Kemps Creek Logistics
Biodiversity Development Assessment Report

ESR

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Project Manager	Belinda Failes
Prepared by	Belinda Failes (#BAAS18159) 
Reviewed by	Meredith Henderson (BAAS17001)
Approved by	David Bonjer
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Template 2.8.1

Executive Summary

Eco Logical Australia Pty Ltd (ELA) was engaged by ESR to prepare a Biodiversity Development Assessment Report (BDAR) for a proposed development at three parcels of land; 59-62 Abbotts Road, 63 Abbotts Road and 290 – 308 Aldington Road, Kemps Creek (the 'development site') in the Penrith local government area. ESR propose to lodge a State Significant Development (SSD) application for a 30 ha industrial estate within the recently rezoned 'Mamre Road Precinct'.

This report has been prepared to meet the requirements of the Biodiversity Assessment Method 2017 (BAM) established under Section 6.7 of the NSW *Biodiversity Conservation Act 2016* (BC Act). The Secretary's Environmental Assessment Requirements have been issued and the preparation of a BDAR is required.

The BDAR describes the biodiversity values within the 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 site. The report provides the number of biodiversity credits that would be required to be retired to offset the residual loss of biodiversity from the impacts of the development as described.

The proposed development involves direct 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 vegetation within the development site has been previously cleared for agricultural purposes including market gardens, chicken sheds and grazing for livestock. A portion of the existing driveway and road verge have been planted with native vegetation which at times represents locally indigenous species. An assessment in accordance with Appendix D of the BAM 2020 was undertaken and determined that the planted native vegetation does not require assessment of impacts under the BAM.

Remnant trees and derived native grasslands were also present within the site.

Two Plant Community Types (PCT) have been mapped within the development site, *PCT 849 Cumberland Shale Plains Woodland* and *PCT 1071 Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion.*

PCT 849 Cumberland Shale Plains Woodland is listed as a component of the critically endangered ecological community *Cumberland Plain Woodland in the Sydney Basin Bioregion* which is listed under the BC Act. The vegetation was in poor condition and did not satisfy listing under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The proposed industrial development will result in the removal of 0.70 ha of planted native vegetation and 3.51 ha of native vegetation (PCT 849). No ecosystem credits were required for the proposed development.

A small amount of semi-aquatic and fringing native vegetation around the dams will be directly affected resulting in the removal of 0.07 ha of *PCT 1071 Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion.* The vegetation integrity score was low (8.3) and

therefore, this PCT does not require an offset. Similarly, *PCT 849 Cumberland Shale Plains Woodland* had a low integrity score and did not require an offset.

The proposed development has one Serious and Irreversible Impact (SAII) candidate entity, Cumberland Plain Woodland. The proposed development will impact upon this SAII entity. An SAII assessment has been undertaken for this community, however, there are currently no thresholds for whether the proposed works will trigger a SAII. Full details are documented in this report.

Targeted surveys were conducted for one species credit species, *Meridolum corneovirens* (Cumberland Plain Land Snail). No individuals were located. It was determined that the vegetation in the development site does not contain suitable habitat for this species and therefore, no species credits are required.

One Matters of National Environmental Significance have potential to be affected by the proposal: *Pteropus poliocephalus* (Grey-headed Flying-Fox) An assessment of the Commonwealth Significant Impact Criteria under the EPBC Act was undertaken for this entity and concluded the works are unlikely to have a significant impact on Matters of National Environmental Significance.

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Abbreviations

Abbreviation	Description
AOBV	Areas of Outstanding Biodiversity Value
BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Credit Calculator
BC Act	NSW *Biodiversity Conservation Act 2016*
BC Regulation	NSW *Biodiversity Conservation Regulation 2017*
BDAR	Biodiversity Development Assessment Report
CEEC	Critically Endangered Ecological Community
DA	Development application
DAWE	Commonwealth Department of Agriculture, Water and Environment (formerly DoEE)
DCP	Development Control Plan
DNG	Derived native grassland
DoEE	Commonwealth Department of Environment and Energy (now DAWE)
DPIE	NSW Department of Planning, Industry and Environment (formerly OEH)
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
LEP	Local Environmental Plan
LGA	Local Government Area
LLS	Local Land Service
MNES	Matters of National Environmental Significance
NSW	New South Wales
NOW	NSW Office of Water
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Type
SEPP	State Environmental Planning Policy
SSD	State Significant Development
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 Belinda Failes, an accredited person (BAAS18159) under the NSW *Biodiversity Conservation Act 2016* (BC Act). The report was peer reviewed by Meredith Henderson (BAAS17001) who is also an accredited person under the BC Act.

A list of key terms and their definitions are provided in Appendix A.

1.1.1 Background and development layout

The development site consists of the following parcels of land (Figure 1):

- 59-62 Abbotts Road
- 63 Abbotts Road
- 290 – 308 Aldington Road, Kemps Creek.

ESR propose to develop a 30 ha industrial estate within the recently zoned Mamre Road Precinct. The study area is zoned IN1 General Industrial under the State Environmental Planning Policy (Western Sydney Employment Area) Amended 2020.

The proposed development includes construction of seven industrial buildings, internal roads, car parks, stormwater and drainage work including a stormwater detention basin and landscaping (Figure 1).

1.1.2 General description of the development site

The development site consists of three parcels of land currently, or until recently, utilised for farming including market gardens, chicken sheds and grazing of livestock. Planted native canopy species have been established along the perimeter and within one of the parcels of land. Scattered remnant trees also feature within the development site. A large patch of native grasses was located along the eastern boundary of the development site. Farm dams with limited fringing vegetation were located within the development site. The remaining areas consists of cultivated lands or exotic grasses.

There are several built structures within the development site which will be removed as part of the proposed redevelopment. The development site is not mapped on the Biodiversity Values Map (date accessed 9 December 2020).

This report includes two base maps, the Site Map (Figure 2) and the Location Map (Figure 3).

1.1.3 Sources of information used

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

- BioNet Vegetation Classification System Version 3.1
- BioNet / Atlas of NSW Wildlife 5 km database search (Department of Planning, Industry and Environment DPIE 2020a) (accessed December 2020)
- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool 5 km database search (Department of Agriculture, Water and Environment DAWE 2020a) (accessed 9 December 2020)

- National Flying-Fox Monitoring data (DAWE 2020b) (accessed 9 December 2020)
- BioNet threatened biodiversity data collection
- NSW Government BioNet Vegetation Classification
- Threatened species profiles and recovery plans (DAWE 2020c and DPIE 2020b)
- Biodiversity Assessment Methodology Calculator (BAMC) version 32
- NSW Government Biodiversity Values Map (DPIE 2020c) (accessed on 9 December 2020)
- Request for Planning Secretary's Environmental Assessment Requirements (Ethos Urban 2020)
- Mamre Road – flood, riparian corridor and integrated water cycling management strategy (Sydney Water 2020)
- Previous vegetation mapping datasets
    - Office of Environment and Heritage (OEH) (2013)
- Previous ecological constraints assessments:
    - Sclerophyll Flora Surveys and Research 2019
    - ELA 2019.

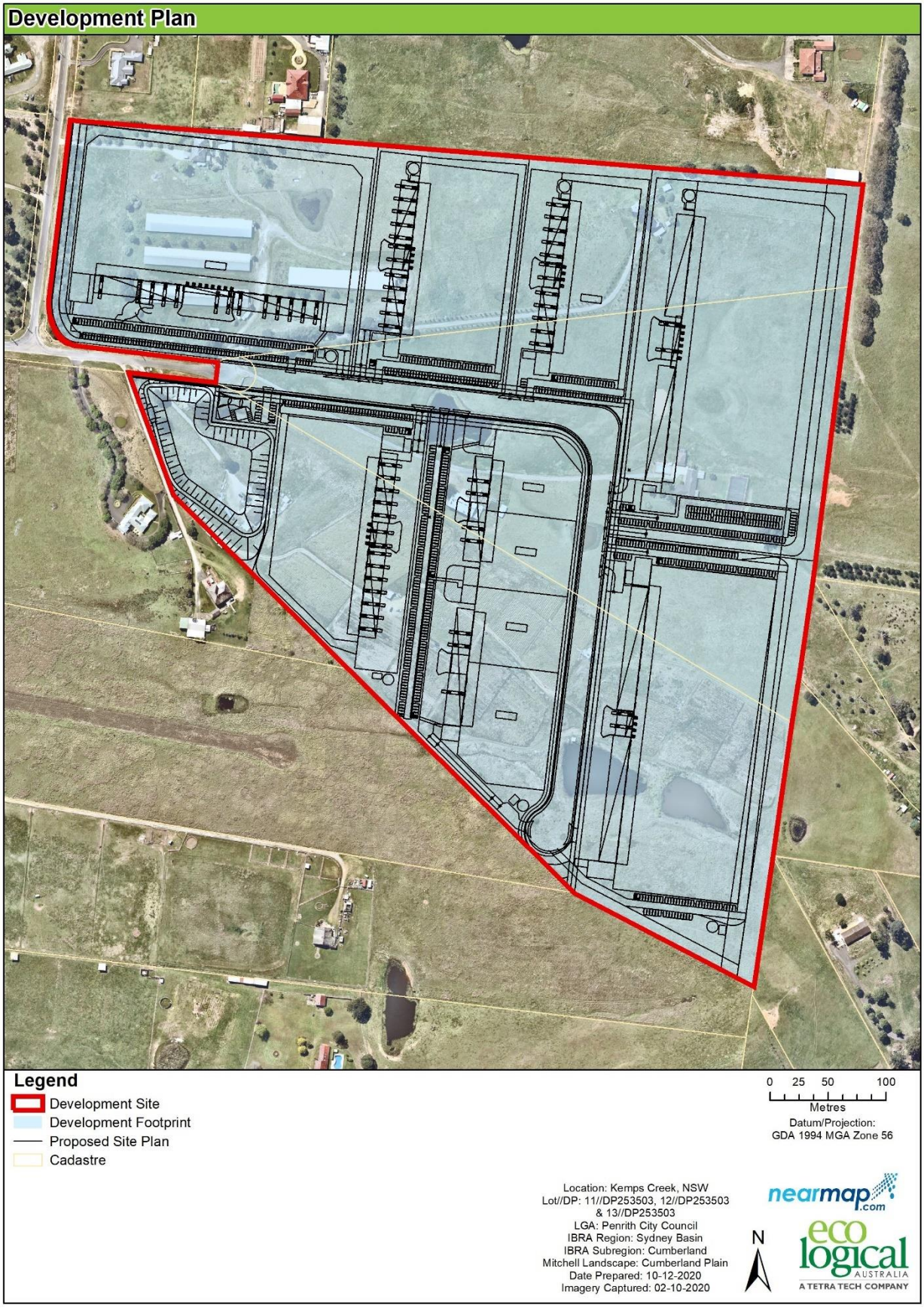

Figure 1: Development footprint

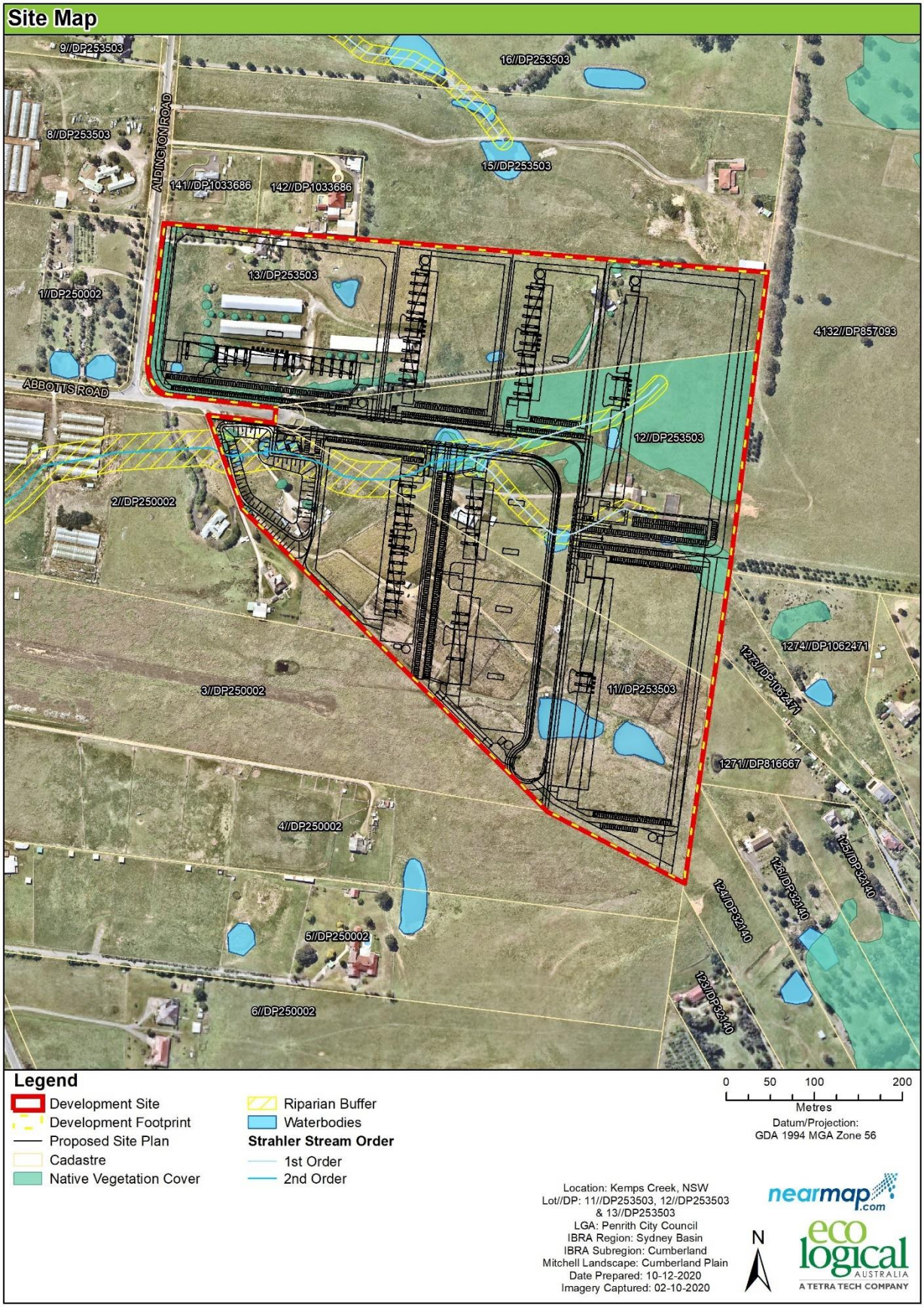

Figure 2: Site Map

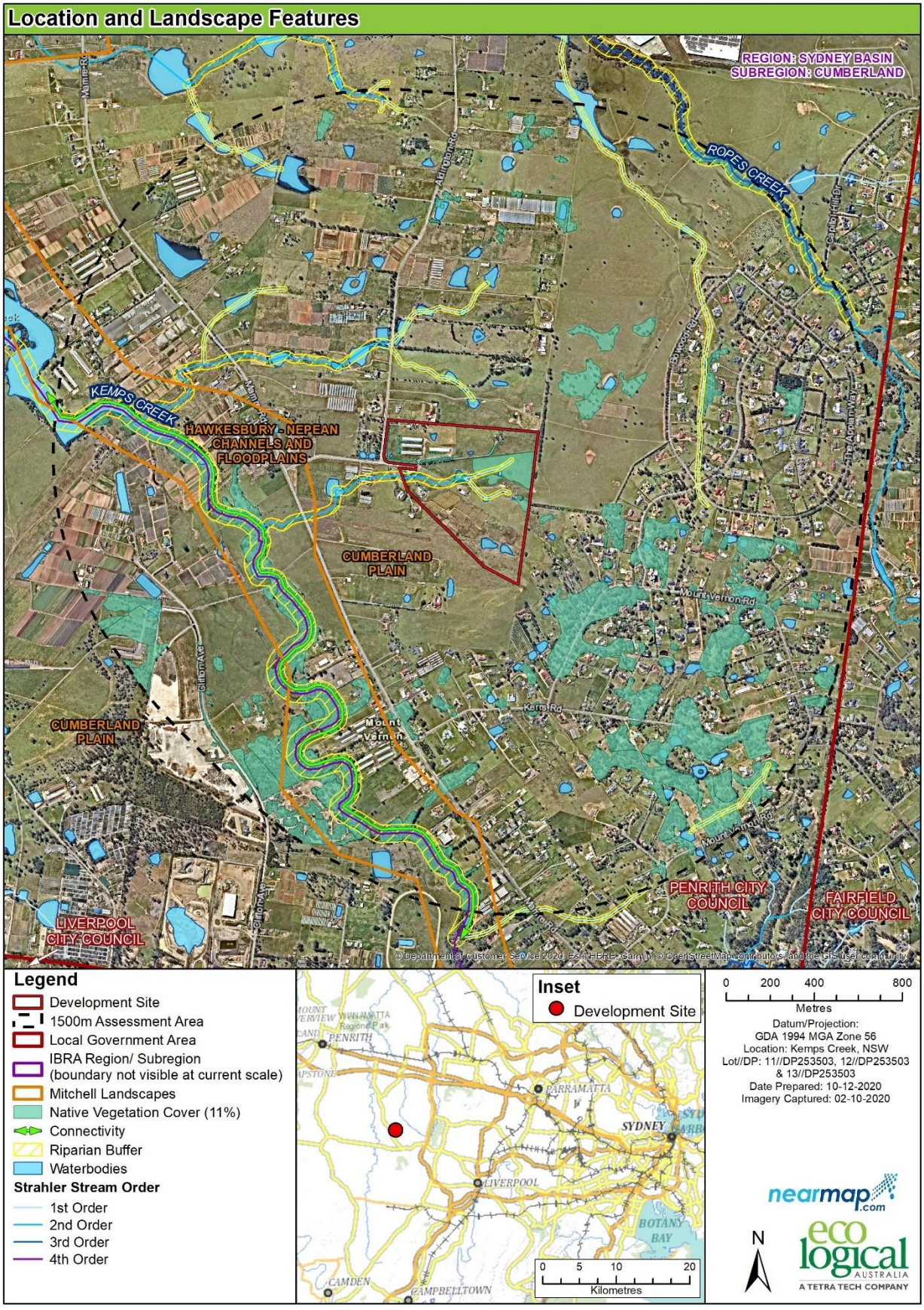

Figure 3: Location Map

1.2 Legislative context

Table 1: Legislative context

Name	Relevance to the project
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.
Environmental Planning and Assessment Act 1979 (EP&A Act)	The proposed development exceeds the Capital Investment Value so the works will be assessed as a State Significant Development (SSD) under Part 4.1 of the EP&A Act. Secretary's Environmental Assessment Requirements (SEARS) have been issued (SSD 9138102) 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).*
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 *State Environmental Planning Policy (SEPP) (Vegetation in Non-Rural Areas) 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. The Mamre Road Precinct includes a riparian corridor strategy which has been development for the Precinct The waterways across the Mamre Road Precinct have been ground truth-ed to determine the presence of riparian lands and those areas to be retained. The Strahler streams located within the development site are not mapped as riparian areas to be retained as part of the proposed Mamre Road Precinct.
Environmental Planning Instruments	
State Environmental Planning Policy (SEPP) (Vegetation in Non-Rural Areas) 2017 (Vegetation SEPP)	The Vegetation SEPP applies to development in urban areas and environmental conservation zones that do not require consent. As the project requires consent under the EP&A Act, the Vegetation SEPP does not apply.
State Environmental Planning Policy (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.

