The new Sydney Fish Market: Biodiversity Development Assessment Report

Concept and Stage 1 Works and Stage 2 Main Works

Infrastructure NSW

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UrbanGrowth NSW Development Corporation (UrbanGrowth NSW) was abolished on 1 July 2019 with all functions transferred to Infrastructure NSW. Any reference to UrbanGrowth NSW throughout this report is interchangeable with Infrastructure NSW (INSW).

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Executive Summary

Eco Logical Australia Pty Ltd (ELA) was commissioned by Infrastructure NSW to conduct a Biodiversity Development Assessment Report (BDAR) for the proposed construction of a new Sydney Fish Market, within Blackwattle Bay (the development site). The new facility will include land and water-based structures, car park, new foreshore promenade and wharves. This BDAR assesses impacts to terrestrial ecology, whilst a separate report by ELA will assess impacts to marine ecology. The proposed redevelopment will be assessed as a State Significant Development (SSD) (application Number SSD 8925). The Secretary's Environmental Assessment Requirements (SEARs) have been issued and required the preparation of a Biodiversity Development Assessment Report (BDAR) in accordance with the Biodiversity Assessment Method (BAM).

Additional information has been provided in this report to address comments by Department of Planning, Industry and Environment - Environment, Energy and Science (EES) scientific review team. This includes additional consideration of legislative context, assessment of Prescribed Impacts and targeted surveys for threatened microchiropteran (microbats).

No mapped Plant Community Types (PCTs), as defined by the NSW BioNet Vegetation Classification system had previously been recorded within the development site. The development site does not contain any mapped streams or wetlands; however, the development site is located on waterfront land and requires consideration in accordance with the *Water Management Act 2000*. Additionally, the development site contributes to a Biodiversity Corridor mapped by Greater Sydney Local Land Services (GSLLS). The development site is mapped with the soil landscape 'Disturbed Terrain'. These areas were previously swamps, estuaries, and wetlands, which have been cut and filled using estuarine sand and mud, and rocks and local soil materials, along with a variety of artificial material. The site inspection solely identified scattered planted (or naturally established) native and exotic vegetation within the development site. No PCTs were assigned to vegetation within the development site, therefore no offsets are required under the BC Act.

Due to the absence of PCTs within the development site, no ecosystem credit or species credit species were predicted to occur. To determine the Likelihood of Occurrence of threatened species, a 10 km search of BioNet records of threatened species under the *Biodiversity Conservation Act 2016* (BC Act), and 10 km Protected Matters search for threatened species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), was conducted. Species of Local Conservation Significance under the Urban Ecology Strategic Action Plan (UESAP; City of Sydney) and Connected Corridors for Biodiversity (CCB; Southern Sydney Regional Organisation of Councils Incorporated), were also included in the assessment.

Targeted surveys were conducted for three threatened microbat species as identified by EES and an additional three species identified by ELA as having the potential to utilise features within the development site as roosting habitat and could therefore be affected by the proposed development:

- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat)
- *Miniopterus orianae oceanensis* (Large Bent-winged Bat)

- *Miniopterus australis* (Little Bent-winged Bat)
- *Myotis macropus* (Southern Myotis)
- Scoteanax rueppellii (Greater Broad-nosed Bat).

Southern Myotis is listed as a species credit species with breeding habitat (i.e. hollow bearing trees, buildings and wharf) and foraging habitat (waterbodies) considered present within the development site. The two Bent-winged Bats are dual species, however, suitable breeding habitat (i.e. caves) are not present in the development site. The remaining species are listed as ecosystem species and do not require targeted surveys consistent with BAM. However, targeted surveys for all microbats and microbat roosting habitat were conducted under the wharf and in the one of the buildings and assessed as part of assessment of Prescribed Impacts. Southern Myotis was recorded during targeted surveys and was likely to utilise the development site as roosting, breeding and foraging habitat. As no PCTs were assigned to vegetation within the development site, impacts to species credit species cannot be offset. ELA has addressed impacts to microbats through prescribed impacts. Due to impacts on Southern Myotis and possibly other threatened microbats, a Microbat Management Plan (MMP) is required prior to construction works.

The development site is located in the southern portion of Blackwattle Bay and has substantially avoided biodiversity impacts (particularly threatened species and ecological communities) by utilising, as much as possible, already disturbed sites and existing infrastructure. However, the development will directly affect a small amount of potential foraging habitat for small birds of local conservation significance, and *Pteropus poliocephalus* (Grey-headed Flying Fox).

Grey-headed Flying Fox, listed as *Vulnerable* under the BC Act and EPBC Act, and native non-threatened small birds (as a general group of local conservation significance under the UESAP) were identified with the potential to occur within the development site. Although the development site lacks areas of dense native mid-storey vegetation, canopy vegetation provides potential habitat for small birds including Yellow Thornbill, Australian Reed-warbler, Superb Fairy-wren, Spotted Pardalote, and Silvereye, all birds of local conservation significance.

It is noted that the Grey-headed Flying-fox is an ecosystem credit species (for foraging and non-breeding habitat) and the small birds of local conservation significance are not listed threatened species, and therefore, due to the absence of PCTs within the Development Footprint, do not require an offset.

One Matter of National Environmental Significance (MNES) was identified as potentially adversely affected by the proposed works.

An assessment of the Commonwealth Significant Impact Criteria was undertaken for the Grey-headed Flying-fox. The assessment concluded that the project would not have a significant impact on this species. All impacts on MNES have been avoided as far as practicable and all impacts have been assessed in accordance with Commonwealth guidelines. Mitigation strategies have been put into place to manage potential impacts to MNES.

Potential indirect impacts of the proposed works would include sediment runoff, mitigated by using sediment barriers, and light spill to adjacent stand of Fig trees (potential foraging habitat for Grey-headed Flying-fox), mitigated by intentional direction of lighting.

The proposed works would not have any Serious and Irreversible Impacts (SAII).

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ABBREVIATIONS

Abbreviation	Description
BAM	Biodiversity Assessment Methodology
BC Act	*Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
BLA	Bird Life Australia
CCB	Connected Corridors for Biodiversity
CEMP	Construction Environmental Management Plan
CoS	City of Sydney
DA	Development Application
DECC	Department of the Environment and Climate Change (now DoEE)
DECCW	Department of Environment, Climate Change and Water
DotEE	Department of the Environment and Energy (formally DECC)
DPIE	NSW Department of Planning, Industry and Environment (previously known as NSW OEH)
EES	NSW Environment, Energy and Science (previously part of OEH)
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FBA	Framework for Biodiversity Assessment
GSLLS	Greater Sydney Local Land Services
LGA	Local Government Area
LPI	Land and Property Information
MMP	Microbat Management Plan
NSW	New South Wales
NOW	NSW Office of Water
OEH	Office of Environment and Heritage (now EES)
PCT	Plant Community Type
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SFM	Sydney Fish Market Pty Ltd.
SRD	State and Regional Development
SSROC	Southern Sydney Regional Organisation of Councils
TEC	Threatened Ecological Community
UESAP	Urban Ecology Strategic Action Plan

1. Biodiversity Assessment

1.1 Introduction

Sydney Fish Market is the largest of its kind in the Southern Hemisphere and among the three largest seafood markets in terms of variety in the world. The market sources product both nationally and internationally and trades approximately 14,500 tonnes of seafood annually with up to one hundred sustainable seafood species traded every day and approximately 500 species traded annually. The site attracts over 3 million visits each year.

In November 2016 the NSW Premier announced a new Sydney Fish Market would be built at the head of Blackwattle Bay, adjacent to the existing Fish Market. In June 2017 the Premier of NSW announced the appointment of Danish architects 3XN to lead the design team that includes Sydney firms BVN and Aspect Studios. They have been working with key stakeholders, including Infrastructure and Sydney Fish Market Pty Ltd (SFM), to develop the design for the new Sydney Fish Market. As announced by the NSW Premier, works are planned to commence in 2019.

This Biodiversity Development Assessment Report (BDAR) has been prepared by Mitchell Scott and Matthew Dowle. Mitchell and Matthew are both Accredited Persons under the NSW *Biodiversity Conservation Act 2016* (BC Act), and Matthew is the nominated Accredited Assessor for this report. Recent updates to the report have been prepared by Belinda Failes and reviewed by Dr Meredith Henderson, both of whom are Accredited Persons under the BC Act.

The BDAR is a requirement of the NSW Secretary's Environmental Assessment Requirements (SEARS) for the State Significant Development (SSD8925) and assessment under the BC Act. This report was prepared in accordance with Part 7 of the BC Act. Specifically:

- under Section 7.9 of the BC Act, State Significant Developments (SSD) must be accompanied by a BDAR
- under Section 7.14 of the BC Act, for SSD, a BDAR must assess the likely impact of the proposed development on biodiversity values. The conditions of the consent or approval may require the applicant to retire biodiversity credits to offset the residual impact on biodiversity values.

