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Moore Point Planning Proposal Biodiversity Development Assessment Report

Joint Landowner Group

DOCUMENT TRACKING

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Project Number	23SYD-5575
Project Manager	Belinda Failes
Accredited assessor certification	I certify that this report has been prepared on the basis of the requirements of, and information provided under, the Biodiversity Assessment Method and s.6.15 of the BC Act. In preparing this assessment I have acted in accordance with the Accredited BAM Assessor Code of Conduct. I declare that I have considered the circumstances and there is no actual, perceived, or potential conflict of interest.  Belinda Failes (BAAS18159)
Prepared by	Belinda Failes and Claire Plunkett
Reviewed by	Dr Frank Lemckert and Meredith Henderson
Approved by	David Bonjer
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Template 2.8.1

Executive Summary

Eco Logical Australia Pty Ltd (ELA) was engaged by the Joint Landowner Group (comprised of Leamac Property Group Pty Ltd and Coronation Property Co. Pty Ltd) to update the Biodiversity Development Assessment Report (BDAR) for the Moore Point Planning Proposal. This BDAR addresses the Gateway Determination conditions issued by the Department of Planning and Environment (DPE) (4 April 2023). The Planning Proposal proposes to rezone the following addresses and lots for redevelopment of (i.e. the 'subject land'):

- 3 Bridges Road, Moorebank (Lot 200 DP 1009044)
- 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)
- 16 Bridges Road, Moorebank (Lot 1 DP 329572)
- 361 Newbridge Road, Moorebank (Lot 101 DP 827141)

This BDAR supports a planning proposal provided to Liverpool City Council under Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This BDAR has also been prepared to meet the requirements of the Biodiversity Assessment Method (BAM) 2020 established under Section 6.7 of the *Biodiversity Conservation Act 2016* (BC Act).

The rezoning will create a mixed-use precinct containing residential and commercial structures as well as public spaces and amenities. ELA understands that re-engineering of the Georges River bank along the western boundary of the Leamac holdings and the northern boundary of the Coronation holdings will be required. This will also include removal of existing industrial structures along with native and exotic vegetation within the subject land.

Table 1: Gateway Determination conditions issued by the Department of Planning and Environment (4 April 2023) and ELAs response

Gateway condition	Response
<i>5. The Biodiversity Assessment must be updated to:</i>	
a. Identify land comprising coastal protection, and the attributes and sensitivities of this site.	Table 2 Legislative context in this BDAR includes reference to the Environmentally Sensitive Land under the Liverpool Local Environmental Plan (LEP) 2008.
b. Address the impacts on the water quality, river flows, bushland and sensitive environments such as wetlands, freshwater and estuarine ecosystems.	An assessment of Prescribed Impacts in Section 8 of this BDAR has been prepared to include a review of hydrological reports. More information regarding aquatic matters has been provided in the Aquatic Ecology Report (ELA 2024).
c. Reflect all current legislation, guidelines and assessment criteria.	ELA has amended the legislation table to ensure the SEPPs and legislation are in accordance with the latest legislation and policies. ELA has included reference to relevant guidelines and assessment criteria in the BDAR.

Gateway condition	Response
d. Identify which order stream the Georges River is and update the report accordingly.	Georges River is a 7th order drainage line. This has been included in Table 5 of the BDAR and displayed in Figure 2 Location Map
e. Ensure all species references and credit species references are correct.	The amended BDAR has reviewed the species and ecosystem credit species to ensure all species have been included in this assessment.
f. Identify the biodiversity values and consider the impact of the proposed development on the land identified to be zoned RE1 within the Precinct, including any indirect impacts to Haigh Park, The Georges River and Lake Moore. This should also include consideration of the impacts of any development proposed within these areas such as upgrades to Haigh Park, the installation of pathways, lighting, and overshadowing.	Section 10.3 of this BDAR has been amended to include additional indirect impacts and mitigation measures, additionally, Figure 27 includes an indirect impact map.
g. Adequately justify any impact to threatened ecological communities.	Section 9 of this BDAR provides a justification regarding the design of the Planning Proposal. Impacts to the TECs were considered during the planning, however, due to the reshaping of Georges River, TECs will be impacted by the Planning Proposal.
h. Update the Biodiversity Assessment Report to include a discussion on how the existing biodiversity values informed the land zoning and development footprint.	Section 9 of this BDAR discusses how the project design has been changed to avoid impacts to areas of SEPP wetlands and retaining vegetation within Haigh Park. The Planning Proposal has excluded the eastern portion of the site to retain additional areas of native vegetation and coastal wetlands.
i. Review and address NSW Environment and Heritage Group (EHG) comments in regards to: i. exclusions of ecosystems credits and; ii. undertake targeted surveys in the correct times of the year.	ELA has provided this amended BDAR to include targeted surveys for microbats, Koalas and other species credit species in accordance with the latest survey guidelines. ELA has amended the ecosystem credit exclusions in Section 6.3 of this BDAR.

The planning proposal will require approval to remove approximately 0.21 ha of *PCT 3145 Cumberland Bangalay x Blue Gum Riverflat Forest*, 0.46 ha of *PCT 4023 Coastal Valleys Swamp Oak Riparian Forest* and 1.44 ha of *PCT 4024 Cumberland Blue Box Riverflat Forest*. The removal of 0.47 ha of native planted vegetation was assessed using BAM 2020 Appendix D: Streamlined assessment module - Planted native vegetation. The removal of 6.52 ha of exotic and ornamental vegetation does not require assessment.

Two threatened ecological communities in low condition were identified within the subject land:

- *River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregion* – PCT 4024 and PCT 3145
- *Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions* – PCT 4023.

The vegetation within the subject land was in poor condition and did not satisfy the criteria for listing as part of the critically endangered ecological community *River-flat Eucalypt Forest on Coastal Floodplains*

of the southern NSW and eastern VIC (PCT 4024 or PCT 3145) or the endangered ecological community *Coastal Swamp Oak (Casuarina glauca)* *Fres* of South-east Queensland and New South Wales (PCT 4023), both listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Impacts to these PCTs will require the retirement of 37 'ecosystem credits' to address the residual impacts of the planning proposal according to the offsetting rules of the Biodiversity Offset Scheme (BOS).

Ecosystem credits required

Veg Zone	PCT ID	PCT Name	Condition	Vegetation integrity score	Direct impact (ha)	Credits required
1	3145	Cumberland Bangalay x Blue Gum Riverflat Forest	Weedy	25.9	0.21	3
2	4023	Coastal Valleys Swamp Oak Riparian Forest	Low	27.8	0.46	6
3	4024	Cumberland Blue Box Riverflat Forest	Weedy	38.6	1.44	28
					2.11	37

Targeted surveys were conducted for candidate species credit microchiropteran bat (microbat) species that had potential to utilise the site. The total number of calls during the targeted surveys were very low with only one call from possible *Myotis macropus* / non-threatened species. The results from the targeted surveys indicate that microbats only utilise the subject land on rare occasions and are not roosting/breeding or regularly foraging within the subject land. No species credits were generated for the proposed works. Additionally, no ecosystem credit species microbats were detected during targeted surveys.

No other species credit species were detected during targeted surveys; therefore, no species credits are required to offset the impacts of the planning proposal.

At the detailed design stage, the subject land should be re-assessed for presence or absence of ecosystem and species credit species (particularly microbats). This may be deemed necessary due to presence of human-made structures which may provide habitat for species credit species and requires further assessment prior to removal.

This BDAR outlines the measures taken to avoid, minimise and mitigate impacts on the vegetation and species habitat present within the development footprint and measures to minimise impacts during construction and operation of the development. Following consideration of the below aspects, the residual unavoidable impacts of the project were calculated consistent with BAM by utilising the Biodiversity Assessment Method Credit Calculator (BAMC).

There were no Serious and Irreversible Impact (SAIL) entities identified during this assessment.

One Matter of National Environmental Significance was identified as having potential to be adversely 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 vegetation within

the subject land for seasonal foraging. An assessment of the Commonwealth Significant Impact Criteria was undertaken for the Grey-headed Flying-fox and concluded that the planning proposal would not result in a significant impact to this species.

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Abbreviations

Abbreviation	Description
BAM	Biodiversity Assessment Method
BAR	Biodiversity Assessment Report
BAMC	Biodiversity Assessment Method Credit Calculator
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
BDAR	Biodiversity Development Assessment Report
CEEC	Critically Endangered Ecological Community
DAWE	Commonwealth Department of Agriculture, Water and the Environment (now DCCEEW)
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water (formerly DAWE)
DPE	NSW Department of the environment (formerly DPIE now NSW DCCEEW)
DPIE	NSW Department of Planning, Industry and Environment (now DPE)
EEC	Endangered Ecological Community
ELA	Eco Logical Australia Pty Ltd
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
FM Act	NSW <i>Fisheries Management Act 1994</i>
GIS	Geographic Information System
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
JLG	Joint Landowner Group
LCA	Liverpool Collaboration Area
LGA	Local Government Area
LLS	Local Land Service
NSW	New South Wales
NOW	NSW Office of Water
PCT	Plant Community Type
SEPP	State Environmental Planning Policy
SSD	State Significant Development
TEC	Threatened Ecological Community
VIS	Vegetation Information System
VMP	Vegetation Management Plan
WM Act	NSW <i>Water Management Act 2000</i>

1. Biodiversity assessment

This Biodiversity Development Assessment Report (BDAR) has been prepared by Belinda Failes, an accredited person (BAAS 18159) with additional surveys undertaken by Daniel Watts, an Accredited Person (BAAS 19038) to apply the Biodiversity Assessment Method (BAM) under the NSW *Biodiversity Conservation Act 2016* (BC Act). All credit calculations have been undertaken using the BAM Calculator (BAMC) version in case number 00044646. This document is approved by Meredith Henderson also an Accredited Person (BAAS 17001).

This BDAR has applied the Streamlined Assessment Module – Planted Native Vegetation in accordance with Appendix D of the BAM. The subject land contains planted native vegetation which does not conform to a Plant Community Type (PCT). Therefore, the Streamlined Assessment Module – Planted Native Vegetation was applied to the assessment.

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

An early Biodiversity Assessment report prepared by ELA for the Planning Proposal was submitted for the Gateway process in 2020. This BDAR addresses the Gateway Determination condition 5 (Table 1) issued by the Department of Planning and Environment (DPE) (4 April 2023). This BDAR has been prepared to provide a full assessment of biodiversity impacts for the planning phase.

This report includes two base maps, the Site Map (Figure 1) and the Location Map (Figure 2).

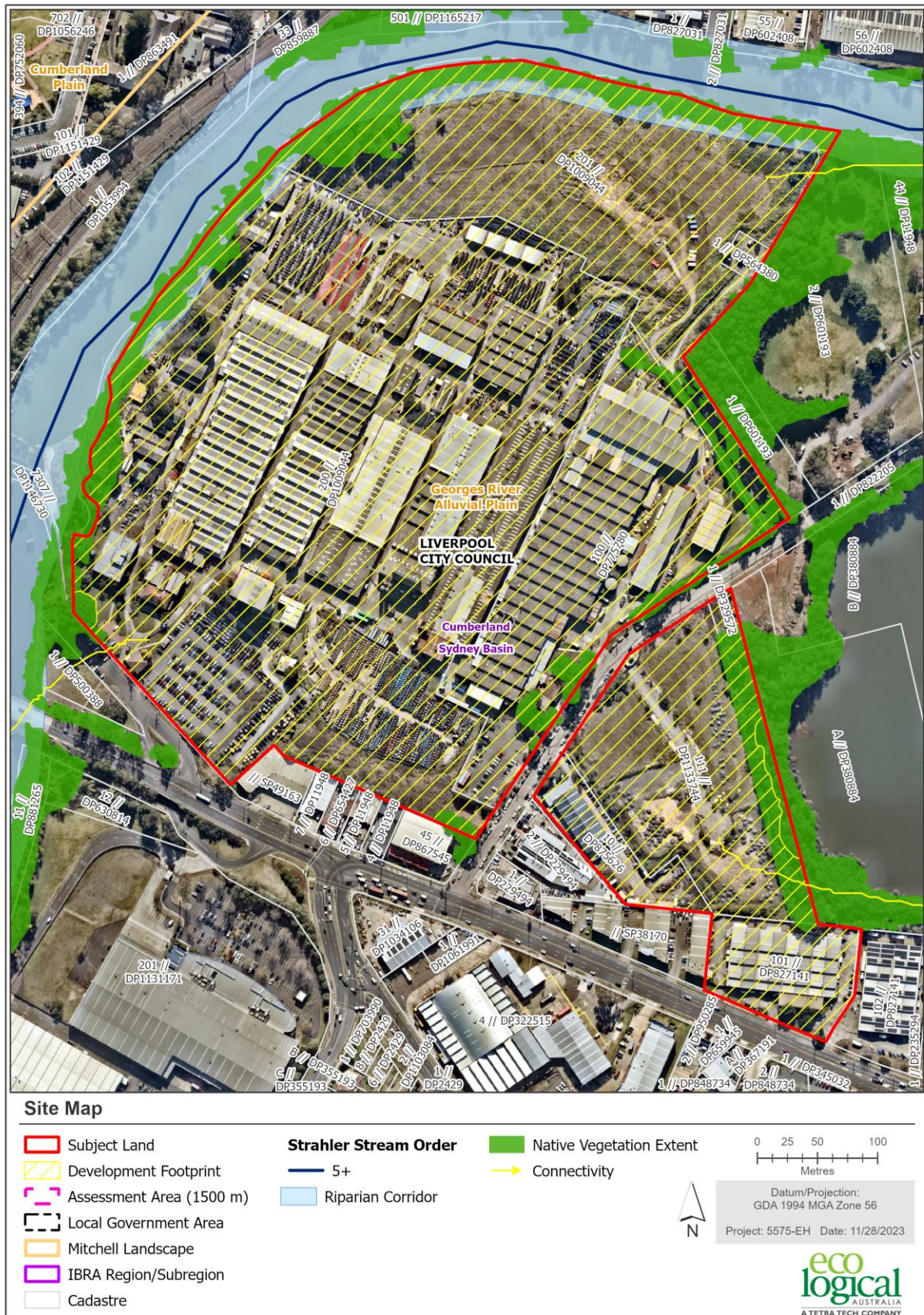


Figure 1: Site Map



Figure 2: Location Map

1.1. Introduction

Moore Point is the largest privately-led urban renewal project in Australia, led by a Joint Landowner Group (JLG) comprised of Coronation Property Co and Leamac Property Group.

The 31.4 hectares site, set within the Liverpool Collaboration Area (LCA), is a unique opportunity to deliver a model for urban renewal at a metropolitan scale consistent with the strategic priorities of Government, it will be a catalyst for Liverpool City Council (Council) to realise its objectives for the LCA and the Western Parkland City.

When delivered, Moore Point will consolidate Liverpool's role as Australia's a great river city, providing a high-quality living and working environment for future generations. It will deliver homes, jobs and open space up to 2060, in a highly accessible location with unparalleled recreational amenity along the Georges River and Lake Moore.

At a glance, Moore Point will deliver:

- Approximately 11,000 dwellings set within distance of Liverpool CBD and LCA,
- A Significant contribution of employment generating floorspace and associated jobs to complement the expansion of Liverpool CBD, and
- Over 10 hectares of publicly accessible open space supported by bridge crossings from Liverpool CBD to a fully accessible Georges River foreshore and Haigh Park.

The site plays a critical role in fulfilling the connectivity, liveability, productivity and sustainability priorities of the LCA and support the vision to make Liverpool Australia's next great river city. These include:

- New housing and jobs within a highly accessible location (five minutes' walk to Liverpool CBD and transport interchange) via new bridge crossings over the Georges River. This will support active and sustainable modes of travel within the LCA.
- Critical links from the CBD and LCA to the Georges River, Haigh Park and Lake Moore. This will support the creation of a new interconnected high-performance green and blue infrastructure network, which will support healthy urban growth.
- A genuine riverside precinct with high levels of activation, amenity and accessibility, facilitating Council's vision of celebrating the river and prioritising great places for people.
- A diverse range of new and enhanced social and civic infrastructure outcomes to benefit both current and future generations.

1.1.1. The subject land

Moore Point is located east of Liverpool CBD across the Georges River in the suburb of Moorebank. It is located within the LCA and comprises 31.4 hectares of the 38 hectare Georges River North Precinct.

The subject land comprises of the following addresses and lots within the Liverpool City Council LGA (and shown in Figure 1):

- 3 Bridges Road, Moorebank (Lot 200 DP 1009044)
- 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)
- 16 Bridges Road, Moorebank (Lot 1 DP 329572)
- 361 Newbridge Road, Moorebank (Lot 101 DP 827141).

The subject land is defined by the Georges River along the western and northern edge and Lake Moore along the eastern edge. A large open space is located adjacent to the north-eastern corner and Lake Moore (a constructed lake) is located directly east of the subject land. Newbridge Road, a major arterial road, forms the southern boundary of the subject land.

Part of the site contains heritage items including the Former MM Cables Factory and Cable Makers Australia Factory Pty Ltd Group, including inter-war administration building, factory and interiors.

The subject land currently accommodates large industrial, commercial development and open space, largely lacking native vegetation. The subject land has been subject to considerable vegetation disturbance. Aerial photography from 1943 shows remnant vegetation as being cleared within and round the subject land. 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 of Georges River and Lake Moore. Revegetation includes planted native trees, shrubs and ground cover species within the north, east and western riparian buffer along the perimeter of the subject land. Planted native vegetation within horticultural gardens and open grassland with opportunistic weeds occur throughout the subject land.

The subject land is currently zoned as E4 (General Industrial) under the Liverpool Local Environmental Plan (LEP) 2008 with the planning proposal to rezone the area as MU1 (Mixed Use) and RE1 (Public Recreation).

The land subject of the planning proposal relates to the land owned and under the control of the JLG, as defined in Figure 3



Figure 3: Land Application.

1.1.2. Background

Moore Point has been the subject of extensive strategic planning investigations over the past decade. These investigations have consistently advocated for Moore Point as a future expansion of the CBD. It has both State and local level endorsement that has commenced since 2008.

Following adoption of the Liverpool Collaboration Area Place Strategy (Place Strategy) by the Greater Sydney Commission (GSC) in September 2018, Council indicated to landowners in Moore Point that it was prepared to consider a rezoning of land in the precinct that would meet the intention expressed in the Liverpool Collaboration Area Place Strategy.

Council's Local Strategic Planning Statement (LSPS) also established support for the rezoning of the area, stating that Council would 'Investigate amendments 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' over the short-to-medium term.

Council indicated to landowners that had previously submitted planning proposals that a precinct-wide approach to development of Moore Point should be undertaken, including a structure plan for the entire precinct.

On this basis, a planning proposal was lodged with Council on 15 April 2020 for the consolidated Moore Point site. The planning proposal replaced RZ-6-2015 and withdrew all other previous site-specific planning proposals that were submitted.

The Planning Proposal was endorsed by Council on 25 November 2020, subject to the following:

1. Notes the advice of the Liverpool Local Planning Panel;
2. Endorses in principle the planning proposal request with the following amendments:
 - a. An additional 1.5 hectares of open space marked as 'Open Space Investigation' adjacent to Haigh Park;
 - b. A minimum 40 m RE1 – Public Recreation zone is provided along Lake Moore;
3. Endorses an Urban Design Study and Structure Plan for the Georges River North precinct, with the above amendments, to guide the assessment of future planning proposals in this area.



*The alignment of the northern pedestrian bridge over the Georges River is subject to further discussions with affected landowners. The alignment of the pedestrian bridge is subject to change

Figure 4: Endorsed Structure Plan.

The Planning Proposal was then forwarded to DPE for Gateway in December 2020. At the same time, Council was finalising a Regional Flood Evacuation Analysis. Council wrote to DPE requesting the proposal be submitted once the analysis was completed and its findings could inform the proposal. The advice was to relodge the planning proposal once the findings of Council's Regional Flood Study were understood.

The Georges River Flood Evacuation Analysis was finalised in March 2022 and the planning proposal was relodged by Council for Gateway on 4 May 2022.

In March 2022, in response to the flooding of the Northern Rivers region, the NSW Government commissioned an independent expert inquiry to flooding. The inquiry recommended a review of planning rules for developing on flood-prone land. DPE reviewed current planning proposal in relation to the flood risk each proposal represented, to determine if proposals can proceed or whether flood risk and mitigation measures and evacuation capacity was required.

Considering the recommendation of the NSW Flood Inquiry, DPE sought advice from a Flood Advisory panel (the Panel) regarding the flood risk associated with Moore Point. The Panel found that there was sufficient case-specific merit to pursue the flood risk mitigation measures and allow the proposal to proceed to Gateway, subject to conditions that have been informed by the Technical Advisory Group (TAG) and other material before the Panel.

To guide assessment of the Panel recommendations, DPE have appointed an independent peer review to ensure the recommendations have been fulfilled as part of the assessment process. Council has also engaged a technical flood advisor to support Council's review of the revised planning proposal. These processes were funded by the JLG to support the progression of the proposal.

On 4 April 2023, DPE concluded the planning proposal could proceed subject to conditions. These conditions are addressed as part of the updated planning proposal package submitted to Council for assessment.



Figure 5: Timeline Summary.

1.1.3. The Vision

In preparing the planning proposal, the JLG have developed the following vision for Moore Point:

Liverpool has the ambition to be the next Great River City of the world. A city where the Georges River is its beating heart unifying both sides of the river into a pulsating riverfront experience.

The Moore Point vision will shape the city's eastern bank into an internationally renowned destination loved by locals and visitors alike. Reimagined riverfront parklands, river pools, creative heritage quarter and marketplace inspire our people and residents to be the most productive, most happy, and most healthy people on the planet.

The proposal will create the first truly integrated riverfront development at scale. At the heart of this attraction will be a revitalised riverbank which will undergo an ecological transformation and create a natural, healthy and vibrant river ecosystem.

The river will also offer a diverse range of recreational opportunities, providing activities that meet the needs of a diverse community, and which encourages an active outdoor lifestyle.

1.1.4. The proposal

The planning proposal seeks to amend the *Liverpool Local Environmental Plan 2008* (the LEP) to transform the zoning from industrial to mixed-use and public recreation, including changes to floor space ratio, height of buildings and site-specific provisions.

In response to the Gateway conditions, the planning proposal and supporting structure plan has been updated. The planning proposal has enhanced and improved many of the key elements of the originally endorsed Structure Plan and planning proposal by Council on 25 November 2020 meeting including:

- Celebrating Heritage - Enhanced heritage response, including the retention of the heritage grid, Factory 1 and the Administration Building with partial retention of Factory 2 and adaptive reuse of additional outbuildings along the Georges River foreshore.
- Foreshore Park – Embellishment of a new 7 hectare linear foreshore park and completing the missing link between Lighthouse Park and Haigh Park.
- Bridges and Community Anchors – Creation of new pedestrian bridges to Liverpool CBD and LCA, facilitating access from the wider area to a 1,000 capacity primary school, community facilities and retail amenity.
- Street Hierarchy and Boulevards – A new movement and access network to facilitate active transport from Georges River to Lake Moore and a ring road to support vehicular movement.
- Pedestrian Lanes and Pocket Parks – Creation of a diverse range of pocket parks, passive open space areas and pedestrian laneways between blocks to enhance access to open space, views and access to the waterfront.

The JLG engaged Yerrabingin in 2021 to prepare an Indigenous Narrative Report. The report establishes Connecting with Country themes for the revised masterplan and public domain. This includes bringing river ecology up and over into the foreshore, including restoration of endemic/native species through naturalised revetment treatment that will support habitat.

The revised planning proposal has been informed by a suite of interdisciplinary technical consultants through an iterative process to ensure the creation of a successful place that comprehensively addresses the Gateway conditions.

1.1.5. Structure Plan and Indicative Masterplan

The planning proposal is supported by a structure plan and indicative masterplan. Each plan serves a distinct purpose in supporting the outcomes of the project.

- **Structure Plan** - Sets out the spatial parameters for Moore Point that will remain constant throughout the delivery of the project. This includes the open space network, primary school, foreshore, roads and streets, heritage items to be re-used and development blocks.
- The Structure Plan informs the basis for masterplan development and the preparation of a future site specific Development Control Plan (DCP) and will also allow Moore Point to respond flexibly to changing market demands and policy contexts.

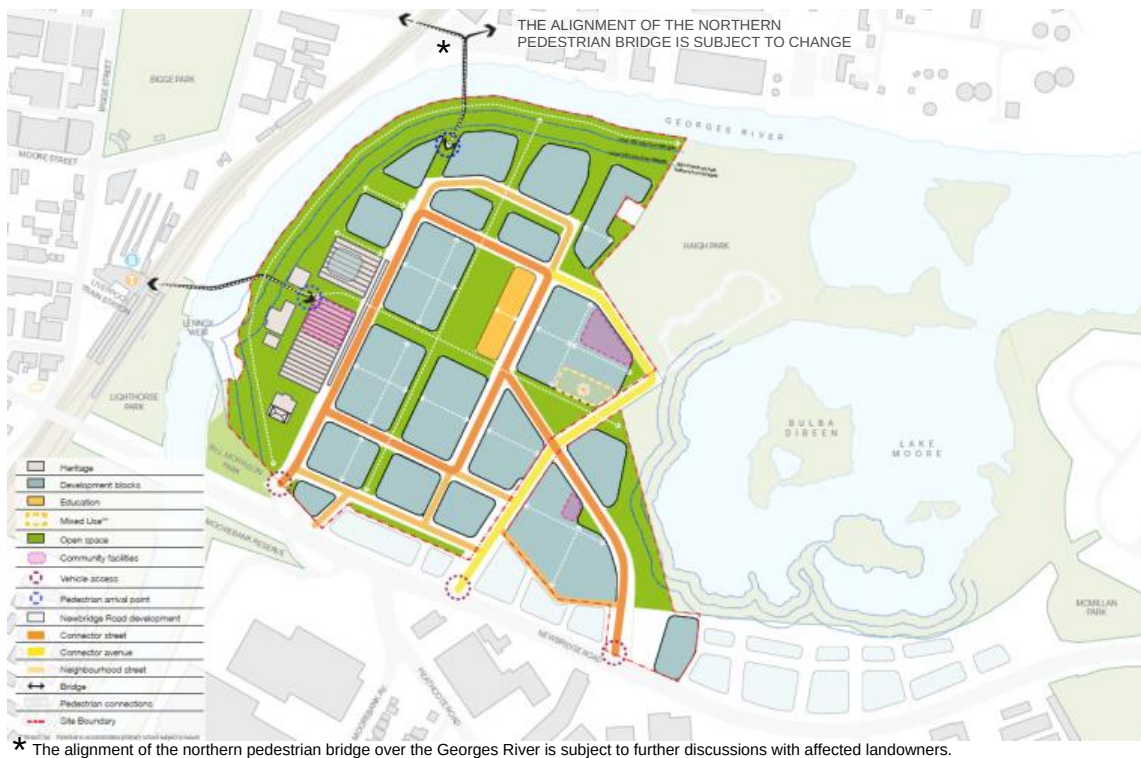


Figure 6: Updated Structure Plan

- **Indicative Masterplan** – Depicts one of many potential land use and built form outcomes set within the development blocks. This includes potential residential and non-residential uses, typologies and built form configurations.
- The level of information provided in the indicative masterplan has been prepared to address the issues raised by the Gateway determination including assessment against design standards and environmental considerations. The purpose of the masterplan, at this stage, is to both allow for technical testing (such as urban design, traffic, economics, flooding, evacuation) and to set a high quality vision for the development of the site.

1.2. Legislative context

Legislation relevant to the subject land is outlined in Table 2.

Table 2: Legislative context

Name	Relevance to the project	Report section
Commonwealth		
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	Matters of National Environmental Significance (MNES) have been identified on or near the subject land. An Assessment of Significance under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) is required for species listed under the EPBC Act with potential to be impacted by the Planning Proposal. There is one MNES identified as having the potential to occur on or near the subject land: <i>Pteropus poliocephalus</i> (Grey-headed Flying-Fox). This report assesses impacts to MNES and concludes that the planning proposal is unlikely to have a significant impact on the above MNES. Further information is provided in Section 12.2.	12.2
State		
<i>Biodiversity Conservation Act 2016</i>	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. A Biodiversity Development Assessment Report (BDAR) is required to be submitted with any development that has a significant impact on biodiversity values. There are four triggers for a significant impact: - exceeding the clearing threshold in section 7.2 of the BC Regulation 2017 (see below) - impacting on vegetation shown on the Biodiversity Values Map in accordance with section 7.3 of the BC Regulation 2017. The subject land is located on this map, therefore, this trigger will apply for future Part 4 DA. - a significant impact in accordance with section 7.3 of the BC Act 2016 - impacts to Areas of Outstanding Biodiversity Value (AOBV). As there are not AOBV on site, this trigger does not apply. The subject land is on the Biodiversity Values map (accessed 27 November 2023) and therefore, future development under Part 4 of the EP&A Act will require the preparation of a BDAR (Figure 7).	This report
<i>Environmental Planning and Assessment Act 1979</i>	The EP&A Act is the principal planning legislation for NSW. It provides a framework for the overall environmental planning and assessment of development proposals. The project is currently a planning proposal (Part 3 of the EP&A Act). It is unclear whether future development will proceed under Part 4 of the EP&A Act or as a State Significant Development (SSD). For the purpose of the assessing impacts to biodiversity matters a full assessment is required at the planning stage prior to Gateway determination. Under Section 9.1(2) of the EP&A Act, the Minister for Planning the planning proposal should consider the following directions: 3.1 Conservation Zones 4.2 Coastal Management.	The report Refer to Section 12 of this report and Aquatic Report (ELA 2024).