Name	Relevance to the project
(Coastal Management SEPP)	
State Environmental Planning Policy (Koala Habitat Protection) 2020	The proposed development is not located within a local government area to which the SEPP (Koala Habitat Protection) 2020 applies.
SEPP (Western Sydney Employment Area) Amendment 2020	(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. The development site is located within Precinct 12 (Mamre Road) on the Land Application Map. The development site is zone IN1 General Industrial under the SEPP. The proposed development is consistent with the zoning.
Mamre Road Precinct Draft Development Control Plan (November 2020)	The Draft DCP contains provisions relating to Biodiversity (Section 2.2.3) and Riparian Lands (Section 2.5). The Draft DCP contains mapped riparian corridor and Biodiversity Areas which require protection. These areas are not located within the development site.
Cumberland Plain Conservation Plan	NSW *Department of Planning, infrastructure and Environment* (DPIE) is undertaking strategic conservation planning in Western Sydney to balance the priorities of people and biodiversity at a landscape scale. The Plan will identify how any impacts to biodiversity from projected growth in Western Sydney will be addressed. The Cumberland Plain Conservation Plan is expected to meet legislative requirements for strategic biodiversity certification under the BC Act 2016 and EPBC Act 1999. The draft plan was on public exhibition in 2020. The development site is located within areas mapped to be certified, however the plans have yet to be gazetted. The project is consistent with the proposed use of the land under the Cumberland Plain Conservation Plan.
Penrith City Council Local Environmental Plan (LEP) 2010	The development site is located within the Western Sydney Employment Area and as such the LEP does not apply.
Penrith City Council 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

1.3 Landscape features

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

The development site is 32.06 ha in size and falls wholly within the Sydney Basin IBRA region and Cumberland IBRA subregion (Figure 3). The assessment area, defined as the area within the 1,500 m buffer around the development site, also falls within the Sydney Basin IBRA and Cumberland IBRA subregion (Figure 3).

1.3.2 Mitchell Landscapes

The majority of the development site falls within the Cumberland Plain Mitchell Landscape (DECC 2002) as outlined in Table 2. A small portion of the assessment area is covered by the Hawkesbury – Nepean Channels and Floodplains landscape (Figure 3).

Table 2: Mitchell Landscapes (DECC 2002)

Mitchell landscape	Description	% Cleared
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 landscape). 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 valley Woodlands and open forest of *Eucalyptus moluccana* (Grey Box), *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus crebra* (Narrow-leaved Ironbark), *Eucalyptus eugenioides*, *Eucalyptus amplifolia* (Cabbage Gum) and *Angophora subvelutina*. Grassy to shrubby understorey often dominated by *Bursaria spinosa*, poorly drained valley floors, often salt affected with *Casuarina glauca* and *Melaleuca* sp.	89

1.3.3 Native vegetation extent

The extent of native vegetation within the development site and the assessment area is provided in Table 3. This area was calculated using the existing OEH (2013) vegetation datasets. Native vegetation for the purpose of this step has included native/exotic urban vegetation but did not include weeds.

Table 3: Native vegetation extent

Location	Area (ha)	Extent of native vegetation (ha)
Development footprint	32.06	4.29
Assessment area	1099.64	117.81

1.3.4 Rivers and streams

The development site has two mapped first order Strahler streams which intersect and merge into a second order stream (Table 4 and shown in Figure 2). These streams meander for one kilometre until they converge with Kemps Creek to west of the development site.

Table 4: Rivers and streams

River/stream	Order	Riparian buffer
Tributaries of Kemps Creek	1st	10 m either side of the channel

1.3.5 Wetlands

The development site does not contain any mapped important or local wetlands. However, the site contains several artificial / constructed dams which fit the description of a 'wetland' under the BAM.

The BAM defines a wetland; as: "*an area of land that is wet by surface water or ground water, or both, for long enough periods that the plants and animals in it are adapted to, and 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*."

One of the dams connects to the unnamed 1st Strahler order stream (Figure 2). The dams do not appear on any local or SEPP Coastal Wetlands mapping. For the purpose of this assessment, the artificial dams were entered as a landscape feature in the development footprint into the BAM Credit Calculator (BAMC).

1.3.6 Connectivity features

The development site contains very limited connectivity features within the development site. The development site is located within a highly fragmented environment. Vegetation is limited to roadside vegetation or scattered remnant trees or plantings. Connectivity was mapped along Kemps Creek in the west outside of the development site as shown in Figure 2.

Fragmented connections may remain for highly mobile species such as birds or bats, this includes flyways for migratory birds and bat species moving through the landscape and to the development site. For the purpose of this assessment, the connectivity features 'roadside vegetation' were entered into the BAMC.

Table 5: Connectivity features

Connectivity feature name	Feature type
Roadside vegetation	Connectivity feature

1.3.7 Areas of geological significance and soil hazard features

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

1.3.8 Site context

1.3.8.1 Method applied

The site based method has been applied to this development.

1.3.8.2 Percent native vegetation cover in the landscape

The current percent native vegetation cover in the landscape was assessed in a Geographic Information System (GIS) using aerial imagery sourced from NSW Public Imagery using increments of 5%. The percent native vegetation cover within the assessment area (1099.64 ha) is 10.71% (117.81 ha) (Table 3). There are no differences between the mapped vegetation extent and the aerial imagery based on OEH 2013 vegetation mapping.

1.3.8.3 Patch size

Patch size was calculated using available vegetation mapping for all patches of intact native vegetation on and adjoining the development site. There was one patch size (4.48 ha) for the development site. The patch size range was < 5 ha.

1.4 Native vegetation

1.4.1 Literature review and previous ecological surveys

A desktop and literature review were conducted prior to field validation. Previous ecological surveys have been undertaken in the development site by Sclerophyll Flora Surveys and Research (2019) and ELA (2019). A summary of the ecological survey and results is provided in Table 6.

Table 6: Summary of previous ecological surveys conducted within the development site

Author, report and date	Survey	Results

Sclerophyll Flora Surveys and Research
Ecological constraints for 59-63 Abbotts Road, Kemps Creek
July 2019
	The two southern parcels of land (21 ha in size) were surveyed in July 2019 over 6 hours. Surveys included a general travers of vegetation.
	Paddock tree assessment under the BAM 2019 was applied.
	No targeted surveys were conducted.
		Surveys recorded two PCTs:
		PCT 850 Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion which is listed under the BC Act. The vegetation did not satisfy listing under the EPBC Act.
		PCT 1071 Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion around the farm dams. This PCT did not satisfy listing as part of a TEC.
		The surveys did not record any threatened flora species and has assumed that no habitat for threatened flora species occurs within the site due to historical land use.
		No threatened fauna species were recorded, however potential habitat for threatened species was noted.
		Potential habitat for threatened:
		• *Meridolum corneovirens* Cumberland Plain Land Snail
		• Threatened microbat species
		  ○ *Scoteanax rueppellii* (Greater broad nosed Bat)
		  ○ *Myotis macropus* (Southern Myotis)
		  ○ *Micronomus norfolkensis* (Eastern Freetail-bat)
		  ○ *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
		• *Pteropus poliocephalus* (Grey-headed Flying-fox)
		• *Daphoenositta chrysoptera* (Varied Sittella)

Author, report and date	Survey	Results
		• *Artamus cyanopterus cyanopterus* (Dusky Woodswallow) • *Litoria aurea* (Green and Golden Bell Frog).
ELA Ecological constraints for 290-309 Aldington Road, Kemps Creek October 2019	The northern parcel of land was surveyed over 8 hours. Survey included a traverse of the area to map and record PCTs. One vegetation integrity plot was conducted. The traverse of the site included surveys for threatened flora species.	The vegetation contained planted native and exotic vegetation. A small patch of planted native species *Melaleuca styphelioides, Casuarina glauca* and *Eucalyptus paniculata*. No remnant vegetation was recorded within the site. No threatened species were recorded. Habitat features include farm dams and one tree hollow in an exotic tree.

1.4.2 Survey effort

An ecological assessment was conducted by Belinda Failes on 290-308 Aldington Road on 10 October2020. A detailed ecological assessment was conducted by Nicole McVicar over the entire development site on 7 December 2020. Another site visit was conducted by Belinda Failes on 16 December 2020. The field surveys were conducted to validate the Plant Community Types (PCT), their condition and conduct vegetation integrity plots in accordance with the Biodiversity Assessment Method (BAM) (Figure 4).

A total of six full-floristic and vegetation integrity plots were conducted to confirm vegetation type and condition (Table 7 and Figure 5).

Due to the linear nature of vegetation zones Plots 1, 2 and 3 were undertaken using a modified version of the BAM plot. The structure and function plots were modified to a 10 m x 100 m plot and the composition plot modified to a 40 m x 10m plot, rather than the standard 50 m x 20 m and 20 m x 20 m plot.

Targeted surveys for threatened flora species and one threatened fauna species, *Meridolum corneovirens* (Cumberland Plain Land Snail) was conducted in suitable habitat. More information is provided in Section 1.5.4 and displayed on Figure 7.

All field data collected at full-floristic and vegetation integrity plots is included in Appendix B.

Table 7: Full-floristic and vegetation integrity plots

Veg Zone	PCT ID	PCT Name	Ancillary	Condition	Area (ha)	Plots required	Plots surveyed
1	849	*Cumberland Shale Plains Woodland*	Scattered trees	Low	0.12	1	1
2	849	*Cumberland Shale Plains Woodland*	DNG	Low	3.39	2	2
3	1071	*Phragmites australis and Typha orientalis coastal*	Dam	Low	0.07	1	1

Veg Zone	PCT ID	PCT Name	Ancillary	Condition	Area (ha)	Plots required	Plots surveyed
		freshwater wetlands of the Sydney Basin Bioregion					
0	-	*Planted native vegetation**	-	Low	0.70	0	2
				TOTAL	**4.29**	**4**	**6**

* NOTE: AN ASSESSMENT OF PLANTED NATIVE VEGETATION WAS CONDUCTED BELOW AND DETERMINE THAT THIS VEGETATION DOES NOT REPRESENT A PCT

1.4.3 Planted native vegetation

In accordance with Appendix D of the BAM 2020 the assessor may apply the Streamlined assessment module to vegetation which represents planted native vegetation. The BAM provides framework for the assessment which is summarised in Table 9. The framework assists assessors to determine if the planted native vegetation requires assessment under the BAM. If the outcome of the framework determines that the vegetation does not require additional assessment then the planted native vegetation does not require consideration beyond Chapter 3 of the BAM 2020.

Native planted vegetation was mapped within the development site (Figure 5). The vegetation consists of planted vegetation which has been established for shade and windbreaks around the disused chicken sheds such as Eucalyptus saplings. *Casuarina glauca* (Swamp Oak) align the driveway in the east (Photo 1). These patches of planted native species were dominated by dense exotic grasses including *Ehrharta erecta.*

A narrow band of planted native canopy and tall shrubs are located along Aldington Road in the western part of the boundary. Canopy species include *Eucalyptus microcorys* (Tallowwood) and *Melaleuca armillaris* (Bracelet Honey Myrtle) (Photo 2). BAM vegetation integrity plots were undertaken to determine the vegetation assemblage. In accordance with the BAM 2020, if the framework outlined in Table 8 determines that the vegetation does not require additional consideration under the BAM, then Chapters 4 and 5 do not apply to the planted native vegetation provided the vegetation does not provide habitat for threatened species.

In summary, the planted native vegetation does not require further consideration. It was determined that the planted vegetation does not provide habitat for species credit species according to the methodology outlined in Appendix D2 of the BAM 2020.

Table 8: Decision making tool for Planted Native Vegetation in accordance with Appendix D of the BAM 2020

Decision making key	Response
1) **Does the planted native vegetation occur within an area that contains a mosaic of planted and remnant native vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal?** i Yes – the planted native vegetation must be allocated to the best-fit PCT and the BAM must be applied. ii No – Go to 2.	No, the planted vegetation does not occur in a mosaic of planted and remnant vegetation.

Decision making key	Response
2. Is the planted native vegetation: **a. Planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.), and** **b. The primary objective was to replace or regenerate a plant community type of a threatened plan species or its habitat?** i Yes – the planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM ii No – Go to 3.	No, the vegetation has not been established for rehabilitation or restoration works. No, the primary objective was not conducted to replace or regenerate a PCT as the vegetation consists of non-indigenous species to the area.
3. Is the planted / translocated native vegetation individuals of a threatened species or other native species planted/ translocated for the purpose of providing threatened species habitat under one of the following: **a. A species recovery project** **b. *Saving our Species* project** **c. Other types of government funded restoration project** **d. Condition of consent for a development approval that required those species to be planted or translocated for the purpose of providing threatened species habitat** **e. Legal obligation as part of a condition of ruling of court. This includes regulatory directed or ordered remedial plantings (e.g. Remediation Order for clearing without consent issued under the BC Act or the Native Vegetation Act)** **f. Ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan, or** **g. Approved vegetation management plan (e.g. as required as part of a Controlled Activity Approval for works on waterfront land under the NSW *Water Management Act 2000*)?** i Yes – the planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM • No – Go to 3.	No, the planted vegetation does not include translocated native vegetation of threatened species.
4. Was the planted native vegetation (including individuals of a threatened flora species) undertaken voluntarily for revegetation, environmental rehabilitation or restoration within a legal obligation to secure or provide for management of the native vegetation? i Yes – Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied) • No – Go to 5.	No, the planted native vegetation was not undertaken as part of any conservation or rehabilitation projects or to satisfy a legal obligation.
5. Is the planted native vegetation (including individuals of a threatened flora species) planted for functional, aesthetic, horticultural or plantation forestry purposes? This includes examples such as; windbreaks in agricultural landscapes, roadside plantings (including street trees, median stripes, roadside batters), landscaping in parks, gardens and sport fields/complexes, macadamia plantations or teatree farms? i Yes – Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied) ii No – Go to 6.	Yes, the planted native vegetation was conducted for windbreaks and shading for livestock. Therefore, the native vegetation was assessed in accordance with Appendix D2 and it was determined that the vegetation did not provide habitat for threatened species credit species. Therefore, no additional consideration under the BAM is required.

Decision making key	Response
6. Is the planted native vegetation a species listed as a widely cultivated native species on a list approved by the Secretary of the Department (or an officer authorised by the Secretary)? i Yes – Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied) ii No – There may be other types of occurrences of planted native vegetation that do not easily fit into the decision-making key above.	N/A

1.4.4 Plant Community Types present

The remaining vegetation within the development site was mapped into PCTs. Two PCTs were identified in the development site (Table 9, Figure 4). *PCT 849 Cumberland Shale Plains Woodland,* was mapped in varying condition within the development site. This PCT was split into different vegetation zones based on the difference in the vegetation structure or composition (Table 10 and Figure 4).

The PCTs are listed as part of threatened ecological communities (TECs) in the BioNet Vegetation Classification, however, only one of the PCTs (PCT 849) was considered a TEC. More information is provided in Section 1.4.7 below.

Table 9: Plant Community Types in the development footprint

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Area	Percent cleared
849	*Cumberland Shale Plains Woodland*	Coastal Valley Grassy Woodlands	Grassy Woodlands	3.51	93
1071	*Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion*	Coastal Freshwater Lagoons	Freshwater Wetlands	0.07	75

1.4.5 PCT Selection Justification

Justification for the selection of the PCT occurring on the development site is based on features provided in Table 10. The soil landscape, elevation, analysis of key representative species, previous vegetation mapping was used to determine the 'best-fit' PCT for the native vegetation within the development site.

Previous vegetation mapping by OEH (2013) has not mapped any native vegetation within the study area. Two PCTs, *PCT 850 Cumberland Shale Hills Woodland* and *PCT 849 Cumberland Shale Plains Woodland* have previously been mapped within the broader landscape around the development site.

1.4.5.1 PCT 849 Cumberland Shale Plains Woodland

PCT 849 *Cumberland Shale Plains Woodland* was determined as the best-fit PCT for remnant and regenerating native vegetation through analysis of mapped soil landscapes and elevation. Quantitative analysis of full-floristic plot data was not undertaken as the floristic plot data recorded a limited number of native species. Two vegetation zones were assigned to this PCT; *PCT 849_scattered trees* and *PCT 849_derived native grassland (DNG)*. *PCT 849_scattered trees* were represented by *Eucalyptus*

tereticornis and *E. moluccana*. These canopy species are listed as key diagnostic species in the BioNet Vegetation Classification for *PCT 849 Cumberland Shale Plains Woodland*. The development site contained the occasional *Corymbia maculata* (Spotted Gum) which is not listed as a key characteristic species of PCT 849 in the BioNet Vegetation Classification, however, it is listed as a positive diagnostic species in The Native Vegetation of Sydney Metropolitan Areas - Vegetation Community Profiles (OEH 2016).

PCT 849_ DNG was represented by native species within the ground cover. Native canopy and shrubs were absent in this vegetation zone. The groundcover species include *Themeda triandra* (Kangaroo Grass) and *Austrostipa rudis.*

Soil landscapes were also used to determine the best-fit PCT. The majority of the development site is located on Luddenham (erosional) soil landscape with a small portion of the western boundary transitioning into Blacktown (residual) soil landscape. Luddenham soil landscapes are associated with Wianamatta Shale group with low local relief of 50 – 120 m and gentle rolling hills (Bannerman and Hazelton 1990). The land associated with Luddenham soil landscapes has been cleared for grazing, remnant vegetation includes *E. moluccana*, lesser occurrence of ironbark species and *E. tereticornis*. The soil landscape and relief are consistent with vegetation PCT 849 identified within the development site (DECCW 2008). Blacktown soil landscapes occur on Cumberland lowlands on Wianamatta Group – Ashfield Shale. Much of the pre-European vegetation has been cleared however remnant vegetation still contains patches of woodland or open forest represented by *Eucalyptus tereticornis, E. crebra* (Narrow-leaved Ironbark), *E. moluccana* and *Corymbia maculata* (Spotted Gum).

The description of the two soil landscapes and the vegetation associated with the soil landscapes closely resembles PCT 849 Cumberland Shale Plains Woodland and the vegetation mapped within the development site.

Based on the representative canopy species recorded within the floristic plot data, the location on Wianamatta Shale group and the location in the landscape, it was determined that *PCT 849 Cumberland Shale Plains Woodland* was the most appropriate PCT for the remnant vegetation within the development site.

1.4.5.2 PCT 1071 Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion

A small patch of fringing and semi-aquatic vegetation was located around two of the artificial dams. The vegetation includes *Eleocharis sphacelata, Triglochin striata* and *Juncus usitatus*. These native species have established opportunistically and are not considered to be part of a remnant patch of vegetation.

Justification of the selection of each PCT is provided in Table 10 and a description of each vegetation zone is provided in Section 1.4.5 below.

Table 10: PCT selection justification

PCT ID	PCT Name	Selection criteria	Species relied upon for identification of vegetation type and relative abundance
849	*Cumberland Shale Plains Woodland*	IBRA region, subregion, soil landscape, topography/ landscape position of the	Presence of canopy species *Eucalyptus tereticornis* (Forest Red Gum), *E. moluccana* (Grey Box) and ground cover species *Themeda*

PCT ID	PCT Name	Selection criteria	Species relied upon for identification of vegetation type and relative abundance
		vegetation corresponds with description of the PCT listed in the BioNet Vegetation Classification.	*triandra* (Kangaroo Grass) and *Austrostipa rudis* indicate this PCT is a strong match.
1071	*Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion*	IBRA region, subregion and vegetation descriptions.	Based on the description of the PCT in the BioNet Vegetation Classification which includes artificial or constructed dams.

