sensitivity to Potential Gain	2.00	3
5	1071_Low02	Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	9.4	9.4	0.27	Endangered Ecological Community	Not Listed	High Sensitivity to Potential Gain	2.00	0
6	1071_Low03	Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	5.4	5.4	0.19	Endangered Ecological Community	Not Listed	High Sensitivity to Potential Gain	2.00	0

BAM Credit Summary Report

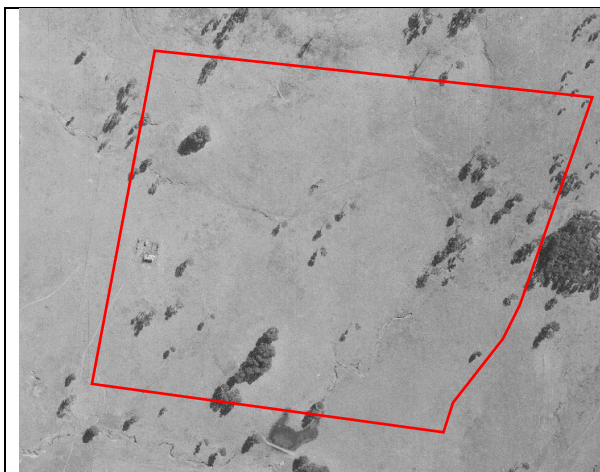
7	1071_Low04	Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	1.1	1.1	2.3	Endangered Ecological Community	Not Listed	High Sensitivity to Potential Gain	2.00	0
8	1071_Low05	Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	6.4	6.4	0.3	Endangered Ecological Community	Not Listed	High Sensitivity to Potential Gain	2.00	0
									Subtotal	3
									Total	18

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAI	Species credits
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Appendix C. Historical aerial photography





1950



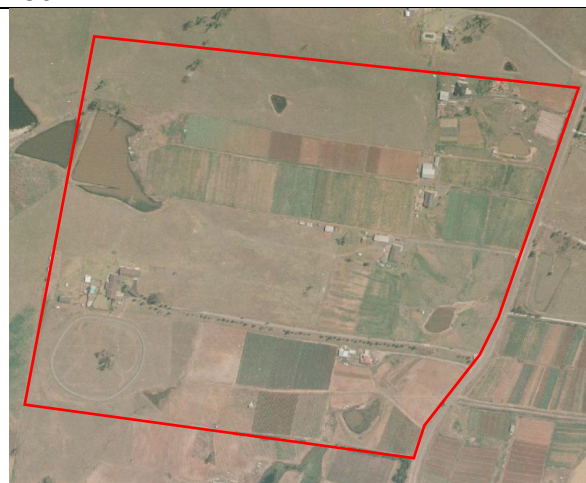
1961



1970



1986



1991



2005



écologique | environmental consulting