Moore Point Planning Proposal
Biodiversity Assessment Report

Moore Point Landowners Group

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1300 646 131
www.ecoaus.com.au

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Project Name	Moore Point Planning Proposal– Biodiversity Assessment Report
Project Number	19SYD-12608
Project Manager	Belinda Failes
Prepared by	Belinda Failes and Carolina Mora
Accredited Assessor	Belinda Failes (BAAS 18159)
Reviewed by	Nicole McVicar (BAAS 18077)
Approved by	David Bonjer
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Template 2.8.1

Executive Summary

Eco Logical Australia Pty Ltd (ELA) was engaged by the Moore Point Landowners Group via Leamac Property Group and Coronation Property Group to prepare a Biodiversity Assessment Report for the proposed Masterplan of Moore Point, NSW (referred to as the 'study area' in this report). A Planning Proposal is to be submitted to the Gateway process seeking rezoning from IN2 Light Industrial to Mixed Use under Liverpool LEP 2008. Development of the site in accordance with the Precinct Plan would then proceed via a State Significant Development (SSD) application. This Biodiversity Assessment Report describes the biodiversity values within the site and assess the impacts of the proposed Masterplan on the biodiversity values. Nothing contained within this report precludes rezoning.

This report assumes that the built form will require significant earthworks and therefore any biodiversity values within this area will be removed. Biodiversity in the open space area along the Georges River will generally be retained and rehabilitated other than along a section of the western foreshore which will be subject to a more formal landscaped approach. As the detailed landscape plan has not yet been prepared, impacts within the open space area have not been assessed. The vegetated riparian zone is generally in poor condition with significant weed invasion. The development of the study area will provide an opportunity to invest in the rehabilitation of this vegetation.

A Biodiversity Development Assessment Report (BDAR) will be required for the SSD application in accordance with the Biodiversity Assessment Method 2016 (BAM) established under Section 6.7 of the *NSW Biodiversity Conservation Act 2016* (BC Act). The BDAR will include assessment of impacts across the entire site and will include results of targeted threatened species survey that will be undertaken post-Gateway.

The study area is approximately 38.5 ha in size. The study area has been subject to considerable vegetation disturbance and does not contain remnant native vegetation.

One threatened ecological community, *River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions* listed as an endangered ecological community (EEC) under the BC Act has been mapped as occurring in the study area (OEH 2016). The vegetation has been established through revegetation works. It contains high weed blooms and is in poor condition. Therefore, it did not satisfy listing criteria under the EPBC Act, which is currently nominated for listing under the EPBC Act.

One Matter of National Environmental Significance was identified as having potential to be affected by the proposed works. *Pteropus poliocephalus* (Grey-headed Flying-fox) is listed as vulnerable under the EPBC Act and it is considered that this species is likely to use some of the study area for seasonal foraging. An assessment of the Commonwealth Significant Impact Criteria is required for species listed under the EPBC Act and submitted with the BDAR.

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Abbreviations

Abbreviation	Description
BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Credit Calculator
BC Act	NSW Biodiversity Conservation Act 2016
BDAR	Biodiversity Development Assessment Report
BSSAR	Biodiversity Stewardship Site Assessment Report
CEEC	Critically Endangered Ecological Community
DCP	Development Control Plan
DNG	Derived Native Grassland
DoEE	Commonwealth Department of Environment and Energy
DPE	NSW Department of Planning and Environment
DPIE	NSW Department of Planning, Industry and Environment
EEC	Endangered Ecological Community
ELA	Eco Logical Australia Pty Ltd
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
FM Act	NSW Fisheries Management Act 1994
GHFF	Grey-headed Flying Fox
GIS	Geographic Information System
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
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
SSI	State Significant Infrastructure
TEC	Threatened Ecological Community
VIS	Vegetation Information System
WM Act	NSW Water Management Act 2000

1. Project context

The following section has been provided by Leamac and Coronation Property Group.

1.1 Background

This Biodiversity Report has been prepared by Eco Logical Australia on behalf of Leamac and Coronation to assess the biodiversity values of the study area in relation to a Planning Proposal at Moore Point, Liverpool (the site).

The site is located east of Liverpool CBD on the opposite side of the Georges River and north of Newbridge Road. It provides a site area of 38.5 hectares (approx.) and is currently developed with industrial uses. There is nothing contained within this report to preclude rezoning.

The site is situated within Liverpool Collaboration Area's Georges River North precinct and is subject to the priorities and actions of the Liverpool Place Strategy (Strategy), which was released by the Greater Sydney Commission (GSC) in December 2018. Refer to the figure below:

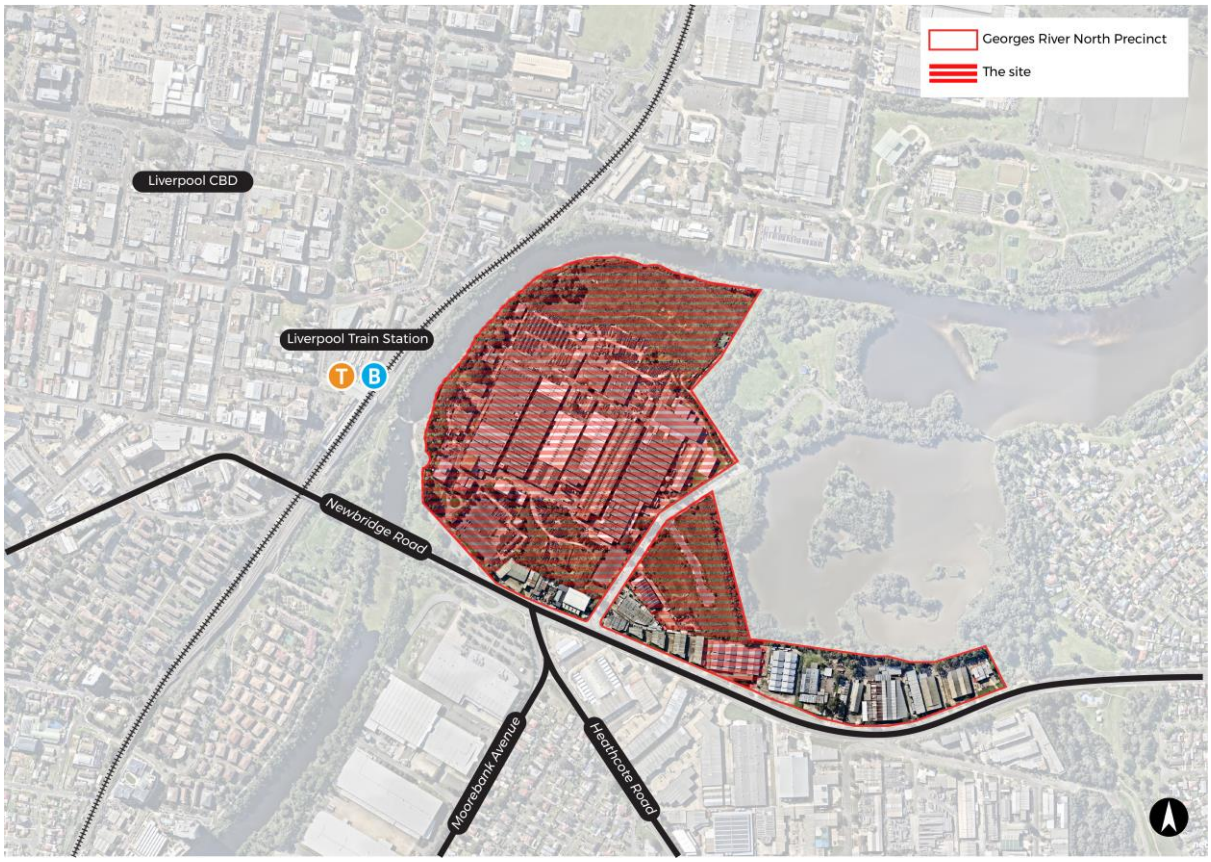

Figure 1:– Site aerial (Source: Nearmap modified by Mecone)

The Strategy states that by 2036 Liverpool will be a rejuvenated river city, offering diverse and growing residential and employment opportunities. Major health, education and retail precincts, and a mixture of open spaces and parklands alongside the Georges River, will create a rich mix of jobs and workplaces, public spaces, shops and entertainment.

Under the Strategy the site is identified as 'mixed use', which comprises:

'a mixture of commercial, retail, residential and community uses that provide sustainable employment, that is complementary to, and not in competition with, the commercial core'

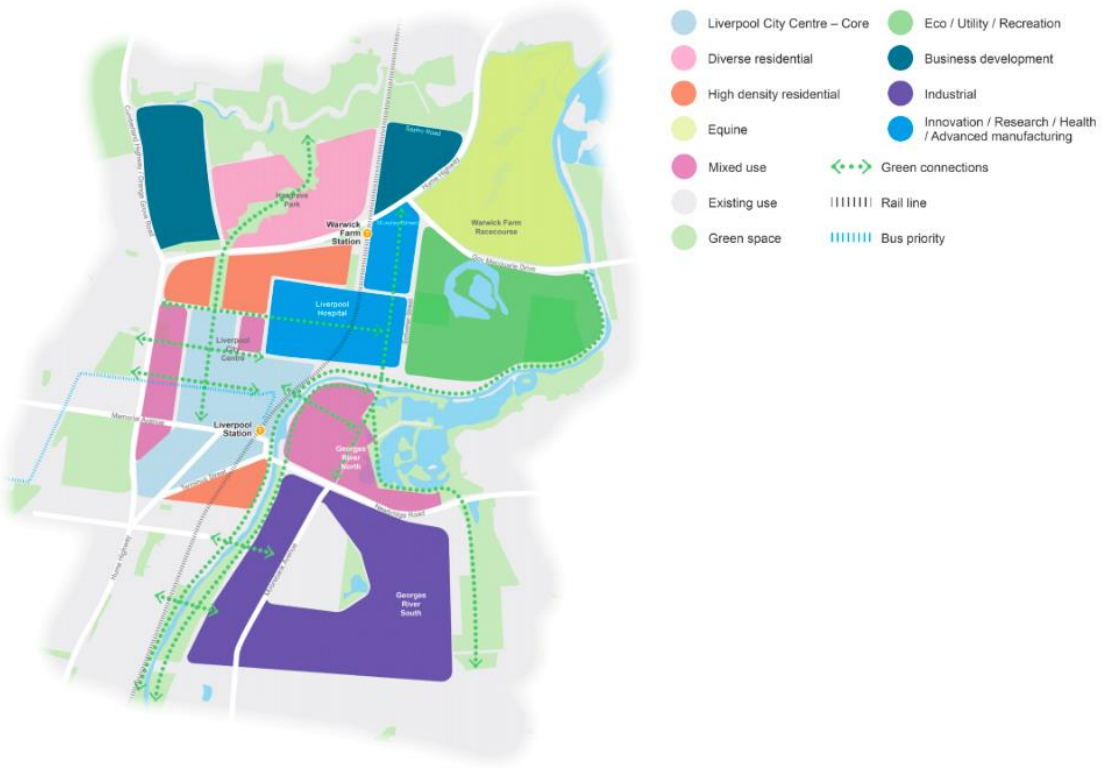

Figure 2:– A Place Strategy for Liverpool (Source: Liverpool Collaboration Area Place Strategy 2018)

The 2019 Annual report summary for Liverpool Collaboration Area highlighted key steps commenced and completed to address the imperatives acknowledged in the Strategy to accelerate the delivery of the Collaboration Area. These included:

- Engagement with Transport for NSW (TfNSW) to prepare the Liverpool Place-based Integrated Transport Strategy and accelerated investment; and
- flood studies and flooplain risk management plan completed by Liverpool City Council.

The land uses reflected in the Strategy are reinforced in Liverpool City Council's Local Strategic Planning Statement (LSPS), which identifies the site for investigation as residential/mixed use to support the CBD and Innovation Precinct in tandem with linking open space and green corridors.

The LSPS provides the following short to medium term action (12-24 months) specific to the Georges River North precinct:

Action 11.2 – Investigate amendments to LEP to rezone River precinct north of Newbridge Road (Moore Point) as a mixed-use zone to support the Liverpool CBD and Innovation Precinct, with an extensive open space system and cross-river linkages (short to medium term)

The Planning Proposal involves the creation of a mixed use precinct, providing new homes, jobs and open space adjoining the Georges River and connecting to Liverpool CBD. Key features of the proposal include:

- Adaptive re-use of existing heritage;
- Foreshore embellishments and new open spaces;
- Educational and cultural facilities;
- Connections to Liverpool CBD and Train Station; and
- Transport, intersection and collector road improvements.

The Planning Proposal aligns with the priorities of Government and the implementation phase of the Place Strategy by facilitating the transformation of the Collaboration Area with new jobs, infrastructure, green spaces and housing. The Planning Proposal responds to The Pulse of Greater Sydney's performance indicators, which sit under the following key themes:

1.1.1 Infrastructure and Collaboration

The Planning Proposal will facilitate additional jobs, education and housing in close proximity to Liverpool CBD and Train Station. The proposal will support additional medium and long-term housing supply in Liverpool CBD through diverse and new housing products. The proposal supports the continual expansion and growth of Liverpool Innovation precinct and nearby health infrastructure, with potential to provide complementary uses near Liverpool Hospital and educational and cultural facilities on the site.