Name	Relevance to the project	Report section
<i>Local Land Services Amendment Act 2016</i>	Part 5A – Land Management (Native Vegetation) applies to any area of the State, other than: (a) urban areas of the State to which State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017 applies. (b) national park estate and other conservation areas. The Vegetation SEPP applies to the City of Liverpool LGA; therefore this Part does not apply.	N/A
<i>Fisheries Management Act 1994</i>	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 subject land along Georges River along the northern and western boundary. This is addressed in the Aquatic Ecology Assessment (ELA 2024).	Addressed in the Aquatic Ecology report (ELA 2024)
<i>Coastal Management Act 2016 (CM Act)</i>	The objects of this Act are to manage the coastal environment of NSW in a manner consistent with the principles of ecologically sustainable development for the social, cultural and economic well-being of the people of the State. Part 2 of the CM Act identifies objectives related to four coastal management areas of the ‘coastal zone’, with maps and development controls applied under the State Environmental Planning Policy (Resilience and Hazards SEPP) 2021 (Resilience and Hazards SEPP). Under Part 2 of the CM Act, the coastal zone is defined as any area of land that comprises one or more of the following coastal management areas: - Coastal wetlands and littoral rainforests - Coastal vulnerable areas - Coastal environment areas - Coastal use areas. The proposed subject land is mapped as the following under the Resilience and Hazards SEPP (Figure 11): - coastal wetlands - coastal wetland proximity area - coastal environment area - coastal use area. A separate Aquatic Ecology Assessment (ELA 2024) has addressed matters which relate to the CM Act.	Addressed in the Aquatic Ecology report (ELA 2024)
<i>Water Management Act 2000 (WM Act)</i>	The WM Act’s main objective is to manage NSW water in a sustainable and integrated manner that will benefit current generations without compromising future generations’ ability to meet their needs. The WM Act is administered by the Department of Planning and Environmental (DPE Water) and establishes an approval regime for activities within waterfront land, defined as the land 40 m from the highest bank of a river, lake or estuary. A Controlled Activity Approval (CAA) is typically required for work within waterfront land. Section 91E of the Act creates an offence for carrying out a controlled activity within waterfront land without approval.	Addressed in the Aquatic Ecology report (ELA 2024)
State and Local Planning Instruments		

Name	Relevance to the project	Report section
State Environmental Planning Policy (SEPP) (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP)	This SEPP applies to the subject land. The following chapters are relevant to the biodiversity assessment for this planning proposal: Chapter 2 Vegetation in Non-Rural Areas of the SEPP, which applies to the development that does not require consent. This is currently a Planning Proposal and does not seek the removal of vegetation and therefore, this Chapter does not apply. Future development applications will require consideration of this SEPP. Chapter 4 Koala Habitat Protection 2021 of the SEPP, which applies if the proposed development is located within a Local Government Area specified in the SEPP. The subject land is located in an LGA specified in the SEPP, so Chapter 4 applies to the Planning Proposal – see below. Chapter 6 Water Catchments. The subject land is located within Georges River Catchment in accordance with this SEPP. Therefore, development controls under Section 6.7 relating to aquatic ecology would apply to a future impact assessment and have been assessed in the Aquatic Ecology Report (ELA 2024). Chapter 4 Koala habitat protection 2021 of the SEPP is relevant to the subject land, as the subject land is located within a Local Government Area (LGA) specified in Schedule 2 of the SEPP. 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 subject land is on the Koala Development Application Map. • The subject land is at least 1 ha. • The subject land is not located on land to which an approved Koala Plan of Management applies.	Section 12
State Environmental Planning Policy (SEPP) (Resilience and Hazards) 2021	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 <i>Coastal Management Act 2016</i>, including the management objectives for each coastal management area, by: - managing development in the coastal zone and protecting the environmental assets of the coast, and - establishing a framework for land use planning to guide decision-making in the coastal zone, and - mapping the four coastal management areas that comprise the NSW coastal zone for the purpose of the definitions in the Coastal Management Act 2016. The subject land has mapped areas of Coastal Environment Area Map, Coastal Use Area Map and is located within the boundary for the Land Application Map (Figure 11). The development footprint excludes areas mapped within Coastal Wetland but does include Coastal Wetland Proximity Area.	Including in assessment of wetlands
Liverpool Environmental Plan (LEP) 2008	The subject land is currently zoned as E4 General Industrial under the Liverpool LEP. The subject land 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 (i.e. the north-western corner of the subject land) will be converted into open space following bank stabilisation works.	N/A

Name	Relevance to the project	Report section
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The subject land contains class 5 Acid Sulfate Soils and requires the implementation of an acid sulfate soils management plan. This is addressed in a separate report for future development.

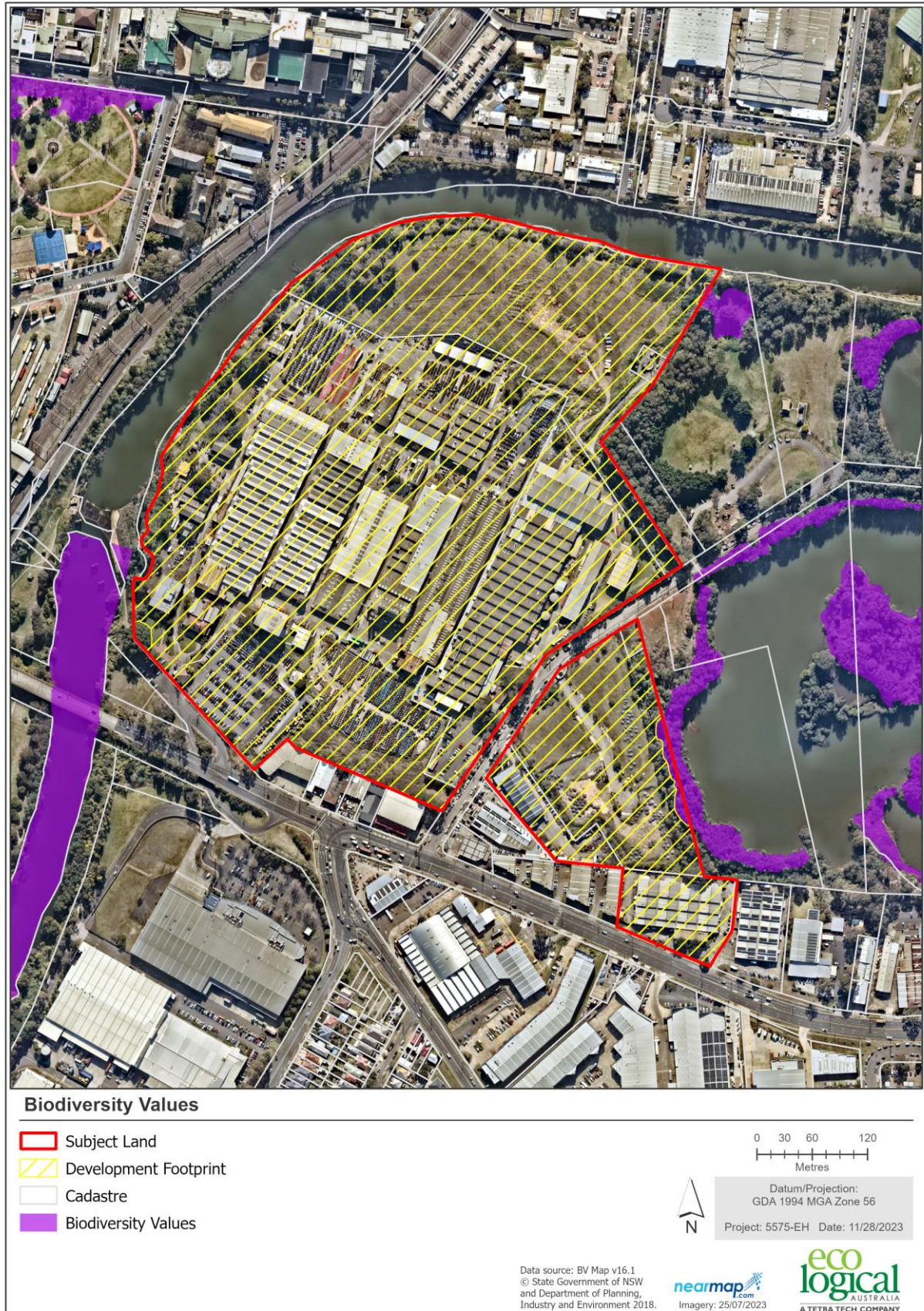


Figure 7: Biodiversity values map

2. Methodology

2.1. Literature and data review

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

- Biodiversity Assessment Method Calculator (BAMC) (Version 61)
- BioNet Vegetation Classification System ((VIS) November 2023)
- BioNet / Atlas of NSW Wildlife 5 km database search (Department Planning and Environment (DPE) November 2023a)
- *Environment Protection and Biodiversity Conservation Act 1999* Protected Matters Search Tool 5 km database search (Department of Climate Change, Environment, Energy and Water (DCCEEW) November 2023)
- Threatened Biodiversity Data Collection (TBDC) (accessed 27 November 2023)
- NSW Government Biodiversity Values Map (accessed on 27 November 2023)
- The State Vegetation Type Map (DPE 2022) – Sharing and Enabling Environmental Data in NSW
- NSW Government Biodiversity values map (accessed on 27 November 2023)
- Department of Sustainability, Environment, Water, Population and Communities. (SEWPAC)
- 2013. Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Regions). Bioregional Assessment Source Dataset. August 2021
- Department of Planning, Industry and Environment (DPE) 2016. NSW (Mitchell) Landscapes – version 3.1
- Aerial mapping (SIXMaps, including 1943 historic maps)
- Additional Geographic Information System (GIS) datasets including soil, topography, geology and drainage
- National Flying-fox monitor viewer (DCCEEW 2023b) (Accessed November 2023)
- Department of Planning and Environment (DPE) 2023b Register of Declared Areas of Outstanding Biodiversity Value
- State of NSW and Department of Planning, Industry and Environment (DPIE) 2021. Soil Landscapes from espade.environment.nsw.gov.au
- ELA 2024. Aquatic Ecology Report.
- ELA. 2016. Prysmian Liverpool Flora and Fauna Assessment. Prepared for LAC JV Pty. Ltd.
- ELA. 2020. Moore Point Planning Proposal Biodiversity Assessment Report. Prepared for Moore Point Landowners Group
- Northrop 2021. Moore Point & Lake Moore: Riparian Strategy for Coronation Property & Leamac Property Group.

Previous ecological surveys have been undertaken by ELA (2016 -2023), and ACS Environmental Pty Ltd (2015) within the subject land. A summary of the ecological surveys and results are provided in Table 3.

A review of BioNet records identified that two threatened fauna species have previously been recorded within the subject land. *Miniopterus australis* (Little Bent-winged Bat) and *Daphoenositta chrysoptera* (Varied Sittella) were recorded in 2013. Both species are listed as vulnerable under the BC Act and Little Bent-winged Bat is a dual (ecosystem/species) credit species and the Varied Sittella as an ecosystem credit species under the BAM.

Table 3: Summary of previous ecological surveys conducted within the subject land

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 subject land which adjoins Lake Moore. Survey involved random meander method to identify floristics and vegetation boundaries. Habitat assessment was also conducted. Targeted searches were conducted for threatened species including <i>Acacia pubescens</i> and <i>Meridolum corneovirens</i> (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 subject land. No threatened fauna species were recorded within the subject land; however, the Varied Sittella was recorded within Haigh Park. The vegetation within the subject land was identified as unsuitable for Cumberland Plain Land Snail. Potential foraging habitat was identified for: • <i>Miniopterus orianae oceanensis</i> (Large Bent-winged Bat) • <i>Pteropus poliocephalus</i> (Grey-headed Flying-fox).

Report, company and date	Survey methodology	Results
Prysmian Liverpool Flora and Fauna Assessment report ELA 2016	ELA conducted a Flora and Fauna Assessment for the western portion of the subject land. 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 <i>Meridolum corneovirens</i> (Cumberland Plain Land Snail).	The literature review identified one threatened species has previously recorded within the subject land (<i>Daphoenositta chrysoptera</i> (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 exotic vegetation (which does not correspond to a native vegetation community). No threatened flora species were recorded within the subject land or having potential to occur. No Cumberland Plain Land Snails were recorded or were considered likely to occur within the subject land. Hollow-bearing trees (HBT)s were identified within the subject land which may provide habitat for threatened tree-roosting microbats such as: • <i>Micronomus norfolkensis</i> (Eastern Coastal Free-tail Bat) • <i>Saccolaimus flaviventris</i> (Yellow-bellied Sheath-tail-bat) • <i>Myotis macropus</i> (Southern Myotis) Other threatened species which may utilise the subject land occasional include: • <i>Daphoenositta chrysoptera</i> (Varied Sittella) • <i>Hieraetus morphnoides</i> (Little Eagle) • <i>Glossopsitta pusilla</i> (Little Lorikeet) • <i>Pteropus poliocephalus</i> (Grey-headed Flying-fox).
Strategic Vision 335 – 349 Newbridge Road Moorebank – Ecological Constraints letter ELA 2019	ELA conducted a desktop assessment and field validation of the south-eastern portion of the subject land for Moore Lake Pty Ltd.	The field survey confirmed the presence of TECs: • River-flat Eucalypt Forest • Swamp Oak Floodplain Forest. The constraints assessment identified that the vegetation was highly disturbed and is unlikely to contain habitat for threatened flora species. Foraging habitat for microbats, Grey-headed Flying-fox and <i>Litoria aurea</i> (Green and Golden Bell Frog) was noted within the site.

3. Streamlined Assessment Module

Section 7.14 (1) of the BC Act requires an application for development consent under Part 4 of the *Environmental Planning and Assessment Act 1979* (or a planning proposal in this situation), to be accompanied by a BDAR if the Biodiversity Offset Scheme (BOS) is triggered. Appendix D of the BAM 2020 outlines a streamlined assessment module for assessing planted native vegetation. The streamlined assessment module can be applied where part of the subject land contains planted native vegetation.

1.1 Streamlined Assessment Module – Planted Native Vegetation

Section 2.2 of the BAM contains a streamlined assessment module for planted native vegetation. The streamlined assessment can be used where the native vegetation was planted for purposes such as street trees and other roadside plantings, windbreaks, landscaping in parks and gardens, and revegetation for environmental rehabilitation.

The streamlined assessment module for planted native vegetation has been applied to the part of the subject land where areas of planted native vegetation will be impacted. All other areas of non-planted vegetation impacted within the subject land will be assessed in this BDAR under the Small Area Assessment Module of the BAM 2020 if works do not impact upon land mapped on the BV Map or Koala habitat.

The planted native vegetation within the subject land has been planted for the purpose of landscape plantings such as within the existing gardens along Bridges Road. Appendix D of the BAM provides a decision-making key for the assessment of the planted native vegetation. This decision-making key was applied to the sections of planted native vegetation mapped within the subject land. This assessment is displayed in Table 4.

Native planted vegetation was identified within the subject land which does not represent a PCT (Figure 8 and Figure 9). Under the BAM, planted vegetation native to NSW requires consideration as to the 'best fit' PCT. 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). *Livistona australis* and *Westringia fruticosa* are both listed in Appendix B, Widely cultivated native species list, of the *Streamlined Assessment Module Planted Native Vegetation BAM Operational Manual*.

A row of planted *Eucalyptus tereticornis* (Forest Red Gum) were recorded within the subject land. *Eucalyptus tereticornis* is listed as a characteristic species of PCT 3320 which may be considered a naturally occurring PCT to the subject land; however, these trees are clearly planted due to:

- substantial soil disturbance as shown by the presence of fill batters along the existing roads
- absence of remnant vegetation in the area of planted native vegetation (i.e. does not contain a mosaic of planted and remnant vegetation)
- isolation of the planted vegetation and mapped remnant vegetation which contain *Eucalyptus tereticornis* as a characteristic species such as PCT 3320
- historical aerial photography shows an absence of any vegetation within planted areas

- its location within horticultural landscape gardens and/or on fill batters
- planting in a distinct row of the trees and evenly spaced
- trees are of the same stem class.

Aerial photography interpretation of 1943 imagery (Figure 10) identified that the subject land has been substantially modified for well over 50 years and contained limited remnant vegetation except along the foreshores of Lake Moore, which does not represent PCT 3320. Additionally, the 1943 imagery also indicates substantial vegetation clearing within the broader landscape surrounding the subject land. A review of literature and field survey confirmed that a high proportion of the current vegetation has been established through revegetation works, both recent and over 20 years old. Opportunistic native colonisers and weeds have also established.

It is noted that *Eucalyptus tereticornis* may also occur within other PCTs which have been mapped within the subject land. These include PCT 4024 and 3145, which are restricted to alluvial floodplains. As previously mentioned, the planted native vegetation is located on a fill batter and does not occur on alluvial flats subject to periodic inundation, which would represent PCT 4024 or 3145.

A review of available vegetation database mapping within the broader landscape of the subject land did not record the presence of PCT 3320, which contains *Eucalyptus tereticornis* as a characteristic species.

Additionally, planted native vegetation within the subject land have not been mapped as part of a PCT by previous mapping datasets (DPE 2022 or OEH 2016).



Figure 8: Example area of planted native vegetation including a row of *Eucalyptus tereticornis* with similar stem size



Figure 9: Areas of planted native vegetation consisting of non-locally indigenous native canopy species



Figure 10: Aerial imagery of the subject land from 1943 (approximate location of mapped planted native vegetation shown in red)

Table 4: Decision-making key for planted native vegetation

Question	Response
A1 Does the planted native vegetation occur within an area that contains a mosaic of planted and remnant native vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal?	No – Planted native vegetation was located along a fill batter and around existing buildings. The subject land has previously been subject to re-engineering works as part the construction of Lake Moore. Some revegetation works have occurred around Lake Moore and vegetation there has been assigned to a best-fit PCT. The areas of planted native vegetation are disconnected from native vegetation recorded along Georges River and Lake Moore, around the perimeter of the subject land. The planted native vegetation contains a canopy/tall shrub layer including <i>Livistona australis</i>, <i>Westringia fruticosa</i>, <i>Ceratopetalum gummiferum</i>, <i>Banksia serrata</i> and <i>Eucalyptus tereticornis</i> with exotic grasses and opportunistic weeds such as <i>Ligustrum sinense</i>, <i>Olea europaea</i> subsp. <i>cuspidata</i> (African Olive). Although the planted native vegetation includes a row of <i>Eucalyptus tereticornis</i> the remaining planted native vegetation did not include species which represent part of a local indigenous PCT. A vegetation plot was conducted to assist in the justification of this area as part of planted native vegetation. The plot data (plot 2_2020) shows the vegetation contains exotic groundcover species such as <i>Modiola caroliniana</i> and <i>Bidens pilosa</i> and lacks native ground cover species. The plot data shows that the area of planted native vegetation does not contain a mosaic of planted and remnant vegetation. Although the vegetation contains <i>Eucalyptus tereticornis</i> which could be assigned to PCT 3320, the

Question	Response
	trees have been clearly planted in defined rows and of similar age class (Figure 8) and does not represent part of PCT 3320. There are no patches of PCT 3320 within the assessment area (i.e. a 1,500 m buffer around the subject land). The location of the <i>Eucalyptus tereticornis</i> is on a fill batter and does not represent alluvial floodplains which could be mapped as part of PCT 4024 or 3145. Therefore, the planted vegetation could not be reasonably assigned into a PCT and represents planted native vegetation.
A2 Is the planted native vegetation: - planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.), and - the primary objective was to replace or regenerate a plant community type or a threatened plant species population or its habitat?	• No – Planted native vegetation has not been established for the purpose of environmental rehabilitation or restoration. The planted vegetation does not include representative species which are part of a local PCT, except several <i>Eucalyptus tereticornis</i>. <i>Eucalyptus tereticornis</i> is a characteristic species of PCT 3320 and may also occur in PCT 4024 and 4023 which are mapped within the subject land. PCT 4024 and 4023 are part of vegetation communities associated with alluvial floodplain subject to periodic flooding. The location of the <i>Eucalyptus tereticornis</i> is on high elevations on a fill batter which does not represent a natural alluvial floodplain. The <i>Eucalyptus tereticornis</i> are planted in a defined row and lacks other native species which represent part of a locally occurring PCT. The vegetation has not been planted as part of a conservation obligation or restoration of a PCT. • The remaining planted native vegetation includes widely cultivated species which do not represented part of a locally occurring PCT.
A3 Is the planted/translocated native vegetation individuals of a threatened species or other native species planted/translocated for the purpose of providing threatened species habitat under one of the following: - species recovery project <i>Saving our Species</i> project - other types of government funded restoration project - condition of consent for a development approval that required those species to be planted or translocated for the purpose of providing threatened species habitat - legal obligation as part of a condition or ruling of court. This includes regulatory directed or ordered remedial plantings (e.g. Remediation Order for clearing without consent issued under the BC Act or the Native Vegetation Act) - ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan, or - approved vegetation management plan (e.g. as required as part of a Controlled Activity Approval for works on waterfront land under the NSW <i>Water Management Act 2000</i>)?	• No – the native species present are not listed as threatened under the BC Act or EPBC Act. They have not been planted for rehabilitation works and have not been planted or translocated for the purposes listed.

Question	Response
A4 Was the planted native vegetation (including individuals of a threatened flora species) undertaken voluntarily for revegetation, environmental rehabilitation or restoration without a legal obligation to secure or provide for management of the native vegetation?	• No – the planted native vegetation forms part of the landscaping of the existing fill batter within the subject land.
A5 Is the native vegetation (including individuals of a threatened flora species) planted for functional, aesthetic, horticultural or plantation forestry purposes? This includes examples such as: windbreaks in agricultural landscapes, roadside plantings (including street trees, median strips, roadside batters), landscaping in parks, gardens and sport fields/complexes, macadamia plantations or teatree farms?	• Yes – the planted native vegetation has been planted for functional purposes associated with aesthetics for landscaping. • Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied)
A6 Is the planted native vegetation a species listed as a widely cultivated native species on a list approved by the Secretary of the Department (or an officer authorised by the Secretary)?	• N/A

Section D.2 of Appendix D of the BAM requires that the planted native vegetation is assessed for threatened species habitat. Opportunistic survey and habitat assessment for threatened flora and fauna habitat was undertaken as part of the field survey. Following a habitat assessment of this area it was determined that the planted native vegetation is unlikely to provide suitable habitat for threatened flora species.

No hollow-bearing trees were identified during habitat assessments within vegetation mapped as part of planted native vegetation. No nests, scats, scratches, or any other evidence of fauna were identified within the area of planted native vegetation on site. It was determined that the planted native vegetation does not provide roosting or breeding habitat for threatened fauna species. The planted native vegetation could possibly provide marginal foraging habitat for urban and peri-urban fauna such as common bird species however is unlikely to provide important foraging habitat for threatened fauna species. There will be 0.47 ha of planted native vegetation affected under the planning proposal which does not require offset as a result of this streamlined assessment module.

4. Landscape features

In accordance with the BAM, a number of features are assessed within and surrounding the subject land and a 1,500 m buffer around the subject land. These landscape features are used to identify biodiversity values that are important for the subject land and inform the habitat suitability of the subject land for threatened species. The landscape features considered for this assessment are presented in Table 5, Figure 2 and Figure 1.

Table 5: Landscape features

Landscape feature	Development footprint	Assessment area	Data source
IBRA Region(s)	Sydney Basin region	Sydney Basin region	Interim Biogeographic Regionalisation for Australia, Version 7
IBRA subregion(s)	Cumberland subregion	Cumberland subregion	Interim Biogeographic Regionalisation for Australia, Version 7
Rivers and streams	The subject land contains a portion of a seventh order drainage line along the western and north boundaries of the subject land (Georges River) and the 50 m riparian buffer for this drainage line lies within the subject land	The assessment area contains a number of first order streams including Anzac Creek, Cunningham Creek and an unnamed drainage line draining into Horseshoe Pond to the north of the subject land. One fifth-order second drainage line is also present, Brickmakers Creek to the north west of the subject land. The riparian buffers associated with Georges River, Brickmakers Creek (and the other streams in the 1,500 m buffer), calculated in accordance with Appendix 3 of the BAM, are shown in Figure 2.	NSW LPI Waterway mapping

Landscape feature	Development footprint	Assessment area	Data source
Wetlands and important wetlands	A small portion of the subject land overlaps with areas mapped as Coastal Wetlands. However, the actual development footprint as part of this planning proposal does not directly impact upon the mapped Coastal Wetlands (Figure 11).	The assessment area includes areas mapped as Coastal Wetlands in accordance with the State Environmental Planning Policy (SEPP) (Resilience and Hazard) 2021 (Figure 11). SEPP (Resilience and Hazard) 2021 includes the former SEPP 14 (Coastal Wetlands), which is defined as an 'important wetland' in accordance with the BAM (see definition in Appendix A). Georges River to the west and north is mapped as an 'Important Wetland' and Lake Moore to the east is mapped as a 'Local Wetland' (Figure 11).	NSW directory of Important Wetlands
Connectivity of different areas of habitat	The subject land contains built environment including existing buildings and car park. Despite this, the subject land has some connectivity along Georges River to the north and south of the subject land.	The assessment areas connectivity to larger tracts of native vegetation is fragmented and provides connectivity for highly mobile species only. This includes flyways for migratory birds and bat species moving through the landscape. The major connectivity is provided by vegetation adjacent to Georges River, although narrow in places, this vegetated corridor extends north and south along the river edges (Figure 2). To the north a vegetated corridor is present to Lake Moore Wetland, while a discontinuous corridor extends to the south of the site with existing urban development encroaching on the habitat corridor. A vegetated corridor also exists to the south east, along Anzac Creek. This corridor is significantly impeded by Newbridge Road and urban development and extends approximately 3 km from the assessment area to reconnect with Georges River (Figure 2).	Aerial imagery
Geological features of significance and soil hazard features	The subject land does not contain karst, caves, crevices, cliffs or other areas of geological significance. Acid Sulphate Soils risk mapping identifies an area of high risk to the west, north and east of the subject land (Figure 12).	The assessment area does not contain any geological features of significance, including karst, caves, crevices or cliffs.	Aerial imagery, site inspection eSPADE v2.1 (DPIE 2020c)

Landscape feature	Development footprint	Assessment area	Data source
Areas of Outstanding Biodiversity Value	The subject land does not contain Areas of Outstanding Biodiversity Values (accessed 27 November 2023).	The assessment area does not contain Areas of Outstanding Biodiversity Values (accessed 27 November 2023).	Register of Declared Areas of Outstanding Biodiversity Value (DPE 2023)
NSW (Mitchell) Landscapes	The subject land is wholly within the <i>Georges River Alluvial Plain</i> NSW (Mitchell) Landscapes. It is characterised by 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 30 m, local relief 10 m. Massive uniform or gradational profiles on yellow brown to orange clayey sand. Podzols 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 <i>Eucalyptus amplifolia</i> , <i>Angophora floribunda</i> , <i>Eucalyptus fibrosa</i> , <i>Eucalyptus sclerophylla</i> and <i>Angophora bakeri</i> . Extensive <i>Casuarina glauca</i> along the riverbanks and in low-lying areas often with <i>Melaleuca styphelioides</i> , these extend to brackish estuarine swamps with grey mangrove (<i>Avicennia marina</i>) and limited saltmarsh.	The assessment area also includes Cumberland Plain Landscapes to the north and Ashfield Plains to the south of the subject land.	NSW (Mitchell) Landscapes - version 3.1 (DPIE 2016)
Percent native vegetation extent (%)	There are no differences between the mapped vegetation extent and the aerial imagery. The subject land is approximately 31.42 ha and contains approximately 2.59 ha of native vegetation.	The assessment area is approximately 1,108.17 ha and contains approximately 62.39 ha of native vegetation (5.63%).	Calculated using aerial imagery and ArcGIS software
Patch size	Patch size was calculated using available vegetation mapping for all patches of intact native vegetation within the subject land and adjoining lands. The patch size was calculated for each vegetation zone individually due to large areas of exotic vegetation and open water (>30 m). The patch sizes are: - PCT 3145 - < 5 ha - PCT 4023 - < 5 ha - PCT 4024 5-25 ha	The vegetation within the assessment area includes a narrow band of vegetation along the Georges River to the south and north and along ANZAC Creek to the south-east.	Calculated using aerial imagery and ArcGIS software.



Figure 11: Coastal Management (Resilience and Hazards SEPP 2021) mapping and adjacent wetlands

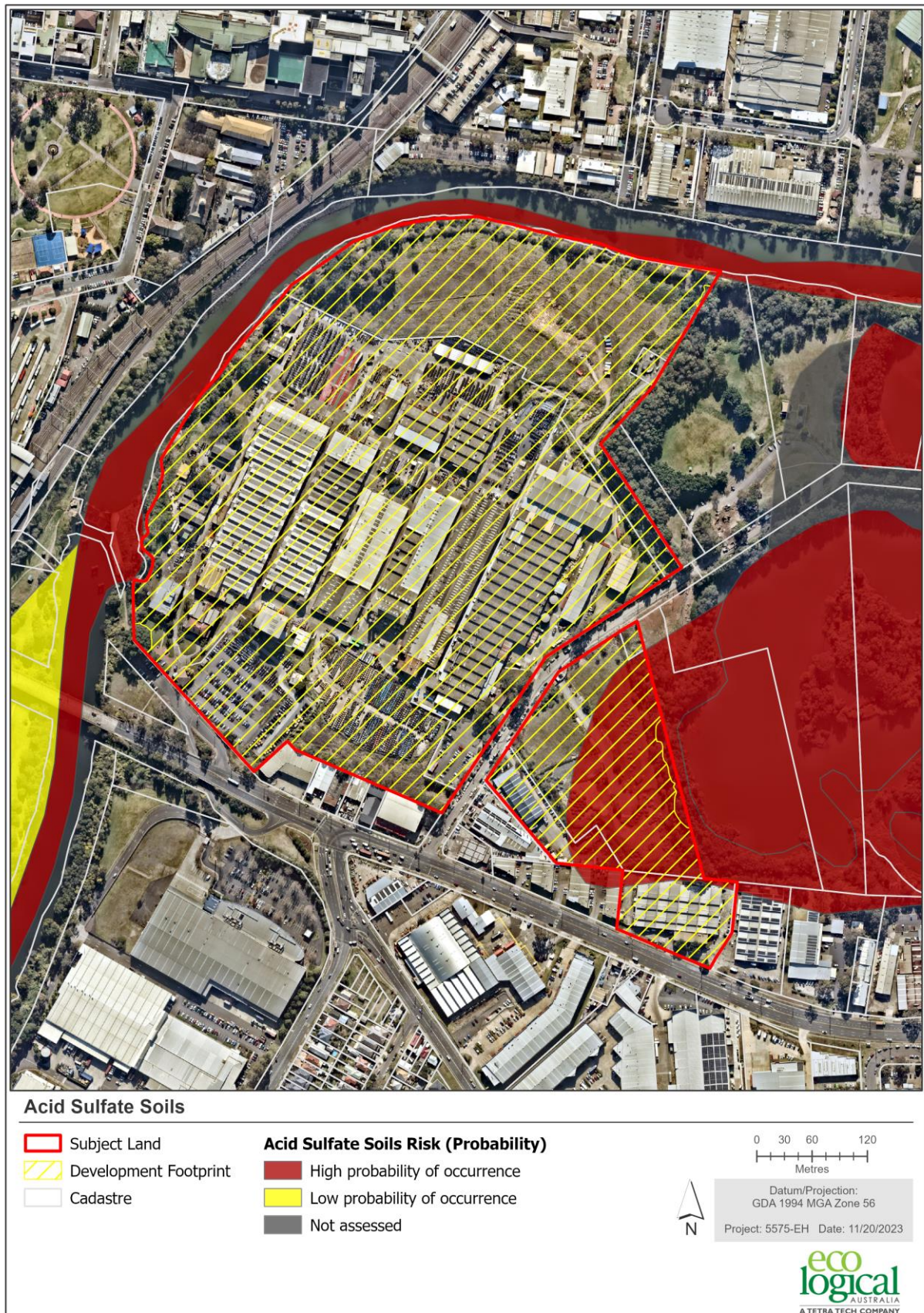


Figure 12: Acid sulphate soils risk and potential areas of contamination

5. Native Vegetation

5.1. Field assessment of vegetation communities

Vegetation mapping was conducted during the initial ecological assessment by ecologists Belinda Failes and Carolina Mora on 20 June 2019 (ELA 2019). Additional surveys including targeted fauna and flora surveys were undertaken to further refine the vegetation mapping and to reflect the adjusted subject land as part of this assessment. These were completed by ELA ecologists Shawn Ryan and Michael Gregor on 1-4 and 26 November 2021 and by ecologists Belinda Failes and Claire Plunkett on 29 May 2023.

The subject land was traversed on foot to identify the vegetation structure and dominant species within patches of native vegetation. The distribution of each patch of vegetation was traversed to sample any spatial variation within each polygon, identify boundaries between vegetation communities and to identify and map vegetation zones in accordance with the BAM.