1.4.6 Vegetation zones

A description of vegetation zones is provided in Table 10. The location of vegetation zones is shown in Figure 5. Photos are show in Photos 1-5 below.

Table 11: Vegetation zones in the development footprint

Veg zone	PCT	Condition	Area (ha)	Description
1	PCT 849 *Cumberland Shale Plain Woodland*	Scattered trees	0.12	Scattered *Eucalyptus tereticornis* and *Corymbia maculata* and one large remnant *E. moluccana* were recorded within the southern portion of the development site. The ground cover generally consists of exotic species and an absence of mid layer.
2	PCT 849 *Cumberland Shale Plains Woodland*	DNG	3.39	This vegetation zone was mapped across a large extent within the south-eastern portion of the development site. The vegetation includes more than 50 % native grasses *Austrostipa rudis* and *Themeda triandra* (Photo 3) with exotic species also present within the vegetation zone such as *Briza subaristata* and *Paspalum dilatatum*.
3	PCT 1071 *Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion*	Dam	0.07	A small patch of fringing vegetation was recorded within the edges of two of the dams. Vegetation includes small patches of *Eleocharis sphacelata* and *Triglochin striata* (Photo 5) within the water and *Juncus usitatus* and *Persicaria decipiens* within the shallow waters edge.
0	Planted native vegetation		0.70	Several patches of immature planted Eucalyptus were interspersed between the chicken sheds. *Casuarina glauca* align the driveway in the east.
0	Exotic vegetation	-	0.50	Exotic species, *Pinus radiata* have been planted along the upper slope either side of the eastern driveway in a singular line and mature *Phoenix canariensis* (Phoenix Palm) are located along the drive in the west.
0	Exotic grasses	-	19.36	Exotic grasses have been established across the majority of the development site and include improved pasture grasses; *Paspalum dilatatum* (Paspalum), *Cenchrus clandestinus* (Kikuyu) and *Cynodon dactylon* (Couch).

Veg zone	PCT	Condition	Area (ha)	Description
0	Cultivated grass	-	4.59	Cultivated gardens includes horticultural plots which have significant soil disturbance and lack native vegetation.
	Cleared / built		2.44	This includes driveways and existing buildings
	Dam		0.89	This includes open water
		TOTAL	**32.06**	

1.4.7 Threatened Ecological Communities

Of the PCTs recorded within the development site, only one PCT (PCT 849) conforms to a threatened ecological community (TEC) (Table 13) and displayed on Figure 6.

The following PCTs mapped within the development site are associated with TECs in the BioNet Vegetation Classification system, however, they do not meet the TEC criteria:

- PCT 1071 - does **not** conform to *Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions.*

The PCTs represent planted native species and opportunistic native species and do not represent remnant vegetation.

PCT 849 Cumberland Shale Plains Woodland

In the BioNet Vegetation Classification PCT 849 Cumberland Shale Plains Woodland is associated with *Cumberland Plain Woodland in the Sydney Basin Bioregion* which is listed as a critically endangered ecological community (CEEC) under the BC Act and as critically endangered as part of *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* under the EPBC Act.

The final determination for Cumberland Plain Woodland 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 849 vegetation zone 4 contains more than 50% native grasses and therefore satisfies the criteria for listing as part of the TEC under the BC Act. The BC Act also protects remnant paddock trees such as vegetation zone 3.

The criteria for listing of *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* under the EPBC Act is provided in Table 12. Additionally, the conservation advice (DEWHA 2009), states that vegetation listing under the EPBC Act for Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest "*always has upper tree layer species present and either a shrub or ground layer present*."

The vegetation within the development site did not contain a patch of vegetation more than 0.5 ha in size. Vegetation zone 3 did not contain more than 30 % native perennial species and vegetation zone 4 lacked a canopy layer. Therefore, the vegetation within the development site did not satisfy the criteria for listing under the EPBC Act (Table 13).

Table 12: Condition thresholds for patches that meet the definition of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest critically endangered ecological community

Category and rationale	Thresholds
A. Core thresholds that apply under most circumstances: patches with an understorey dominated by natives and a minimum size that is functional and consistent with the minimum mapping unit size applied in NSW.	Minimum patch size is ≥0.5ha; AND ≥50% of the perennial understorey vegetation cover is made up of native species.
OR	
B. Larger patches which are inherently valuable due to their rarity	The patch size is ≥5 ha; AND ≥ 30% of the perennial understorey vegetation cover is made up of native species
OR	
C. Patches with connectivity to other large native vegetation remnants in the landscape	The patch size is ≥0.5 ha; AND The patch is contiguous with a native vegetation remnant (any native vegetation where cover in each layer present is dominated by native species) that is ≥ 5 ha in area.
OR	
D. Patches that have large mature trees or trees with hollows (habitat) that are very scarce on the Cumberland Plain.	The patch size is ≥ 0.5 ha in size; AND ≥ 30% of the perennial understorey vegetation cover is made up of native species; AND The patch has at least one tree with hollows per hectare or at least one large tree (≥80 dbh) per hectare from the upper tree layer species.

Table 13: Threatened Ecological Communities in the development footprint

PCT ID	BC Act			EPBC Act		
	Listing status	Name	Area (ha)	Listing status	Name	Area (ha)
850	CEEC	*Cumberland Plain Woodland*	3.51	*	*	*

CEEC CRITICALLY ENDANGERED ECOLOGICAL COMMUNITY.
*VEGETATION DID NOT SATISFIED LISTING UNDER THE EBPC ACT

1.4.8 Vegetation integrity assessment

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

Table 14: Vegetation integrity in the development footprint

Veg Zone	PCT ID	Condition	Area (ha)	Composition Condition Score	Structure Condition Score	Function Condition Score	Current vegetation integrity score
1	849	Scattered trees	0.12	8.4	2.9	18.7	7.7
2	849	DNG	3.39	3.9	41.5	0.1	2.4
3	1071	Dam	0.07	42.8	1.6	0	8.3

1.4.9 Use of local data

The use of local data is not proposed for this assessment.

Photo 1: Planted native vegetation

Photo 2: Planted native vegetation

Photo 3: Vegetation zone 1 *PCT 849 Cumberland Shale Plains Woodland_scattered trees*

Photo 4: Vegetation zone 2 *PCT 849 Cumberland Shale Plains Woodland_DNG*

Photo 5: Vegetation zone 3 ***PCT 1071 Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion_dam***

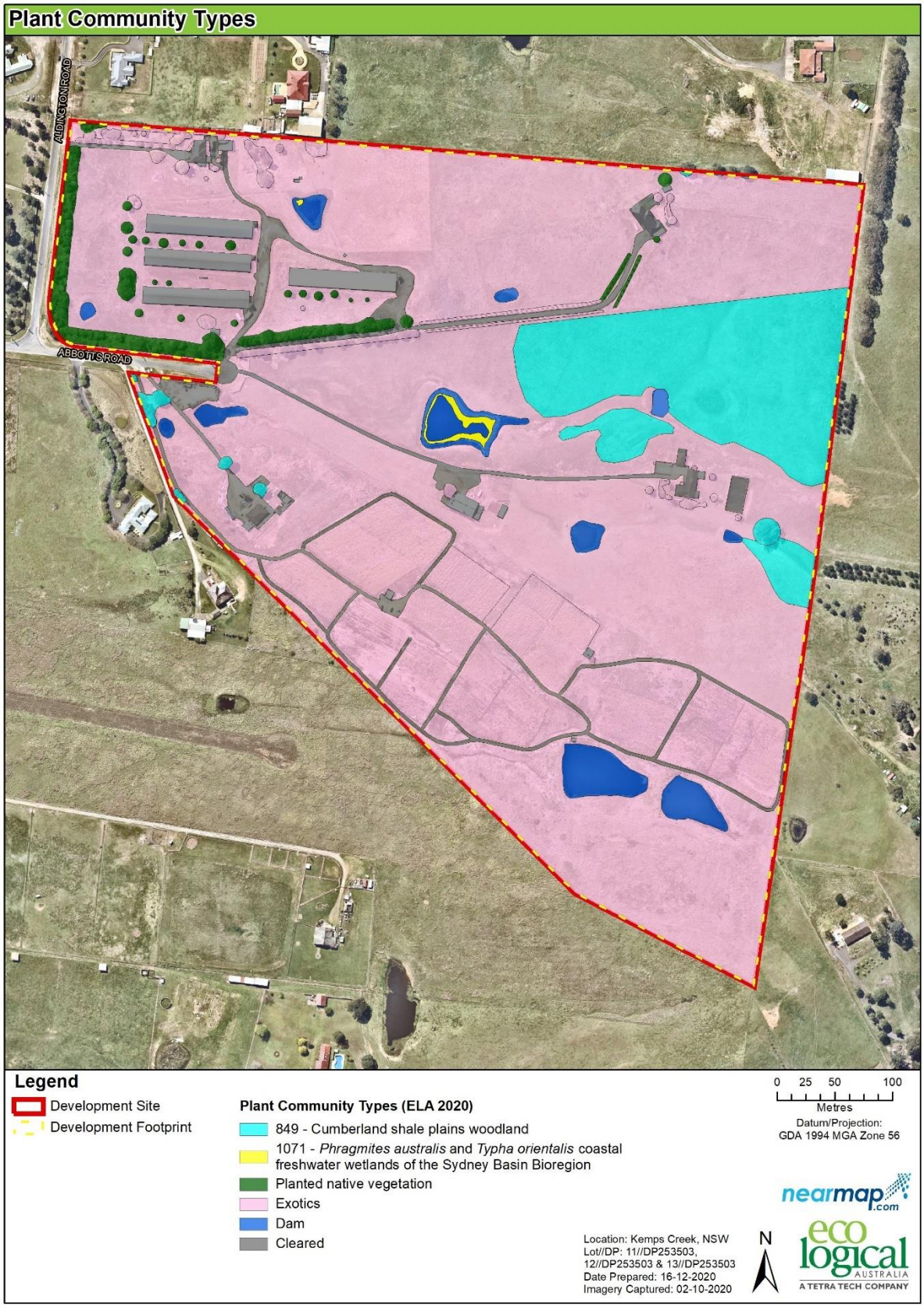

Figure 4: Plant Community Types and native vegetation extent

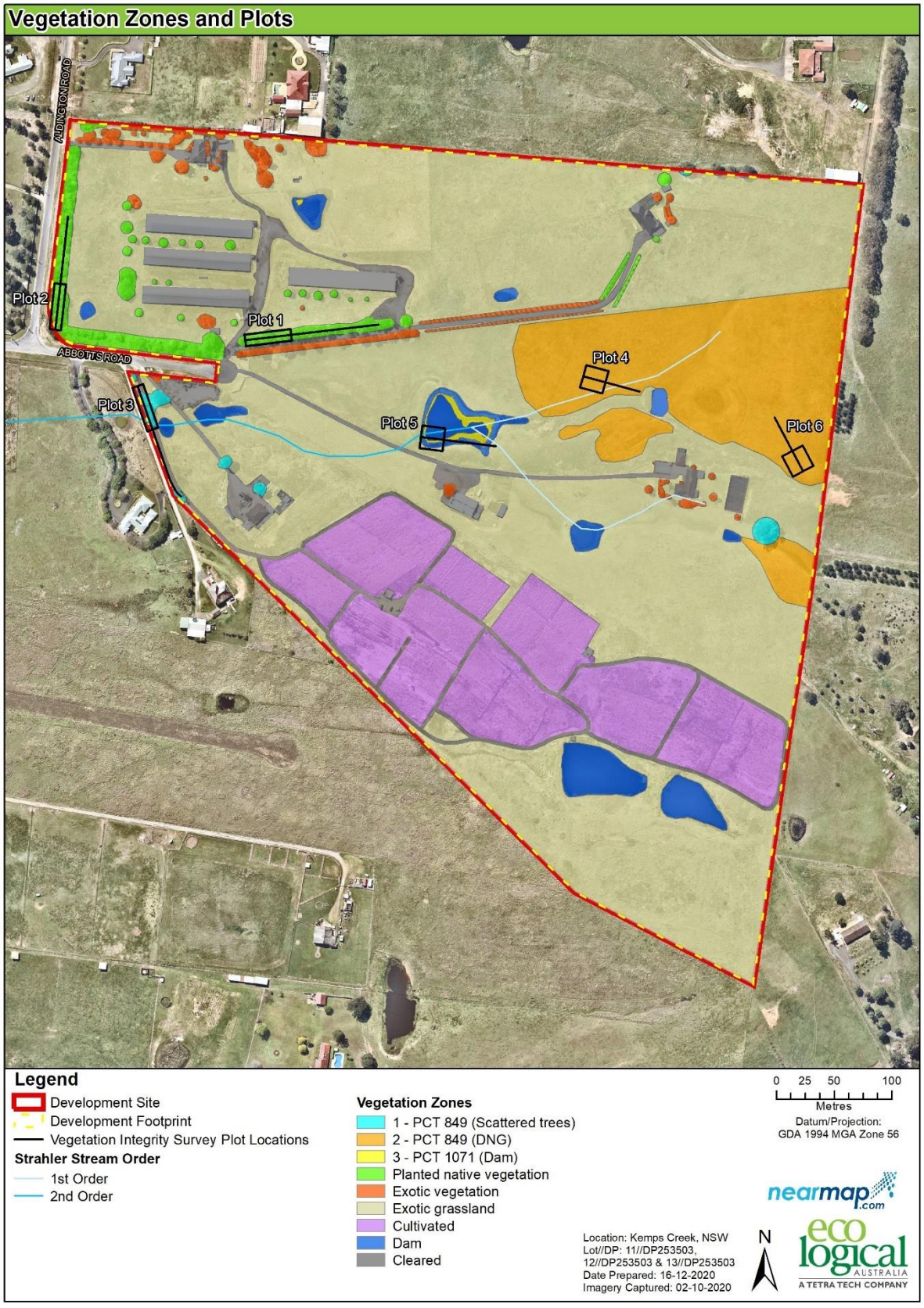

Figure 5: Plot locations and vegetation zones

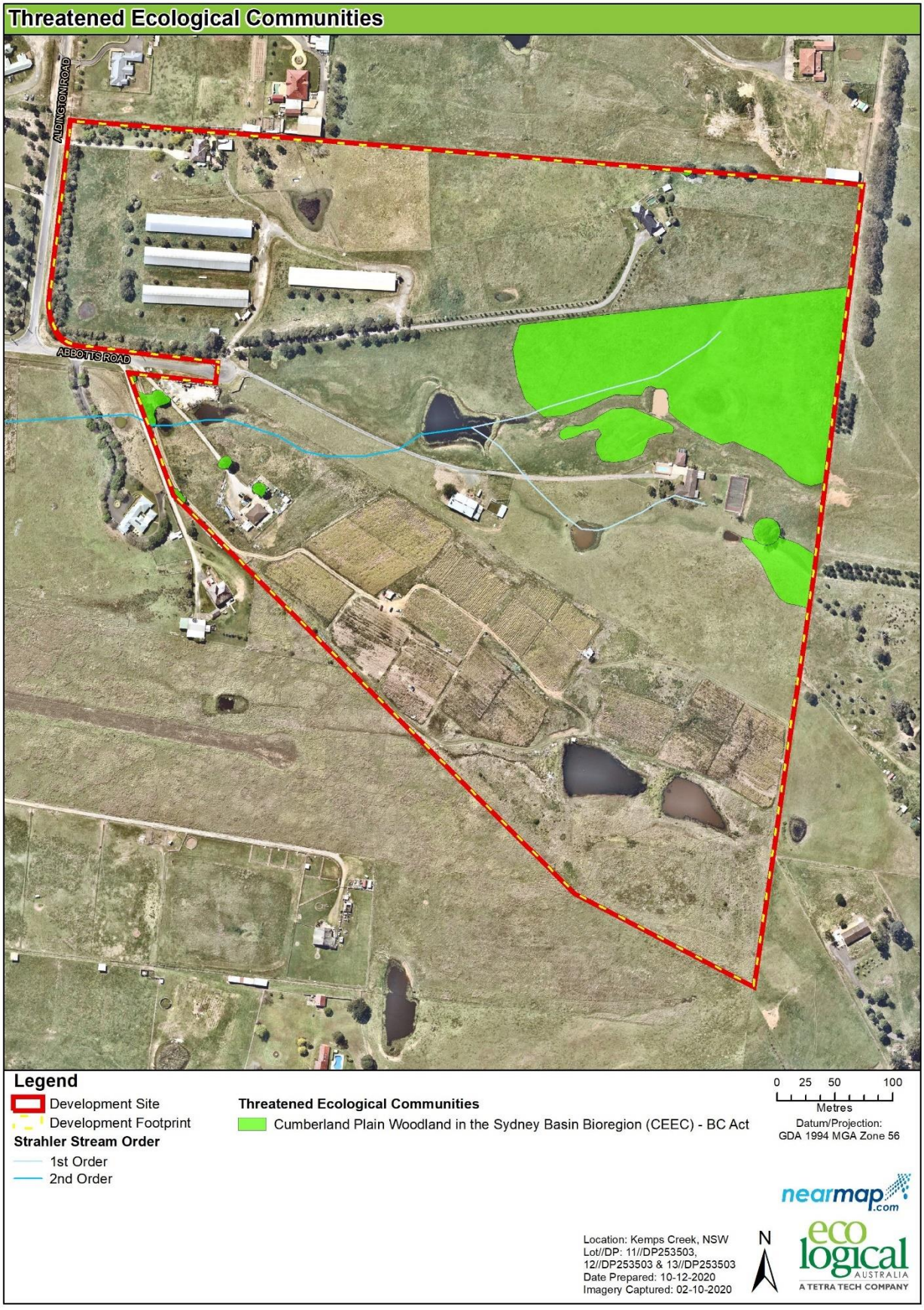

Figure 6: Threatened Ecological Communities

1.4.10 Flora and fauna habitat assessment

Habitat assessments were undertaken during field surveys on 10 October 2019 and 7 December 2020 to determine the likelihood of threatened species utilising the development site on occasion or a permanent basis. Survey effort is provided in Figure 7.

Habitat assessments involved a search for important habitat features for threatened fauna species, such as hollow bearing trees, ephemeral pools, rocky outcrops or deep leaf litter. Assessments also included a search for evidence of fauna foraging or roosting such as chewed cones, sap trees, white wash/pellets and inspections of suitable roosting or breeding habitat for threatened raptor birds (i.e. nest trees) or hollow-bearing trees for microchiropteran bats (microbats). Binoculars were used when required to inspect within high branches in the tree canopies.

A combination of parallel transects and random meanders were undertaken during field survey in search of habitat features and predicted candidate flora species. Grazed open grasslands which did not contain suitable habitat were traversed using a random meander.

1.4.11 Targeted surveys methodology

Targeted surveys for species credit flora and fauna species undertaken within the development footprint are provided in the following tables (Table 15 and Table 16). Weather conditions recorded during the field surveys are provided in Table 17.

Survey effort is provided is outlined in Figure 7.

Cumberland Plain Land Snail diurnal surveys

Targeted surveys were conducted for one species credit species, *Meridolum corneovirens* (Cumberland Plain Land Snail). Surveys involved raking back accumulated leaf litter around the base of *Eucalyptus tereticornis* and *Eucalyptus moluccana* and searching under logs (where present) or cluster of native grasses. Survey involved approximately 5 – 10 mins digging in leaf litter within a 1 m buffer around base of *Eucalyptus tereticornis* or *E. moluccana*.