The contents of this BDAR complies with the minimum requirements outlined in Table 25 of the Biodiversity Assessment Methodology (BAM: OEH, 2017).

1.1.1 General description of the development site

The development site is approximately 4 ha in size, located on the boundary of Glebe, Ultimo, and Pyrmont, within the Sydney Local Government Area (LGA) (Figure 1 and Figure 2). This BDAR considers only terrestrial areas within the Development site. Aquatic impacts associated with the development are considered in a separate report.

The development site is located at the head of Blackwattle Bay between the Pyrmont Peninsula and the foreshore of Glebe, situated less than 2km west of Sydney's CBD and is partially within the City of Sydney Local Government Area.

The land to which the development application relates comprises Lots 3 - 5 in DP 1064339 part of lot 107 in DP 1076596 and part Lot 1 in DP835794. Works to connect to the existing waterfront promenade

to the west of the site are located on Lot 3 in DP1018801. The development footprint is irregular in shape and has an area of approximately 36,800 m². The site is partly on land above mean high water mark and partly on water below mean high water mark.

The development site has a frontage to Bridge Road to the south and Blackwattle Bay to the north. Pyrmont Bridge Road is an arterial road that links to the Anzac Bridge to the north west of the site. Sydney Secondary College Blackwattle Bay Campus is immediately south west of the site and the existing Fish Market immediately north east. Located directly opposite the site to the south is Wentworth Park, separated by Bridge Road.

Located approximately 400 m walking distance from the site are the existing Fish Markets, Wentworth Park, and Glebe Light Rail stops which are serviced by the Dulwich Hill Line which is a 23 stop, 12.8-kilometre route running from Dulwich Hill to Central station via Pyrmont.

The development site's current uses include a concrete batching plant at the Western end and concrete hardstand and wharf area at the Eastern end, which is currently vacant. The development site includes wharves and land-based structures. Part of the development site is the water of Blackwattle Bay. Works will be undertaken on Bridge Road and its intersections with Wattle Street and Wentworth Park Road.

No mapped native vegetation communities, defined as Plant Community Types (PCTs) by the NSW BioNet Vegetation Classification system occur within the development site.

The development site is defined in the Site Map (Figure 1) and the Location Map (Figure 2).

1.1.2 Development footprint

In this report, the development site and the development footprint are the same area, and hereafter cumulatively referred to as the development site (Figure 1).

1.1.3 Sources of information used

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

- Biodiversity Assessment Methodology Calculator
- BioNet Vegetation Classification
- BioNet Atlas
- The native vegetation of the Sydney metropolitan area (OEH 2013)
- Urban Ecology Strategic Action Plan (UESAP) (CoS 2014)
- Connected Corridors for Biodiversity (CCB) (SSROC 2016).

