200 Aldington Road, Kemps Creek NSW
Biodiversity Development Assessment Report

Fife Kemps Creek Pty Ltd

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Template 2.8.1

Executive Summary

Eco Logical Australia Pty Ltd was engaged by Fife Kemps Creek to prepare a Biodiversity Development Assessment Report for a proposed development at 200 Aldington Road in the Penrith City Council local government area. The subject land is the assessable area which includes the area of land defined by land title boundaries of Lot 20 DP 255560; Lot 21 DP 255560; Lot 22 DP 255560; Lot 23 DP 255560 and Lot 30 DP 258949 between 144-228 Aldington Road, Kemps Creek. The proposed development is for the construction of an industrial estate and associated infrastructure on the site. The development is classified as a Part 4.1 State Significant Development under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

This report has followed the Biodiversity Assessment Method 2017 (BAM) established under Section 6.7 of the NSW *Biodiversity Conservation Act 2016* (BC Act) and responds to the following SEARs for project SSD-10479 issued July 2020:

- *- an assessment of the biodiversity impacts in accordance with the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report (BDAR);*

This report describes the biodiversity values within the subject land and development site, describes the impacts and outlines the measures to be taken to avoid, minimise and mitigate impacts to the Plant Community Types and threatened species habitat present within the development footprint and development site.

The report provides the number of biodiversity credits that would need to be retired to offset the residual loss of biodiversity if the development proceeds as described.

The proposed development involves direct impacts to the biodiversity values within the development footprint, and indirect impacts within the development site. Following avoidance and mitigation, the residual direct impacts were calculated in accordance with the BAM by utilising the BAM Credit Calculator.

The proposed development site is approximately 72.09 ha in size and consists largely of rural housing and market gardens, with low to moderate condition remnant vegetation. Three Plant Community Types (PCTs), comprising five vegetation zones, are present within the development site and development footprint. A summary of the areas of each zone within the development footprint is provided below.

Vegetation Zone	PCT ID	PCT Name	Condition	Direct impact (ha)
1	835	Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate	0.222
2	835	Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Low - Moderate	1.106

Vegetation Zone	PCT ID	PCT Name	Condition	Direct impact (ha)
3	850	Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	low	0.115
4	1232	Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion	low	0.926
5	1232	Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion	moderate	0.672
Total				3.041

A total of 23 ecosystem credits will be required for the removal of vegetation within the development footprint.

Below are details how each of the three PCTs correspond to threatened ecological communities as listed under the BC Act and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It also provides a breakdown of the number of ecosystem credits required per PCT for the removal of vegetation within the development footprint.

PCT ID	PCT Name	BC Act listing	EPBC Act listing	Direct impact (ha)	Credits required
835	Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Endangered	Not Listed	1.328	16
850	Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Critically Endangered	The community on site does not meet the condition thresholds for listing under the EPBC Act	0.115	0
1232	Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion	Endangered	The community on site does not meet the condition thresholds for listing under the EPBC Act	1.598	7

A total of 34 species credit species will be required for the removal of threatened species habitat within the development footprint. A summary of the species credits requirements is provided below.

Species	Common Name	Presence	Direct impact (ha)	Credits required
Litoria aurea	Green and Golden Bell Frog	Assumed	0.342	5
Myotis macropus	Southern Myotis	Assumed	2.975	29

Serious and Irreversible Impact (SAII) values have also been considered in this assessment. *Cumberland Plain Woodland of the Sydney Basin Bioregion* is listed as a SAII in the BioNet Threatened Biodiversity Data Collection. According to the Threatened Biodiversity Data Collection, the SAII thresholds for this community are still under development.

Matters of National Environmental Significance (MNES) identified as having potential to be adversely affected by the proposed works include:

- *Anthochaera phrygia* (Regent Honeyeater)
- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Lathamus discolor* (Swift Parrot)
- *Litoria aurea* (Green and Golden Bell Frog)
- *Phascolarctos cinereus* (Koala)
- *Gallinago hardwickii* (Latham's Snipe).

Assessments of the Commonwealth Significant Impact Criteria was undertaken for the above MNES and concluded that the project is unlikely to have a significant impact on any of the MNES.

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Abbreviations

Abbreviation	Description
BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Credit Calculator
BC Act	NSW *Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
BSSAR	Biodiversity Stewardship Site Assessment Report
CEEC	Critically Endangered Ecological Community
DAWE	Commonwealth Department of Agriculture, Water and Environment (formally Department of Environment and Energy (DoEE)
DNG	Derived Native Grassland
DPE	NSW Department of Planning and Environment

Abbreviation	Description
EEC	Endangered Ecological Community
ELA	Eco Logical Australia Pty Ltd
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
FM Act	NSW *Fisheries Management Act 1994*
GIS	Geographic Information System
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
LGA	Local Government Area
LLS	Local Land Service
NSW	New South Wales
NOW	NSW Office of Water
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Type
PMST	Protected Matters Search Tool
SEPP	State Environmental Planning Policy
SSD	State Significant Development
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community
VIS	Vegetation Information System
WM Act	NSW Water Management Act 2000

1. Stage 1: Biodiversity assessment

1.1 Introduction

This Biodiversity Development Assessment Report (BDAR) has been prepared by Kirsten Velthuis (BAAS 19048) who is an Accredited Person under the NSW *Biodiversity Conservation Act 2016* (BC Act). The report has been peer reviewed by Accredited Assessor Nicole McVicar (18077). The contents of this BDAR comply with the minimum requirements outlined in Table 25 of the Biodiversity Assessment Method (BAM) (Office of Environment and Heritage (OEH) 2017) and address the Secretary's Environmental Assessment Requirement for'*An assessment of the biodiversity impacts in accordance with the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report'*.

Definitions relevant to the report are provided in Appendix A.

1.1.1 General description of the development site

The proposed development site, defined as the area of land that is subject to the proposed development application, is 72.09 ha and located within the Penrith City Council local government area (LGA). The development site is bordered by Aldington Road to the west, and rural, residential properties to the north, east and south. The development site currently contains market gardens, rural/residential properties, native vegetation and regenerating native vegetation. The development site consists of the following adjoining parcels of land:

Address	Title
106-124 Aldington Road, Kemps Creek	Lot 32 DP258949
126-142 Aldington Road, Kemps Creek	Lot 31 DP258949
144-160 Aldington Road, Kemps Creek	Lot 30 DP258949
162-178 Aldington Road, Kemps Creek	Lot 23 DP255560
180-196 Aldington Road, Kemps Creek	Lot 22 DP255560
198-212 Aldington Road, Kemps Creek	Lot 21 DP255560
214-228 Aldington Road, Kemps Creek	Lot 20 DP255560

The proposed development is a State Significant Development (SSD) SSD-10479 and entails the construction of an industrial estate and associated infrastructure on the site.

The general description of the development site and development footprint is displayed on the following maps:

- Site Map (Figure 1)
- Location Map (Figure 2)
- Development footprint (Figure 3).

1.1.2 Development footprint and project description

The BAM defines the development footprint as *the area of land that is directly impacted on by a proposed development, including access roads, and areas used to store construction materials. The term development footprint is also taken to include clearing footprint*. In relation to this project, the development footprint is all the land that will be directly affected. The proposed development entails the construction of industrial warehousing and associated infrastructure on the site. The development footprint is 72.00 ha in size.

This BDAR assesses the impacts of the final concept masterplan, which will form part of the detailed development application (DA) for the Stage 1 component of the development.

The concept masterplan with an indicative total building area of 375,755 sqm, consists of:

- 357,355 sqm of warehouse gross floor area (GFA);
- 18,200 sqm of ancillary office GFA;
- 200 sqm of café GFA;
- 13 individual development lots for warehouse buildings with associated hardstand areas;
- Internal road layouts and road connections to Aldington Road;
- Provision for 1700 car parking spaces; and
- Associated site landscaping.

- Detailed consent for site preparation, earthworks and infrastructure works (i.e. Stage 1 works) on the site, including:
  - Demolition and clearing of all existing built form structures;
  - Drainage and infill of existing farm dams and any ground dewatering;
  - Clearing of all existing vegetation;
  - Construction of a warehouse building with a total of 50,930 sqm of GFA, including:
    - 48,430 sqm of warehouse GFA;
    - 2,500 sqm of ancillary office GFA;
    - 231 car parking spaces; and
    - associated landscaping
  - Bulk earthworks including ‘cut and fill’ to create flat development platforms for the warehouse buildings, and topsoiling and grassing / site stabilisation works;
  - Roadworks, access infrastructure and associated landscaping;
  - Stormwater and drainage works including stormwater basins, diversion of stormwater lines, gross pollutant traps and associated swale works;
  - Sewer and potable water reticulation; and
  - Inter-allotment, road and boundary retaining walls.

1.1.3 Sources of information used

The following data sources were reviewed as part of this report:

- BioNet Vegetation Classification (accessed between August 2019 and August 2020)
- BioNet / Atlas of NSW Wildlife 5 km database search (Department of Planning Industry and Environment (DPIE), August 2019 and August 2020)
- Commonwealth *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool 5 km database search (DAWE, accessed between August 2019 and August 2020). Likelihood of occurrence table has been provided in Appendix C.
- NSW Government Biodiversity Values Map and Threshold Tool (BV Map). The subject land is mapped on BV Map (accessed August 2020)
- CTENVIRONMENTAL (2020). Mamre Road Precinct Rezoning: Waterway Assessment– Kemps Creek and Mount Vernon. Prepared for Sydney Water.
- Waterway Assessment– Kemps Creek and Mount Vernon. Prepared for Sydney Water.
- Aerial mapping (SIXMaps and NearMaps) (accessed between August 2019 and August 2020)
- Additional geographic information system (GIS) datasets including soil, topography, geology and drainage

Figure 1: Site Map

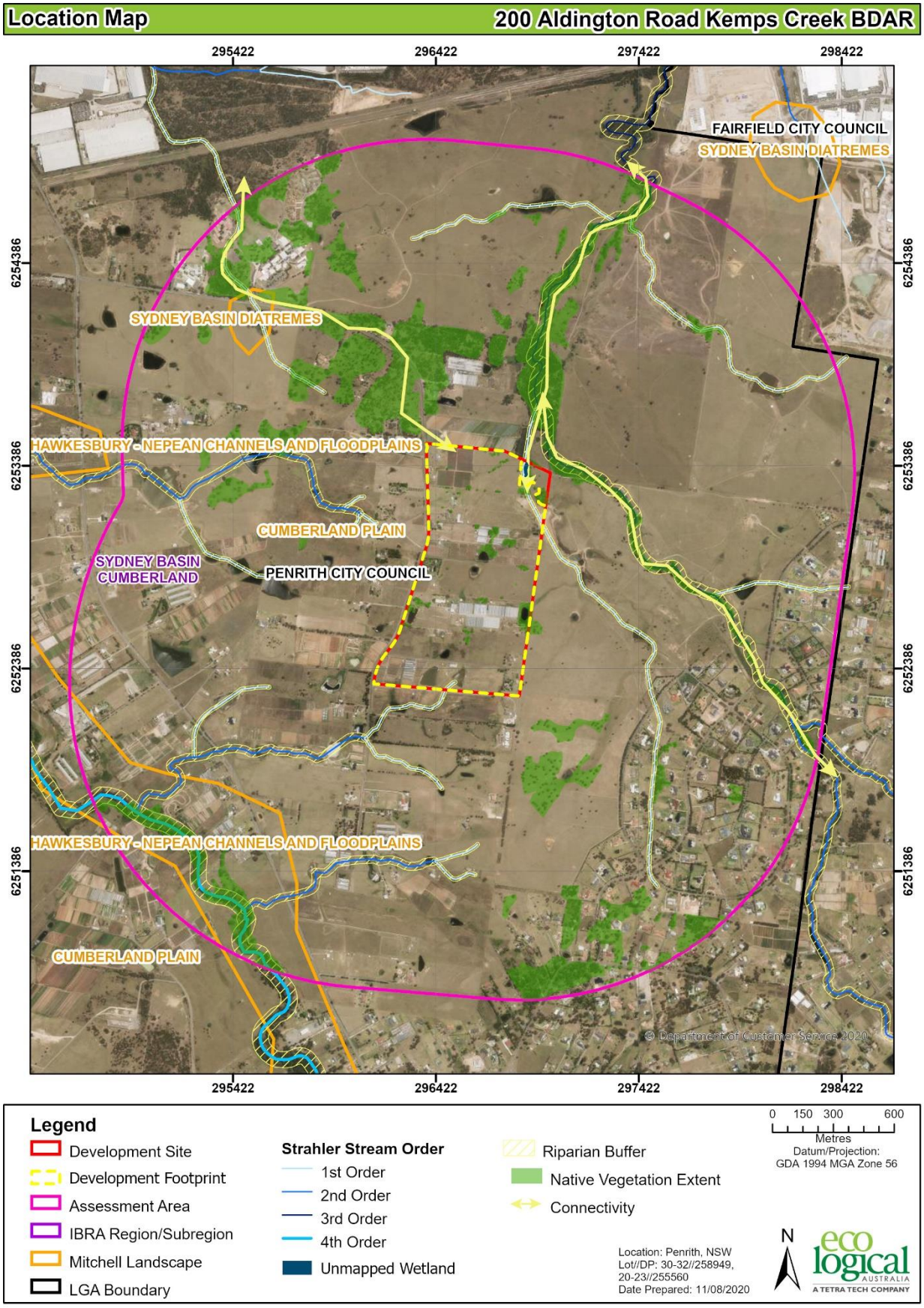

Figure 2: Location Map

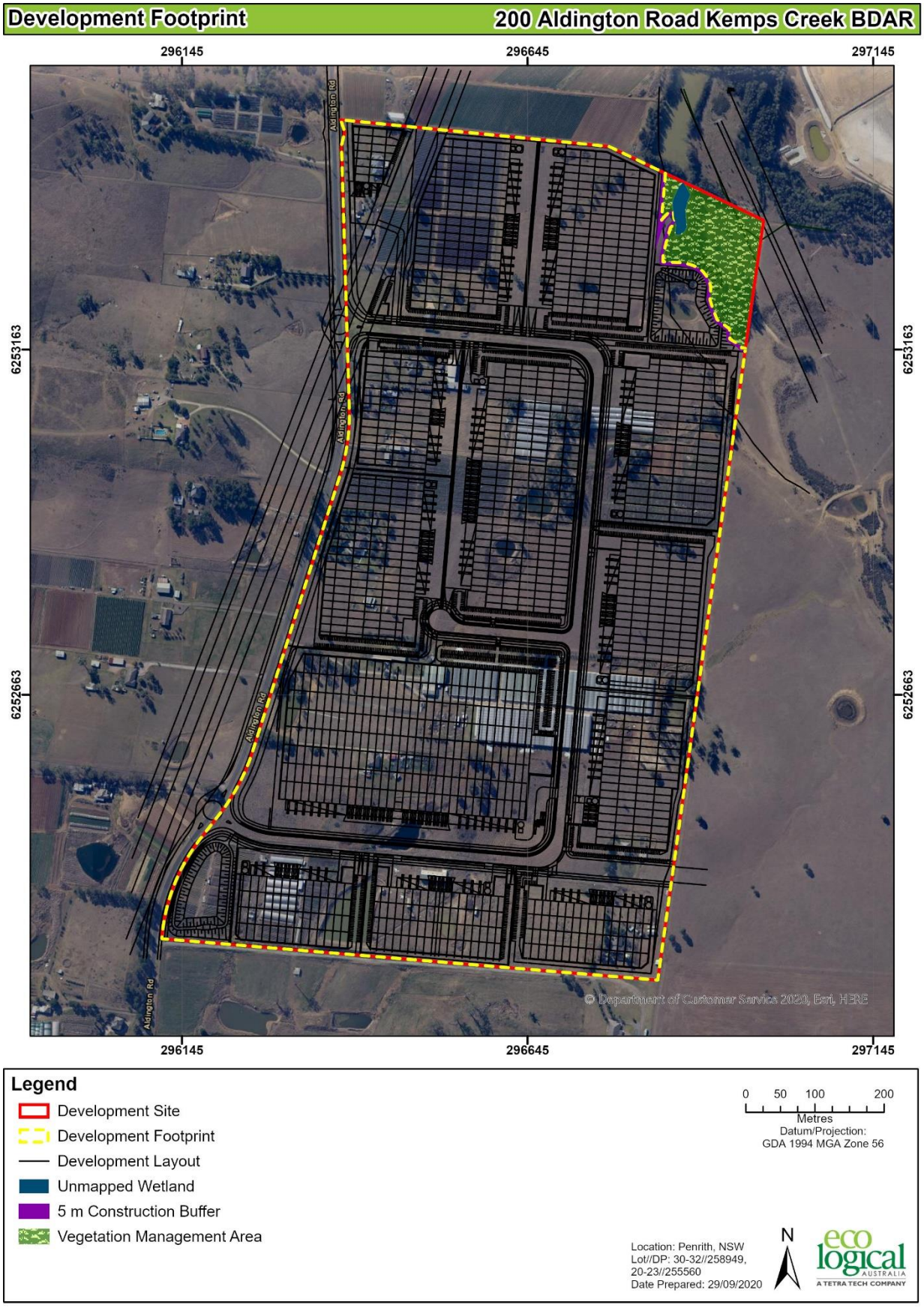

Figure 3: Development footprint

1.2 Legislative context

Table 1: Legislative context

Name	Relevance to the project
Commonwealth	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Matters of National Environmental Significance (MNES) have been identified on or near the development site. This report assesses impacts to MNES and concludes that the development is not likely to have a significant impact on MNES.
State	
Environmental Planning and Assessment Act 1979 (EP&A Act)	The proposed development is State Significant Development (SSD) and is to be assessed under Part 4.1 of the EP&A Act. Secretary's Environmental Assessment Requirements (SEARS) have been issued (SSD-10479 issued July 2020) and the relevant SEARs are as follows: *The EIS must address the following specific matters:* *Biodiversity – including:* • *the biodiversity impacts in accordance with the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report (BDAR); and* • *the development's impacts on the riparian corridor and wetland on site, including detailed interface management measures.*
Biodiversity Conservation Act 2016 (BC Act)	The proposed development is SSD and thus 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.*
*Fisheries Management Act 1994 (*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.
Local Land Services Amendment Act 2016 (LLS Act)	The LLS Act does not apply to areas of the state to which the Vegetation in Non Rural Area State Environmental Planning Policy 2017 (Vegetation SEPP) applies. The Vegetation SEPP applies to the City of Penrith local government area.
Water Management Act 2000 (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. In accordance with Part 4, Division 4.7, Section 4.41 (1) (g) of the EP&A Act, a water use approval under Section 89, a water management work approval under Section 90 or an activity approval (other than an aquifer interference approval) under Section 91 of the WM Act is not required for SSD. However, the regulatory framework of the WM Act and associated guidelines should be used to guide assessments for these developments.
Planning Instruments	
Vegetation in Non Rural Area State Environmental Planning Policy 2017 (Vegetation SEPP)	The Vegetation SEPP applies to development in urban areas and environmental conservation zones that does not require consent. As this project requires consent under the EP&A Act, the Vegetation SEPP does not apply.