No individuals or shells were recorded.

Targeted flora species survey

Targeted surveys were conducted for candidate flora species in accordance with the *NSW Guide to Surveying Threatened Plants* (DPIE 2020) and within the seasonal requirements outlined in the BAMC and Threatened Biodiversity Data Collection. Targeted surveys for threatened flora species consisted of a combination of parallel transects and random meander. Survey effort is provided in Figure 7. No threatened flora species were recorded. The results of targeted surveys are provided in Section 1.5.4.

Table 15: Targeted surveys flora

Date	Surveyors	Target species
10 October 2019	Belinda Failes	*Acacia pubescens* *Grevillea juniperina* subsp. *juniperina* *Pimelea spicata*
7 December 2020	Nicole McVicar	*Acacia pubescens* *Grevillea juniperina* subsp. *juniperina* *Marsdenia viridiflora* subsp. *viridiflora* *Maundia triglochinoides* *Pimelea spicata*

Table 16: Targeted surveys fauna

Date	Surveyors	Target species
Fauna species		
7 December 2020	Nicole McVicar	*Meridolum corneovirens* (Cumberland Plain Land Snail)

Table 17: Weather conditions (BOM 2020)

Date	Rainfall (mm)	Minimum temperature 0C	Maximum temperature 0C	Max wind speed and direction
10 October 2019	0	8.6	20.6	35 km/hr SE
7 December 2020	0	10.4	29.6	61 km/hr W
16 December 2020	8.4	19.7	27.3	7 km/hr E

1.5 Threatened species

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 18.

Table 18: Predicted ecosystem credit species

Species	Common Name	Habitat constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	Justification for exclusion or inclusion
Anthochaera phrygia	Regent Honeyeater (Foraging)	N/A	High	Critically Endangered	Critically Endangered	Included Habitat features for this species are only present in the PCT 849 vegetation zone 1 at this site. The remaining vegetation zones in the development site do not comprise key plant species required for foraging.
Artamus cyanopterus cyanopterus	Dusky Woodswallow	N/A	Moderate	Vulnerable	Not Listed	Included Habitat features for this species are present at in 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. The dams do not contain fringing vegetation for this species.
Calidris ferruginea	Curlew Sandpiper (foraging)	Other As per mapped areas	High	E	CE	Excluded Habitat for this species was not considered suitable in the development site. The dams do not contain fringing vegetation for this species.
Callocephalon fimbriatum	Gang-gang Cockatoo (Foraging)	N/A	Moderate	Vulnerable	Not Listed	Excluded Habitat features for this species are not present at this site. The site is substantially degraded. There are only five BioNet records for this species within a 5 km radius of the development site.
Chthonicola sagittata	Speckled Warbler	N/A	High	Vulnerable	Not Listed	Excluded This species requires a relatively large undisturbed remnant vegetation to persist in an area. The development site is substantially degraded and contains limited

Species	Common Name	Habitat constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	Justification for exclusion or inclusion
						remnant vegetation for this species. There are 11 BioNet records for this species within a 5 km radius of the development site.
Circus assimilis	Spotted Harrier	N/A	Moderate	Vulnerable	Not Listed	Included Habitat features for this species are present at this site.
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	N/A	High	Vulnerable	Not Listed	Included This species inhabits open forests and woodlands. Fallen timber is considered an important habitat requirement for this species. Habitat features for this species are limited but present at this site, this includes vegetation zones 1.
Daphoenositta chrysoptera	Varied Sittella	N/A	Moderate	Vulnerable	Not Listed	Excluded This species is a sedentary species and inhabits woodlands. It will avoid open grasslands. Habitat features for this species are not present in the development site. The site is substantially degraded.
Dasyurus maculatus	Spotted-tailed Quoll	N/A	High	Vulnerable	Endangered	Excluded Habitat features for this species are not present at this site. 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. There is one record for this species within a 5 km radius of the development site.
Ephippiorhynchus asiaticus	Black-necked Stork	Swamp Swallow, open freshwater or saline wetlands or shallow edges of deeper wetlands within 300 m of these swamps/waterbodies Shallow lakes, lake margins and estuaries within 300	Moderate	Endangered	Not Listed	Excluded Although the development site contains dams, it does not contain swamps or wetlands suitable for these species. The dams also contain limited fringing or aquatic vegetation for this species.

Species	Common Name	Habitat constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	Justification for exclusion or inclusion
		m of these waterbodies				
Epthianura albifrons	White-fronted Chat	N/A	Moderate	Vulnerable	Not Listed	Excluded The development site lacks habitat features such as large permanent wetlands with tall Typha species for this species. The vegetation within the development site is substantially degraded and contains small artificial dams.
Glossopsitta pusilla	Little Lorikeet	N/A	High	Vulnerable	Not Listed	Included There are two BioNet records for this species within a 5 km radius of the development site. This species may utilise the flowering species within the development site for seasonal foraging in vegetation zone 1.
Grantiella picta	Painted Honeyeater	Other Mistletoes present at a density of greater than five mistletoe per ha	Moderate	Vulnerable	Vulnerable	Excluded This species inhabits woodlands and forests where it feeds on mistletoes. The development site does not comprise key plant species (mistletoe) required for foraging. There are no BioNet records for this species within a 5 km radius of the development site.
Haliaeetus leucogaster	White-bellied Sea-Eagle (Foraging)	Waterbodies Within 1 km of rivers, lakes, large dams or creeks, wetlands and coastlines	High	Vulnerable	Not Listed	Included The development site does not contain any waterbodies; however, it is located within 1 km of Kemps Creek. Therefore, foraging habitat was mapped within the development site.
Hieraaetus morphnoides	Little Eagle (Foraging)	N/A	Moderate	Vulnerable	Not Listed	Included The development site contains potential foraging habitat for this species.
Irediparra gallinacea	Comb-crested Jacana	Waterbodies Freshwater wetlands with a good surface cover of floating aquatic vegetation	Moderate	Vulnerable	Not Listed	Excluded Habitat features such as large permanent wetlands with floating aquatic species was not present in the development site. Although the development site contains small artificial dams with fringing vegetation the vegetation within the development site is substantially degraded. There are no BioNet records for this species within a 5 km radius of the development site.

Species	Common Name	Habitat constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	Justification for exclusion or inclusion
Ixobrychus flavicollis	Black Bittern	Waterbodies Land within 40 m of freshwater and estuarine wetlands in areas of permanent water and dense vegetation	Moderate	Vulnerable	Not Listed	Excluded Habitat features such as large permanent wetlands with floating aquatic species was not present in the development site. Although the development site contains small artificial dams with fringing vegetation the vegetation within the development site is substantially degraded. There are no BioNet records for this species within a 5 km radius of the development site.
Lathamus discolor	Swift Parrot (Foraging)	N/A	Moderate	Endangered	Critically Endangered	Included On mainland Australia this species utilises *Eucalyptus tereticornis* which was recorded in PCT 850 and PCT 849, vegetation zones 1.
Limicola falcinellus	Broad-billed Sandpiper (Foraging)	Other As per mapped areas	High	Vulnerable	Not Listed	Excluded The development site is not within mapped as Migratory Shorebirds Important Areas in the BAMC (access 10 December 2020). Habitat features such as coastal habitats were not present in the development site.
Limosa limosa	Black-tailed Godwit (Foraging)	Other As per mapped areas	High	Vulnerable	Not Listed	Excluded The development site is not within mapped as Migratory Shorebirds Important Areas in the BAMC (access 10 December 2020). Habitat features such as coastal habitats were not present in the development site.
Lophoictinia isura	Square-tailed Kite (Foraging)	N/A	Moderate	Vulnerable	Not Listed	Included The development site contains potential foraging habitat for this species.
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	N/A	Moderate	Vulnerable	Not Listed	Included This species inhabits woodlands and cleared areas. The development site provides suitable habitat for this species within vegetations 1 and 2.
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	N/A	Moderate	Vulnerable	Not Listed	Excluded This species inhabits dry woodlands dominated by box species or ironbark eucalypts. Habitat features for this species are not present in the development

Species	Common Name	Habitat constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	Justification for exclusion or inclusion
						site. The site is substantially degraded. There are no BioNet records for this species within a 5 km radius of the development site.
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	N/A	High	Vulnerable	Not Listed	Included Seasonal foraging habitat was identified in this assessment.
Miniopterus australis	Little Bent-winged-Bat (Foraging)	N/A	High	Vulnerable	Not Listed	Included Seasonal foraging habitat was identified in this assessment.
Miniopterus orianae oceanensis	Large Bent-winged Bat (Foraging)	N/A	High	Vulnerable	Not Listed	Included Seasonal foraging habitat was identified in this assessment.
Neophema pulchella	Turquoise Parrot	N/A	High	Vulnerable	Not Listed	Included This species is associated with woodlands and feeds on seeds and herbs in grasslands. Suitable foraging habitat is present in the development site. There are no BioNet records for this species within a 5 km radius of the development site.
Ninox strenua	Powerful Owl (Foraging)	N/A	High	Vulnerable	Not Listed	Included There are three BioNet records for this species within a 5 km radius of the development site. The development site contains marginal foraging habitat for this species.
Pandion cristatus	Eastern Osprey (Foraging)	N/A	Moderate	Vulnerable	Not Listed	Excluded Habitat features associated with this species are not present in the development site. This species is a specialist feeder requiring large open waterbodies which are absent from the development site. The small artificial dams do not provide suitable habitat for this species.
Petroica boodang	Scarlet Robin	N/A	Moderate	Vulnerable	Not Listed	Included This species has been included as a candidate species as during autumn and winter individuals may move to grasslands or grazed paddocks with scattered trees.

Species	Common Name	Habitat constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	Justification for exclusion or inclusion
						There is one BioNet record for this species within a 5 km radius of the development site.
Petroica phoenicea	Flame Robin	N/A	Moderate	Vulnerable	Not Listed	Included This species utilises open understorey habitat for foraging. Breeding habitat occurs in ridgetops in tall moist forests. The development site contains potential foraging habitat for this species. There are two BioNet records for this species within a 5 km radius of the development site.
Phascolarctos cinereus	Koala (Foraging)	N/A	High	Vulnerable	Vulnerable	Included The development site contains koala feed tree species as identified in the Koala SEPP.
Pteropus poliocephalus	Grey-headed Flying-fox (Foraging)	N/A	High	Vulnerable	Vulnerable	Included Limited foraging resources were present within the development area for this highly mobile species. This species may occasionally utilise the Eucalyptus species during flowering seasons to supplement foraging resources in vegetation zones 1.
Rostratula australis	Australian Painted Snipe	N/A	Moderate	Endangered	Endangered	Excluded Habitat present is substantially degraded and highly fragmented such that this species is unlikely to utilise the development site. Although the development site contains small dams the surrounding vegetation is grazed or cultivated and does not provide habitat for this species.
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	N/A	High	Vulnerable	Not Listed	Included Seasonal foraging habitat was identified in this assessment.
Stagonopleura guttata	Diamond Firetail	N/A	Moderate	Vulnerable	Not Listed	Included This species feeds exclusively on the ground for grasses and herbs in woodland environments including derived grasslands. The development site contains suitable foraging habitat for this species. There are no BioNet records within 5 km radius of the development site.

Species	Common Name	Habitat constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	Justification for exclusion or inclusion
Stictonetta naevosa	Freckled Duck	N/A	Moderate	Vulnerable	Not Listed	Excluded Habitat present is substantially degraded and highly fragmented such that this species is unlikely to utilise the development site.
Tyto novaehollandiae	Masked Owl (Foraging)	N/A	High	Vulnerable	Not Listed	Included There are four BioNet records for this species within a 5 km radius of the development site. The development site contains potential foraging habitat for this species.

CE = Critically Endangered; E = Endangered; E2 = Endangered Population; V = Vulnerable

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 is included in Table 19.

Table 19: Candidate species credit species

Species	Common Name	Habitat constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for exclusion or inclusion
Acacia bynoeana	Bynoe's Wattle	N/A	High	Endangered	Vulnerable	Excluded This species is associated with dry sclerophyll forests on sandy soils. Habitat for this species was not recorded within the development site. There are no BioNet records for this species within a 5 km radius of the development site.
Acacia pubescens	Downy Wattle	N/A	High	Vulnerable	Vulnerable	Included This species is associated with shale soils. Suitable habitat includes PCT 849. This species was included as a candidate species credit species for targeted surveys.
Anthochaera phrygia	Regent Honeyeater (Breeding)	Other As per mapped areas	High	Critically Endangered	Critically Endangered	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 the DPIE Mapped Important Areas (access in the BAMC on 10 December 2020).
Burhinus grallarius	Bush Stone-curlew	Fallen / standing dead timber including logs	High	Endangered	Not Listed	Excluded Habitat features (woodland with abundance of fallen logs or standing dead timber) for this species are not present in the development site: There are two BioNet records for this species within a 5 km radius of the development site. The site is substantially degraded and does not contain habitat features.

Species	Common Name	Habitat constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for exclusion or inclusion
Caladenia tessellata	Thick Lip Spider Orchid	N/A	Moderate	Endangered	Vulnerable	Excluded Habitat for this species was not considered suitable in the development site. The site is substantially degraded due to grazing by livestock and cultivated lands. There are no BioNet records for this species within a 5 km radius of the development site.
Calidris ferruginea	Curley Sandpiper (Breeding)	N/A	High	Endangered	Critically Endangered	Excluded The development is not mapped as Migratory Shorebirds Important Areas in the BAMC (accessed 10 December 2020).
Callocephalon fimbriatum	Gang-gang Cockatoo (Breeding)	Hollow bearing trees Eucalypt tree species with hollows greater than 9cm diameter	High	Vulnerable	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 such as Eucalypt trees with hollows > 9cm in diameter and shrubs that are suitable for the species to utilise the site. There are only five BioNet records for this species within a 5 km radius of the development site.
Cercartetus nanus	Eastern Pygmy-possum	N/A	High	Vulnerable	Not Listed	Excluded Habitat present is substantially degraded such that this species is unlikely to utilise the development site. There is no nesting habitat present or preferred foraging habitat such as *Banksia* sp. present. There are no individuals recorded within 5 km of the development site.
Chalinolobus dwyeri	Large-eared Pied Bat	Cliffs Within two km of rocky areas containing caves, overhangs, escarpment,	Very High	Vulnerable	Vulnerable	Excluded This species is associated with sandstone escarpment/cliff/cave features which were not recorded within the development site. The development site is

Species	Common Name	Habitat constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for exclusion or inclusion
		outcrops, or crevices or within two km of old mines or tunnels				located more than 5 km from the foothills of the Great Dividing Range which may provide suitable habitat for this species. There are no BioNet records for this species within a 5 km radius of the development site.
Commersonia prostrata	Dwarf Kerrawang	N/A	High	Endangered	Endangered	Excluded The development site does not contain suitable habitat for this species. This species occurs on sandy soils in Southern Highlands and Southern Tablelands.
Cynanchum elegans	White-flowered Wax Plant	N/A	High	Endangered	Endangered	Excluded This species is associated with dry rainforest vegetation. The vegetation mapped within the development site does not contain suitable habitat for this species.
Dillwynia tenuifolia	Dillwynia tenuifolia	N/A	Moderate	Vulnerable	Not Listed	Excluded Habitat for this species includes heathy habitats on transitional soils. The vegetation within the development site does not support suitable habitat for this species. The site is substantially degraded and does not support suitable habitat for this species.
Dillwynia tenuifolia – endangered population	Endangered population Kemps Creek	Area bounded by Western road, Elizabeth Drive, Devonshire Road and Kemps Creek in the Liverpool LGA	High	Endangered Population	Not Listed	Excluded The development site is not located within the geographic distribution for this endangered population.
Eucalyptus benthamii	Camden White Gum	N/A	High	Vulnerable	Vulnerable	Excluded Habitat for this species was not considered suitable in the development site. The site is substantially degraded. There are no BioNet records for this species within a 5 km radius of the development site.
Grevillea juniperina subsp. *juniperina*	Juniper-leaved Grevillea	N/A	Moderate	Vulnerable	Not Listed	Included

Species	Common Name	Habitat constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for exclusion or inclusion
						This species is associated with Wianamatta Shale and may occur in disturbed patches of Cumberland Plain Woodland (PCT 849). This species was included as a candidate species credit species for targeted surveys. No individuals were recorded during targeted surveys.
Haloragis exalata subsp. exalata	Square Raspwort	Waterbodies Edges of coastal lakes after flooding has removed other vegetation, creek banks within flood zone, areas close to these features subject to human disturbance including road verges and powerline easements or within 100 m	Moderate	Vulnerable	Vulnerable	Excluded There are no BioNet records for this species within a 5 km radius of the development site. The vegetation within the development site is substantially degraded such that this species is unlikely to occur within the development site.
Haliaeetus leucogaster	White-bellied Sea-Eagle (Breeding)	Other Living or dead mature trees within suitable vegetation within 1 km of rivers, lakes, large dams or creeks, wetlands and coastlines	High	Vulnerable	Not Listed	Excluded This is a dual credit species, and only a species credit species when specific habitat constraints are present for breeding. Although the development site is located within 1 km of a creek, the site does not contain larger patches of intact vegetation or large trees that are suitable for the species to utilise the site. The development site does not contain large rivers, lakes or large dams.
Hieraaetus morphnoides	Little Eagle (Breeding)	Other Nest trees -live (occasionally dead) large old trees within vegetation	Moderate	Vulnerable	Not Listed	Excluded Habitat for this species was not considered suitable in the development site. The development site does not contain old vegetation which may provide nesting locations for this species. The site is substantially degraded. No large nest trees were recorded in the development site.

Species	Common Name	Habitat constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for exclusion or inclusion
Lathamus discolour	Swift Parrot (Breeding)	Other As per mapped areas	Moderate	Endangered	Critically Endangered	Excluded The development site is not within the important areas for this species in the BAMC (accessed 10 December 2020).
Limicola falcinellus	Broad-billed Sandpiper (Breeding)	-	High	Vulnerable	Not Listed	Excluded This is a dual credit species and only species credit species when specific habitat constraints are present for breeding. This species breeds in Siberia then migrates to Australia. The development site does not include Mapped Important Areas for this species
Limosa limosa	Black-tailed Godwit (Breeding)	-	High	Vulnerable	Not Listed	Excluded This is a dual credit species and only species credit species when specific habitat constraints are present for breeding. This species breeds in East Siberia and Mongolia then migrates to Australia. The development site does not include Mapped Important Areas for this species (accessed 10 December 2020).
Litoria aurea	Green and Golden Bell Frog	Semi-permanent / ephemeral wet areas Within 1 km of wet areas/ swamps Within 1 km of swamp/ waterbodies Within 1 km of Waterbody	High	Endangered	Vulnerable	Excluded Habitat for this species (i.e. Typha reeds) was recorded within the development site. The site is substantially degraded. Kemps Creek is located less than 1 km from the development site and is disconnected from the site by roads. There are four historic BioNet records between 1966 and 1998 for this species within a 5 km radius of the development site.
Lophoictinia isura	Square-tailed Kite (Breeding)	Other Nest trees	Moderate	Vulnerable	Not Listed	Excluded Habitat for this species was not considered suitable in the development site. The site is substantially degraded. No nest trees were recorded within the development site.