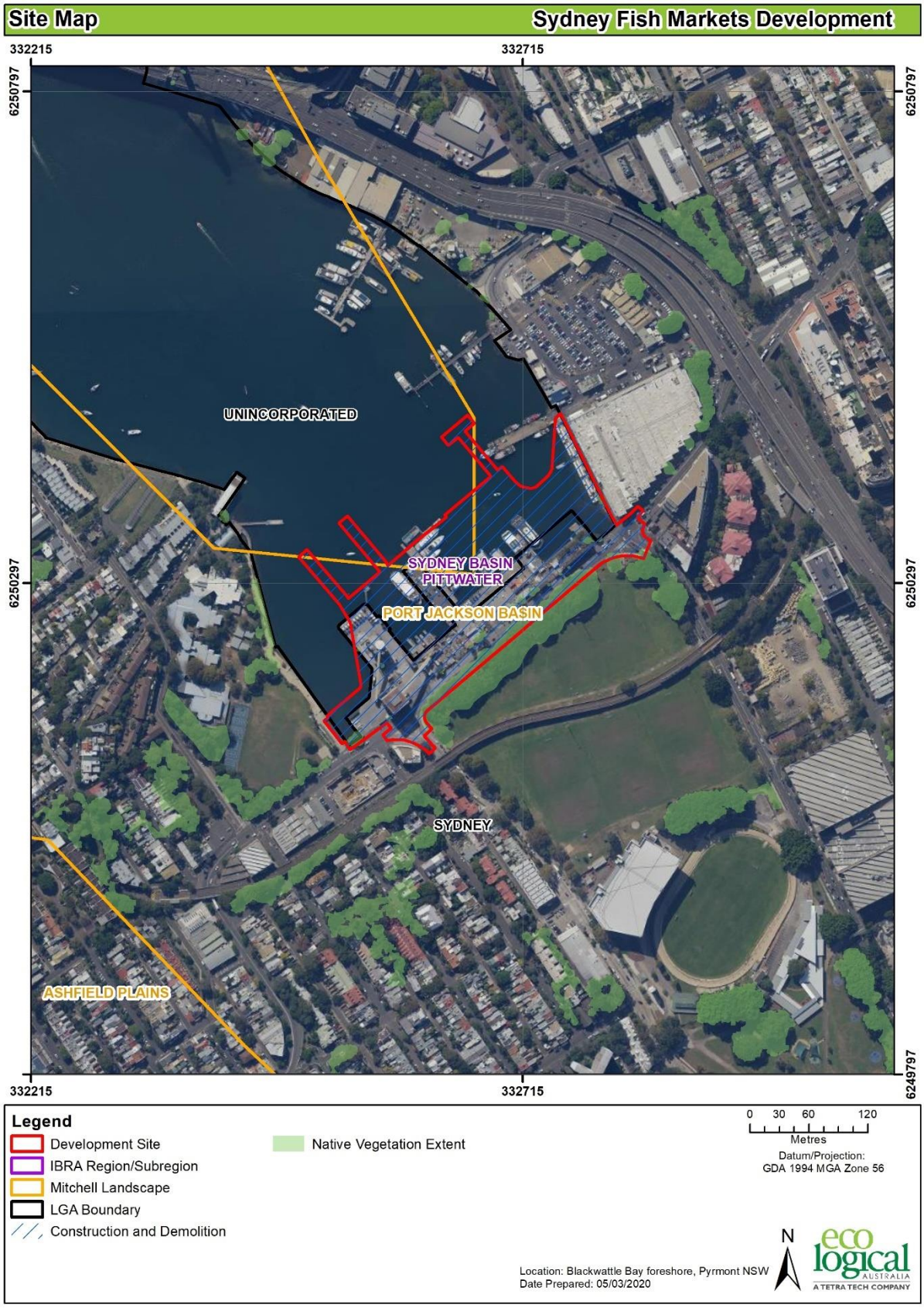

Figure 1: Site Map

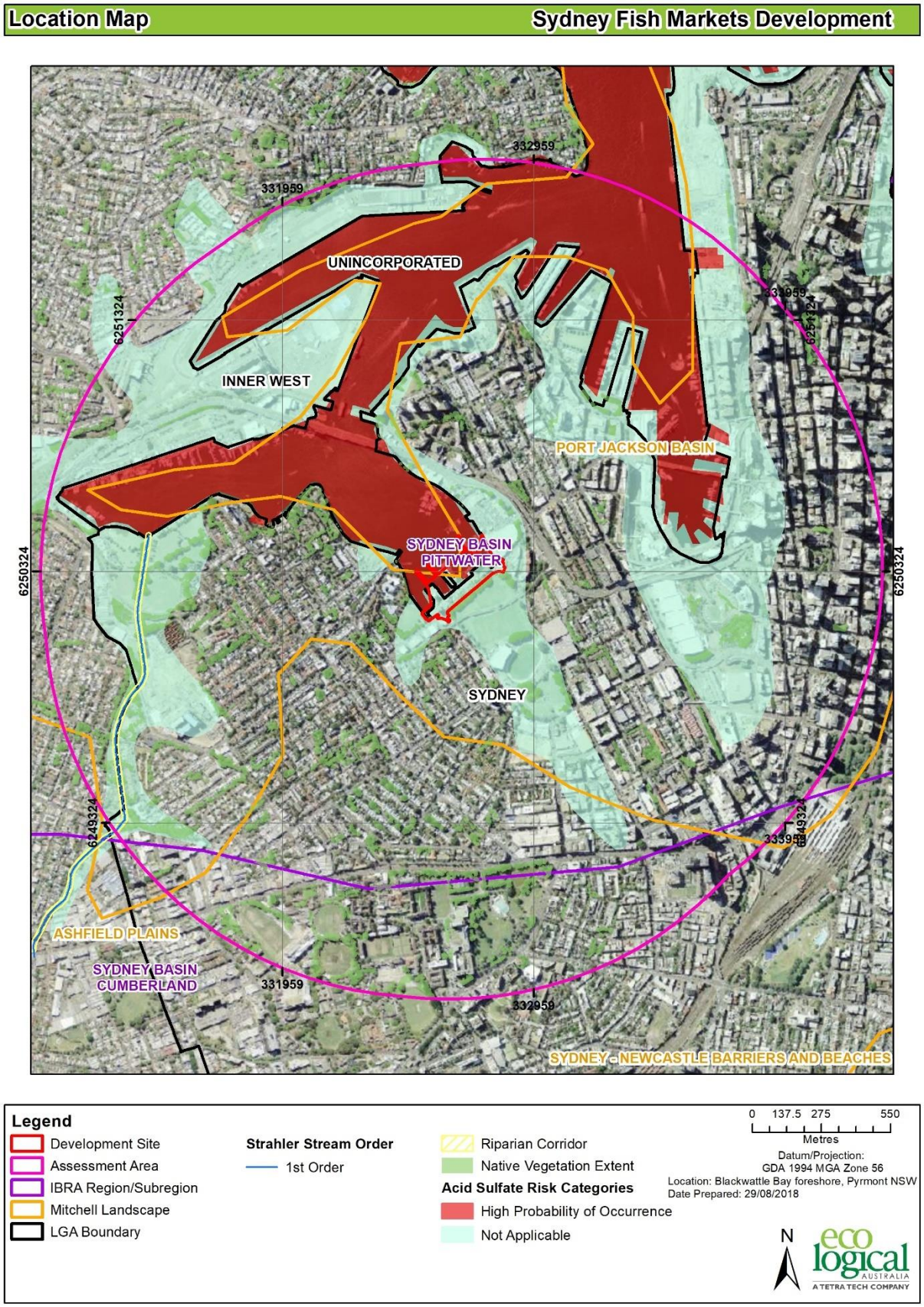

Figure 2: Location Map

1.2 Approval Strategy

Pursuant to the provisions of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and *State Environmental Planning Policy (State and Regional Development) 2011* (SEPP SRD) the new Sydney Fish Market development is a State Significant Development (SSD 8925) and the Minister for Planning is the consent authority.

The purpose of this BDAR is to address the Secretary's Environmental Assessment Requirements (SEARs) Application Number SSD 8924 and SSD 8925, under Specific Matter 10 - Biodiversity:

- Provide a Biodiversity Development Assessment Report (BDAR) prepared in accordance with the Biodiversity Assessment Method (BAM) to assess the impacts of the proposed development on biodiversity.

To deliver the new Sydney Fish Market, the following applications will be lodged:

1. A concept development application seeking approval for concept proposals for the new Sydney Fish Market. This is to meet the requirements for a master plan contained in clause 40 of Sydney Regional Environmental Plan No 26—City West (SREP26). This concept development application will also set out details of the first stage of the development being the demolition of land and water-based structures on the site including removal of marine piles and any resulting repairs to the existing sea wall.

2. A development application for the construction of the new Sydney Fish Market.

3. An application to amend the planning controls applying to the site to enable the proposed development to be a permissible use on all of the site. This is to be achieved by an amendment to Sydney Regional Environmental Plan No 26—City West (SREP26).

These applications are lodged concurrently.

EES reviewed the BDAR and has requested additional information regarding an assessment of threatened microbat habitat within the development site. ELA has addressed these requirements as part of prescribed impacts in Section 2.1.2.

1.3 Summary of the Development

The proposal is to build a new Sydney Fish Market with a contemporary urban design, provide unique experiences for visitors and world-class auction and wholesale facilities. The new facility will be set within an improved public domain including the creation of a waterfront promenade with improved access to Blackwattle Bay and linking to surrounding areas and to public transport.

The development will expand and improve the functions of the existing in a new setting designed to achieve design excellence, functional performance and environmental sustainability.

The new Sydney Fish Market will include retail and food and beverage premises, wholesale facilities and auction rooms, offices and commercial space, Sydney Seafood Schools, back-of-house facilities and car, truck and coach parking spaces. The new facility is to include a new foreshore promenade and wharves.

The new Sydney Fish Market will be purpose built and will be supported by a state of the art back-of-house plant and recycling/waste management facilities.

1.3.1 Concept development application

The Concept development application seeks approval for:

- the use of the site for the new Sydney Fish Market including waterfront commercial and tourist facilities and ancillary uses and the distribution of uses
- a gross floor area of approximately 30,000 m^2 contained within a defined building envelope
- waterfront structures such as wharves
- concepts for improvements to the public domain including promenades, access to Blackwattle Bay and landscaping
- pedestrian cycle and road access and circulation principles
- principles for infrastructure provision and waste management.

This concept development application will also set out details of the first stage of the development being the demolition of land and water-based structures on the site including removal of marine piles and any resulting repairs to the existing sea wall, and related services relocations.

1.3.2 Main Works development application

The Main Works development application seeks approval for:

- the construction of a new Sydney Fish Market including land and water-based structures
- the use of the site for the new Sydney Fish Market including waterfront commercial and tourist facilities and ancillary uses and the distribution of uses
- a gross floor area of approximately 26,000 m^2 as calculated according to the definition of GFA under SREP 26 (approximately 25,600 m^2 as calculated according to the definition of GFA under the Standard Instrument)
- public domain works including promenades access to Blackwattle Bay and landscaping
- pedestrian, cycle and road access and circulation
- infrastructure provision and waste management
- associated works as required.

Below Ground Level

- parking for service and delivery, and private vehicles up to approximately 415 vehicles
- plant and storage
- waste Management facilities
- end of journey facilities.

Ground Level - Outside of Building Envelope

- up to three operational wharves for fishing fleet servicing and product unloading/loading, multi-purpose wharf space, recreational vehicles and the like
- vehicular access driveways
- publicly accessible promenade.

Ground Level - Within Building Envelope

- wholesale services space including product storage and processing
- auction floor and associated refrigeration and handling space
- loading dock including limited delivery and service vehicle parking area
- waste management facilities
- office space including buyers room
- staff amenities, plant and storage.

Upper Ground Level (L1)

- Retail premises including fresh food retail, food and drink premises including harbourside dining;
- External/shared dining space;
- Ancillary back of house space and staff amenities; and
- Circulation areas.

Upper Level 2

- catering space
- the Sydney Seafood School
- tenant and subtenant office space
- plant and storage space.

Bridge Road works

- road upgrade and widening on Bridge Road and its intersections with Wattle Street and Wentworth Park Road.

1.4 Legislative context

Table 1: Legislative context

Name	Relevance to the project	Report Section
Commonwealth		
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Matters of National Environmental Significance have been identified on or near the development site. An assessment under the Commonwealth Significant Impact Criteria has been undertaken for the *Pteropus poliocephalus* (Grey-headed – Flying-fox). This report does not require further assessment to MNES under the EPBC Act.	
State		
Biodiversity Conservation Act 2016 (BC Act)	The proposed development requires submission of a BDAR (i.e. this report) under the BC Act.	All
Environmental Planning and Assessment Act 1979 (EP&A Act)	The proposed development requires consent under the EP&A Act.	N/A
Fisheries Management Act 1994 (FM Act)	The development site has been mapped as Key Fish Habitat (Figure 4). A separate Marine Ecology Assessment conducted by ELA (2019) has addressed FM Act and Key Fish Habitat requirements. The proposed structure does not shade marine vegetation. Fish attracting features will be mounted to the structure to provide aquatic habitat connectivity.	N/A
Local Land Services Amendment Act 2016 (LLS Act)	The LLS Act does not apply to areas of the state to which the Vegetation SEPP applies. The Vegetation SEPP applies to the City of Sydney LGA.	N/A
Water Management Act 2000 (WM Act)	The WM Act aims to provide for the sustainable and integrated management of water resources for NSW. The Act requires developments on waterfront land to be ecologically sustainable and recognises the benefits of aquatic ecosystems to agriculture, fisheries, and recreation. The WM Act is administered by the Natural Resources Access Regulator (NRAR) and establishes an approval regime for activities within waterfront land, defined as the land 40 m from the highest bank of a river, lake or estuary. For State Significant Development, a separate approval in accordance with the WM Act is not required. However, it is likely that the SEARs will require consideration of the hydrological and riparian areas. This has been assessed by ELA as a separate document to be submitted as part of the SDD application.	N/A
Environmental Planning Instruments		