Name	Relevance to the project
SEPP (Koala Habitat Protection) 2019 (Koala Habitat Protection SEPP)	The Koala Habitat Protection SEPP replaces SEPP 44 – Koala Habitat Protection. The new SEPP provides maps defining areas of 'core koala habitat' on the Koala Development Application Map. According to Schedule 1 of the SEPP, the SEPP does not apply to Penrith City Council, therefore the development site is not mapped on the Koala Development Application Map. Therefore, no further provisions of this policy apply to this development.
Coastal Management 2018	SEPP Coastal Management 2018 consolidated SEPP 14 Coastal Wetlands, SEPP 26 Littoral Rainforests and SEPP 71 Coastal Protection. The proposed development is not located on or adjacent to land subject to this SEPP therefore this SEPP is not applicable.
SEPP (Western Sydney Employment Area) 2009	(1) *This Policy aims to protect and enhance the land to which this Policy applies (the Western Sydney Employment Area) for employment purposes.* *(2) The particular aims of this Policy are as follows—* *(a) to promote economic development and the creation of employment in the Western Sydney Employment Area by providing for development including major warehousing, distribution, freight transport, industrial, high technology and research facilities,* *(b) to provide for the co-ordinated planning and development of land in the Western Sydney Employment Area,* *(c) to rezone land for employment, environmental conservation or recreation purposes,* *(d) to improve certainty and regulatory efficiency by providing a consistent planning regime for future development and infrastructure provision in the Western Sydney Employment Area,* *(e) to ensure that development occurs in a logical, environmentally sensitive and cost-effective manner and only after a development control plan (including specific development controls) has been prepared for the land concerned,* *(f) to conserve and rehabilitate areas that have a high biodiversity or heritage or cultural value, in particular areas of remnant vegetation.* This policy applies to land identified on the Land Application Map as the Broader Western Sydney Employment Area. The development site is located within Precinct 12 (Mamre Road) on the Land Application Map.
Penrith Local Environment Plan (LEP) 2010	The development site is currently zoned IN1 (General Industrial) and RU2 (Rural Landscape) under the Penrith LEP. The development site is not subject to the Biodiversity or Riparian overlay under the LEP.
Penrith Development Control Plan (DCP) 2014	As the development is SSD and also subject to the SEPP (Western Sydney Employment Area) 2009, the provisions of the DCP do not apply However, the Penrith DCP provisions relating to native vegetation are as follows. Section C2 Vegetation Management: • *To adopt the principles of ecologically sustainable development (ESD) in protecting and enhancing Penrith's native vegetation;* • *To preserve existing trees and vegetation for the benefits they provide;* • *To preserve existing trees and vegetation, where possible, during the design, development and construction process and justify any tree or vegetation removal to Council;*

Name	Relevance to the project
	• *To protect and enhance native vegetation and biodiversity in the Penrith Local Government Area, including habitat for threatened species, populations and ecological communities and corridors for flora and fauna;* • *To retain native vegetation in parcels of a size and configuration which will enable existing plant and animal communities to survive in the long term;* • *To protect and enhance the landscape character and scenic qualities of the Penrith Local Government Area; and* • *To manage the conflict between protecting and removing vegetation to address natural hazards such as bushfires.* The proposed development has provided a vegetation management area in the north east corner, which provides some consistency with the objectives of the DCP.

1.3 Landscape features

1.3.1 Interim Biogeographic Regionalisation for Australia (IBRA) regions and subregions

The development site falls entirely within the Sydney Basin IBRA region and Cumberland subregion.

1.3.2 Mitchell Landscapes

The development site falls within the Cumberland Plain Mitchell Landscapes as outlined in Table 2.

Table 2: Mitchell Landscapes

Mitchell landscape	Description
Cumberland Plain	Low rolling hills and valleys in a rain shadow area between the Blue Mountains and the coast on horizontal Triassic shales and lithic sandstones forming a down-warped block on the coastal side of the Lapstone monocline. Intruded by a small number of volcanic vents and partly covered by Tertiary river gravels and sands (Hawkesbury-Nepean Terrace Gravels ecosystem). Quaternary alluvium along the mains streams. General elevation 30 to 120m, local relief 50m and sometimes affected by salt in tributary valley floors. Pedal uniform red to brown clays on volcanic hills. Red and brown texture-contrast soils on crests grading to yellow harsh texture-contrast soils in valleys Woodlands and open forest of *Eucalyptus moluccana* (Grey Box), *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus crebra* (Narrow-leaved Ironbark), *Eucalyptus eugenioides* (Thin-leaved Stringybark), *Eucalyptus amplifolia* (Cabbage Gum) and *Angophora subvelutina* (Broad-leaved Apple). Grassy to shrubby understorey often dominated by blackthorn, poorly drained valley floors, often salt affected with swamp oak and paperbark (Department of Environment and Climate Change (now DPIE) 2002).

1.3.3 Native vegetation extent

The current percent native vegetation cover in the landscape was assessed using a Geographic Information System (GIS) and aerial imagery sourced from NearMaps using increments of 5%. The extent of native vegetation within the development site and 1500 m buffer is outlined below in Table 3.

Table 3: Native vegetation extent

Area within the 1,500 m buffer area	Native vegetation within the 1,500 m buffer area	Area of native vegetation within the development site	Percent native vegetation within the 1,500 m buffer area (%)
1335 ha	130 ha	3.714 ha	10%

1.3.4 Rivers and streams

The development site contains rivers and streams as outlined in Table 4.

Table 4: Rivers and streams

River/stream	Order	Riparian buffer (m)
Unnamed	1st order	10
Unnamed	1st order	10
Ropes Creek	3rd order	30

1.3.5 Wetlands

There were 11 farm dams identified within and adjacent to the study area, and the development site contains one unnamed local wetland. This is displayed on Figure 1.

Connectivity features

The development site contains limited connectivity features outlined in Table 5 and shown in Figure 1 and Figure 2.

A vegetated corridor exists along the Ropes Creek riparian corridor to the north west. This vegetation remains connected both north and south of the development site until it becomes fragmented by roads, namely Capitol Hill Drive and residential areas in the south-east. It is also fragmented by private roads and industrial areas in the suburb of Orchard Hills in the north-east. Patches of native vegetation to the north-west of the development site also provides connectivity for highly mobile species such as birds or bats moving through the landscape.

Table 5 Connectivity features

Connectivity feature name	Feature type
Ropes Creek riparian corridor to the north and south east	Connectivity links
Patches of native vegetation to the north-west	Connectivity links

1.3.6 Areas of geological significance and soil hazard features

The development site does not contain areas of geological significance and soil hazard features.

1.3.7 Site context

1.3.7.1 Method applied

The site based method has been applied to this development.

1.3.7.2 Patch size

Patch size was calculated using available vegetation mapping for all patches of intact native vegetation on and adjoining the development site. The patch size area was <5ha for each vegetation zone.

1.4 Native vegetation

1.4.1 Survey effort

Vegetation survey and BAM plots were undertaken within the development site by ELA ecologists Kirsten Velthuis, Stacey Wilson and Claire Wheeler on 21 July 2020. A total of six (6) full-floristic and vegetation integrity plots were undertaken in accordance with the BAM.

The site visit also included an assessment of habitat features within the development footprint but did not include targeted threatened species searches. All field data collected, and full-floristic and vegetation integrity plots are included in Appendix B and C. Plot photos are included in Table 9 -13.

1.4.2 Plant Community Types present

A total of three PCTs were identified on the development site (Table 6, Figure 4).

A total of six full-floristic and vegetation integrity plots were surveyed to identify vegetation zones, PCTs and TECs within the development site. Five vegetation zones were identified in the development site (Table 7, Figure 5).

All three PCTs are threatened ecological communities (TECs) listed under the BC Act.

Justification for the selection of PCTs occurring on the development site is based on a qualitative assessment and quantitative analysis of full-floristic plot data and is provided in Section 1.4.3.4.

Table 6: Plant Community Types within the development footprint

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Area within the development site (ha)	Percent cleared
835	Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Coastal Floodplain Wetlands	Forested Wetlands	1.69	93
850	Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Coastal Valley Grassy Woodlands	Grassy Woodlands	0.12	88
1232	Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion	Coastal Swamp Forests	Forested Wetlands	1.91	95

Table 7: Vegetation integrity plots

Veg Zone	PCT ID	PCT Name	Condition	Area with the development site (ha)	Plots required	Plots surveyed
1	835	Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate	0.54	1	1
2	835	Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Low - Moderate	1.15	1	2
3	850	Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	low	0.12	1	1
4	1232	Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion	low	1.24	1	1
5	1232	Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion	moderate	0.67	1	1
Totals				3.71	**5**	**6**

1.4.3 Threatened Ecological Communities

TECs present within the development site are summarised in Table 8 and display in Figure 6.

1.4.3.1 River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

Through floristic analysis it was determined that PCT 835 (River- Flat Eucalypt Forest) does correspond to the NSW BC Act definition of *River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions.*

River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions is associated with silts, clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains, below 50m elevation and is known to occur within the Penrith local government area. The best-fit PCT – PCT 835 was determined using a quantitative analysis of floristic plot data from three sample plots undertaken in the vegetation community, and a qualitative analysis of the site's characteristics (such as soil type, position in the landscape, and elevation). The quantitative analysis resulted in a very strong match to PCT 835 based purely on the species composition. This site's abiotic characteristics (soil type, landscape position etc.) also provide strong justification for assigning this vegetation to PCT 835.

1.4.3.2 Cumberland Plain Woodland in the Sydney Basin Bioregion

The BioNet Vegetation Classification lists PCT 850 Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion as a component of *Cumberland Plain Woodland in the Sydney Basin Bioregion* which is listed as critically endangered under the BC Act and as critically endangered as part of *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* under the Commonwealth EPBC Act.

The final determination for Cumberland Plain Woodland listed under the BC Act states:

"*Native grassland derived from clearing of the woodland and forest are also part of this community if they contain characteristic non-woody species listed in paragraph 3.*" (Scientific Committee 2009).

PCT 850 mapped in the development site contains native shrubs *Dillwynia retorta*, native grasses *Aristida ramosa, Themeda triandra* and native herbs. Therefore, it satisfies the criteria for listing as part of the Cumberland Plain Woodland under the BC Act.

PCT 850 may also correspond with *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* listed as a critically endangered ecological community, provided it satisfied the listing criteria under the EPBC Act (Threatened Species Scientific Committee 2009) However, PCT 850 vegetation did not meet the threshold criteria for listing under the EPBC Act as the patch size is less than 0.5 ha and the ground cover comprised > 30% exotic species. Therefore it was determined that PCT 850 does not correspond with the Commonwealth definition of *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest.*

1.4.3.3 Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregion

Through floristic analysis it was determined that PCT 1232 Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion does correspond to the NSW BC Act definition of the TEC *Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions*.

The PCT on the development site does not correspond to the Commonwealth definition of Co*astal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community.* The approved conservation and listing advice for the Commonwealth definition of the community was consulted to determine if PCT 1232 within the development site corresponds with the Commonwealth definition of Coastal Swamp Oak Forest. PCT 1232 identified on site occurs as two discrete patches: vegetation zone 5 and vegetation zone 6. The sizes of these patches are 1.26 and 0.68 respectively. While both patches meet the small patch criteria, non-native species comprise of over 20% of the total understorey vegetation cover within both patches. Further to this, neither patch is connected to a larger area of contiguous native vegetation >5 ha. As such, it has been determined that PCT 1232 does not correspond with the Commonwealth definition of Coastal Swamp Oak Forest.

Table 8: Threatened Ecological Communities

PCT ID	BC Act			EPBC Act		
	Listing status	Name	Area (ha) within development site	Listing status	Name	Area (ha)
835	Endangered	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	1.69	Not listed	N/A	N/A
850	Critically Endangered	Cumberland Plain Woodland of the Sydney Basin Bioregion	0.12	The community on site does not meet the condition thresholds for listing under the EPBC Act	N/A	N/A
1232	Endangered	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	1.91	The community on site does not meet the condition thresholds for listing under the EPBC Act	N/A	N/A

1.4.3.4 PCT Selection Justification and Vegetation Zone Description

Table 9 to Table 13 provide a detailed description and justification of the PCT assignment for each of the vegetation zones within the development site.

Table 9: PCT 835 Vegetation Zone 1

VEGETATION ZONE 1	
PCT	835
PCT Name	Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
Condition	Moderate
Area	0.54 ha
TEC	NSW BC Act River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
Plots	1
Vegetation Integrity Score	34.9
PCT Selection criteria	Soil type, dominant canopy, midstorey and groundcover species, vegetation formation and class, IBRA subregion, landscape position
Diagnostic tools	The Native Vegetation of Sydney Metropolitan Area 2016 V 3.1 diagnostic species list, BioNet Vegetation Classification
Description/ justification	Open woodland structure comprising primarily regrowth canopy species *Casuarina glauca* (Swamp Oak) and *Angophora subvelutina* (Broad-leaved Apple). The native midstorey was absent from this zone and the native groundcover comprised a dense cover of *Einadia nutans* subsp. *nutans.* The remainder of the understorey cover comprised weeds and exotic species including *Bidens pilosa* var. *pilosa* (Cobbler's Peg), *Capsella bursa-pastoris* (Shepherd's Purse), *Setaria pumila* (Pale Pigeon Grass) and *Sida rhombifolia* (Paddy's Lucerne).
Photo	

Table 10: PCT 835 Vegetation Zone 2

VEGETATION ZONE 2	
PCT	835
PCT Name	Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
Condition	Low - Moderate
Area	1.15 ha
TEC	NSW BC Act River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
Plots	2
Vegetation Integrity Score	21.3
PCT Selection criteria	Soil type, dominant canopy, midstorey and groundcover species, vegetation formation and class, IBRA subregion, landscape position
Diagnostic tools	The Native Vegetation of Sydney Metropolitan Area 2016 V 3.1 diagnostic species list, BioNet Vegetation Classification
Description/ justification	Open woodland structure comprising *Eucalyptus tereticornis* (Forest Red Gum), *Corymbia intermedia* (Pink Bloodwood), *Eucalyptus amplifolia* (Cabbage Gum). A native midstorey was absent from this zone and native groundcover comprised *Dichondra repens* (Kidney Weed), *Glycine tabacina*, *Microlaena stipoides* var. *stipoides*, *Lomandra filiformis* subsp. *filiformis* (Wattle mat-rush). The remainder of the understorey cover comprised weeds and exotic species including *Sida rhombifolia., Oxalis* sp., *Solanum nigrum* (Blackberry Nightshade), *Phytolacca octandra* (Inkweed) and *Senecio madagascariensis* (Fireweed).
Photo	

Table 11: PCT 850 Vegetation Zone 3

VEGETATION ZONE 3	
PCT	850
PCT Name	Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion
Condition	Low
Area	0.12 ha
TEC	NSW BC Act Cumberland Plain Woodland of the Sydney Basin Bioregion
Plots	1
Vegetation Integrity Score	1.5
PCT Selection criteria	Soil type, dominant canopy, midstorey and groundcover species, vegetation formation and class, IBRA subregion, landscape position
Diagnostic tools	The Native Vegetation of Sydney Metropolitan Area 2016 V 3.1 diagnostic species list, BioNet Vegetation Classification
Description/ justification	The native canopy was absent within this vegetation zone. The native midstorey contained *Acacia decurrens* (Black Wattle), *Acacia implexa* (Hickory Wattle) and native groundcover consisted of *Einadia polygonoides* (Knotweed Goosefoot). The groundcover was highly disturbed and contains exotic grasses including *Cenchrus clandestinus* (Kikuyu Grass), *Ehrharta erecta* (Panic Veldtgrass), *Eragrostis curvula* (African Lovegrass) and *Seteria pumila* (Pale Pigeon Grass), *Foeniculum vulgare* (Fennel), and *Anredera cordifolia* (Madeira vine).
Photo	

Table 12: PCT 1232 Vegetation Zone 4

VEGETATION ZONE 4	
PCT	1232
PCT Name	Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion
Condition	Low
Area	1.24 ha
TEC	NSW BC Act Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions
Plots	1
Vegetation Integrity Score	11
PCT Selection criteria	Soil type, dominant canopy, midstorey and groundcover species, vegetation formation and class, IBRA subregion, landscape position
Diagnostic tools	The Native Vegetation of Sydney Metropolitan Area 2016 V 3.1 diagnostic species list, BioNet Vegetation Classification.
Description/ justification	Canopy solely comprised *Casuarina glauca* (Swamp Oak). No midstorey was present. A highly disturbed groundcover with few native species was present including *Persicaria decipiens (Slender Knotweed); Digitaria parviflora (Native Summer Grass)* and *Cynodon dactylon* (Common Couch).
Photo	

Table 13: PCT 1232 Vegetation Zone 5

VEGETATION ZONE 5	
PCT	1232
PCT Name	Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion
Condition	Moderate
Area	0.67 ha
TEC	NSW BC Act Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions
Plots	1
Vegetation Integrity Score	21.4
PCT Selection criteria	Soil type, dominant canopy, midstorey and groundcover species, vegetation formation and class, IBRA subregion, landscape position
Diagnostic tools	The Native Vegetation of Sydney Metropolitan Area 2016 V 3.1 diagnostic species list, BioNet Vegetation Classification.
Description/ justification	The canopy comprised *Casuarina glauca* (Swamp Sheoak). No midstorey was present. A moderately disturbed ground cover was present containing *Dichondra repens* (Kidney Weed), *Geranium homeanum, Alternanthera denticulata* (Lesser Joyweed) and *Persicaria decipiens* (Slender Knotweed).
Photo	

1.4.4 Vegetation integrity assessment

The vegetation integrity assessment using the Credit Calculator (BAMC) was undertaken and the results are outlined in Table 14.

Table 14: Vegetation integrity

Veg Zone	PCT ID	Condition	Composition Condition Score	Structure Condition Score	Function Condition Score	Current vegetation integrity score
1	835	Moderate	11.9	51.1	70.4	34.9
2	835	Low - Moderate	19.1	11.4	44.5	21.3
3	850	Low	3.6	1	0	1.5
4	1232	Low	19.6	2.4	28.8	11
5	1232	Moderate	16.9	12.7	45.9	21.4

Use of local data

The use of local data is not proposed as part of this assessment.