Species	Common Name	Habitat constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for exclusion or inclusion
Marsdenia viridiflora subsp. viridiflora – endangered population	Endangered population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith LGA	Those LGAs named in the populations listing	Moderate	Endangered Population	Not Listed	Included This species is associated with open shale woodlands such as PCT 849, vegetation zone 1. This species was included as a candidate species credit species for targeted surveys.
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 Shallow waterbodies up to 1 m	High	Vulnerable	Not Listed	Included This species is associated with open shale woodlands such as PCT 1071, vegetation zone 3. This species was included as a candidate species credit species for targeted surveys.
Melaleuca biconvexa	Biconvex Paperbark	-	High	Vulnerable	Vulnerable	Excluded There are no BioNet records for this species within a 5 km radius of the development site. The vegetation within the development site is substantially degraded such that this species is unlikely to occur within the development site.
Meridolum corneovirens	Cumberland Plain Land Snail	N/A	High	Endangered	Not Listed	Included Targeted surveys were conducted for this species within the PCT 849 along the southern boundary in vegetation zone 1. No habitat was present within the development site.

Species	Common Name	Habitat constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for exclusion or inclusion
Miniopterus australis	Little Bent-winged Bat (Breeding)	Caves Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' Observation type code 'E nest-roost' With numbers of individuals > 500 Or from the scientific literature	Very High	Vulnerable	Not Listed	Excluded Habitat features for this species are not present at this site. There are no buildings within the development site. 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 such as caves that are suitable for the species to utilise the site. There are 3 BioNet records for this species within a 5 km radius of the development site.
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	Vulnerable	Not Listed	Excluded Habitat features for this species are not present at this site. There are no buildings within the development site. 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 such as caves that are suitable for the species to utilise the site.
Myotis macropus	Southern Myotis	Hollow bearing trees	High	Vulnerable	Not Listed	Excluded

Species	Common Name	Habitat constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for exclusion or inclusion
		Within 200 m of riparian zone / other Bridges, caves or artificial structures within 200 m of riparian zone/waterbodies This includes rivers, creeks, billabongs, dams and other waterbodies on or within 200m of the site				Although 1st order stream has been mapped within the development site, this does not meet the definition of a 'river'. The vegetation within the development site lacked habitat features for this species. There are no HBTs within 200m of a waterbody.
Ninox strenua	Powerful Owl (Breeding)	Hollow-bearing trees Living or dead trees with hollow >20cm diameter	High	Vulnerable	Not Listed	Excluded This is a dual credit species, and only a species credit species when specific habitat constraints are present for breeding. The hollow recorded within the development site was only small and did not contain large hollow entrance > 20cm diameter. The development site does not contain suitable breeding habitat.
Pandion cristatus	Eastern Osprey (Breeding)	Other Presence of stick-nests in living and dead trees (>15cm) or artificial structures within 100 m of a floodplain for nesting	Moderate	Vulnerable	Not Listed	Excluded The development site does not contain the presence of stick nests for this species. The development site is not located within 100 m of a floodplain.
Persicaria elatior	Tall Knotweed	Semi-permanent / ephemeral wet areas or within 50 m Swamps or within 50 m Waterbodies including wetlands or within 50 m	High	Vulnerable	Vulnerable	Excluded There are no BioNet records for this species within a 5 km radius of the development site. It was determined that the habitat is substantially degraded such that this species is unlikely to occur within the development site.
Persoonia bargoensis	Bargo Geebung	N/A	High	Endangered	Vulnerable	Excluded

Species	Common Name	Habitat constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for exclusion or inclusion
						This species is associated with transitional soils. Habitat for this species was not considered suitable in the development site. The site is substantially degraded. There are no BioNet records for this species within a 5 km radius of the development site.
Petaurus norfolcensis	Squirrel Glider	N/A	High	Vulnerable	Not Listed	Excluded Habitat present is substantially degraded such that this species is unlikely to utilise the development site. Habitat in the development site is isolated and disturbed with a higher likelihood of this species more suitable habitat within the locality. Additionally, this species has a strong preference for old growth forests which does not include the development site.
Phascolarctos cinereus	Koala (Breeding)	Other Areas identified via survey as important habitat	High	Vulnerable	Vulnerable	Excluded This is a dual credit species, and only a species credit species when specific habitat constraints are present for breeding. Habitat present is considered unsuitable and substantially degraded such that this species is highly unlikely to utilise the site for breeding. The development does not contain important habitat for this species.
Pilularia novae-hollandiae	Austral Pillwort	N/A	High	Endangered	Not Listed	Excluded There are no BioNet records for this species within a 5 km radius of the development site. It was determined that the habitat is substantially degraded such that this species is unlikely to occur within the development site.
Pimelea curviflora var. *curviflora*	Pimelea curviflora var. curviflora	N/A	High	Vulnerable	Vulnerable	Excluded This species occurs on transitional soils on ridgetops which does not include habitat mapped in the development site. The presence of this species was not identified (conspicuous species) and it was determined that the

Species	Common Name	Habitat constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for exclusion or inclusion
						habitat is substantially degraded such that this species is unlikely to occur in the development site.
Pimelea spicata	Spiked Rice-flower	N/A	High	Endangered	Endangered	Included This species is known to occur on the Cumberland Plains. There are 40 BioNet records for this species within a 5 km radius of the development site. This species was included as a candidate species credit species for targeted surveys.
Pommerhelix duralensis	Dural Land Snail	Other Leaf litter and shed bark or 50m of litter or bark/rocky areas Rocks or within 50 m of rocks/ fallen / standing dead timber including logs Including logs and bark or within 50 m of logs or bark	High	Endangered	Endangered	Excluded Habitat present is substantially degraded such that this species is unlikely to utilise the development site. This species is distributed in north-west Sydney between Rouse Hill, Cattai and Wiseman's Ferry. The development site is not located within the geographic distribution of this species distribution. There are no BioNet records for this species within 5 km radius of the development site.
Pteropus poliocephalus	Grey-headed Flying-fox (Breeding)	Other Breeding camps	High	Vulnerable	Vulnerable	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 any breeding sites that are suitable for the species to utilise.
Pterostylis saxicola	Sydney Plains Greenhood	N/A	Moderate	Endangered	Endangered	Excluded This species is associated with shallow soils on sandstone rock shelves above cliff lines. Habitat for this species was not recorded within in the development site.
Pultenaea pedunculata	Matted Bush-pea	N/A	High	Endangered	Not Listed	Excluded This species is associated with dry gullies with loamy soils. Habitat for this species was not recorded within the development site. The site is substantially degraded.

Species	Common Name	Habitat constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for exclusion or inclusion
						There are no BioNet records for this species within 5 km radius of the development site.
Thesium australe	Austral Toadflax	N/A	Moderate	Vulnerable	Vulnerable	Excluded This species is associated with coastal headlands and grassy woodlands. The site is substantially degraded. There are no BioNet records for this species within 5 km radius of the development site.
Tyto novaehollandiae	Masked Owl (Breeding)	Hollow bearing trees Living or dead trees with hollows > 20cm diameter	High	Vulnerable	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 habitat such as trees with large hollows that are suitable for the species to utilise the site for breeding. There are four BioNet record for this species within a 5 km radius of the site.
Zannichellia palustris	-	Waterbodies Freshwater or slightly brackish estuarine areas (10%)	High	Endangered	Not Listed	Excluded There are no BioNet records for this species within a 5 km radius of the development site. It was determined that the habitat is substantially degraded such that this species is unlikely to occur within the development site.

CE = Critically Endangered; E = Endangered; E2 = Endangered Population; V = Vulnerable

1.5.3 Habitat survey results

Two small stags (dead standing tree) with no visible hollows and one hollow-bearing tree were located within the development site (Figure 7). The hollow-bearing tree was located in an exotic species, *Phoenix canariensis* (Phoenix Palm), near an existing house. Two *Trichoglossus moluccanus* (Rainbow Lorikeets) were observed inhabiting this hollow. No threatened species were recorded during field surveys.

The native vegetation within the development site may be used as intermittent foraging habitat for microbats, *Ninox strenua* (Powerful Owl), *Pteropus poliocephalus* (Grey-headed Flying-fox) and raptors species such as *Circus assimilis* (Spotted Harrier), *Hieraaetus morphnoides* (Little Eagle) and *Lophoictinia isura* (Square-tailed Kite). There is a Nationally Important Flying-fox Camp approximately 15 kilometres to the east of the development site in Wetherill Park. Larger areas of suitable foraging habitat are present outside the development site along Kemps Creek and Ropes Creek and contain additional foraging habitat for these species.

1.5.4 Targeted survey results

Targeted surveys were conducted for species credit flora and fauna species (as described in Section 1.4.11). The results of the survey are provided in Table 20 and displayed in Figure 7.

Following the completion of the habitat assessments and targeted surveys it was determined that the vegetation within the development site is highly disturbed and does not provide habitat for species credit species. Therefore, no additional assessment of species credit species is required for these species.

Table 20: Results of targeted surveys and credit requirements

Target species	Common name	Survey method	Survey effort	Survey dates	BAM survey period	Species recorded during survey	Species credits required
FLORA							
Acacia pubescens	-	Flora transects and random meander	16 person hours	10/10/2020 7/12/2020	All year	No	No. Not recorded in the development site.
Grevillea juniperina subsp. *juniperina*	Juniper-leaved Grevillea	Flora transects and random meander	16 person hours	10/10/2020 7/12/2020	All year	No	No. Not recorded in the development site.
Marsdenia viridiflora subsp. *viridiflora*		Flora transects and random meander	8 person hours	7/12/2020	November - February	No	No. Not recorded in the development site.
Maundia triglochinoides		Flora transects and random meander	8 person hours	7/12/2020	November - March	No	No. Not recorded in the development site.

Target species	Common name	Survey method	Survey effort	Survey dates	BAM survey period	Species recorded during survey	Species credits required
Pimelea spicata	Spiked Rice-flower	Flora transects and random meander	16 person hours	10/10/2020 7/12/2020	All year	No	No. Not recorded in the development site.
Meridolum corneovirens	Cumberland Plain Land Snail	Active diurnal search around base of paddock trees	8 person hours	7/12/2020	All year	No	No. Not recorded in the development site.

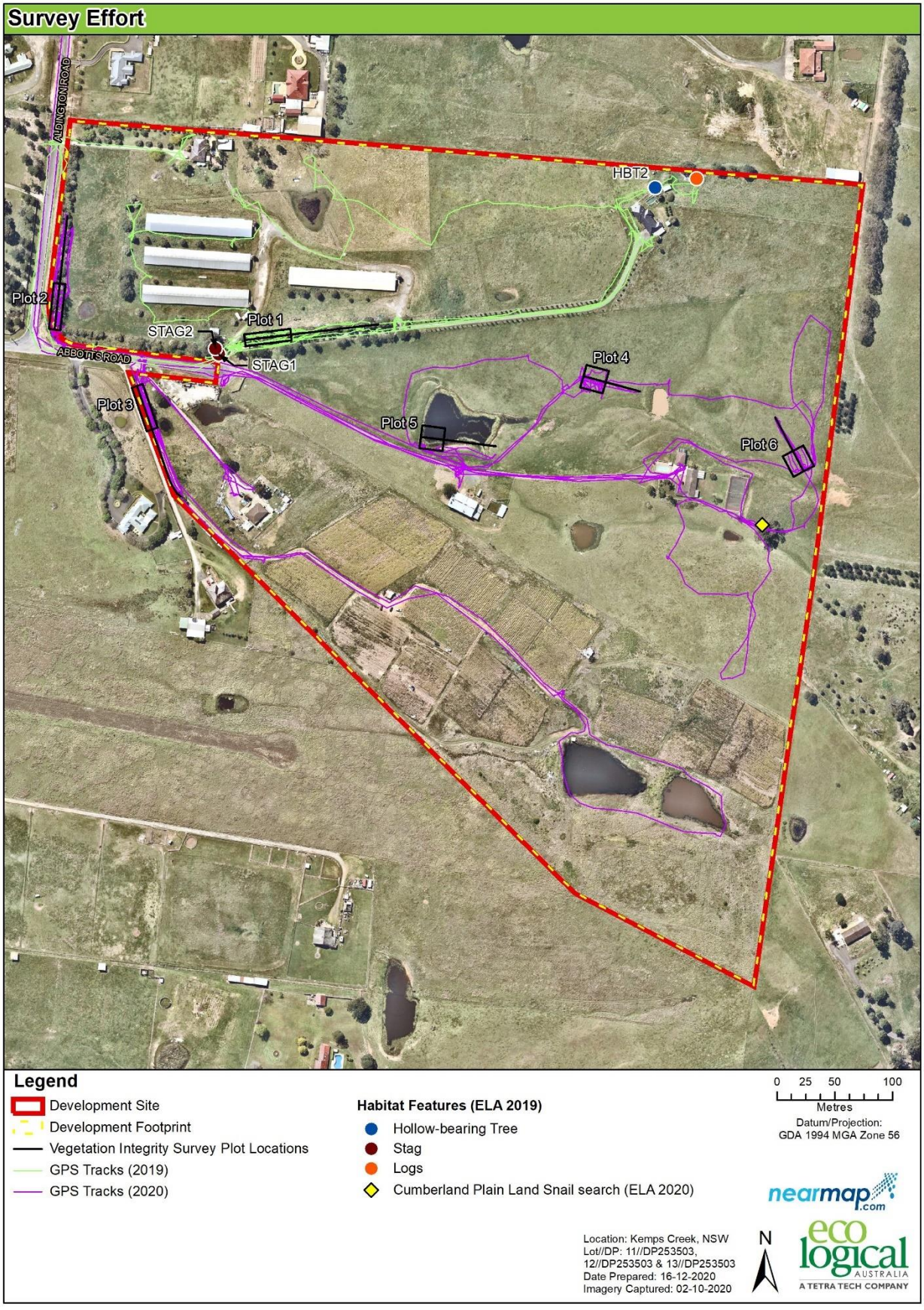

Figure 7: Survey effort

2. Stage 2: Impact assessment (biodiversity values)

2.1 Avoiding impacts

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

The project will result in the removal of native vegetation from within the development footprint. The project design has not avoided or mitigated impacts to biodiversity values as discussed below (Table 21).

Table 21: Locating a project to avoid and minimise impacts on vegetation and habitat

Approach	How addressed and justification
Locating the project in areas where there are no biodiversity values	The project has utilised areas where there are few biodiversity values including open exotic grasslands and exotic vegetation. However, the development will also affect biodiversity values including PCT 849 which is listed as part of a TEC. The impacts to the vegetation within the development area is unavoidable as bulk earthworks are required to level the existing undulating terrain for development. Additionally, the vegetation occurs in fragmented patches within the site which does not provide opportunities to retain clusters of vegetation within the development footprint.
Locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition	The majority of the project is located in previously cleared areas which contains planted native vegetation or low quality TEC which provides poor habitat for threatened species. The development will affect low quality Cumberland Plain Woodland which contains a low vegetation integrity score. PCT 849 vegetation zone 1 had a vegetation integrity score of 7.7 and PCT 849 vegetation zone 2 had a vegetation integrity score of 2.4.
Locating 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 project will impact upon native vegetation (PCT 849 vegetation zone 1 and 2) which forms a component of listed as part of a critically endangered ecological community (CEEC), Cumberland Plain Woodland. Impacts to these patches of CEEC cannot be avoided due to the scattered distribution of the vegetation and the current design which requires bulk earthworks to reduce the undulating terrain of the landscape. The vegetation here is in poor condition (see above).
Locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained	The vegetation within the development site is highly fragmented and does not support vegetated corridors to adjacent parcels of land. The scattered vegetation may provide stepping-stone habitat for highly mobile threatened or migratory species moving through the landscape. A slight reduction in the availability of native vegetation is unlikely to result in a loss of connectivity for highly mobile species or loss of exchange of genetic diversity.
Reducing the clearing footprint of the project	Due to the undulating terrain of the site, the clearing footprint will result in impacts to all of the native vegetation within the development site.
Locating ancillary facilities in areas where there are no biodiversity values	The development site contains large cleared lands which will be utilised for ancillary facilities to service the development.
Locating 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)	Ancillary features will be located within the operational footprint which includes low condition TECs within a low vegetation integrity score and cleared areas. Planted native vegetation with a higher integrity scores (i.e. vegetation zone 1 and 2) may also be affected by the installation of ancillary features.

Approach	How addressed and justification
Locating ancillary facilities in areas that avoid habitat for species and vegetation in high threat status categories (e.g. an EEC or CEEC)	Ancillary features will be located within the operational footprint or land approved for development within the development site. This includes impact to low condition Cumberland Plain Woodland (vegetation zone 1 and 2).
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 are not considered appropriate to this development.
Making provision for the demarcation, ecological restoration, rehabilitation and/or ongoing maintenance of Retained native vegetation habitat on the development site.	The development involves the removal of all the vegetation within the development site and as such the demarcation of vegetation to be retained is not required.

2.1.2 Prescribed biodiversity impacts

The development site has the prescribed biodiversity impacts as outlined in Table 22.

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

- Occurrence of karst, caves, crevices and cliffs – none occur within the development site
- Occurrence of rock – no rock outcrops or scattered rocks occur within the development site
- Occurrence of human made structures and non-native vegetation – **Yes, human-made and non-native vegetation, see section below**
- Hydrological processes that sustain and interact with the rivers, streams and wetlands – **Yes, two 1st Strahler order stream and several dams are located within the development site and will be affected by the proposed works**
- Proposed development for a wind farm and use by species as a flyway or mitigation route – the project does not involve any wind farm development.

The development site contains prescribed impacts including human made buildings, non-native vegetation and constructed farm dams. The development is located within a highly fragmented and cleared landscape.

The development will include the removal of one hollow-bearing trees which was *Phoenix canariensis*.

Non-native vegetation also includes open exotic grasslands which provides foraging habitat for threatened raptor species such as *Circus assimilis* (Spotted Harrier), *Hieraaetus morphnoides* (Little Eagle) and *Lophoictinia isura* (Square-tailed Kite). No nesting habitat for these raptor species were recorded within the development site.

Consideration was given during the literature review to buildings that could potentially be utilised as roosting habitat for microbats. Visual inspections were conducted during site investigations. Human made structures includes residential dwellings and open farm sheds. It was determined that the human made structures are unlikely to provide habitat for threatened microbat species as no suitable openings into the roof cavities were observed.

Some threatened microbat species may on occasion forage over non-native vegetation and exotic grasses. No suitable roosting or breeding habitat was recorded in non-native or exotic grasses. Threatened microbat species include:

- *Miniopterus australis* (Little Bent-winged Bat)
- *Miniopterus orianae oceanensis* (Large Bent-winged Bat)
- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat)
- *Saccolaimus flaviventris* (Yellow-bellied Sheath-tail Bat)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat).

Table 22: 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: • karst, caves, crevices, cliffs and other geological features of significance, or • rocks, or • human made structures, or • non-native vegetation	The development site contains human-made structures such as residential houses. The development site contains non-native vegetation in the form of landscaped gardens and open exotic grasslands.	Potential foraging habitat for threatened microbat species above non-native vegetation canopy: • Little Bent-winged Bat • Large Bent-winged Bat. • Eastern False Pipistrelle • Eastern Coastal Free-tailed Bat • Yellow-bellied Sheath-tail Bat • Greater Broad-nosed Bat. Potential foraging for Grey-headed Flying-fox on fruiting non-native vegetation (*Phoenix canariensis*). Potential foraging habitat for raptor species: • Spotted Harrier • Little Eagle • Square-tailed Kite.
Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	The proposed development will remove small patches of non-native vegetation and exotic grasses from within the development footprint.	The development site is located within a highly fragmented landscape. Land surrounding the development site contains open landscape and scattered vegetation, similar to the vegetation within the development site. The development is unlikely to result in changes to the connectivity of highly mobile species moving across the landscape.
Impacts of development on movement of threatened species that maintains their lifecycle	The proposed development does not contain significant connectivity values which links important habitat or provide connective corridors for highly mobile or migratory species.	As per above, the development site is located within a highly fragmented landscape. The development is unlikely to impact upon the movement of threatened species that maintains their lifecycle such as migratory species.