Name	Relevance to the project	Report Section
State Environmental Planning Policy (SEPP) – Coastal Management 2018	The objectives of the SEPP Coastal Management are to manage the coastal environment of New South Wales and adjacent coastal areas. Section 10 of the Coastal SEPP states that clearing of native vegetation in the Coastal Wetland requires consent. Part 2 of the SEPP identifies objectives relating to four coastal management areas of the 'coastal zone': • Coastal wetlands and littoral rainforest areas • Coastal vulnerable areas • Coastal environment area • Coastal use area. The proposed development is located on land subject to SEPP coastal management. The development site has been mapped as Coastal Environment Area and Coastal Use Area. More information is provided in Section 2.6.3 and displayed in Figure 4.	N/A
State Environmental Planning Policy (Koala Habitat Protection) 2019 (Koala Habitat Protection SEPP) (effective 1 March 2020)	This SEPP and the accompanying Koala Habitat Protection Guidelines does not apply to the Sydney City LGA.	N/A
SEPP (Vegetation in Non-Rural Areas) 2017	This SEPP applies to development that does not require development consent. As this project requires consent under the EP&A Act, the Vegetation SEPP is not relevant.	N/A

Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005	The Sydney Regional Environmental Plan covers all the waterways of the Harbour, the foreshores and entire catchment. It establishes planning principles to be used by councils for planning instruments.
	The aim of the Plan is to protect the Sydney Harbour Catchment 2005:
	• To ensure that the catchment, foreshores, waterways and islands of Sydney Harbour are recognised, protected, enhanced and maintained:
	  ○ as an outstanding natural asset, and
	  ○ as a public asset of national and heritage significance,
	  ○ for existing and future generations,
	• to ensure a healthy, sustainable environment on land and water,
	• to achieve a high quality and ecologically sustainable urban environment,
	• to ensure a prosperous working harbour and an effective transport corridor,
	• to encourage a culturally rich and vibrant place for people,
	• to ensure accessibility to and along Sydney Harbour and its foreshores,
	• to ensure the protection, maintenance and rehabilitation of watercourses, wetlands, riparian lands, remnant vegetation and ecological connectivity,
	• to provide a consolidated, simplified and updated legislative framework for future planning.
	The development site is located within the Foreshores and Waterways Area Boundary and a small section in the Water Zoning.
		2.6.5

Sydney Local Environmental Plan 2012 (LEP)	The development site is not zoned under the Sydney LEP. Instead the development site is located within the Sydney Regional Environmental Plan and provision relating to the Sydney LEP do not apply.	2.6.2

Name	Relevance to the project	Report Section
Sydney Development Control Plan (DCP) 2012	The Sydney DCP has been reviewed for additional biodiversity provisions that may relate to the development site. Section 3.5.1 Urban Ecology of the DCP relates to the: • Protection of existing habitat features within and adjacent to development sites • Improve the diversity and abundance of locally indigenous flora and fauna species across the LGA. Under the DCP, development is to be consistent with the Street Tree Master Plan, Park Tree Management Plans and the Landscape Code. These matters have been addressed in this report.	2.6.3
Darling Harbour Development Control Plan 1 1985	The development site is mapped as land application within the Darling Harbour Development Control Plan No. 1. Provision relating to the control plan have been reviewed.	2.6.4

1.5 Landscape features

1.5.1 IBRA regions and subregions

The development site falls within the Sydney Basin IBRA region, within the Pittwater subregion (Figure 2). The boundary of the Cumberland subregion occurs approximately 1 km to the south of the development site.

1.5.2 Mitchell Landscapes

The terrestrial portion of the development site is located within the Mitchell Landscape as outlined in Figure 2.

Table 2: Mitchell Landscapes

Mitchell landscape	Description	Area within Development site (ha)
Port Jackson Basin	Deep elongated harbour with steep cliffed margins on horizontal Triassic quartz sandstone. Small pocket beaches and more extensive Quaternary estuary fill of muddy sand at the head of most tributary streams. General elevation 0 to 80 m, local relief 10 to 50 m. Sandstone slopes and cliffs have patches of uniform or gradational sandy soil on narrow benches and within joint crevices that support forest and woodland of Sydney peppermint (*Eucalyptus piperita*), smooth-barked apple (*Angophora costata*), red bloodwood (*Corymbia gummifera*) and blackbutt (*Eucalyptus pilularis*). Sheltered gullies contain some turpentine (*Syncarpia glomulifera*), coachwood (*Ceratopetalum apetalum*) and water gum (*Tristaniopsis laurina*). Estuarine sands were originally dominated by saltmarsh but have been taken over by grey mangrove (*Avicennia marina*) in the past century (DECC 2002).	Approximately 4 ha (the entire Development site)

1.5.3 Native vegetation extent

The extent of native vegetation within the development site is 0.29 ha, and within the 1,500 m buffer is 45.05 ha (0.64 %). Native vegetation has the same definition as in Part 5A of the *Local Land Services Act 2013.*

1.5.4 Rivers and streams

The development site does not contain any rivers or streams. The nearest drainage line is approximately 700 m from the development site. However, the development site contains areas mapped as 'water'.

1.5.5 Wetlands

The development site does not contain any wetlands. The nearest local wetland is mapped under the Coastal Management SEPP, approximately 900 m to the west of the development site.

1.5.6 Connectivity features

A large proportion of the development site has been mapped as providing a Biodiversity Corridor under the Greater Sydney Local Land Services (GSLLS) Biodiversity Corridor Mapping (GSLLS 2017) (Figure 3).

The following definitions apply:

- Supporting habitat - Vegetation mapped as 'Urban & exotic' by OEH (2013), which comprises 'generalised boundaries of mixed vegetation in a highly urbanised environment'; including additional areas supporting habitat areas identified by Council staff during the review phase

- Supporting areas – areas within 100 m of potential habitat.

Given the urban context of the development site and the type of specific habitat provided (mostly landscape plantings and street trees) the mapping of the development site is taken to refer primarily to highly mobile species such as birds and bats.

Connectivity features relating to the aquatic portion of the development site have been addressed in a separate report.

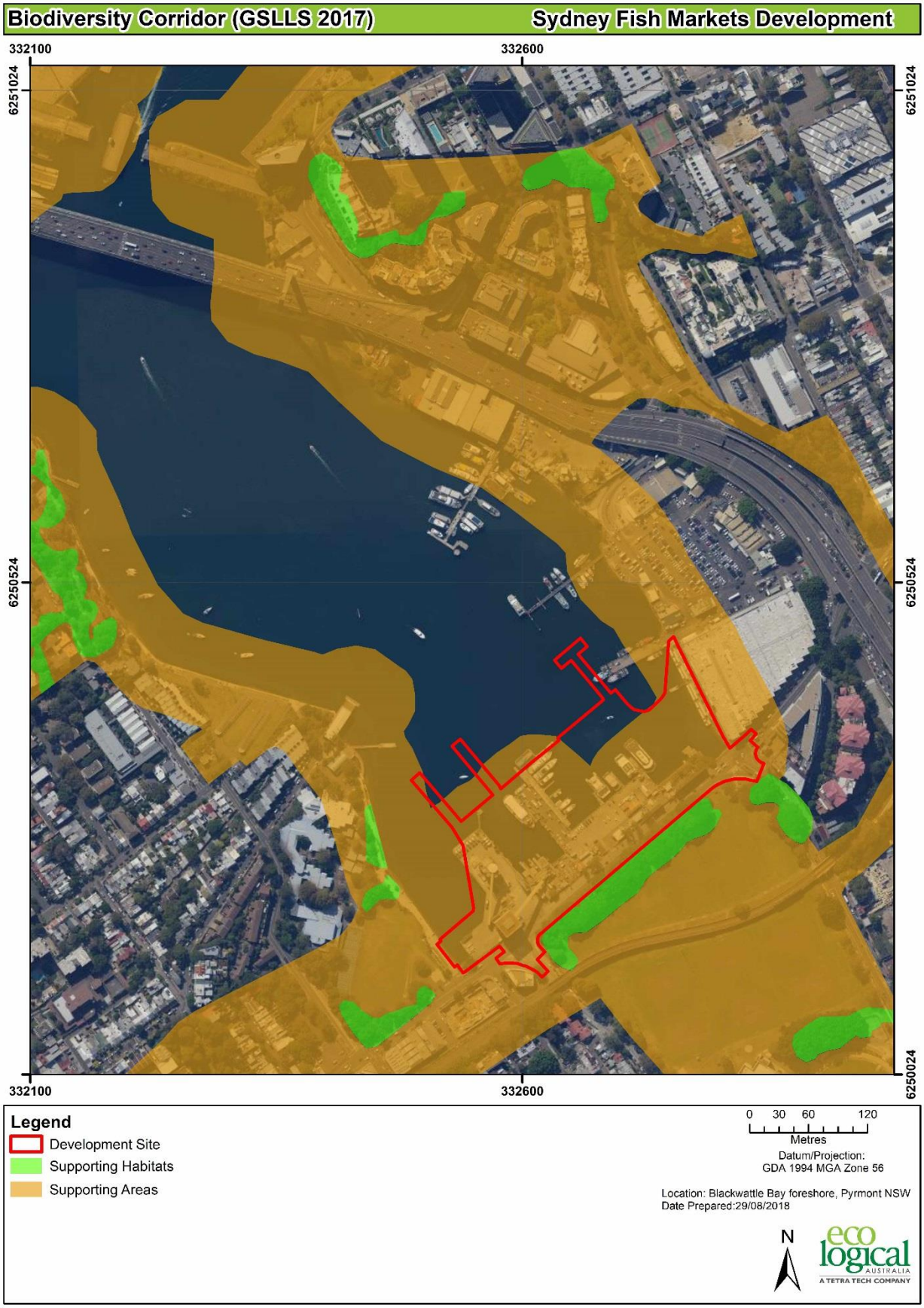

Figure 3: Greater Sydney Local Land Services (GSLLS) Biodiversity Corridor Mapping