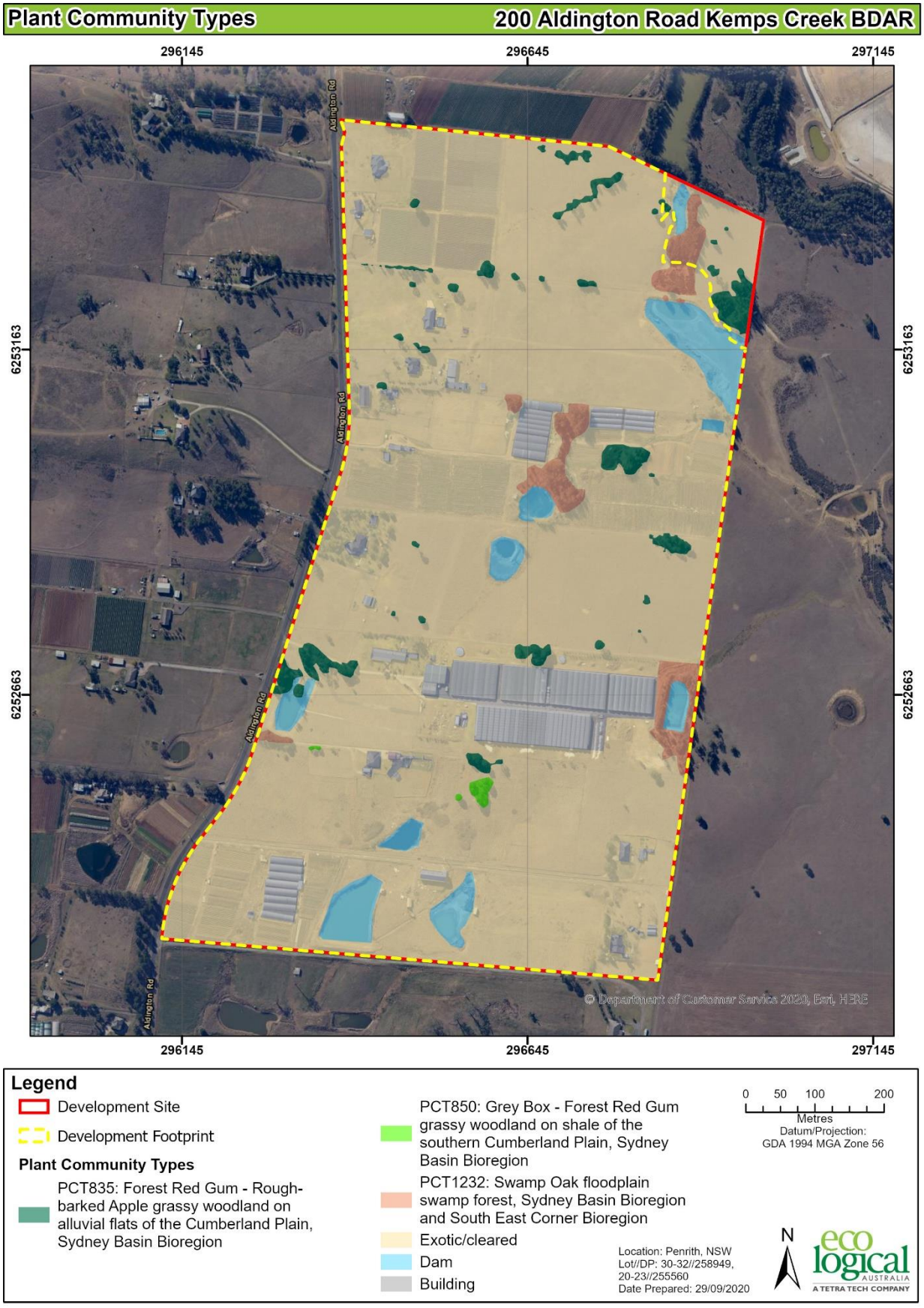

Figure 4: Plant Community Types within the development site

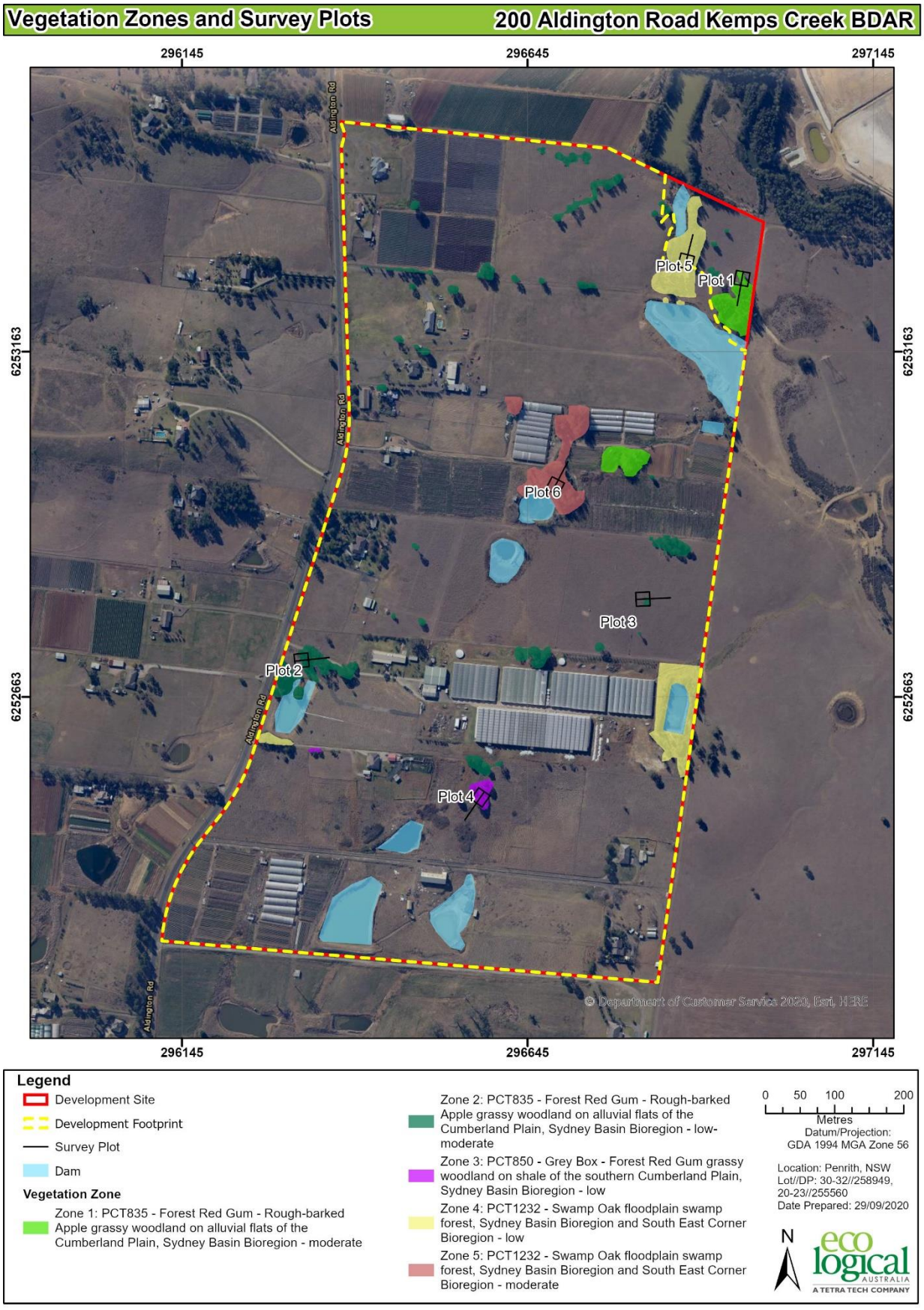

Figure 5: Vegetation zones and plot locations within the development site

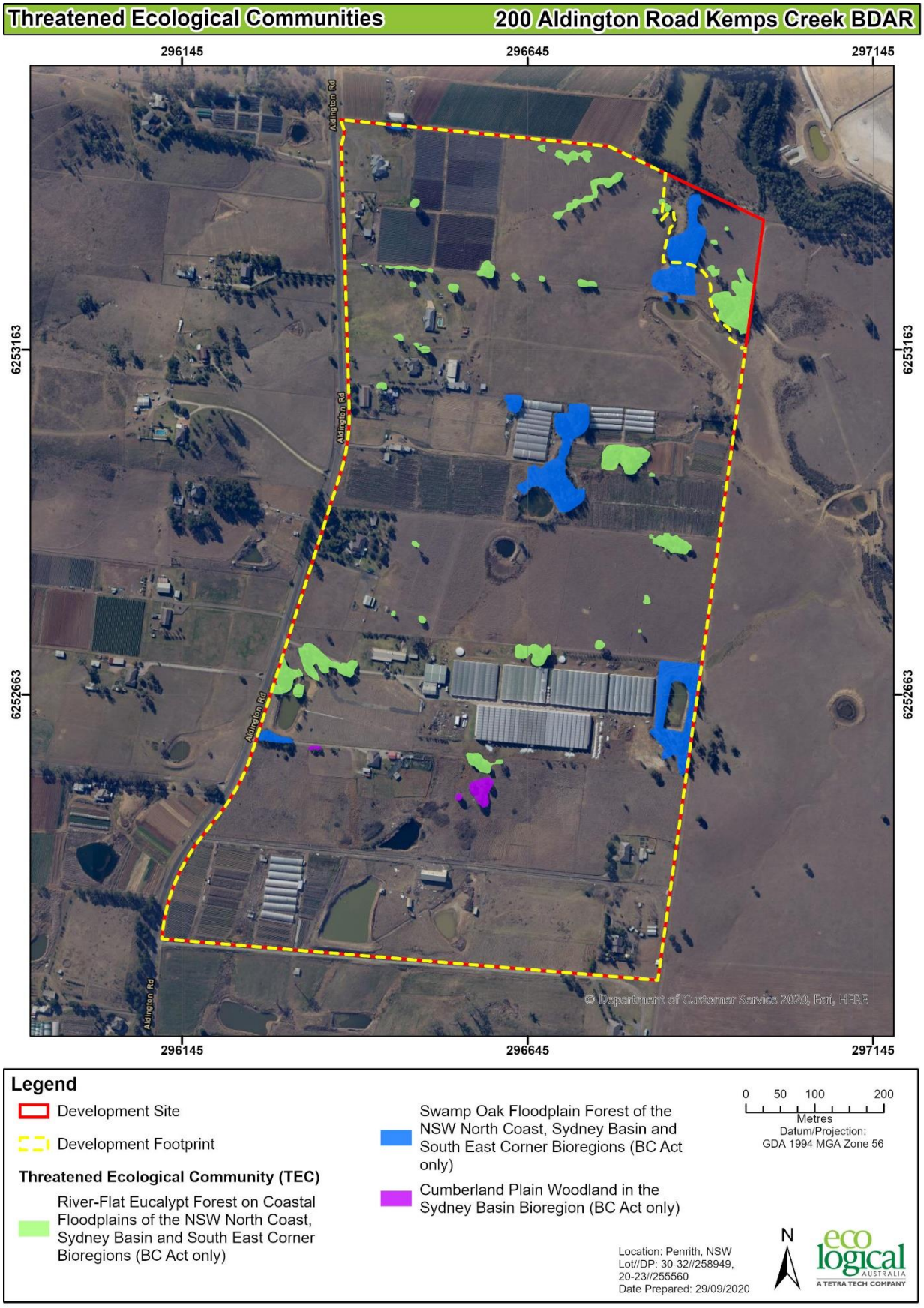

Figure 6: Threatened Ecological Communities

1.5 Threatened species

Habitat assessments were undertaken during the field survey to determine the likelihood of threatened flora and fauna species occurring within the development site on an intermittent or permanent basis. Habitat assessments for fauna species involved a search for hollow-bearing trees within the development site, and a search for evidence of fauna foraging such as chewed cones, sap trees or roosting habitat in the form of whitewash/pellets.

It was found that hollow bearing trees were present within the development site. Multiple artificial structures such as houses and sheds (which may contain microbat habitat) were present within the development site. Additionally, the development site contained riparian areas and dams.

The development site contains habitat for threatened species as detailed in section 1.5.1 and 1.5.2 below.

1.5.1 Ecosystem credit species

Ecosystem credit species predicted to occur at the development site, their associated habitat constraints, geographic limitations and sensitivity to gain class is included in Table 15.

Ecosystem credit species which have been excluded from the assessment and relevant justification is also included in Table 15.

Table 15: Justification for exclusion of predicted ecosystem credit species

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
Anthochaera phrygia	Regent Honeyeater (Foraging)	N/A	High	CE	CE	Included Occasional seasonal foraging habitat features associated with this species were identified within the development site.
Artamus cyanopterus cyanopterus	Dusky Woodswallow	N/A	Moderate	V	Not Listed	Included Occasional foraging habitat features associated with this species were identified within the development site.
Botaurus poiciloptilus	Australasian Bittern	N/A	Moderate	E	E	Excluded Habitat for this species was not considered suitable in the development site
Calyptorhynchus lathami	Glossy Black-Cockatoo (Foraging)	Other Presence of Casuarina species	High	V	Not Listed	Included The development site contains *Casuarina* species, which comprise suitable foraging habitat for this species.

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
Chthonicola sagittata	Speckled Warbler	N/A	High	V	Not Listed	Excluded Large, relatively undisturbed remnants are absent within the development site.
Climacteris picumnus victoriae	Brown Treecreeper	N/A	High	V	Not Listed	Included Foraging habitat features associated with this species were identified within the development site.
Dasyurus maculatus	Spotted-tailed Quoll	N/A	High	V	E	Excluded This species requires habitat features such as maternal den sites, an abundance of food (birds and small mammals) and large areas of relatively intact vegetation to forage in. While the development site has some connectivity to vegetation areas, habitat within the development site is minimal and vegetated areas it is connected to are small and not intact.
Glossopsitta pusilla	Little Lorikeet	N/A	High	V	Not Listed	Included The development site contains flowering eucalypts and riparian habitats which comprise suitable foraging habitat for this species.
Haliaeetus leucogaster	White-bellied Sea-Eagle (Foraging)	n/a	High	V	Not Listed	Excluded Large waterbodies which are habitat features associated with this species were not identified within the development site.
Lathamus discolor	Swift Parrot (Foraging)	N/A	Moderate	E	CE	Included Foraging habitat features associated with this species were identified within the development site.
Melanodryas cucullate cucullate	Hooded Robin (South-eastern form)	N/A	Moderate	V	Not Listed	Included Foraging habitat features associated with this species were identified within the development site.
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	N/A	High	V	Not Listed	Included Foraging features associated with this species were identified within the development site.

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
Miniopterus australis	Little Bentwing-bat (Foraging)	N/A	High	V	Not Listed	Included Foraging habitat features associated with this species were identified within the development site.
Miniopterus orianae oceanensis	Large Bentwing-bat (Foraging)	N/A	High	V	Not Listed	Included Foraging habitat features associated with this species were identified within the development site.
Pandion cristatus	Eastern Osprey (Foraging)	N/A	Moderate	V	Not Listed	Excluded Habitat features for this species are not present within the development site.
Petroica boodang	Scarlet Robin	N/A	Moderate	V	Not Listed	Included Foraging habitat features associated with this species were identified within the development site.
Petroica phoenicea	Flame Robin	N/A	Moderate	V	Not Listed	Included Foraging habitat features associated with this species were identified within the development site.
Phascolarctos cinereus	Koala (Foraging)	N/A	High	V	V	Included The development site contains koala multiple feed tree species as identified in the Koala SEPP.
Pteropus poliocephalus	Grey-headed Flying-fox (Foraging)	N/A	High	V	V	Included Seasonal foraging habitat was identified within the development site.
Rostratula australis	Australian Painted Snipe	N/A	Moderate	E	E	Excluded Habitat for this species was not considered suitable in the development site
Stagonopleura guttata	Diamond Firetail	N/A	Moderate	V	Not Listed	Included Foraging habitat features associated with this species were identified within the development site.
Stictonetta naevosa	Freckled Duck	N/A	Moderate	V	Not listed	Excluded Habitat for this species was not considered suitable in the development site

1.5.2 Species credit species

Species credit species predicted to occur at the development site (i.e. candidate species), their associated habitat constraints, geographic limitations and sensitivity to gain class are included in Table 16.

Species credit species which have been excluded from the assessment and relevant justification are also included in Table 16. Included species include *Litoria aurea* (Green and Golden Bell Frog) and *Myotis macropus (*Southern Myotis).

Table 16: Candidate species credit species

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
Acacia pubescens	Downy Wattle	N/A	High	V	V	Excluded Suitable habitat was not present within the development site.
Anthochaera phrygia	Regent Honeyeater (Breeding)	N/A	High	CE	CE	Excluded This is a dual credit species, and only a species credit species when specific habitat constraints are present for breeding. The development site is not within an important breeding area for this species as per the BAM Important Areas map in BOAMS (date accessed 23 September 2020)
Caladenia tessellata	Thick Lip Spider Orchid	N/A	Moderate	E	V	Excluded Habitat for this species was not considered suitable in the development site due to the level of disturbance. Furthermore, this species is only known from old records in Sydney area.
Callistemon linearifolius	Netted Bottle Brush	N/A	Moderate	V	Not Listed	Excluded This species is only known in the Sydney area within the Hornsby Plateau area near the Hawkesbury River.
Calyptorhynchus lathami	Glossy Black-Cockatoo (Breeding)	Hollow bearing trees Living or dead tree with hollows greater than 15 cm diameter and greater than 5 m above ground	High	V	Not Listed	Excluded This is a dual credit species, and only a species credit species when specific habitat constraints are present for breeding. The presence of this species was not identified and it was determined that the habitat is substantially disturbed such that this species is unlikely to occur in the development site.
Cynanchum elegans	White-flowered Wax Plant	N/A	High	E	E	Excluded

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
						No suitable habitat within the development site, no local records.
Eucalyptus benthamii	Camden White Gum	N/A	High	E	E	Excluded The presence of this species was not identified and it was determined that the habitat is substantially disturbed such that this species is unlikely to occur in the development site.
Grevillea juniperina subsp. juniperina	Juniper-leaved Grevillea	N/A	Mod	V	Not Listed	Excluded The presence of this species was not identified (conspicuous species) and it was determined that the habitat is substantially disturbed such that this species is unlikely to utilise the development site.
Haliaeetus leucogaster (Breeding)	White-bellied Sea-Eagle	Other. Living or dead mature trees within suitable vegetation within 1km of rivers, lakes, large dams or creeks, wetlands and coastlines.	High	V	Not Listed	Excluded This is a dual credit species, and only a species credit species when specific habitat constraints are present for breeding. No presence of large stick nests within the development site.
Hibbertia sp Bankstown	-	N/A	High	CE	CE	Excluded Known only from one population at Bankstown Airport in the Bankstown local government area.
Lathamus discolor	Swift Parrot (Breeding)	Other As per mapped areas	Moderate	E	CE	Excluded Seasonal foraging habitat features associated with this species were identified within the development site and has been included as an ecosystem credit species only. The development site is not within an important breeding area for this species as per the BAM Important Areas map in BOAMS (date accessed 23 September 2020)

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
Litoria aurea	Green and Golden Bell Frog	Semi-permanent/ephemeral wet areas Within 1km of wet areas/Swamps Within 1km of swamp/Waterbodies Within 1km of waterbody	High	E	V	Included Habitat features associated with this species were present within the development site (3 dams containing *Typha* spp.)
Marsdenia viridiflora subsp. viridiflora-endangered population	Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	Blacktown, Camden, Campbelltown, Canterbury-Bankstown, Cumberland, Fairfield, Liverpool and Penrith LGAs (as amended from the Determination))	Moderate	EP	Not Listed	Excluded Habitat features associated with this species were not present on the development site.
Maundia triglochinoides	-	Other. Riparian areas/drainage lines, water ponding, man-made dams and drainage channels up to 1 m deep/Semi-permanent/ephemeral wet areas/Swamps Shallow swamps up to 1 m deep/Waterbodies Shallow waterbodies up to 1 m deep	High	V	Not Listed	Excluded The presence of this species was not identified and it was determined that the habitat is substantially disturbed such that this species is unlikely to utilise the development site.
Melaleuca biconvexa	Biconvex Paperbark	N/A	High	V	V	Excluded The presence of this species was not identified (conspicuous species); known only from populations in Jervis Bay and Gosford-Wyong.

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
Meridolum corneovirens	Cumberland Plain Land Snail	N/A	High	E	Not Listed	Excluded It was determined that the habitat within associated PCT 850 is substantially disturbed such that this species is unlikely to occur within the development site.
Miniopterus australis	Little Bentwing-bat (Breeding)	Caves Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' Observation type code 'E nest-roost' With numbers of individuals >500 Or from the scientific literature	Very High	V	Not Listed	Excluded This is a dual credit species, and only a species credit species when specific habitat constraints are present for breeding. The development site does not contain breeding habitat for this species.
Miniopterus orianae oceanensis	Large Bent-winged Bat (Breeding)	Caves Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' Observation type code 'E nest-roost' With numbers of individuals >500 Or from the scientific literature	Very High	V	Not Listed	Excluded This is a dual credit species, and only a species credit species when specific habitat constraints are present for breeding. The development site does not contain breeding habitat for this species.
Myotis macropus	Southern Myotis	Hollow bearing trees within 200 m of riparian zone/Other Bridges, caves or artificial structures within 200 m of riparian zone	High	V	Not Listed	Included This is a dual credit species, and only a species credit species when specific habitat constraints are present for breeding. The development site contains potential breeding habitat (hollow-bearing trees and structures) for this species along the riparian zone in the north-eastern corner of the site.

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
Pandion cristatus	Eastern Osprey (Breeding)	Other Presence of stick-nests in living and dead trees (>15m) or artificial structures within 100m of a floodplain for nesting	High	V	Not Listed	Excluded This is a dual credit species, and only a species credit species when specific habitat constraints are present for breeding. The development site does not contain suitable breeding habitat.
Persicaria elatior	Tall Knotweed	Semi-permanent/ephemeral wet areas or within 50m from swamps/ wetlands/ waterbodies	High	V	V	Excluded Habitat features for this species were not present within the development site; known from records in northern and south eastern NSW only.
Persoonia hirsuta	Hairy Geebung	N/A	High	E	E	Excluded Habitat features for this species were not present within the development site. The presence of this species was not identified and it was determined that the habitat is substantially disturbed such that this species is unlikely to occur within the development site.
Petaurus norfolcensis	Squirrel Glider	N/A	High	V	Not Listed	Excluded It was determined that the habitat is substantially disturbed such that this species is unlikely to occur within the development site.
Phascolarctos cinereus	Koala (Breeding)	Other Areas identified via survey as important habitat (see comments)	High	V	V	Excluded This is a dual credit species, and only a species credit species when specific habitat constraints are present for breeding. It was determined that the habitat is substantially disturbed such that this species is unlikely to occur as breeding within the development site.
Pilularia novae-hollandiae	Austral Pillwort	N/A	High	E	Not Listed	Excluded Habitat features associated with this species were not present on the development site

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
Pimelea spicata	-	N/A	High	E	E	Excluded It was determined that the habitat (PCT 850) is substantially disturbed such that this species is unlikely to occur within the development site.
Pomaderris brunnea	Brown Pomaderris	N/A	high	E	V	Excluded It was determined that the habitat is substantially disturbed such that this species is unlikely to occur within the development site.
Pommerhelix duralensis	Dural Woodland Snail	Other Leaf litter and shed bark or within 50m of litter or bark/Rocky areas Rocks or within 50m of rocks/Fallen/standing dead timber including logs Including logs and bark or within 50m of logs or bark	High	E	E	Excluded It was determined that the habitat is substantially disturbed such that this species is unlikely to occur within the development site
Pteropus poliocephalus	Grey-headed Flying-fox (Breeding)	Other Breeding camps	High	V	V	Excluded This is a dual credit species, and only a species credit species when specific habitat constraints are present for breeding. The development site does not contain suitable breeding habitat.
Pultenaea pedunculata	Matted Bush-pea	N/A	High	E	V	Excluded It was determined that the habitat is substantially disturbed such that this species is unlikely to utilise the development site.
Thesium austral	Austral Toadflax	N/A	Moderate	V	V	Excluded Known in the area only from old records. It was determined that the habitat is substantially disturbed

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
						such that this species is unlikely to utilise the development site.
Wahlenbergia multicaulis- endangered population	Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield	N/A	High	EP	Not Listed	Excluded No known sites within the Kemps Creek area. It was determined that the habitat is substantially disturbed such that this species is unlikely to utilise the development site.