1.1.2 Productivity

The Planning Proposal supports the growth of the thirty-minute city, ensuring Liverpool emerges as a premier CBD in the Western City. The proposal provides capacity for new transport infrastructure on the site, road and intersection upgrades and locating density near major transport infrastructure (Liverpool Train Station and Badgery's Creek Aerotropolis). The proposal encourages additional business activity and investment in Liverpool by providing new commercial uses that will complement Liverpool CBD.

1.1.3 Liveability

The Planning Proposal significantly improves upon the existing use of the site by creating walkable places for people to live work and play. This includes foreshore embellishments to the Georges River, improved connections across the Georges River and adaptative re-use of existing heritage items. These measures will contribute to Sydney's Green Grid, improve access to services in Liverpool CBD and establish a community that celebrates identity and place.

1.1.4 Sustainability

The Planning Proposal addresses the urban heat island effect by significantly increasing the quantum of green space on the site for active and passive recreational use. The proposal will provide new parks and green connections to surrounding open spaces including Haigh Park, which will contribute to the urban tree canopy of the area.

Overall, the Planning Proposal represents a clear and consistent strategic line of site with the priorities of government. It meets the performance indicators, priorities and objectives expressed in the District Plan, Place Strategy, LSPS and The Pulse of Greater Sydney.

Nothing contained in the body of this report/assessment would preclude the Planning Proposal from rezoning and gazettal for residential/mixed use purposes.

2. Stage 1: Biodiversity assessment

2.1 Introduction

This Biodiversity Assessment Report has been prepared by Belinda Failes, an accredited person (BAAS 18159) under the *Biodiversity Conservation Act 2016* (BC Act) with field and reporting assistance from Carolina Mora. The report was peer reviewed by Nicole McVicar (BAAS 18077) who is also an accredited person under the BC Act.

Definitions for terminology used throughout this report are presented in Appendix A.

2.1.1 Planning approval

The Moore Point Landowner Group seek an amendment to Liverpool LEP 2008 by rezoning the site from IN2 to B4. A Development Control Plan will be established to give effect to the masterplan shown in Figure 3.

2.1.2 General description of the study area

The proposed development (i.e. the 'study area'), defined as the area of land that is subject to the proposed development application, comprises the following addresses and lots within the Liverpool City Council LGA (and shown in Figure 5):

- 2 Bridges Road, Moorebank (Lot 1 DP 229494)
- 3 Bridges Road, Moorebank (Lot 200 DP 1009044)
- 4 Bridges Road, Moorebank (Lot 2 DP 229494)
- 5 Bridges Road, Moorebank (Lot 100 DP 775780)
- 6 Bridges Road, Moorebank (Lot 10 DP 875626
- 8 Bridges Road, Moorebank (Lot 111 DP 1133744)
- 11 Bridges Road, Moorebank (Lot 201 DP 1009044)
- 317 Newbridge Road, Chipping Norton (Lot 2 DP 562025)
- 323 Newbridge Road, Chipping Norton (Lot 3 DP 562025)
- 331 Newbridge Road, Chipping Norton (Lot 4 DP 562025)
- 333 Newbridge Road, Chipping Norton (Lot 32 DP 535604)
- 337 Newbridge Road, Moorebank (Lot 201 DP 584561)
- 351 Newbridge Road, Moorebank (Lot B1 DP 392696)
- 353 Newbridge Road, Moorebank (Lot 1 DP 235294)
- 355 Newbridge Road, Moorebank (Lot 102 DP 827141)
- 361 Newbridge Road, Moorebank (Lot 101 DP 827141)
- 377 Newbridge Road, Moorebank (Lot 6 SP 38170)
- 391 Newbridge Road, Moorebank (Lot 45 DP 867545)
- 397 Newbridge Road, Moorebank (Lot 4 DP 11948)
- 399 Newbridge Road, Moorebank (Lot 5 DP 11948)
- 401 Newbridge Road, Moorebank (Lot 6 DP 654427)
- 403 Newbridge Road, Moorebank (Lot 7 DP 11948)
- 405 Newbridge Road, Moorebank (Lot 1 SP 49163)

The study area is currently zoned as IN2: Light Industrial under the Liverpool *Local Environmental Plan* (LEP) 2008 and has an area of approximately 38.5 ha.

The study area abuts Georges River along the western and northern boundaries. Haigh Park, a large open space, is located adjacent to the north-eastern corner and Lake Moore is located directly east of the study area. Newbridge Road, a major arterial road, forms the southern boundary of the study area.

The study area currently accommodates large industrial and commercial development. The study area has been subject to considerable vegetation disturbance. Aerial photography from 1943 shows remnant vegetation has been historically cleared within the study area. The landscape has been raised with fill material and flattened as part of historical clearing and development (ACS Environmental 2015).

Revegetation work has occurred along the riparian buffer along Georges River and Lake Moore. Revegetation includes planted native trees, shrubs and ground cover species along the north , east and western riparian buffer along the perimeter of the study area. Planted native vegetation within horticultural gardens and open grassland with opportunistic weeds were also recorded within the study area.

The general description of the study area is displayed on the following maps:

- Masterplan Concept Design (Figure 3)
- Development footprint (Figure 4)
- Site Map (Figure 5)
- Location Map (Figure 6).

2.1.3 Masterplan footprint

The planning proposal seeks approval to rezone the site to Mixed Use under the Liverpool LEP 2008.

The Masterplan (provided in Figure 3) proposes a mix of public open green space, commercial development, mixed use development, retail space, transport interchange, school and a heritage interpretation area.

For the purposes of this assessment ELA have defined two areas as shown in Figure 3.

- Development area which includes the commercial development, mixed use development, retail space, transport interchange and school; and
- open space which includes the riparian corridor and recreation areas

The development area is assumed to require significant earthworks such that all vegetation from this area would be cleared. Within the open space, vegetation will largely be retained and rehabilitated, however detailed designs for this area are not yet available and therefore this report does not include impacts within the open space area. Some vegetation may be removed to provide open space infrastructure.

Detailed assessment of all development and landscape impacts will be undertaken post-gateway and prior to the submission of BDAR.

2.1.4 Sources of information used

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

- BioNet Vegetation Classification System
- BioNet / Atlas of NSW Wildlife 5 km database search (Department Planning Industry and Environment (DPIE) March 2020a)
- *Environment Protection and Biodiversity Conservation Act 1999* EPBC Act Protected Matters Search Tool 5 km database search (Department of Environment and Energy (DoEE) March 2020a)
- Threatened Biodiversity Data Collection
- NSW Government Biodiversity Values Map (accessed on 2 March 2020)
- The Native Vegetation of the Sydney Metropolitan Area (Office of Environment and Heritage (OEH) 2016)
- Biodiversity values map and threshold tool (accessed on 2 March 2020)
- Aerial mapping (SIXMaps, including 1943 historic maps)
- Additional Geographic Information System (GIS) datasets including soil, topography, geology and drainage
- Existing ecological reports.

Structure Plans

4.2 Public domain and landscape structure plan

DRAFT

Moore Point is defined by the Georges River, Haigh Park and Lake Moore. Thus the landscape and public domain network of the site aims to connect these unique assets while reinforcing the urban grid of the site. Key open spaces include:

1	Georges riverfront park A	19,850m²
2	Georges riverfront park B	33,651m²
3	Urban linear park A	1,671m²
4	Urban linear park B	2,672m²
5	Urban linear park C	2,720m²
6	Lakefront park A	8,151m²
7	Lakefront park B	8,419m²

A network of landscaped street raingardens (swales) run north-south and east-west to collect, store and filter runoff. The swales also provide optimal conditions for landscaping and trees for canopy cover to mitigate the urban heat island effect and create good urban microclimatic conditions for people. The plaza in front of the adaptively reused factories should have good solar access thus a sun access plane to this space between 11am and 1pm on the winter solstice is recommended.

	Coronation & Leamac sites	Moore Point Masterplan (red boundary)
site area	319,001m²	387,303m²
open space area	68,575m²	76,994m²
proportion of OS	21.5%	19.8%

- site
- active Georges riverfront park
- passive Georges riverfront park
- linear park
- lakefront park
- riparian interface with building
- open space interface with building
- major east-west swale
- north-south swale
- key recreational paths (walking and cycling)
- surrounding open space (RE1)
- sun access protection area
- proposed pedestrian bridge
- potential vehicular bridge

Figure 19: public domain and landscape structure plan

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Moore Point Masterplan

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Figure 3: Proposed Concept Masterplan