Based upon traverses of the subject land, vegetation communities present were identified, and their boundaries were mapped. The floristics of each of these vegetation communities were then sampled within 20 m x 20 m plot-based floristic vegetation surveys, consistent with Section 5.2.1.9 of the BAM. The location of floristic vegetation plots was based upon randomly sampled areas of each vegetation community, whilst ensuring that the plot-based surveys included representative areas within each community and avoided, where possible, edge effects (i.e., located close to edges of vegetation extent) or ecotones with adjacent vegetation zones.

A total of five full-floristic and vegetation integrity plots relevant to impacts contained within the subject land were undertaken to identify Plant Community Types (PCTs) and Threatened Ecological Communities (TECs). These were completed consistent with BAM minimum plot requirements per vegetation zone.

One plot was conducted in Planted Native Vegetation and was modified into a 10 m x 40 m floristic plot contained within a 10 m x 100 m vegetation integrity plot and used to justify the assignment of planted native vegetation (Table 8).

An additional vegetation integrity plot was also conducted in adjacent land to the east of the subject land prior to changes to the development footprint. This vegetation plot was not included in the calculations for this BDAR.

All field data collected using full-floristic and vegetation integrity plots are included in Appendix B and their locations shown in Figure 20.

Table 6: Full-floristic PCT identification plots

PCT ID	PCT Name	Number of plots surveyed
3145	Cumberland Bangalay x Blue Gum Riverflat Forest	2
4023	Coastal Valleys Swamp Oak Riparian Forest	1
4024	Cumberland Blue Box Riverflat Forest	2

Table 7: Vegetation integrity plots

Vegetation Zone	PCT ID	PCT Name	Condition	Area (ha)	Plots required	Plots surveyed
1	3145	Cumberland Bangalay x Blue Gum Riverflat Forest	Weedy	0.21	1	1
2	4023	Coastal Valleys Swamp Oak Riparian Forest	Low	0.56	1	2
3	4024	Cumberland Blue Box Riverflat Forest	Weedy	1.45	1	2
N/A	N/A	N/A	Planted native vegetation	0.52	0	1
N/A	N/A	N/A	Exotic grassland	6.53	0	0
N/A	N/A	N/A	Cleared	22.31	0	0
TOTAL				31.57	3	6

5.2. Vegetation Zones

The PCTs identified within the subject land were classified into vegetation zones for credit calculation purposes. The vegetation zones are based on the condition descriptions above with the area of each vegetation zones shown in Table 8 and Figure 20 shows the spatial arrangement of the vegetation zones within the subject land and associated vegetation integrity survey plots.

5.2.1. Plant Community Types present

The identification of PCTs was in accordance with the NSW PCT classification as described in the BioNet Vegetation Classification (VIS). Determination of the most appropriate PCTs for vegetation communities within the subject land used the VIS database to identify PCT types which matched the geographic distribution (based upon IBRA subregions, LGAs), vegetation formation and floristics of vegetation within the subject land. The data for each potential PCT including vegetation formation, descriptive attributes and distribution information were then reviewed to determine the most appropriate PCT for each of the vegetation communities sampled within the subject land. Observations of vegetation structure and composition made during traverses of the subject land as well as adjacent areas also informed the determination of most appropriate PCTs for the vegetation communities within the subject land.

Based on the floristic composition of the vegetation three PCTs were identified within the subject land (Table 8, Table 12, Table 9, Table 10 and Figure 19). The remaining areas of vegetation within the subject land consisted of highly disturbed areas including planted native vegetation and exotic vegetation (Figure 14: , Figure 19). These areas were not consistent with any listed PCT.

5.2.1.1. Planted native vegetation

The subject land contains planted native canopy and shrubs species which are native to NSW, however these were not considered locally indigenous to the PCTs. Planted native vegetation was located along a fill batter and within a landscaped garden (Figure 8 - Figure 9 and Table 12). In accordance with the BAM 2020, planted native vegetation was assessed under the Streamlined Assessment Module (Appendix D of the BAM) in Section 3 of this report.

5.2.1.2. Exotic vegetation

Large areas throughout the subject land have been previously cleared of native vegetation, or affected through the dumping of soil and modification of terrain. The subject land supports grasslands dominated by exotic grasses, herbaceous and woody weeds (Figure 19). Species include *Foeniculum vulgare* (Wild Fennel), *Paspalum dilatatum* (Paspalum), *Chloris gayana* (Rhodes Grass), *Lolium* sp. and *Lantana camara* (Lantana) (Figure 13 and Figure 14). These are not part of a locally occurring PCT.



Figure 13: Example of exotic vegetation within the subject land.



Figure 14: Example area of exotic grassland vegetation within the subject land

Table 8: Plant Community Types and other vegetation within the subject land

PCT ID	PCT Name			Vegetation Class		Vegetation Formation		Percent cleared	Total area (ha)
3145	Cumberland Bangalay x Blue Gum Riverflat Forest			North Coast Wet Sclerophyll Forests		Wet Forests (Shrubby sub-formation)	67.96	0.21	
4023	Coastal Valleys Swamp Oak Riparian Forest			Coastal Wetlands	Floodplain	Forested Wetlands	78.22	0.56	
4024	Cumberland Riverflat Forest	Blue Box		Coastal Wetlands	Floodplain	Forested Wetlands	98.88	1.45	
N/A	Planted Native			N/A		N/A	N/A	0.52	
N/A	Exotic grassland			N/A		N/A	N/A	6.53	
N/A	Cleared			N/A		N/A	N/A	22.31	
							Total	31.42	

Table 9: Vegetation zone 1 – PCT 3145 – weedy

3145 - Cumberland Bangalay x Blue Gum Riverflat Forest			
Vegetation formation/class	Forested Wetland/Coastal Swamp Forests		
Conservation status	NSW BC Act EEC: <i>Swamp Oak Floodplain Forest on the NSW North Coast, Sydney Basin and South East Corner bioregions</i>		
	EPBC Act: did not satisfy Commonwealth criteria for listing (see Section 5.3)		
Description	This community occurs as a small, isolated patch of vegetation along the northern boundary of the subject land. A second patch was located in vegetation adjacent to the subject land. The ground layer was mixed with native and exotic species and generally contained a high percentage of High Threat Exotics. The native midstorey was absent.		
Characteristic canopy trees	<i>Eucalyptus botryoides</i>		
Characteristic mid-storey	Nil		
Characteristic groundcovers	<i>Cardiospermum grandiflorum</i> , <i>Megathyrsus maxima</i> , <i>Tradescantia</i> sp.		
Mean native richness	19		
Exotic species / HTE cover	<i>Cardiospermum grandiflorum</i> , <i>Acetosa sagittata</i> , <i>Ehrharta erecta</i> , <i>Ageratina adenophora</i> and <i>Axonopus fissifolius</i>		
Condition	low		
Variation and disturbance	All occurrences of this community are highly degraded with an absent midstorey, and groundcover layer dominated by weeds. The vegetation intergrades with another vegetation community, PCT 4024, in all occurrences of the community within the subject land.		
No. sites sampled	1 plot (P3_2021)		
Threatened flora species	Habitat is considered substantially degraded such that threatened flora are unlikely to occur within the subject land.		
Fauna habitats	Limited hollow bearing trees, flowering eucalypts and fallen logs are present in some patches. Low condition amphibian habitat occurs within close proximity to the Georges River. Occurrence of Koala feed trees (such as <i>E. botryoides</i>) are patchy.		
Composition	Structure	Function	Vegetation Integrity Score
30	30.2	19.2	25.9



Figure 15: Plot P3_2021 within the subject land. PCT 3145 Cumberland Bangalay x Blue Gum Riverflat Forest - weedy.

Table 10: Vegetation zone 2 PCT 4023 - low

4023 – Coastal Valleys Swamp Oak Riparian Forest			
Vegetation formation/class	Forested Wetland/Coastal Floodplain Wetland		
Conservation status	NSW BC Act EEC: Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin Bioregion and South East Corner Bioregion		
	EPBC Act – Not commensurate with Commonwealth listing (see Section 5.3)		
Description	This community occurs as a narrow band of vegetation along the foreshore of Lake Moore and extends a short way upstream of Georges River adjacent to the subject land. The ground layer and midstorey were mixed with native and exotic species and generally contained a high percentage of High Threat Weeds. Evidence of revegetation works to establish this vegetation was noted from historical aerial photography and during field surveys. Species diversity and mature canopy is limited.		
Characteristic canopy trees	<i>Casuarina glauca</i> and <i>Eucalyptus robusta</i>		
Characteristic mid-storey	<i>Lantana camara</i>		
Characteristic groundcovers	<i>Megathyrsus maximus</i> , <i>Cynodon dactylon</i> and <i>Paspalum dilatatum</i>		
Mean native richness	7		
Exotic species / HTE cover	<i>Lantana camara</i>		
Condition	low		
Variation and disturbance	All occurrences of this community are highly degraded with an absent midstorey, and groundcover layer dominated by weeds. The vegetation intergrades with another vegetation community, PCT 4024 along the eastern boundary within the subject land.		
No. sites sampled	1 plot (P3_2020)		
Threatened flora species	Habitat is considered substantially degraded such that threatened flora are unlikely to occur within the subject land.		
Fauna habitats	Limited hollow bearing trees, flowering eucalypts and fallen logs are present in some patches. Low condition amphibian habitat occurs within limited man-made drainage lines and depressions. Occurrence of Koala feed trees (such as <i>E. robusta</i>) are patchy.		
Composition	Structure	Function	Vegetation Integrity Score
44.2	18.5	26.4	27.8



Figure 16: Plot P4_2021 within the subject land. PCT 4023 – Coastal Valleys Swamp Oak Riparian Forest - low

Table 11: Vegetation zone 3 PCT 4024 - weedy

4024 - Cumberland Blue Box Riverflat Forest			
Vegetation formation/class	Forested Wetlands/ Coastal Floodplain Wetlands		
Conservation status	NSW BC Act EEC: <i>River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i> EPBC Act – did not satisfy criteria for listing under the Commonwealth listing (see Section 5.3)		
Description	This community occurs as patchy clusters around the western and northern perimeter of the subject land. The ground layer and midstorey were mixed with native and exotic species and generally contained a high percentage of High Threat Weeds. Includes scattered remnant canopy species and planting as part of rehabilitation works.		
Characteristic canopy trees	<i>Eucalyptus tereticornis</i> , <i>Angophora floribunda</i> , <i>Alphitonia excelsa</i> and <i>Casuarina glauca</i>		
Characteristic mid-storey	Absent in some patches. <i>Backhousia myrtifolia</i> , <i>Acacia binervata</i> and <i>Bursaria spinosa</i>		
Characteristic groundcovers	<i>Microlaena stipoides</i> . Exotic species - <i>Megathyrsus maximus</i> , <i>Ehrharta erecta</i> and <i>Cardiospermum grandiflorum</i>		
Mean native richness	12		
Exotic species / HTE cover	<i>Lantana camara</i> and <i>Cardiospermum grandiflorum</i>		
Condition	low		
Variation and disturbance	Most occurrences of this community are highly degraded with an absent and/or weed dominated midstorey and groundcover layer. The vegetation intergrades with another vegetation community, PCT 4023 Coastal Valley Swamp Oak Riparian Forest along the foreshore of Georges River in the north eastern corner, outside of the subject land.		
No. sites sampled	2 Plots (Plots P4_2020 and P2_2021)		
Threatened flora species	Habitat is considered substantially degraded such that threatened flora are unlikely to occur within the subject land.		
Fauna habitats	Limited hollow bearing trees, flowering eucalypts and fallen logs are present in some patches. Low condition amphibian habitat occurs within the riparian areas and limited man-made drainage lines and depressions. Occurrence of Koala feed trees (such as <i>E. tereticornis</i>) are patchy.		
Composition	Structure	Function	Vegetation Integrity Score
30.1	24.5	77.9	38.6



Figure 17: Plot P2_2021 within PCT 4024 -- weedy.

Table 12: Planted Native Vegetation

Planted native vegetation does not represent a PCT	
Vegetation formation/class	N/A
Conservation status	N/A
	-
Description	This community occurs as small, isolated patches of planted vegetation within horticultural landscape gardens within the eastern and southern boundaries of the subject land. The vegetation was not assigned to a PCT as the vegetation was located on a batter with garden species and distinct rows of canopy species.
Characteristic canopy trees	<i>E. tereticornis</i> , <i>Ceratopetalum gummifera</i> , <i>Lophostemon confertus</i> and <i>Banksia serrata</i> .
Characteristic mid-storey	<i>Livistona australis</i>
Characteristic groundcovers	<i>Cynodon dactylon</i> , <i>Paspalum dilatatum</i> and <i>Westringia fruticosa</i>
Mean native richness	10
Exotic species / HTE cover	<i>Lantana camara</i>
Condition	Planted
Variation and disturbance	All occurrences of this community are highly degraded with an absent midstorey, and groundcover layer dominated by weeds and horticultural landscape species.
No. sites sampled	1 plot (Plot P2_2020)
Threatened flora species	Habitat is considered substantially degraded such that threatened flora are unlikely to occur within the subject land.
Fauna habitats	Limited hollow bearing trees, flowering eucalypts and fallen logs are present in some patches. Low condition amphibian habitat occurs within limited man-made drainage lines and depressions. Occurrence of Koala feed trees (such as <i>E. tereticornis</i>) are patchy.



Figure 18: Plot 2 Planted Native Vegetation

5.2.2. Plant Community Type selection justification

Interim Biogeographic Regionalisation for Australia (IBRA) region and sub-region allowed for the narrowing of potential community types. The assessment of dominant canopy, mid-storey and ground cover species from data collected during field surveys in combination with the BioNet Vegetation Classification Tool (VIS), including the landscape position, allowed for the allocation of each PCT. Justification for the selection of PCTs occurring on the subject land is provided in Table 13. It is noted that the vegetation within the subject land has been cleared and subject to disturbance and a high level of weed infestation. As such, a number of characteristic species are absent from the vegetation. Additionally, some of the vegetation has been established through restoration works and therefore, may not represent the natural assemblages of species within a PCT.

Three of the PCTs conform to listed TECs under the BC Act (Table 14, Figure 19), including PCTs 4024, 3145 and 4023 (see section 5.3). The occurrences did not meet the listing criteria for the commensurate EPBC Act listed TECs.

Table 13: PCT selection justification

Selected PCT	Selection criteria	Species relied upon for identification of vegetation type and relative abundance	Other PCT options and reason for exclusion
3145 Cumberland Bangalay x Blue Gum Riverflat Forest	IBRA region, subregion, LGA, Class and formation, soil landscape, elevation and results of floristic plot analysis including the presence of <i>Eucalyptus botryoides</i> (see Table 8).	This PCT has been accepted as the best fit for these patches of native vegetation based on a review of existing vegetation mapping in the region and the dominance of <i>Eucalyptus botryoides</i> , which is not present in any other PCT, as a dominant in the LGA.	<u>PCT 3985</u> Although this PCT includes <i>Eucalyptus botryoides</i>, its distribution does not include Liverpool LGA. <u>PCT 4028</u> This PCT was not considered a potential candidate PCT for the vegetation as PCT 4028 occurs on fringing swamps or freshwater wetlands dominated by <i>Casuarina glauca</i>, <i>Melaleuca</i> species or mangroves. This vegetation zone was located at higher elevation and did not include mangrove or <i>Melaleuca</i> species. Therefore, it was not considered a good fit for this vegetation zone. <u>PCT 4025</u> PCT 4025 was a potential candidate PCT for this vegetation zone, however, the VIS describes this PCT as occurring along the Hawkesbury and Nepean River system and does not associate Georges River in its distribution. Additionally, <i>Eucalyptus botryoides</i> is not associated with PCT 4025, however mature <i>E. botryoides</i> are the canopy species within the subject land. Therefore, this PCT was not considered a good fit. <u>PCT 3145</u> This PCT was selected based on its dominance of <i>Eucalyptus botryoides</i> and <i>Acacia binervia</i> which are key representative species in this

Selected PCT	Selection criteria	Species relied upon for identification of vegetation type and relative abundance	Other PCT options and reason for exclusion
			PCT and were recorded within the subject land. The VIS describes this PCT 3145 as common along the Nepean and Georges Rivers. This PCT was chosen based on the presence of canopy species, distribution and location in the landscape. It is noted that the vegetation zone was highly disturbed and contained limited representative species to find a good PCT fit.
4023 Coastal Valleys Oak Forest	IBRA region, subregion, soil landscape, elevation and results of floristic plot analysis including the presence of positive diagnostic canopy species (see Table 9).	Dominance of <i>Casuarina glauca</i>, <i>Eucalyptus tereticornis</i>, <i>Angophora floribunda</i>, <i>Acacia decurrens</i> existing vegetation mapping adjacent to its areas of occurrence.	<u>PCT 3985</u> Although this PCT is dominated by <i>Casuarina glauca</i>, its distribution does not include Liverpool LGA. <u>PCT 4028</u> This PCT was a potential candidate PCT for the vegetation however, according to the VIS it has a higher dominance of <i>Casuarina glauca</i> than other PCTs. PCT 4028 also has a wide variety of canopy species, including <i>Melaleuca quinquenervia</i>, <i>Glochidion ferdinandi</i> and <i>Cupaniopsis anacardioides</i>, and limited <i>Eucalyptus</i> present. PCT 4028 occurs at higher elevations and upstream than other PCTs. The vegetation within the subject land contained a high representative of <i>Casuarina glauca</i> and <i>Eucalyptus</i> species. The latter is not represented within PCT 4028. Therefore, it was not considered a good fit. <u>PCT 4023</u> This PCT was chosen due to the presence of <i>Casuarina glauca</i>, <i>Eucalyptus tereticornis</i>, <i>Angophora floribunda</i> and <i>Acacia decurrens</i> which are listed as key diagnostic species of this PCT.
4024 Cumberland Blue Box Riverflat Forest	IBRA region, subregion, LGA soil landscape, elevation and results of floristic plot analysis including the presence of positive diagnostic canopy species (see Table 6).	Presence of <i>Eucalyptus baueriana</i>, <i>E. tereticornis</i>, <i>Angophora floribunda</i> and <i>Acacia decurrens</i>.	<u>PCT 4025</u> PCT 4025 was a potential candidate PCT for this vegetation zone, however, the VIS describes this PCT as occurring along the Hawkesbury and Nepean River system and does not associate Georges River in its distribution. Additionally, <i>Eucalyptus baueriana</i> is not considered a representative species in PCT 4025, but mature <i>E. baueriana</i> were recorded within the subject land and indicate its significance. <u>PCT4024</u>

Selected PCT	Selection criteria	Species relied upon for identification of vegetation type and relative abundance	Other PCT options and reason for exclusion
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This PCT was selected due to the presence of diagnostic species such as *Eucalyptus baueriana*. This PCT is listed as a commonly occurring PCT along Georges River and includes a mix of *Eucalyptus* and *Angophora* species with *Acacia* rather than *Melaleuca* species.



Figure 19: plant community types and native vegetation extent

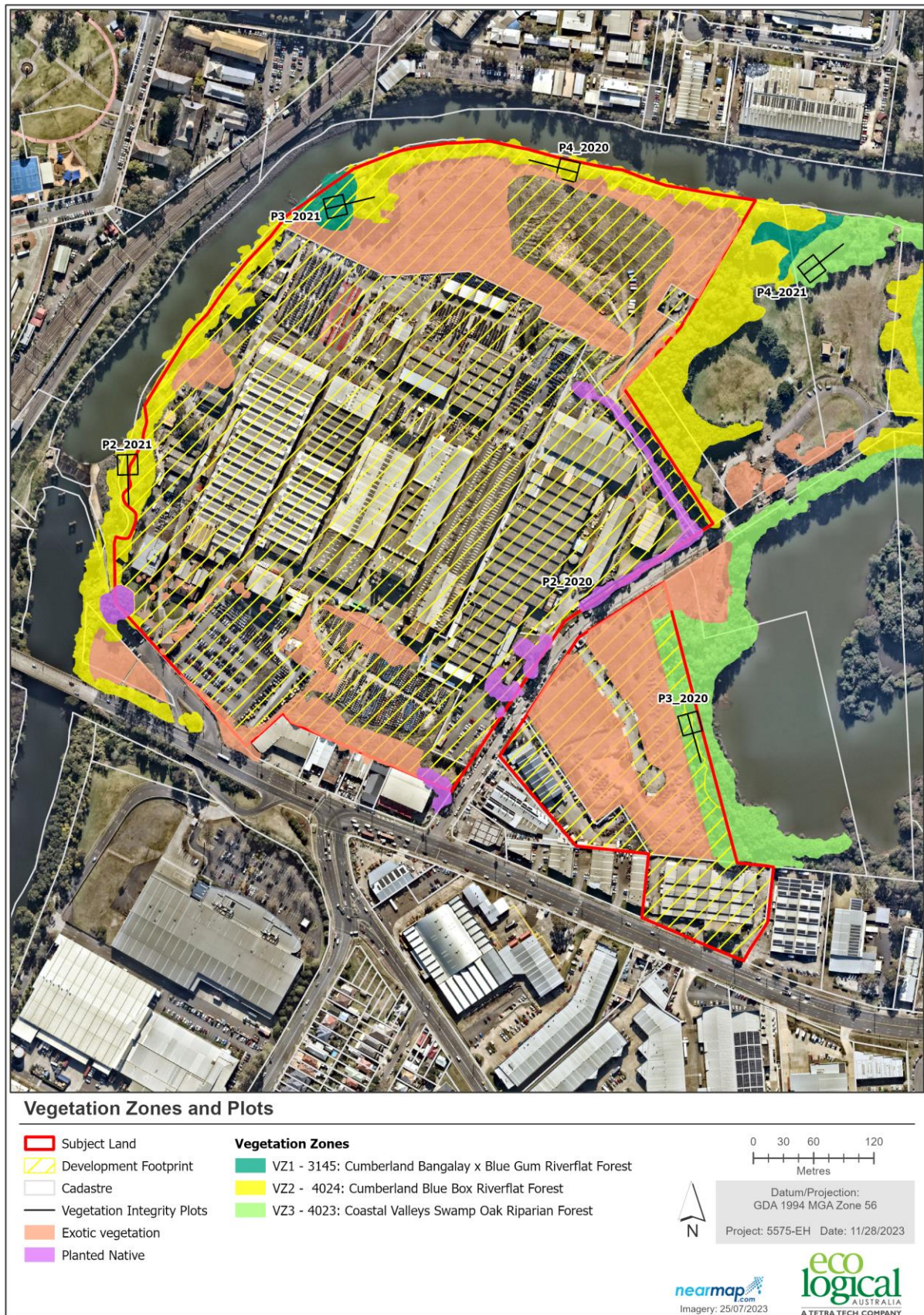


Figure 20: Vegetation zones and vegetation integrity survey plot locations

5.3. Threatened Ecological Communities

Two threatened ecological communities (TECs) occur within the subject land (Table 14 and Figure 21) and are present throughout the broader assessment area. An assessment of the criteria for listing of the TECs under the NSW and Commonwealth acts are provided below.

Table 14: Threatened Ecological Communities

PCT ID	BC Act			EPBC Act		
	Listing status	Name	Area (ha) (subject land)	Listing status	Name	Area (ha)
3145	ECC	<i>River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregion</i>	0.23	*	-	-
4023	EEC	<i>Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions</i>	0.56	*	-	-
4024	EEC	<i>River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregion</i>	1.45	*	-	-

EEC – ENDANGERED ECOLOGICAL COMMUNITY

* NOTE THAT PCT 4024, 3145 AND 4023 DID NOT SATISFY THE REQUIREMENTS FOR LISTING UNDER THE EPBC ACT.

The remaining vegetation within the subject land did not represent part of a PCT or TEC.

5.3.1. River-flat Eucalypt Forest on the coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions

The BioNet Vegetation Classification lists PCT 4024 and PCT 3145 as conforming to *River-flat Eucalypt Forest on the coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions* which is listed as endangered under the BC Act and listed as part of the critically endangered ecological community *River-flat Eucalypt Forest on Coastal Floodplains of the southern NSW and eastern VIC* under the EPBC Act.

5.3.1.1. BC Act conservation listing

Although the vegetation was in a poor condition, PCT 4024 and PCT 3145 still satisfied listing under the BC Act for the following reasons:

- The vegetation contains characteristic species as listed in the final determination for this TEC.
- The subject land is located within Liverpool which is listed as an LGA this TEC is known to occur in.
- The subject land is located on alluvial soils on a coastal floodplain.

For the above reasons, PCT 4024 and PCT 3145 mapped within the subject land is part of the TEC *River-flat Eucalypt Forest on the coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions* under the BC Act.

5.3.1.2. EPBC Act conservation listing

PCT 4024 and PCT 3145 were categorised as a low condition vegetation zone based on the presence of weeds, small patch size and limited structural values. The vegetation for both PCT 4024 and PCT 3145 did not satisfy listing criteria under the EPBC Act as it did not achieve >30% perennial understorey. The plot data for PCT 4024 indicated that the vegetation contained 8.5% native groundcover and 9.1% native shrubs which is less than 30% perennial understorey. The plot data for PCT 3145 (plot 3) lacked a shrub layer and had a groundcover of 0.7% for the plot. Therefore, PCT 4024 and PCT 3145 did not satisfy the criteria for listing as part of the TEC under the EPBC Act (Table 15).

Table 15: EPBC Act criteria for listing of *River-flat Eucalypt Forest on Coastal Floodplains of the southern NSW and eastern VIC*

Patch size thresholds → Biotic thresholds ↓	Large patch Patch size ≥ 2 ha	Small contiguous ⁷ patch Patch size ≥ 0.5 ha within a larger area of native vegetation ≥ 5 ha	Small patch Patch size ≥ 0.5 ha
High condition ≥ 80% of its total perennial understorey vegetation cover ¹ is comprised of native species AND Ground cover richness ² ≥ 10 native species per sample plot AND ≥ 20 large trees ³ per ha	CLASS A1 Large or contiguous patch in high condition		CLASS B1 Small patch in high condition
Good condition with arboreal mammals ≥ 50% of its total perennial understorey vegetation cover ¹ is comprised of native species AND Ground cover richness ² ≥ 6 native species per sample plot AND At least 10 large trees ³ per ha AND Evidence of 4 or more species of arboreal mammals ⁴ detected ⁵ in the patch	CLASS A2 Large or contiguous patch in good condition with arboreal mammals		CLASS B2 Small patch in good condition with arboreal mammals
Good condition ≥ 50% of its total perennial understorey vegetation cover ¹ is comprised of native species AND Ground cover richness ² ≥ 6 native species per sample plot AND At least 10 large trees ³ per ha	CLASS B3 Large or contiguous patch in good condition		CLASS C1 Small patch in good condition
Moderate condition ≥ 30% of its total perennial understorey vegetation cover ¹ is comprised of native species AND Ground cover richness ≥ 4 native species per sample plot ²	CLASS C2 Large or contiguous patch in moderate condition		

5.3.2. Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions

5.3.2.1. BC Act conservation listing

The occurrence of PCT 4023 is commensurate with the NSW BC Act listed *Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions*. This PCT was categorised as a low condition vegetation zone based on the presence of High Threat Exotic species, the moderate patch size and limited structural values. Despite the poor condition, PCT 4023 satisfies listing under the BC Act for the following reasons:

- The subject land occurs on waterlogged or periodically inundated flats.
- The vegetation contains characteristic species of this TEC including *Casuarina glauca*.
- The subject land is located within Liverpool LGA, which is listed as one of the LGAs where this TEC occurs.

For the above reasons, PCT 4023 mapped within the subject land is part of the TEC *Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions* under the BC Act.

5.3.2.2. EPBC Act conservation listing

PCT 4023 did not satisfy the listing criteria under the Conservation Advice for the *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland* listed under the EPBC Act (Table 16). The occurrence of the community has a history of clearing in the past but is dominated by *Casuarina glauca*. The entire patch is moderate in size (approximately 3.5 hectares). The mid and ground strata are dominated by exotic species and are greater than 50% relative cover of transformative weed species. Primarily this is driven by *Ehrharta erecta* (Panic Veldtgrass) which is not listed in Appendix C of the conservation advice but is a perennial weed species that is recognised as a High Threat Exotic species under the BAM and has been considered a transformative weed in this context. Therefore, due to the dominance of exotic vegetation and absence of key diagnostic species, PCT 4023 within the subject land did not satisfy listing requirements under the EPBC Act.

Table 16: Condition threshold for listing of Coastal Swamp Oak Forest under the EPBC Act

Condition thresholds Patch size classes → ↓ Vegetation quality classes	Large patch The patch is at least 5 ha	Medium patch The patch is at least 2 ha and less than 5 ha	Small contiguous** patch The patch is at least 0.5 ha and less than 2 ha, and is connected to a larger area of native vegetation of at least 5 ha	Small patch The patch is at least 0.5 ha and less than 2 ha
HIGH QUALITY Predominantly native understorey Non-native species comprise less than 20% of total understorey vegetation cover*	CATEGORY A A <u>large patch</u> that meets key diagnostics and has a <u>predominantly</u> native understorey	CATEGORY B A <u>medium patch</u> that meets key diagnostics and has a <u>predominantly</u> native understorey OR A <u>small patch</u> that meets key diagnostics and has a <u>predominantly</u> native understorey and is <u>contiguous**</u> with another <u>large</u> area of native vegetation		CATEGORY C A <u>small patch</u> that meets key diagnostics and has a <u>predominantly</u> native understorey
GOOD QUALITY Mostly native understorey Non-native species comprise less than 50% of total understorey vegetation cover* AND transformer species*** comprise less than 30% of total understorey vegetation cover*	CATEGORY B A <u>large patch</u> that meets key diagnostics and has a <u>mostly</u> native understorey	CATEGORY C A <u>medium patch</u> that meets key diagnostics and has a <u>mostly</u> native understorey OR A <u>small patch</u> that meets key diagnostics and has a <u>mostly</u> native understorey and is <u>contiguous**</u> with another <u>large</u> area of native vegetation		
MODERATE QUALITY Some native understorey Non-native species comprise less than 80% of total understorey vegetation cover* AND transformer species*** comprise less than 50% of total understorey vegetation cover*	CATEGORY C A <u>large or medium patch</u> that meets key diagnostics and has <u>some</u> native understorey			

5.3.3. Vegetation integrity survey plots

A vegetation integrity assessment using the Biodiversity Assessment Method Credit Calculator (BAMC) was undertaken and the results are outlined in **Table 17**.

Table 17: Vegetation integrity plots

Veg Zone	PCT ID	Condition	Area (ha)	Composition Condition Score	Structure Condition Score	Function Condition Score	Presence of Hollow bearing trees	Current vegetation integrity score
1	3145	Weedy	0.21	30	30.2	19.2	0	25.9
2	4023	Low	0.56	44.2	18.5	26.4	0	27.8
3	4024	Weedy	1.45	30.1	24.5	77.9	0	38.6

5.4. Use of local data

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



Figure 21: Threatened Ecological Communities

6. Threatened species

6.1. Fauna habitats

Fauna habitat searches (concurrent with vegetation surveys) were conducted for potential foraging, roosting, breeding or nesting habitat of nocturnal and diurnal species. This includes inspection for the presence of tree hollows, stags, bird nests, possum dreys, decorticated bark, food trees (*Banksia* spp., *Allocasuarina* spp., and winter-flowering eucalypts), culverts, dens, riparian areas and refuge habitats of man-made structures.