1.5.3 Targeted surveys

No targeted surveys for species credit species were undertaken at the development site, instead species credit species included in this assessment were assumed present as outlined in Table 17.

Table 17: Species credit species included in the assessment

Species	Common Name	Species presence	Geographic limitations	Habitat (ha)	Biodiversity Risk Weighting
Litoria aurea	Green and Golden Bell Frog	Assumed	Semi-permanent/ephemeral wet areas Within 1km of wet areas/Swamps/ Waterbodies. Habitat features associated with this species consist of any dam containing *Typha* spp.	0.34	2.00
Myotis macropus	Southern Myotis	Assumed	Hollow bearing trees within 200 m of riparian zone.	2.97	2.00

Figure 7: Species polygon *Litoria aurea* (Green and Golden Bell Frog)

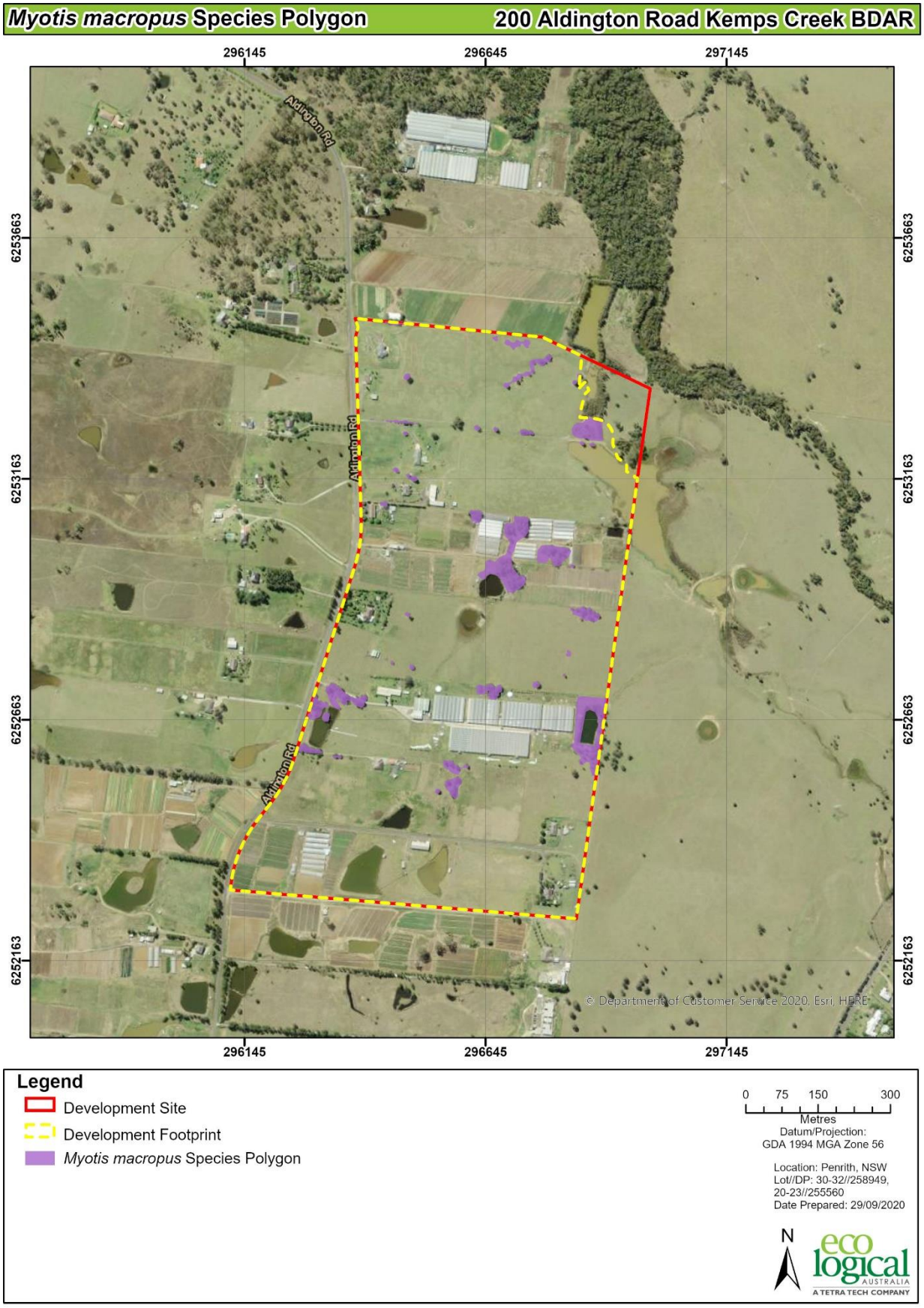

Figure 8: Species polygon *Myotis macropus* (Southern Myotis)

2. Stage 2: Impact assessment (biodiversity values)

2.1 Avoiding impacts

2.1.1 Locating and designing a project to avoid and minimise impacts on vegetation and habitat

The development has been located and designed in a way which avoids and minimises impacts as outlined in Table 18.

Table 18: Locating and designing a project to avoid and minimise impacts on vegetation and habitat

Approach	How addressed and justification
Locating and designing the project in areas where there are no biodiversity values. Locating and designing the project in areas where the native vegetation or threatened species habitat is in the poorest condition Designing the project to reduce the clearing footprint of the project	The proposal is located within a rural landscape which consists largely of areas of non-native vegetation. Native vegetation to be impacted is generally disturbed and of low or moderate condition. The impact of the proposal on native vegetation has been reduced by locating the sediment dam in a way that minimises impact to PCT 835.
Designing the project to locate ancillary facilities in areas where there are no biodiversity values. Designing the project to locate ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas that have a lower vegetation integrity score)	A vegetation management area in the north east has been avoided in order to retain some habitat on the development site.
Locating and designing the project in areas that avoid habitat for species and vegetation in high threat categories (e.g. an EEC or CEEC), indicated by the biodiversity risk weighting for a species.	The proposal is located within a rural landscape which consists largely of areas of non-native vegetation. TEC vegetation to be impacted is generally disturbed and of low or moderate condition. Impact to a CEEC is limited to 0.115ha of a CEEC of a very low integrity score of 1.5. The TEC vegetation in the north east has been avoided in order to retain some habitat in the development site.
Locating and designing the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained.	Existing corridors to nearby habitat along Ropes Creek riparian corridor to the north and south east will be impacted by the development and may reduce movement of species to areas of nearby habitat. However as discussed above, a vegetation management area has been retained in the north east which will facilitate some movement, connectivity and genetic exchange between areas of adjacent habitat.
Providing structures to enable species and genetic material to move across barriers or hostile gaps	Structures to enable species and genetic materials to move across barriers or hostile gaps have not been considered for this development.
Making provision for the demarcation, ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on the development site	It is recommended that a Vegetation Management Plan for all vegetation within the vegetation management zone is undertaken.

2.1.2 Prescribed biodiversity impacts

The list of potential prescribed biodiversity impacts as per the BAM is provided below:

- Occurrences of karst, caves, crevices and cliffs - none occur within the development site
- Occurrences of rock - no rock outcrops or scattered rocks occur within the development site
- Occurrences of human made structures and non-native vegetation – **Yes, both are present, and impacts are detailed below**.
- Hydrological processes that sustain and interact with the rivers, streams and wetlands – **Yes, an unnamed wetland and a riparian area occur within the development site, and impacts are detailed below.**

Table 19: Prescribed biodiversity impacts

Prescribed biodiversity impact	Description in relation to the development site	Threatened species or ecological communities effected
Impacts of development on the habitat of threatened species or ecological communities associated with: • **human made structures, or** • **non-native vegetation**	The development site contains human made structures and non-native vegetation which will be removed.	Non-native vegetation (incl fruit trees and market gardens) provides potential habitat for Grey-headed Flying-fox. Human-made structures may provide potential habitat for microbat species.
Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities	A wetland and riparian zone will be impacted by the proposed development.	Green and Golden Bell Frog; Swamp Oak Floodplain Forest;, River-Flat Eucalypt Forest

2.1.2.1 Locating and designing a project to avoid and minimise prescribed biodiversity impacts

The development has been located and designed in a way which avoids and minimises prescribed biodiversity impacts as outlined in Table 20.

Table 20: Locating and designing a project to avoid and minimise prescribed biodiversity impacts

Approach	How addressed and justification
Locating the envelope of surface works to avoid direct impacts on the habitat features	Due to the nature of the development, no human made structures will be retained, however a small area of exotic grassland vegetation will be retained in the north-eastern section of the development site.
Locating the project to avoid direct impacts on water bodies. **Design of the project to maintain hydrological processes that sustain threatened species and TECs**	There were 11 farm dams identified within and adjacent to the development site. Most of these had limited aquatic habitat and nine are to be removed as part of the proposed development. The dam in the northern-most section of the site had moderate levels of aquatic habitat and was representative of a wetland environment. This dam will be retained after development, and the surrounding vegetation managed to maintain habitat values.
Design of the project to avoid and minimise downstream impacts on rivers, wetlands and estuaries by control of the quality of water released from the site.	Permanent sediment and water quality control measures are to be implemented during and after construction to prevent offsite impacts to downstream waterways and water dependent communities. It is recommended to install stormwater quality improvement devices to prevent long-term impacts to downstream waterbodies.

2.2 Assessment of Impacts

2.2.1 Direct impacts

The direct impacts of the development on:

- native vegetation are outlined in Table 21
- threatened ecological communities are outlined in Table 22
- threatened species and threatened species habitat is outlined in Table 23
- prescribed biodiversity impacts is outlined in Section 2.2.2

Direct impacts including the final project footprint (construction and operation) are shown on Figure 9.

Table 21: Direct impacts to native vegetation

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Direct impact (ha)
835	Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Coastal Floodplain Wetlands	Forested Wetlands	1.328
850	Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Coastal Valley Grassy Woodlands	Grassy Woodlands	0.115
1232	Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion	Coastal Swamp Forests	Forested Wetlands	1.598

Table 22: Direct impacts on threatened ecological communities

PCT ID	BC Act			EPBC Act	
	Listing status	Name	Direct impact (ha)	Listing status	Direct impact (ha)
835	Endangered	NSW BC Act River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	1.328	Not Listed	N/A
850	Critically Endangered	Cumberland Plain Woodland of the Sydney Basin Bioregion	0.115	The community on site does not meet the condition thresholds for listing under the EPBC Act	N/A
1232	Endangered	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	1.598	The community on site does not meet the condition thresholds for listing under the EPBC Act	N/A

Table 23: Direct impacts on threatened species and threatened species habitat

Species	Common Name	Direct impact number of individuals / habitat (ha)	NSW listing status	EPBC Listing status
Litoria aurea	Green and Golden Bell Frog	0.598	E	V
Myotis Macropus	Southern Myotis	2.975	V	Not Listed

2.2.2 Change in vegetation integrity

The change in vegetation integrity as a result of the development is outlined in Table 24.

Table 24: Change in vegetation integrity

Veg Zone	PCT ID	Condition	Area (ha)	Current vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity
1	835	Moderate	0.222	34.9	0	-34.9
2	835	Low - Moderate	1.106	21.3	0	-21.3
3	850	low	0.115	1.5	0	-1.5
4	1232	low	0.926	11	0	-11
5	1232	moderate	0.672	21.4	0	-21.4

2.2.3 Indirect impacts

The development site comprises the development footprint and additional areas subject to indirect impacts. Indirect impacts are described in the BAM Operational Manual Stage 2 (DPIE 2020) as *development related activities not associated with clearing for the development footprint. Examples include increased noise, dust, light spill, weeds and pathogens and edge effects that can be reasonably attributed to the development. Indirect impacts often occur beyond the development footprint or even the development site, have a lower or variable intensity of impact compared to direct impacts, may be harder to predict spatially and temporally, may have unclear boundaries of responsibility.*

The indirect impacts of the development are outlined in Table 25.

Table 25: Indirect impacts

Indirect impact	Project phase	Nature	Extent	Frequency	Duration	Timing
Sedimentation and contaminated and/or nutrient rich run-off	Construction and operation	Runoff during construction and operation resulting in pollution and degradation of adjacent creeklines	Potential sedimentation and contaminated runoff into adjacent creeks	During rainfall events	During construction and operational phase of project	Potentially long-term impacts

Indirect impact	Project phase	Nature	Extent	Frequency	Duration	Timing
Noise, dust or light spill	Construction and operation	Noise and dust from machinery, light spill during operational phase disturbing fauna activity in adjacent vegetation.	Adjacent vegetation	Daily, during construction works and operational phase	During construction and operational phase of project	Potentially long-term impacts
Inadvertent impacts on adjacent habitat or vegetation	Construction and operation	Damage to adjacent habitat and vegetation including riparian areas and TECs as a result of construction or operation of the development.	Adjacent vegetation	Daily, during construction works and operational phase	During construction and operational phase of project	Potentially long-term impacts
Transport of weeds and pathogens from the site to adjacent vegetation	Construction and operation	Spread of weed seed and pathogens from incoming machinery and equipment	Potential spread into nearby habitat	Daily, during construction and operational phases	During construction and operational phase of project	Potentially long-term impacts
Vehicle strike	Construction and operation	Potential for native fauna to be struck by working machinery and moving vehicles	Within construction and operational area	Daily, during construction and operational phases	During construction and operational phase of project	Potentially long-term impacts
Rubbish dumping	Construction and operation	Unauthorised rubbish dumping by workers and public leading to degradation of adjacent vegetation	Potential for rubbish to spread into adjacent vegetation in the indirect impact areas and outside development site	Daily, during construction and operational phases	During construction and operational phase of project	Potentially long-term impacts
Increase in predatory species populations	Construction and operation	Potential to increase if food scraps/rubbish is left on or adjacent to site. Potential to increase -/+ decrease due to disturbance to existing vegetation resulting in increased predation on native fauna	Within the development and throughout indirect impact areas and adjacent vegetation	Potential to occur gradually after disturbance to habitat and vegetation takes place	During construction and operational phase of project	Potentially long-term impacts
Increase in pest animal populations	Construction and operation	Potential to increase if food scraps/rubbish is left on or adjacent to	Within the development and	Potential to occur gradually	During construction and	Potentially long-term impacts

Indirect impact	Project phase	Nature	Extent	Frequency	Duration	Timing
		site. Potential to increase -/+ decrease due to disturbance to existing vegetation.	throughout indirect impact areas and adjacent vegetation	after disturbance to habitat and vegetation takes place	operational phase of project	
Increased risk of fire	Construction and operation	Potential for fire to spark during construction and operation from any machinery or electrical works	Throughout adjacent vegetation	Potential to occur at any time throughout the operational or construction phases	During operating/ construction hours	Potentially long-term impacts

2.2.4 Prescribed biodiversity impacts

The development site has the prescribed biodiversity impacts as outlined in Table 26.

2.2.5 Mitigating and managing impacts

Measures proposed to mitigate and manage impacts at the development site before, during and after construction are outlined in

Table 27.

Table 26: Direct impacts on prescribed biodiversity impacts

Prescribed biodiversity impact	Nature	Extent	Frequency	Duration	Timing
Impacts of development on the habitat of threatened species or ecological communities associated with Removal of human made structures and non-native vegetation	Removal of human made structures and non-native vegetation	Removal of all buildings and majority of non-native vegetation onsite	Single event.	Permanent removal	Long term impacts
Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	Reduced connectivity of vegetation and habitat for threatened species this reducing their ability to move across their range.	Removal of all buildings and majority of non-native vegetation onsite; removal of nine dams.	Single event	Permanent removal	Long term impacts
Impacts of development on movement of threatened species that maintains their lifecycle	Reduced connectivity of vegetation and habitat for threatened species thus reducing their ability to maintain their lifecycle.	Removal of all buildings and majority of non-native vegetation onsite; removal of nine dams.	Single event	Permanent removal of remnant, naturally occurring bushland and riparian habitat which provides habitat to maintain lifecycle of threatened species.	Long Term Impacts
Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities	Reduction in water quality due to runoff. Clearing of native vegetation within riparian buffers.	Removal of nine dams.	Daily, during construction and operational phases. During heavy rainfall events	Single event during construction. During rainfall events.	Long-term impacts

Table 27: Measures proposed to mitigate and manage impacts

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Timing works to avoid critical life cycle events such as breeding or nursing	High	Low	Tree felling of hollow bearing trees should be undertaken outside of spring and summer (main breeding season for native birds and microbats). If this is not possible, strict pre-clearing protocols must be observed when removing tree hollows.	Prevent disturbance to fauna during breeding.	During felling	Contractor, Project Ecologist
Instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed wildlife handler during clearing events	High	Medium	All hollow-bearing trees within the footprint will be removed. Pre-clearance and clearance survey to be undertaken by suitably qualified ecologists to relocate potential fauna inhabitants. Pre-clearance and clearance survey to be undertaken by suitably qualified ecologists to relocate potential fauna inhabitants. It is recommended that at a minimum, two ecologists are present at the clearing site at all times.	Prevent injury or death to native fauna.	Prior to and during felling.	Project Ecologists, Project Manager
Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance	High	Low	Boundaries of the impact area to be clearly delineated with heavy duty fencing, retained areas marked with "No Go" signage, in particular in the areas adjacent to PCT 835 which is being retained.	Protection of retained vegetation with heavy duty fencing.	Throughout the life of the project	Project Manager in consultation with the ecologist
Sediment barriers or sedimentation ponds to control the quality of water released from the site into the receiving environment	High	Moderate	Install permanent sediment barriers and erosion control during and post construction to prevent runoff into adjacent creeklines and wetlands, maintain controls throughout construction and undertake regular inspections (weekly – or daily if raining).	Control of erosion, sedimentation and runoff of contaminated substances into adjacent waterways	Throughout life of project	Project Manager
Noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise	Low	Very Low	Daily timing of construction activities is recommended in accordance with Table 1 of Interim Noise Guidelines (2009).	Noise impacts associated with the development will be managed in accordance with guidelines.	Throughout life of project	Project Manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill	Low	Very Low	Conduct works during daylight hours.	Avoid light disturbance to native fauna during construction	Throughout life of project	Project Manager
Adaptive dust monitoring programs to control air quality	High	Moderate	Dust management controls to be implemented during construction and operations. If water is being used to manage dust, ensure contaminated water in managed appropriately on and off site in accordance with a water management plan or similar.	Control dust and maintain air quality during construction.	During construction and operations.	Project Manager, Contractor.
On site water management	High	Moderate	All water being used onsite (e.g. dust management, cleaning, processes) is to be managed appropriately on site in accordance with a water management plan or similar.	Control contaminated water on site and prevent from leaving the site.	Throughout like of the project	Project Manager, Contractor
Programming construction activities to avoid impacts; for example, timing construction activities for when migratory species are absent from the site, or when particular species known to or likely to use the habitat on the site are not breeding or nesting	Medium	Low	Impacts to vegetation during the Spring Summer breeding period should be minimised to avoid disrupting the breeding cycles of threatened species.	Avoid disruption of breeding cycle of threatened species.	During construction	Project Manager
Temporary fencing to protect significant environmental features such as riparian zones	High	Low	Temporary fencing and signage to be installed at the edge of the development site to prevent entry into the adjacent retained vegetation.	No unintended clearing or trampling of adjacent vegetation to be retained.	During construction .	Project Manager
Hygiene protocols to prevent the spread of weeds or pathogens	Medium	Low	Phytophthora control measures must be undertaken from the commencement of the project to minimise the risk of spread and to the site. The following guidelines should be followed:	Spread of weeds /pathogens between	During construction .	Project Manager / Contractors

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
between infected areas and uninfected areas			https://www.rbgsyd.nsw.gov.au/science/plants/pests-diseases/phytophthora-dieback/disinfection-procedures http://www.environment.gov.au/biodiversity/invasive-species/publications/management-phytophthora-cinnamomi-biodiversity-conservation Vehicles, machinery and building refuse should remain only within the development site and disposed of at an appropriate waste management facility. Weed management to be undertaken where required. Vehicles should be washed down before entering and exiting the site to prevent the spread of weeds to or from the development site and adjacent vegetation. In particular, machinery work on or nearby dams are required to be washed down in order to prevent the spread of chytrid fungus into or from the development site. If water trucks are being used for dust control, implement procedures such as daily cleaning of the water truck and equipment.	unaffected areas prevented.		
Staff training and site briefing to communicate environmental features to be protected and measures to be implemented	Medium	Low	All staff working on the project will undertake an environmental induction as part of their site familiarisation. Site briefings should be updated based on phase of the work. This induction will include items such as: • Site environmental procedures (vegetation management, sediment and erosion control, exclusion fencing) • Threatened species habitat and TECs • What to do in case of environmental emergency (chemical spills, fire, injured fauna) • Key contacts in case of environmental emergency • What to do in the case of finding a threatened species • What to do in the case of finding fauna on the site	All staff entering the site are fully aware of all environmental aspects relating to the development and know what to do in case of any environmental emergencies	To occur for all staff entering / working at the site and when environmental issues become apparent	Project Manager, all staff

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Making provision for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on or adjacent to the development site	High	Medium	A Vegetation Management Plan should be prepared which covers the retained bushland within PCT835	Protection of flora and fauna outside of the development footprint	Prior to the commencement of construction	Client

2.2.6 Serious and Irreversible Impacts (SAII)

The development has candidate Serious and Irreversible Impacts (SAII) values as outlined in Table 28. Detailed consideration of whether impacts on candidate species are serious and irreversible is included in Table 31 and on TECs is included in Table 30.