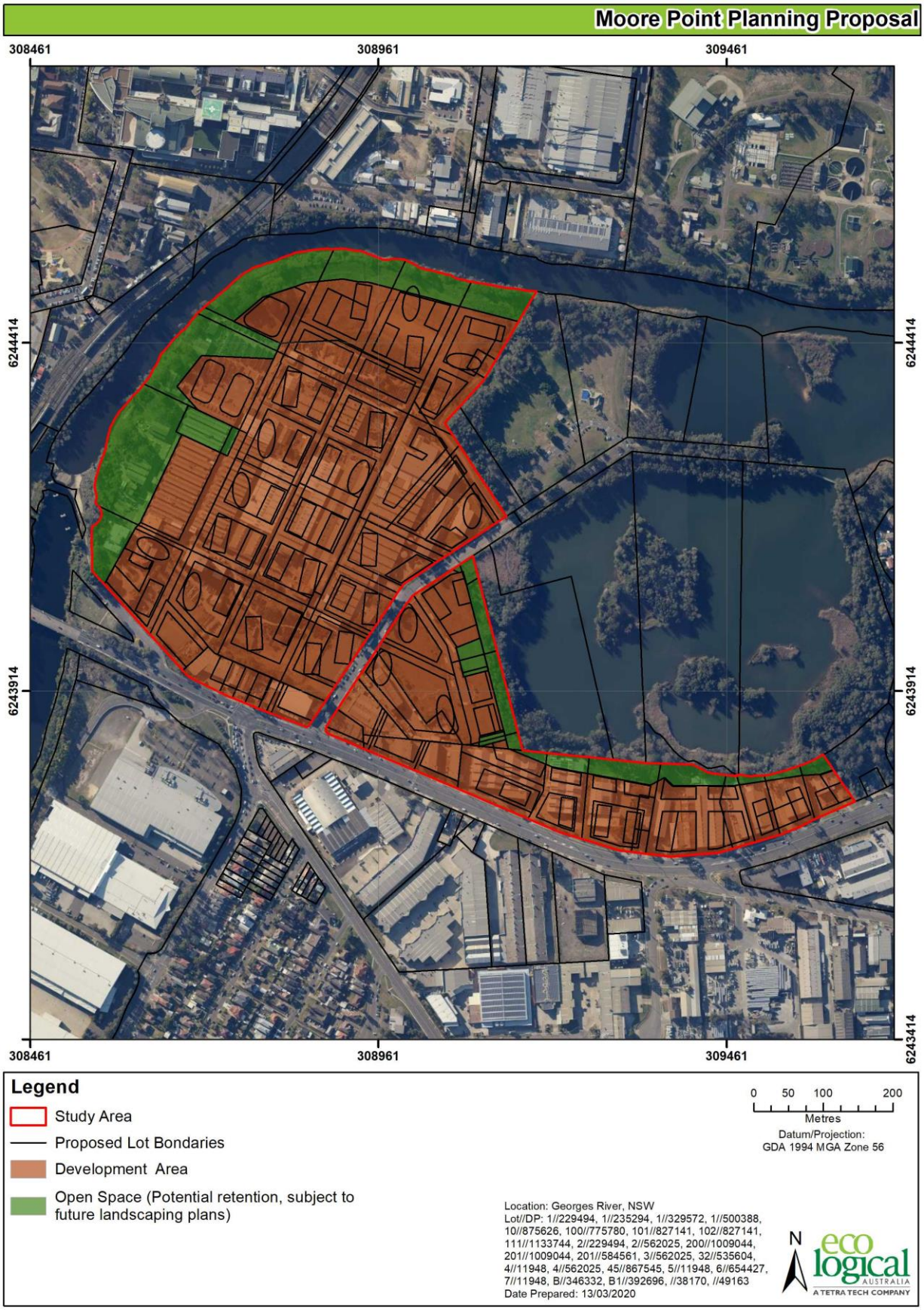

Figure 4: Development footprint showing impact areas and open space

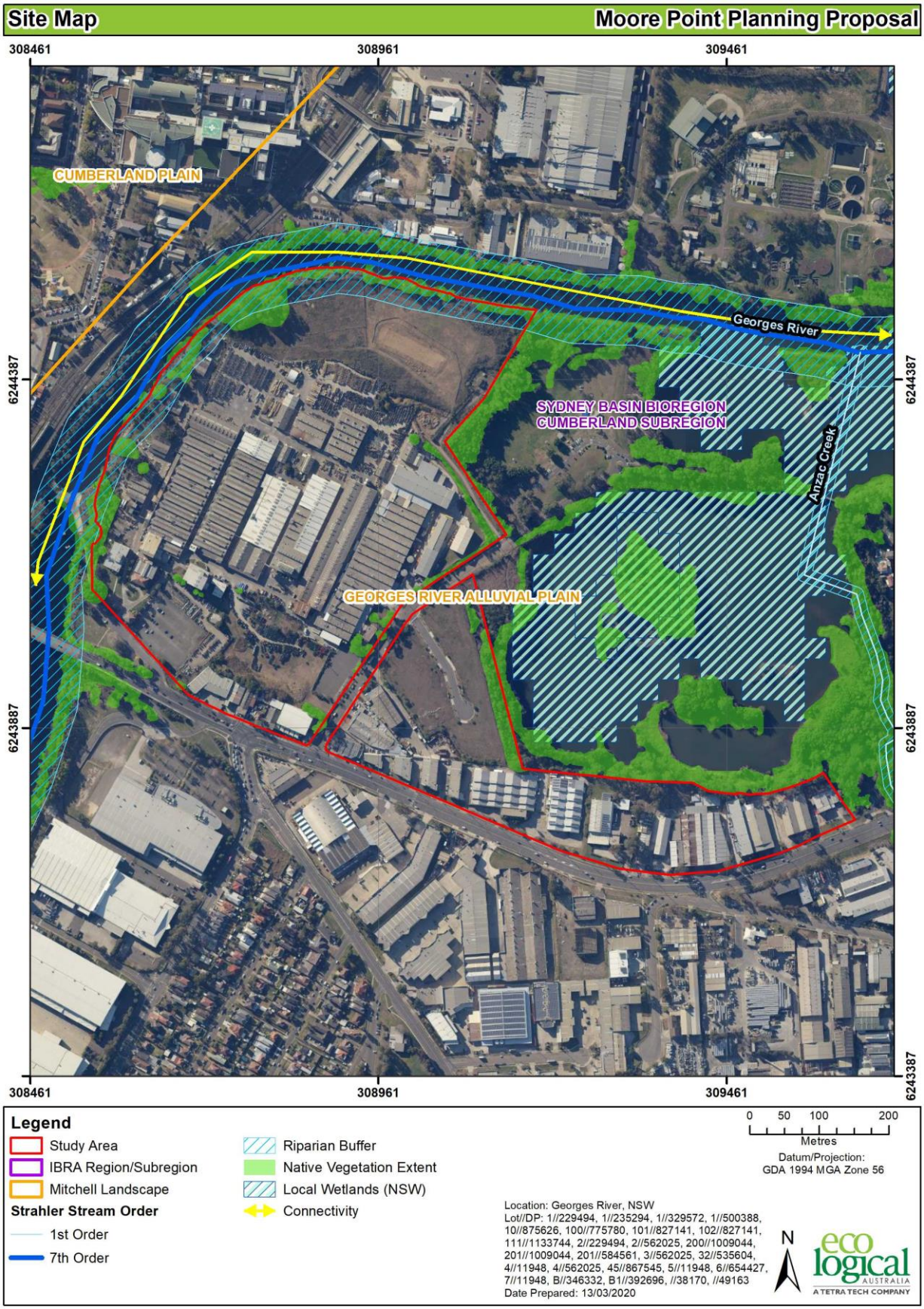

Figure 5: Site Map

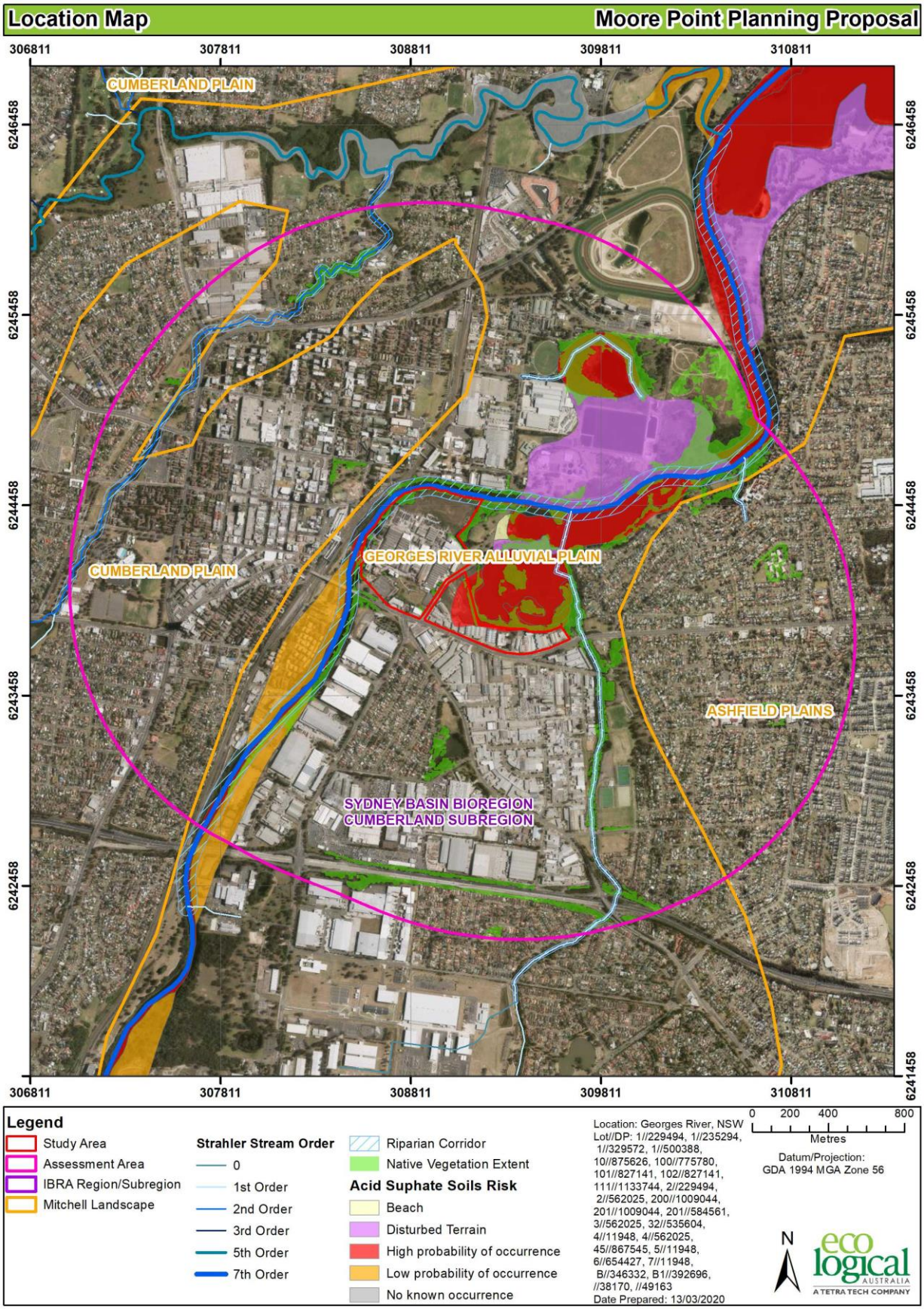

Figure 6: Location Map

2.2 Legislative context

Table 1: Legislative context

Name	Relevance to the project
Commonwealth	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Matters of National Environmental Significance (MNES) have been identified on or near the study area. An Assessment of Significance under the EPBC Act is required for species listed under the EPBC Act with potential to be impacted by the proposed Masterplan.
State	
Biodiversity Conservation Act 2016 (BC Act)	The BC Act 2016 does not have specific controls relating to Planning Proposals. At the development application stage, the development will need to be assessed in accordance with the BC Act 2016. As this development will be assessed as an SSD the proposed development requires the submission of a BDAR under the BC Act.
Environmental Planning and Assessment Act 1979 (EP&A Act)	The proposed masterplan will require consent under the EP&A Act.
Fisheries Management Act 1994 (FM Act)	The FM Act 1994 governs the management of fish and their habitat in NSW. The Schedules of the Act list key threatening processes and threatened species. The FM Act regulates the provision of permits required in relation to harm to protected marine vegetation (seagrass, macroalgae, mangroves and saltmarsh), dredging, reclamation or obstruction of fish passage on or adjacent to Key Fish Habitat (KFH). This includes direct and indirect impacts, whether temporary or permanent. KFH has been mapped within the study area along Georges River along the northern and western boundary and Lake Moore (outside of the study area).
Local Land Services Amendment Act 2016 (LLS Act)	The LLS Act does not apply to areas of the state to which the Vegetation SEPP applies. The Vegetation SEPP applies to the City of Liverpool LGA.
State and Local Planning Instruments	
State Environmental Planning Policy (SEPP) (Vegetation in Non-Rural Areas) 2017	The study area is located on land to which the Vegetation in Non-Rural Areas SEPP applies. The SEPP applies to development that does not require consent. This report is part of a planning proposal and therefore, matters relating to this SEPP do not apply.
State Environmental Planning Policy No. 19 Bushland in Urban Areas	This SEPP applies to the study area. However, as the planning proposal does not provide approval to clear vegetation, this SEPP does not apply to this report.
State Environmental Planning Policy 2018 (Coastal Management SEPP)	The Planning Proposal affects land identified in this SEPP The aim of this Policy is to promote an integrated and co-ordinated approach to land use planning in the coastal zone in a manner consistent with the objects of the Coastal Management Act 2016, including the management objectives for each coastal management area, by: a. managing development in the coastal zone and protecting the environmental assets of the coast, and b. establishing a framework for land use planning to guide decision-making in the coastal zone, and c. mapping the four coastal management areas that comprise the NSW coastal zone for the purpose of the definitions in the Coastal Management Act 2016.

Name	Relevance to the project
	The study area has mapped areas of Coastal Environment Area Map, Coastal Use Area Map and is located within the boundary for the Land Application Map (Figure 7). The study area is also mapped within Coastal Wetland and Coastal Wetland Proximity Area.
State Environmental Planning Policy (Koala Habitat Protection) 2019 (Koala Habitat Protection SEPP) (effective 1 March 2020)	This SEPP and the accompanying Koala Habitat Protection Guideline applies to land within the Liverpool LGA. Under the SEPP, further assessment is required for the following reasons: • The study area is on the Koala Development Application Map (accessed 9 March 2020). • The study area is at least 1 ha. • The study area is not located on land to which an approved Koala Plan of Management applies. Based on the Guideline, future development applications relating to the site are likely to trigger the Tier 2 (Development applications impacting koalas and/or habitat) process for the following reasons: • The proposed development includes clearing of native vegetation within koala habitat (as mapped under the SEPP). • As a State Significant Development, the proposed development enters the Biodiversity Offsets scheme. As a Tier 2 development application under the SEPP, the preparation of a Koala Assessment Report by a suitably qualified and experienced person is required. However, a flora and fauna survey (consistent with the method described in the Guideline) may be conducted by a suitably qualified person (as defined by the SEPP) to determine whether a site contains core koala habitat prior to the preparation of a Koala Assessment Report. Confirmation of this interpretation with the NSW Government is recommended prior to preparation of SSD documentation.
Liverpool Local Environmental Plan (LEP) 2008	The study area is wholly zoned as IN2: Light Industrial under the Liverpool LEP. Rezoning of the study area is required to support the Masterplan. The site is not subject to the Biodiversity or Riparian overlay under the LEP. However, Georges River and Lake Moore and their land buffer are included in Environmentally Sensitive Land under Additional Local Provisions of the LEP. The area mapped as Environmentally Significant Land will be rezoned Open Space and should be protected from development as shown in the Concept Masterplan (Figure 3). The study area contains class 5 Acid Sulfate Soils and requires the implementation of an acid sulfate soils management plan. This is not required as part of the planning proposal, however, will be required as part of the SSD application.
Greater Metropolitan Regional Environmental Plan No. 2. 2009 Georges River Catchment	General aims of the Greater Metropolitan Regional Environmental Plan (GMREP) include: • to maintain and improve the water quality and river flows of the Georges River and its tributaries and ensure that development is managed in a manner that is in keeping with the national, State, regional and local significance of the Catchment; • to protect and enhance the environmental quality of the Catchment for the benefit of all users through the management and use of the resources in the Catchment in an ecologically sustainable manner; and; • to preserve and protect and to encourage the restoration or rehabilitation of regionally significant sensitive natural environments such as wetlands, bushland and open space corridors within the Catchment. The final approved Masterplan should take the aims and objectives of this regional environmental plan into consideration.

2.3 Landscape features

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

The study area has an area of 38.5 ha and falls wholly within the Sydney Basin IBRA region and Cumberland IBRA subregion (Figure 6). The assessment area, defined as the area within a 1,500 m buffer of the study area, also falls wholly within the Sydney Basin IBRA region and Cumberland IBRA subregion (Figure 6).

2.3.2 Mitchell Landscapes

The study area falls within the Georges River Alluvial Plain Mitchell Landscapes (DECC 2002) as outlined in Table 2 as shown in Figure 6.

Table 2: Mitchell Landscapes

Mitchell Landscape	Description	Area within study area (ha)
Georges River Alluvial Plain	Channel, floodplain and terraces of the Georges River on Quaternary and Tertiary alluvial sediments. Mostly clayey sand and sand with limited gravel on the highest terrace, general elevation 0 to 30m, local relief 10m. Massive uniform or gradational profiles on yellow brown to orange clayey sand. Podsols with well-developed double pans on limited areas of deep quartz sand, stony, harsh, yellow, texture-contrast soils on higher terraces. Forest and woodland of *Eucalyptus amplifolia*, *Angophora floribunda*, *Eucalyptus fibrosa*, *Eucalyptus sclerophylla* and *Angophora bakeri*. Extensive *Casuarina glauca* along the riverbanks and in low-lying areas often with *Melaleuca s*typh*elioides*, these extend to brackish estuarine swamps with grey mangrove (*Avicennia marina*) and limited saltmarsh.	38.76

2.3.3 Rivers and streams

The study area does not contain any rivers or streams; however, it does contain riparian buffers. For the purpose of this assessment, it is noted that rivers and streams have been mapped within the 1,500m assessment area.