Fauna habitats within the subject land are typical of a predominately cleared and disturbed industrial area, with the available habitat features considerably degraded. Habitat features relevant to each fauna group with potential to use the subject land are presented in Table 18 and described in the following sections.

Fauna habitat assessments were used when determining suitable habitat for ecosystem and species credit species. Targeted surveys conducted for species credit species are provided in Section 7.1.

Table 18: Key fauna habitat features present across the subject land

Habitat features	Fauna species
Hollow bearing trees and stags	Arboreal mammals, birds, microchiropteran bats, reptiles and frogs
Grassy woodlands	Birds, arboreal and terrestrial mammals, microchiropteran bats, reptiles and frogs
Forested wetlands	Birds, arboreal and terrestrial mammals, microchiropteran bats, reptiles and frogs
Riparian habitats	Birds, microchiropteran bats, reptiles and frogs
Key Fish Habitat	Birds, microchiropteran bats, reptiles and frogs

6.1.1. Hollow bearing trees and stags

Nine hollow bearing trees (HBTs) within the subject land which may provide habitat for threatened tree roosting microchiropteran bats (< 5 cm hole entrance) and/or small woodland birds (5-9 cm entrance) were recorded (Figure 25). No stags were present and none of the HBTs present on the subject land are suitable habitat for large forest owls (i.e. none > 20 cm entrance).

6.1.2. Grassy Woodlands

The majority of Grassy woodland habitat within the subject land is in low condition and highly degraded or modified by landscaping. Limited seasonal flower resources (largely from planted native and non-native species) and hollow bearing trees are present (including > 20 cm diameter). The mid-storey is absent, and the groundcover is highly modified and degraded (Figure 8 and Figure 9).

6.1.3. Forested wetlands

The majority of forested wetland habitat within the subject land is in low condition, providing seasonal flower resources and limited coarse woody debris and hollow bearing trees (including > 20 cm diameter). The mid-storey is generally absent, and the groundcover is highly modified and degraded (Figure 22).

Forested wetlands within the subject land provide the most connectivity as they are present as narrow strips along the periphery of the Georges River **Figure 19**.



Figure 22: Example of Forested Wetland habitat within the subject land

6.1.4. Riparian habitats

Riparian habitats within the subject land include:

- man-made, ephemeral drainage lines and depressions within cleared paddocks
- disturbed riparian vegetation along 7th order stream (Georges River).

Riparian habitats within the subject land largely consist of limited man-made drainage lines or depressions. Small patches of aquatic plants such as *Typha* sp. (Bullrush) occur within these areas of otherwise predominantly exotic, degraded groundcover vegetation (Figure 23). Other minor depressions within the subject land provide limited habitat features as they are highly degraded and dominated by exotic species.

Riparian vegetation along the Georges River pertains to the western and northern boundary of the subject land. These areas contain widely scattered remnant eucalypts with a largely absent midstory and predominantly exotic and degraded groundcover vegetation (Figure 25).



Figure 23: Example of wet depressions representing limited amphibian habitat within the subject land.

6.1.5. Key Fish Habitat

Areas along the western and northern boundary of the site contain areas of riparian vegetation in and adjoining mapped Key Fish Habitat (Figure 24, Figure 25). All other artificial drainage lines and depressions within the site do not present key fish habitat. Impacts to key fish habitat are assessed in the Aquatic Ecology report (ELA 2024).



Figure 24: Example of riparian vegetation in and adjoining areas of mapped key fish habitat (Georges River) along the western boundary of the subject land.

6.1.6. Disturbed exotic grassland

These highly disturbed and previously cleared areas dominate the subject land and present limited habitat opportunities (Figure 14:).

6.1.7. Features not present

Within the subject land the following habitat features are not present:

- cliffs, overhangs, escarpments or crevices
- old mines or tunnels within 2 km
- Flying-fox camps
- Important habitat for Regent Honeyeater or Swift Parrot or Migratory Shorebirds.

6.2. Threatened flora species habitat

Potential habitat for threatened flora shrub and groundcover species is not present within low condition forested wetland (PCT 4023) or low condition grassy woodland (PCT 4024). These areas are present as narrow strips or isolated patches that are generally degraded from a history of industrial and development related disturbance.



Figure 25: Habitat features

6.3. Ecosystem credit species

6.3.1. Identification of ecosystem credit species

Ecosystem credit species predicted to occur at the subject land, their associated habitat constraints, geographic limitations and sensitivity to gain class are included in Table 19. Ecosystem credit species which have been excluded from the assessment and relevant justification are also included in Table 19. Three threatened fauna species were added into the BAMC list of candidate ecosystem credit species. *Daphoenositta chrysoptera* (Varied sittella) and *Hieraaetus morphnoides* (Little Eagle) (foraging habitat only) were not listed as candidate ecosystem species associated with PCT 4024, 3320 or 4023. However, there are BioNet records for these species recorded within or adjacent to the subject land. Therefore, it was determined that these species should be considered part of the assessment.

Table 19: Justification for inclusion or 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
<i>Anthochaera phrygia</i>	Regent Honeyeater (Foraging)	-	High	CE	CE	<u>Included</u> This species is associated with PCT 4023 and PCT 4024 and potential foraging by the Regent Honeyeater in flowering canopy species was recorded during field surveys.
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	-	Moderate	V	Not Listed	<u>Included</u> The subject land contains fringing vegetation and open grasslands which may represent suitable but degraded habitat for this species within all PCTs in the subject land.
<i>Botaurus poiciloptilus</i>	Australasian Bittern	Waterbodies Brackish or freshwater wetlands	Moderate	E	E	<u>Included</u> The subject land contains fringing vegetation and open grasslands which may represent suitable but degraded habitat for this species including PCTs 4023 and 4024.
<i>Calidris ferruginea</i>	Curlew Sandpiper (Foraging)	-	High	E	CE	<u>Included</u> This species is associated with the fringing wetland vegetation of PCT 4023. The habitat is considered highly disturbed, however, it may provide occasional refuge and foraging for this species.
<i>Calyptorhynchus lathami lathami</i>	Glossy Black-Cockatoo (Foraging)	Presence of Allocasuarina and Casuarina species	Moderate	V	V	<u>Included</u> The subject land contains casuarina species which may represent suitable feeding habitat in a degraded landscape for this species (includes all PCTs within the subject land).
<i>Chthonicola sagittata</i>	Speckled Warbler	-	High	V	Not Listed	<u>Included</u> The subject land contains open woodland vegetation which may represent suitable but degraded habitat for this species within all PCTs in the subject land.

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
<i>Climacteris picumnus</i>	Brown Treecreeper (eastern subspecies)	-	High	V	V	<u>Included</u> The subject land woodland vegetation which may represent suitable but degraded habitat for this species within all PCTs in the subject land.
<i>Daphoenositta chrysoptera</i>	Varied Sittella	-	Moderate	V	Not Listed	<u>Included</u> This species was added to the BAMC as this species has been previously recorded within the subject land boundary. It has been included for all PCTs within the subject land.
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	-	High	V	E	<u>Excluded</u> Habitat features for this species are not present at the subject land. 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.
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	Swamps Shallow, open freshwater or saline wetlands or shallow edges of deeper wetlands within 300 m of these swamps/waterbodies Shallow lakes, lake margins and estuaries within 300 m of these waterbodies	Moderate	E	Not Listed	<u>Included</u> There are two records for the species downstream of the subject land and potential habitat is present within and adjacent to the subject land. This species may utilise the wetlands and margins of the Georges River and Lake Moore. This species has potential to utilise all PCTs within the subject land due to the proximity to waterbodies.

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
<i>Falco subniger</i>	Black Falcon	-	Moderate	V	Not listed	<u>Included</u> The subject land contains fringing vegetation and open grasslands which may represent suitable but degraded habitat for this species including PCTs 4023 and 4024.
<i>Glossopsitta pusilla</i>	Little Lorikeet	-	High	V	Not Listed	<u>Included</u> There are 42 BioNet records for this species within a 5 km radius of the subject land including several recent records in close proximity to the subject land. This species may utilise the flowering species within the subject land for seasonal foraging. This species was included in this assessment
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle (Foraging)	-	High	V	Not Listed	<u>Included</u> There are 18 BioNet records for this species within a 5 km radius of the subject land including several recent records in close proximity to the subject land. This species may utilise habitat features within the subject land for foraging.
<i>Hieraaetus morphnoides</i>	Little Eagle (Foraging)	-	Moderate	V	Not Listed	<u>Included</u> This species was added to the list of ecosystem species. It is not associated within the PCTs recorded within the subject land but there are recent BioNet records for this species. The subject land contains open grasslands and fringing aquatic vegetation which represents low quality foraging habitat for this species.
<i>Hirundapus caudacutus</i>	White-throated Needle-tail	-	High	Not Listed	V	<u>Included</u> The subject land contains fringing vegetation and open grasslands which may represent suitable but degraded habitat for this species including all PCTs recorded within the subject land.

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
<i>Irediparra gallinacea</i>	Comb-crested Jacana	Waterbodies Freshwater wetlands with a good surface of floating aquatic vegetation	Moderate	V	Not listed	<u>Included</u> This species is associated with the fringing wetland vegetation of PCT 4023. The habitat is considered highly disturbed, however, it may provide occasional refuge and foraging for this species.
<i>Lathamus discolor</i>	Swift Parrot (Foraging)	-	Moderate	E	CE	<u>Included</u> This species is associated with PCT3145, PCT 4023 and PCT 4024 and potential foraging in flowering canopy species was recorded during field surveys.
<i>Limosa limosa</i>	Black-tailed Godwit (Foraging)	-	Moderate	V	Not Listed	<u>Included</u> This species is associated with the fringing wetland vegetation of PCT 4023, PCT 4024 and PCT3145. The habitat is considered highly disturbed, however, it may provide occasional refuge and foraging for this species.
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	-	Moderate	V	Not Listed	<u>Included</u> This species is associated with the fringing wetland vegetation of PCT 3145. The habitat is considered highly disturbed, however, it may provide occasional refuge and foraging for this species.
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	-	High	V	Not Listed	<u>Included</u> The subject land contains fringing vegetation and open grasslands which may represent suitable but degraded habitat for this species including all PCTs recorded within the subject land.
<i>Miniopterus australis</i>	Little Bent-winged Bat (Foraging)	-	High	V	Not Listed	<u>Included</u> Seasonal foraging habitat was identified in this assessment. This species has previously been recorded within the subject land.

Species	Common Name		Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat		-	High	V	Not Listed	<u>Included</u> Seasonal foraging habitat was identified in this assessment.
<i>Pandion cristatus</i>	Eastern Osprey		-	Moderate	V	Not Listed	<u>Included</u> The subject land contains fringing vegetation and open grasslands which may represent suitable but degraded habitat for this species including all PCTs recorded within the subject land.
<i>Petroica boodang</i>	Scarlet Robin		-	Moderate	V	Not Listed	<u>Included</u> Habitat features associated with this species includes an abundance of logs and fallen timber, these features were limited within the subject land. This species is associated with PCT 4023. The vegetation within the subject land may provide supplementary habitat for this species.
<i>Petroica phoenicea</i>	Flame Robin		-	Moderate	V	Not Listed	<u>Included</u> Habitat features associated with this species are not present in the subject land. This species requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses which the subject land does not contain. This species is associated with PCT 3145 but the vegetation within the subject land represents low condition vegetation for this species.
<i>Pteropus poliocephalus</i>	Grey-headed fox	Flying-	-	High	V	V	<u>Included</u> Seasonal foraging habitat was identified within all PCTs and planted native vegetation within the subject land.

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
<i>Rostratula australis</i>	Australian Snipe	Painted -	Moderate	E	E	<u>Included</u> Potential habitat is present within and adjacent to the subject land including PCT 4023 and PCT 4024. This species may utilise the wetlands and margins of the Georges River and Lake Moore.
<i>Stagonopleura guttata</i>	Diamond Firetail	-	Moderate	V	Not Listed	<u>Included</u> Habitat present is substantially degraded and highly fragmented such that this species is unlikely to rely on the vegetation within the subject land. However, this species has been included in this assessment and is associated with all PCTs recorded within the subject land.

* NOTE: JUSTIFICATION FOR EXCLUSION OF A SPECIES CAN BE BASED ON THE ABSENCE OF NECESSARY HABITAT COMPONENTS (E.G. CAVES), ARE VAGRANT, HABITAT IS TOO DEGRADED OR ABSENCE OF THE SPECIES BASED ON TARGETED SURVEY IN ACCORDANCE WITH THE NSW SURVEY GUIDELINES.

6.4. Species credit species

6.4.1. Identification of species credit species

Species credit species predicted to occur at the subject land (i.e. candidate species), their associated habitat constraints, geographic limitations and sensitivity to gain class is included in Table 20. Species credit species excluded from the assessment and relevant justification are also included in Table 20.

Habitat assessments were undertaken during the field surveys on 20 June 2019, 1-4 and 26 November 2021 and on 29 May 2023 to determine the likelihood of threatened species occurring within the subject land on an intermittent or permanent basis. Habitat assessments involved a search of all possible hollow-bearing trees (HBTs) within the subject land, 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. Nine HBTs were recorded within the subject land. 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 physically and safely accessible areas. On-ground inspections were conducted using binoculars looking at roof cavities for possible entrance for microbats, and evidence of fauna use (such as scats, scratch marks or staining) within the subject land.

Although the vegetation within the subject land contains limited native vegetation and has been substantially modified, the vegetation is located adjacent to waterbodies and provides connectivity to adjacent patches of native vegetation. The vegetation within the subject land contains potential habitat for some threatened species.

Note: no other species were manually added that were not listed in the BAMC.

Table 20: Justification for exclusion of species Candidate species

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
<i>Anthochaera phrygia</i>	Regent Honeyeater (Breeding)	Other As per mapped areas	High	CE	CE	<u>Excluded</u> The subject land does not contain mapped important areas for this species and the proposal does not present risk of SAIL. The important areas were accessed on the BOAMS (3 May 2024).
<i>Calidris ferruginea</i>	Curlew Sandpiper (Breeding)	Other As per mapped areas	High	E	CE	<u>Excluded</u> The subject land does not contain mapped important areas for this species and the proposal does not present risk of SAIL. The important areas were accessed on the BOAMS (3 May 2024).
<i>Calyptorhynchus lathami lathami</i>	Glossy Black-Cockatoo (Breeding)	Hollow bearing trees Living or dead tree with hollows greater than 15cm and greater than 8 m above ground	High	V	Not Listed	<u>Excluded</u> Hollows recorded within the subject land were not suitable for this species, all occurring relatively low to the ground (between 2 – 5 metres), were small in size and in degraded habitats.
<i>Deyeuxia appressa</i>	-	-	High	E	E	<u>Excluded</u> According to the TBDC this species has not been collected since 1942. These records were located from Killara and Herne Bay (Bankstown). The species profile indicates that this species may be extinct in the wild and there is very limited knowledge of its ecology. Furthermore, the vegetation is in a highly degraded landscape and has been subject to a long history of disturbance and engineering. The subject land does not provide potential habitat for this species.
<i>Eucalyptus benthamii</i>	Camden White Gum	N/A	High	CE	V	<u>Included</u> This species was included in targeted surveys. This species is associated with floodplains and therefore, all PCTs recorded within the subject land were identified as low quality, but potential habitat for this species.

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
<i>Gyrostemon thesioides</i>	-	Sandy, alluvial or colluvial soil within 50 m of a water course	High	E	Not Listed	<u>Included</u> This species was included in targeted surveys. This species is associated with floodplains and therefore, all PCTs recorded within the subject land were identified as low quality but potential habitat for this species.
<i>Haliaeetus leucogaster</i>	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	<u>Included</u> The subject land is located within the foreshores of a Lake Moore and Georges River. Targeted surveys were conducted to identify the presence of stick nests or breeding activity for this species.
<i>Hibbertia</i> sp. <i>Bankstown</i>	Hibbertia sp. Bankstown	N/A	High	CE	CE	<u>Included</u> This species is known to occur near the Bankstown airport in highly disturbed environments on alluvial floodplains. This species was included in targeted surveys within the subject land.
<i>Lathamus discolor</i>	Swift Parrot (Breeding)	Other As per mapped areas	Moderate	E	CE	<u>Excluded</u> The subject land does not contain mapped important areas for this species and the proposal does not present risk of SAIL. The important areas were accessed on the BOAMS (3 May 2024).
<i>Limosa limosa</i>	Black-tailed Godwit (Breeding)	Other As per mapped areas	High	V	Not Listed	<u>Excluded</u> The subject land does not contain mapped important areas for this species and the proposal does not present risk of SAIL. The important areas were accessed on the BOAMS (3 May 2024).
<i>Litoria aurea</i>	Green and Golden Bell Frog	Semi- permanent/ephemeral wet areas Within 1 km of wet areas, swamps Within 1 km of swamp,	High	E	V	<u>Included</u> Habitat features associated with this species, including soaks and fringing vegetation, were recorded within the subject land, which may contain suitable habitat for this species.

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
		waterbodies Within 1 km of waterbody				
<i>Marsdenia viridiflora</i> <i>subsp. viridiflora</i> endangered population	Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	Those LGAs named in the populations	Moderate	E2	Not Listed	<u>Included</u> This species was included in targeted surveys. This species is associated with floodplains and therefore, all PCTs recorded within the subject land were identified as low quality but potential habitat for this species.
<i>Meridolum corneovirens</i>	Cumberland Plain Land Snail	N/A	High	E	Not Listed	<u>Included</u> This species was included in targeted surveys. This species is associated with floodplains and therefore, all PCTs recorded within the subject land were identified as low quality but potential habitat for this species.
<i>Miniopterus australis</i>	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	<u>Excluded</u> This is a dual credit species, and only a species credit species when specific habitat constraints are present for breeding. The subject land does not contain breeding habitat such as caves that are suitable for the species to utilise the subject land.
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat (Breeding)	Caves Cave, tunnel, mine, culvert or other structure known	Very High	V	Not Listed	<u>Excluded</u>

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
		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				This is a dual credit species, and only a species credit species when specific habitat constraints are present for breeding. The subject land does not contain breeding habitat such as caves, tunnels, mines or culverts.
<i>Myotis macropus</i>	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	<u>Included</u> Habitat present is substantially degraded however, hollow bearing trees were identified within the subject land, the nearest tree is within 200 m of the drainage line within the subject land.
<i>Pandion cristatus</i>	Eastern Osprey (Breeding)	Other Presence of stick-nests in living and dead trees (>15m) or artificial structures within 100 m of a floodplain for nesting	Moderate	V	Not Listed	<u>Included</u> This species was included in targeted surveys. This species is associated with floodplains and therefore, all PCTs recorded within the subject land were identified as low quality but potential habitat for this species.
<i>Persoonia nutans</i>	Nodding Geebung	-	Moderate	E	E	<u>Included</u> This species was included in targeted surveys. This species is associated with floodplains and therefore, all PCTs recorded within the subject land were identified as low quality but potential habitat for this species.
<i>Petaurus norfolcensis</i>	Squirrel Glider	-	High	V	Not Listed	<u>Excluded</u> Habitat present is substantially degraded such that this species is unlikely to utilise the subject land. Habitat in the subject land is isolated and disturbed with a higher likelihood of this species utilising more suitable habitat within the locality to the east. Additionally, this species has a strong preference

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
						for old growth forests, which does not include the subject land. There are no BioNet records for this species within a 5 km radius of the subject land.
<i>Phascolarctos cinereus</i>	Koala (Breeding)	Other Presence of koala use trees	High	V	V	<u>Included</u> This species was included in targeted surveys. This species is associated with woodlands and therefore, all PCTs recorded within the subject land were identified as low quality but potential habitat for this species.
<i>Pimelea spicata</i>	Spikey Rice-flower	-	High	E	E	<u>Included</u> This species was included in targeted surveys. This species is associated with woodlands and therefore, all PCTs recorded within the subject land were identified as low quality but potential habitat for this species.
<i>Pomaderris brunnea</i>	Brown Pomaderris	-	High	E	V	<u>Excluded</u> 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 subject land.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox (Breeding)	Other Breeding camps	High	V	V	<u>Included</u> This species was included in targeted survey for breeding habitat. This species breeding habitat is associated with riparian areas. The subject land contains riparian vegetation. Therefore, surveys were conducted during survey period to identify presence of breeding habitat for this species.
<i>Pultenaea pedunculata</i>	Matted Bush-pea	-	High	E	Not listed	<u>Included</u> This species was included in targeted surveys. This species is associated with woodlands and therefore, all PCTs recorded within the subject land were identified as low quality but potential habitat for this species.
<i>Rhodamnia rubescens</i>	Scrub Turpentine	-	Very High	CE	CE	<u>Included</u> This species was included in targeted surveys. This species is associated with woodlands and therefore, all PCTs recorded within the subject land were identified as low quality but potential habitat for this species.

Species	Common Name	Habitat constraints/ Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status	Justification if species excluded
<i>Senna acclinis</i>	Forest Cassia	-	High	E	Not listed	<u>Included</u> This species was included in targeted surveys. This species is associated with woodlands and therefore, all PCTs recorded within the subject land were identified as low quality but potential habitat for this species.
<i>Wahlenbergia multicaulis</i> – endangered population	Tadgell's Bluebell in the LGAs of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield	Check for updated LGA names	High	E2	Not Listed	<u>Excluded</u> The subject land is not located within the geographic LGA distribution for this species.

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

6.4.2. Candidate species requiring further assessment

Due to the high level of modification of vegetation within the subject land 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 20.

Targeted survey methodologies are detailed within the following sections.

6.4.2.1. Targeted flora and fauna survey methodology

The targeted flora and fauna surveys were undertaken in suitable habitat within the development footprint. Details of the survey methods for each target species are provided below. Field surveys were undertaken in accordance with the relevant survey guidelines including:

- Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method (DPIE 2020a).
- Threatened reptiles – Biodiversity Assessment Method survey guide (DPE 2022a).
- Species credit' threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Method (OEH, 2018).
- Survey guidelines for Australia's threatened frogs (DPIE 2020b).
- Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide (DPE 2022b)
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities – Working Draft (DEC 2004).

Targeted survey effort for threatened fauna species included:

- Spotlighting for amphibians
- Call playback for amphibians
- Searches in leaf litter and woody debris for Cumberland Land Snail
- Koala Spot Assessment Technique (SAT)
- Echolocation survey for microchiropteran bat
- Watercourse habitat assessment for threatened amphibians
- Raptor nest search and flying-fox camp search.

Targeted surveys were limited to suitable habitat within the development footprint. Relevant experience of staff undertaking surveys are provided in Appendix G.

7. Presence or absence of candidate species credit species

Confirmed candidate species were assessed consistent with Steps 4 – 6 of section 6.4 of the BAM. Targeted surveys for species credit species were undertaken in accordance with section 6.5 of the BAM, including undertaking surveys during the nominated survey period specified for each candidate species and in accordance with the relevant threatened species survey guidelines. Surveys were conducted 20 June 2019, 1-4 and 5-8 November 2021 and on 29 May 2023. The survey effort, timing and locations for threatened species are outlined in Table 23 and the following sections.

7.1. Targeted field surveys

Targeted surveys for candidate species credit species were undertaken at the subject land on the dates outlined in Table 22. The location of targeted surveys is shown on Figure 26 and Figure 27. Relevant experience of staff undertaking surveys are provided in Appendix G.

7.1.1. Flora surveys

Where suitable habitat was identified for candidate threatened flora species, targeted flora surveys were undertaken in accordance with NSW Guide to Surveying Threatened Plants (DPIE 2020) and within the seasonal requirements outlined in the BAM Calculator and Threatened Biodiversity Data Collection. Targeted flora surveys involved parallel field traverses with a separation width of approximately 10 m within areas of open vegetation and 5 m in areas of dense vegetation. Survey approach is displayed Table 21 and Figure 26.

Table 21: Targeted flora survey effort and results

Target species	Survey method	Survey effort	Dates	BAM survey period	Species recorded	Species credit requirements / species polygon justification
<i>Eucalyptus benthamii</i>	Parallel transects in the development footprint in associated PCTs 10 m apart	16 person hours	1-4 November 2021 29 May 2023	All year	No	Not required, the species was not identified during targeted surveys.
<i>Gyrostemon thesioides</i>	Parallel transects in the development footprint in associated PCTs 10 m apart	16 person hours	1-4 November 2021 29 May 2023	All year	No	Not required, the species was not identified during targeted surveys.
<i>Hibbertia</i> sp. <i>Bankstown</i>	Parallel transects in the development footprint in associated PCTs 10 m apart	8 person hours	1-4 November 2021	September - December	No	Not required, the species was not identified during targeted surveys.
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i>	Parallel transects in the development footprint in associated PCTs 10 m apart	8 person hours	1-4 November 2021	November - February	No	Not required, the species was not identified during targeted surveys.
<i>Persoonia nutans</i>	Parallel transects in the development footprint in associated PCTs 10 m apart	8 person hours	1-4 November 2021	May - November	No	Not required, the species was not identified during targeted surveys.
<i>Pimelea spicata</i>	Parallel transects in the development footprint in associated PCTs 10 m apart	16 person hours	1-4 November 2021 29 May 2023	All year	No	Not required, the species was not identified during targeted surveys.
<i>Pultenaea pedunculata</i>	Parallel transects in the development footprint in associated PCTs 10 m apart	8 person hours	1-4 November 2021	September - November	No	Not required, the species was not identified during targeted surveys.
<i>Rhodamnia rubescens</i>	Parallel transects in the development footprint in associated PCTs 10 m apart	16 person hours	1-4 November 2021 29 May 2023	All year	No	Not required, the species was not identified during targeted surveys.
<i>Senna acclinis</i>	Parallel transects in the development footprint in associated PCTs 10 m apart	16 person hours	1-4 November 2021 29 May 2023	All year	No	Not required, the species was not identified during targeted surveys.

7.1.2. Fauna surveys

7.1.2.1. Call playback and amphibian searches

Candidate Species Targeted: Green and Golden Bell Frog (*Litoria aurea*)

Call playback surveys were undertaken along one transect within an areas of suitable breeding habitat, consisting of vegetated riparian areas along the western boundary of the subject land (Figure 26). Surveys were conducted over four separate nights on the 1-4 November 2021 and followed approximately 100 mm of rain during late October. The BAM frog guidelines state that the first and last surveys should be conducted 14 days apart, however, the conditions following abundant rain were ideal, therefore, the surveys were conducted to target this species over four consecutive nights to ensure preferred environmental conditions. Therefore, the 14 days guidelines were not applied for this survey.

Call sequences for Green and Golden Bell Frog were broadcasted followed by five minutes of quiet listening, for approximately (2 person hrs) along each transect between 6-9 pm.

Spotlighting, aural-visual searches and audio recordings were also conducted in combination with call playback. Surveys were conducted over four nights (2 person hrs per transect per night) in November 2021 (as above) and within suitable breeding habitat, such as riparian vegetation, temporary pools and drainage lines with fringing vegetation.

7.1.2.2. SAT surveys

Candidate Species Targeted: Koala (*Phascolarctos cinereus*)

Targeted surveys for Koalas utilised the Koala Spot Assessment Technique (SAT) and and spotlighting in accordance with the BAM Koala surveys. Surveys were conducted within areas of suitable habitat adjacent to the subject land on 1-5 November 2021 (Figure 27).

7.1.2.3. Acoustic ultra-sonic surveys

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 Impacts (see Section 10.4) including any man-made structures which may be roosting habitat for the following threatened microbat species:

- *Myotis macropus* (Southern Myotis) – species credit species
- *Saccolaimus flaviventris* (Yellow-bellied Sheathtail Bat) – ecosystem credit species
- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle) - ecosystem credit species
- *Miniopterus australis* (Little Bentwing-bat) – dual credit species
- *Miniopterus orianae oceanensis* (Large Bent-winged Bat) – dural credit species.

Targeted surveys for candidate species and survey timing are outlined in Table 22.

Table 22: Candidate species and survey timing

Species	Common Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fauna													

Species	Common Name		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Falsistrellus tasmaniensis</i> *	Eastern False Pipistrelle		X	X	X	X	X	X	X	X	X	X	X	X
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle								X	X	X	X	X	X
<i>Litoria aurea</i>	Green and Golden Bell Frog		X	X	X								X	X
<i>Meridolum corneovirens</i>	Cumberland Land Snail	Plain	X	X	X	X	X	X	X	X	X	X	X	X
<i>Miniopterus australis</i>	Little Bentwing-bat		X	X										X
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat		X	X										X
<i>Myotis macropus</i>	Southern Myotis		X	X	X							X	X	X
<i>Pandion cristatus</i>	Eastern Osprey					X	X	X	X	X	X	X	X	
<i>Phascolarctos cinereus</i>	Koala		X	X	X	X	X	X	X	X	X	X	X	X
<i>Pteropus poliocephalus</i>	Grey-headed Flying fox											X	X	X
<i>Saccolaimus flaviventris</i> *	Yellow-bellied Sheathtail Bat		X	X	X	X	X	X	X	X	X	X	X	X

Notes: X indicates appropriate survey season in BioNet. Green highlight indicates survey conducted. Additional targeted surveys are proposed prior to construction. * denotes ecosystem credit species

Only one candidate species credit bat species was considered during targeted surveys, Southern Myotis. The remaining species were assessed for prescribed impacts.

Species targeted for prescribed impacts include:

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

Microbat surveys were undertaken using acoustic detection in accordance with the 'Species credit' threatened bats and their habitats NSW survey guide (OEH 2018). Eight devices were deployed in the subject land on 1 - 5 November 2021, however, one of the devices stopped collecting data on 3 November 2021. Redeployment of another device was made on the 5 -8 November 2021 to supplement the loss of data. Three of the eight devices were specifically placed to collect data for assessment of impact areas in the subject land.

The survey effort equates to a minimum 16 survey nights, which meets the survey effort specified in the "Species credit' threatened bats and their habitats" (OEH 2018). Two devices were placed along the riparian areas of the adjoining Georges River, one device was placed within proximity to industrial buildings and potential man-made roosting habitat and one device within adjacent Haigh Park (Figure 26). The detectors were set to record before sunset and stop after dawn, placed >50 m apart and in a position that maximised the likelihood of recording bats in accordance with BAM Threatened microbats Species credit species guidelines (OEH 2018).

Bat call analysis was undertaken by Dr Julia Ryeland through Anabat Insight (Version 2.0.1-0-g1ca0e76), with a subsample of 30 calls reviewed by Alicia Scanlon (ELA 2021). See Appendix E for the full results.

7.1.2.4. Bat camps

Targeted surveys were conducted within the riparian vegetation (PCT 3145, 4023 and 4024) in November 2021. Surveys include an inspection of the canopy for roosting Grey-headed Flying-fox individuals.

7.1.2.5. Cumberland Plain Land Snail surveys

Targeted surveys for Cumberland Plain Land were conducted in May 2023 over 1 person hour. Surveys involved gently scraping back by hand the leaf litter around a one metre radius of large Eucalyptus such as *E. tereticornis* and *E. baueriana*.

7.1.2.6. Raptor nests

Targeted surveys were conducted in November 2021 and May 2023 to identify potential White-bellied Sea-eagle nests (survey period July-Dec) and Eastern Osprey nests (survey period April-November). Surveys involved a traverse of the subject land and visual inspection of trees to identify potential stick nest and to record activity of raptors.