Table 28: Candidate Serious and Irreversible Impacts

Species / Community	Common Name	Principle	Direct impact individuals / area (ha)	Threshold
Cumberland Plain Woodland of the Sydney Basin Bioregion	Cumberland Plain Woodland	1	0.115	Under development

Table 29: Determining whether impacts are serious and irreversible

Determining whether impacts are serious and irreversible	Assessment
Principle 1	
Does the proposal impact on a species, population or ecological community that is a candidate entity because it is in a rapid rate of decline?	Yes
If yes, is the impact in excess of any threshold identified and therefore likely to be serious and irreversible? Note: where candidate entities have no listed threshold, any impact is considered likely to be serious and irreversible	The thresholds for this TEC have not been published yet according to the Threatened Biodiversity Data Collection provided in DPIE BioNet.
Principle 2	
Does the proposal impact on a species that is a candidate entity because it has been identified as having a very small population size?	Yes
If yes, is the impact in excess of any threshold identified and therefore likely to be serious and irreversible? Note: where candidate entities have no listed threshold, any impact is considered likely to be serious and irreversible	The thresholds for this TEC have not been published yet according to the Threatened Biodiversity Data Collection provided in DPIE BioNet
Principle 3	
Does the proposal impact on the habitat of a species or an area of an ecological community that is a candidate entity because it has a very limited geographic distribution?	No
If yes, is the impact in excess of any threshold identified and therefore likely to be serious and irreversible? Note: where candidate entities have no listed threshold, any impact is considered likely to be serious and irreversible.	N/A
Principle 4	
Does the proposal impact on a species, a component of species habitat or an ecological community that is a candidate entity because it is irreplaceable?	No
b. If yes, is the impact in excess of any threshold identified and therefore likely to be serious and irreversible? Note: where candidate entities have no listed threshold, any impact is considered likely to be serious and irreversible.	N/A

Table 30: Evaluation of an impact on a TEC

Impact Assessment Provisions	Assessment
1. The area and condition of the TEC to be impacted directly and indirectly by the proposed development	The proposed development will remove 0.115 ha of this TEC which is in a low condition with a vegetation integrity score of 1.5. The TEC affected within the development site is present as lacking a canopy, containing 2 native midstorey species and a highly disturbed groundcover.
2. The extent and overall condition of the TEC within an area of 1500 metres, and then 5000 metres, surrounding the proposed development footprint. In the case of strategic biodiversity certification projects, the extent and overall condition of the TEC may be assessed across the IBRA sub region	There is an estimated 33.9 ha of this TEC within a 1,500m radius of the development site (mapped by OEH 2016). There is an estimated 285.8 ha of this TEC within a 5000m radius of the development site (mapped by OEH 2016).
3. An estimate of the extant area and overall condition of the TEC remaining before and after the impact of the proposed development has been taken into consideration	The removal of 0.115 ha of this TEC within the development site represents 0.34% of the mapped TEC extent within the 1,500 m radius and 0.04% of the mapped TEC extent within the 5,000 m radius. The development will not result in the overall decline of the condition of the TEC remaining in the locality after development.
4. The development proposal's impact on:	
a. Abiotic factors critical to the long-term survival of the TEC; for example, will the impact lead to a reduction of groundwater levels or substantial alteration of surface water patterns; will it alter natural disturbance regimes that the TEC depends upon, e.g. fire, flooding etc.?	The development will not affect abiotic factors critical to the long-term survival of the TEC. The proposal will not result in a reduction in ground water levels or substantial alteration of surface water patterns or natural disturbance regimes of which the TEC depends upon outside of the development site.
b. Characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of under-storey species or harvesting of plants	The proposed development will not affect characteristic and functionally important species outside of the proposed impact area.
c. The quality and integrity of an occurrence of the TEC through threats and indirect impacts including, but not limited to, assisting invasive flora and fauna species to become established or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species in the TEC	The development site is located within a modified rural area with areas affected by weeds which will be removed during the proposed works. The proposed development has the potential to result in the introduction of new weed plumes into and adjacent to the development site. These potential impacts will be controlled during the construction phase of the proposed development.
5. Direct or indirect fragmentation and isolation of an area of the TEC	The development will result in a very minor increase in the direct or indirect fragmentation or isolation of areas of the TEC
6. The measures proposed to contribute to the recovery of the TEC in the IBRA subregion.	In its current form, the proposed development does not contribute to the recovery of this TEC in the IBRA subregion.

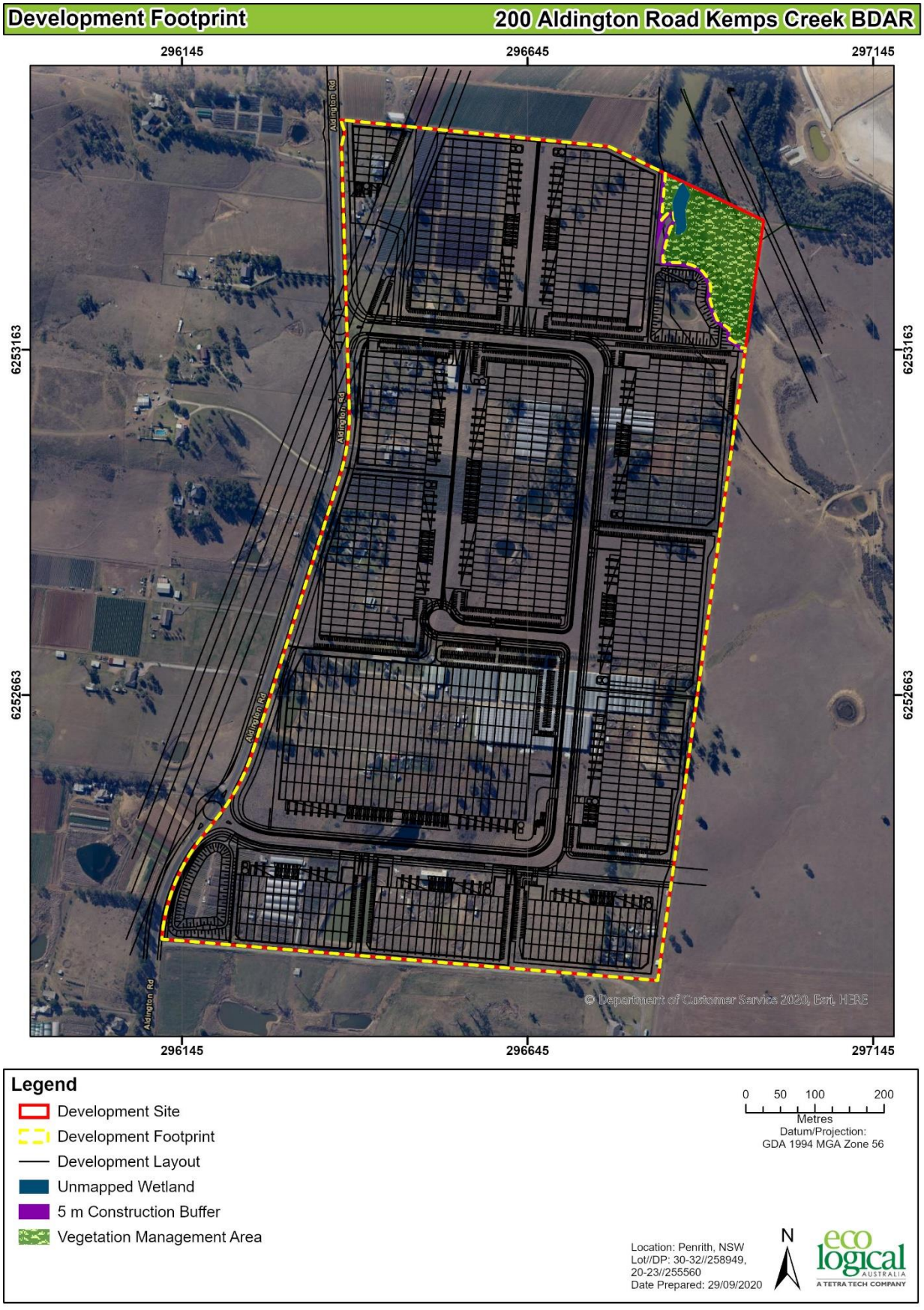

Figure 9: Final project footprint including construction and operation

2.3 Impact summary

Following implementation of the BAM and the BAMC, the following impacts have been determined.

2.3.1 Serious and Irreversible Impacts (SAII)

The development has candidate Serious and Irreversible Impacts (SAII) values as outlined in Table 28 and shown on Figure 10. Detailed consideration of whether impacts on candidate species are serious and irreversible is included in Table 33.

Table 31: Serious and Irreversible Impacts Summary

Species / Community	Common Name	Principle	Direct impact (ha)
Cumberland Plain Woodland of the Sydney Basin Bioregion	Cumberland Plain Woodland	1	0.115

2.3.2 Impacts requiring offsets

The impacts of the development requiring offset for native vegetation are outlined in Table 32 and shown on Figure 11. The impacts of the development requiring offset for threatened species and threatened species habitat are outlined in Table 33 and on Figure 11.

2.3.3 Credit summary

The number of ecosystem credits required for the development are outlined in Table 34. The number of species credits required for the development are outlined in Table 35. A biodiversity credit report is included in Appendix D:.

Table 32: Impacts to native vegetation that require offsets

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Direct impact (ha)	Credits required
835	Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Coastal Floodplain Wetlands	Forested Wetlands	1.33	16
1232	Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion	Coastal Swamp Forests	Forested Wetlands	0.67	7

Table 33: Impacts on threatened species and threatened species habitat that require offsets

Species	Common Name	Direct impact (ha)	NSW listing status	EPBC Listing status	Credits required
Litoria aurea	Green and Golden Bell Frog	0.342	E	V	5
Myotis Macropus	Southern Myotis	2.975	V	Not Listed	29

2.3.4 Impacts not requiring offsets

The impacts of the development not requiring offset for native vegetation are outlined in Table 34 and shown on Figure 12. The impacts of the development not requiring assessment is shown in Figure 14.

Table 34: Impacts to native vegetation that do not require offsets

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Direct impact (ha)
850	Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Coastal Valley Grassy Woodlands	Grassy Woodlands	0.12
1232	Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion	Coastal Swamp Forests	Forested Wetlands	0.93

2.3.5 Areas not requiring assessment

Areas not requiring assessment are shown on Figure 13.