Georges River is a 4th Strahler order stream and is located within 20 m of the northern and western boundary of the study area (Figure 6). Lake Moore is also located within 20 m of the south-eastern boundary of the study area. The study area contains areas mapped under the Coastal Management SEPP buffer (Figure 7).

2.3.4 Wetlands

The study area does not contain mapped wetlands. However, the assessment area contains one local wetlands (Lake Moore) (Figure 7) which is not identified as an important wetland under the BAM (see definition in Appendix A). Lake Moore is also mapped under the Coastal Management SEPP.

2.3.5 Connectivity features

The study area contains the connectivity features outlined in Table 3 and shown in Figure 6.

Connectivity to large tracts of native vegetation has been fragmented by the formation of Newbridge Road to the south and waterbodies to the north, west and east of the study area. A narrow riparian

corridor is located either side of Georges River and provides some connectivity for highly mobile species such as birds and bats. This includes flyways for migratory birds and bat species moving through the landscape.

Table 3: Connectivity features

Connectivity feature name	Feature type
Georges River	Vegetated riparian corridor

2.3.6 Areas of geological significance and soil hazard features

The study area does not contain areas of geological significance.

The study area is mapped as having Class 5 Acid Sulfate Soils. Acid sulfate soils are listed as soil hazard features.

2.3.7 Site context

2.3.7.1 Method applied

The site based method has been applied to this development.

2.3.7.2 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 NearMap) using increments of 5%. The percent native vegetation cover within the 1,500 m buffer area is 6 % (73.74 ha).

2.3.7.3 Patch size

Patch size was calculated using available vegetation mapping for all patches of intact native vegetation on and adjoining the study area. The patch size area is 101 ha.

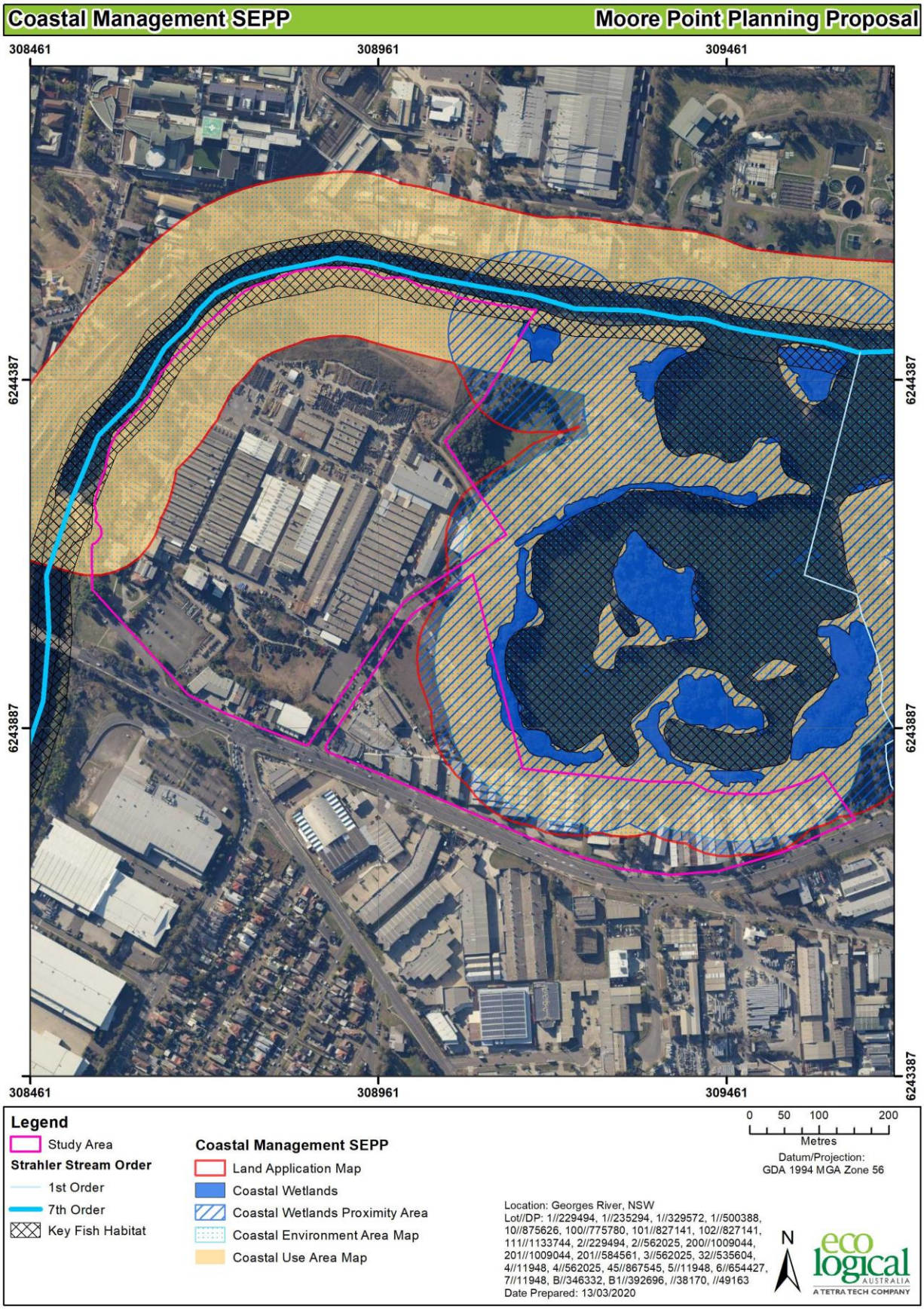

Figure 7: SEPP Coastal Management 2008 mapping and adjacent wetlands

2.4 Native vegetation

2.4.1 Literature review

Prior to field surveys previous vegetation mapping conducted by Sydney Metropolitan Catchment Management Authority (OEH 2016) identified the following vegetation communities:

- Cumberland River-flat Forest which is a component of *River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions* listed as an endangered ecological community under the BC Act and nominated for listing under the EPBC Act
- Estuarine Swamp Oak Forest which is a component of *Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions* listed as an endangered ecological community under the BC Act
- Coastal Freshwater Wetlands which is a component of *Sydney Freshwater wetlands in the Sydney Basin Bioregion* listed as an endangered ecological community under the BC Act.

2.4.2 Previous ecological reports

Previous ecological surveys have been undertaken by ELA (2016), ELA (2019) and ACS Environmental Pty Ltd (2015) within the study area. A summary of the ecological surveys and results are provided in Table 4.

A review of BioNet records identified that two threatened fauna species have previously been recorded within the study area. Miniopterus *australis* (Little Bent-winged Bat) and *Daphoenositta chrysoptera* (Varied Sittella) were recorded in 2013. Both species are recorded as vulnerable under the BC Act and are listed as ecosystem credit species under the BAM (see Section 2.5.1).

It should be noted that during the literature review it was identified there was a data gap between areas survey by ELA in 2016 and 2019 and the boundary of the study area. Access was restricted during ELA 2019 surveys and assumptions have been provided in the following text regarding potential data gaps. Data gaps will be address as part of the BDAR at DA stage.

Table 4: Summary of previous ecological surveys conducted within the study area

Report, company and date	Survey methodology	Results
Flora & Fauna survey and riparian zone impact assessment ACS Environmental 2015	ACS conducted an assessment of 6-16 Bridges Road and 361 Newbridge road, Moorebank. Located in the southern portion of the study area which adjoins Lake Moore. Survey involved random meander (Cropper 1993) method to identify floristics and vegetation boundaries. Habitat assessment was also conducted. Targeted searches were conducted for threatened species including *Acacia pubescens* and *Meridolum corneovirens* (Cumberland Plain Land Snail).	The field surveys validated the presence of Swamp Oak Forest which has been established from revegetation works from the late 1970-early 1980s. This vegetation community was identified during the 2015 assessment as part of a threatened ecological community (TEC). The field survey also recorded revegetation works which includes Alluvial Woodland and Cumberland Plain Woodland species but was not recorded as part of a TEC. No threatened flora species were recorded or were deemed likely to occur within the study area.

Report, company and date	Survey methodology	Results
		No threatened fauna species were recorded within the study area; however, the Varied Sittella was recorded within Haigh Park. The vegetation within the study area was identified as unsuitable for Cumberland Plain Land Snail. Potential foraging habitat was identified for: • *Miniopterus orianae oceanensis* (Large Bent-winged bat) • *Pteropus poliocephalus* (Grey-headed Flying-fox).
Prysmian Liverpool Flora and Fauna Assessment report ELA 2016	ELA conducted a Flora and Fauna Assessment for the western portion of the study area. The field survey was conducted on 21 June 2016 to validate vegetation communities and presence of threatened flora and fauna species. Targeted surveys were conducted for *Meridolum corneovirens* (Cumberland Plain Land Snail).	The literature review identified one threatened species has previously recorded within the study area (*Daphoenositta chrysoptera* (Varied Sittella)). The field survey confirmed the presence of two TECs and a planted vegetation community: • River-flat Eucalypt Forest • Swamp Oak Floodplain Forest • Planted native and urban vegetation which does not respond to a native vegetation community No threatened flora species were recorded within the study area or having potential to occur. No Cumberland Plain Land Snails were recorded or were considered likely to occur within the study area. Hollow-bearing trees (HBT)s were identified within the study area which may provide habitat for threatened tree-roosting microbats such as: • *Mormopterus norfolkensis* (Eastern Freetail-bat) • *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat) • *Myotis macropus* (Southern Myotis) Other threatened species which may utilise the study area occasional include: • *Daphoenositta chrysoptera* (Varied Sittella) • *Hieraaetus morphnoides* (Little Eagle) • *Glossopsitta pusilla* (Little Lorikeet) • *Pteropus poliocephalus* (Grey-headed Flying-fox).
Strategic Vision 335 – 349 Newbridge Road Moorebank – Ecological Constraints letter	ELA conducted a desktop assessment and field validation of the south-eastern portion of the study area for Moore Lake Pty Ltd.	The field survey confirmed the presence of TECs: • River-flat Eucalypt Forest • Swamp Oak Floodplain Forest

Report, company and date	Survey methodology	Results
ELA 2019		The constraints assessment identified that the vegetation wad highly disturbed and is unlikely to contain habitat for threatened flora species. Foraging habitat for microbats, Grey-headed Flying-fox and *Litoria aurea* (Green and Golden Bell Frog) was noted within the site.
ELA 2020 data gap analysis	A desktop assessment was conducted as part of this assessment to determine the extent of areas survey by ELA in 2019 in accordance with the BAM and compare with areas with restricted access (Figure 8).	It was estimated that 7.8 ha was located within areas where access was not provided. This area requires validation for the BDAR. Additional BAM plots are unlikely to be required as impacts to areas mapped as open space are likely to be minimal and therefore will not result in more than 2 ha of disturbance.

2.4.3 Survey effort

Vegetation survey was undertaken within the study area by ecologists Belinda Failes and Carolina Mora on 20 June 2019. A total of four (4) full-floristic and vegetation integrity plots were undertaken to identify Plant Community Types (PCTs) and TECs on the study area in accordance with the BAM (Table 5). A summary table of the extend of each PCT recorded within the study area and the amount impacted by the development footprint is provided in Table 6 and shown in Figure 8. Plot locations are displayed in Figure 9.

A modified version of the BAM integrity plot was undertaken to account for the narrow linear vegetation zone in PCT 849_planted. The integrity plot was modified into a 10 m x 40 m plot and the transect into 10 m x 100 m configuration.

The site visit also involved vegetation mapping of the remaining study area, assessment of habitat and mapping of habitat features, namely hollow-bearing trees (HBTs) and habitat for amphibians (i.e. drainage line and soaks). The location of these trees is displayed in Figure 8.

All field data collected, photos, and full-floristic and vegetation integrity plots are included in Appendix B, C and D.

Table 5: Full-floristic and vegetation integrity plots

Veg Zone	PCT ID	PCT Name	Ancillary code	Area (ha)*	Plots required	Plots surveyed
1	835	Cumberland Riverflat Forest	Weedy	1.48	1	2
2	835	Cumberland Riverflat Forest	Revegetation	0.44	1	1
3	849	Cumberland Shale Plains Woodland	Planted	0.57	1	1

*THE AREA IN HECTARES MAY CHANGES FOLLOWING CONFIRMATION OF UNVALIDED VEGETATION.