Prescribed biodiversity impact	Description in relation to the development site	Threatened species or ecological communities effected
Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining)	The development will result in the removal of seven farm dams and removal of mapped watercourses.	Due to the scale of the proposed development the development footprint will result in the removal of natural hydrological processes from within the development site. The field surveys did not identify threatened species or threatened ecological communities which may be sustained by the dams and mapped watercourse.

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 23.

Table 23: Locating and designing a project to avoid and minimise prescribed biodiversity impacts

Approach	How addressed and justification
Locating and designing the development to avoid direct impacts on habitat features	There project will affect human-made structures such as existing residential dwellings. No threatened microbat habitat was recorded within the roof cavities of these houses. Non-native vegetation will be removed from the development site. These habitats cannot be avoided and in general do not supply critical habitat to resident threatened species.
Locating the envelope of sub-surface works, both in the horizontal and vertical plane, to avoid and minimise operations beneath the habitat features, e.g. locating long wall panels away from geological features of significance or water dependent plant communities and their supporting aquifers	Not applicable.
Locating the project to avoid severing or interfering with corridors connecting different areas of habitat, migratory flight paths to important habitat or preferred local movement pathways	The development site is located within a highly cleared and fragmented environment. The vegetation within the development site is fragmented by open grasslands which limits migratory/foraging connectivity and exchange of genetic material of flora species and less mobile fauna species between patches of vegetation.
Optimising project layout to minimise interactions with threatened and protected species and ecological communities, e.g. designing turbine layout to allow buffers around features that attract and support aerial species, such as forest edges, riparian corridors and wetlands, ridgetops and gullies	The development design has utilised areas with minimal impacts to biodiversity values by utilising existing disturbed areas to minimise interactions with threatened species habitat.
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 seven farm dams with water identified within the development site. Two contained some aquatic vegetation. Several constructed drainage channels were identified within the development site and will be affected by the proposed works. The hydrological processes do not sustain threatened species or TECs. There is potential that the proposed works may result in an alteration in water flow due to change in land use and topography

Approach	How addressed and justification
	of the development site. However, the proposed development is in accordance with the Precinct plans and has considered management of water as per the Precinct plans. The proposed works have therefore included a detention basin to management water on site.
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. On-site water will be managed through detention basins.
Engineering solutions, e.g. proven techniques to minimise fracturing of bedrock underlying features of geological significance, water dependent communities and their supporting aquifers; proven engineering solutions to restore connectivity and favoured movement pathways	Not applicable.

2.2 Assessment of Impacts

2.2.1 Direct impacts

The direct impacts of the development on:

- native vegetation are outlined in Table 24
- threatened ecological communities are outlined in Table 25
- prescribed biodiversity impacts are outlined in Section 2.2.5.

Direct impacts including the final project footprint (construction and operation) are shown on Figure 8.

Table 24: Direct impacts to native vegetation

Veg zone	PCT ID	PCT name	Condition	Impact area (ha)
1	850	*Cumberland Shale Hills Woodland*	Exotic grasses	0.31
2	850	*Cumberland Shale Hills Woodland*	Native grasses	0.39
3	849	*Cumberland Shale Plain Woodland*	Scattered trees	0.12
4	849	*Cumberland Shale Plains Woodland*	DNG	3.39
5	1071	*Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion*	Dam	0.07

Table 25: Direct impacts on threatened ecological communities

PCT ID	BC Act			EPBC Act		
	Listing status	Name	Impact (ha)	Listing status	Name	Impact (ha)
849	CEEC	Cumberland Plain Woodland	3.51	-	-	-

2.2.2 Change in vegetation integrity

The change in vegetation integrity due to the development is provided in Table 26. The future vegetation integrity scores of zero reflects the clearing of all native vegetation within the development site.

Table 26: Change in vegetation integrity

Veg zone	PCT ID	Ancillary	Impact area (ha)	Current vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity
1	849	Scattered trees	0.12	7.7	0	-7.7
2	849	DNG	3.39	2.4	0	-2.4
3	1071	Dam	0.07	8.3	0	-8.3

2.2.3 Indirect impacts

The indirect impacts of the development are outlined in Table 27. 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.

Table 27: Indirect impacts

Indirect impact	Project phase	Nature	Extent	Frequency	Duration	Timing
Sedimentation and contaminated and/or nutrient rich run-off	Construction	Runoff during construction works. Changes in surface water flow including water quality and flow rates due to hard surfaces of new development.	Confined to development site with sediment fencing	During heavy rainfall or storm events	During rainfall events	Short-and long term impacts
Noise, dust or light spill	Construction	Noise and dust created from machinery (no night works proposed therefore no light spill). Impacts to fauna from new street lights.	Noise and dust likely to carry beyond development site boundary. Impacts to fauna foraging within the site at night.	Daily, during construction works During life of the project	Sporadic throughout construction period On-going	Short-and long-term impacts

Indirect impact	Project phase	Nature	Extent	Frequency	Duration	Timing
Inadvertent impacts on adjacent habitat or vegetation	Construction / operation	N/A	N/A	Daily, during construction works	Throughout construction period On-going	Short-and-term impacts
Transport of weeds and pathogens from the site to adjacent vegetation	Construction	Spread of weed seed or pathogens	Potential for spread into adjacent lands	Daily, during construction works	Sporadic throughout construction period	Potentially long-term impacts
Vehicle strike	Construction / operation	Potential for native fauna to be struck by working machinery and moving vehicles	Within development site	Daily, during both construction and operational phases.	Throughout life of project	Short-term impacts
Rubbish dumping	Construction / operation	Potential for rubbish to impact upon the quality and health of fauna and flora species or their habitat in the development site.	Within the development site and spread to adjacent properties.	Daily, during both construction and operational phases.	Throughout life of project	Short-term impacts
Disturbance to specialist breeding and foraging habitat	Construction / operation	N/A	N/A	N/A	N/A	N/A
Displacement of native fauna species	Construction	Loss of roosting/sheltering habitat or loss of foraging habitat.	Within the development site	Construction and operational phase	Throughout project	Long- and short-term impacts
Change in edge effects from clearing of vegetation, installation of hard surfaces and alteration of hydrological flow	Construction / operation	Land adjacent to the boundaries of the development site may be subject to changes in surface water flow and changes in water quality as a result to the proposed development.	The vegetation adjacent to the site or downslope	Construction and operational phase	Throughout project	Long- and short-term impacts
Wood collection	Construction / operation	Minimal woody debris available for collection	Within development site	Daily, during construction and operation phases.	Throughout life of project	Short term and long-term impacts.

2.2.4 Prescribed biodiversity impacts

The development site has the prescribed biodiversity impacts as outlined in Table 28.

Table 28: Direct 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 non-native vegetation.	Construction / operation / on-going	Confined to the development site. Removal of non-native vegetation	Daily, during construction works Ongoing additional noise, vibration	Throughout construction period	Short-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	Construction / operation / on-going	Confined to the development site Production of noise and vibration	Daily, during construction works Ongoing additional noise and vibration during construction	Throughout construction period	Short-term impacts
Impacts of development on movement of threatened species that maintains their lifecycle	Construction / operation / on-going	Confined to the development site	Daily, during construction works Ongoing additional noise and loss of habitat for threatened species.	On-going	Long-term impacts

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 29.

Table 29: Measures proposed to mitigate and manage impacts

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
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	Minor	Pre-clearance survey of trees to be removed and identification / location of habitat trees (i.e. for birds or possums) by a suitably qualified ecologist. Supervision by a qualified ecologist/licensed wildlife handler during habitat tree removal in accordance with best practise methods. Any tree removal is to be undertaken by a suitably qualified and insured arborist.	Any fauna utilising habitat within the development site will be identified and managed to ensure clearing works minimise the likelihood of injuring resident fauna	During clearing works	Project Manager / Ecologist
Installing artificial habitats for fauna in adjacent vegetation and habitat or human made structures to replace the habitat resources lost and encourage animals to move from the impacted site, e.g. nest boxes	High	Minor	A ratio of one nest box per hollow removed. Nest boxes are to be of a similar dimension to hollows removed and installed under the supervision of an ecologist in an offset location.	Replacement of removed habitat features	Prior to and during vegetation clearance works	Project Manager / Ecologist
Timing works to avoid critical life cycle events such as breeding or nursing	High	Minor	Where possible within construction timelines, avoid clearing works in later winter/ spring during breeding / nesting period for birds and mammals.	Impacts to fauna during nesting / nursing avoided	During clearing works	Project Manager
Sediment barriers or sedimentation ponds to control the quality of water released from the site into the receiving environment	Moderate	Minor	Appropriate controls are to be utilised to manage exposed soil surfaces and stockpiles to prevent sediment discharge into waterways. Soil and erosion measures such as sediment fencing, clean water diversion must be in place prior the commencement of the construction work.	Erosion and sedimentation risks controlled	For the duration of the construction works	Project Manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Prevent impacts of noise, dust and light spill on fauna species	Moderate	Minor	Construction lights or development lights should be positioned to prevent shine into future planted vegetation. Street lights should use ecologically sensitive designs including use of shields and timers and positioned away from retained vegetation. Noise should be limited to construction hours only. Dust should be managed through appropriate dust control management plan.	Avoid impacts from artificial lighting on nocturnal or diurnal species. Reduction of noise outside of operation hours. Management of dust.	For the duration of the construction works and long-term	Project Manager
Prevent damage to vegetation retained adjacent to site	High	Moderate	Clearly delineate clearance limits and identify all trees for removal.	Prevent accidental removal of vegetation	For the duration of construction works	Project Manager
Prevent the dumping of rubbish found on site	Minor	Negligible	Waste bins to be present on site. Covers to be used to prevent blown litter and the entry of pest animals or rain. Removal and appropriate disposal of general waste.	Dumping of rubbish during construction prevented	For the duration of the construction works	Project Manager
Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	Moderate	Minor	Vehicles, machinery and building refuse should remain only within the development site. Washdown protocols for vehicles should be observed to prevent the entry of soil borne pathogens. Weed management to be undertaken where required. Weeds should be removed and handled in accordance with relevant Biosecurity Act protocols if high threat weeds are present.	Spread of weeds prevented Spread of pathogens and disease	Prior to and during clearing works	Project Manager
Staff training and site briefing to communicate environmental features to be protected and measures to be implemented	Minor	Negligible	Construction staff to be briefed prior to work commencing to be made aware of any sensitive biodiversity values present and environmental procedures such as:	All staff entering the development site are fully aware of all the ecological values present within the site and environmental aspects relating to the development	To occur for all staff entering/working at the development site. Site	Project Manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
			• Site environmental procedures (vegetation management, sediment and erosion control, exclusion fencing and weeds) • What to do in case of environmental emergency (chemical spills, fire, injured fauna) • Key contacts in case of environmental emergency.	and know what to do in case of any environmental emergencies.	briefings should be updated based on phase of the work and when environmental issues become apparent.	
Making provision for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on or adjacent to the development site	Minor	Negligible	It is recommended that landscaping in the development site considers the use locally derived native species and those found within PCT 849/850	Areas within the development site will be landscaped using appropriate species	Throughout construction and following completion of construction activities.	Project Manager

2.2.6 Serious and Irreversible Impacts (SAII)

Cumberland Plain Woodland is listed as a candidate Serious and Irreversible Impact (SAII) entity as outlined in Table 30 and shown in Figure 9. There is no threshold listed for Cumberland Plain Woodland is listed under the Threatened Biodiversity Data Collection (DPIE BioNet).

There is currently no threshold to guide the consent authority in assessing candidates for SAII. It is the role of the consent authority to determine if an impact on an entity constitutes a SAII. Table 31 provides justification of Cumberland Plain Woodland as a SAII entity in accordance with the Principles 1-4 listed in clause 6.7 of the BC Reg.

A total of 3.51 ha of mapped Cumberland Plain Woodland will be affected by the development footprint. About 3.39 ha is present in vegetation zone 2 PCT 849_DNG and 0.12 ha is in vegetation zone 1 PCT 849_scattered trees. Both vegetation zones represent part of Cumberland Plain Woodland vegetation community in poor condition.

The remaining vegetation within the development site does not represent part of a SAII entity.

Detailed consideration of whether impacts on candidate species are serious and irreversible is included in Table 32.

Table 30: Candidate Serious and Irreversible Impact entity and the relevant principle (cl 6.7 BC Reg)

Species / Community	Principle	Direct impact individuals / area (ha)	Threshold
Cumberland Plain Woodland	1 and 2	3.51 ha	N/A

Table 31: Evaluating which extinction risk principles apply to the candidate entity

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?	There are currently no thresholds for Cumberland Plain Woodland in the Threatened Biodiversity Data Collection provided in DPIE BioNet. Cumberland Plain Woodland is listed as a SAII candidate as it has undergone a dramatic rate of decline due to the extent of vegetation clearance. The vegetation within the development footprint contains scattered trees or derived native grasslands.
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?	There are currently no thresholds for Cumberland Plain Woodland in the Threatened Biodiversity Data Collection provided in DPIE BioNet.

Determining whether impacts are serious and irreversible	Assessment
	The proposed development will result in the impact to 0.12 ha of scattered trees (vegetation zone 1) and 3.39 ha of derived native grasslands (vegetation zone 2) which represents poor quality Cumberland Plain Woodland.
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?	The development site is not located at the outer limits of distribution for this ecological community.
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?	The vegetation within the development site is not considered irreplaceable as this vegetation community has been mapped in the broader locality of the development site.

The following assessment is based on Section 10.2.2 of the BAM.

Table 32: Evaluation of an impact on a TEC

Impact Assessment Provisions	Assessment
1. The action and measures taken to avoid the direct and indirect impacts on the potential entity for an SAII	The proposed development has located the proposed development within predominantly cleared lands. However, due to the undulating terrain of the development site, all vegetation will be removed prior to bulk earthworks.
2. The area and condition of the TEC to be impacted directly and indirectly by the proposed development. The condition of the TEC is to be represent by the vegetation integrity score for each vegetation zone	Approximately 0.12 ha of scattered trees (vegetation zone 1) will be removed for the development. Vegetation zone 1 had a vegetation integrity score of 7.7 which indicates that the vegetation is in poor condition. A further 3.39 ha of vegetation zone 2 which includes derived native grasslands will also be removed for the development. Vegetation zone 2 had a vegetation integrity score of 2.4 which also indicates that the vegetation is in poor condition. Comparing the vegetation present to the approved benchmarks shows that the vegetation present is highly modified. The vegetation and scored very low against all areas of composition, structure and function. Vegetation zone 1 and 2 were not considered part of the TEC or SAII.
3. A description of the extent to which the impact exceeds the threshold for the potential entity that is specified in the *Guidance to assist a decision-maker to determine a serious and irreversible impact*	There is not SAII threshold listed in the Threatened Biodiversity Data Collection for Cumberland Plain Woodland.

Impact Assessment Provisions	Assessment
4. An estimate of the extent and overall condition of the potential TEC within an area of 1,000 ha and 10,000 ha surrounding the proposed development footprint	The area of Cumberland Plain Woodland within 1,000 ha and 10,000 ha surrounding the development site is estimated at 80.13 ha and 1,222 ha respectively (based on OEH 2013 vegetation mapping). The condition is not known for these areas; however, it is expected to range from good to poor. In general, this TEC within 1,000 and 10,000 ha is moderately to highly fragmented with few large, intact patches. The vegetation in the development site to be affected represents 4.38% of the Cumberland Plain Woodland in the 1,000 ha and 0.29 % in the 10,000 ha area surrounding the development. The mapping data from 2013 was accurate for the area within 1,000 ha from the development site (as shown on Figure 3).
5. An estimate of the extant area and overall condition of the potential TEC remaining in the IBRA subregion before and after the impact of the proposed development has been taken into consideration	Using OEH 2013 data, within the Cumberland IBRA subregion there is an estimate 12910 ha of Cumberland Plain Woodland. The includes small remnant patches in urbanised environments and large intact patches. After the proposed development, this is unlikely to decrease OEH (2013) mapped Cumberland Plain Woodland as the vegetation within the development site was not previously mapped as native by OEH (2013). Nonetheless, there would be a reduction in the area of Cumberland Plain Woodland of about 3.51 ha.
6. An estimate of the area of the candidate TEC that is in reserve system within the IBRA region and IBRA subregion.	Within the Sydney Basin IBRA region there is an estimated 12158.8 ha of Cumberland Plain Woodland. Within the Cumberland Plain IBRA subregion there is also an estimated 1,291.53 ha of Cumberland Plain Woodland remaining within the reserve system (i.e. National Parks and State Forests).
7. 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 proposed development is unlikely to affect abiotic factors critical to the survival of Cumberland Plain Woodland outside of the proposed clearing area. The proposal is not likely to affect groundwater or surface water flowing to any other Cumberland Plain Woodland remnants. The proposal is not likely to alter fire regimes in the landscape. No particular disturbance regime is known to facilitate the TEC's long-term survival. However, fires that are too frequent would alter the species composition and structural diversity and flooding may alter these elements as well. The proposal is not going to alter either of these in this landscape.
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 development will not impact upon characteristic and functionally important species outside of the impact areas. The TEC present in the development footprint was species poor and did not contain the features usually associated with this community, such as numerous tree species, structural diversity and highly diverse forb and grass understorey. There was little if any coarse woody debris and no large trees, or trees with hollows. As described above,

Impact Assessment Provisions	Assessment
	the development is unlikely to result in inappropriate fire/flooding regimes of this TEC.
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 proposed development will result in the removal of scattered trees and derived native grassland within the development site which represents poor quality Cumberland Plain Woodland. . The quality of the patches present was very low and there were few features close to benchmark. The integrity of the patches was also low. This is because they were present as five smaller and disconnected patches containing trees and three larger but disconnected patches of native grasses. The land has been zoned as IN1 and has not been identified in the WSEA SEPP as containing land of Conservation Value. The land has also not been identified on the Biodiversity Value Map. Therefore, there has been no long-term plan to improve or maintain the biodiversity values present. There are no patches of Cumberland Plain Woodland identified in adjacent lands. As such the proposed works will not result in indirect or direct disturbance to adjacent patches of this TEC or habitat for threatened species
8. Direct or indirect fragmentation and isolation of an area of the TEC	The proposed development will result in the removal of Cumberland Plain Woodland within the development site. The vegetation is already fragmented from other patches of TECs. These patches may have provided steppingstone foraging habitat for a range of mobile species. The patches do not form habitat for resident or sedentary threatened species. The proposed development will not result in new fragmentation of patches.
9. The measures proposed to contribute to the recovery of the TEC in the IBRA subregion.	Mitigation measures provided in Table 29 recommends that landscaping plans include characteristic species of PCT 849/850. No additional measures are proposed to contribute to the recovery of the TEC.