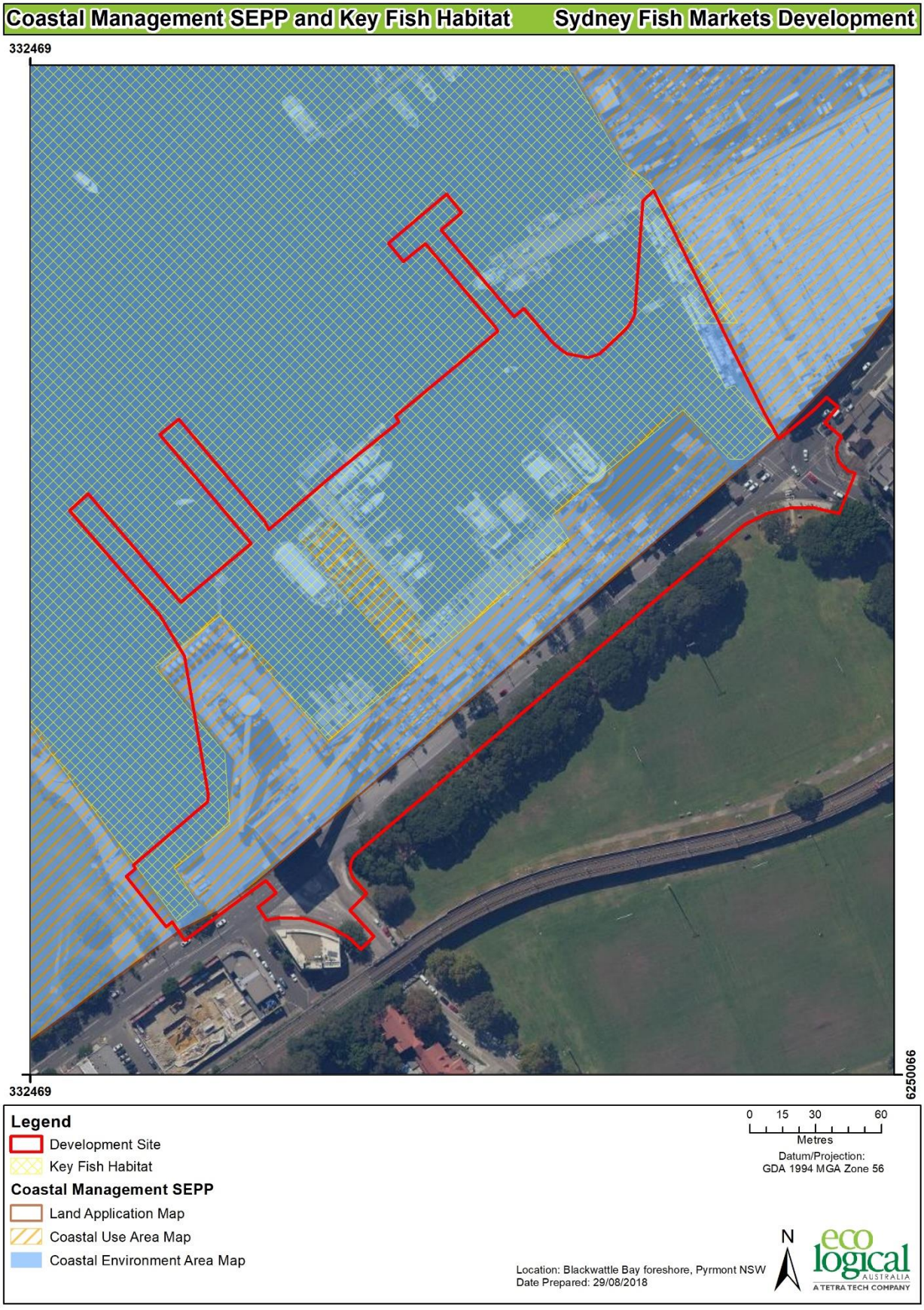

Figure 4: Coastal Management SEPP mapping and Key Fish Habitat

1.5.7 Areas of geological significance and soil hazard features

The development site does not contain areas of geological significance. The development site has been mapped with the soil landscape 'Disturbed Terrain'. These areas were previously swamps, estuaries, and wetlands, which have been cut and filled using estuarine sand and mud, and rocks and local soil materials, along with a variety of artificial material including demolition rubble, industrial and household waste (OEH 2017a).

1.5.8 Site context

1.5.8.1 Method applied

The site-based method has been applied to this development.

1.5.8.2 Percent native vegetation cover in the landscape

The current percent native vegetation cover in the landscape was assessed in a Geographic Information System (GIS) using aerial imagery sourced from SIX Maps (LPI 2018) using increments of 5%. The extent of native vegetation within the development site is 0.29 ha, and within the 1,500 m buffer is 45.05 ha (0.64 %).

1.6 Native vegetation

1.6.1 Survey effort

A vegetation survey was undertaken within the development site by Ecologist Mitchell Scott on 22 August 2017 and 31 August 2017.

Vegetation within the development site has been mapped in Figure 5 and a species list provided in Appendix B.

No Plant Community Types (PCTs) as defined by the NSW BioNet Vegetation Classification system were identified within the development site, thus no vegetation integrity plots were conducted.

1.6.2 Plant Community Types present

No PCTs were identified within the development site. The development site is entirely modified and disturbed, and contains exotic species, weeds and planted native or non-indigenous species.

1.6.2.1 PCT selection justification

No PCTs were mapped within development site (Figure 5). The entire development site is located on soil mapped as 'Disturbed Terrain', having previous been an area of wetland and estuarine habitat. Therefore, it was unlikely that remnant native vegetation would currently occur within the development site.

All vegetation present within the development site was classified as ‘Urban Exotic and Native Cover’, consistent with the non-native vegetation mapped by OEH (2013; Sydney Metropolitan Catchment Management Authority Vegetation Mapping project) and was considered to be in a low condition. This vegetation type is not required to be further assessed using the BAM and was thus excluded from any credit or offset calculations.

The largest portion of contiguous vegetation are a line of *Casuarina glauca* (Swamp Oak) located along the south-eastern boundary of the development site.

The development site includes scattered native and exotic vegetation which has been either planted or naturally established (Figure 5).

Vegetation Mapping

Vegetation within the development site includes native canopy species *Casuarina glauca*, *Ficus rubiginosa* (Port Jackson Fig) and *Ficus macrophylla* (Moreton Bay Fig), and exotic canopy species *Celtis sinensis* (Japanese Hackberry), and *Magnolia grandiflora* (Magnolia). Mid-storey and groundcover species include *Lantana camara* (Lantana), *Ehrharta erecta* (Veldtgrass), and *Cenchrus setaceus* (Fountain Grass) (Figure 7 and Figure 8).

The road adjacent to the south of the development site is lined with *Lophostemon confertus*. A large stand of planted *F. macrophylla* (Moreton Bay Fig), and one *Ficus microcarpa* var. *hillii* (Hills Weeping Fig), occurs adjacent to the southern boundary of the development site, within Wentworth Park. The canopy of this stand overhangs the boundary of the development site and may require trimming only within the development site boundary (Figure 9).