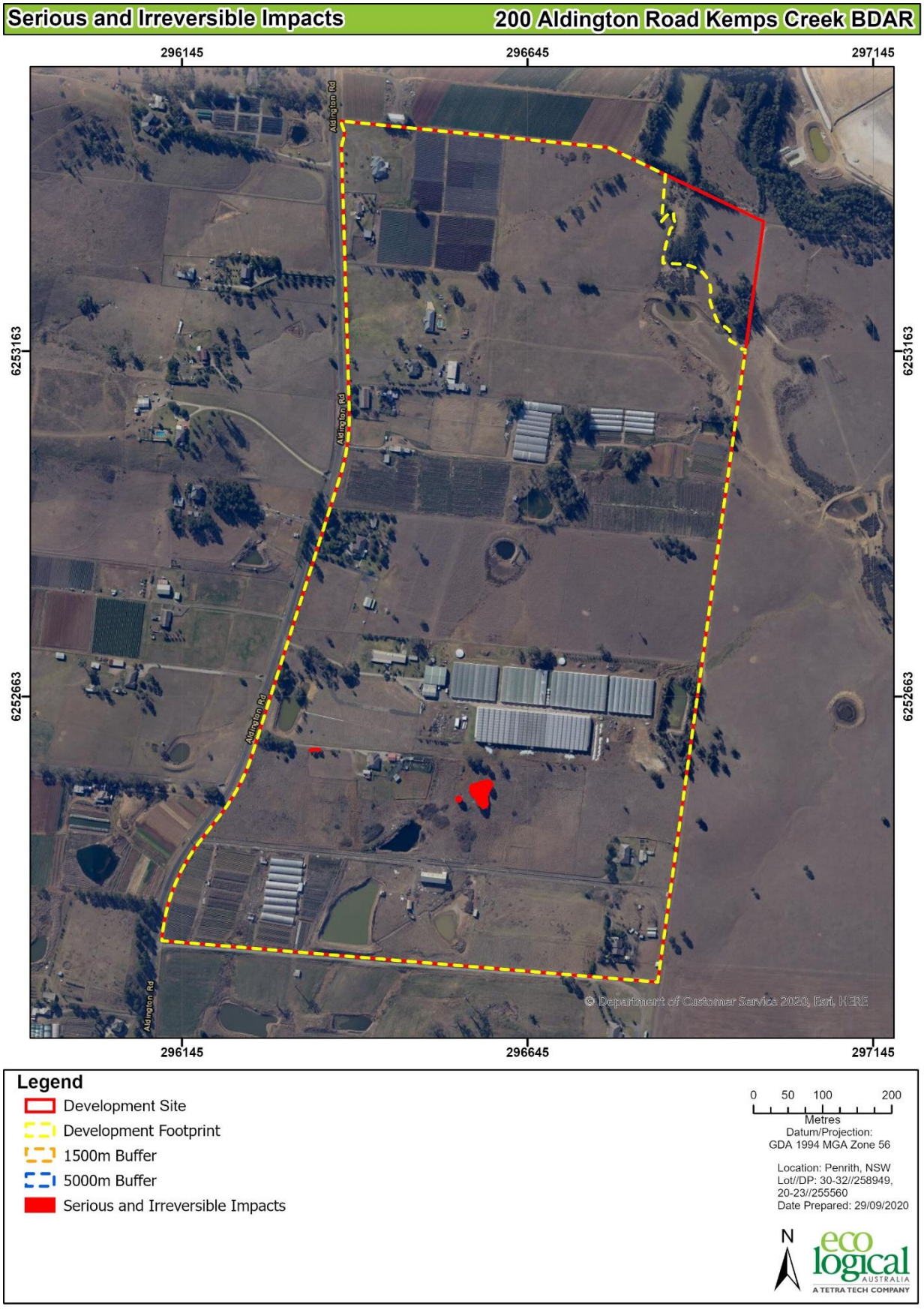

Figure 10: Serious and Irreversible Impacts

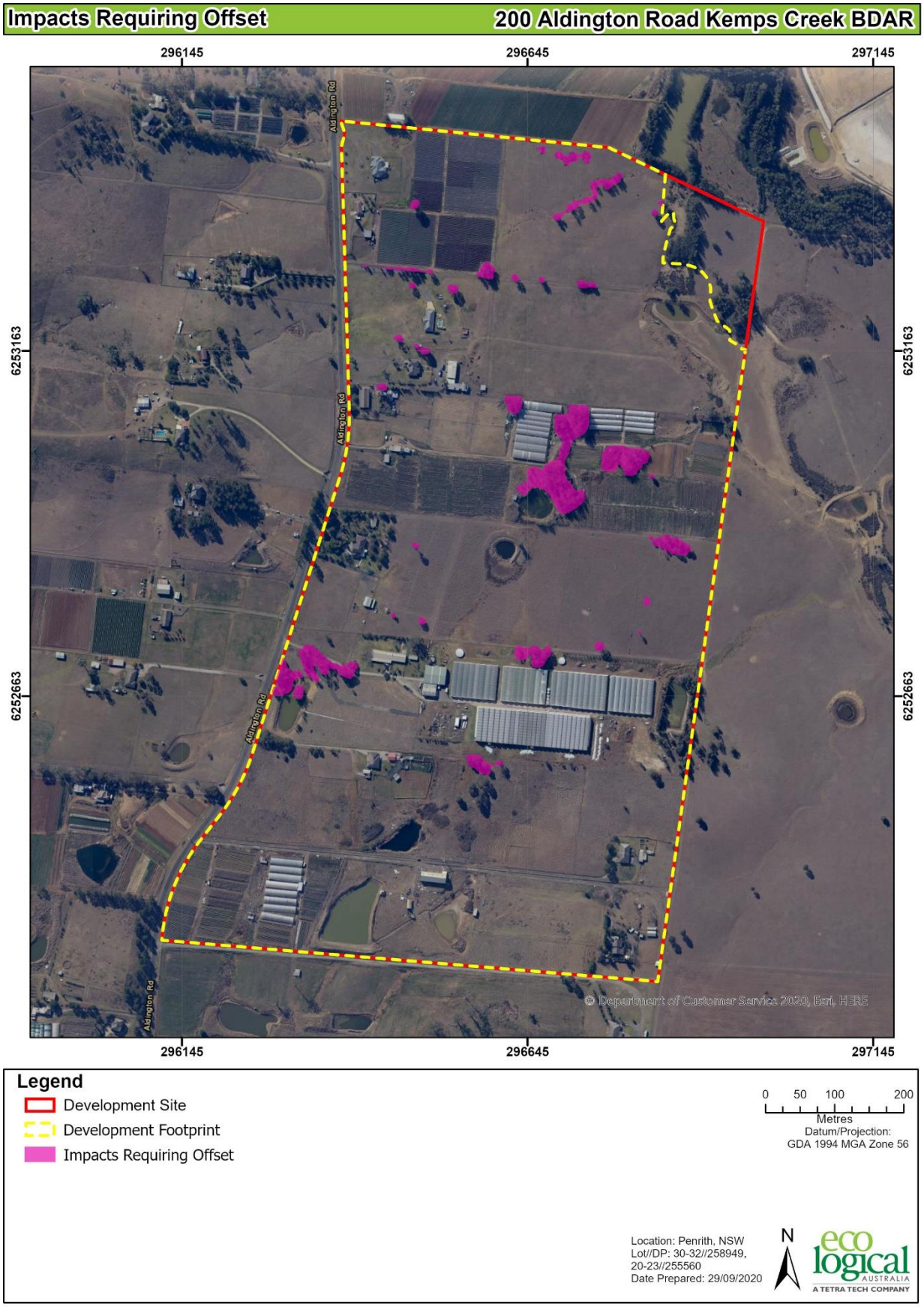

Figure 11: Impacts requiring offset

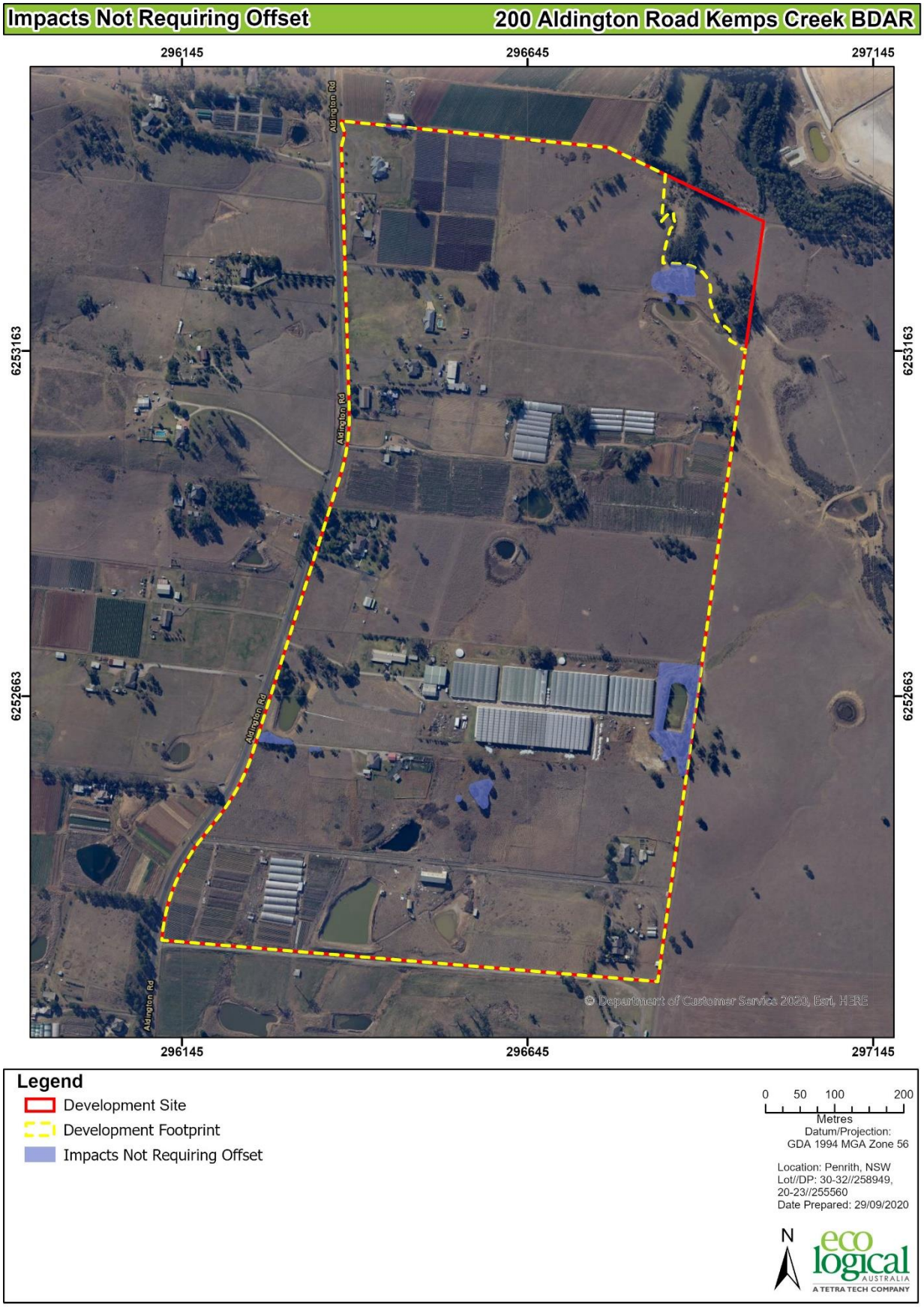

Figure 12: Impacts not requiring offset

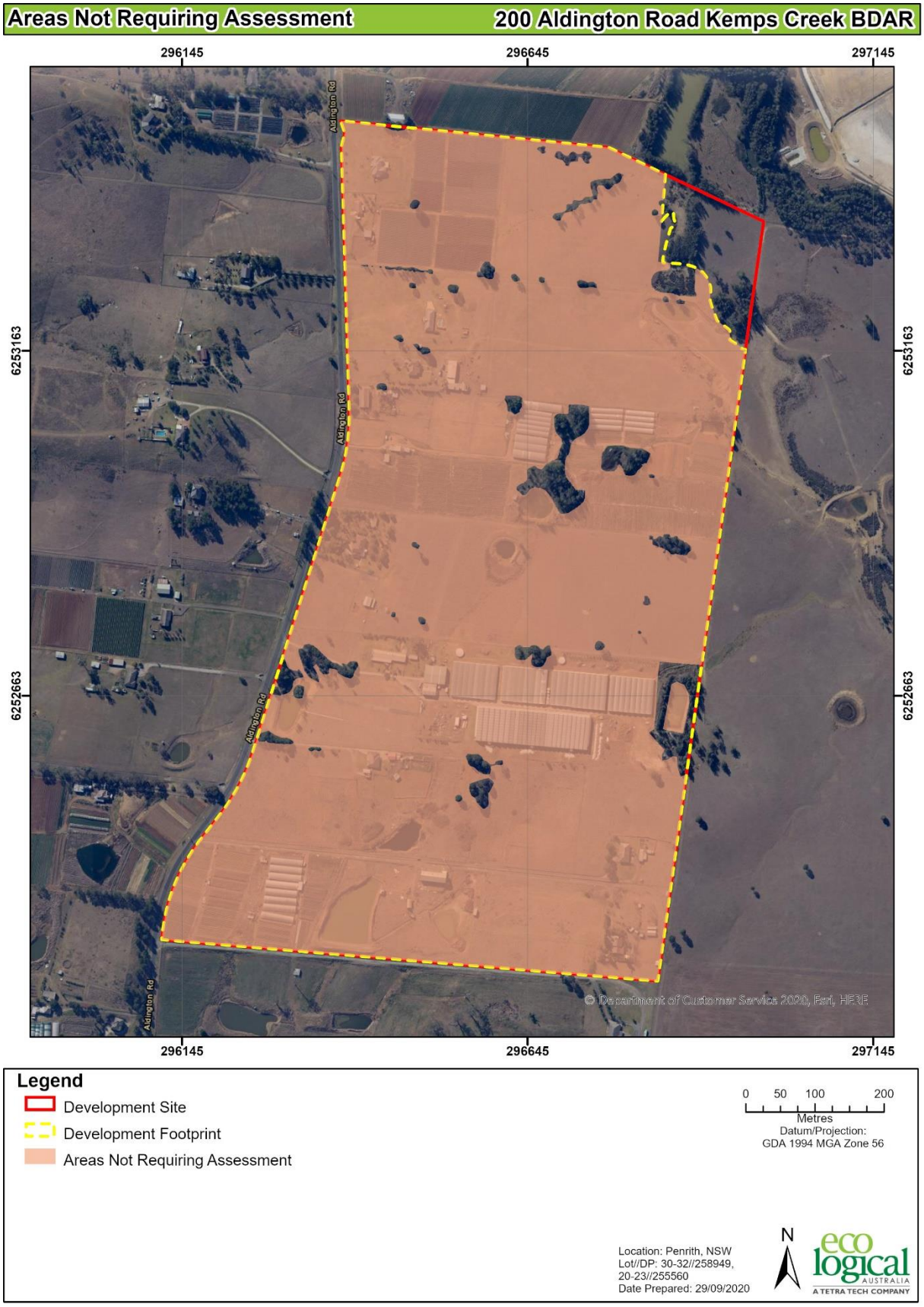

Figure 13: Areas not requiring assessment

2.4 Consistency with legislation and policy

Additional matters relating to impacts on flora and fauna which are not covered by the BC Act must also be addressed for the proposed development. Potential MNES in accordance with the Commonwealth EPBC Act have been addressed in Section 2.4.1.

2.4.1 Commonwealth *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act)

The EPBC Act establishes a process for assessing the environmental impact of activities and developments where MNES may be affected. Under the Act, any action which "has, will have, or is likely to have a significant impact on MNES" is defined as a "controlled action", and requires approval from the Commonwealth Department of Agriculture, Water and the Environment (DAWE), which is responsible for administering the EPBC Act.

A habitat assessment and Likelihood of Occurrence was completed for listed threatened species that represent MNES (Appendix F). The following MNES were assessed as either having the potential to occur within the development site, likely to occur or known from the development site:

- *Anthochaera phrygia* (Regent Honeyeater)
- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Lathamus discolor* (Swift Parrot)
- *Litoria aurea* (Green and Golden Bell Frog)
- *Phascolarctos cinereus* (Koala)
- *Gallinago hardwickii* (Latham's Snipe).

The assessments in this section were prepared in accordance with the EPBC Act Matters of National Environmental Significance: Significant Impact Guidelines 1.1 (Department of Environment 2009). These guidelines were established to assist proponents to determine whether a proposed action is likely to result in a significant impact on a matter of national environmental significance.

It was determined that the action will not have or is unlike to have a significant impact on the above MNES.

2.4.1.1 Forest birds *(Anthochaera phrygia* (Regent Honeyeater) *and Lathamus discolor* (Swift Parrot)*)*

The Regent Honeyeater and Swift Parrot are both listed as critically endangered under the EPBC Act. The distribution and habitat associations of this threatened species are presented in Appendix C:. Due to similar habitat requirements of these species, a single test was undertaken for both. These species were not recorded within the development site during survey. The proposed action will impact 3.04 ha of potential foraging habitat for both the Regent Honeyeater and Swift Parrot. The development site is not included within the DPIE mapped breeding areas for the threatened species (as accessed on BOAMS on 6 July and 23 September 2020).

Criterion	Question	Response
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility of the following:		
1)	will the action lead to a long-term decrease in the size of a population *Note: A 'population of a species' is defined under the EPBC Act as an occurrence of the species in a particular area.*	The Regent Honeyeater and Swift Parrot comprise single populations of each respective species (DAWE 2020c). The proposed action will not affect breeding habitat for either threatened species but will remove 3.04 ha of vegetation, including potential foraging habitat. Given the proximity of suitable habitat in connective vegetation within the assessment area and beyond, the removal of this potential foraging habitat would not lead to the long-term decrease in the size of a population of either species.
2)	will the action reduce the area of occupancy of the species	The proposed action would reduce the amount of potential foraging habitat for these species by up to 3.04 ha. Neither species are known to occupy the development site, but the Regent Honeyeater and Swift Parrot may occasionally forage within the development site. Both the Regent Honeyeater and Swift Parrot are recorded as travelling long distances and would likely utilise the potential foraging habitat outside of the development site on feeding forays.
3)	will the action fragment an existing population into two or more populations	The proposed action will not fragment an existing population into two or more populations.
4)	will the action adversely affect habitat critical to the survival of a species	The National Recovery Plan for the Regent Honeyeater lists habitat critical to the survival of the species as: "any breeding or foraging areas where the species is likely to occur. Any newly discovered breeding or foraging locations". The National Recovery Plan for the Swift Parrot 2011 lists priority habitats as those which are used for nesting, by large proportions of the population, repeatedly between seasons or for prolonged periods of time. Based on the records of these species observed within 5 km of the development site (2 Regent Honeyeater, 0 Swift Parrot), the development site is not considered habitat critical to the survival of either species. Furthermore, similar foraging habitat is available directly adjacent to the development site.
5)	will the action disrupt the breeding cycle of a population	The proposed action will not disrupt the breeding cycle of either threatened species given that no breeding habitat will be affected by the proposed action and suitable

Criterion	Question	Response
		foraging habitat is available adjacent to the development site.
6) i	will the action modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed action will remove 3.04 ha of vegetation, including foraging habitat for the Regent Honeyeater and Swift Parrot. It is unlikely that the extent of this vegetation removal will cause either species to decline because suitable habitat is available adjacent to the development site.
6) ii	will the action result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	The proposed action is unlikely to result in the establishment of an invasive species that is harmful to either threatened species.
7)	will the action introduce disease that may cause the species to decline	The proposed action is unlikely to introduce disease that may cause either threatened species to decline.
8)	will the action interfere with the recovery of the species	The proposed action will remove suitable foraging habitat for these species; however this will not interfere substantially with recovery objectives listed in their National Recovery Plans. The proposed action will not affect any breeding habitat and suitable foraging habitat is available adjacent to the development site.
Conclusion	Is there likely to be a significant impact?	No. The proposed action is unlikely to have a significant impact on the Regent Honeyeater or Swift Parrot for the following reasons: • No known breeding habitat will be removed by the proposed action. • Extensive areas of more suitable foraging habitat for these highly mobile species is available adjacent to the development site.

2.4.1.2 *Pteropus poliocephalus* (Grey-headed Flying-fox)

The Grey-headed Flying-fox is listed as vulnerable under the EPBC Act. The distribution and habitat associations of this threatened species are presented in Appendix C:. This species was not identified within the development site during survey. The proposed action will impact 3.04 ha of native vegetation, some of which comprises suitable foraging habitat for this species. No camps were identified within the development site, the nearest Grey-headed Flying-fox camp is located approximately 11 km east of the development site at Wetherill Park and has a count of 500-2,499 individuals. No camps will be affected by the proposed action.

Criterion	Question	Response
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
1)	lead to a long-term decrease in the size of an important population of a species *Note: An 'important population' is a population that is necessary for a species' long-term survival and recovery.*	No roosting habitat (camps) will be affected by the proposed action. The proposed action will affect 3.04 ha of native vegetation, some of which comprises suitable foraging habitat for the Grey-headed Flying-fox. The Grey-headed Flying-fox is recorded as travelling long distances (up to 50 km) on feeding forays. Given the proximity of more suitable habitat in connective vegetation within the assessment area, the removal of this potential foraging habitat would not lead to the long-term decrease in the size of an important population of Grey-headed Flying-fox.
2)	reduce the area of occupancy of an important population	The proposed action would affect 3.04 ha of potential foraging habitat for this species. The Grey-headed Flying-fox is not known to occupy the development site in the form of a camp but may occasionally forage within the development site. The Grey-headed Flying-fox is recorded as travelling long distances on feeding forays and would likely utilise the potential foraging habitat outside of the development site.
3)	fragment an existing important population into two or more populations	According to the Draft Recovery Plan for the Grey-headed Flying-fox 2017, "the Grey-headed Flying-fox is considered to be a single, mobile population with individuals distributed across Queensland, New South Wales, Victoria, South Australia, Tasmania and the ACT." The proposed action will not fragment an existing important population into two or more populations. No camps will be affected by the proposed action and other areas of foraging habitat are available for this highly mobile species within the region.
4)	adversely affect habitat critical to the survival of a species *Note: 'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:* • *for activities such as foraging, breeding, roosting, or dispersal* • *for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of*	The Draft Recovery Plan for the Grey-headed Flying-fox 2017 identifies 'a continuous temporal sequence of productive foraging habitats, linked by migration corridors or stopover habitats, and suitable roosting habitat within nightly commuting distance of foraging areas' as habitat critical to the survival of the species. The proposed action will affect 3.04 ha of native vegetation, some of which may represent habitat critical survival to this species. However, this impact is considered unlikely to have an adverse effect given that the species is recorded as travelling long distances (50 km) on feeding forays and similar habitat is available adjacent to the development site.

Criterion	Question	Response
	the species or ecological community, such as pollinators) • *to maintain genetic diversity and long term evolutionary development, or* • *for the reintroduction of populations or recovery of the species or ecological community.*	
5)	disrupt the breeding cycle of an important population	The proposed action will not disrupt the breeding cycle of the Grey-headed Flying-fox given that no camps will be affected by the proposed action and suitable foraging habitat is available adjacent to the development site.
6)	modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed action will affect 3.04 ha of vegetation, including foraging habitat for the Grey-headed Flying-fox. It is unlikely that the extent of this vegetation removal will cause the species to decline because suitable habitat is available adjacent to the development site.
7)	result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The proposed action is unlikely to result in the establishment of an invasive species that is harmful to the Grey-headed Flying-fox.
8)	introduce disease that may cause the species to decline, or	Grey-headed Flying-fox are reservoirs for the Australian bat lyssavirus, Hendra Virus and Menangle virus, and can cause clinical disease and mortality in Grey-headed Flying-fox. The proposed action would not increase the incidence of this disease.
9)	interfere substantially with the recovery of the species.	The proposed action will remove suitable foraging habitat for this species; however this will not interfere substantially with recovery objectives listed in the Draft National Recovery Plan for the Grey-headed Flying-fox 2017. The proposed action will not affect any camps and suitable foraging habitat is available adjacent to the development site.
Conclusion	Is there likely to be a significant impact?	No. The proposed action is unlikely to have a significant impact on the Grey-headed Flying-fox for the following reasons: • No camps will be removed by the proposed action. • More suitable foraging habitat for this highly mobile species is available adjacent to the development site.

2.4.1.3 Litoria aurea (Green and Golden Bell Frog)

The Green and Golden Bell Frog is listed as vulnerable under the EPBC Act. The distribution and habitat associations for this threatened species are presented in Table 16. Targeted survey was not undertaken for this species, however the development site contains 0.34 ha of potential habitat for this species, associated with dams with *Typh*a sp.

Criterion	Question	Response
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
1)	Lead to a long-term decrease in the size of an important population of a species *Note: An 'important population' is a population that is necessary for a species' long-term survival and recovery.*	The proposed action will impact up to 0.34 ha of potential habitat for the Green and Golden Bell Frog in the form of farm dams and associated vegetation. Based on the records of this species observed within 5 km of the development site (1 record), the proposed action would not lead to the long-term decrease in the size of an important population of Green and Golden bell Frog.
2)	Reduce the area of occupancy of an important population	The action would reduce the potential area of occupancy available for this species by removing up to 0.34 ha of potential habitat. However, given the number of records and marginal quality of potential habitat, it is considered unlikely that an important population would occupy this area.
3)	Fragment an existing important population into two or more populations	The proposed action will not fragment an existing population into two or more populations.
4)	Adversely affect habitat critical to the survival of a species *Note: 'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:* • *for activities such as foraging, breeding, roosting, or dispersal* • *for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)* • *to maintain genetic diversity and long-term evolutionary development, or* • *for the reintroduction of populations or recovery of the species or ecological community.*	The proposed action would impact 0.34 ha of native vegetation and associated dams that represent potential habitat. The area of potential habitat to be impacted is of marginal quality and only one individual has been recorded within 1 km of the development site. Therefore, it is unlikely that the proposed action will adversely affect potential habitat to the detriment of the survival of the species.
5)	Disrupt the breeding cycle of an important population	The proposed action is unlikely to result in the loss of a large number of individuals that would disrupt the life cycle of this species.
6)	Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed action will decrease the availability of habitat for the species within the development site by 0.34 ha. However, it is unlikely that the extent of this habitat removal will cause the species to decline because similar habitat is

Criterion	Question	Response
		available within the assessment area and only one individual is known from the region.
7)	Result in an invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	A number of invasive fish species, especially *Gambusia holbrooki* (Eastern Mosquitofish), have been identified as main threats to the Green and Golden Bell Frog. The proposed action is unlikely to result in harmful invasive species becoming established in existing habitat for the Green and Golden Bell Frog.
8)	Introduce disease that may cause the species to decline	Infection with *Batrachochytrium dendrobatidis* (Chytrid Fungus) is listed as a main threat to the Green and Golden Bell Frog. The proposed action is unlikely to introduce the Chytrid Fungus.
9)	Interfere substantially with the recovery of the species	The proposed action will remove potential habitat for this species. However, the action will not interfere substantially with the recovery of the species.
Conclusion	Is there likely to be a significant impact?	No. The proposed action is unlikely to have a significant impact on the Green and Golden Bell Frog for the following reasons: • The 0.34 ha of potential Green and Golden Bell Frog habitat to be removed is considered marginal in quality. • Similar habitat is available within the assessment area.

2.4.1.4 *Phascolarctos cinereus* (Koala)

The Koala is listed as vulnerable under the EPBC Act. The distribution and habitat associations of this threatened species are presented in Table 16. This species was not identified within the development site during survey. The proposed action will affect 3.04 ha of native vegetation, some of which comprises suitable foraging habitat for this species. No breeding habitat will be affected by the proposed action.