7.1.2.7. Opportunistic

Opportunistic sightings of secondary indications resident fauna were noted. Such indicators included:

- distinctive scats left by mammals
- scratch marks made by various types of arboreal animals
- nests made by various guilds of birds
- feeding scars on Eucalyptus trees made by Gliders
- whitewash, regurgitation pellets and prey remains from Owls
- aural recognition of bird and frog calls
- skeletal material of vertebrate fauna
- chewed cones of *Allocasuarina* spp. or *Pinus* spp. as well as some of the other cultivars known to be used by native fauna.

Table 23: Targeted surveys

Date	Surveyors	Survey	Target Species
1 November 2021	Shawn Ryan and Michael Gregor	Call playback, amphibian searches, SAT, spotlighting and acoustic ultra-sonic recordings	Green and Golden Bell Frog, Koala, Southern Myotis and Grey-headed Flying-fox.
2 November 2021	Shawn Ryan and Michael Gregor	Call playback, amphibian searches, SAT, spotlighting and acoustic ultra-sonic recordings	Green and Golden Bell Frog, Koala and Southern Myotis
3 November 2021	Shawn Ryan and Michael Gregor	Call playback, amphibian searches, SAT, spotlighting and acoustic ultra-sonic recordings	Green and Golden Bell Frog, Koala and Southern Myotis
4 November 2021	Shawn Ryan and Michael Gregor	Call playback, amphibian searches, SAT, spotlighting and acoustic ultra-sonic recordings	Green and Golden Bell Frog, Koala and Southern Myotis
5 November 2021	Shawn Ryan and Michael Gregor	Call playback, amphibian searches, SAT, spotlighting and acoustic ultra-sonic recordings	Green and Golden Bell Frog, Koala and Southern Myotis, Eastern Osprey and White-bellied Sea-eagle
6 November 2021	Device deployment	acoustic ultra-sonic recordings	Southern Myotis,
7 November 2021	Device deployment	acoustic ultra-sonic recordings	Southern Myotis
8 November 2021	Device deployment	acoustic ultra-sonic recordings	Southern Myotis
29 May 2023	Belinda Failes and Claire Plunkett	Raptor nest or activity search	Cumberland Plain Land Snail, Eastern Osprey and White-bellied Sea-eagle

Table 24: Weather observations for survey dates (Bureau of Meteorology 2023)

Date	Rainfall (mm)	Minimum temperature °C	Maximum temperature °C
20 June 2019	0.0	2.8	16.9
1 November 2021	0.0	10	24.1
2 November 2021	0.0	12.9	25.4
3 November 2021	0.0	12.8	25.4
4 November 2021	0.0	17.6	20.5
5 November 2021	17.6	16.8	24.8
6 November 2021	1.8	14.3	27.3
7 November 2021	0.4	16.4	23.3
8 November 2021	14.8	17.5	24.5
29 May 2023	0.0	4.6	21.1

OBSERVATIONS TAKEN FROM BOM WEATHER STATION HORSLEY PARK (STATION 94760 FOR 2021) AND BANKSTOWN AIRPORT (STATION 66137 FOR 2023) APPROXIMATELY 10 KM NORTH WEST OF THE SUBJECT LAND.

Survey effort and results within the subject land is outlined in Table 25.

Table 25: Survey effort and results

Target species	Common name	Method	Stratification units	Dates	Total effort	BAM survey period	Species recorded	Species credit required / polygon justification
<i>Litoria aurea</i>	Green and Golden Frog	Call playback Amphibian searches Habitat search (day)	1 – Forested wetland 1 – Woodland	1-5 Nov 2021	4 nights, 2 person hours 5 days 50 person hours	Nov - Mar	No	Not required. Species not identified during targeted survey
<i>Phascolarctos cinereus</i>	Koala	Call playback Spotlighting SAT surveys Habitat search (day)	1 – Woodland 1 – Forested Wetland	1-5 Nov 2021	2 SAT, 2 person hours (i.e only 2.245 ha of suitable habitat). Two x 200 m spotlighting transect in suitable habitat over four nights. 5 days, 50 person hours	All year	No	Not required. Species not identified during targeted survey
<i>Meridolum corneovirens</i>	Cumberland Plain Land Snail	Search of leaf litter around base of Eucalyptus or under logs in suitable habitat	1 – Woodland 1 – Forested Wetland	29 May 2023	1 person hour	All year	No	Not required. Species not identified during targeted survey
<i>Myotis macropus</i>	Southern Myotis	Acoustic ultra-sonic recording Habitat search (day) hollows	1 – Woodland 1 – Forested Wetland	1-5 Nov 2021	4 devices over 4 consecutive nights (16 trap nights). 5 days, 50 person hours	Oct - Mar	No	Not required. Species not identified during targeted survey
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	Raptor nest search	1 – Woodland 1 – Forested Wetland	1-4 Nov 2021	5 days, 50 person hours	Jul - Dec	No	Not required. Species not identified during targeted survey
<i>Pandion cristatus</i>	Eastern Osprey	Raptor nest search	1 – Woodland 1 – Forested Wetland	1-4 Nov 2021 29 May 2023	5 days, 50 person hours	Apr- Nov	No	Not required. Species not identified during targeted survey



Figure 26: Targeted surveys



Figure 27: Koala SAT targeted surveys within the subject land

7.1.3. Targeted fauna survey results

Targeted surveys were conducted for fauna species considered to have potential to occur in the subject land and the results of the surveys are provided above in Table 25. No species polygons or species credits were required to be offset as part of the planning proposal.

More details are provided below.

7.1.3.1. Amphibians

No threatened frog species were detected during targeted surveys.

7.1.3.2. Koala (SAT)

No primary or secondary signs of Koalas were detected during targeted surveys.

7.1.3.3. Microbats

At least seven microbat species were definitely recorded during the surveys, with an additional seven species potentially recorded (see Appendix D for the full list and results). The most common species recorded were *Chalinolobus gouldii* (Chocolate wattle bat) and *Ozimops ridei* (Ride's Free-Tailed Bat), two species common across the Sydney Basin and none of which are listed under the EPBC Act or the BC Act.

Threatened species recorded included *Miniopterus australis* (Eastern Bent-winged Bat) and one potential *Myotis macropus* (Southern Myotis) call, however these recordings were from locations 5 and 4, within adjacent vegetation east of the subject land (Haigh Park and Lake Moore Wetlands) (see Figure 26). The Southern Myotis potential record contained overlapping features with non-threatened species *Nyctophilus* species and could therefore not be identified as Southern Myotis with certainty. It is likely that a call during this time would represent a foraging bat, given the close proximity to suitable foraging habitat along the Georges River. Additionally, some calls were recorded of possible *F. tasmaniensis* / *S. rueppellii* / *S. orion* at location 2 within the subject land (Figure 26). These calls were unlikely to have been from Eastern False Pipistrelle, given the degraded nature of the site's vegetation, with this species typically being associated with high quality vegetated sites. This is an ecosystem species.

Given the above results, the Eastern Bent-winged bat is considered likely to occur within the subject land but is a species credits for breeding habitat only, and no suitable breeding habitat occurs within the site or subject land. The species requires further consideration for prescribed impacts. Southern Myotis was potentially recorded within Haigh Park which will be retained as "Open Space" as part of the Concept Masterplan and is unlikely to utilise the subject land, where future impacts will occur. Given the lack of calls and the degraded nature of the site the species is considered unlikely to utilise the subject land and determined to be not present within impact areas. As a precautionary measure, additional targeted surveys will be conducted when the future development applications are submitted.

7.1.3.4. Bat camps

No evidence of bat camps for the Grey-headed Flying-fox were detected during field surveys.

7.1.3.5. Cumberland Plain Land Snail surveys

No live or shells of the Cumberland Plain Land Snail shells were identified during surveys. No other types of snail shells were detected.

7.1.3.6. Raptor nests

No suitable raptor nests were identified or observations of raptors flying over the subject land were recorded during surveys.

7.1.3.7. Opportunistic

No threatened species were detected during opportunistic surveys.

8. Identification of prescribed impacts

8.1. Karst, caves, crevices, cliffs, rocks and other geological features of significance

There are no karst, caves, crevices, cliffs, rocks or other geological features of significance within the subject land. There is evidence of acid sulphate soils along the eastern perimeter of the subject land (Figure 12). Mitigation measures will be provided during future development applications.

8.2. Human-made structures and non-native vegetation

Human-made structures present within the subject land includes large industrial buildings. Human-made structures within the subject land were assessed (where possible) during field survey and are considered unlikely to contain any habitat for roosting or breeding microchiropteran bats. Targeted surveys were conducted for microbats which may utilise these structures. Additional field surveys may be required at the DA stage.

The subject land contains 6.52 ha of open exotic grasses /exotic vegetation predominately represented by environmental weed species.

Table 26: Assessment of prescribed impacts to human-made structures and non-native vegetation

Criteria in accordance with BAM 2020 Section 6.1.2	Response
2. If human-made structures (e.g. bridges, culverts, abandoned buildings) and non-native vegetation (e.g. camphor laurel trees) provides habitat for threatened species, the assessor must:	
a. provide a description of the type of human-made structure or non-native vegetation habitat	The subject land contains noisy industrial buildings, car parks and roads. Non-native vegetation present in the subject land includes environmental weeds such as <i>Ligustrum sinense</i> and <i>Olea europaea</i> subsp. <i>cuspidata</i> and planted exotics such as <i>Jacaranda mimosifolia</i>.
b. prepare a list of threatened species that use these features as habitat	The following species (microbats) are known to utilise human-made structures: • <i>Miniopterus australis</i> (Little Bent-winged Bat) • <i>Miniopterus orianae oceanensis</i> (Large Bent-winged Bat) • <i>Myotis macropus</i> (Southern Myotis). The field surveys did not record evidence of microbat use in the industrial buildings. Exotic vegetation may be utilised for foraging by: • <i>Pteropus poliocephalus</i> (Grey-headed Flying Fox) Open grasslands may provide foraging habitat for the following species: • <i>Hieraaetus morphnoides</i> (Little Eagle) • <i>Lophoictinia isura</i> (Square-tailed Kite).
c. describe how each threatened species could, or does, use the human-made structure or non-native vegetation as habitat (based on published literature and other reliable sources).	Microbat species may utilise the buildings as non-breeding roosting habitat. Breeding for microbats is unlikely to occur within the industrial buildings as all the above listed microbat species require caves as maternity roosts which are not located within or near the subject land. The exception is

Criteria in accordance with BAM 2020 Section 6.1.2	Response
	<i>Myotis macropus</i> which may occasionally utilise buildings to shelter, however, no evidence of microbat use was recorded at the industrial buildings. <i>Miniopterus orianae oceanensis</i> and <i>Miniopterus australis</i> are known to form large maternity colonies in specific caves (Mills 2021, Augusteyn et al 2021) and do not utilise human-made structure as part of breeding habitat. As mentioned above, the non-native vegetation may provide supplementary foraging habitat for Grey-headed Flying-fox. The Little Eagle prefers to forage in open areas including farmlands and may utilise trees for perching during foraging ((Marchant and Higgins 1993). Square-tailed Kite utilises the ecotones between timbered and open habitats (Debus and Czechura 1989) similar to the vegetation found within the subject land.

8.3. Habitat connectivity

Although the subject land has been largely cleared of vegetation and located within a highly modified environment, the subject land has some connectivity features along the riparian vegetation along Georges and ANZAC Rivers. As identified in Figure 28. The subject land provides some connectivity links between habitats for mobile threatened species.

An assessment of prescribed impacts to habitat connectivity is presented in Table 27.

Table 27: Assessment of prescribed impacts to habitat connectivity

Criteria in accordance with BAM 2020 Section 6.1.3	Response
2. Where corridors or other areas of connectivity link habitat for threatened entities, the assessor must:	
a. prepare a list of threatened entities that are likely to use or are a part of the connectivity or corridor	Highly mobile, threatened birds and bats that are likely to utilise the vegetation within the subject land (mostly for supplementary foraging) and were included in this assessment. Megabats: • <i>Pteropus poliocephalus</i> (Grey-headed Flying Fox). Microbats: • <i>Falsistrellus tasmaniensis</i> (Eastern False Pipistrelle) • <i>Miniopterus australis</i> (Little Bent-winged Bat) • <i>Miniopterus orianae oceanensis</i> (Large Bent-winged Bat) • <i>Micronomus norfolkensis</i> (Eastern Coastal Free-tailed Bat) • <i>Saccolaimus flaviventris</i> (Yellow-bellied Sheath-tail Bat) • <i>Scoteanax rueppellii</i> (Greater Broad-nosed Bat) • <i>Vespadelus troughtoni</i> (Eastern Cave Bat). Birds, including: • <i>Glossopsitta pusilla</i> (Little Lorikeet) • <i>Ninox strenua</i> (Powerful Owl) • <i>Lophoictinia isura</i> (Square-tailed Kite)

Criteria in accordance with BAM 2020 Section 6.1.3	Response
	• <i>Hieraaetus morphnoides</i> (Little Eagle). Migratory species (birds): • <i>Anthochaera phrygia</i> (Regent Honeyeater) • <i>Lathamus discolor</i> (Swift Parrot) • <i>Hirundapus caudacutus</i> (White-throated Needletail).
b. describe the importance of the connectivity to threatened entities, particularly for maintaining movement that is crucial to the species' life cycle	The vegetation within the subject land provides a stepping-stone habitat between vegetation within the subject land and broader landscape. The removal of the vegetation will reduce the extent of native vegetation available across the landscape.

8.4. Water bodies, water quality and hydrological processes

There are water bodies mapped adjacent to the subject land.

Table 28: Assessment of prescribed impacts to water bodies, water quality and hydrological processes

Criteria in accordance with BAM 2020 Section 6.1.4	Response
1. Where water bodies or any hydrological processes that sustain threatened entities occur on the subject land, the assessor must:	
a. prepare a list of threatened entities that may use or depend on water bodies or hydrological processes for all or part of their life cycle, or b. prepare a list of threatened entities that will be, or are likely to be impacted by changes to existing water bodies or hydrological processes or the construction of a new water body	Species with waterbodies as habitat constraints, including: • Southern Myotis which may utilise the waterbodies as foraging habitat. Additionally, roosting habitat is located within 200 m of waterbody and breeding habitat includes caves within 10-15 m from waterbody. • PCT 3145 and 4024 which are part of TEC River-flat Eucalypt Forest and PCT 4023 part of TEC Swamp Oak Forest are considered TECs which are dependent upon hydrological processes for their survival. • Coastal Wetlands mapped within and adjacent to the subject land are considered groundwater dependent ecosystems. The Planning Proposal requires a high degree of future modification of the land to prevent flooding, as such the proposal has been subject to flooding and riparian assessments. The planning proposal will result in changes to the hydrological processes due to future clearing of riparian vegetation, reshaping of Georges River. This includes impact and clearing of the TECs and modification of factors which sustain the life cycle of the TECs (i.e. hydrological flows). According to the Aquatic Ecology Report (ELA 2024) the future "development would not impede the hydrology within the wetland or obstruct connectivity with the river. Flows leaving the site and entering the wetland would likely be similar before and after development". A Vegetation Management Plan will be implemented as part of future applications and will include restoration of TECs.

Criteria in accordance with BAM 2020 Section 6.1.4	Response
c. describe the habitat provided for each threatened entity by the water body or hydrological process, including consideration of water quality, volume, flow paths and seasonal patterns	According to the Aquatic Report (ELA 2024) the Planning Proposal will not impede the hydrology within the wetland or obstruct connectivity within the river. Therefore, it is unlikely that the Planning Proposal will involve future changes to hydrological flow, therefore, it is unlikely to impact adjacent vegetation (PCT 3145, 4023 and 4024 listed as TECs). However, the Aquatic Report notes that clearing of native vegetation has potential to change the biophysical and ecological integrity of the adjacent native vegetation (ELA 2024) and impacts to foraging habitat for Southern Myotis. <u>Southern Myotis</u> According to the TBDC Southern Myotis relies on waterbodies >3 m wide for foraging and habitat surrounding waterbodies are used for breeding and foraging. The Planning Proposal will clear riparian vegetation and reshape Georges River. The Planning Proposal has potential to impact upon foraging habitat due to changes to hydrological flow, removal of riparian vegetation and decrease in water quality which reduces availability of food items (i.e. fish). <u>PCT 3145, 4023, 4024 and mapped wetlands</u> Changes to the species composition of PCTs downstream to the future reshaping of Georges River may result in erosion, sedimentation and a reduction in water quality of Georges River.

8.5. Wind farm developments

The planning proposal is not for a wind farm development.

8.6. Vehicle strike

The planning proposed may result in an increase in vehicle movement within the subject land. There could be an increased risk of vehicle strike on threatened species and other native fauna. Increase in risk of vehicle strike is most likely to impact upon nocturnal species and less mobile species. Mitigation measures to reduce impacts to native fauna species have been included in Section Table 38.

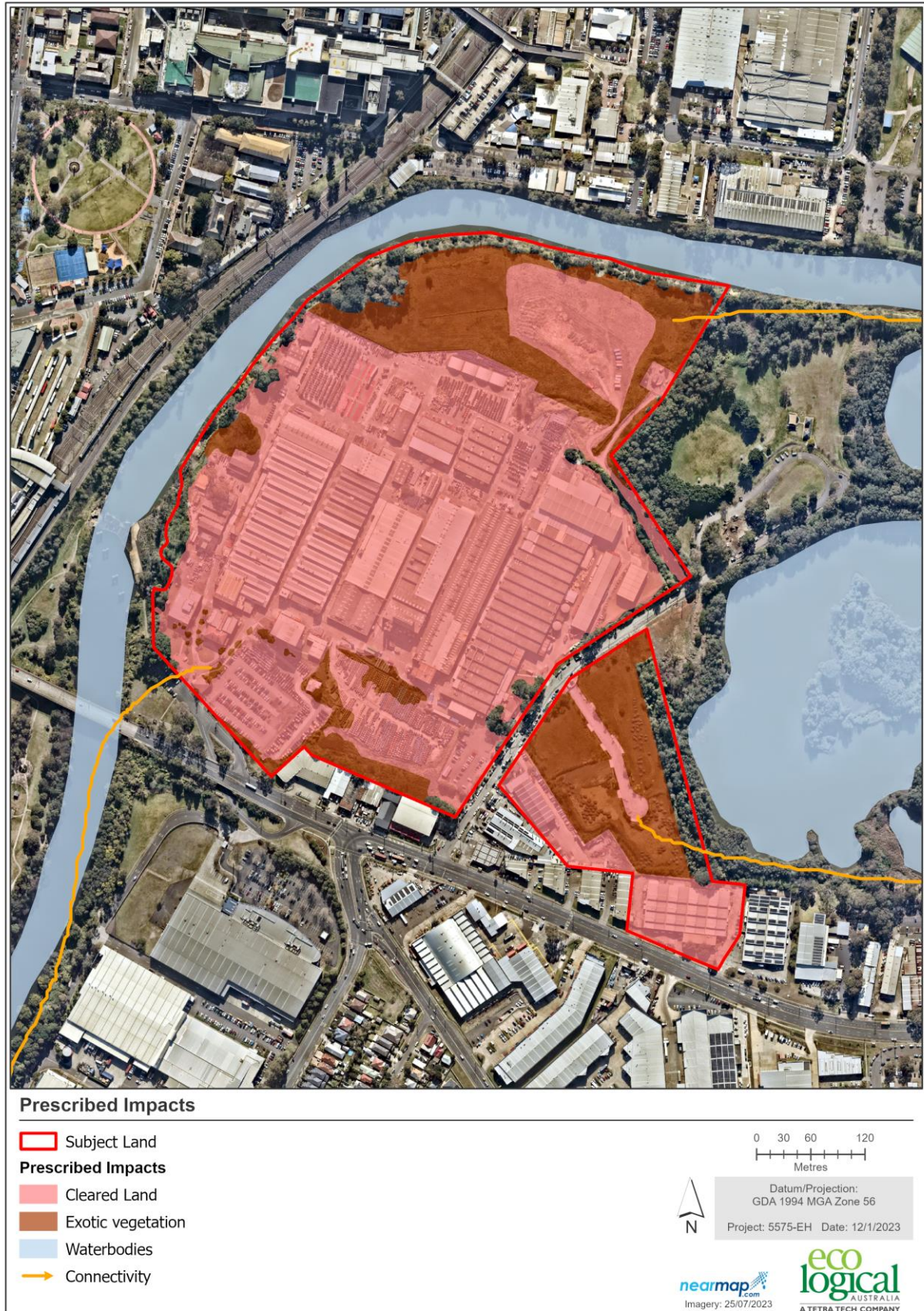


Figure 28: Prescribed impacts within the development footprint

9. Avoiding and minimising impacts on biodiversity values

9.1. Locating a project to avoid and minimise impacts on vegetation and habitat

The planning proposal has been located in a way which avoids and minimises impacts as outlined in Table 29.

Table 29: Locating a project to avoid and minimise impacts on vegetation and habitat

Approach	How addressed	Justification
Locating the proposal (including ancillary facilities) in areas lacking biodiversity values	Areas of cleared land and reduced biodiversity values have been utilised within the development footprint. The residual impacts to native vegetation are restricted to degraded and unstable areas of riparian vegetation and planted native trees.	The development footprint has been adjusted multiple times during the Concept Plan, with consultation with relevant stakeholders informing the final design with recent alterations to the construction footprint to avoid areas of SEPP wetlands. Areas of existing industrial development and cleared land will contain most of the future development. The Planning Proposal has prioritised retention of higher quality habitat within Haigh Park, which is no longer part of the subject land. This includes mapped coastal wetland and a large patch of PCT 4024 and smaller patches of PCT 3145 and 4023. A portion of the subject land along the eastern boundary will also be retained to prevent impacts to coastal wetlands mapped.
Locating the proposal (including ancillary facilities) in areas where the native vegetation or threatened species habitat is in the poorest condition	The project is predominantly located where native vegetation is in degraded or planted states and threatened species habitat is considered marginal foraging habitat. The final design of the precinct avoids areas of higher quality vegetation and species habitat in Haigh Park and around Lake Moore.	The project is located within predominantly cleared industrial estate and degraded riparian vegetation. Higher quality habitat occurs within and adjacent to the subject land in Haigh Park and Lake Moore. These areas will form part of the network of open spaces within the final design of the precinct and are zoned to ensure these areas remain as open spaces with retained vegetation. A Vegetation Management Plan will be implemented following the re-shaping and clearing of native vegetation along Georges River.
Locating the proposal (including ancillary facilities) in areas that avoid habitat for species with a high biodiversity risk weighting or land mapped on the important habitat map, or native vegetation that is a TEC, a highly cleared PCT or an entity at risk of a serious and irreversible impact (SAII)	The project has aimed to limit, as far as practical, the removal of vegetation/habitat in high threat categories by locating the majority of the subject land within areas of lower quality vegetation, along unstable banks prone to slumping where intrusive engineering interventions are likely to be required regardless of the development.	The Planning Proposal has limited opportunity to avoid all areas of TECs within the development footprint, specifically along the Georges River frontage portion of the site. Areas of higher quality TECs in the Haigh Park portion of the subject land will be retained within the final design of the precinct. Areas of mapped wetlands will be retained, and indirect and direct impacts associated with wetlands are assessed under a separate Aquatic Ecology Report (ELA 2024). There are no SAIIs identified within the subject land.
Locating the proposal in areas outside of the buffer	The Planning Proposal has been centred around the area of least biodiversity	Woodland and forest vegetation within the subject land are located within a highly

Approach	How addressed	Justification
area around breeding habitat features such as nest trees or caves	impact with the aim to recreate some elements of connectivity values following the revegetation works. This includes connected green spaces. The Planning Proposal also aims to conserve habitat features surrounding the subject land.	fragmented landscape and generally occurs as degraded linear patches of vegetation along the Georges River with some areas of higher quality habitat, such as in Haigh Park and around Lake Moore. These small patches provide connectivity features for mobile species to larger patches of remnant vegetation. Ranging from patchy isolated areas adjoined by roads and existing industrial and residential areas to moderate condition areas adjoining the Georges River. The Planning Proposal has sought to mitigate impacts to the vegetated riparian zone and connectivity elements through landscape plantings that will provide similar features to what is currently present, i.e. native eucalypt species and patches of native ground cover. These landscaping features will facilitate movement for highly mobile species along the riparian corridor to allow continued movement of species and genetic material between areas of nearby habitat.

9.2. Designing the proposal to avoid or minimise direct and indirect impacts on native vegetation, threatened species, threatened ecological communities and their habitat

The project is proposed on heavily modified/degraded land. The design has incorporated existing cleared areas as much as possible and minimised the clearing native vegetation. The avoidance portion of the Planning Proposal has retained larger patches of TECs in Haigh Park as open space.

The planning proposal has assumed the worst-case scenario in which all the vegetation within the development footprint will be affected. There is potential in the design phase that vegetation may be retained within the subject land and demonstrate avoid and minimising impacts to biodiversity values. However, that will be determined and assessed at a later stage. For the purpose of this report, an assumed worst-case scenario has been assessed. The assessment of avoiding and minimising impacts is outlined provided in Table 30 below.

Table 30: Designing a project to avoid and minimise impacts on vegetation and habitat

Approach	How addressed	Justification
Reducing the proposal's clearing footprint by minimising the number and type of facilities	The condition of the riparian vegetation and the instability of the bank, evidenced by areas of bank slumping in February 2020 (Northrop, 2021). In designing the development, the aim was to conserve the larger intact patches of vegetation within Haigh Park and Lake Moore foreshore. The majority of the development is	The project has been designed to minimise impacts to vegetation within Haigh Park and to restabilise the foreshore through extensive engineering intervention and re-establish a vegetated riparian zone that incorporates public amenity features that facilitate community access to the foreshore. Stabilisation of the foreshore is a critical step in preparing the subject land for future

Approach	How addressed	Justification
	centred in the most cleared portion of the existing industrial infrastructure.	development. The retention and rehabilitation works of vegetation within Haigh Park provides for some avoidance and additional mitigation of the impacts to the areas of degraded riparian habitat within the site.
Locating ancillary facilities in areas that have no biodiversity values	The design has endeavoured to locate ancillary facilities (such as temporary offices and laydown areas) areas, within already cleared areas and avoid patches of native vegetation.	The placement of ancillary facilities (such as temporary offices and laydown areas) has been designed to minimise impacts to biodiversity values by locating them in already cleared areas.
Locating ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas with the lowest vegetation integrity scores)	The design has endeavoured to locate ancillary facilities in existing cleared and industrial infrastructure.	The placement of ancillary facilities has been designed to minimise impacts to biodiversity values by locating them in areas of lower biodiversity value (existing cleared areas) within the subject land boundary.
Locating ancillary facilities in areas that avoid habitat for species and vegetation that has a high threat status (e.g. an endangered ecological community (EEC) or critically endangered ecological community (CEEC) or is an entity at risk of a serious and irreversible impact (SAIL))	Placement of ancillary facilities has been able to avoid impacts to areas providing species habitat and EEC vegetation.	The placement of ancillary facilities has been designed to work in and around areas of cleared land. No clearing of species habitat or EEC will occur solely for ancillary facilities.
Actions and activities that provide for rehabilitation, ecological restoration and/or ongoing maintenance of retained areas of native vegetation, threatened species, threatened ecological communities and their habitat on the subject land.	The planning proposal has considered rehabilitation or restoration works. These actions will be provided during the submission of the future DA.	A Vegetation Management Plan will be prepared to re-establish riparian vegetation along Georges River. Instream works including fish habitat and passage will also be included. The VMP should also consider weed removal along the foreshore of Lake Moore.

9.3. Locating a project to avoid and minimise prescribed biodiversity impacts

The planning proposal has been located in a way which avoids and minimises prescribed biodiversity impacts as outlined in Table 31.

Table 31: Locating a project to avoid and minimise prescribed biodiversity impacts

Approach	How addressed and justification
Locate surface works to avoid direct impacts on the habitat features	The planning proposal has been designed to avoid direct impact to coastal wetlands along the eastern and north-eastern boundary of the subject land. However, the future design will result in re-shaping Georges River which will impact upon aquatic and riparian habitat and hydrological processes.

Approach	How addressed and justification
	The planning proposal will also result in the removal of nine hollow-bearing trees and removal of TECs and connectivity corridors along Georges River and Lake Moore.
Locating the envelope of sub-surface works, both in the horizontal and vertical plane, to avoid and minimise operations beneath the habitat features, e.g. locating long wall panels away from geological features of significance or water dependent plant communities and their supporting aquifers	The planning proposal has been subject to redesign and intensive surveys including flood studies to provide the best ecological outcome and minimise impacts on habitat features including hydrological processes. The Planning Proposal does not directly impact upon the mapped wetlands located within the subject land. These areas have been avoided as part of the updated Planning Proposal. The planning proposal will result in impact to TECs which are considered water dependent plant communities due to the reliance of periodic inundation including PCT 3145, 4023 and 4024. The planning proposal will also result in the removal of nine hollow-bearing trees which are considered potential habitat features for threatened entities such as Southern Myotis.
Locating the project to avoid severing or interfering with corridors connecting different areas of habitat and migratory flight paths to important habitat or preferred local movement pathways	The proposed planning proposal will result in a minor reduction in the extent of vegetation within the subject land. This vegetation may provide stepping stone habitat between urban fragmented patches of vegetation. The riparian corridor provides an important connective pathway for the dispersal of mobile species including the Southern Myotis. Corridor movement will be recreated for highly mobile species through landscaping in the Vegetated Management Zone around the periphery of the site. The vegetation structure to be recreated, upon maturation will be similar or greater value than the vegetation currently in this area.
Locating the project to avoid direct impacts on water bodies	The subject land is adjacent and within the riparian buffer area of Georges River wetlands and within close proximity to Lake Moore wetlands. The subject land is considered part of a hydrological process. Both Georges River and Lake Moore wetlands potentially sustain known threatened species habitat and threatened ecological communities. The project involves reshaping of Georges River which is a large waterbody. Effort has been made to reduce the impacts of the reshaping, however, due to flood issues, substantial works along the foreshores area are also required. A VMP will be prepared to mitigate some of the impacts following the removal of riparian vegetation and instream works.

9.4. Designing a project to avoid and minimise prescribed biodiversity impacts

The planning proposal will result in complete removal of vegetation and all dwellings. Although the development has been located in an area which avoids and minimises impacts to better quality vegetation and more important habitat in the locality, it has not been designed in a way which avoids and minimises impacts on prescribed biodiversity values within the subject land.