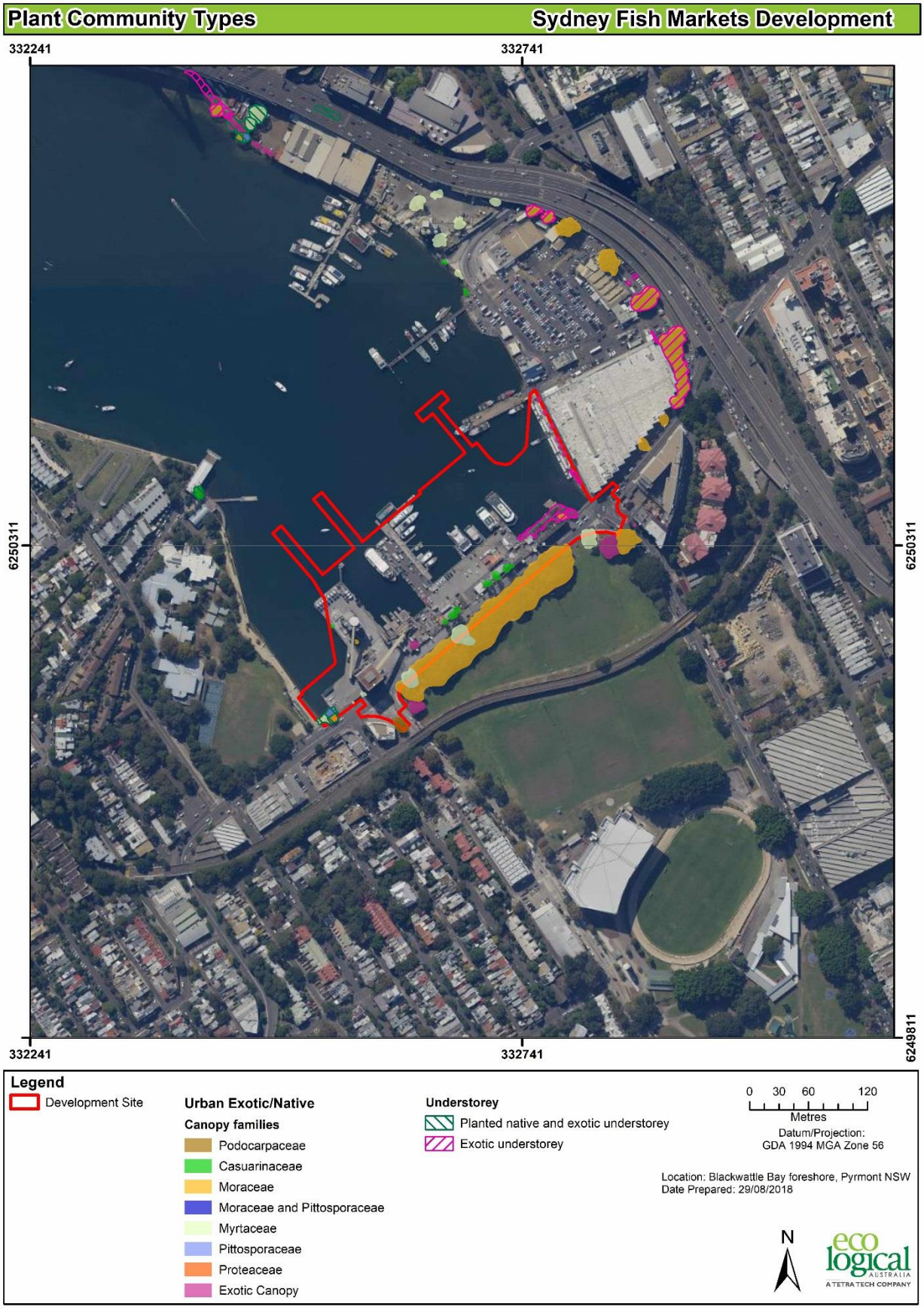

Figure 5: Terrestrial habitat in the southern portion of the development site

Figure 6: Exotic vegetation within development site

Figure 7: Canary Island Date Palms on the eastern border of the development site

Figure 8: *Ficus rubiginosa* (Port Jackson Fig) within the development site

Figure 9: Vegetation adjacent to the south-eastern boundary of the development site (to be retained)

1.6.2.2 Threatened Ecological Communities Justification

No threatened ecological communities (TECs) were identified within the development site.

1.6.3 Vegetation integrity assessment

No PCTs were identified within the development site, and thus a vegetation integrity assessment as part of the BAM has not been conducted.

1.6.4 Use of local data

Use of local data instead of benchmark integrity scores is not proposed.

1.7 Threatened species

1.7.1 Ecosystem credit species

The BDAR requires that a list of threatened species that can be reliably predicted by habitat surrogates are identified. These species are called ecosystem credit species and they are automatically generated based on the PCT, the IBRA subregion of the project footprint, the condition and patch size of vegetation. The BDAR allows an assessor to determine whether any of the habitat components for the predicted threated species are present or not. If they are not present, an assessor does not need to identify the ecosystem credit species present in the vegetation zone.

However, due to the lack of PCTs within the development site, no ecosystem credit species were predicted to occur.

1.8 Species credit species

1.8.1 Candidate species credit species

Species credit species are typically predicted by the assessment tool based on the PCTs present within the project footprint, and a series of habitat and geographic location questions formulated by the assessment tool. Once the species credit species are identified, they undergo a second filtering step to determine whether they are filtered into the assessment for consideration as a species credit species.

No species credit species were identified from the tool and therefore no species credit species were considered for further assessment. Due to the lack of PCTs mapped within the development site, potential candidate species (including species credit species) were assessed as part of Prescribed Impacts (see Section 2.1.2).

1.9 Final candidate species

No candidate species were initially predicted by the tool. However, some species have habitat requirements that cannot be predicted by PCTs, and therefore cannot be predicted by the assessment tool. Particularly those species that can utilise man-made or exotic environments. As such, a conservative list of final candidate species was developed (Table 3).

This list is based on the species Likelihood of Occurrence (Appendix A), which was informed from database searches, previous studies, and specific habitat features present within the development site.

The list of final candidate species is then used to determine whether or not the species requires further assessment in the tool and whether targeted surveys are required.

A list of targeted species assessed in accordance with Prescribed Impacts are provided in Section 2.1.2 and have been included in the table below.

Furthermore, it is noted that a candidate species is typically not considered present by the BDAR where:

- The habitat is substantially degraded
- An expert report states that the species is unlikely to be present
- The species is a vagrant and is unlikely to frequently use habitat in the project footprint
- Records of the species are at least 20 years old or have doubtful authenticity.

Table 3: Final candidate species list

Species	Common Name	Species Type	Habitat Constraints	Sensitivity to gain class	BC Act	EPBC Act
Small birds (As a general group identified by the UESAP. Non-threatened species recorded within 10 km of Development site listed in Table 23)		n/a			-	-
*Acanthiza nana**	Yellow Thornbill	n/a			-	-
*Acrocephalus australis**	Australian Reed-warbler	n/a			-	-
*Malurus cyaneus**	Superb Fairy-wren	n/a			-	-
*Pardalotus punctatus**	Spotted Pardalote	n/a			-	-
*Zosterops lateralis**	Silvereye	n/a			-	-
Microbats						
Chalinolobus dwyeri	Large-eared Pied Bat	Species credit	within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within 2 km of old mines or tunnels.	Very High	V	V
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Ecosystem	N/A	High	V	Not Listed

Species	Common Name	Species Type	Habitat Constraints	Sensitivity to gain class	BC Act	EPBC Act
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	Ecosystem	N/A		V	Not Listed
Miniopterus australis	Little Bent-winged Bat	Ecosystem (foraging) and Species Credit (breeding) Species	Caves Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding	Very High	V	Not Listed
Miniopterus orianae oceanensis	Large Bent-winged Bat	Ecosystem (foraging) and Species Credit (breeding) Species	Caves Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding	Very High	V	Not Listed
Myotis macropus	Southern Myotis	Species credit		High	V	Not Listed
Saccolaimus flaviventris	Yellow-bellied Sheath-tailed Bat	Ecosystem		High	V	Not Listed
Scoteanax rueppellii	Greater Broad-nosed Bat	Ecosystem		High	V	Not Listed
Megabats						
Pteropus poliocephalus	Grey-headed Flying-fox	Ecosystem (foraging) and Species Credit (breeding) Species	Breeding colonies	High Sensitivity to Potential Gain	Vulnerable	Vulnerable

*species of local conservation significance, as identified by the UESAP and SSROC CCB

1.9.1 Targeted surveys

A literature review was conducted to identify if buildings or structures could potentially be utilised as a roosting resource by microbats, including reviewing the BioNet records from within 10 km of the development site. Following the literature review and database searches, the list of potentially occurring threatened microbat species (candidate species) includes:

- *Chalinolobus dwyeri* (Large-eared Pied Bat)
- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat)
- *Miniopterus australis* (Little Bent-winged Bat)

- *Miniopterus orianae oceanensis* (Large Bent-winged Bat)
- *Myotis macropus* (Southern Myotis)
- *Saccolaimus flaviventris* (Yellow-bellied Sheath-tailed Bat)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat).