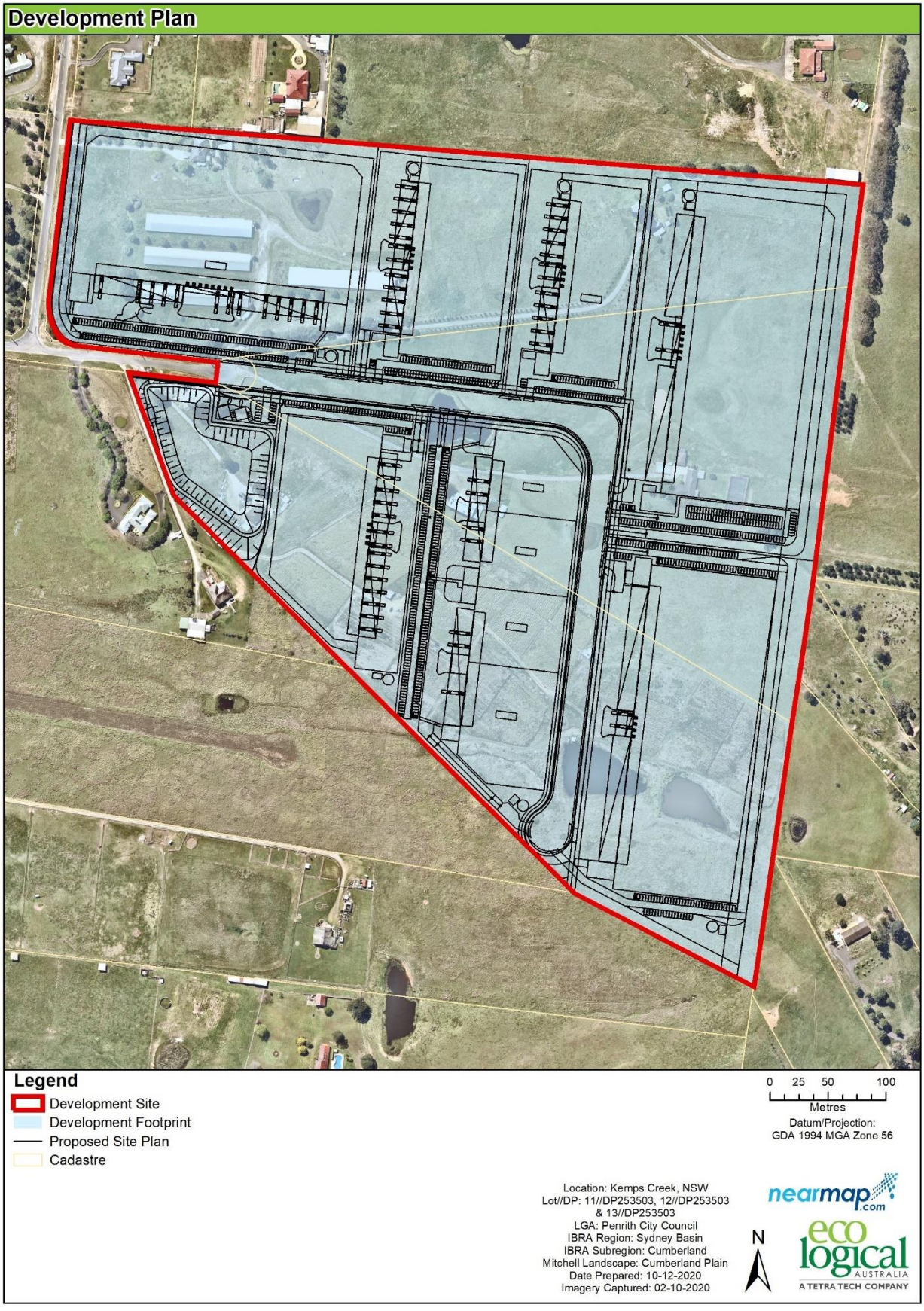

Figure 8: Final project footprint including construction and operation

2.3 Impact summary

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

The development footprint included the construction of 30 ha of proposed industrial development.

2.3.1 Serious and Irreversible Impacts (SAII)

Cumberland Plain Woodland is a candidate entity for SAII. The proposed development will result in the removal of 3.51 ha of this TEC. An SAII assessment has been undertaken for this TEC (see Section 2.2.6). However, the condition of the TEC is such that no offsets have been calculated in BAMC (see below).

2.3.2 Impacts requiring offsets

The impacts of the development do not require any offset.

2.3.3 Impacts not requiring offsets

The impacts of the development not requiring offset for native vegetation are outlined in Table 33 and shown on Figure 10. Vegetation zone 1, 2 and 3 do not require offsetting as per Section 10.3.1.1 of the BAM - a vegetation zone that has a vegetation integrity score <15 where the PCT is representative of an endangered or critically endangered ecological community.

Table 33: Impacts to native vegetation that do not require offsets

Veg zone	PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Direct impact (ha)	Rationale
1	849	Cumberland Shale Plains Woodland	Coastal Valley Grassy Woodlands	Grassy Woodlands	0.12	Vegetation integrity score (7.7) does not reach the threshold (15) for offset for a TEC
2	849	Cumberland Shale Plains Woodland	Coastal Valley Grassy Woodlands	Grassy Woodlands	3.39	Vegetation integrity score (2.4) does not reach the threshold (15) for offset for a TEC
3	1071	*Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion*	Coastal Freshwater Lagoons	Freshwater Wetlands	0.07	Vegetation integrity score (8.3) does not reach the threshold (20) for a non-TEC

2.3.4 Areas not requiring assessment

Areas not requiring assessment within the development site include those mapped as native vegetation (0.70 ha), exotic grasslands (19.36 ha), exotic vegetation (0.50 ha), cultivated areas (4.59 ha), dams (0.89 ha) and cleared / built areas (2.44 ha). Areas not requiring assessment area shown on Figure 11.

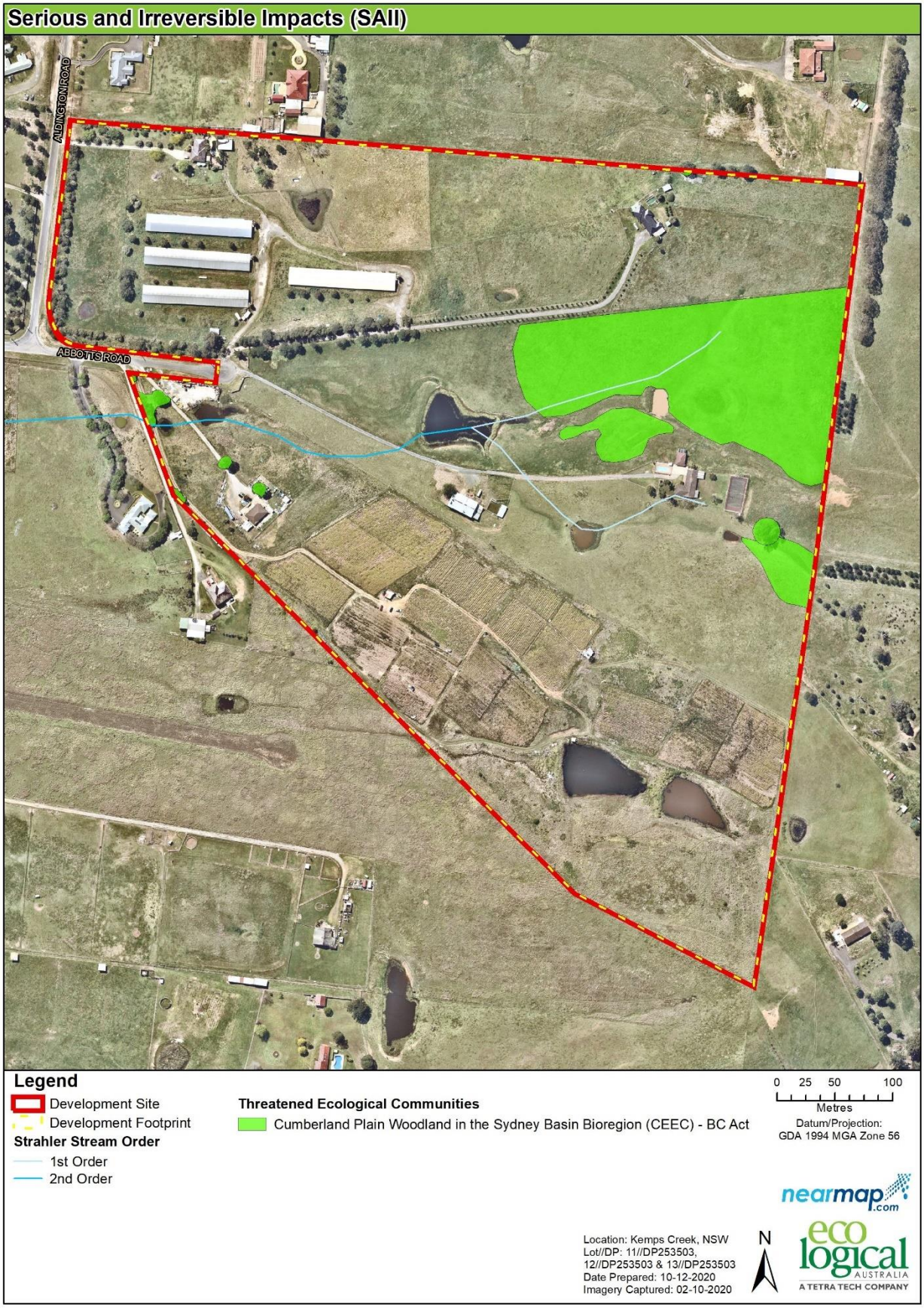

Figure 9: Serious and Irreversible Impacts

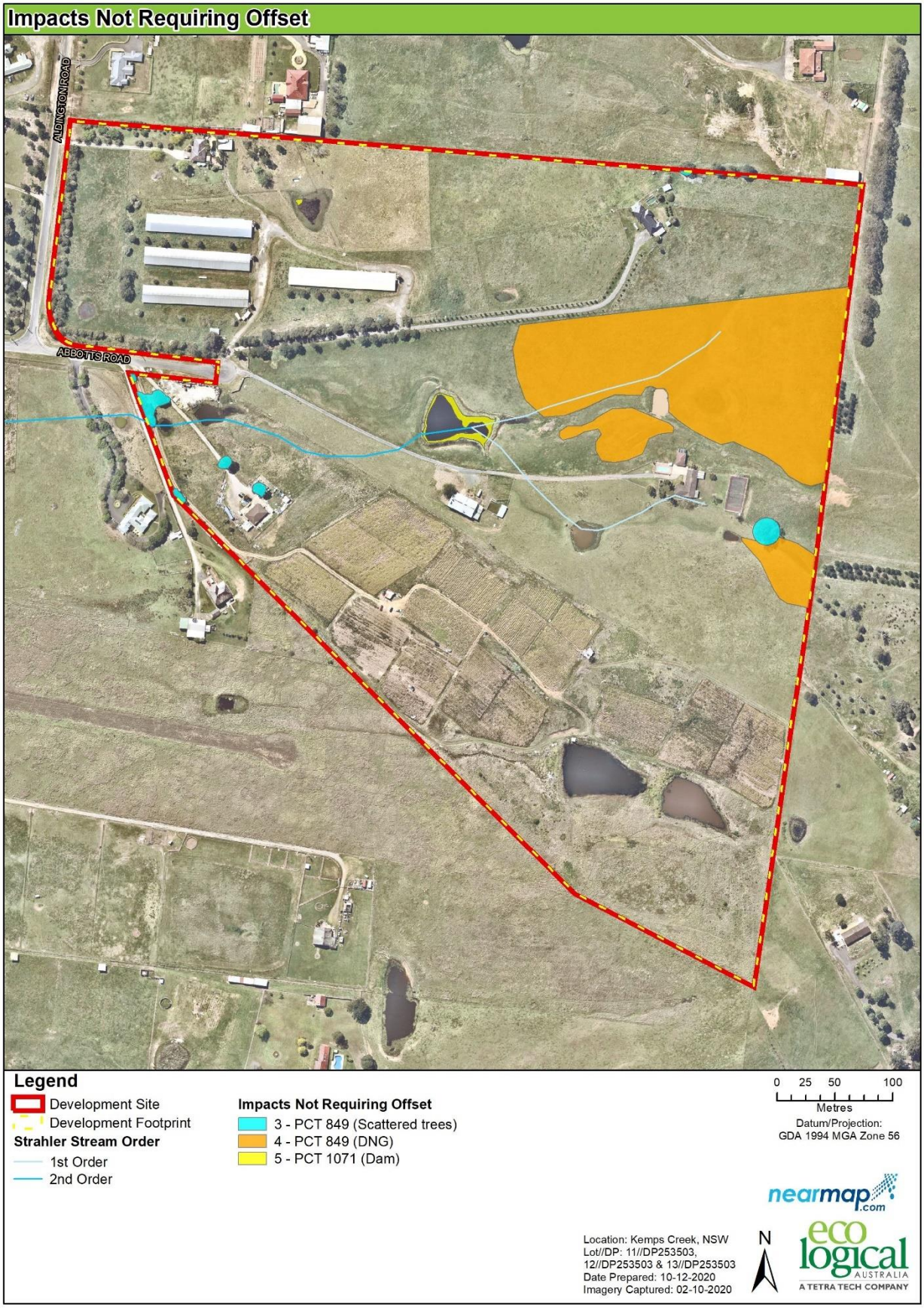

Figure 10: Impacts not requiring offset

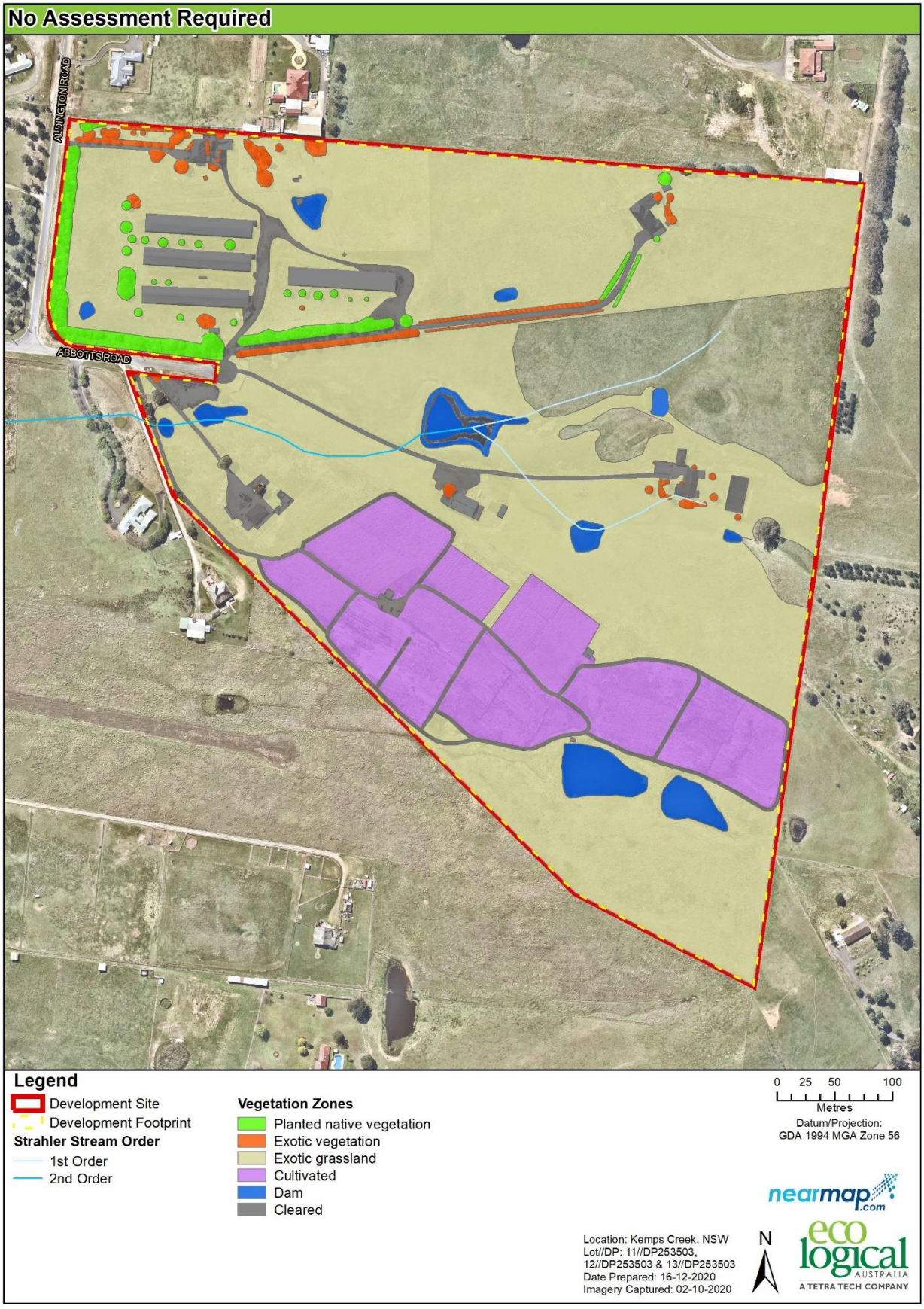

Figure 11: Areas not requiring assessment

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 "Matters of National Environmental Significance" (MNES) in accordance with the EPBC Act have been addressed in Section 2.4.1 below.

2.4.1 *Environment Protection and 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 a matter of MNES" is defined as a "controlled action", and requires approval from the Commonwealth DAWE, which is responsible for administering the EPBC Act.

The process includes undertaking an Assessment of Significance for listed threatened species and ecological communities that represent a matter of MNES that will be impacted as a result of the proposed action. Significant impact guidelines that outline a number of criteria have been developed by the Commonwealth, to provide assistance in conducting the Assessment of Significance and help decide whether or not a referral to the Commonwealth is required.

A habitat assessment and Likelihood of Occurrence was completed (Appendix C) and the following MNES were assessed under the EPBC Act:

- *Pteropus poliocephalus* (Grey-headed Flying-fox) (Table 34).

Pteropus poliocephalus (Grey-headed Flying-fox)

The Grey-headed Flying-fox is listed as a vulnerable threatened species under the EPBC Act. This species utilises a wide variety of habitats (including disturbed areas) for foraging and have been recorded travelling long distances on feeding forays. Fruits and flowering plants of a wide variety of species are the main food source. The species roosts in large 'camps' of up to 200 000 individuals. Camps are usually formed close to water and along gullies, however, the species has been known to form camps in urban areas.

Grey-headed Flying Fox has not been recorded on development site but has been recorded close to the development site. The closest nationally recognised camp is located approximately 15 km east at Wetherill Park (DAWE 2020c).

The vegetation within the site provides potential foraging habitat in the form of seasonally flowering myrtaceous tree species including *Eucalyptus tereticornis*. It is considered likely that this species would use the site and adjacent areas on occasion for foraging purposes. No roosting camps are located within the site.