Table 32: Designing a project to avoid and minimise prescribed biodiversity impacts

Approach	How addressed and justification
Design of project elements to minimise interactions with threatened entities	The planning proposal will result in the removal of TECs. PCT 3145, 4023 and 4024 and planted native vegetation may provide foraging habitat for threatened entities such as the Grey-headed Flying-fox. The planning proposal also impacts upon habitat for Southern Myotis. Effort has been made to consider different design options and the current planning

Approach	How addressed and justification
	proposal has minimised impacts to mapped coastal wetlands. However, the project will impact upon threatened entities and their habitat.
Maintain environmental processes that are critical to the formation and persistence of habitat features not associated with native vegetation	The planning proposal will result in the removal of native vegetation including PCT 3145, 4023, 4024 and planted native vegetation. The planning proposal will result in the loss of native vegetation and modification of the environmental processes (i.e. due to reshaping of Georges River) which maintain two TECs and mapped Coastal Wetlands. The planning proposal will retain environmental processes within the subject land and contribute towards restoration works including implementation of a VMP with instream fish habitat.
Maintain hydrological processes that sustain threatened entities	The planning proposal will involve future reshaping of Georges River and removal of riparian vegetation. This will result in changes to the hydrological flow to achieve this. The Aquatic Ecological Report (ELA 2024) states that after the instream works, the hydrological flows should represent similar flow to pre-reshaping works. As such, there will be disturbance to the hydrological flows which sustain habitat for Southern Myotis and TECs, however these will be reinstated following works.
Controlling the quality of water released from the site, to avoid or minimise downstream impacts on threatened entities	Additional assessments will be conducted following the gateway approval and finalisation of the development plans to assess the water quality from the future development. For the purpose of this planning proposal, the future works will result in impacts to TECs and threatened entities.



Plate 1: Example of potential winter-roosting habitat for microbats in human-made structures.



Plate 2: Example of non-native vegetation potentially utilised as foraging habitat for mobile fauna species.

10. Assessment of Impacts

10.1. Direct impacts

The direct impacts of the development on:

- native vegetation is outlined in Table 33
- threatened ecological communities are outlined in Table 34
- prescribed biodiversity impacts are addressed in Section 6.4.

Direct impacts including the indicative future footprint are shown on Figure 29.

Table 33: Direct impacts to native vegetation and exotic vegetation

PCT ID	PCT Name	Condition	Direct impact (ha)
3145	Cumberland Bangalay x Blue Gum Riverflat Forest	Weedy	0.21
4023	Coastal Valleys Swamp Oak Riparian Forest	Low	0.46
4024	Cumberland Blue Box Riverflat Forest	Weedy	1.44
N/A	Planted native	-	0.47
N/A	Exotic	-	6.52
N/A	Cleared**	-	22.31
TOTAL			31.42

** CLEARED AREAS INCLUDES BUILD ENVIRONMENTS AND EXOTIC GRASSLANDS

Table 34: Direct impacts on threatened ecological communities

PCT ID	BC Act			EPBC Act		
	Listing status	Name	Direct impact (ha)	Listing status	Name	Area (ha)
3145	ECC	<i>River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregion</i>	0.21	*	-	-
4023	EEC	<i>Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions</i>	0.46	*	-	-
4024	EEC	<i>River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregion</i>	1.44	*	-	-

EEC – ENDANGERED ECOLOGICAL COMMUNITY

* NOTE THAT PCT 4024, 3145 AND 4023 DID NOT SATISFY THE REQUIREMENTS FOR LISTING UNDER THE EPBC ACT.

10.2. Change in vegetation integrity

The change in vegetation integrity as a result of the development is outlined in Table 35.

Table 35: Change in vegetation integrity

Veg Zone	PCT ID	Condition	Area (ha)	Current vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity
1	3145	Weedy	0.21	25.9	0	-25.9
2	4023	Low	0.56	27.8	0	-27.8
3	4024	Weedy	1.45	38.6	0	-38.6

10.3. Indirect impacts

The indirect impacts of the planning proposal are outlined in Table 36. Indirect impacts include, but are not limited to:

- Reduced water quality viability of adjacent habitats due to noise, dust or pollutants.
- Transport of weeds and pathogens which may float on the water to new habitats or via wind.
- Rubbish dumping into the water body and impacts to aquatic species.
- Increase in pest or feral species.
- Changes to the hydrological flow or water quality to adjacent wetlands and waterways
- Over-shadowing of the adjacent waterbodies and vegetation due to proposed future construction of tall buildings.
- Alteration of the flora species composition of adjacent vegetation such as Haigh Park due to future removal of vegetation for the Planning Proposal.
- Avoidance of fauna species from traversing the site such as disturbance to nocturnal species due to increase lighting, noise and proposed removal of native vegetation.

Mitigation measures designed to decrease the potential indirect impacts are outlined in the following sections.



Figure 29: Final project footprint including construction and operation

Table 36: Indirect impacts

Indirect impact	Description (nature, extent and frequency)	Biodiversity value affected	Duration/Timing	Consequence
Inadvertent impacts on adjacent vegetation or habitat	Damage to vegetation outside the approved construction/development footprint during construction and operational phases.	Native vegetation, threatened ecological community	Short term impacts Construction and operational phase	Loss of vegetation, loss of potential foraging habitat for threatened species
Reduced viability of adjacent habitat due to edge effects or overshadowing	Removal of vegetation on the edge of the development footprint may cause edge effects. Reduced viability of specialist and/or threatened species. Most likely to occur during the construction phase. The establishment of future development may result in overshadowing of adjacent vegetation and foreshores and will be addressed in future DAs.	Native vegetation, threatened ecological community and native fauna	Short term impacts Construction phase. Long-term	Increase in edge effects, weed species colonising areas of disturbed habitat on edge of the subject land, causing reduction in habitat for some flora and fauna species. The development of future buildings may result in overshadowing of adjacent vegetation and foreshores resulting in a loss of vegetation integrity. These matters will be addressed as part of future DAs.
Reduced viability of adjacent habitat due to noise, dust or light spill	Noise and dust created from machinery during daytime construction. Night work is not expected as part of the construction works therefore, no light spill associated with night works. However, it is expected that outdoor night lighting will be used as part of the operational phase.	Native fauna, native vegetation	Short term impacts (construction phase) Ongoing impacts (life of project)	Noise and dust deter native fauna from the subject land in the short term. Dust may inhibit plant growth in the short term. Night lighting may influence fauna behaviour in the long-term, e.g. attraction of invertebrates to lighting, therefore species such as microbats may be increasingly attracted to the area. Night lighting may also disrupt fauna movement and activity, including foraging.

Indirect impact	Description (nature, extent and frequency)	Biodiversity affected	value	Duration/Timing	Consequence
Transport of weeds and pathogens from the site to adjacent vegetation	Weeds and pathogens introduced into subject land and adjacent retained vegetation, resulting from transport of topsoil or machinery.	Native vegetation, threatened ecological community		Construction phase. May cause long-term impacts.	Potential for weed spread into adjacent habitat and affect quality of vegetation for native flora and fauna. Potential for pathogens to be introduced into the subject land through use of machinery.
Increased risk of starvation or exposure and loss of shade or shelter	Permanent loss of shade/shelter due to loss of canopy. Permanent loss of suitable foraging habitat for Grey-headed Flying-fox	Native fauna		Short and long term impacts, during life of project	Permanent loss of shade or shelter for some fauna species such as reptiles, however, contiguous adjacent habitat will continue to provide shelter, so risk of starvation and exposure is low and short term.
Trampling of threatened flora species	Threatened flora species are unlikely to occur in the subject land due to the high exotic groundcover and low condition of native vegetation.	N/A		N/A	N/A
Inhibition of nitrogen fixation and increased soil salinity	The project is unlikely to inhibit nitrogen fixation or increase soil salinity outside the development footprint.	N/A		N/A	N/A
Fertiliser drift	Fertilisers may be used post-construction for landscaping purposes, however as this would be applied to specific areas and not applied aerially, this potential impact is unlikely to occur.	Native vegetation, threatened ecological community		Ongoing impacts Post-construction	Decreased plant diversity and increased exotic cover, as invasive species take advantage of additional nutrients.
Rubbish dumping	Within and adjacent to the subject land during construction and operational phases.	Native vegetation, threatened ecological community		Short-term and long-term impacts	Rubbish dumping may impact on quality and health of fauna or flora species and habitat retained adjacent to the development footprint. Dumped rubbish may have downwind effects where it is

Indirect impact	Description (nature, extent and frequency)	Biodiversity value affected	Duration/Timing	Consequence
				loose and makes its way into sensitive ecosystems or suffocates fauna.
Wood collection	Removal of wood from development footprint	Native vegetation, threatened ecological community	Short-term and long-term impacts Life of project, including construction phase	Permanent removal of microhabitats could impact native fauna populations in land surrounding the subject land or instream fish habitat.
Removal and disturbance of rocks including bush rock	Potential for disturbance during construction phase and for residents to collect bush rock during operational phase of future residential development.	Native fauna and native vegetation habitat	Construction phase Operational phase	Potential reduction in fauna habitat and decline in rock habitat available.
Increase in predators	Increased predation on native fauna, reduction in vegetation where predators inhabit. Resulting from urban development and opportunistic increase in predators.	Native fauna	Long term impacts	Decreased native fauna diversity and population sizes.
Increase in pest animal populations	Resulting from urban development and opportunistic increase in pest/invasive species that thrive in urban spaces. Increased native fauna competition in surrounding habitat. Likely limited effects considering limited existing habitat in surrounds and extensive urban development north of the subject land. Increased grazing or degradation of retained native vegetation. Trampling of vegetation.	Native vegetation, native fauna	Long term impacts	Decreased native fauna diversity and population sizes. Loss of habitat due to grazing, degradation or trampling.
Changed fire regimes	During construction, working machinery and/or chemicals have the potential to spark fire. Potential fire hazard associated with industrial activities post-construction.	Native vegetation, native fauna	Life of project including construction. Short-term and long-term impacts.	Disturbance to vegetation, loss or damage to vegetation adjacent to the subject land. Loss of habitat for fauna species. Death of fauna species.

Indirect impact	Description (nature, extent and frequency)	Biodiversity affected	value	Duration/Timing	Consequence
Disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds	Disturbance/removal of foraging habitat for Eucalypt-dependent and highly mobile species (such as Grey-headed Flying-fox). Ongoing light and/or noise impacts to native fauna associated with the operational phase.	Native fauna		Short-term and long-term impacts. Life of project.	Reduced numbers of species in vicinity. Deter or alter breeding and foraging regimes for fauna in proximity to development.
Sedimentation and contaminated and/or nutrient rich run-off	Runoff containing high nutrients and/or contamination into adjacent vegetation during construction and operational phases.	Native vegetation, threatened ecological community		Short-term and long-term impacts. Life of project. Construction phase higher risk (due to machinery/refuelling)	Change in vegetation quality. Habitat loss downwind or downslope of subject land.
Vehicle strike	Potential for native fauna to be struck by working machinery and moving vehicles during construction and operational phases	Native fauna		Short-term (construction) Long-term (operational)	Loss of native fauna species. Potential reduction in fauna population numbers.

10.4. Prescribed biodiversity impacts

Prescribed biodiversity impacts are defined under clause 6.1 of the BC Reg and include impacts on biodiversity values in addition to, or instead of, impacts from clearing vegetation and/or loss of habitat. Prescribed biodiversity impacts are outlined within Table 37.

Table 37: Direct impacts on prescribed biodiversity impacts

Prescribed biodiversity impact	Description (Nature, extent and frequency)	Consequences	Justification
Karst, caves, crevices, cliffs, rocks and other geological features of significance	There are no karsts, caves, crevices, cliffs, rocks or other geological features in the development footprint.	N/A	N/A
Human made structures or non-native vegetation	There are human made structures in the subject land. The field surveys did not record presence of microbat activity around the structures. Targeted surveys have been conducted and confirmed that microbats are present and additional surveys are required at construction phase to prevent impact to microbats. There are some patches of non-native vegetation. The National Recovery Plan for the Grey-headed Flying-fox lists weeds as part of its diet. The exotic vegetation is considered marginal supplementary foraging habitat and would most likely be used in the absence or in conjunction with native foraging resources.	Loss of supplementary / marginal foraging habitat for some highly mobile species	Impacts to human made structures and exotic vegetation will occur as part the planning proposal.
Habitat connectivity	The vegetation within the subject land has connectivity features with vegetation along Georges River. Lake Moore and Georges River in the east acts as a geographic barrier to dispersal of some species. The planning proposal will result in the loss of vegetation within the subject land; however,	The potential disruptions to habitat connectivity are limited, given that the vegetation to be removed is within a degraded landscape.	Connectivity of native vegetation will be retained as scattered street trees along the Georges River and Lake Moore in the adjacent landscape.

Prescribed biodiversity impact	Description (Nature, extent and frequency)	Consequences	Justification
	this is unlikely to fragment the patchy habitat connectivity in the landscape.		
Water bodies, water quality and hydrological processes	The planning proposal includes adjacent water bodies, wetlands and TECs and threatened entities which rely on hydrological process.	An Aquatic Ecology Report (ELA 2024) has been prepared which includes an assessment of impacts to aquatic habitats.	An Aquatic Ecology Report (ELA 2024) has been prepared which includes an assessment of impacts to aquatic habitats.
Wind turbine strikes on protected animals	This is not required for this proposal, since the project is not a wind farm.	N/A	N/A
Vehicle strikes	This is currently a planning proposal. Future works may result in an increase in traffic during operation of the project.	N/A	N/A

10.5. Mitigating and managing direct and indirect impacts

Measures proposed to mitigate and manage impacts at the subject land before, during and after construction are outlined in **Table 38**.

Table 38: Measures proposed to mitigate and manage impacts

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Sediment barriers or sedimentation ponds to control the quality of water released from the site into the receiving environment	Moderate	Minor	Appropriate controls are to be utilised to manage exposed soil surfaces and stockpiles to prevent sediment discharge into retained lands. Soil and erosion measures such as sediment fencing, clean water diversion must be in place prior the commencement of the construction work.	Erosion and sedimentation will be controlled.	For the duration of construction works	Project Manager
Prevent impacts of noise, dust and light spill on fauna species	Moderate	Minor	Construction lights or development lights should be positioned to prevent shine into retained vegetation. Street lights should use ecologically sensitive designs including use of shields and timers and positioned away from retained vegetation. Noise should be limited to construction hours only. Dust should be managed through appropriate dust control management plan.	Avoid impacts from artificial lighting on nocturnal or diurnal species. Reduction of noise outside of operation hours. Management of dust.	For the duration of the construction works and long-term	Project Manager
Prevent damage to vegetation retained on site	High	Moderate	Clearly delineate clearance limits and identify all trees for removal. Install 'No-go' fencing around vegetation to be retained prior to any works on site (i.e. coastal wetlands and along eastern boundary).	Prevent accidental removal of native vegetation. Prevent damage to retained revegetation.	For the duration of construction works	Project Manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecologist or licensed wildlife handler during clearing events	Moderate	Minor	Pre-clearance survey of trees to be removed and identification / location of habitat trees (i.e. for birds or possums) by a suitably qualified ecologist. Trees identified for retention should be clearly delineated as a 'No Go' zone with high visibility bunting. Supervision by a qualified ecologist/licensed wildlife handler during habitat tree removal in accordance with best practise methods. Any tree removal is to be undertaken by a suitably qualified and insured arborist. Additional microbat survey works within the buildings are required during the next phase of the development.	Any fauna utilising habitat within the subject land will be identified and managed to ensure clearing works minimise the likelihood of injuring resident fauna.	During clearing works	Project Manager / Ecologist
Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	Moderate	Minor	Vehicles, machinery should be cleaned of soil prior to entry into the subject land as external soil may contain pathogens or disease. Weed management to be consistent with best management practices.	Spread of weeds prevented.	Post-construction	Project Manager
Prevent the displacement of resident fauna	Moderate	Minor	Pre-clearance survey of trees to be removed and identification/location of habitat trees by a suitably qualified ecologist. Supervision by a qualified ecologist/licensed wildlife handler during tree removal in accordance with best practice methods (two-stage soft fall clearing).	Resident fauna relocated in a sensitive manner.	Prior to and during clearing works	Project Manager/ Ecologist
Timing works to avoid critical life cycle events such as breeding or nursing individuals	Moderate	Minor	Where possible within construction timelines, avoid clearing works in later winter/spring during breeding/ nesting season for animals.	Impacts to fauna during nesting/nursing season avoided.	During clearing works	Project Manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Making provision for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on or adjacent to the development footprint	Minor	Negligible	Landscaping in the subject land is to use locally derived native species and those found within the PCT present (PCT 3145, 4023, 4024). The removal of hollow-bearing trees should be mitigated through the installation of appropriate size nest boxes at ratio of two equivalent nest boxes per hollow removed.	Areas within the subject land will be landscaped using appropriate species.	Throughout construction and following completion of construction activities.	Project Manager
Prevent the dumping of rubbish found on site	Minor	Negligible	Waste bins to be present on site. Covers to be used to prevent blown litter and the entry of pest animals or rain. Removal and appropriate disposal of general waste.	Dumping of rubbish during construction prevented.	For the duration of the construction works	Project Manager
Fencing to protect significant environmental features such as riparian zones	High	Low	Temporary fencing and signage to be installed at the edge of the subject land to prevent entry into the adjacent vegetation and areas to be retained. Permanent fencing should be established at the interface of the subject land and vegetation to be retained to prevent impacts during the operational stage of the development.	No unintended clearing or trampling of adjacent vegetation to be retained.	During construction and operational phase of the development.	Project Manager
Enforced speed limits within the development footprint	High	Low	Recommended speed limits set no more than 40 km /hr during construction and 50 km / hr after construction.	Prevent fauna vehicle strike.	During construction and operational phase of the development.	Project Manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Staff training and site briefing to communicate environmental features to be protected and measures to be implemented	Minor	Negligible	Construction staff to be briefed prior to work commencing to be made aware of any sensitive biodiversity values present and environmental procedures such as: • Site environmental procedures (vegetation management, sediment and erosion control, exclusion fencing and weeds) • What to do in case of environmental emergency (chemical spills, fire, injured fauna) • Key contacts in case of environmental emergency.	All staff entering the subject land are fully aware of all the ecological values present within the Lot and environmental aspects relating to the development and know what to do in case of any environmental emergencies.	To occur for all staff entering/working at the subject land. Site briefings should be updated based on phase of the work and when environmental issues become apparent.	Project Manager

11. Impact summary

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

11.1. Serious and Irreversible Impacts (SII)

The Planning Proposal does not currently include any Serious and Irreversible Impacts (SII). Candidate entities can be nominated or included on the list, and this would need to be revised at the DA stage.

11.2. Impacts requiring offsets

The impacts of the development requiring offset for native vegetation are outlined in Table 39 and shown on Figure 30.

Table 39: Impacts to native vegetation that require offsets

Vegetation Zone	PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Biodiversity risk weighting	SII	Direct impact (ha)
1	3145	Cumberland Bangalay x Blue Gum Riverflat Forest	North Coast Wet Sclerophyll Forests	Wet Sclerophyll Forests (Shrubby sub-formation)	2	No	0.21
2	4023	Coastal Valleys Swamp Oak Riparian Forest	Coastal Floodplain Wetlands	Forested Wetlands	2	No	0.46
3	4024	Cumberland Blue Box Riverflat Forest	Coastal Floodplain Wetlands	Forested Wetlands	2	No	1.44
TOTAL							2.11

11.3. Impacts not requiring offsets

The impacts of the development not requiring offset are for planted native vegetation (0.47 ha) Figure 31.

11.4. Areas not requiring assessment

Areas not requiring assessment are shown on Figure 32. These areas have been cleared of native vegetation and do not contain habitat for threatened species. These areas include built or cleared & managed environments (22.31 ha) and exotic vegetation (6.52 ha) within the development footprint.

11.5. Credit summary

The number of ecosystem credits required for the development are outlined in Table 40. No candidate species credit species or likely habitat was recorded within the development footprint; hence no species credit species are required to offset the development. The biodiversity credit report is included in Appendix D.

Table 40: Ecosystem credits required

Vegetation Zone	PCT ID	PCT Name	Credit Class	Direct impact (ha)	Credits required
1	3145	Cumberland Bangalay x Blue Gum Riverflat Forest	Forested Wetlands Tier 3 or higher threat status	0.21	3
2	4023	Coastal Valleys Swamp Oak Riparian Forest	Forested Wetlands Tier 3 or higher threat status	0.46	6
3	4024	Cumberland Blue Box Riverflat Forest	Forested Wetlands Tier 1 or higher threat status	1.44	28
TOTAL				2.11	37

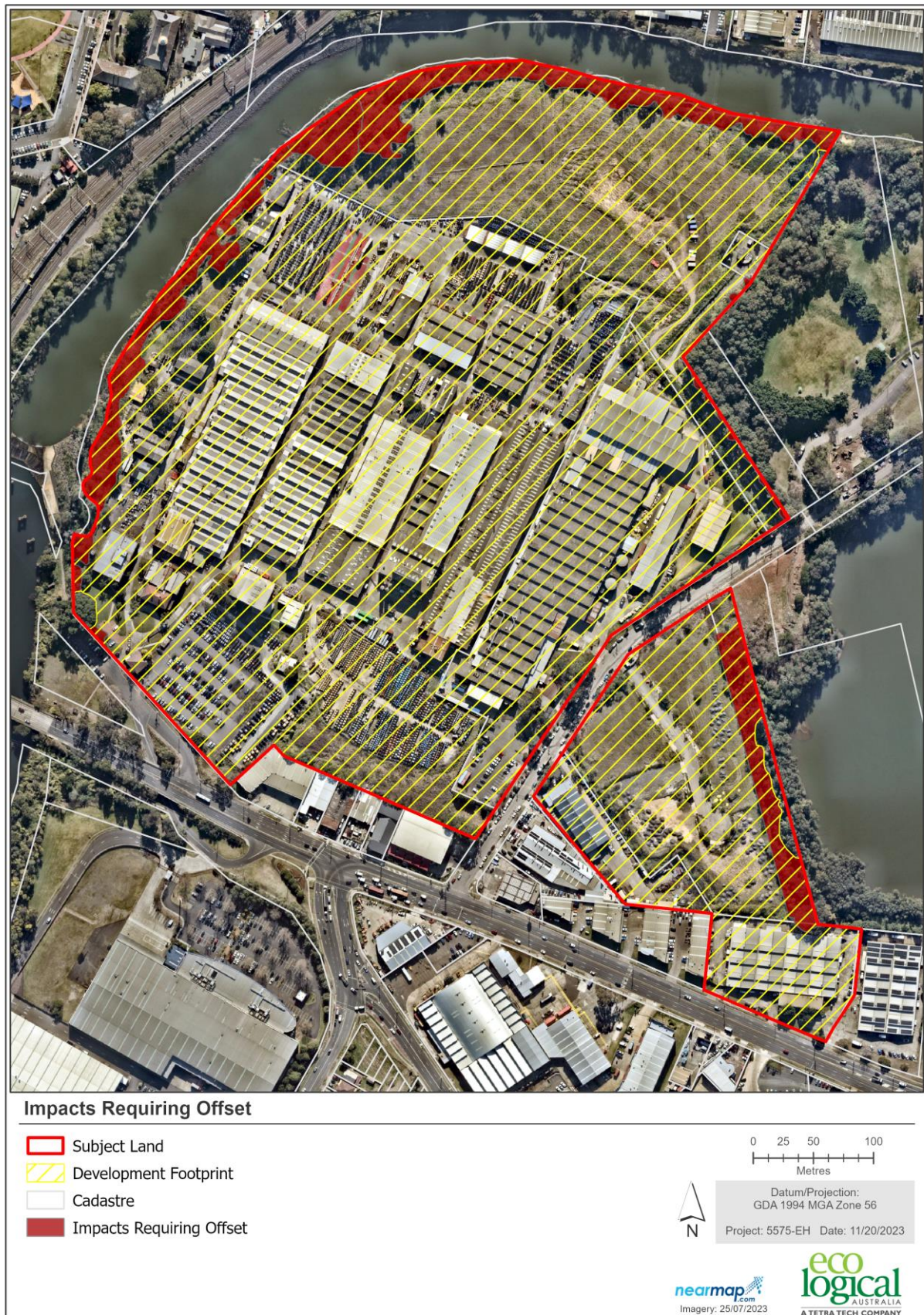


Figure 30: Impacts requiring offset



Figure 31: Not requiring offsets

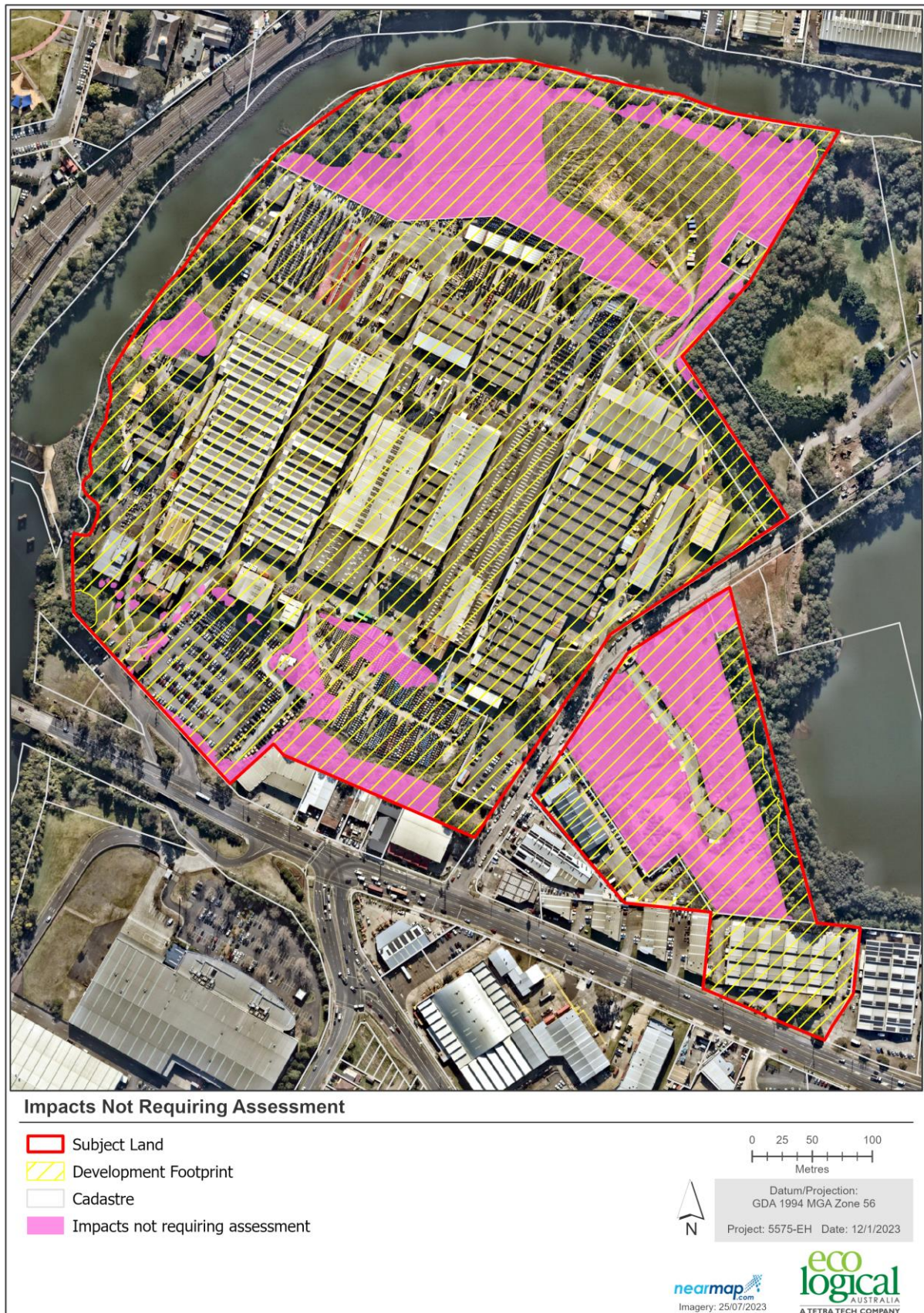


Figure 32: Areas not requiring assessment

12. Consistency with legislation and policy

12.1. Local Planning Directions

Under Section 9.1(2) of the EP&A Act a planning proposal lodged with the Department of Planning and Environment must consider the Local Planning Directions. The following directions are relevant to this proposal:

- 3.1 Conservation Zones
- 4.2 Coastal Management.

12.1.1. 3.1 Conservation Zones

The objective of the conservation zones is to:

“protect and conserve environmentally sensitive areas.”

The direction states:

- A planning proposal must include provisions that facilitate the protection and conservation of environmentally sensitive areas.
- A planning proposal that applies to land within a conservation zone or land otherwise identified for environment conservation/protection purposes in a LEP must not reduce the conservation standards that apply to the land (including by modifying development standards that apply to the land). This requirement does not apply to a change to a development standard for minimum lot size for a dwelling in accordance with Direction 9.2 (2) of “Rural Lands”.

The northwestern portion of the subject site is located on the Environmentally sensitive land map under the Liverpool LEP 2008. This land will be re-shape the steep bank along Georges River and clear riparian vegetation as part of the planning proposal. The works will then include reinstate riparian and fringing aquatic vegetation and fish habitat along the new bank and stabilisation works along the new bank. The planning proposal includes provisions to improve the long-term stability and health of Georges River.

12.1.2. 4.2 Coastal Management

The objective of the coastal management direction is to protect and manage coastal areas of NSW.

The direction states:

- (1) A planning proposal must include provisions that give effect to and are consistent with:
 - (a) the objects of the Coastal Management Act 2016 and the objectives of the relevant coastal management areas;
 - (b) the NSW Coastal Management Manual and associated Toolkit;
 - (c) section 3.2 of the NSW Coastal Design Guidelines 2023; and
 - (d) any relevant Coastal Management Program that has been certified by the Minister, or any Coastal Zone Management Plan under the Coastal Protection Act 1979 that continues to have effect under clause 4 of Schedule 3 to the Coastal Management Act 2016, that applies to the land.

- (2) A planning proposal must not rezone land which would enable increased development or more intensive land-use on land:
 - (a) within a coastal vulnerability area identified by chapter 2 of the State Environmental Planning Policy (Resilience and Hazards) 2021; or
 - (b) that has been identified as land affected by a current or future coastal hazard in a local environmental plan or development control plan, or a study or assessment undertaken:
 - i. by or on behalf of the relevant planning authority and the planning proposal authority, or
 - ii. by or on behalf of a public authority and provided to the relevant planning authority and the planning proposal authority.
- (3) A planning proposal must not rezone land which would enable increased development or more intensive land-use on land within a coastal wetlands and littoral rainforests area identified by chapter 2 of the State Environmental Planning Policy (Resilience and Hazards) 2021.
- (4) A planning proposal for a local environmental plan may propose to amend the following maps, including increasing or decreasing the land within these maps, under chapter 2 of the State Environmental Planning Policy (Resilience and Hazards) 2021:
 - (a) Coastal wetlands and littoral rainforests area map;
 - (b) Coastal vulnerability area map;
 - (c) Coastal environment area map; and
 - (d) Coastal use area map.

The Aquatic Report (ELA 2024) and Northrop 2024 (Moore Point Riparian)

12.2. Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The EPBC Act establishes a process for assessing the environmental impact of activities and developments where MNES may be affected. Under the Act, any action which “has, will have, or is likely to have a significant impact on a matter of MNES” is defined as a “controlled action”, and requires approval from the Commonwealth DCCEW, which is responsible for administering the EPBC Act.

The process includes conducting an Assessment of Significance for listed threatened species and ecological communities that represent a matter of MNES that will be impacted as a result of the proposed action.

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

- *Pteropus poliocephalus* (Grey-headed Flying-fox) - Vulnerable.

The assessments in this section were prepared in accordance with the EPBC Act Matters of National Environmental Significance: Significant Impact Guidelines 1.1 (Department of Environment 2013). These guidelines were established to assist proponents to determine whether a proposed action is likely to

result in a significant impact on a matter of national environmental significance. It was determined that the action is unlikely to have a significant impact on the threatened species listed above.