Targeted surveys are required for species which are listed as species credit species.

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 roof cavities of buildings. However, the Southern Myotis has potential to utilise human-made structures (i.e. the wharf) located within the development site as breeding and roosting habitat.

ELA conducted additional surveys as requested by EES to identify potential microbat roosting habitat and evaluate microbat activity within, beneath and around the human-made structures within the development site. Targeted surveys were conducted for threatened microbat species outside the buildings and under the wharf as part of assessment of Prescribed Impacts.

Targeted microbat surveys were undertaken in accordance with the 'Species credit' threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Methodology (OEH 2018).

Targeted microbat surveys at the subject site included:

- diurnal external structure inspection of the buildings on 14 February 2020 for a total of 2 person hours
- 55 nights of acoustic recording across the site in two separate survey periods, between 17 and 20 February and between 27 and 30 March 2020
- diurnal external structure inspection by boat beneath the wharves on 27 March 2020 which categorised the microbat habitat present beneath the structure into high, medium and low value and searched for evidence of microbats or their roosts for a total of 8 person hours (Figure 2)
- diurnal inspection from the land (24 April 2020) and water (31 March 2020) of surrounding structures and potential microbat habitat (wharves, jetties, piles, culverts, bridges) within 2 km of the subject site for a total effort of 4 person hours
- emergence survey of the southern wharf at dusk from the water using three acoustic detectors and three thermal imaging cameras conducted by three ecologists on 8 April 2020 for a total survey effort of 4.5 person hours.

A diurnal site assessment was conducted by Principal Scientific Ecologist, Dr Frank Lemckert on 14 February 2020 to identify whether potential habitat for threatened microbat species exists within the development site. Visual surveys of the external surfaces of the buildings were conducted from the wharf to determine if the wharf or buildings within the development site contain potential openings into sheltered crevices that could be utilised by microbats as roosting habitat. The diurnal visual field assessment focused on two buildings within the development site. The southern most structure is

currently operating as a loader. The roof has a wooden framing and no obvious holes or signs of microbat utilisation were evident.

The second structure at the northern end of the wharf is a derelict brick building that has been mostly boarded up but still has several obvious small entrances that could be used by microbats as roosting habitat. This survey found that potential microbat roosting and foraging habitat exists at the development site in the form of numerous gaps, cracks and crevices within the structure of the wharf and within one of the buildings on site.

Following the diurnal visual survey, two ultrasonic detection surveys were conducted within the development site between 17 and 21 February and again between 27 and 30 March 2020. Across these two survey periods, fourteen locations were surveyed for a total of 55 nights of ultrasonic survey. A total of seven ultrasonic survey nights were recorded outside the building. The remaining 48 survey nights were recorded from detectors situated at 50 m intervals around the edges of the elevated wharf with microphones positioned under the wharf to capture microbats potentially emerging from roosts beneath the wharf or moving along potential flyways into Blackwattle Bay to forage.

The location of detectors placed around the development site is provided in Figure 10 and survey weather conditions are provided in Table 4.

Table 4: Survey weather conditions (BOM Station number 066062) recorded over eight nights from 17 - 20 February and from 27 - 30 March 2020

Date	Rainfall (mm)	Min temperature (oC)	Max temperature (oC)
17 February 2020	1.2	20.8	25.3
18 February 2020	0.4	20.5	29.4
19 February 2020	10.2	20.3	29.4
20 February 2020	0.2	18.2	25.6
27 March 2020	0.2	17.7	23.9
28 March 2020	0.2	15.2	24.3
29 March 2020	13.4	17.6	24.8
30 March 2020	0.8	19.4	24.9

Analysis of the ultrasonic data indicated that at least seven (7) and up to thirteen (13) different species of microbat were recorded ultrasonically at the subject site (ELA 2020). This included up to four threatened species listed as vulnerable under the BC Act, *Miniopterus orianae oceanensis* (Large Bent-winged Bat), *Myotis macropus* (Southern Myotis), *Saccolaimus flaviventris* (Yellow-bellied Sheath-tailed Bat) and *Vespadelus troughtoni* (Eastern Cave Bat).

Based on the call profiles, *Miniopterus orianae oceanensis* (Large Bent-winged Bat) and *Myotis macropus* (Southern Myotis) both listed as Vulnerable under the BC Act were deemed to definitely be present within the study area. *Vespadelus troughtoni* (Eastern Cave Bat) and *Saccolaimus flaviventris* (Yellow-bellied Sheath-tailed Bat), which are also listed as Vulnerable under the BC Act, are potentially present within the study area.

The calls of *Vespadelus troughtoni* (Eastern Cave Bat) overlap with those of other more common and non-threatened *Vespadelus* species known to occur in the Sydney Basin and could not be separated based upon the single call recorded at the south western end of the subject site. This species is known to roost in caves and mines and cliff lines. The development site does not support potential roosting or breeding habitat for this species.

The calls of *Saccolaimus flaviventris* (Yellow-bellied Sheath-tailed Bat) overlap with those of the more common and non-threatened *Austronomus australis* (White-striped Free-tailed Bat) and could not be separated based on the recorded call characteristics.

Southern Myotis is known to roost/ breed and forage over water. Due to the time calls from Southern Myotis were recorded (prior to sunset and within 1 hour of sunrise and sunrise), it is assumed that this species is roosting within the wharf structure. There is potential that the wharf may also provide maternity roosting habitat. It should be noted that the calls were recorded in relatively low frequency suggesting only small numbers of Southern Myotis are present. From comparison with long-term monitoring data gathered by ELA at a range of known Southern Myotis roosts varying in size from 10 to over 200 bats, it is estimated that between 10 and 30 bats are roosting at the development site.

A summary of the ultrasonic results is presented in Table 5. The detailed ultrasonic analysis report for surveys conducted between 17 and 21 February is provided in Appendix D.

Table 5: Summary of microbat species recorded within the development site during targeted surveys

Scientific Name	Common Name	Conservation status	Species presence	Geographic limitations
Austronomus australis	White-striped Free-tailed Bat		Potential recording	This species roosts primarily in tree hollows but is also known to roost in an old building at Sydney Olympic Park
Chalinolobus gouldii	Gould's Wattled Bat	-	Definite recording	This species roosts primarily in tree hollows but has been recorded in buildings
Chalinolobus morio	Chocolate Wattled Bat		Definite recording	This species roosts primarily in tree hollows but has been recorded in buildings, culverts, bridges and caves
Miniopterus orianae oceanensis	Large Bent-winged Bat	Vulnerable (BC Act)	Definite recording	This species roosts in caves, mines, tunnels, culverts, bridges and stormwater drains
Myotis macropus	Southern Myotis	Vulnerable (BC Act)	Definite recording and observation with corresponding definite recording during emergence survey	This species roosts in subterranean locations including caves, bridges, culverts, tunnels, old mines and wharves as well as in tree hollows.
Nyctophilus geoffroyi	Lesser Long-eared Bat	-	Potential recording	This species roosts primarily in tree hollows but has been recorded in buildings and caves.
Nyctophilus gouldii	Gould's Long-eared Bat	-	Potential recording	This species roosts primarily in tree hollows but has been recorded in buildings and caves.

Scientific Name	Common Name	Conservation status	Species presence	Geographic limitations
Ozimops ridei	Ride's Free-tailed Bat	-	Definite recording	This species roosts primarily in tree hollows but has been recorded in buildings.
Rhinolophus megaphyllus	Eastern Horseshoe Bat	-	Potential recording	This species preferred roost habitats are caves, old mines, tunnels and occasionally buildings.
Saccolaimus flaviventris	Yellow-bellied Sheath-tailed Bat	Vulnerable (BC Act)	Potential recording	This species roosts primarily in tree hollows.
Vespadelus pumilus	Eastern Forest Bat	-	Potential recording	This species roosts primarily in tree hollows.
Vespadelus troughtoni	Eastern Cave Bat	Vulnerable (BC Act)	Potential recording	This species is a cave roosting species but has been recorded in disused mines and buildings.
Vespadelus vulturnus	Little Forest Bat	-	Potential recording	This species roosts primarily in tree hollows.