Table 6: Summary of the PCTs and non-PCTs mapped within the study area and within the Masterplan

PCT and Veg Zone	Impact for development (ha)	Open Space* (ha)	TOTAL (ha)
PCT 835 Zone 1_Weedy	0.14	1.35	1.48
PCT 835 Zone 2_Revegetation	0.02	0.42	0.44
PCT 849 Zone 3_Planted	0.49	0.08	0.57
Sub-total	**0.65**	**1.85**	**2.49**
Exotic	7.49	2.03	9.62
Cleared**	23.56	2.80	26.36
Unvalidated vegetation	0.61	0.32	0.93
TOTAL	**31.75**	**7.01**	**38.75**

*NOTE SOME AREAS WITHIN THE OPEN SPACE WILL BE SUBJECT TO LANDSCAPING WORKS AND MAY RESULT IN REMOVAL OF NATIVE VEGETATION. THESE IMPACTS WILL BE FINALISED IN THE BDAR
** CLEARED AREAS INCLUDES BUILD ENVIRONMENTS AND EXOTIC GRASSLANDS

2.4.4 Plant Community Types present

Two PCTs were identified within the study area (Table 7, Figure 8). One PCT (835) is listed as a TEC under the BC Act and/ or EPBC Act (Table 9, Figure 10). PCT 835 varied in condition and mapped as two vegetation zones, weedy (Photo 1) and revegetated (Photo 2). Both vegetation zones for PCT 835 has been established through plantings and does not satisfy listing under the BC and / or Act. More information is provided in Section 1.4.4.1 below.

The study area also contains planted native canopy, shrubs and occasionally ground cover species which are native to NSW, however these were not considered locally indigenous to the PCTs. Under the BAM, planted vegetation native to NSW requires consideration as to the 'best fit' PCT. Based on the soil landscape, elevation and locality it was determined that planted native vegetation 'best-fit' PCT was *PCT 849 Cumberland Shale Plains Woodland* (Photo 3). Justification for the selection of PCTs occurring on the study area is based on a quantitative analysis of full-floristic plot data and a summary is provided in Table 10.

PCT 1234 Swamp Oak Floodplain Forest was recorded adjacent to Moorebank and was located outside of the study area. The study area will not impact upon PCT 1234 and therefore, is not part of this assessment.

Table 7: Plant Community Types (PCTs) recoded within the study area

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Area (ha)	Percent cleared of original extent
835	Cumberland Riverflat Forest	Coastal Floodplain Wetlands	Forested Wetlands	1.92	93
849	Cumberland Shale Plains Woodland	Coastal Valley Grassy Woodlands	Grassy Woodlands	0.57	93

Photo 1: PCT 835_Cumberland Riverflat Forest Weedy, vegetation zone 1 (TEC)

Photo 2: Plot 4 located in PCT 835 revegetation, vegetation zone 2 (TEC)

Photo 3: Plot 2 located in PCT 849__planted, vegetation zone 3 (non-TEC)

Photo 4: Exotic grasslands mapped within the study area and does not conform to a PCT

2.4.4.1 PCT selection justification

Justification for the selection of PCTs occurring on the study area is provided in Table 10.

Aerial photography interpretation of 1943 imagery identified that the study area has been substantially modified and contains limited remnant vegetation. Additionally, the 1943 imagery also indicates substantial vegetation clearing within the broader landscape surrounding the study area.

A review of literature and field survey confirmed that the vegetation has been established through revegetation works both recent and over 20 years old. Opportunistic native colonisers and weeds have also established.

Two forms of *PCT 835 Cumberland Riverflat Forest* were mapped within the study area (Figure 9). Patchy clusters of vegetation mapped as PCT 835_weedy were recorded around the western and northern perimeter of the study area. PCT 835_weedy was generally represented by *Eucalyptus tereticornis* (Forest Red Gum), *Alphitonia excelsa* (Red Ash), *Casuarina glauca* (Swamp Oak), *Backhousia myrtifolia* (Grey Myrtle) and *Acacia binervata* (Two-veined Hickory). The ground layer and midstorey were mixed with native and exotic species and generally contained a high percentage of High Threat Weeds (HTW), namely *Cardiospermum grandiflorum* (Balloon Vine).

The eastern perimeter has been established through recent revegetation works. This patch of PCT 835_revegetation contains immature plantings such as *Eucalyptus tereticornis, E. amplifolia, Acacia decurrens* (Black Wattle) and *Casuarina glauca.* Several large *Eucalyptus baueriana* (Blue Box) were also present in the south eastern corner which extends outside of the study area boundary. The vegetation intergrades with another vegetation community, *Swamp Oak Floodplain Forest* along the foreshores of Lake Moore, outside of the study area. This threatened ecological community occurs outside of the study area and therefore was not included as part of this assessment.

PCT 849 Cumberland Shale Plain Woodland was assigned to the planted native vegetation located away from the alluvial floodplain. This included native planted gardens including non-locally indigenous species such as *Livistona australis* (Cabbage Tree Palm), *Westringia fruticosa* (Coastal Westringia) and *Ceratopetalum gummiferum* (NSW Christmas Bush). Several mature *Ficus rubiginosa* (Port Jackson Fig) and scattered trees, *Eucalyptus tereticornis,* were recorded within the study area. *Eucalyptus tereticornis* is listed as a characteristic species of PCT 849; however, these trees are likely to be planted due to the substantial soil disturbance, absence of remnant vegetation, isolation of vegetation patches and its location within horticultural landscape gardens within the study area.

A review of available vegetation database mapping within the broader landscape of the study area recorded PCT 849 at higher elevations to the south of the study area. There is no connectivity with the site and vegetation mapped as PCT 849 outside of the study area. Additionally, areas mapped within the study area have not been mapped as native vegetation by previous mapping datasets (OEH 2016).

In the absence of suitable pre-European vegetation data, a description of the soil landscape and the location within the study area was used to assign a suitable PCT. A description of the Mitchells Landscape is provided in Table 2 and indicates the presence of alluvium vegetation communities which does not fit the current description of this vegetation zone.

A review of soil landscape datasets identified that the majority of the study area is mapped with the Blacktown soil landscape and a small portion of Richmond soil landscape located in the south-east of the study area. Blacktown soil landscapes are associated with the Cumberland Plain on Wianamatta shale which includes ecological communities such as PCT 849. However, since the soil profile has been significantly altered it is highly unlikely the vegetation would be considered part of a remnant patch of PCT 849.

It is likely that the study area would have had similar vegetation as the remnant patch located to the south, prior to European settlement. Additionally, the study area shares similar location in the landscape and same soil types to the remnant patch. In light of the above, PCT 849 was considered suitable PCT for the planted vegetation.

Table 8: PCT selection justification

PCT ID	PCT Name	Selection criteria	Species relied upon for identification of vegetation type and relative abundance
835	Cumberland Riverflat Forest	IBRA region, subregion, soil landscape, elevation and results of floristic plot analysis including the presence of positive diagnostic canopy species	Presence of *Eucalyptus tereticornis, E. baueriana, Angophora floribunda* and *Casuarina glauca*.
849	Cumberland Shale Plains Woodland	IBRA region, subregion, soil landscape, elevation, vegetation mapping outside of the study area and planting of canopy species *Eucalyptus tereticornis.*	This PCT has been accepted as the best fit for planted vegetation native based on review of existing vegetation mapping adjacent to the study area and presence of planted *Eucalyptus tereticornis.*

2.4.4.2 Threatened Ecological Communities Justification

The BioNet Vegetation Classification lists PCT 835 as conforming to *River-flat Eucalypt Forest* which is listed as endangered under the BC Act and nominated for listing as endangered under the EPBC Act. PCT 835 was mapped within the study area and has been re-established through revegetation works. Section 3.2.2 of the nominated EPBC Act listing, states that revegetated areas may be listed under the Act provided they meet the key diagnostic characteristics and condition thresholds under the EPBC Act. This PCT was categorised as a poor condition vegetation zone based on the presence of weeds, small patch size and absence of large trees. The vegetation did not satisfy listing criteria under the EPBC Act.

The BioNet Vegetation Classification lists PCT 849 as a component of Cumberland Plain Woodland which is listed as a critically endangered ecological community (CEEC) under the BC Act and EPBC Act. However, the vegetation present in the study area contains scattered native planted eucalypt and other non-indigenous species. There is no evidence of remnant vegetation within the study area. Additionally, the soil profile has been substantially modified and does not represent original profile. Therefore, the

vegetation mapped as PCT 849 within the study area does not form part of the Cumberland Plain Woodland TEC listed under the BC or EPBC Act.

Table 9: Threatened Ecological Communities within study area

PCT ID	BC Act			EPBC Act		
	Listing status	Name	Area (ha)	Listing status	Name	Area (ha)
835	EEC	River-flat Eucalyptus Forest	1.92	*	-	-
849	**	-	-	**	-	-

EEC – ENDANGERED ECOLOGICAL COMMUNITY
* NOTE THAT PCT 835 EEC DID NOT SATISFY THE REQUIREMENTS FOR LISTING UNDER THE EPBC ACT CRITERIA.
** NOTE THAT PCT849 NON-TEC PLANTED DID NOT SATISFY THE REQUIREMENTS FOR LISTING UNDER THE BC ACT OR EPBC ACT CRITERIA.

2.4.5 Vegetation integrity assessment

A vegetation integrity assessment using the Biodiversity Assessment Method Credit Calculator (BAMC) was undertaken and the results are outlined in Table 10.

Table 10: Vegetation integrity

Veg Zone	PCT ID	Ancillary code	Area (ha)*	Composition Condition Score	Structure Condition Score	Function Condition Score	Current vegetation integrity score
1	835	Weedy	1.48	18.1	18.1	67.9	28.2
2	835	Revegetation	0.44	48.2	17.9	26.4	28.3
3	849	Planted	0.57	20.1	30.4	38.4	28.6

*ASSUMES TOTAL AMOUNT OF VEGETATION WIHTIN THE STUDY AREA IS IMPACTED THIS WILL BE UPDATED AFTER LANDSCAPE DESIGNS HAVE BEEN FINALISED