Table 34: EPBC Act of Significance for Pteropus poliocephalus (Grey-headed Flying-fox)

Criterion	Assessment
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
Criterion a: lead to a long-term decrease in the size of an important population of a species	The Grey-headed Flying-fox is considered one population due to the constant exchange of genetic material between individuals and its movement between camps throughout

Criterion	Assessment
	its entire geographic range (DAWE 2020c). Maternity or other roosting habitat is considered important habitat for this species. No roosting habitat (i.e. camps) have been recorded within the development site. According to the National Flying-fox Monitoring Program, no camps currently occur or have ever been recorded within the development site (DAWE 2020b). The nearest active Grey-headed Flying-fox camp occurs approximately 15 km to the east of the development site, within Wetherill Park (DAWE 2020b). The development site contains 1.33 ha of potential foraging habitat for the Grey-headed Flying-fox. Additional foraging habitat was recorded within the broader locality of the development site. Given the proximity of more suitable habitat 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.
Criterion b: reduce the area of occupancy of an important population	The proposed development will reduce the extent of available foraging habitat for the Grey-headed Flying-fox. About 1.33 ha of potential foraging habitat will be removed. The vegetation within the development site may provide supplementary foraging habitat for this species. The development site does not contain breeding or sheltering habitat (i.e. bat camps). The Grey-headed Flying-fox is known to fly long distances (up to 50 km per night) and move between bat camps. As such this species is likely to utilise a large extent of habitat around the Wetherill Park camp which may include some habitat within the development site and a large amount of habitat in adjacent lands. Due to the extent of habitat within a 50 km radius of the known bat camp at Wetherill Park, the removal of a small amount of native planted vegetation is unlikely to significantly reduce the extent of occupancy for this species.
Criterion c: fragment an existing important population into two or more populations	The proposed development will result in the loss of 1.33 ha of potential foraging habitat in the form of native species and exotic vegetation within the development site. The proposed works will not affect camps. Additionally, due to the planted and highly urbanised nature of the vegetation within the development site, it is likely that the vegetation affected by the development is considered marginal or supplementary foraging habitat for this species. The Grey-headed Flying-fox is a highly mobile species and is considered part of one large population. As the vegetation within the development site is considered supplementary habitat for this species, it is unlikely that the proposed works will result in the fragmentation of populations for this highly mobile species.
Criterion d: adversely affect habitat critical to the survival of a species	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. No camps will be affected by the proposed action. The proposed action will affect 1.33 ha of 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 (50 km) on feeding forays and suitable habitat is available outside of the development site.
Criterion e: disrupt the breeding cycle of an important population	The proposed action will affect 1.33 ha of vegetation, some of which comprises suitable foraging habitat for the Grey-headed Flying-fox. The proposed action will not disrupt the breeding cycle of the Grey-headed Flying-fox given that no camps will be impacted by the proposed action and suitable foraging habitat is available adjacent to the development site.
Criterion f: Adversely affect habitat critical to the survival of a species; modify, destroy, remove or isolate or decrease	The proposed action will affect 1.33 ha of vegetation, including foraging habitat for the Grey-headed Flying-fox. Grey-headed Flying-fox camps will not be removed or disturbed, and suitable habitat is available outside of the development site.

Criterion	Assessment
the availability or quality of habitat to the extent that the species is likely to decline	
Criterion g: 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.
Criterion h: Introduce disease that may cause the species to decline	Grey-headed Flying-fox are reservoirs for the Australian bat lyssavirus and can cause clinical disease and mortality in Grey-headed Flying-fox. The proposed action would not increase the incidence of this disease.
Criterion i: Interfere substantially with the recovery of the species	A Draft National Recovery Plan for the Grey-headed Flying-fox was developed in 2017. The relatively small amount of foraging habitat to be removed is unlikely to substantially interfere with the recovery of this species.
Conclusion	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 outside of the development site.

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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 Group	Species name	Exotic (*)	High Threat Weed (*)	Plot 1 Cover %	Plot 2 Cover %	Plot 3 Cover %	Plot 4 Cover %	Plot 5 Cover %	Plot 6 Cover %
G	Forb (FG)	*Alisma plantago-aquatica*							0.1	
G	Forb (FG)	*Alternanthera denticulata*				0.1				
G		*Ambrosia spp.*	*			0.1				
G		*Araujia sericifera*	*	1	0.1	0.1		0.1		
G		*Asteraceae spp.*					0.1			
G	Grass & grasslike (GG)	*Austrostipa rudis subsp. rudis*				1	50			6
G	Grass & grasslike (GG)	*Austrostipa spp.*						0.2		
G		*Avena barbata*	*					0.5		
G		*Bidens spp.*	*		0.1	0.5		0.5		
G		*Briza minor*	*				0.1			
G		*Briza subaristata*	*	1			10			5
G		*Bromus catharticus*	*		0.1	20		5		
M	Shrub (SG)	*Callistemon citrinus*			5	3				
U	Tree (TG)	*Casuarina glauca*			15	5				
G	Grass & grasslike (GG)	*Cenchrus spp.*			0.3					
G	Grass & grasslike (GG)	*Cenchrus spp.*						1		
G		*Centaurium tenuiflorum*	*				1			0.3
G		*Chloris gayana*	*	1				40		

Stratum	Form Group	Species name	Exotic (*)	High Threat Weed (*)	Plot 1 Cover %	Plot 2 Cover %	Plot 3 Cover %	Plot 4 Cover %	Plot 5 Cover %	Plot 6 Cover %
G		*Cirsium vulgare*	*			0.1		2		
G		*Conyza bonariensis*	*			0.5	0.2			0.1
G		*Cyclospermum leptophyllum*	*				0.1			
G		*Cyclospermum spp.*				0.1				
G	Grass & grasslike (GG)	*Cynodon dactylon*			0.3	0.1	1	2		
G		*Cyperus eragrostis*	*	1		0.1				
G		*Echium plantagineum*	*					0.1		
G		*Ehrharta erecta*	*	1	70	40				
G	Forb (FG)	*Einadia nutans subsp. linifolia*				0.5				
G	Forb (FG)	*Einadia polygonoides*			0.2					
G	Grass & grasslike (GG)	*Eleocharis sphacelata*							0.5	
G		*Eragrostis curvula*	*	1		0.1				
U	Tree (TG)	*Eucalyptus beyeriana*			4					
U	Tree (TG)	*Eucalyptus paniculata subsp. paniculata*			5					
U	Tree (TG)	*Eucalyptus tereticornis*						10		
G		*Gamochaeta spp.*	*				0.2			0.5
G		*Hordeum spp.*	*		0.1					
G	Forb (FG)	*Hypericum gramineum*					0.1			
G		*Hypochaeris glabra*	*			0.1		0.1		
G		*Hypochaeris radicata*	*		0.1	0.1	2	0.1		0.2

Stratum	Form Group	Species name	Exotic (*)	High Threat Weed (*)	Plot 1 Cover %	Plot 2 Cover %	Plot 3 Cover %	Plot 4 Cover %	Plot 5 Cover %	Plot 6 Cover %
G	Grass & grasslike (GG)	*Juncus usitatus*				0.1			1	
G	Grass & grasslike (GG)	*Lachnagrostis filiformis*				1				
G		*Lactuca serriola f. serriola*	*		0.1	0.1				
M		*Ligustrum sinense*	*	1		0.1				
G		*Lolium perenne*	*			0.1				
G		*Lolium rigidum*	*					0.1		
G		*Lotus subbiflorus*	*				1			0.2
G	Forb (FG)	*Ludwigia peploides subsp. montevidensis*							0.1	
G		*Lysimachia arvensis*	*				0.1			
G		*Malva parviflora*	*		0.1					
M	Shrub (SG)	*Melaleuca spp.*				3				
M	Shrub (SG)	*Melaleuca styphelioides*			10	40				
G		*Modiola caroliniana*	*			0.1		0.5		
G		*Nassella neesiana*	*	1		1				
M		*Olea europaea subsp. cuspidata*	*			1				
M		*Opuntia stricta var. stricta*	*	1				0.1		
G	Forb (FG)	*Ottelia ovalifolia subsp. ovalifolia*							2	
G		*Oxalis corniculata*	*		0.1					0.1
G	Forb (FG)	*Oxalis spp.*				0.1				
G		*Paspalum dilatatum*	*	1		10	5	20		5
G	Forb (FG)	*Persicaria decipiens*							0.1	

Stratum	Form Group	Species name	Exotic (*)	High Threat Weed (*)	Plot 1 Cover %	Plot 2 Cover %	Plot 3 Cover %	Plot 4 Cover %	Plot 5 Cover %	Plot 6 Cover %
G	Forb (FG)	*Persicaria spp.*				0.1				
G		*Phalaris aquatica*	*					1		
G		*Photinia spp.*	*			2				
G		*Plantago lanceolata*	*			2	1	1		
M		*Prunus spp.*	*			0.1		10		
M	Shrub (SG)	*Rubus spp.*						0.1		
G	Forb (FG)	*Rumex brownii*				0.1				
G		*Rumex crispus*	*			0.5				
G		*Schinus spp.*	*		0.5					
G		*Senecio madagascariensis*	*	1		0.1	0.1	0.1		0.2
G		*Setaria parviflora*	*			0.5	1			
G		*Sida rhombifolia*	*		0.2	5		1		
G		*Solanum linnaeanum*	*		0.2					0.1
G		*Solanum sisymbriifolium*	*			0.1		1		
G		*Sonchus oleraceus*	*			0.1				
G	Grass & grasslike (GG)	*Sporobolus creber*						0.1		
U	Tree (TG)	*Syncarpia glomulifera subsp. glomulifera*			2					
G		*Taraxacum officinale*	*			0.5				
G	Grass & grasslike (GG)	*Themeda triandra*					2			70
		Trifolium repens	*							0.1
G	Forb (FG)	*Triglochin striata*							20	

Stratum	Form Group	Species name	Exotic (*)	High Threat Weed (*)	Plot 1 Cover %	Plot 2 Cover %	Plot 3 Cover %	Plot 4 Cover %	Plot 5 Cover %	Plot 6 Cover %
G		*Verbena bonariensis*	*			0.5		10		
G	Forb (FG)	*Wahlenbergia spp.*					0.1			

KEY: U = UPPER, M= MIDDLE, G = GROUND. EG = FERN, FG = FORB, GG = GRASS & GRASSLIKE, OG = OTHER, SG = SHRUB, TG = TREE

Table 36: Vegetation integrity data (Composition, Structure and function)

Plot location data							
Plot no.	PCT	Vegetation Zone	Condition	Zone	Easting	Northing	Bearing (°)
1	Planted Native vegetation	0		56	296227	6551511	65
2	Planted Native vegetation	0		56	294053	6251519	347
3	849	2	DNG	56	296509	6251479	79
4	849	1	Scattered trees	56	296126	6251472	150
5	1071	3	Dam	56	296368	6251420	81
6	849	2	DNG	56	296699	6251397	330

only plots 3-6 were used in the credit calculator

Composition (number of species)						
Plot no.	Tree	Forb	Shrub	Grass	Other	Fern
1	4	1	2	2	0	0
2	1	5	3	4	0	0
3	0	2	0	3	0	0
4	1	0	1	4	0	0
5	0	5	0	2	0	0
6	0	0	0	3	0	0
Structure (Total cover %)						
Plot no.	Tree	Forb	Shrub	Grass	Other	Fern
1	26	0.2	15	0.6	0	0
2	5	0.9	46	2.2	0	0
3	0	0.2	0	53	0	0

Composition (number of species)						
4	10	0	0.1	3.3	0	0
5	0	22.3	0	1.5	0	0
6	0	0	0	76	0	0

Function

Plot no.	Large Trees (dbh > 80 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 Stem 80+ cm	Tree Regen	High Threat Weed Cover (%)
1	0	0	6	8	1	0	1	1	0	0	0	70.1
2	0	0	48	32	1	1	1	1	0	0	1	51.5
3	0	0	1.2	0	0	0	0	0	0	0	0	15.1
4	0	0	3.2	0	0	0	1	1	1	0	0	60.3
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	10.2

FOR STEM SIZE CLASSES: 0 = ABSENCE, 1 = PRESENCE.

Appendix C EPBC Act Likelihood of Occurrence

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the Protected Matters Search Tool. 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 within the study area and in the vicinity is unsuitable for the species.

A test of significance was conducted for threatened species or ecological communities 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.

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 Data Collection.

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
			FAUNA			
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.	Unlikely - suitable habitat not identified within the site.	N/A	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 woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of *Casuarina cunninghamiana* (River Oak).	Unlikely - suitable habitat not identified within the site.	N/A	No.
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.	Unlikely - suitable habitat not identified within the site.	N/A	No.
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* spp. (bullrushes) and *Eleocharis* spp. (spikerushes).	Unlikely - suitable habitat not identified within the site.	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	Unlikely - suitable habitat not identified within the site.	N/A	No.

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
			inundated or emergent sedges, grass, saltmarsh or other low vegetation.			
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.	Unlikely - suitable habitat not identified within the site.	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.	Unlikely - suitable habitat not identified within the site.	N/A	No.
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 rainforests and sandstone outcrop country.	Unlikely - suitable habitat not identified within the site.	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.	Unlikely - suitable habitat not identified within the site.	N/A	No.
Dasyurus maculatus (SE mainland population)	Spotted-tail Quoll	E	Found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Qld.	Unlikely - suitable habitat not identified within the site.	N/A	No.

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
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 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).	Unlikely - suitable habitat not identified within the site.	N/A	No.
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.	Unlikely - suitable habitat not identified within the site.	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.	Unlikely - suitable habitat not identified within the site.	N/A	No.
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.	Unlikely - suitable habitat not identified within the site.	N/A	No.
Hirundapus caudacutus	White-throated Needletail	M	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.	Unlikely - suitable habitat not identified within the site.	N/A	No.

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
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.	Unlikely - suitable habitat not identified within the site.	N/A	No – impacts are negligible for this mobile species.
Litoria aurea	Green and Golden Bell Frog	V	Since 1990, recorded from ~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* spp. (bullrushes) or *Eleocharis* spp. (spikerushes). Some populations occur in highly disturbed areas.	Unlikely – farm dams did not contain suitable fringing aquatic habitat for this species.	N/A	No.
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.	Unlikely - suitable habitat not identified within the site.	N/A	No.
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.	Unlikely - suitable habitat not identified within the site.	N/A	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.	Unlikely - suitable habitat not identified within the site.	N/A	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.	Unlikely - suitable habitat not identified within the site.	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
Numenius madagascariensis	Eastern Curlew	CE	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 reefs, rock platforms, saltmarsh, mangroves, freshwater/brackish lakes, saltworks and sewage farms.	Unlikely - suitable habitat not identified within the site.	N/A	No
Petauroides volans	Greater Glider	V	This population on the south coast of NSW is bounded by the Moruya River to the north, Coila Lake to the south and the Princes Highway and cleared land exceeding 700 m in width to the west. Eucalypt forests and woodlands.	Unlikely - suitable habitat not identified within the site.	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.	Unlikely - suitable habitat not identified within the site.	N/A	No
Phascolarctos cinereus (combined populations of Qld, NSW and ACT)	Koala (combined populations of Qld, NSW and ACT	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.	Unlikely - suitable habitat not identified within the site.	Unlikely	No
Pseudomys novaehollandiae	New Holland Mouse	V	Fragmented distribution across eastern NSW. Open heathlands, woodlands and forests with a heathland understorey, vegetated sand dunes.	Unlikely - suitable habitat not identified within the site.	N/A	No
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.	Unlikely – no breeding or sheltering habitat on site. seasonal foraging habitat available within the study	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
				area. No camps identified within study area.		
Rhipidura rufifrons	Rufous Fantail	M	Wet sclerophyll forests, subtropical and temperate rainforests. Sometimes drier sclerophyll forests and woodlands.	Unlikely - suitable habitat not identified within the site.	N/A	No
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. Swamps, dams and nearby marshy areas.	Unlikely - suitable habitat not identified within the site.	N/A	No
Synemon plana	Golden Sun Moth	CE	It is found in native open temperate grasslands and open grassy woodlands dominated by *Austrodanthonia* spp.	Unlikely - suitable habitat not identified within the site.	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.	Unlikely - suitable habitat not identified within the site.	N/A	No
			FLORA			
Acacia bynoeana	Bynoe's Wattle	V	Found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. Heath or dry sclerophyll forest on sandy soils.	Unlikely - suitable habitat not identified within the study area.	N/A	No
Acacia pubescens	Downy Wattle	V	Restricted to the Sydney region around the Bankstown-Fairfield-Rookwood and Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. Open woodland and forest, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland. Occurs on alluviums, shales and at the intergrade between shales and sandstones.	Unlikely - suitable soils not identified within the study area.	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
Allocasuarina glareicola	-	E	Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Castlereagh woodland on lateritic soil. Found in open woodland with *Eucalyptus parramattensis*, *Eucalyptus fibrosa*, *Angophora bakeri*, *Eucalyptus sclerophylla* and *Melaleuca decora*.	Unlikely - suitable habitat not identified within the study area.	N/A	No
Cynanchum elegans	White-flowered Wax Plant	E	*Cynanchum elegans* is a twiner with a corky bark when mature. Restricted from Brunswick Heads to Gerroa. It inhabits littoral rainforests, coastal scrub and open forests and woodlands.	Unlikely - suitable habitat not identified within the study area.	N/A	No
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.	Unlikely - suitable habitat not identified within the site.	N/A	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.	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.	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.	Unlikely - suitable habitat not identified within the site.	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
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.	Unlikely - suitable habitat not identified within the site.	N/A	No
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.	Unlikely - suitable habitat not identified within the site.	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.	Unlikely - suitable habitat not identified within the site.	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.	Unlikely - suitable habitat not identified within the site.	N/A	No
Pimelea spicata	Spiked Rice-flower	E	Two disjunct areas; the Cumberland Plain (Marayong and Prospect Reservoir south to Narellan and Douglas Park) and the Illawarra (Lansdowne to Shellharbour to northern Kiama). Well-structured clay soils. *Eucalyptus moluccana* (Grey Box) communities and in areas of ironbark on the Cumberland Plain. Coast Banksia open woodland or coastal grassland in the Illawarra.	Unlikely - suitable habitat not identified within the site.	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	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.	Unlikely - suitable habitat not identified within the site.	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). All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage.	Unlikely - suitable habitat not identified within the site.	N/A	No
Pterostylis saxicola	Sydney Plains Greenhood	E	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. There are very few known populations and they are all very small and isolated. Restricted to western Sydney between Freemans Reach in the north and Picton in the south. There are very few known populations and they are all very small and isolated.	Unlikely - suitable habitat not identified within the site.	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.	Unlikely - suitable habitat not identified within the site.	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.	Unlikely - suitable habitat not identified within the site.	N/A	No
Thesium australe	Austral Toadflax	V	In eastern NSW it is found in very small populations scattered along the coast, and from the Northern to Southern Tablelands. Grassland on coastal headlands or grassland and grassy woodland away from the coast.	Unlikely - suitable habitat not identified within the site.	N/A	No

EPBC ACT STATUS: CE = CRITICALLY ENDANGERED, E = ENDANGERED, V = VULNERABLE, M = MIGRATORY, X = EXTINCT

Appendix D Biodiversity credit report

NSW GOVERNMENT

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00023283/BAAS18159/20/00023284	Kemps Creek Logistics	07/12/2020
Assessor Name	Report Created	BAM Data version *
Belinda Jane Failes	16/12/2020	34
Assessor Number	BAM Case Status	Date Finalised
BAAS18159	Open	To be finalised
Assessment Revision	Assessment Type	
1	Major Projects	

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

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

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	BC Act Listing status	EPBC Act listing status	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Cumberland shale plains woodland											
2	849_scattered_trees	Cumberland Plain Woodland in the Sydney Basin Bioregion	7.7	7.7	0.12	Critically Endangered Ecological Community	Critically Endangered	High Sensitivity to Potential Gain	2.50	TRUE	0

NSW GOVERNMENT

BAM Credit Summary Report

3	849_DNG	Cumberland Plain Woodland in the Sydney Basin Bioregion	2.4	2.4	3.4	Critically Endangered Ecological Community	Critically Endangered	High Sensitivity to Potential Gain	2.50	TRUE	0
										Subtotal	**0**
Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion											
1	1071_dam	Not a TEC	8.3	8.3	0.07			High Sensitivity to Potential Gain	2.00		0
										Subtotal	**0**
										Total	**0**

Species credits for threatened species

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

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1300 646 131
www.ecoaus.com.au