Criterion	Question	Response
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
1)	lead to a long-term decrease in the size of an important population of a species *Note: An 'important population' is a population that is necessary for a species' long-term survival and recovery.*	The proposed action will affect 3.04 ha of native vegetation, some of which contains potential foraging habitat for the Koala. No evidence of breeding habitat was detected within the development site during survey. This impact would not lead to a long-term decrease in the size of a population of the species, given the proximity of similar habitat adjacent to the development site.
2)	reduce the area of occupancy of an important population	The proposed action would affect up to 3.04 ha of native vegetation, some of which represents potential foraging habitat for this species. The Koala is not known to occupy the development site but may occasionally forage within the development site.
3)	fragment an existing important population into two or more populations	The proposed action will not fragment an existing important population into two or more populations.
4)	adversely affect habitat critical to the survival of a species *Note: 'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:* • *for activities such as foraging, breeding, roosting, or dispersal* • *for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)* • *to maintain genetic diversity and long term evolutionary development, or* • *for the reintroduction of populations or recovery of the species or ecological community.*	No habitat critical to the survival has been identified for this species. The development site contains feed trees considered foraging habitat for this species, however this habitat is not considered critical to the survival of the species. Furthermore, the development site is not mapped under the Koala Habitat Protection SEPP 2019. The proposed action may affect up to 3.04 ha of native vegetation, some of which represents potential foraging habitat for this species, however similar habitat is available adjacent to the development site.
5)	disrupt the breeding cycle of an important population	The proposed action will not disrupt the breeding cycle of the Koala given that no breeding habitat will be affected by the proposed action and suitable foraging habitat is available adjacent to the development site.

Criterion	Question	Response
6)	modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed action will affect up to 3.04 ha of native vegetation, including foraging habitat for the Koala. It is unlikely that the extent of this vegetation removal will cause the species to decline because suitable, more extensive habitat is available adjacent to the development site.
7)	result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The proposed works are unlikely to result in the establishment of an invasive species in the habitat of the Koala.
8)	introduce disease that may cause the species to decline, or	The action is unlikely to introduce disease that would cause this species to decline.
9)	interfere substantially with the recovery of the species.	The Approved Conservation Advice for this species identifies the following main threats: loss and fragmentation of habitat, vehicle strike, disease and predation by dogs. The proposed action will impact foraging habitat; however the action is unlikely to exacerbate these threats to the extent that it would interfere substantially with the recovery of the species.
Conclusion	Is there likely to be a significant impact?	No. The proposed action is unlikely to have a significant impact on the Koala for the following reasons: • No breeding habitat will be impacted by the action. • More suitable habitat for this species is available adjacent to the development site.

2.4.1.5 Gallinago hardwikii (Latham's Snipe)

Latham's Snipe is listed as a migratory species under the EPBC Act. The distribution and habitat associations for this threatened species are presented in Table 16. This species was not identified within the development site during survey, however the proposed development will remove farm dams which represent foraging and roosting habitat for this species. Latham's Snipe does not breed in Australia.

Criterion	Question	Response
An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:		
1)	Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species *Note: An area of 'important habitat' for a migratory species is:* • *habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or* • *habitat that is of critical importance to the species at particular life-cycle stages, and/or* • *habitat utilised by a migratory species which is at the limit of the species range, and/or* • *habitat within an area where the species is declining.*	The proposed action will affect dams considered potential foraging and roosting habitat for Latham's Snipe. The species does not breed in Australia. Latham's Snipe prefers bodies of fresh water that contain low, dense vegetation which provides shelter for roosting purposes. The structure and composition of the fringing vegetation is a high determinant in the suitability of the habitat for foraging and roosting purposes. The dams within the development site are only considered marginal habitat for this species.
2)	Result in invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	Predation by *Vulpes vulpes* (European Red Fox) is considered a threat to Latham's Snipe. The proposed action is unlikely to exacerbate predation of Latham's Snipe by the European Red Fox.
3)	Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species *Note: Listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore, what is an 'ecologically significant proportion' of the population varies with the species (each circumstance will need to be evaluated). Some factors that should be considered include the species' population status, genetic*	The global population of Latham's Snipe is estimated to be between 25,000 and 100,000 individuals (DAWE 2020c). The species' extent of occurrence is estimated at 300,000 km^2 and the area of occupancy at 3000 km^2. An area of habitat is considered important if it supports >1% of the current population. Given only four individuals have been recorded within 5 km of the development site, the development site is not considered important habitat or likely to support a significant proportion of the population. Latham's Snipe does not breed in Australia but migrates after the breeding season anywhere between July – November, leaving by February. The species migrates to Australia for foraging and roosting purposes and would rely on the resources in the development site only occasionally.

Criterion	Question	Response
	distinctiveness and species specific behavioural patterns (for example, site fidelity and dispersal rates). *'Population', in relation to migratory species, means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries including Australia.*	
Conclusion	Is there likely to be a significant impact?	No. The proposed action is unlikely to have a significant impact on Latham's Snipe for the following reasons: • The action will not affect breeding habitat for the species • The habitat in the development site is considered marginal and would only be used occasionally in a transient manner by species • The species is highly mobile and will readily move roosting locations as habitat becomes less / more suitable • The species' range is widespread and the proposed action would not impact the species at the extent of its range.

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Appendix A: Definitions

Terminology	Definition
Biodiversity credit report	The report produced by the Credit Calculator that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site.
BioNet Atlas	The BioNet Atlas (formerly known as the NSW Wildlife Atlas) is the OEH database of flora and fauna records. The Atlas contains records of plants, mammals, birds, reptiles, amphibians, some fungi, some invertebrates (such as insects and snails) and some fish
Broad condition state:	Areas of the same PCT that are in relatively homogenous condition. Broad condition is used for stratifying areas of the same PCT into a vegetation zone for the purpose of determining the vegetation integrity score.
Connectivity	The measure of the degree to which an area(s) of native vegetation is linked with other areas of vegetation.
Credit Calculator	The computer program that provides decision support to assessors and proponents by applying the BAM, and which calculates the number and class of biodiversity credits required to offset the impacts of a development or created at a biodiversity stewardship site.
Development	Has the same meaning as development at section 4 of the EP&A Act, or an activity in Part 5 of the EP&A Act. It also includes development as defined in section 115T of the EP&A Act.
Development footprint	The area of land that is directly impacted on by a proposed development, including access roads, and areas used to store construction materials.
Development site	An area of land that is subject to a proposed development that is under the EP&A Act.
Ecosystem credits	A measurement of the value of EECs, CEECs and threatened species habitat for species that can be reliably predicted to occur with a PCT. Ecosystem credits measure the loss in biodiversity values at a development site and the gain in biodiversity values at a biodiversity stewardship site.
High threat exotic plant cover	Plant cover composed of vascular plants not native to Australia that if not controlled will invade and outcompete native plant species.
Hollow bearing tree	A living or dead tree that has at least one hollow. A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the minimum entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. you cannot see solid wood beyond the entrance); (d) the hollow is at least 1 m above the ground. Trees must be examined from all angles.
Important wetland	A wetland that is listed in the Directory of Important Wetlands of Australia (DIWA) and SEPP 14 Coastal Wetlands
Linear shaped development	Development that is generally narrow in width and extends across the landscape for a distance greater than 3.5 kilometres in length
Local population	The population that occurs in the study area. In cases where multiple populations occur in the study area or a population occupies part of the study area, impacts on each subpopulation must be assessed separately.
Local wetland	Any wetland that is not identified as an important wetland (refer to definition of Important wetland).
Mitchell landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000.

Terminology	Definition
Multiple fragmentation impact development	Developments such as wind farms and coal seam gas extraction that require multiple extraction points (wells) or turbines and a network of associated development including roads, tracks, gathering systems/flow lines, transmission lines
Operational Manual	The Operational Manual published from time to time by OEH, which is a guide to assist assessors when using the BAM
Patch size	An area of intact native vegetation that: a) occurs on the development site or biodiversity stewardship site, and b) includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or ≤30 m for non-woody ecosystems). Patch size may extend onto adjoining land that is not part of the development site or stewardship site..
Proponent	A person who intends to apply for consent to carry out development or for approval for an activity.
Reference sites	The relatively unmodified sites that are assessed to obtain local benchmark information when benchmarks in the Vegetation Benchmarks Database are too broad or otherwise incorrect for the PCT and/or local situation. Benchmarks can also be obtained from published sources.
Regeneration	The proportion of over-storey species characteristic of the PCT that are naturally regenerating and have a diameter at breast height <5 cm within a vegetation zone.
Remaining impact	An impact on biodiversity values after all reasonable measures have been taken to avoid and minimise the impacts of development. Under the BAM, an offset requirement is calculated for the remaining impacts on biodiversity values.
Retirement of credits	The purchase and retirement of biodiversity credits from an already-established biobank site or a biodiversity stewardship site secured by a biodiversity stewardship agreement.
Riparian buffer	Riparian buffers applied to water bodies in accordance with the BAM
Sensitive biodiversity values land map	Development within an area identified on the map requires assessment using the BAM.
Site attributes	The matters assessed to determine vegetation integrity. They include: native plant species richness, native over-storey cover, native mid-storey cover, native ground cover (grasses), native ground cover (shrubs), native ground cover (other), exotic plant cover (as a percentage of total ground and mid-storey cover), number of trees with hollows, proportion of over-storey species occurring as regeneration, and total length of fallen logs.
Site-based development	a development other than a linear shaped development, or a multiple fragmentation impact development
Species credits	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.
Subject land	Is land to which the BAM is applied in Stage 1 to assess the biodiversity values of the land. It includes land that may be a development site, clearing site, proposed for biodiversity certification or land that is proposed for a biodiversity stewardship agreement.
Threatened Biodiversity Data Collection	Part of the BioNet database, published by OEH and accessible from the BioNet website.
Threatened species	Critically Endangered, Endangered or Vulnerable threatened species as defined by Schedule 1 of the BC Act, or any additional threatened species listed under Part 13 of the EPBC Act as Critically Endangered, Endangered or Vulnerable.

Terminology	Definition
Vegetation Benchmarks Database	A database of benchmarks for vegetation classes and some PCTs. The Vegetation Benchmarks Database is published by OEH and is part of the BioNet Vegetation Classification.
Vegetation zone	A relatively homogenous area of native vegetation on a development site, land to be biodiversity certified or a biodiversity stewardship site that is the same PCT and broad condition state.
Wetland	An area of land that is wet by surface water or ground water, or both, for long enough periods that the plants and animals in it are adapted to, and depend on, moist conditions for at least part of their life cycle. Wetlands may exhibit wet and dry phases and may be wet permanently, cyclically or intermittently with fresh, brackish or saline water
Woody native vegetation	Native vegetation that contains an over-storey and/or mid-storey that predominantly consists of trees and/or shrubs

Appendix B: Vegetation plot data

Table 35: Species matrix (species recorded by plot)

Stratum	Form	Scientific name	Exotic (*)	High Threat Weed (*)	Cover (%)					
					Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6
U	TG	*Acacia decurrens*			0	0	0	0.2	0	0
M	SG	*Acacia implexa*			0	0	0	0.5	0	0
G	FG	*Alternanthera denticulata*			0	0	0	0	0	0.1
G		*Lysimachia arvensis*.	*		0	0	0.1	0	0.1	0
U	TG	*Angophora subvelutina*			8	0	0	0	0	0
G		*Anredera cordifolia*	*	*	0	0	0	0.1	0	0
G		*Araujia sericifera*	*	*	0	0	0	0.1	0	0.1
G	GG	*Aristida* spp.			0	0	0.1	0	0	0
G		*Bidens pilosa* var. *pilosa*			5	0	0	0	0	10
G		*Briza subaristata*	*	*	0	0	0	0	0.1	0
G		*Capsella bursa-pastoris*	*		0.1	0	30	0	0	0
U	TG	*Casuarina glauca*			20	0	0	0	5	10
G		*Cenchrus clandestinus*	*	*	0	0	0	50	0	0
G	FG	*Centella asiatica*			0	0.1	0	0	0	0
G		*Cerastium vulgare*	*		0	0	0	0	0	1
G		*Cestrum parqui*	*	*	0	0	0	0.1	0	1
G		*Chenopodium album*	*		0	0	0	0	0	0.5
G		*Chloris gayana*	*	*	0	0	0	0.1	0	0
G		*Conyza bonariensis*	*		1	0	0	0	0.1	2
U	TG	*Corymbia intermedia*			0	1	0	0	0	0
G		*Cotula coronopifolia*	*		0	0	0	0	0.2	0
G	GG	*Cynodon dactylon*			15	0	5	0	2	3
G		*Cyperus eragrostis*	*	*	0	0	0	0	0	0.5
G		*Daucus carota*	*		0	0	0	0	0	2
G	FG	*Daucus* spp.			0	0	0	0	0.1	0
G	FG	*Dichondra repens*			0	1	0	0	0	5
G	GG	*Digitaria parviflora*			0	0	0	0	0.1	0
M	SG	*Dillwynia retorta*			0	0	1	0	0	0
G		*Ehrharta erecta*	*	*	20	0	0	1	0	25
M	FG	*Einadia nutans* subsp. *nutans*			0.1	0	0	0	0	0

Stratum	Form	Scientific name	Exotic (*)	High Threat Weed (*)	Cover (%)					
					Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6
G	FG	*Einadia polygonoides*			0	0	0	0.3	0	0
G		*Eragrostis curvula*	*	*	0	0	0	0.2	0	0
U	TG	*Eucalyptus amplifolia* subsp. *amplifolia*			0	8	0	0	0	0
U	TG	*Eucalyptus tereticornis*			0	1	0	0	0	0
G		*Foeniculum vulgare*	*		0	0	0	1	0	0
G	FG	Forb			0	0	0	0	0.2	0
G	FG	*Geranium homeanum*			0	0	0	0	0	0.1
G	OG	*Glycine tabacina*			0	0.5	0	0	0	0
G		*Gomphocarpus fruticosus*	*		0	0	0	0.1	0	0
G		*Juncus acutus* subsp. *acutus*	*	*	0	0	0	0	30	0
G	GG	*Lomandra filiformis* subsp. *filiformis*			0	0.1	1	0	0	0
G	GG	Microlaena stipo*ides* var. *stipoides*			0	0.1	0	0	0	0
G		*Modiola caroliniana*	*		0.1	0.1	0.1	0	0	0
G		*Onopordum* spp.	*		0	0	0	0.1	0	0.5
G		*Opuntia stricta* var. *stricta*	*	*	0	0.1	0.1	0	0	0
G	FG	*Oxalis* spp.			0	0.1	0	0	0.1	0
G	GG	*Paspalidium distans*			0	0.1	0	0	0	0
G		*Paspalum dilatatum*	*	*	0	0	30	0.1	0	0.5
G	GG	*Pennisetum* spp.			20	0	0	0	0	0
G	FG	*Persicaria decipiens*			0	0	0	0	0.1	25
G		*Phytolacca octandra*	*		0	0.1	0	0	0	0.1
G		*Plantago lanceolata*	*		0	0.1	0.2	0.1	0.1	0
G	SG	*Rubus* spp.			0	0	0	3	0	0.1
G		*Senecio madagascariensis*	*	*	0	0.5	0.1	0	0.1	1
G		*Setaria pumila*	*		2	0	5	0.2	0.1	0
G		*Sida rhombifolia*	*		15	10	0	0.2	0.1	0.5
G		*Solanum linnaeanum*	*		0.1	3	0.1	0.1	0	0
G		*Solanum nigrum*	*		0.2	0.1	0	0.1	0	0.1
G		*Sonchus oleraceus*	*		0	0	0.1	0.1	0	0.1
G	GG	*Themeda triandra*			0	0	30	0	0	0
G		*Vicia sativa* subsp. *nigra*	*		0	0	0.2	0.1	0	0

Key: U = Upper, M= Middle, G = Ground. EG = Fern, FG = Forb, GG = Grass & grasslike, OG = Other, SG = Shrub, TG = Tree.

Table 36: Plot location data

Plot no.	PCT	Vegetation Zone	Condition	Zone	Easting	Northing	Bearing (°)
1	835	1	Moderate	56	296956	6253275	183
2	835	2	Low-Moderate	56	296308	6252714	84
3	835	2	Low-Moderate	56	296803	6252798	85
4	850	3	Low	56	296539	6252465	72
5	1232	4	Low	56	296866	6253285	8
6	1232	5	Moderate	56	296679	6252962	33

Table 37: Vegetation integrity data (Composition, Structure and function)

Composition (number of species)						
Plot no.	Tree	Shrub	Grass	Forb	Fern	Other
1	2	0	2	1	0	0
2	3	0	3	3	0	1
3	0	1	4	0	0	0
4	1	2	0	1	0	0
5	1	0	2	4	0	0
6	1	1	1	4	0	0

Structure (Total cover %)						
Plot no.	Tree	Shrub	Grass	Forb	Fern	Other
1	28.0	0.0	35.0	0.1	0.0	0.0
2	10.0	0.0	0.3	1.2	0.0	0.5
3	0.0	1.0	36.1	0.0	0.0	0.0
4	0.2	3.5	0.0	0.3	0.0	0.0
5	5.0	0.0	2.1	0.5	0.0	0.0
6	10.0	0.1	3.0	30.2	0.0	0.0

Function											
Plot no.	Large Trees (DBH > 50 cm)	Hollow trees	Litter Cover (%)	Length Fallen Logs (m)	Tree Stem 5-9 cm	Tree Stem 10-19 cm	Tree Stem 20-29 cm	Tree Stem 30-49 cm	Tree Stem 50-79 cm	Tree Regen	High Threat Weed Cover (%)
1	2	1	5	50	1	1	1	1	1	0	20.0
2	1	3	39	0	1	1	1	1	0	1	0.6
3	0	0	44	0	0	0	0	0	0	0	30.2

Function										
4	0	0	0	0	0	0	0	0	0	51.7
5	0	0	56	0	1	1	1	0	0	30.2
6	0	0	27	13	1	1	1	1	0	1	28.1

Note: For stem size classes: 0 = Absence, 1 = Presence.

Plot number	Photo
Plot 1	
2	

Plot number	Photo
3	
4	
5	

Plot number	Photo
6	

Appendix C: EPBC Act Likelihood of Occurrence

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database search. Only species listed under the EPBC Act were included in the assessment. Species listed only under the BC Act were assessed as part of determining credit species included in the BAMC. Five terms for the likelihood of occurrence of species are used in this report. This assessment was based on database or other records, presence or absence of suitable habitat, features of the proposal site, results of the site inspection and professional judgement. Some Migratory or Marine species identified from the Commonwealth database search have been excluded from the assessment, due to lack of habitat. The terms for likelihood of occurrence are defined below:

- "known" = the species was or has been observed on the site
- "likely" = a medium to high probability that a species uses the site
- "potential" = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur
- "unlikely" = a very low to low probability that a species uses the site
- "no" = habitat on site and in the vicinity is unsuitable for the species.

A test of significance was conducted for threatened species that were recorded within the study area or had a higher likelihood of occurring and were not recorded during the site visit. It is noted that some threatened fauna species that are highly mobile, wide ranging and vagrant may use portions of the study area intermittently for foraging. For these fauna species, the habitat present and likely to be impacted is not considered to be important to the threatened species, particularly in relation to the amount of similar habitat remaining in the surrounding landscape. As such, a test of significance in reference to Commonwealth legislation was not considered necessary.

The records column refers to the number of records occurring within 5 km of the study area, as provided by the Atlas of NSW Wildlife (BioNet) and Protected Matters Search Tool database search.

Information provided in the habitat associations' column has primarily been extracted (and modified) from the Commonwealth Species Profile and Threats Database and the NSW Threatened Species Profiles.