2.4.6 Use of local data

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

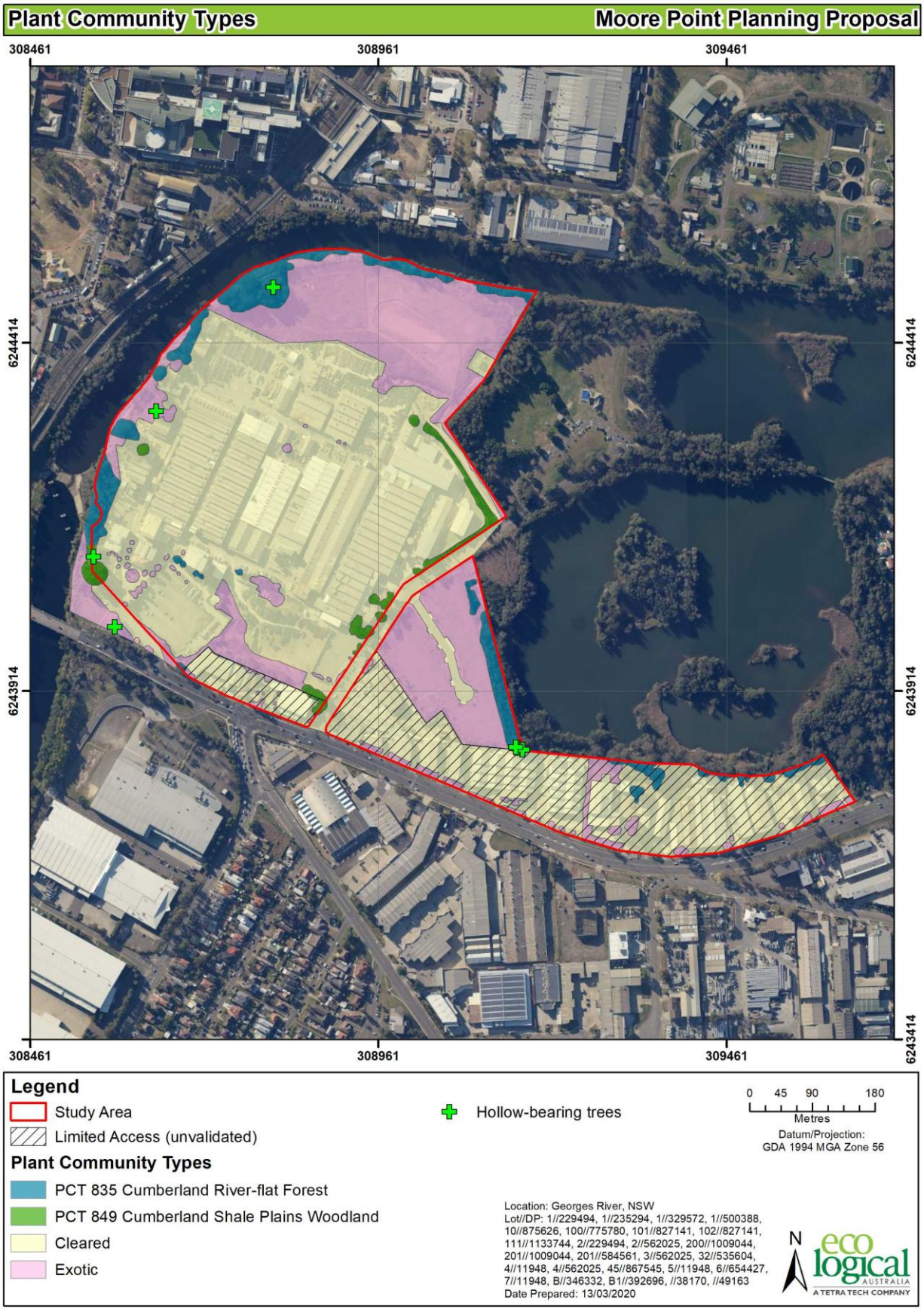

Figure 8: Plant Community Types and native vegetation extent

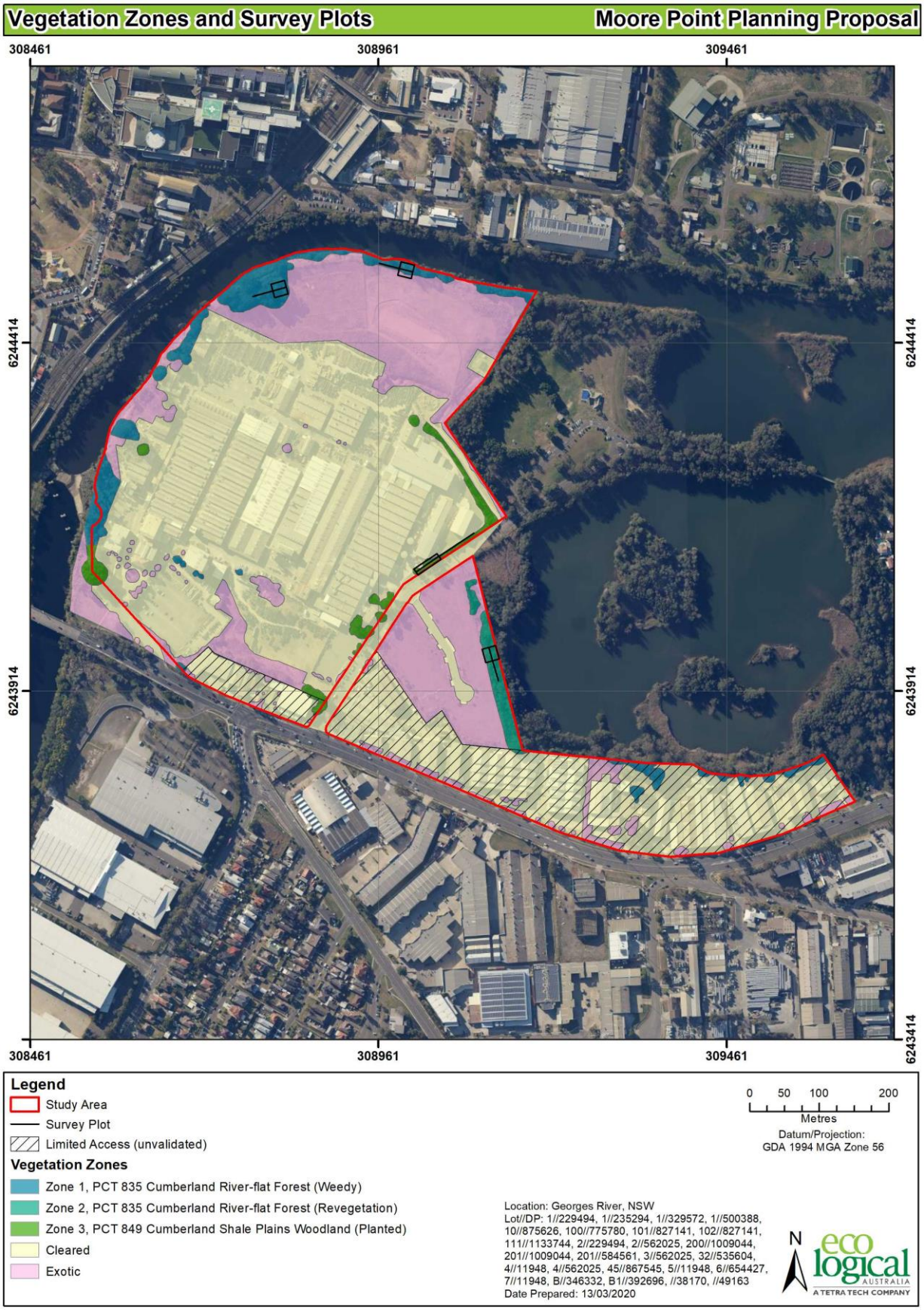

Figure 9: Plot locations

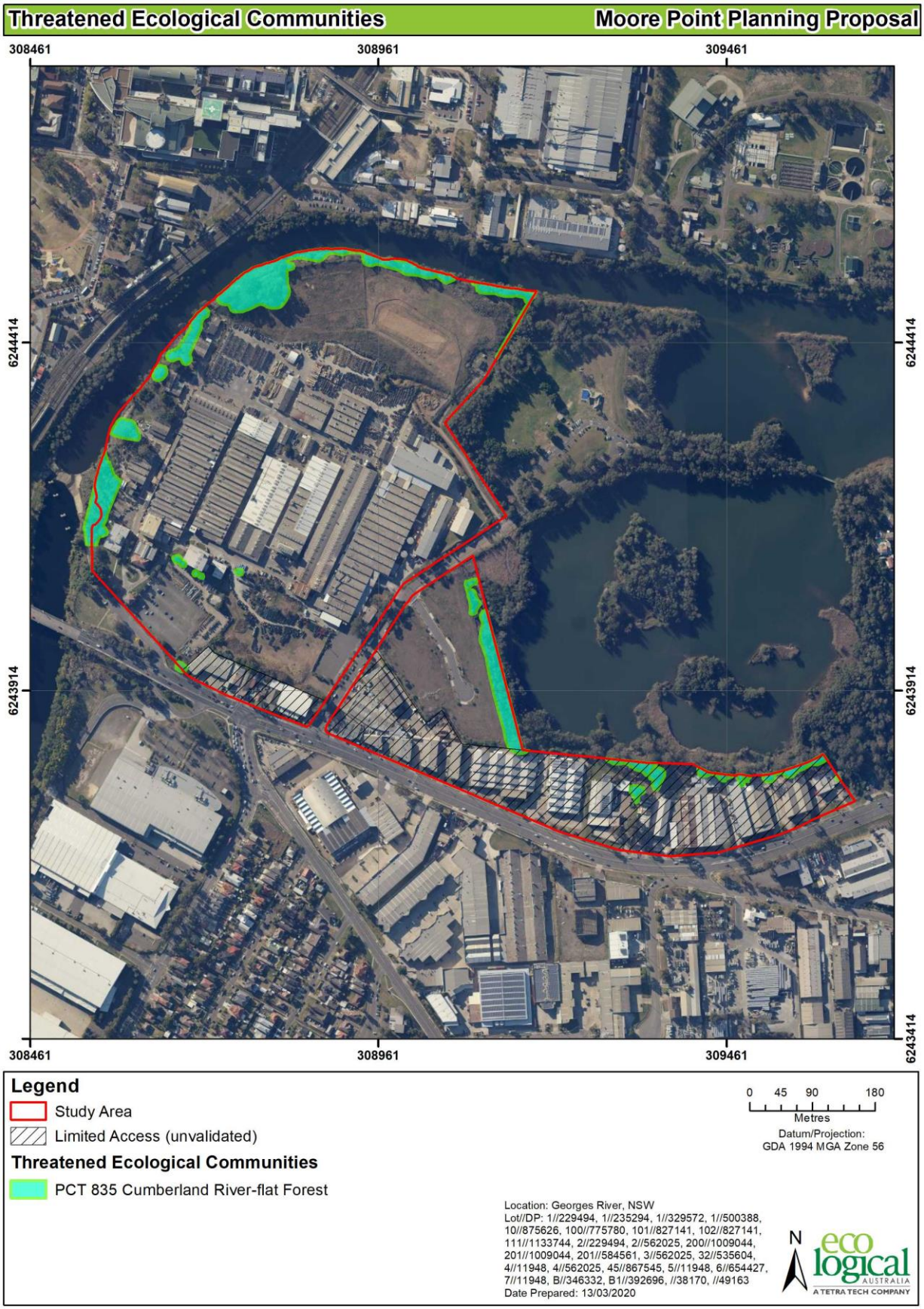

Figure 10: Threatened Ecological Communities

2.5 Threatened species

2.5.1 Ecosystem credit species

Ecosystem credit species predicted to occur at the study area, their associated habitat constraints, geographic limitations and sensitivity to gain class is included in Table 11. Ecosystem credit species which have been excluded from the assessment and relevant justification is also included in Table 11. Three threatened fauna species were added into the BAMC list of candidate ecosystem credit species. *Daphoenositta chrysoptera* (Varied sittella), *Hieraaetus morphnoides* (Little Eagle) and *Ninox strenua* (Powerful Owl) were not listed as candidate ecosystem species associated with PCT 849 or PCT 835. However, there are recent BioNet recorded for these species recorded within or adjacent to the study area. Therefore, it was determined that these species should be considered part of the assessment.

Table 11: Justification for exclusion of predicted ecosystem credit species

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
Anthochaera phrygia	Regent Honeyeater (Foraging)	N/A	High	CE	CE	Excluded Habitat features for this species are not present at this site. The study area does not comprise key plant species required for foraging.
Artamus cyanopterus cyanopterus	Dusky Woodswallow		Moderate	V	Not Listed	Excluded The study area contains degraded vegetation and is unlikely to support habitat for this species.
Botaurus poiciloptilus	Australasian Bittern	Waterbodies Brackish or freshwater wetlands	Moderate	E	E	Included The study area contains fringing vegetation and open grasslands which may represent suitable but degraded habitat for this species.
Chthonicola sagittata	Speckled Warbler	-	High	V	Not Listed	Excluded Habitat present does not contain suitable habitat features for this species such as abundance of fallen logs. The vegetation within the study area is substantially degraded.
Climacteris picumnus	Brown Treecreeper (eastern subspecies)	-	High	V	Not Listed	Excluded Habitat present does not contain suitable habitat features for this species such as abundance of fallen logs. The vegetation within the study area is substantially degraded.

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
Daphoenositta chrysoptera	Varied Sittella	-	Moderate	V	Not Listed	Included This species was added to the BAMC as this species has been previously recorded within the study area boundary.
Dasyurus maculatus	Spotted-tailed Quoll	N/A	High	V	E	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.
Glossopsitta pusilla	Little Lorikeet	N/A	High	V	Not Listed	Included There are 42 BioNet records for this species within a 5 km radius of the study area including several recent records in close proximity to the study area. This species may utilise the flowering species within the study area for seasonal foraging . This species was included in this assessment
Haliaeetus leucogaster	White-bellied Sea-Eagle (Foraging)	Waterbodies Within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines	High	V	Not Listed	Included There are 18 BioNet records for this species within a 5 km radius of the study area including several recent records in close proximity to the study area. This species may utilise habitat features within the study area for foraging.
Hieraaetus morphnoides	Little Eagle (Foraging)	N/A	Moderate	V	Not Listed	Included This species was added to the BAMC as this species has been previously recorded north of the study area boundary
Lathamus discolor	Swift Parrot (Foraging)	N/A	Moderate	E	CE	Excluded Habitat features associated with this species are not present in the study area. There are no habitat features such as the favoured feed trees or lerp infestations.

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	N/A	Moderate	V	Not Listed	Excluded Habitat features associated with this species are not present on the study area. This species requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses which the study area does not contain. No individuals have been recorded within 5 km of the study area.
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	N/A	High	V	Not Listed	Included Foraging habitat was identified in this assessment.
Miniopterus australis	Little Bent-winged Bat (Foraging)	N/A	High	V	Not Listed	Included Seasonal foraging habitat was identified in this assessment. This species has previously been recorded within the study area
Miniopterus orianae oceanensis	Large Bent-winged Bat (Foraging)	N/A	High	V	Not Listed	Included Seasonal foraging habitat was identified in this assessment.
Ninox strenua	Powerful Owl (Foraging)	N/A	High	V	Not Listed	Included This species was added to the BAMC as this species has been previously recorded north of the study area boundary.
Pandion cristatus	Eastern Osprey (Foraging)	-	Moderate	V	Not Listed	Excluded Habitat features associated with this species which includes open water was not recorded within the study area.
Petroica boodang	Scarlet Robin	N/A	Moderate	V	Not Listed	Excluded Habitat features associated with this species includes an abundance of logs and fallen timber, these features were not present in the study area.

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
Petroica phoenicea	Flame Robin	N/A	Moderate	V	Not Listed	Excluded Habitat features associated with this species are not present in the study area. This species requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses which the study area does not contain. No individuals have been recorded within 10 km of the study area.
Phascolarctos cinereus	Koala (Foraging)	N/A	High	V	V	Included A recent BioNet record from 2017 approximately 200 m south of the study area. Although the habitat present is substantially degraded, and highly fragmented feed trees were recorded within the study area. Targeted surveys for this species will be conducted as part of the BDAR in accordance with the BAM and Koala Habitat Protection SEPP guidelines.
Pteropus poliocephalus	Grey-headed Flying-fox (Foraging)	N/A	High	V	V	Included Seasonal foraging habitat was identified in the study area.
Stagonopleura guttata	Diamond Firetail	N/A	Moderate	V	Not Listed	Excluded Habitat present is substantially degraded and highly fragmented such that this species is unlikely to utilise the study area.