12.2.1. Vulnerable Species

12.2.1.1. *Pteropus poliocephalus* (Grey-headed Flying-fox)

There are no known Grey-headed Flying Fox camps within the subject land, with the nearest camp at Cabramatta, is 2 km north of the subject land (DCCEEW 2023). In 2019 the camp recorded 2,500 – 9,999 individuals.

There are five Grey-headed Flying-fox camps within a 20 km radius of the subject land that may use the foraging resources available within the subject land. The potential foraging habitat within the subject land is marginal and would not be relied upon as a sole foraging resource for this species. The Grey-headed Flying-fox will use a range of resources within 20 km of their camps. Therefore, the resources available in the subject land form part of a mosaic of resources within the locality.

Considering that Grey-headed Flying-fox is likely to forage within the subject land on an occasional basis, a significance assessment has been undertaken in accordance with Significant Impact Guidelines 1.1 under the EPBC Act (Table 41).

Table 41: EPBC assessment of significance for vulnerable species

Criterion	Assessment
Criterion a: lead to a long-term decrease in the size of an important population of a species	The Matters of National Environmental Significance Impact Guidelines 1.1 (Commonwealth of Australia, 2013) defines an important population as a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are: • Key source populations either for breeding or dispersal • Populations that are necessary for maintaining genetic diversity, and/or • Populations that are near the limit of the species range The Grey-headed Flying-fox is considered one population due to the constant exchange of genetic material between individuals and its movement between camps throughout its entire geographic range. Maternity or other roosting habitat is considered important habitat for this species. No Grey-headed Flying-fox camps currently or historically occur within the subject land with the nearest active Grey-headed Flying-fox camp approximately 2 km to the north. The proposed action will remove 2.11 ha of degraded PCTs and an additional 0.47 ha of planted native vegetation which comprises suitable foraging habitat for the Grey-headed Flying-fox. Given the proximity of more suitable habitat outside the assessment area, the removal of this potential foraging habitat would not lead to the long-term decrease in the size of an important population of this species.
Criterion b: reduce the area of occupancy of an important population	The proposed development will reduce the extent of available potential foraging habitat for this species. About 2.11 ha of degraded PCTs and an additional 0.47 planted native vegetation of potential foraging habitat will be removed from the subject land. The vegetation within the subject land may provide supplementary foraging habitat for the Grey-headed Flying-fox. The subject land does not contain breeding or sheltering habitat (i.e. bat camps/roost sites). Grey-headed Flying-fox are known to fly long distances and as such they are likely to utilise a large extent of habitat which may include some habitat within the subject land and a large amount of habitat in adjacent lands. Due to the extent of habitat outside the subject land, the removal of a small amount of native and non-native vegetation is unlikely to significantly reduce the extent of occupancy for this species.

Criterion	Assessment
Criterion c: fragment an existing important population into two or more populations	The proposed action will remove 2.11 ha of degraded PCTs and an additional 0.47 planted native vegetation which is likely to provide marginal foraging habitat for the Grey-headed Flying-fox. The removal of this vegetation will not significantly fragment vegetation corridors that may be used by this species. The Grey-headed Flying-fox is a highly mobile, with a large home range therefore the proposed action will not fragment an existing important population into two or more populations. While the potential foraging habitat may contribute as a 'stepping stone' for this highly mobile species to other more substantial foraging habitat sites, this function is unlikely to be significantly inhibited by the proposed works as vegetated areas will remain. Furthermore, the Grey-headed Flying-fox has been recorded in urban environments and are likely to continue to forage adjacent to the subject land and across the broader locality.
Criterion d: adversely affect habitat critical to the survival of a species	The National Recovery Plan for the Grey-headed Flying-fox 2021 identifies a number of myrtaceous plants used for foraging. Important winter and spring vegetation communities used for foraging are those that contain <i>Eucalyptus tereticornis</i>, <i>E. albens</i>, <i>E. crebra</i>, <i>E. fibrosa</i>, <i>E. melliodora</i>, <i>E. paniculata</i>, <i>E. pilularis</i>, <i>E. robusta</i>, <i>E. seeana</i>, <i>E. sideroxylon</i>, <i>E. siderophloia</i>, <i>Banksia integrifolia</i>, <i>Castanospermum australe</i>, <i>Corymbia citriodora</i>, <i>C. eximia</i>, <i>C. maculata</i>, <i>Grevillea robusta</i>, <i>Melaleuca quinquenervia</i> or <i>Syncarpia glomulifera</i>. The plan also identifies habitat which contains native species used for foraging and occur within 20 km of a nationally important camp. Native and exotic species have potential to be used for roosting for this species. The action area contains native species used for foraging and is within 20 km of a nationally important camp, so is considered habitat critical to the survival of a species. No nationally important camps will be directly affected by the proposed action. The planning proposal will result in the future removal of 2.11 ha of PCT in low condition and 0.47 ha of planted native vegetation which may provide suitable seasonal foraging habitat for this species. No camps/roost sites will be affected by the proposed action. Given that this species is relatively mobile, it is considered unlikely that the works would adversely affect habitat critical to the survival of this species.
Criterion e: disrupt the breeding cycle of an important population	The proposed action is unlikely to disrupt the breeding cycle of the Grey-headed Flying-fox given that no camps will be affected by the proposed action and suitable foraging habitat is available adjacent to the subject land.
Criterion f: Adversely affect habitat critical to the survival of a species; modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The potential foraging habitat to be removed is marginal and of low quality. Given the small amount of potential foraging habitat to be removed, that potential foraging habitat will persist adjacent to the subject land and across the locality, and that these species are generally mobile throughout their home ranges, it is unlikely that the habitat to be removed would cause the species to decline.
Criterion g: Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The proposed action is unlikely to result in the establishment of an invasive species that is harmful to this species.
Criterion h: Introduce disease that may cause the species to decline	Grey-headed Flying-foxes are reservoirs for the Australian bat lyssavirus (ABL) and can cause clinical disease and mortality in Grey-headed Flying-foxes. The proposed action is unlikely to present a significant ecological stress on any camps or on individuals that may utilise the subject land and therefore the works are unlikely to introduce or exacerbate this virus or any other disease that may cause this species to decline.

Criterion	Assessment
Criterion i: Interfere substantially with the recovery of the species	Considering the above factors, the proposed works will not interfere substantially with the recovery of this species.
Conclusion	In consideration of the above, the proposed works are considered unlikely to have a significant impact on the Grey-headed Flying-fox.

12.3. State Environmental Planning Policy (Biodiversity and Conservation) -Chapter 4 Koala Habitat Protection) 2021

Vegetation within the subject land is not considered to be highly suitable koala habitat for the purpose of this SEPP. The nearest remnant population in the area is approximately two and a half kilometres away to the south and is cut off from the site by the M5 South-West Motorway and Newbridge Road, a dual carriage way arterial road. The vegetation has a long history of disturbance and dense ground and midstorey weed cover. The site is isolated to the north and west by Georges River and to the east by substantial urban development. Few to no records occur directly east of the site.

13. Conclusion

Eco Logical Australia Pty Ltd was engaged by Leamac Pty Ltd and Coronation holdings Pty Ltd to prepare a BDAR for the Concept Masterplan to redevelop Moore Point into a mixed use precinct in the Liverpool City Council area. An early Biodiversity Assessment report prepared by ELA for the Planning Proposal was submitted for the Gateway process in 2020. This BDAR addresses the Gateway Determination condition 5 (Table 1) issued by the Department of Planning and Environment (DPE) (4 April 2023). This BDAR has been prepared to provide a full assessment of biodiversity impacts for the planning phase.

This report considers the subject land; describes the biodiversity values within the subject land; describes the indicative impacts; and outlines the measures to be taken to avoid, minimise and mitigate impacts to the vegetation and species habitat present within the subject land.

This report has followed the BAM 2020 established under Section 6.7 of the BC Act.

The BDAR has calculated the number of biodiversity credits that would be required to be retired if the development proceeds as described (Table 42) and has provided the relevant Significance Assessments under the Commonwealth EPBC Act. The table below outlines the associated ecosystem credit requirements to offset impacts to this vegetation.

Table 42: Summary of ecosystem credits required to offset the impacts of the development

Vegetation Zone	PCT ID	PCT Name	Condition	Credit Class / Trading Group	Direct impact (ha)	Credits required
1	3145	Cumberland Bangalay x Blue Gum Riverflat Forest		River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions / Tier 1	0.21	3
2	4023	Coastal Valleys Swamp Oak Riparian Forest		Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions / Tier 1	0.46	6
3	4024	Cumberland Blue Weedy Box Riverflat Forest		River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions / Tier 3	1.44	28
TOTAL					2.11	37

Three 'candidate species credit species' were identified for targeted surveys given the condition and extent of vegetation to be impacted. The species were:

- *Litoria aurea* (Green and Golden Bell Frog)
- *Myotis macropus* (Southern Myotis)
- *Phascolarctos cinereus* (Koala).

The species were not present during targeted surveys conducted at the appropriate time of the year and in accordance with BAM guidelines. One possible *Myotis/Nyctophilus* sp. (non-threatened species) was recorded during targeted surveys and was difficult to distinguish if the record was from threatened or non-threatened microbat species. Given that there was only one record, it was determined that this species may foraging within adjacent lands, but no habitat was recorded within the subject land. Therefore, no species credits were required to offset impacts to habitat for this species. Future development applications will require additional targeted surveys for microbats within the subject land particularly in the buildings.

No species credits are required to offset residual impacts of the development for any species credit species or as part of prescribed impacts.

No SAI candidate species were identified during targeted survey and therefore, the proposed development does not pose a risk of SAI to any species.

One MNES under the EPBC Act was identified as requiring significance assessments *Pteropus poliocephalus* (Grey-headed Flying-fox). An assessment of the Commonwealth Significant Impact Criteria was undertaken for this species and concluded that the proposed development would not result in a significant impact to this species. Therefore, a referral to the Commonwealth is not recommended.

Mitigation measures relating to direct, indirect and prescribed impacts are provided within this report to reduce and address any residual impacts from the planning proposal.

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Appendix B Definitions

The following terminology has been used throughout this report for the purposes of describing the impacts of the proposal in the context of a biodiversity assessment in accordance with the NSW Biodiversity Assessment Method 2020. This terminology may or may not align with other technical documents associated with the proposed development.

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 subject land, 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.
Subject land	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 subject land and the gain in biodiversity values at a biodiversity stewardship site.
Extent of occurrence (EOO)	Measures the spatial spread of a taxon to determine the degree to which risks from threatening factors could impact an entire population, and is not intended to be an estimate of the amount of occupied or potential habitat.
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 km in length.
Local population	The population that occurs in the subject land. In cases where multiple populations occur in the subject land or a population occupies part of the subject land, 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).
NSW (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 DPIE, which is a guide to assist assessors when using the BAM.
Patch size	An area of intact native vegetation that: a) occurs on the subject land 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 subject land 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.
Residual impact	An impact on biodiversity values after all reasonable measures have been taken to avoid, minimise or mitigate the impacts of development. Under the BAM, an offset requirement is determined 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 subject land, 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 DPIE 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 subject land, 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 C Vegetation Plot Data

Table 43: Plot location

Plot location data							
Plot no.	PCT	Vegetation Zone	Condition	Zone	Eastings	Northings	Bearing
P4_2020	4024	2	low	56	309010	6244514	30
P2_2021	4024	2	low	56	308564	6244234	182
P3_2021	3145	1	weedy	56	309126	6243980	147
P3_2020	4023	3	Weedy	56	308829	6244493	284
P4_2021	4023	3 (plot not used)	Weedy	56	309234	6244413	37
P2_2020	Planted native		Planted	56	309008	6244087	430

Table 44: Vegetation plot composition data

Composition (number of species)						
Plot no.	Tree	Shrub	Grass	Forb	Fern	Other
P4_2020	4	4	2	0	0	0
P2_2021	6	4	2	2	1	0
P3_2021	8	5	2	2	0	2
P3_2020	1	0	2	1	0	0
P4_2021	2	1	4	2	0	1
P2_2020	3	4	0	2	0	1

Table 45: Vegetation plot structure data

Structure (Total cover %)						
Plot no.	Tree	Shrub	Grass	Forb	Fern	Other
P4_2020	27.0	5.6	5.1	0.0	0.0	0.0
P2_2021	20.3	9.1	8.2	0.2	0.1	0.0
P3_2021	39.9	2.1	0.7	0.2	0.0	0.2
P3_2020	40.0	0.0	0.6	0.1	0.0	0.0
P4_2021	18.0	0.2	0.8	0.2	0.0	0.1
P2_2020	21	10.7	0	10	0	0.5

Table 46: Vegetation plot function data

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	HTE Cover (%)	Tree Regen
P4_2020	1	0	80.2	2.0	1	0	1	0	1	1	64.5	1
P2_2021	0	0	15.0	19.0	1	1	1	1	0	1	100.0	0
P3_2021	0	0	15.8	4.0	1	1	1	1	0	0	27.6	0

Function												
P3_2020	0	0	88	19	0	1	1	1	0	1	91.2	0
P4_2021	0	0	10.0	2.0	1	1	1	1	0	0	85.6	0
P2_2020	0	0	51.6	0	1	0	1	1	1	0	1.2	0

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

Table 47: Vegetation plot species data (species recorded by plot)

Form	Species name	Exotic (*)	High Threat Weed (*)	Cover (%) P4_2020	Cover (%) P2_2021	Cover (%) P3_2021	Cover (%) P3_2020	Cover (%) P4_2021
TG	<i>Acacia binervata</i>			10				
TG	<i>Acacia decurrens</i>				0.5		0.2	
SG	<i>Acacia falcata</i>			0.5				
SG	<i>Acacia falciformis</i>				5			0.2
SG	<i>Acacia filiformis</i>				0.1			
	<i>Acacia saligna</i>	*					0.3	
	<i>Acetosa sagittata</i>	*	1			5	0.1	0.5
	<i>Ageratina adenophora</i>	*	1		1	1		0.3
TG	<i>Ailanthus</i> spp.				1			
TG	<i>Alphitonia excelsa</i>			2	0.5			
TG	<i>Angophora floribunda</i>						0.5	
	<i>Araujia sericifera</i>	*	1				0.1	
	<i>Asparagus asparagoides</i>	*	1	0.1			0.1	
	<i>Axonopus fissifolius</i>	*	1			0.2		
SG	<i>Backhousia myrtifolia</i>			3	2			
	<i>Bidens pilosa</i> var. <i>pilosa</i>	*		0.1			5	0.1
OG	<i>Billardiera scandens</i>							0.1
	<i>Brassica</i> spp.	*					1	
	<i>Briza minor</i>	*						0.1
	<i>Briza subaristata</i>	*	1					0.1
	<i>Bromus catharticus</i>	*			0.2	0.5	0.1	
	<i>Bromus diandrus</i>	*	1		0.1			
SG	<i>Bursaria spinosa</i> subsp. <i>spinosa</i>			2			0.2	
SG	<i>Callistemon salignus</i>						0.2	
	<i>Cardiospermum grandiflorum</i>	*	1	20	3	80		0.2
TG	<i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i>				10			10
TG	<i>Casuarina glauca</i>						20	
	<i>Cenchrus clandestinus</i>	*	1	5				0.1

Form	Species name	Exotic (*)	High Threat Weed (*)	Cover (%) P4_2020	Cover (%) P2_2021	Cover (%) P3_2021	Cover (%) P3_2020	Cover (%) P4_2021
	<i>Cerastium glomeratum</i>	*			0.1			
TG	<i>Ceratopetalum gummiferum</i>						7	
	<i>Cestrum parqui</i>	*	1		10			3
	<i>Chloris gayana</i>	*	1					0.5
	<i>Cinnamomum camphora</i>	*	1	3	5			
	<i>Cirsium vulgare</i>	*					0.1	
	<i>Conyza bonariensis</i>	*					0.1	
	<i>Conyza spp.</i>	*			0.3			0.5
GG	<i>Cynodon dactylon</i>			0.1		0.5		
FG	<i>Desmodium brachypodium</i>						0.1	
FG	<i>Dichondra repens</i>						0.1	
	<i>Ehrharta erecta</i>	*	1	10	2	5	20	0.3
FG	<i>Einadia trigonos subsp. trigonos</i>					0.1		
	<i>Eragrostis curvula</i>	*	1					70
TG	<i>Eucalyptus botryoides</i>					40		
TG	<i>Eucalyptus elata</i>						0.1	
TG	<i>Eucalyptus eugenioides</i>			10				
TG	<i>Eucalyptus robusta</i>				8		2	8
TG	<i>Eucalyptus tereticornis</i>			5			10	
	<i>Facelis retusa</i>	*						0.1
TG	<i>Ficus spp.</i>				0.3			
	<i>Foeniculum spp.</i>	*				0.8		
	<i>Foeniculum vulgare</i>	*		2			0.1	
	<i>Galium aparine</i>	*						0.1
	<i>Gamochoeta spp.</i>	*			0.1			
OG	<i>Glycine tabacina</i>						0.1	
	<i>Gomphocarpus fruticosus</i>	*					0.1	
SG	<i>Grevillea robusta</i>				2			
OG	<i>Hardenbergia violacea</i>						0.1	

Form	Species name	Exotic (*)	High Threat Weed (*)	Cover (%) P4_2020	Cover (%) P2_2021	Cover (%) P3_2021	Cover (%) P3_2020	Cover (%) P4_2021
	<i>Hypochaeris radicata</i>	*						0.1
SG	<i>Indigofera australis</i>						0.5	
GG	<i>Juncus usitatus</i>							0.1
SG	<i>Kunzea ambigua</i>			0.1				
	<i>Lantana camara</i>	*	1	10	45		7	10
	<i>Ligustrum sinense</i>	*	1	1	35		0.1	
	<i>Lolium rigidum</i>	*						0.5
GG	<i>Lomandra longifolia</i>				8		0.2	
	<i>Lycium ferocissimum</i>	*	1	0.2				
	<i>Megathyrsus maximus</i> var. <i>maximus</i>	*			60	35		5
SG	<i>Melaleuca ericifolia</i>						0.2	
TG	<i>Melia azedarach</i>						0.1	
GG	<i>Microlaena stipoides</i> var. <i>stipoides</i>			5	0.2	0.1		0.1
	<i>Modiola caroliniana</i>	*					0.2	0.1
Fern (EG)	<i>Nephrolepis exolata</i>				0.1			
	<i>Nerium oleander</i>	*		1				
	<i>Nothoscordum borbonicum</i>	*						0.1
	<i>Ochna serrulata</i>	*	1	0.1				
GG	<i>Oplismenus aemulus</i>						0.5	
	<i>Opuntia stricta</i> var. <i>stricta</i>	*	1	0.1				
	<i>Oxalis articulata</i>	*					0.1	
	<i>Paspalum dilatatum</i>	*	1				0.1	
GG	<i>Paspalum vaginatum</i>							0.1
GG	<i>Pennisetum</i> spp.							0.5
	<i>Phalaris aquatica</i>	*						0.1
SG	<i>Pittosporum undulatum</i>						1	
	<i>Plantago lanceolata</i>	*				0.2	0.1	0.3
	<i>Senecio madagascariensis</i>	*	1		0.2			0.1
FG	<i>Senecio</i> spp.							0.1

Form	Species name	Exotic (*)	High Threat Weed (*)	Cover (%) P4_2020	Cover (%) P2_2021	Cover (%) P3_2021	Cover (%) P3_2020	Cover (%) P4_2021
	<i>Senna pendula</i> var. <i>glabrata</i>	*	1				0.1	
	<i>Setaria palmifolia</i>	*		0.5			5	
	<i>Setaria parviflora</i>	*						0.1
FG	<i>Sida corrugata</i>				0.1			
	<i>Sida rhombifolia</i>	*						1
	<i>Solanum nigrum</i>	*			0.1	0.1	0.2	
	<i>Solanum pseudocapsicum</i>	*					0.1	
FG	<i>Sonchus</i> spp.				0.1			
	<i>Taraxacum officinale</i>	*						0.1
	<i>Tephrosia glomeruliflora</i>	*					0.1	
	<i>Tradescantia fluminensis</i>	*	1	15				0.5
	<i>Tradescantia</i> spp.	*			0.5	15		
	<i>Trifolium repens</i>	*					0.1	
	<i>Verbena bonariensis</i>	*				0.2		1
	<i>Verbena officinalis</i>	*					0.5	
	<i>Verbena rigida</i> var. <i>rigida</i>	*			0.2			
	<i>Vulpia</i> spp.	*						0.1
FG	<i>Wahlenbergia</i> spp.			10				0.1

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

Appendix D Biodiversity credit report



BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00044646/BAAS18159/23/00044647	Moore Point Planning Proposal	14/03/2024
Assessor Name	Report Created	BAM Data version *
Belinda Jane Failes	03/05/2024	67
Assessor Number	BAM Case Status	Date Finalised
BAAS18159	Open	To be finalised
Assessment Revision	Assessment Type	BOS entry trigger
0	Part 4 Developments (General)	BOS Threshold: Biodiversity Values Map and area clearing threshold

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

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

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

Assessment Id
00044646/BAAS18159/23/00044647

Proposal Name
Moore Point Planning Proposal

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BAM Credit Summary Report

Coastal Valleys Riparian Forest											
1	4023_low	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	27.8	27.8	0.46	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00	6
										Subtotal	6
Cumberland Bangalay x Blue Gum Riverflat Forest											
3	3145_weekly	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	25.9	25.9	0.21	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00	3
										Subtotal	3

Assessment Id
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Proposal Name
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BAM Credit Summary Report

Cumberland Blue Box Riverflat Forest											
2	4024_weekly	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	38.6	38.6	1.4	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00	28
										Subtotal	28
										Total	37

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAI	Species credits
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Assessment Id
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Proposal Name
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Appendix E Acoustic detector analysis

Provided as an attachment

Appendix F EPBC Likelihood of Occurrence

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

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

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

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

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

Scientific Name	EPBC Status	Act	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
ECOLOGICAL COMMUNITIES					
<i>Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion</i>	E		Occurs almost exclusively on soils derived from Tertiary alluvium, or on sites located on adjoining shale or Holocene alluvium. Often adjacent to and on slightly higher ground than Castlereagh Ironbark Forest or Shale Gravel Transition Forest in the Sydney Basin Bioregion. Dominated by <i>Eucalyptus parramattensis</i> subsp. <i>parramattensis</i> , <i>Angophora bakeri</i> and <i>Eucalyptus sclerophylla</i> . A small tree stratum of <i>Melaleuca decora</i> is sometimes present, generally in areas with poorer drainage. It has a well-developed shrub stratum consisting of sclerophyllous species such as <i>Banksia spinulosa</i> var. <i>spinulosa</i> , <i>Melaleuca nodosa</i> , <i>Hakea sericea</i> and <i>Hakea dactyloides</i> (multi-stemmed form). The ground stratum consists of a diverse range of forbs including <i>Themeda australis</i> , <i>Entolasia stricta</i> , <i>Cyathochaeta diandra</i> , <i>Dianella revoluta</i> subsp. <i>revoluta</i> , <i>Stylidium graminifolium</i> , <i>Platysace ericoides</i> , <i>Laxmannia gracilis</i> and <i>Aristida warburgii</i> .	No – this ecological community was not identified within the subject land.	No
<i>Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community</i>	E		The structure of the community may vary from open forests to low woodlands, scrubs or reedlands with scattered trees. It has a dense to sparse tree layer in which <i>Casuarina glauca</i> (swamp oak) is the dominant species northwards from Bermagui. Other trees including <i>Acmena smithii</i> (Lilly Pilly), <i>Glochidion</i> spp. (Cheese Trees) and <i>Melaleuca</i> spp. (Paperbarks) may be present as subordinate species and are found most frequently in stands of the community northwards from Gosford. <i>Melaleuca ericifolia</i> is the only abundant tree in this community south of Bermagui. The understorey is characterised by frequent occurrences of vines, <i>Parsonsia straminea</i> , <i>Geitonoplesium cymosum</i> and <i>Stephania japonica</i> var. <i>discolor</i> , a sparse cover of shrubs, and a continuous groundcover of forbs, sedges, grasses and leaf litter. The composition of the ground stratum varies depending on levels of salinity in the groundwater.	No – this ecological community was not identified within the subject land.	No

Scientific Name	EPBC Status	Act	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
<i>Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland</i>	E		This EEC is associated with sandy loams and humic clay loams on drainage lines and periodically inundated or waterlogged alluvial flats in association with coastal floodplains. The most widespread and abundant dominant trees include <i>Eucalyptus robusta</i> (Swamp Mahogany), <i>Melaleuca quinquenervia</i> (Paperbark) and, south from Sydney, <i>Eucalyptus botryoides</i> (Bangalay) and <i>Eucalyptus longifolia</i> (Woollybut). Small tree species can include <i>Acacia coronata</i> (Green Wattle), <i>Acmena smithii</i> (Lilly Pilly), <i>Elaeocarpus reticulatus</i> (Blueberry Ash), <i>Glochidion ferdinandi</i> (Cheese Tree), <i>Melaleuca linariifolia</i> and <i>M. styphelioides</i> (Paperbarks). Shrubs include <i>Acacia longifolia</i> (Sydney Golden Wattle), <i>Dodonaea triquetra</i> (Hopbush), <i>Ficus coronata</i> (Sandpaper Fig), <i>Leptospermum polygalifolium</i> subsp. <i>polygalifolium</i> (Lemon-scented Tea tree) and <i>Melaleuca</i> spp. (paperbarks). Occasional vines include <i>Parsonsia straminea</i> (Common Silkpod), <i>Morinda jasminoides</i> and <i>Stephania japonica</i> var. <i>discolor</i> (Snake Vine). The groundcover is composed of abundant sedges, ferns, forbs, and grasses including <i>Gahnia clarkei</i> , <i>Pteridium esculentum</i> (Bracken), <i>Hypolepis muelleri</i> (Batswing Fern), <i>Calochlaena dubia</i> (False Bracken), <i>Dianella caerulea</i> (blue flax lily), <i>Viola hederacea</i> , <i>Lomandra longifolia</i> (Spiny-headed Mat-rush) and <i>Entolasia marginata</i> (Bordered Panic) and <i>Imperata cylindrica</i> var. <i>major</i> (Blady Grass).	No – this ecological community was not identified within the subject land.	No
<i>Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion</i>	CE		Associated with silts, clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains. The structure of the community may vary from tall open forests (>40m) to woodlands. The most widespread and abundant dominant trees include <i>Eucalyptus tereticornis</i> (Forest Red Gum), <i>Eucalyptus amplifolia</i> (Cabbage Gum), <i>Angophora floribunda</i> (Rough-barked Apple) and <i>Angophora subvelutina</i> (Broad-leaved Apple). <i>Eucalyptus baueriana</i> (Blue box), <i>Eucalyptus botryoides</i> (Bangalay) and <i>Eucalyptus elata</i> (River Peppermint) may be common south from Sydney. <i>Eucalyptus ovata</i> (Swamp Gum)	No – this ecological community was not identified within the subject land.	No

Scientific Name	EPBC Status	Act	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
			occurs on the far south coast, <i>Eucalyptus saligna</i> (Sydney Blue Gum) and <i>Eucalyptus grandis</i> (Flooded Gum) may occur north of Sydney, while <i>Eucalyptus benthamii</i> is restricted to the Hawkesbury floodplain. A layer of small trees may be present, including <i>Melaleuca decora</i> , <i>M. styphelioides</i> (Prickly-leaved Teatree), <i>Backhousia myrtifolia</i> (grey myrtle), <i>Melia azadarach</i> (White Cedar), <i>Casuarina cunninghamiana</i> (River Oak) and <i>Casuarina glauca</i> (Swamp Oak). Scattered shrubs include <i>Bursaria spinosa</i> , <i>Solanum prinophyllum</i> , <i>Rubus parvifolius</i> , <i>Breynia oblongifolia</i> , <i>Ozothamnus diosmifolius</i> , <i>Hymenanthera dentata</i> , <i>Acacia floribunda</i> and <i>Phyllanthus gunnii</i> . The groundcover is composed of abundant forbs, scramblers and grasses.		
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	CE		This CEEC occurs on soils derived from Wianamatta Shale, and throughout the driest part of the Sydney Basin. Before European settlement, was extensive across the Cumberland Plain, western Sydney. Today, only 9% of the original extent remains intact, with the remnants scattered widely across the Cumberland Plain. The dominant canopy trees of Cumberland Plain Woodland are <i>Eucalyptus moluccana</i> (Grey Box) and <i>E. tereticornis</i> (Forest Red Gum), with <i>E. crebra</i> (Narrow-leaved Ironbark), <i>Corymbia maculata</i> (Spotted Gum) and <i>E. eugenioides</i> (Thin-leaved Stringybark) occurring less frequently. The shrub layer is dominated by <i>Bursaria spinosa</i> (Blackthorn), and it is common to find abundant grasses such as <i>Themeda australis</i> (Kangaroo Grass) and <i>Microlaena stipoides</i> var. <i>stipoides</i> (Weeping Meadow Grass).	No – this ecological community was not identified within the subject land.	No
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	CE		This CEEC is found on the river flats of the coastal floodplains. It has a tall open tree layer of eucalypts, which may exceed 40 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. While the composition of the tree stratum varies considerably, the most widespread and abundant dominant trees include <i>Eucalyptus tereticornis</i> (Forest Red Gum), <i>E. amplifolia</i> (Cabbage Gum), <i>Angophora floribunda</i> (Rough-barked	No – the vegetation within the subject land did not represent the EPBC listed vegetation.	No

Scientific Name	EPBC Status	Act	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
			Apple) and <i>A. subvelutina</i> (broad-leaved apple). <i>Eucalyptus baueriana</i> (blue box), <i>E. botryoides</i> (bangalay) and <i>E. elata</i> (river peppermint) may be common south from Sydney, <i>E. ovata</i> (Swamp Gum) occurs on the far south coast, <i>E. saligna</i> (Sydney Blue Gum) and <i>E. grandis</i> (Flooded Gum) may occur north of Sydney, while <i>E. benthamii</i> is restricted to the Hawkesbury floodplain.		
<i>Shale Sandstone Transition Forest of the Sydney Basin Bioregion</i>	CE		Occurs at the edges of the Cumberland Plain in western Sydney, most now occurs in the Hawkesbury, Baulkham Hills, Liverpool, Parramatta, Penrith, Campbelltown and Wollondilly local government areas. The main tree species include <i>Eucalyptus tereticornis</i> (Forest Red Gum), <i>E. punctata</i> (Grey Gum), <i>E. globoidea</i> , <i>E. eugenioides</i> , <i>E. fibrosa</i> and <i>E. crebra</i> . Areas of low sandstone influence (more clay-loam soil texture) have an understorey that is closer to Cumberland Plain Woodland.	No – this ecological community was not identified within the subject land.	No
<i>Subtropical and Temperate Coastal Saltmarsh</i>	V		Occurs in the intertidal zone along the NSW coast. The intertidal zone on the shores of estuaries and lagoons that are permanently or intermittently open to the sea. Frequently found as a zone on the landward side of mangrove stands.	No – this ecological community was not identified within the subject land.	No
<i>Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion</i>	E		This EEC is generally a tall open eucalypt forests found on igneous rock (predominately Tertiary basalt and microsyenite) in, or adjacent to, the Sydney Basin Bioregion. The ecological community occurs in areas of high rainfall, generally ranging from 950 to 1600 mm/year. Dominant canopy species are most often <i>Eucalyptus fastigata</i> (Brown Barrel), <i>E. viminalis</i> (Ribbon Gum) and <i>E. radiata</i> subsp. <i>radiata</i> (Narrow-leaved Peppermint). <i>Eucalyptus obliqua</i> (Messmate Stringybark), <i>E. elata</i> (River Peppermint), <i>E. quadrangulata</i> (White-Topped Box) and <i>E. smithii</i> (Ironbark Peppermint) are also common components. <i>Eucalyptus oreades</i> (Blue Mountains Ash) and <i>E. blaxlandii</i> (Blaxland's Stringybark) are prevalent in the Blue Mountains forms, particularly on the rocky edges of basalt. <i>Eucalyptus cypellocarpa</i> (Mountain Grey Gum) is widespread in drier	No – this ecological community was not identified within the subject land.	No