Table 38: Likelihood of occurrence assessment for threatened flora and fauna species

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	BioNet Records within 5 km	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact assessment required
FLORA							
Acacia bynoeana	Bynoe's Wattle	V	Found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west	0	No – lack of suitable habitat recorded within the development site,	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	BioNet Records within 5 km	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact assessment required
			to the Blue Mountains. Found in heath or dry sclerophyll forest on sandy soils.		species not observed during surveys, no local records.		
Acacia pubescens	Downy Wattle	V	*Acacia pubescens* occurs on the NSW Central Coast in Western Sydney, mainly in the Bankstown-Fairfield-Rookwood area and the Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. It is associated with Cumberland Plains Woodlands, Shale / Gravel Forest and Shale / Sandstone Transition Forest growing on clay soils, often with ironstone gravel.	7	No – lack of suitable habitat recorded within the development site, species not observed during surveys.	N/A	No
Allocasuarina glareicola	-	E	Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool.	0	No – lack of suitable habitat recorded within the development site, species not observed during surveys, no local records.	N/A	No
Cynanchum elegans	White-flowered Wax Plant	E	Restricted to eastern NSW, from Brunswick Heads on the north coast to Gerroa in the Illawarra region, and as far west as Merriwa in the upper Hunter River valley. Dry rainforest; littoral rainforest; *Leptospermum laevigatum-Banksia integrifolia* subsp. *integrifolia* (Coastal Tea-tree–Coastal Banksia) coastal scrub; *Eucalyptus tereticornis* (Forest Red Gum) or *Corymbia maculata* (Spotted Gum) open forest and woodland; and *Melaleuca armillaris* (Bracelet Honeymyrtle) scrub.	0	No - suitable habitat not recorded within the development site, species not observed during surveys, no local records.	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	BioNet Records within 5 km	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact assessment required
Genoplesium baueri	Bauer's Midge Orchid	E	Has been recorded from locations between Nowra and Pittwater and may occur as far north as Port Stephens. Dry sclerophyll forest and moss gardens over sandstone.	0	No – potential habitat available within development site, however species not observed during survey and no local records present.	Yes	No
Grevillea parviflora subsp. *parviflora*	Small-flower Grevillea	V	Heath and shrubby woodland to open forest on sandy or light clay soils usually over thin shales.	14	No – lack of suitable habitat recorded within the development site, species not observed during surveys.	N/A	No
Haloragis exalata subsp. *exalata*	Square Raspwort	V	Disjunct distribution in the Central Coast, South Coast and North Western Slopes botanical subdivisions of NSW. Protected and shaded damp situations in riparian habitats.	0	No - suitable habitat not recorded within the development site, species not observed during surveys, no local records.	N/A	No
Isotoma fluviatilis subsp. *fluviatilis*	-	X	Damp places on the Cumberland Plain, including freshwater wetland, grassland/alluvial woodland, and alluvial woodland/shale plains woodland.	7	No – lack of suitable habitat recorded within the development site, species not observed during surveys.	N/A	No
Persicaria elatior	Tall Knotweed	V	In south-eastern NSW recorded from Mt Dromedary, Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). Beside streams and lakes, swamp forest or disturbed areas.	0	No - suitable habitat not recorded within the development site, species not observed during surveys, no local records.	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	BioNet Records within 5 km	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact assessment required
Persoonia hirsuta	Hairy Geebung	E	Scattered distribution around Sydney, from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. Sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	0	No - suitable habitat not recorded within the development site, species not observed during surveys, no local records.	N/A	No
Persoonia nutans	Nodding Geebung	E	Northern populations: sclerophyll forest and woodland (Agnes Banks Woodland, Castlereagh Scribbly Gum Woodland and Cooks River / Castlereagh Ironbark Forest) on aeolian and alluvial sediments. Southern populations: tertiary alluvium, shale sandstone transition communities and Cooks River / Castlereagh Ironbark Forest.	13	No – lack of suitable habitat recorded within the development site, species not observed during surveys.	N/A	No
Pimelea curviflora var. *curviflora*	-	V	Confined to the coastal area of the Sydney and Illawarra regions between northern Sydney and Maroota in the north-west and Croom Reserve near Albion Park in the south. Woodland, mostly on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes.	0	No - suitable habitat not recorded within the development site, species not observed during surveys, no local records.	N/A	No
Pimelea spicata	Spiked Rice-flower	E	In western Sydney, *Pimelea spicata* occurs on an undulating topography of well-structured clay soils, derived from Wianamatta shale. It is associated with Cumberland Plains Woodland, in open woodland and grassland often in moist depressions or near creek lines. Has been located in disturbed areas that would have previously supported.	20	No – lack of suitable habitat recorded within the development site, species not observed during surveys.	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	BioNet Records within 5 km	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact assessment required
Pomaderris brunnea	Brown Pomaderris	V	Moist woodland or forest on clay and alluvial soils of flood plains and creek lines.	0	No - suitable habitat not recorded within the development site, species not observed during surveys, no local records.	N/A	No
Pterostylis gibbosa	Illawarra Greenhood	E	Known from a small number of populations in the Hunter region (Milbrodale), the Illawarra region (Albion Park and Yallah) and the Shoalhaven region (near Nowra). Open forest or woodland, on flat or gently sloping land with poor drainage.	0	No - suitable habitat not recorded within the development site, species not observed during surveys, no local records.	N/A	No
Pterostylis saxicola	Sydney Plains Greenhood	E	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. Small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines, adjacent to sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	0	No – potential habitat recorded within the development site, however species not observed during surveys and no local records.	N/A	No
Pultenaea parviflora	-	V	Dry sclerophyll forest, especially Castlereagh Ironbark Forest, Shale Gravel Transition Forest and transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland.	97	No – lack of suitable habitat recorded within the development site, species not observed during surveys.	N/A	No
Syzygium paniculatum	Magenta Lilly Pilly	V	Only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. Subtropical and littoral rainforest on gravels, sands, silts and clays.	0	No - suitable habitat (rainforest) not recorded within the development site, species not observed during surveys, no local records.	N/A	No
Thesium australe	Austral Toadflax	V	In eastern NSW it is found in very small populations	0	No - suitable habitat not recorded within	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	BioNet Records within 5 km	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact assessment required
			scattered along the coast, and from the Northern to Southern Tablelands. Grassland on coastal headlands or grassland and grassy woodland away from the coast.		the development site, species not observed during surveys, no local records.		
Thesium australe	Austral Toadflax	V	This species occupies a narrow coastal area between Bulahdelah and Conjola State Forests in NSW. On the Central Coast, it occurs on Quaternary gravels, sands, silts and clays, in riparian gallery rainforests and remnant littoral rainforest communities. In the Ourimbah Creek valley, S. paniculatum occurs within gallery rainforest with Alphitonia excelsa, Acmena smithii, Cryptocarya glaucescens, Toona ciliata, Syzygium oleosum with emergent Eucalyptus saligna. At Wyrrabalong NP, S. paniculatum occurs in littoral rainforest as a co-dominant with Ficus fraseri, Syzygium oleosum, Acmena smithii, Cassine australe, and Endiandra sieberi.	0	No - suitable habitat not recorded within the development site, species not observed during surveys, no local records.	N/A	No
FAUNA							
Amphibians							
Heleioporus australiacus	Giant Burrowing Frog	V	South eastern NSW and Victoria, in two distinct populations: a northern population in the sandstone geology of the Sydney Basin as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. Heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.	0	No – suitable habitat not present within the development site, no local records.	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	BioNet Records within 5 km	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact assessment required
Litoria aurea	Green and Golden Bell Frog	V	Since 1990, recorded from about 50 scattered sites within its former range in NSW, from the north coast near Brunswick Heads, south along the coast to Victoria. Records exist west to Bathurst, Tumut and the ACT region. Marshes, dams and stream-sides, particularly those containing *Typha* sp. (bullrushes) or *Eleocharis* sp. (spikerushes). Some populations occur in highly disturbed areas.	1	Potential, farm dams may provide potential habitat for this species.	Yes	Yes
Litoria raniformis	Growling Grass Frog	V	Permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. Also found in irrigated rice crops.	0	No – suitable habitat not present within the development site, no local records.	N/A	No
Aves							
Actitis hypoleucos	Common Sandpiper	M	Summer migrant. In NSW, widespread along coastline and also occurs in many areas inland. Coastal wetlands and some inland wetlands, especially muddy margins or rocky shores. Also estuaries and deltas, lakes, pools, billabongs, reservoirs, dams and claypans, mangroves.	0	Unlikely – potential habitat present within the development site, no local records	Yes	No
Anthochaera phrygia	Regent Honeyeater	CE	Inland slopes of south-east Australia, and less frequently in coastal areas. In NSW, most records are from the North-West Plains, North-West and South-West Slopes, Northern Tablelands, Central Tablelands and Southern Tablelands regions; also recorded in the Central Coast and Hunter Valley regions. Eucalypt	2	Likely – suitable foraging habitat detected within the development site. Development site not within DPIE mapped areas (as accessed on BOAMS on 6 July 2020).	Yes (foraging only)	Yes

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	BioNet Records within 5 km	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact assessment required
			woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of *Casuarina cunninghamiana* (River Oak).				
Apus pacificus	Fork-tailed Swift	M	Recorded in all regions of NSW. Riparian woodland, swamps, low scrub, heathland, saltmarsh, grassland, Spinifex sandplains, open farmland and inland and coastal sand-dunes.	1	Unlikely – suitable habitat not present within the development site.	N/A	No
Apus pacificus	Fork-tailed Swift	C, J, K	Sometimes travels with Needletails. Varied habitat with a possible tendency to more arid areas but also over coasts and urban areas.	2	Unlikely – suitable habitat not present within the development site.	N/A	No
Ardea ibis	Cattle Egret	Mar	Grasslands, wooded lands and terrestrial wetlands.	29	Potential – suitable habitat present within the development site.	Yes	No – not required of Marine listed species
Botaurus poiciloptilus	Australasian Bittern	E	Found over most of NSW except for the far north-west. Permanent freshwater wetlands with tall, dense vegetation, particularly *Typha* sp. (bullrushes) and *Eleocharis* sp. (spikerushes).	0	Unlikely – suitable habitat not present within the development site, no local records.	N/A	No
Calidris acuminata	Sharp-tailed Sandpiper	M	Summer migrant. Widespread in most regions of NSW, especially in coastal areas, but sparse in the south-central Western Plain and east Lower Western Regions. Shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.	1	Unlikely – suitable habitat not present within the development site.	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	BioNet Records within 5 km	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact assessment required
Calidris ferruginea	Curlew Sandpiper	CE, M	Occurs along the entire coast of NSW, and sometimes in freshwater wetlands in the Murray-Darling Basin. Littoral and estuarine habitats, including intertidal mudflats, non-tidal swamps, lakes and lagoons on the coast and sometimes inland. Littoral and estuarine habitats, including intertidal mudflats, non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	0	Unlikely – suitable habitat not present within the development site, no local records.	N/A	No
Calidris melanotos	Pectoral Sandpiper	M	Summer migrant to Australia. Widespread but scattered in NSW. East of the Great Divide, recorded from Casino and Ballina, south to Ulladulla. West of the Great Divide, widespread in the Riverina and Lower Western regions. Shallow fresh to saline wetlands, including coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	0	Unlikely – suitable habitat not present within the development site, no local records.	N/A	No
Dasyornis brachypterus	Eastern Bristlebird	E	Central and southern populations inhabit heath and open woodland with a heathy understorey. In northern NSW, habitat comprises open forest with dense tussocky grass understorey.	0	Unlikely – suitable habitat not present within the development site, no local records.	N/A	No
Gallinago hardwickii	Latham's Snipe	C, J, K	A variety of permanent and ephemeral wetlands, preferring open freshwater wetlands with nearby cover. Occupies a variety of vegetation around wetlands including wetland grasses and open wooded swamps. Can	4	Likely – suitable habitat present within the development site.	Yes	yes

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	BioNet Records within 5 km	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact assessment required
			occur in habitats that have saline or brackish water, such as saltmarsh, mangrove creeks, around bays and beaches, and at tidal rivers. They are regularly recorded in or around modified or artificial habitats including pasture, ploughed paddocks, irrigation channels and drainage ditches and sewage and dairy farms. They can also occur in various sites close to humans or human activity (e.g. near roads, railways, airfields, commercial or industrial complexes).				
Grantiella picta	Painted Honeyeater	V	Widely distributed in NSW, predominantly on the inland side of the Great Dividing Range but avoiding arid areas. Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests.	0	No – suitable habitat not present within the development site, no local records.	N/A	No
Haliaeetus leucogaster	White-bellied Sea-Eagle	C	Freshwater swamps, rivers, lakes, reservoirs, billabongs, saltmarsh and sewage ponds and coastal waters. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest and urban areas.	6	Unlikely – suitable habitat not present within the development site.	N/A	No
Hirundapus caudacutus	White-throated Needletail	C, J, K	All coastal regions of NSW, inland to the western slopes and inland plains of the Great Divide. Occur most often over open forest and rainforest, as well as heathland, and remnant vegetation in farmland.	0	Unlikely – potential habitat present within the development site, no local records	Yes	No
Lathamus discolor	Swift Parrot	CE	Migrates from Tasmania to mainland in Autumn-Winter. In NSW, the species mostly occurs on the coast and south west slopes. Box-ironbark forests and woodlands.	0	Likely – suitable foraging habitat detected within the development site. Development site not within DPIE	Yes (foraging only)	Yes

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	BioNet Records within 5 km	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact assessment required
					mapped breeding areas (as confirmed by the DPIE BAM support 23 July 2020).		
Monarcha melanopsis	Black-faced Monarch	M	In NSW, occurs around the eastern slopes and tablelands of the Great Divide, inland to Coutts Crossing, Armidale, Widden Valley, Wollemi National Park and Wombeyan Caves. It is rarely recorded farther inland. Rainforest, open eucalypt forests, dry sclerophyll forests and woodlands, gullies in mountain areas or coastal foothills, Brigalow scrub, coastal scrub, mangroves, parks and gardens.	0	Unlikely – potential habitat present within the development site, no local records	Yes	No
Motacilla flava	Yellow Wagtail	M	Regular summer migrant to mostly coastal Australia. In NSW recorded Sydney to Newcastle, the Hawkesbury and inland in the Bogan LGA. Swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land, lawns.	0	Unlikely – potential habitat present within the development site, no local records	Yes	No
Myiagra cyanoleuca	Satin Flycatcher	M	In NSW, widespread on and east of the Great Divide and sparsely scattered on the western slopes, with very occasional records on the western plains. Eucalypt-dominated forests, especially near wetlands, watercourses, and heavily-vegetated gullies.	0	Unlikely – potential habitat present within the development site, no local records	Yes	No
Numenius madagascariensis	Eastern Curlew	CE, M	Summer migrant to Australia. Primarily coastal distribution in NSW, with some scattered inland records. Estuaries, bays, harbours, inlets and coastal lagoons, intertidal mudflats or sandflats, ocean beaches, coral	0	Unlikely – potential habitat present within the development site, no local records	Yes	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	BioNet Records within 5 km	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact assessment required
			reefs, rock platforms, saltmarsh, mangroves, freshwater/brackish lakes, saltworks and sewage farms.				
Rostratula australis	Australian Painted Snipe	E	In NSW most records are from the Murray-Darling Basin. Other recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys.	1	Unlikely -limited habitat present within the development site, limited local records	Yes	No
Rjipidura rufifrons	Rufous Fantail	M	Wet sclerophyll forests, subtropical and temperate rainforests. Sometimes drier sclerophyll forests and woodlands.	0	Unlikely – suitable habitat not present within the development site, no local records.	N/A	No
Tringa nebularia	Common Greenshank	M	Summer migrant to Australia. Recorded in most coastal regions of NSW; also widespread west of the Great Dividing Range. Found in terrestrial wetlands and sheltered coastal habitats.	0	Unlikely – suitable habitat not present within the development site, no local records.	N/A	No
Insects							
Synemon plana	Golden Sun Moth	CE	NSW populations are found in the area between Queanbeyan, Gunning, Young and Tumut. Natural Temperate Grasslands and grassy Box-Gum Woodlands in which groundlayer is dominated by *Austrodanthonia* spp. (wallaby grasses).	0	Unlikely – suitable habitat not present within the development site, no local records.	N/A	No
Mammals							
Chalinolobus dwyeri	Large-eared Pied Bat	V	Recorded from Rockhampton in Qld south to Ulladulla in NSW. Largest concentrations of populations occur in the sandstone escarpments of the Sydney basin and the NSW north-west slopes. Wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of	0	Unlikely – suitable habitat not present within the development site, no local records.	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	BioNet Records within 5 km	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact assessment required
			rainforests and sandstone outcrop country.				
Dasyurus maculatus	Spotted-tailed Quoll	E	Found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Qld. Rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	0	Unlikely – suitable habitat not present within the development site, no local records.	N/A	No
Petauroides volans	Greater Glider	V	Eastern Australia, from the Windsor Tableland in north Queensland through to central Victoria (Wombat State Forest). Eucalypt forests and woodlands. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows.	0	No – preferred habitat not present within the development site, no local records.	N/A	No
Petrogale penicillata	Brush-tailed Rock-wallaby	V	In NSW they occur from the Qld border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges.	0	No – preferred habitat not present within the development site, no local records.	N/A	No
Phascolarctos cinereus	Koala	V	In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. There are sparse and possibly disjunct populations in the Bega District, and at several sites on the southern tablelands. Eucalypt woodlands and forests.	3	Unlikely – potential habitat & feed trees present within the development site, but site is within largely cleared & disturbed rural/ semi industrial area	Yes (foraging only)	Yes
Pseudomys novaehollandiae	New Holland Mouse	V	Fragmented distribution across eastern NSW. Open heathlands, woodlands and forests with a heathland	0	Unlikely – suitable habitat not present within the	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	BioNet Records within 5 km	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact assessment required
			understorey, vegetated sand dunes.		development site, no local records.		
Pteropus poliocephalus	Grey-headed Flying-fox	V	Along the eastern coast of Australia, from Bundaberg in Qld to Melbourne in Victoria. Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	31	Seasonal foraging habitat available within the site. No camps observed within study area.	Yes (foraging only)	Yes

Appendix D: Biodiversity credit report

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00021253/BAAS19048/20/00021831

Proposal Name
200 Aldington Road Kemps Creek

BAM data last updated *
20/08/2020

Assessor Name
Kirsten Velthuis

Assessor Number
BAAS19048

BAM Data version *
30

Proponent Names

Report Created
30/09/2020

BAM Case Status
Open

Assessment Revision
2

Assessment Type
Part 4 Developments (General)

Date Finalised
To be finalised

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

Potential Serious and Irreversible Impacts

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

Nil

Additional Information for Approval

PCTs With Customized Benchmarks

BAM Biodiversity Credit Report (Like for like)

No Changes

Predicted Threatened Species Not On Site

Name
Haliaeetus leucogaster / White-bellied Sea-Eagle
Pandion cristatus / Eastern Osprey
Chthonicola sagittata / Speckled Warbler

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	Number of credits to be retired
835-Cumberland riverflat forest	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	1.3	16.00
850-Cumberland shale hills woodland	Cumberland Plain Woodland in the Sydney Basin Bioregion	0.1	0.00
1232-Coastal freshwater swamp forest	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	1.6	7.00

835-Cumberland riverflat forest

Like-for-like credit retirement options

Name of offset trading group	Trading group	HBT	IBRA region

	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 686, 828, 835, 839, 941, 971, 1064, 1108, 1109, 1212, 1228, 1232, 1293, 1318, 1326, 1386, 1522, 1556, 1594, 1618, 1646, 1648, 1720, 1794	-	Yes	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
850-Cumberland shale hills woodland	**Like-for-like credit retirement options**			
	Name of offset trading group	Trading group	HBT	IBRA region
	Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 849, 850	-	No	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1232-Coastal freshwater swamp forest	**Like-for-like credit retirement options**			
	Name of offset trading group	Trading group	HBT	IBRA region

	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 915, 916, 917, 918, 919, 1125, 1230, 1232, 1234, 1235, 1236, 1726, 1727, 1728, 1729, 1731, 1800, 1808	-	No	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Area	Credits
Litoria aurea / Green and Golden Bell Frog	0.9	5.00
Myotis macropus / Southern Myotis	3.0	29.00

Litoria aurea/ Green and Golden Bell Frog	1232_Low	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Litoria aurea/Green and Golden Bell Frog	Any in NSW

Myotis macropus/ Southern Myotis	1232_Low	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Myotis macropus/Southern Myotis	Any in NSW
	1232_Moderate	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Myotis macropus/Southern Myotis	Any in NSW
	835_Low_mod	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Myotis macropus/Southern Myotis	Any in NSW
	835_Moderate	**Like-for-like credit retirement options**	
		Spp	IBRA region

		Myotis macropus/Southern Myotis	Any in NSW
	850_Low	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Myotis macropus/Southern Myotis	Any in NSW

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