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

2.6 Species credit species

Species credit species predicted to occur at the study area (i.e. candidate species), their associated habitat constraints, geographic limitations and sensitivity to gain class is included in Table 12.

Species credit species which have been excluded from the assessment and relevant justification are also included in Table 12.

Habitat assessments were undertaken during the field surveys on 20 June 2019 to determine the likelihood of threatened species occurring within the study area on an intermittent or permanent basis.

Habitat assessments involved a search of all possible hollow-bearing trees (HBTs) within the study area, and a search for evidence of fauna foraging such as chewed cones, sap trees or roosting habitat in the

form of white wash/pellets, plus inspection of structures to determine of suitable roosting/breeding habitat for threatened microbats.

Tree hollows were inspected with binoculars to identify evidence of fauna use and record the dimension of the hollow entrance. Six HBTs were recorded within the study area. No hollows inspected displayed any apparent visual evidence of microbat occupation. Microbat scats and/or markings were not observed around any of the entrances, nor were any microbats observed when inspecting inside the accessible hollows. Some threatened microbat species are known to utilise human made structures regularly or on occasion. Access to conduct on ground inspections was limited to accessible areas. On ground inspections were conducted using binoculars looking at roof cavities for possible entrance for microbats, and evidence of fauna (such as scats or scratch marks) use within the study area. Additional targeted surveys may be required at the DA stage as impacts to human made structures that contain habitat for threatened species is a prescribed impact under section 6.1 of the Biodiversity Conservation Regulation 2017.

Although the vegetation within the study area contains limited native vegetation and has been substantially modified, the vegetation is located adjacent to waterbodies and provides connectivity to patches of native vegetation. The vegetation within the study area contains potential habitat for some threatened species. Additional targeted surveys are required as part of the SSD application of the precinct. This may include surveys for Koala (*Phascolarctos cinereus*) in accordance with the new SEPP (Koala Habitat Protection), *Myotis macropus* (Southern Myotis) and *Litoria aurea* (Green and Golden Bell Frog).

Table 12: Candidate species credit species

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
Acacia bynoeana	Bynoe's Wattle	N/A	High	E	V	Excluded The presence of this species was not identified (conspicuous species) and it was determined that the habitat is substantially degraded such that this species is unlikely to occur within the study area.
Acacia pubescens	Downy Wattle	N/A	High	V	V	Excluded The presence of this species was not identified (conspicuous species) and it was determined that the habitat is substantially degraded such that this species is unlikely to occur within the study area.
Anthochaera phrygia	Regent Honeyeater (Breeding)	Other As per mapped areas	High	CE	CE	Excluded This is a dual credit species, and only a species credit species when specific habitat constraints are present for breeding. The study area is not within

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
						the mapped areas accessed on the BOAMS (17 March 2020).
Caladenia tessellata	Thick Lip Spider Orchid	N/A	Moderate	E	V	Excluded Habitat for this species was not considered suitable in the study area. The site is substantially degraded, and this species occurs in grassy sclerophyll woodlands which were not recorded within the study area. Furthermore, this species is only known from old records in Sydney area.
Callistemon linearifolius	Netted Bottle	N/A	Moderate	V	Not Listed	Excluded The presence of this species was not identified (conspicuous species) and it was determined that the habitat is substantially degraded such that this species is unlikely to occur within the study area.
Cynanchum elegans	White-flowered Wax Plant	N/A	Moderate	V	Not Listed	Excluded The presence of this species was not identified (conspicuous species) and it was determined that the habitat is substantially degraded such that this species is unlikely to occur within the study area.
Dillwynia tenuifolia	Dillwynia tenuifolia	N/A	Moderate	V	Not Listed	Excluded The presence of this species was not identified (conspicuous species) and it was determined that the habitat is substantially degraded such that this species is unlikely to occur within the study area.
Dillwynia tenuifolia endangered population	Dillwynia tenuifolia Kemps Creek	The area bounded by Western Road, Elizabeth Drive, Devonshire Road and Cross Street Kemps Creek	High	E2	Not Listed	Excluded The study area is not located within the geographic distribution for this species. This species is not considered a candidate species for this assessment.
Eucalyptus benthamii	Camden White Gum	N/A	High	V	V	Excluded The presence of this species was not identified (conspicuous species) and it was determined that the habitat is substantially degraded such that this

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
						species is unlikely to occur within the study area.
Grevillea juniperina subsp. juniperina	Juniper-leaved Grevillea	N/A	High	V	Not Listed	Excluded The presence of this species was not identified (conspicuous species) and it was determined that the habitat is substantially degraded such that this species is unlikely to occur within the study area.
Haliaeetus leucogaster	White-bellied Sea-Eagle (Breeding)	Other Living or dead mature trees within suitable vegetation within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines	High	V	Not Listed	Excluded The vegetation within the study area does not contain suitable living or dead mature trees for this species. The vegetation contains revegetated and planted species. The field survey did not record large stick nests which represents breeding habitat for this species.
Hibbertia sp. Bankstown	Hibbertia sp. Bankstown	N/A	High	E	Not Listed	Excluded The presence of this species was not identified, and it was determined that the habitat features associated with this species are not present within the study area. The site is substantially degraded such that this species is unlikely to occur within the study area.
Lathamus discolor	Swift Parrot (Breeding)	Other As per mapped areas	Moderate	E	CE	Excluded The study area does not contain suitable habitat for this species.
Litoria aurea	Green and Golden Bell Frog	Semi-permanent/ephemeral wet areas Within 1km of wet areas, swamps Within 1km of swamp, waterbodies Within 1km of waterbody	High	E	V	Included Habitat features associated with this species include soaks and fringing vegetation was recorded within the study area which may contain suitable habitat for this species. Targeted surveys may be required for this species during survey period.
Marsdenia viridiflora subsp. viridiflora	Marsdenia viridiflora R. Br. subsp. viridiflora	Those in LGAs named in the populations	Moderate	E2	Not Listed	Excluded The presence of this species was not identified, and it was determined that the habitat features associated with

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
endangered population	population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas					this species are not present within the study area. The site is substantially degraded such that this species is unlikely to occur within the study area.
Meridolum corneovirens	Cumberland Plain Land Snail	N/A	High	E	Not Listed	Excluded Habitat features associated with this species are not present in the study area. This species occurs within Cumberland Plain Woodland and associated shale vegetation communities. The study area has been substantially modified and does not support these habitat features.
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 recorded in BioNet with microhabitat Observation type code 'E nest-roost' with numbers of individuals >500	Very High	V	Not Listed	Excluded This is a dual credit species, and only a species credit species when specific habitat constraints are present for breeding. The study area does not contain breeding habitat such as caves that are suitable for the species to utilise the 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 recorded in	Very High	V	Not Listed	Excluded This is a dual credit species, and only a species credit species when specific habitat constraints are present for breeding. The study area does not contain breeding habitat such as caves, tunnels, mines or culverts.

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
		BioNet with microhabitat Observation type code 'E nest-roost' with numbers of individuals >500				
Myotis macropus	Southern Myotis	Hollow bearing trees Within 200 m of riparian zone, other bridges, caves or artificial structures within 200 m of riparian zone	High	V	Not Listed	Included Habitat present is substantially degraded however, hollow bearing trees were identified within the study area, the nearest tree is within 200 m of the drainage line within the study area. Targeted surveys will be required for this species.
Pandion cristatus	Eastern Osprey (Breeding)	Other Presence of stick-nests in living and dead trees (>15m) or artificial structures within 100m of a floodplain for nesting	Moderate	V	Not Listed	Excluded The vegetation within the study area does not contain suitable mature trees for this species. The vegetation contains revegetated and planted species. The field survey did not record stick nests which represents breeding habitat for this species.
Persicaria elatior	Tall Knotweed	Semi-permanent / ephemeral wet areas or within 50m Swamps or within 50m waterbodies including wetlands or within 50m	High	V	V	Excluded The presence of this species was not identified, and it was determined that the habitat features associated with this species are not present within the study area. The site is substantially degraded such that this species is unlikely to occur within the study area.
Persoonia bargoensis	Bargo Geebung	N/A	High	E	V	Excluded The presence of this species was not identified, and it was determined that the habitat is substantially degraded such that this species is unlikely to occur within the study area.
Persoonia hirsuta	Hairy Geebung	N/A	High	E	E	Excluded The presence of this species was not identified, and it was determined that

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
						the habitat is substantially degraded such that this species is unlikely to occur within the study area.
Petaurus norfolcensis	Squirrel Glider	N/G	High	V	Not Listed	Excluded Habitat present is substantially degraded such that this species is unlikely to utilise the study area. Habitat in the study area 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 study area. Additionally, there are no BioNet records for this species within a 5 km radius of the study area.
Phascolarctos cinereus	Koala (Breeding)	Other Areas identified via surveys as important habitat	High	V	V	Included The study area is located within the mapped area under the Koala Habitat Protection map. Therefore, targeted surveys will be conducted as part of the BDAR.
Pilularia novae-hollandiae	Austral Pillwort	N/A	High	E	Not Listed	Excluded The presence of this species was not identified (conspicuous species) and it was determined that the habitat is substantially degraded such that this species is unlikely to utilise the study area.
Pimelea curviflora var. *curviflora*	Pimelea curviflora var. curviflora	N/A	High	V	V	Excluded The presence of this species was not identified (conspicuous species) and it was determined that the habitat is substantially degraded such that this species is unlikely to utilise the study area.
Pimelea spicata	Spiked Rice-flower	N/A	High	E	E	Excluded The presence of this species was not identified (conspicuous species) and it was determined that the habitat is substantially degraded such that this species is unlikely to utilise the study area.
Pomaderris brunnea	Brown Pomaderris	N/A	High	E	V	Excluded

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
						The presence of this species was not identified (conspicuous species) and it was determined that the habitat is substantially degraded such that this species is unlikely to occur within the study area.
Pommerhelix duralensis	Dural Woodland Snail	Other Leaf litter and shed bark or within 50m of litter or bark, Rocky areas Rocks or within 50m of rocks, Fallen/standing dead timber including logs Including logs and bark or within 50m of logs or bark	High	E	E	Excluded Habitat present is substantially degraded such that this species is unlikely to utilise the study area. Habitat in the study area is isolated and disturbed. Habitat requirements were not recorded within the study area.
Pteropus poliocephalus	Grey-headed Flying-fox (Breeding)	Other Breeding camps	High	V	V	Excluded This is a dual credit species, and only a species credit species when specific habitat constraints are present for breeding. The study area does not contain any breeding sites that are suitable for the species to utilise.
Pterostylis saxicola	Sydney Plains Greenhood	N/A	Moderate	E	E	Excluded The vegetation within the study area has been substantially modified and does not represent suitable habitat features for this cryptic species. Furthermore, there are no records for this species within 5 km of the study area.
Pultenaea pedunculata	Matted Bush-pea	N/A	Moderate	V	V	Excluded The presence of this species was not identified (conspicuous species) and it was determined that the habitat is substantially degraded such that this species is unlikely to occur within the study area.
Thesium australe	Austral Toadflax	N/A	Moderate	V	V	Excluded The presence of this species was not identified (conspicuous species) and it was determined that the habitat is

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
						substantially degraded such that this species is unlikely to occur within the study area.
Wahlenbergia multicaulis – endangered population	Tadgell's Bluebell in the LGAs of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield	Other	High	E2	Not Listed	Excluded The study area is not located within the geographic LGA distribution for this species.

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

2.6.1 Targeted surveys

Due to the high level of modification of vegetation within the study area and lack of potential habitat, targeted surveys will not be required for many species credit species. Justification for the exclusion of species credit species is provided above in Table 12.

Some microbat species are dual credit species with only breeding habitat considered for species credits. None of the dual credit species are known to breed in man-made structures such as roof cavities. However, under Section 9.2.1 of the BAM, the accessor must take into consideration Prescribed Biodiversity Impacts including any man-made structures which may be roosting habitat for the following threatened microbat species:

- *Saccolaimus flaviventris* (Yellow-bellied Sheathtail Bat)
- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Miniopterus australis* (Little Bentwing-bat)
- *Miniopterus orianae oceanensis* (Large Bent-winged Bat).

Targeted surveys for threatened microbats listed above will be conducted for the BDAR as part of the SSD application. Targeted surveys are also required for Koala, Green and Golden Bell Frog and Southern Myotis.

3. Stage 2: Preliminary impact assessment (biodiversity values)

3.1.1 Prescribed biodiversity impacts

The study area has the prescribed biodiversity impacts as outlined below.

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

- Occurrences of karst, caves, crevices and cliffs - none occur within the study area
- Occurrences of rock - no rock outcrops or scattered rocks occur within the study area
- Occurrences of human made structures and non-native vegetation – **Yes, see section below**.
- Hydrological processes that sustain and interact with the rivers, streams and wetlands - **Yes, see section below**
- Proposed development for a wind farm and use by species as a flyway or migration route - the project does not involve any wind farm development.

The study area contains human made structures and non-native vegetation. The study area also contains hydrological processes that sustain and interact with rivers (Georges River) and wetlands (Lake Moore) as mapped on Figure 7. Additional information regarding these processes will be conducted following a review of the riparian assessment and provided in the BDAR.

Additional information regarding consideration of human made structures is provided below. Non-native vegetation was identified and assessed for any potential to provide habitat for threatened flora and fauna species, including presence of hollow bearing trees.