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sites throughout the range of the ecological community, while <i>E. piperita</i> (Sydney Peppermint) may also occur. <i>Eucalyptus ovata</i> (Swamp Gum) may be present in areas of impeded drainage or high groundwater.					
<i>Western Sydney Dry Rainforest and Moist Woodland on Shale</i>	CE		Occurs almost exclusively on soils derived from Tertiary alluvium, or on sites located on adjoining shale or Holocene alluvium. Often adjacent to and on slightly higher ground than Castlereagh Ironbark Forest or Shale Gravel Transition Forest in the Sydney Basin Bioregion. Dominated by <i>Eucalyptus parramattensis</i> subsp. <i>parramattensis</i> , <i>Angophora bakeri</i> and <i>Eucalyptus sclerophylla</i> . A small tree stratum of <i>Melaleuca decora</i> is sometimes present, generally in areas with poorer drainage. It has a well-developed shrub stratum consisting of sclerophyllous species such as <i>Banksia spinulosa</i> var. <i>spinulosa</i> , <i>Melaleuca nodosa</i> , <i>Hakea sericea</i> and <i>Hakea dactyloides</i> (multi-stemmed form). The ground stratum consists of a diverse range of grasses and forbs including <i>Themeda australis</i> , <i>Entolasia stricta</i> , <i>Cyathochaeta diandra</i> , <i>Dianella revoluta</i> subsp. <i>revoluta</i> , <i>Stylidium graminifolium</i> , <i>Platysace ericoides</i> , <i>Laxmannia gracilis</i> and <i>Aristida warburgii</i> .	No – this ecological community was not identified within the subject land.	No
FAUNA					
<i>Actitis hypoleucos</i>	Common Sandpiper	M	Coastal wetlands and some inland wetlands, especially muddy margins or rocky shores. Also estuaries and deltas, lakes, pools, billabongs, reservoirs, dams and claypans, mangroves.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	Inland slopes of south-east Australia, and less frequently in coastal areas. In NSW, most records are from the North-West Plains, North-West and South-West Slopes, Northern Tablelands, Central Tablelands and Southern Tablelands regions; also recorded in the Central Coast and Hunter Valley regions. Eucalypt woodland and open	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No

Scientific Name		EPBC Status	Act	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
				forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of <i>Casuarina cunninghamiana</i> (River Oak).		
<i>Apus pacificus</i>	Fork-tailed Swift	M		Recorded in all regions of NSW. Riparian woodland., swamps, low scrub, heathland, saltmarsh, grassland, Spinifex sandplains, open farmland and inland and coastal sand-dunes.	Potential. Habitat is severely degraded and likely unsuitable. Larger areas of more suitable habitat occur throughout the region.	No
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E		Found over most of NSW except for the far north-west. Permanent freshwater wetlands with tall, dense vegetation, particularly <i>Typha</i> spp. (Bullrushes) and <i>Eleocharis</i> spp. (Spikerushes).	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	M		Summer migrant. Widespread in most regions of NSW, especially in coastal areas, but sparse in the south-central Western Plain and east Lower Western Regions. Shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Calidris ferruginea</i>	Curlew Sandpiper	CE, M		Occurs along the entire coast of NSW, and sometimes in freshwater wetlands in the Murray-Darling Basin. Littoral and estuarine habitats, including intertidal mudflats, non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Calidris melanotos</i>	Pectoral Sandpiper	M		Shallow fresh to saline wetlands, including coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No

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<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V		Recorded from Rockhampton in Qld south to Ulladulla in NSW. Largest concentrations of populations occur in the sandstone escarpments of the Sydney basin and the NSW north-west slopes. Wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Charadrius leschenaultii</i>	Greater Sand Plover, Large Sand Plover	V, M		In NSW, recorded between the northern rivers and the Illawarra, with most records coming from the Clarence and Richmond estuaries. Almost entirely restricted to coastal areas in NSW, mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Cuculus optatus</i>	Oriental Cuckoo	M		Nonbreeding habitat: monsoonal rainforest, vine thickets, wet sclerophyll forest or open Casuarina, Acacia or Eucalyptus woodland.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Dasyornis brachypterus</i>	Eastern Bristlebird	E		There are three main populations: Northern - southern Qld/northern NSW, Central - Barren Ground NR, Budderoo NR, Woronora Plateau, Jervis Bay NP, Booderee NP and Beecroft Peninsula and Southern - Nadgee NR and Croajingalong NP in the vicinity of the NSW/Victorian border. Central and southern populations inhabit heath and open woodland with a heathy understorey. In northern NSW, habitat comprises open forest with dense tussocky grass understorey.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Dasyurus maculatus maculatus</i>	Spotted-tailed Quoll	E		Found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Qld. Rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No

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<i>Epinephelus daemeli</i>	Black Rockcod, Black Cod, Saddled Rockcod	V		Along the entire NSW coast including Lord Howe Island. Caves, gutters and beneath bomboras on rocky reefs. Small juveniles are often found in coastal rock pools, and larger juveniles around rocky shores in estuaries.	Unlikely, suitable habitat is not present on site.	No
<i>Falco hypoleucos</i>	Grey Falcon	V		The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Gallinago hardwickii</i>	Latham's Snipe	M		Migrant to east coast of Australia, extending inland west of the Great Dividing Range in NSW. Freshwater, saline or brackish wetlands up to 2000 m above sea-level; usually freshwater swamps, flooded grasslands or heathlands.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Grantiella picta</i>	Painted Honeyeater	V		Widely distributed in NSW, predominantly on the inland side of the Great Dividing Range but avoiding arid areas. Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V		South eastern NSW and Victoria, in two distinct populations: a northern population in the sandstone geology of the Sydney Basin as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. Heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Hirundapus caudacutus</i>	White-throated Needletail	V, M		All coastal regions of NSW, inland to the western slopes and inland plains of the Great Divide. Occur most often over open forest and rainforest, as well as heathland, and remnant vegetation in farmland.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No

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<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	V		Largely confined to Triassic and Permian sandstones within the coast and ranges in an area within approximately 250 km of Sydney. Dry and wet sclerophyll forests, riverine forests, coastal heath swamps, rocky outcrops, heaths, grassy woodlands.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat. Suitable sandstone outcrops absent.	No
<i>Lathamus discolor</i>	Swift Parrot	CE		Migrates from Tasmania to mainland in Autumn-Winter. In NSW, the species mostly occurs on the coast and south west slopes. Box-ironbark forests and woodlands.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Limosa lapponica</i>	Bar-tailed Godwit	M		Summer migrant to Australia. Widespread along the coast of NSW, including the offshore islands. Also numerous scattered inland records. Intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons, bays, seagrass beds, saltmarsh, sewage farms and saltworks, salt lakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. Rarely inland wetlands, paddocks and airstrips.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Litoria aurea</i>	Green and Golden Frog	V		Since 1990, recorded from ~50 scattered sites within its former range in NSW, from the north coast near Brunswick Heads, south along the coast to Victoria. Records exist west to Bathurst, Tumut and the ACT region. Marshes, dams and stream-sides, particularly those containing <i>Typha</i> spp. (bullrushes) or <i>Eleocharis</i> spp. (spikerushes). Some populations occur in highly disturbed areas.	Potential – some marginal foraging habitat occurs within the site.	Yes
<i>Monarcha melanopsis</i>	Black-faced Monarch	M		In NSW, occurs around the eastern slopes and tablelands of the Great Divide, inland to Coutts Crossing, Armidale, Widden Valley, Wollemi National Park and Wombeyan Caves. It is rarely recorded farther inland. Rainforest, open eucalypt forests, dry sclerophyll forests and	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No

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				woodlands, gullies in mountain areas or coastal foothills, Brigalow scrub, coastal scrub, mangroves, parks and gardens.		
<i>Monarcha trivirgatus</i>	Spectacled Monarch	M		Usually considered a denizen of the dense rainforests and moist eucalypt forests of eastern and north-eastern Australia, the Spectacled Monarch sometimes also inhabits mangroves and other densely vegetated habitats	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Motacilla flava</i>	Yellow Wagtail	M		Regular summer migrant to mostly coastal Australia. In NSW recorded Sydney to Newcastle, the Hawkesbury and inland in the Bogan LGA. Swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land, lawns.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	M		In NSW, widespread on and east of the Great Divide and sparsely scattered on the western slopes, with very occasional records on the western plains. Eucalypt-dominated forests, especially near wetlands, watercourses, and heavily-vegetated gullies.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Numenius madagascariensis</i>	Eastern Curlew	CE, M		Summer migrant to Australia. Primarily coastal distribution in NSW, with some scattered inland records. Estuaries, bays, harbours, inlets and coastal lagoons, intertidal mudflats or sandflats, ocean beaches, coral reefs, rock platforms, saltmarsh, mangroves, freshwater/brackish lakes, saltworks and sewage farms.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Pandion cristatus</i>	Eastern Osprey	M		Common around the northern NSW coast, and uncommon to rare from coast further south. Some records from inland areas. Rocky shorelines, islands, reefs, mouths of large rivers, lagoons and lakes.	Unlikely - suitable habitat not identified within the subject land.	No
<i>Petauroides volans</i>	Greater Glider	V		This species occurs through southern and central eastern Australia. It requires old forests with abundant large hollows (>10cm) in large, old trees.	Unlikely. The extent of habitat on site is restricted to marginal	No

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					highly degraded foraging habitat.	
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	V		In NSW they occur from the Qld border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat. No rock outcrops.	No
<i>Phascolarctos cinereus</i>	Koala	V		In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. There are sparse and possibly disjunct populations in the Bega District, and at several sites on the southern tablelands. Eucalypt woodlands and forests.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	V		Fragmented distribution across eastern NSW. Open heathlands, woodlands and forests with a heathland understorey, vegetated sand dunes.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V		Along the eastern coast of Australia, from Bundaberg in Qld to Melbourne in Victoria. Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	Potential – some marginal foraging habitat occurs within the site.	Yes
<i>Rhipidura rufifrons</i>	Rufous Fantail	M		Coastal and near coastal districts of northern and eastern Australia, including on and east of the Great Divide in NSW. Wet sclerophyll forests, subtropical and temperate rainforests. Sometimes drier sclerophyll forests and woodlands.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Rostratula australis</i>	Australian Painted Snipe	E		In NSW most records are from the Murray-Darling Basin. Other recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Swamps, dams and nearby marshy areas.	Unlikely. The extent of habitat on site is restricted to marginal	No

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					highly degraded foraging habitat.	
<i>Sternula nereis nereis</i>	Australian Fairy Tern	V		Within Australia, the Fairy Tern occurs along the coasts of Victoria, Tasmania, South Australia and Western Australia; occurring as far north as the Dampier Archipelago near Karratha. The subspecies has been known from New South Wales (NSW) in the past, but it is unknown if it persists there (Birdlife International 2010; Garnett & Crowley 2000).	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Thinornis cucullatus cucullatus</i>	Eastern Hooded Plover	V		Ranges throughout the Pacific and Indian Oceans. There are two main breeding areas in the world: one in the South West Pacific includes Lord Howe Island and New Zealand; the other along the coast of Western Australia.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
<i>Tringa nebularia</i>	Common Greenshank	M		Summer migrant to Australia. Recorded in most coastal regions of NSW; also widespread west of the Great Dividing Range. Terrestrial wetlands and sheltered coastal habitats.	Unlikely. The extent of habitat on site is restricted to marginal highly degraded foraging habitat.	No
FLORA						
<i>Acacia bynoeana</i>	Bynoe's Wattle	V		Found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. Heath or dry sclerophyll forest on sandy soils.	Unlikely - the presence of this species was not identified, and suitable habitat was not identified within the subject land. Site is too degraded for presence of this species.	No

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<i>Acacia pubescens</i>	Downy Wattle	V		Restricted to the Sydney region around the Bankstown-Fairfield-Rookwood and Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. Open woodland and forest, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland. Occurs on alluviums, shales and at the intergrade between shales and sandstones.	Unlikely presence of this species was not identified, and suitable habitat was not identified within the subject land. Site is too degraded for presence of this species.	No
<i>Allocasuarina glareicola</i>	-	E		Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Castlereagh woodland on lateritic soil. Found in open woodland with <i>Eucalyptus parramattensis</i> , <i>Eucalyptus fibrosa</i> , <i>Angophora bakeri</i> , <i>Eucalyptus sclerophylla</i> and <i>Melaleuca decora</i> .	Unlikely presence of this species was not identified, and suitable habitat was not identified within the subject land. Site is too degraded for presence of this species.	No
<i>Caladenia tessellata</i>	Thick-lipped Spider-orchid, Daddy Long-legs	V		Currently known from two disjunct areas; one population near Braidwood on the Southern Tablelands and three populations in the Wyong area on the Central Coast. Grassy sclerophyll woodland on clay loam or sandy soils, or low woodland with stony soil.	Unlikely presence of this species was not identified, and suitable habitat was not identified within the subject land. Site is too degraded for presence of this species.	No

Scientific Name		EPBC Status	Act	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
<i>Cryptostylis hunteriana</i>	Leafless Tongue-orchid	V		In NSW, recorded mainly on coastal and near coastal ranges north from Victoria to near Forster, with two isolated occurrences inland north-west of Grafton. Coastal heathlands, margins of coastal swamps and sedgelands, coastal forest, dry woodland, and lowland forest.	Unlikely presence of this species was not identified, and suitable habitat was not identified within the subject land. Site is too degraded for presence of this species.	No
<i>Cynanchum elegans</i>	White-flowered Wax Plant	E		Restricted to eastern NSW, from Brunswick Heads on the north coast to Gerroa in the Illawarra region, and as far west as Merriwa in the upper Hunter River valley.	Unlikely presence of this species was not identified, and suitable habitat was not identified within the subject land. Site is too degraded for presence of this species.	No
<i>Genoplesium baueri</i>	Bauer's Midge Orchid	E		Has been recorded from locations between Nowra and Pittwater and may occur as far north as Port Stephens. Dry sclerophyll forest and moss gardens over sandstone.	Unlikely presence of this species was not identified, and suitable habitat was not identified within the subject land. Site is too degraded for presence of this species.	No

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<i>Grevillea parviflora</i>	<i>parviflora</i>	<i>subsp.</i>	Small-flowered Grevillea	V		Sporadically distributed throughout the Sydney Basin and in the Hunter in the Cessnock - Kurri Kurri area. Also known from Putty to Wyong and Lake Macquarie on the Central Coast.	Unlikely presence of this species was not identified, and suitable habitat was not identified within the subject land. Site is too degraded for presence of this species.	-	the this not and habitat was not identified within the subject land. Site is too degraded for presence of this species.	No
<i>Hibbertia glabrescens</i>	<i>puberula</i>	<i>subsp.</i>	-	CE		Recent work on this species and its relatives have shown it to be widespread, but never common. It extends from Wollemi National Park south to Morton National Park and the south coast near Nowra. Early records of this species are from the Hawkesbury River area and Frenchs Forest in northern Sydney, South Coogee in eastern Sydney, the Hacking River area in southern Sydney, and the Blue Mountains. It favours low heath on sandy soils or rarely in clay, with or without rocks underneath.	Unlikely presence of this species was not identified, and suitable habitat was not identified within the subject land. Site is too degraded for presence of this species.	-	the this not and habitat was not identified within the subject land. Site is too degraded for presence of this species.	No
<i>Leucopogon exolasius</i>			Woronora Beard-heath	V		Upper Georges River area and in Heathcote National Park. Woodland on sandstone.	Unlikely presence of this species was not identified, and suitable habitat was not identified within the subject land. Site is too degraded for presence of this species.	-	the this not and habitat was not identified within the subject land. Site is too degraded for presence of this species.	No

Scientific Name		EPBC Status	Act	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
<i>Melaleuca deanei</i>	Deane's Paperbark	V		Ku-ring-gai/Berowra area, Holsworthy/Wedderburn area, Springwood (in the Blue Mountains), Wollemi National Park, Yalwal (west of Nowra) and Central Coast (Hawkesbury River) areas. Heath on sandstone.	Unlikely - the presence of this species was not identified, and suitable habitat was not identified within the subject land. Site is too degraded for presence of this species.	No
<i>Persicaria elatior</i>	Tall Knotweed	V		In south-eastern NSW recorded from Mt Dromedary, Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). Beside streams and lakes, swamp forest or disturbed areas.	Unlikely - the presence of this species was not identified, and suitable habitat was not identified within the subject land. Site is too degraded for presence of this species.	No
<i>Persoonia hirsuta</i>	Hairy Geebung	E		Scattered distribution around Sydney, from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. Sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	Unlikely - the presence of this species was not identified, and suitable habitat was not identified within the subject land. Site is too degraded for presence of this species.	No

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<i>Persoonia nutans</i>	Nodding Geebung	E		Restricted to the Cumberland Plain in western Sydney, between Richmond in the north and Macquarie Fields in the south. Northern populations: sclerophyll forest and woodland (Agnes Banks Woodland, Castlereagh Scribbly Gum Woodland and Cooks River / Castlereagh Ironbark Forest) on aeolian and alluvial sediments. Southern populations: tertiary alluvium, shale sandstone transition communities and Cooks River / Castlereagh Ironbark Forest.	Unlikely presence of this species was not identified, and suitable habitat was not identified within the subject land. Site is too degraded for presence of this species.	No
<i>Pimelea curviflora</i> var. <i>curviflora</i>	-	V		Confined to the coastal area of the Sydney and Illawarra regions between northern Sydney and Maroota in the north-west and Croom Reserve near Albion Park in the south. Woodland, mostly on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes.	Unlikely presence of this species was not identified, and suitable habitat was not identified within the subject land. Site is too degraded for presence of this species.	No
<i>Pimelea spicata</i>	Spiked flower	Rice-	E	Two disjunct areas; the Cumberland Plain (Marayong and Prospect Reservoir south to Narellan and Douglas Park) and the Illawarra (Lansdowne to Shellharbour to northern Kiama). Well-structured clay soils. Eucalyptus moluccana (Grey Box) communities and in areas of ironbark on the Cumberland Plain. Coast Banksia open woodland or coastal grassland in the Illawarra.	Unlikely presence of this species was not identified, and suitable habitat was not identified within the subject land. Site is too degraded for presence of this species.	No

Scientific Name		EPBC Status	Act	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
<i>Pomaderris brunnea</i>	Rufous Pomaderris	V		In NSW, found around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. It also occurs near Walcha on the New England tablelands. Moist woodland or forest on clay and alluvial soils of flood plains and creek lines.	Unlikely presence of this species was not identified, and suitable habitat was not identified within the subject land. Site is too degraded for presence of this species.	No
<i>Pterostylis gibbosa</i>	Illawarra Greenhood	E		Known from a small number of populations in the Hunter region (Milbrodale), the Illawarra region (Albion Park and Yallah) and the Shoalhaven region (near Nowra). Open forest or woodland, on flat or gently sloping land with poor drainage.		No
<i>Pterostylis saxicola</i>	Sydney Plains Greenhood	E		Restricted to western Sydney between Freemans Reach in the north and Picton in the south. There are very few known populations and they are all very small and isolated. Two populations occur within a conservation reserve (Georges River National Park; Scheyville National Park). Most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The vegetation communities above the shelves where <i>Pterostylis saxicola</i> occurs are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils. All species of <i>Pterostylis</i> are deciduous and die back to fleshy, rounded underground tuberoids. The time of emergence and withering has not been recorded for this species, however flowering occurs from October to December and may vary due to climatic conditions.	Unlikely presence of this species was not identified (conspicuous species). The subject land is not within the currently known locations and it was determined that the habitat is substantially degraded such that this species is unlikely to utilise the subject land.	No

Scientific Name		EPBC Status	Act	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
<i>Rhizanthella slateri</i>	Eastern Underground Orchid	E		Occurs from south-east Queensland to south-east NSW. In NSW, currently known from fewer than 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. Habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. Highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Therefore usually located only when the soil is disturbed. Flowers September to November.	Unlikely - The presence of this species was not identified (conspicuous species). The subject land is not within the currently known locations and it was determined that the habitat is substantially degraded such that this species is unlikely to utilise the subject land.	No
<i>Rhodamnia rubescens</i>	Scrub Turpentine	CE		Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Populations of <i>R. rubescens</i> typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m above sea level in areas with rainfall of 1,000-1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	Unlikely - not identified during targeted survey for this species.	No
<i>Rhodomyrtus psidioides</i>	Native Guava	CE		Occurs from Broken Bay, approximately 90 km north of Sydney, New South Wales, to Maryborough in Queensland. Populations are typically restricted to coastal and sub-coastal areas of low elevation. Pioneer species found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines.	Unlikely - the presence of this species was not identified, and suitable habitat was not identified within the subject land. Site is too degraded for	No

Scientific Name	EPBC Status	Act	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
				presence of this species.	
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	V	Only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. Subtropical and littoral rainforest on gravels, sands, silts and clays.	Unlikely presence of this species was not identified, and the subject land is not within the species' distribution.	No
<i>Thelymitra kangaloonica</i>	Kangaloon Sun Orchid	CE	Only known to occur on the southern tablelands of NSW in the Moss Vale / Kangaloon / Fitzroy Falls area at 550-700 m above sea level. Swamps in sedgelands over grey silty grey loam soils.	Unlikely presence of this species was not identified, and the subject land is not within the species' distribution.	No
<i>Thesium australe</i>	Austral Toadflax	V	In eastern NSW it is found in very small populations scattered along the coast, and from the Northern to Southern Tablelands. Grassland on coastal headlands or grassland and grassy woodland away from the coast.	Unlikely - suitable habitat not identified within the subject land.	No

Key: V = vulnerable, E = endangered, CE = critically endangered

Appendix G Staff CVs

BELINDA FAILES – SENIOR ECOLOGIST

Belinda has been working as an ecologist with Eco Logical Australia since 2011, and has been involved in the monitoring of, and preparation of reports for, threatened flora and endangered ecological communities, as well as the preparation of Vegetation Management Plans (VMP), Part 3A and Section 5A Assessments under the EP&A Act, Local Environment Studies, and Species Impact Statements (SIS). Belinda has built on the skills she learned while studying a Master of Wildlife Management at Macquarie University through on-going professional development, and is skilled in both flora and fauna identification.

QUALIFICATIONS

Master of Wildlife Management (Macquarie University)

Bachelor of Environmental Science, (University of Newcastle)

Accredited BAM Assessor (BAAS18159)

Senior First Aid Certificate

OHS Construction Induction Certificate – White Card

Rail Industry Safety Induction (RISI) Card

Working at heights

Tree Rescue training

Basic Tree Climbing training

PROJECT EXPERIENCE

BIOBANKING AND BIOCERTIFICATION

One Tree Bay East Biobank

One Tree Bay West Biobank

Lake Wollumboola Biobank

Tullawalla Biobank

Duffys Forest Gum Club Biobank

Culburra Biocertification

Callala Biocertification

Mount Gilead rezoning Biocertification

Teralba Quarry Biobanking

Ingleside rezoning Biocertification

BIODIVERSITY DEVELOPMENT ASSESSMENT REPORTS

Swans HQ Moore Park

Northside Private Hospital

Wicks Road BDAR

Chatswood Education Precinct BDAR

Loreto BDAR

Darlington Public School BDAR

Randwick Campus Redevelopment BDAR

FLORA AND FAUNA IMPACT ASSESSMENTS

Numerous over Sydney

VEGETATION MANAGEMENT PLANS

Bunya, Doonside Landscaping DA

Richmond Road Upgrade, Marsden Park, RMS

The Hills Shire Council Weed Management Plan

Hills M2 Corridor Weed Management Plan

Edmondson Park Development

Schofields Defence Housing Association

Glenfield Stage 3

Campbelltown Comprehensive Koala Plan of Management – field work

MONITORING FIELD WORK

Moolarben Mine Monitoring – flora and fauna monitoring

Wivenhoe Bird Monitoring

RELOCATION

Bunya Cumberland Plain Land Snail



Shawn Ryan ECOLOGIST

Shawn is an ecologist with eight years' combined experience in ecological consulting and environmental field work. With project experience across coastal NSW, Shawn has completed biodiversity assessments and monitoring projects in a variety of environments for a range of activities including infrastructure, mining, energy, government and urban development. Shawn has experience in all aspects of ecological consultancy including survey design and planning, flora and fauna surveys, data collection and analysis, reporting and client communication.

Shawn has extensive field experience on large projects in regional and remote areas of New South Wales which has led to the development of strong skills in field logistics including preparation of survey plans and conducting large field-based surveys.

QUALIFICATIONS

Bachelor of Environmental Science & Management (Ecology), University of Newcastle

BAM Accredited Assessor under the NSW Biodiversity Conservation Act 2016

Senior First Aid

Defensive Driving Training

PROJECT EXPERIENCE

ECOLOGICAL SURVEYS & MONITORING

- Preclearance surveys for Green and Golden Bell Frog (*Litoria aurea*) Kooragang Island – Port Authority NSW
- Assist in Implementation of various broad scale vegetation-based monitoring programs for large-scale and complex seasonal and annual monitoring programs for this State and Commonwealth listed EEC. Monitoring included flora based repeated measures sampling within a BACI monitoring design, Newnes Plateau – Large mine
- Monitoring and research programs for the Blue Mountains Water Skink and Giant Dragon Fly, Newnes Plateau – Large mine
- Land Management Strategy, Compensatory Habitat and EEC monitoring based on vegetation condition within the BBAM and BAM frameworks, Lower Hunter and South Eastern Highlands – Large mine
- Targeted threatened flora and fauna surveys as part of impact assessments and preclearance surveys in NSW
- Rapid Data Plot vegetation assessments and mapping in NSW

TARGETED FLORA AND FAUNA SURVEYS

- Large scale targeted Koala surveys, utilising; SAT, eucalyptus foliage sampling and dog detection, Port Stephens – Large Development
- Targeted threatened fauna surveys, including trapping, call-playback, spotlighting and diurnal bird census for impact assessments in South Eastern Highlands, Sydney Basin, Lower Hunter, NSW North Coast and North Western Slopes.

- Targeted threatened flora surveys, in South Eastern Highlands, Sydney Basin, Lower Hunter, NSW North Coast and North Western Slopes.

REFS & IMPACT ASSESSMENTS

- Assessments under NSW Biodiversity Offsets Scheme using the Biodiversity Assessment Method (BAM) that included targeted surveys and assessment of the following Threatened Ecological Communities (TEC) and species:
 - EECs such as Box Gum Grassy Woodland, Tableland Cool Temperate Grassy Woodland, Swamp Sclerophyll Forest, Lowland Rainforest and Lower Hunter Spotted Gum - Ironbark Forest
 - Threatened woodland fauna such as Koala, Regent Honeyeater and Squirrel Glider.
 - Threatened bats such as Grey-headed Flying-fox, Large-footed Myotis and East Coast Freetail Bat.
 - Threatened frogs such as Green and Golden Bell Frog, Stuttering Frog, Green-thighed Frog and Wallum Froglet.
 - Threatened flora such as *Prasophyllum pallens*, *Genoplesium plumosum* and *Melaleuca biconvexa*.

URBAN DEVELOPMENT AND INFRASTRUCTURE

- Assessments under NSW Biodiversity Offsets Scheme using the Biodiversity Assessment Method (BAM)

ENERGY AND MINING

- Preliminary Ecological Assessments for Solar Farm, NSW Western Slopes - UPC Renewables
- Preliminary Ecological Assessments for Quarry upgrades, Northstar and Johns River - Boral
- Biodiversity Management Plans and Conditions of Consent compliance, Western Blue Mountains and Lake Macquarie – Large mine
- Ecological due diligence for permissible activities, Western Blue Mountains and Lake Macquarie – Large mine
- Broad and fine scale monitoring programs for targeted threatened entities, Western Blue Mountains and Lake Macquarie – Large mine

DEPARTMENT OF ENVIRONMENT

- Large scale grid-based surveys in high priority areas Barrington Tops and Gloucester Tops, focusing on threatened species, feral fauna and exotic flora - Biodiversity Conservation Division
- Targeted threatened orchid surveys, Barrington Tops and Gloucester Tops – Biodiversity Conservation Division
- Targeted threatened species surveys for SOS species *Prostanthera junonis*, Somersby Plateau - Biodiversity Conservation Division

Michael Gregor ECOLOGIST

Michael is an ecologist with 1 year of experience as an ecological consultant, and previous experience as a bush regenerator and bush regenerator team leader. Michael has worked on a large variety of projects for various clients such as Broadspectrum, Transport for New South Wales, Whitehaven Coal, and various other smaller developers and local councils. His field work expertise includes: conducting general and targeted flora and fauna surveys across New South Wales flora identification, conducting mine site rehabilitation and subsidence monitoring, mapping of high threat weeds, call playbacks, stag surveys, spotlight audits, conducting pre-clearance surveys and providing tree clearance supervision.

QUALIFICATIONS

- Bachelor of Science (Geography) UNSW 2015
- Conservation and Land Management Certificate 3
- OH&S General Induction Training for Construction Work in NSW (White Card)
- Senior First Aid
- 4x4 Certificate
- Bush Regeneration specific training (Chainsaw Operations (Level 1) Statement of Attainment, Chainsaw Operations (Level 2) Statement of Attainment, ChemCert and LR truck driver's license)

PROJECT EXPERIENCE

- Green and Golden Bell Frog surveys (Call playback and spotlighting) – Mt Gilead, Cattai, Appin and Glenswood Hills. This included surveying along dams and creeks using call playback to identify frog species in the area.
- Koala surveys – Narrabri, NSW. This included tree and SAT searches to identify Koalas in the area
- Threatened flora and fauna surveys – Western edge of the Snowy Mountains - TransGrid
- Secondment work – Narrabri, NSW (Whitehaven Coal)
- Fauna surveys (trapping, pitfalls, remote cameras, spotlighting and callback) – Narrabri, NSW
- Rail corridor pre-clearance assessments – Sydney Basin (Broadspectrum)
- Bush regeneration works to restore and manage the CEEC Cumberland Plain Woodland at the Harrington Grove and Catherine Park development area in Western Sydney. This has involved bush regeneration, flora and fauna surveys, riparian remediation and erosion control measures over a 300ha conservation site.
- Bush regeneration works to restore and manage the EEC Elderslie Banksia Scrub Forest at an offset site in Western Sydney. This worked has included weed control and planting, as well as the establishment and care of biodiversity offset areas.
- Riparian management and restoration works for various developments in south-western Sydney including at Gledswood Hills, Gregory Hills and Cobbitty.