A literature review was conducted to identify if buildings or structures could potentially be utilised as a roosting resource by microbats, including BioNet records within the study area and surrounding landscape. Visual surveys were conducted to visually determine if the buildings within the study area contain potential openings, possibly utilised by microbats. Possible threatened microbats surveyed for include:

- *Saccolaimus flaviventris* (Yellow-bellied Sheathtail Bat)
- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Miniopterus australis* (Little Bentwing-bat)
- *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat).

Existing buildings in the study area include a variety of potential microbat habitats. Areas of open, noisy industrial sheds were not considered potential habitat. Additional surveys within the survey seasonal requirements are required for microbats as part of the BDAR.

Prescribed Impacts will be assessed in accordance with the BAM and submitted with the BDAR.

3.1.2 Direct impacts

The direct impacts of the planning proposal on:

- native vegetation are outlined in Table 13
- threatened ecological communities are outlined in Table 14

- prescribed biodiversity impacts will be assessed as per Section 3.1.1.

The Masterplan has provided a development footprint to be assessed in the following sections. A detailed landscape design has yet to been finalised. It is assumed that some minor impacts are likely to occur within areas mapped as Open Space. As such, these need to be included in the impact assessment and impacts to biodiversity values are to be offset in accordance with the BAM.

The development area will result in the removal of approximately 0.16 ha of PCT 835 which includes 0.14 ha of PCT 835_weedy condition and 0.02 ha of PCT 835_revegetation. These vegetation zones are also listed as part of TEC (see Table 14).

The development footprint will also result in the removal of 0.49 ha of vegetation mapped as PCT 849_planted. This vegetation community is not considered part of a TEC.

Up to 0.61 ha of unvalidated vegetation will also be impacted. Any native vegetation within the unvalidated vegetation areas will be assigned into a vegetation zone for the BDAR.

Table 13: Impacts to vegetation for the development footprint and Open Space areas

PCT and Veg Zone	Impact for development (ha)	Open Space* (ha)	Total area within study area (ha)
PCT 835 Zone 1_Weedy	0.14	1.35	1.48
PCT 835 Zone 2_Revegetation	0.02	0.42	0.44
PCT 849 Zone 3_Planted	0.49	0.08	0.57
Exotic	7.49	2.03	9.62
Cleared**	23.56	2.80	26.36
Unvalidated vegetation	0.61	0.32	0.93
TOTAL	31.75	7.01	38.75

*NOTE SOME AREAS WITHIN THE OPEN SPACE WILL BE SUBJECT TO LANDSCAPING WORKS AND MAY RESULT IN REMOVAL OF NATIVE VEGETATION. THESE IMPACTS WILL BE FINALISED IN THE BDAR
** CLEARED AREAS INCLUDES BUILD ENVIRONMENTS AND EXOTIC GRASSLANDS

The proposed development footprint will result in the removal of 0.14 ha of PCT 835_weedy and 0.02 ha of PCT 835_revegetation which is listed as part of the endangered ecological community (River-flat Eucalypt Forest) under the NSW BC Act. The development footprint does not contain threatened ecological communities which satisfy listing criteria under the EPBC Act.

Table 14: Direct impacts on threatened ecological communities

PCT ID	BC Act				EPBC Act
	Listing status	Name	Development impact (ha)	Open Space* (ha)	Listing status
PCT 835 Zone 1_Weedy	EEC	River-flat Eucalypt Forest	0.14	1.35	N/A
PCT 835 Zone 2_Revegetation	EEC	River-flat Eucalypt Forest	0.02	0.42	N/A
PCT 849 Zone 3_Planted	-	-	-	-	N/A
TOTAL			0.16	1.7.7	

*NOTE SOME AREAS WITHIN THE OPEN SPACE WILL BE SUBJECT TO LANDSCAPING WORKS AND MAY RESULT IN REMOVAL OF NATIVE VEGETATION. THESE IMPACTS WILL BE FINALISED IN THE BDAR

3.2 Impact summary

3.2.1 Serious and Irreversible Impacts (SAII)

The development is unlikely to contain Serious and Irreversible Impacts (SAII) entities. The study area does not contain vegetation communities which are candidate entities for SAII. Additionally, the development footprint is unlikely to impact upon threatened species which are considered a candidate species for SAII.

3.2.2 Impacts requiring offsets

The impacts of the development footprint requiring offsets for native vegetation are outlined in Table 15. Impacts from development within Open Space will be updated to the table below once finalised.

Table 15: Impacts to native vegetation that require offsets

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Direct impact (ha)
PCT 835 Zone 1_Weedy	Cumberland Riverflat Forest	Coastal Floodplain Wetlands	Forested Wetlands	0.14
PCT 835 Zone 2_Revegetation	Cumberland Riverflat Forest	Coastal Floodplain Wetlands	Forested Wetlands	0.02
PCT 849 Zone 3_Planted	Cumberland Shale Plains Woodland	Coastal Valley Grassy Woodlands	Grassy Woodlands	0.49

3.2.3 Impacts not requiring offsets

All native vegetation within the study area which will be removed requires offsets.

3.2.4 Areas not requiring assessment

Areas not requiring assessment include existing buildings, carparks, paths, exotic grassland and exotic vegetation which does not provide habitat for threatened species. The study area contains build/cleared areas, exotic grassland and exotic vegetation as shown in Figure 9. These areas were not consistent with any listed PCT, nor did they contain any threatened species. An assessment of Prescribed Impacts will be undertaken, hence further assessment under the BAM was not required.

3.2.5 Credit summary

An indicative summary of the number of ecosystem credits required for the development are outlined in Table 16. These calculations will be updated following the submission of the final Masterplan design to include the Open Space impacts.

Targeted surveys for threatened species will be required and may require offsets for species credit species at the DA stage.

Table 16: Ecosystem credits required for development impacts (this excludes open space impacts)

PCT ID	PCT Name	Vegetation Formation	Direct impact (ha)	Credits /ha	Est. credits required
PCT 835 Zone 1_Weedy	Cumberland Riverflat Forest	Forested Wetlands	0.14	14	2
PCT 835 Zone 2_Revegetation	Cumberland Riverflat Forest	Forested Wetlands	0.02	14	1
PCT 849 Zone 3_Planted	Cumberland Shale Plains Woodland	Grassy Woodlands	0.49	18	9
TOTAL			0.65	-	12

4. References

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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 study area, 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.
Study area	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 study area 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 study area 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 study area 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 study area, 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 study area, 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 17: Vegetation integrity data (Composition, Structure and function)

Plot location data							
Plot no.	PCT	Vegetation Zone	Condition	Zone	Eastings	Northings	Bearing
1	835	1	Weedy	56	308829	6244493	257
2	849	3	Planted	56	309008	6244087	430
3	835	2	Revegetation	56	309126	6243980	147
4	835	1	Weedy	56	309010	6244514	30

Composition (number of species)						
Plot no.	Tree	Shrub	Grass	Forb	Fern	Other
1	4	0	2	1	0	0
2	3	4	1	2	0	1
3	8	5	2	2	0	2
4	4	4	3	0	0	0

Structure (Total cover %)						
Plot no.	Tree	Shrub	Grass	Forb	Fern	Other
1	35.2	0	70.1	0.1	0	0
2	31	20.7	0.3	20	0	0.5
3	39.9	2.1	0.7	0.2	0	0.2
4	27	5.6	10.1	0	0	0

Function												
Plot no.	Large Trees	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	1	0	45.8	0	0	0	1	1	1	0	0	16.5
2	1	0	51.6	0	1	0	1	1	1	0	0	0.9
3	0	0	15.8	4	1	1	1	1	0	0	0	27.6
4	2	0	80.2	2	1	0	1	0	1	1	1	94.5

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

Table 18: Species matrix (species recorded by plot)

Stratum	Form	Species name	Exotic (*)	High Threat Weed (*)	Cover (%) Plot 1	Cover (%) Plot 2	Cover (%) Plot 3	Cover (%) Plot 4
U	TG	*Acacia binervata*						10
M	TG	*Acacia decurrens*			0.1		0.2	
M	SG	*Acacia falcata*						0.5
M		*Acacia saligna*	*				0.3	
G		*Acetosa sagittata*	*	*	0.1		0.1	
M	TG	*Alphitonia excelsa*			0.1			2
G		*Anagallis* spp.	*			0.1		
U	TG	*Angophora floribunda*					0.5	
G		*Araujia sericifera*	*	*	1		0.1	
M		*Araujia sericifera*	*	*		0.1		
G		*Asparagus asparagoides*	*	*	0.1		0.1	0.1
U	SG	*Backhousia myrtifolia*						3
M	TG	*Banksia serrata*				0.5		
M		*Bidens* spp.	*		0.5			
G		*Bidens* spp.	*			0.5	5	0.1
G		*Brassica* spp.	*				1	
G		*Bromus catharticus*	*			0.1	0.1	
M	SG	*Bursaria spinosa* subsp. *spinosa*					0.2	2
M	SG	*Callistemon citrinus*				20		
M	SG	*Callistemon salignus*					0.2	
M		*Cardiospermum grandiflorum*	*	*	10			30
G	GG	*Carex inversa*			0.1			
U	TG	*Casuarina glauca*					20	
M	TG	*Ceratopetalum gummiferum*				0.5		
G	TG	*Ceratopetalum gummiferum*					7	
M		*Cestrum parqui*	*	*	0.1	0.1		
M		*Cinnamomum camphora*	*	*		0.5		
U		*Cinnamomum camphora*	*	*				3
G		*Cirsium vulgare*	*		0.1		0.1	

Stratum	Form	Species name	Exotic (*)	High Threat Weed (*)	Cover (%) Plot 1	Cover (%) Plot 2	Cover (%) Plot 3	Cover (%) Plot 4
G		*Conyza bonariensis*	*				0.1	
U	TG	*Corymbia maculata*			20			
G	GG	*Cotula australis*				5		
G	GG	*Cynodon dactylon*						0.1
G	GG	*Desmodium brachypodum*					0.1	
G	GG	*Dichondra repens*					0.1	
G		*Ehrharta erecta*	*	*	1	0.1	20	10
G	GG	*Einadia nutans* subsp. *nutans*			0.1			
G		*Eleusine indica*	*			0.1		
M	TG	*Eucalyptus elata*					0.1	
U	TG	*Eucalyptus eugenioides*						10
U	TG	*Eucalyptus robusta*					2	
U	TG	*Eucalyptus tereticornis*			15	30	10	5
M		*Foeniculum vulgare*	*		5			5
G		*Foeniculum vulgare*	*				0.1	
M		*Genista linifolia*	*	*	2			
G	OG	*Glycine tabacina*					0.1	
M		*Gomphocarpus fruticosus*	*				0.1	
M	SG	*Grevillea* spp.				0.1		
G	OG	*Hardenbergia violacea*					0.1	
G		*Hypochaeris radicata*	*			0.2		
M	SG	*Indigofera* spp.					0.5	
M	SG	*Kunzea ambigua*						0.1
M		*Lantana camara*	*	*	2		7	10
M		*Ligustrum sinense*	*	*		0.1		1
G		*Ligustrum sinense*	*	2			0.1	
U	OG	*Livistona australis*				0.5		
G	GG	*Lomandra longifolia*					0.2	
M		*Lycium ferocissimum*	*	*				0.2
M	SG	Melaleuca ericifolia					0.2	
M	TG	*Melia azedarach*					0.1	

Stratum	Form	Species name	Exotic (*)	High Threat Weed (*)	Cover (%) Plot 1	Cover (%) Plot 2	Cover (%) Plot 3	Cover (%) Plot 4
G	GG	*Microlaena stipoides* var. *stipoides*						5
G		*Modiola caroliniana*	*			0.5	0.2	
M		*Nerium oleander*	*					1
G		*Nothoscordum* spp. (Onion Weed)			0.1			
M		*Ochna serrulata*	*	*	0.1			0.1
M		*Olea europaea* subsp. *cuspidata*	*		0.5	0.1		
G	GG	*Oplismenus aemulus*					0.5	
G		*Opuntia stricta* var. *stricta*	*	*				0.1
G		*Oxalis articulata*	*				0.1	
G		*Paspalum dilatatum*	*	*			0.1	
G	GG	*Pennisetum* spp.			70	0.3		5
M	SG	*Pittosporum undulatum*				0.5	1	
G		*Plantago lanceolata*	*				0.1	
G		*Senna pendula* var. *glabrata*	*	*			0.1	
G		*Setaria palmifolia*	*				5	0.5
M		*Sida rhombifolia*	*		0.5			
M		*Solanum nigrum*	*		0.1		0.2	
M		*Solanum pseudocapsicum*	*				0.1	
G	GG	*Sonchus asper*				15		
G		*Tephrosia glomeruliflora*	*				0.1	
G		*Tradescantia fluminensis*	*	*	0.1			40
G		*Trifolium repens*	*				0.1	
M		*Verbena bonariensis*	*		0.1			
M		*Verbena officinalis*	*				0.5	
M	SG	*Westringia fruticosa*				0.1		

G = Ground, M = Midstorey, U= Understorey TG = Tree, SG = Shrub, GG = Grass & Grasslike, FG = Forb, EG = Fern, OG = Other

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