On 27 March 2020 an inspection of the wharf structures conducted via boat mapped the microbat habitat across the site (Figure 10). This survey identified that the high conservation value microbat roosting habitat is primarily located within the western section of the site, beneath the largest wharf. This wharf is approximately 100 m long and 50 m wide. It is constructed of concrete, timber and steel elements reflecting the history of additions and repairs made to the wharf over time. As a result there are numerous cracks, gaps and crevices created by joins between materials and sections constructed at different times that provides roosting habitat for microbats. In addition, some of the timber elements are degraded and have split, contain fissures or hollowed cores. Some of the concrete elements have also started to delaminate, are peeling, cracked and have broken edges creating more potential microbat roosting habitat.

In contrast the remainder of the wharf structure to the east of the largest jetty is constructed largely of concrete with minimal joins and is generally of low value as microbat roosting habitat. Although there are several jetties projecting into Blackwattle Bay from this section, one of which is also approximately 100 m long and 20 m wide, potential microbat roosting locations are much fewer and less well developed.

The emergence survey conducted on 8 April 2020 by three ecologists from the water targeted the largest wharf and associated drainage features that were identified in the mapping exercise as being of high conservation vale as roosting habitat. Visual observations, combined with ultrasonic recording and thermal imaging surveys were undertaken from outside a large culvert and along the edges of the wharf during a 1.5 hour period at dusk.

A single microbat was observed flying from beneath the wharf at a time when the ultrasonic detector recorded the calls of Southern Myotis. These results further support the assumption that Southern Myotis are roosting beneath the wharf.

The Large-eared Pied Bat is a species credit species known to roost in caves, crevices in cliffs, mines and the old nests of some mud nesting bird species (Churchill 2008). These mud nests are often found on bridges, wharves and in culverts and the elevated wharf at the development site may contain potential roosting habitat for this species. There is only one record of this species from within 10 km of the development site and it was not recorded during targeted surveys. The development site does not contain optimal foraging habitat (woodlands and forests on high fertility soils along the edges of sandstone escarpments) for this species and it is unlikely to be present on site or be impacted by proposed works.

The Eastern Coastal Free-tailed Bat, Eastern False Pipistrelle and Greater Broad-nosed Bat are all ecosystem credit species known to utilise tree hollows for breeding but have also been known to roost occasionally in buildings (Churchill 2008). There are no tree hollows recorded within the development site but the buildings on site represent potential non-breeding roosting habitat for these species. None of these species are particularly adapted to the highly urbanised environment present at the development site and none were recorded during targeted surveys. Features present within the development site may be used as roosting habitat from time to time but are not considered to represent significant habitat for any of these species.

Large Bent-winged Bats and Little Bent-winged Bats are both subterranean roosting species. Both species congregate in large numbers at a few known maternity caves outside of the Sydney Basin over spring and summer to breed and raise young and disperse to winter hibernation roosts up to 300 km away from maternity roosts (Large Bent-winged Bat) in autumn (Churchill 2008). These species are both known to inhabit the Sydney Basin throughout the winter months with some non-breeding individuals remaining in the area throughout the year. There are multiple Large and Little Bent-winged Bat records within a 10 km radius of the development site. The Large Bent-winged Bat was recorded on site during surveys. The Little Bent-winged Bat was not recorded on site during surveys.

It should be noted that the human-made structures within the development site do not represent breeding habitat for either the Large, or Little Bent-winged Bat species. Large aggregations (1000s) of Large and Little Bent-winged Bats are required to sustain a maternity roost. These species are not known to breed in buildings or wharfs and there is no evidence of large aggregations of these species within a 10 km radius of the development site. However, where microbat roosting habitat exists there is potential for these species to utilise cavities within the buildings or the wharf structures as winter roosting habitat or as non-breeding roosting habitat throughout the year.

The Yellow-bellied Sheath-tailed Bat is an ecosystem credit species that is known to roost in hollows. There are no tree hollows recorded within the development site and the elevated wharf and buildings on site do not contain suitable roosting habitat for this species.

The existing elevated wharf and associated buildings within the development site contain potential roosting habitat for the following threatened microbat species:

- Eastern Coastal Free-tailed Bat
- Eastern False Pipistrelle
- Greater Broad-nosed Bat
- Large Bent-winged Bat

- Little Bent-winged Bat
- Southern Myotis.

Additionally, Grey-headed Flying Fox is listed as both an ecosystem and species credit species; the species credit listing relates to breeding colonies only. No Grey-headed Flying Fox breeding colonies are located within or near the development site, and thus no targeted survey was conducted for this species (see Section 2.2.6).

According to the National Flying-fox Monitoring Program, no Grey-headed Flying Fox camps currently occur or have ever been recorded within the development site (DotE 2018). The nearest historic camp occurred approximately 2 km to the east of the development site, within the Royal Botanic Gardens, although no Grey-headed Flying Fox camps currently occur there. The nearest active Grey-headed Flying Fox camp occurs approximately 5 km to the south-east of the development site, within Centennial Park (DotE 2018).

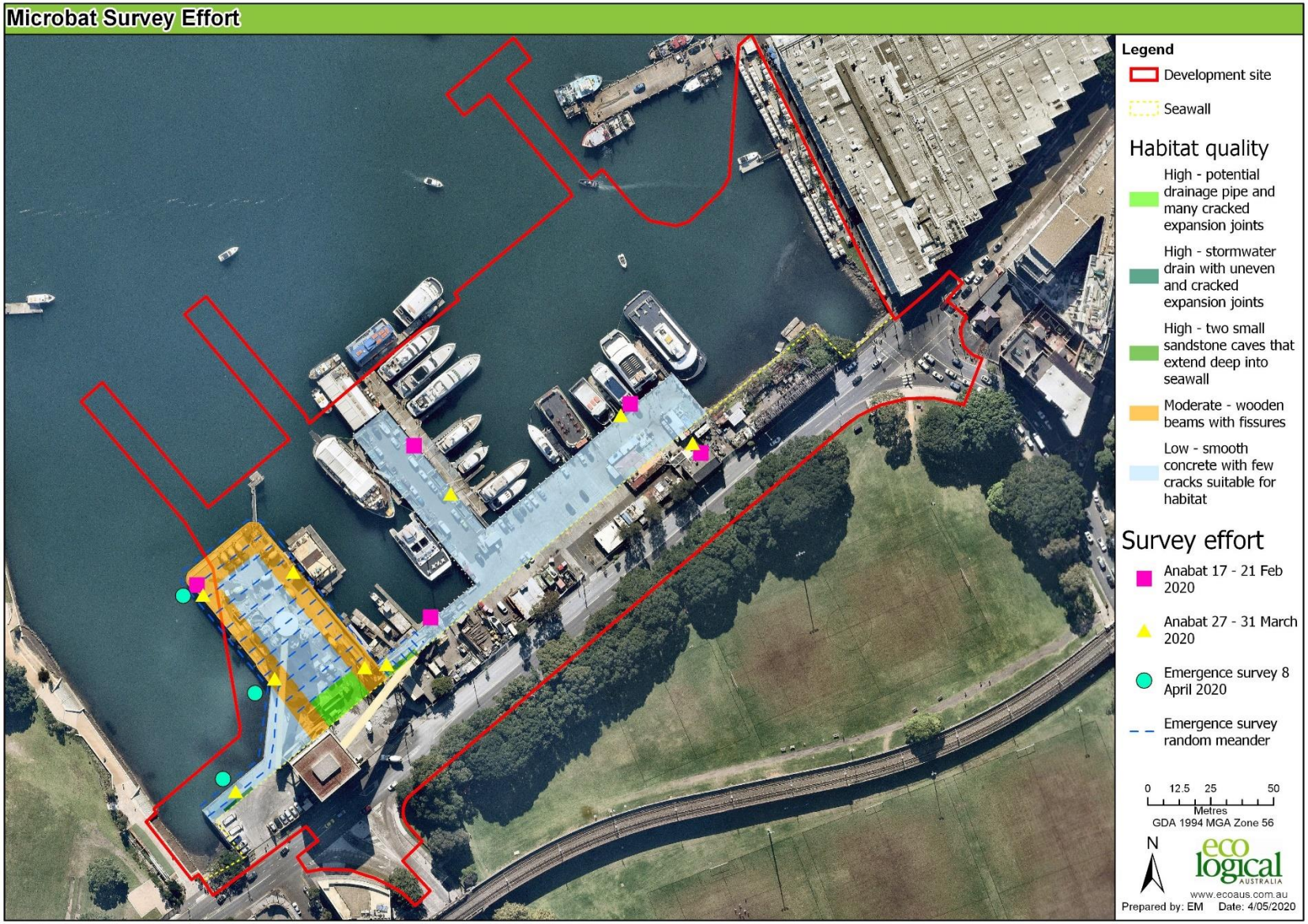

Figure 10: Targeted microbat surveys recording device locations

1.9.2 Potential habitat for threatened species

'Small birds' (a general group under the UESAP)

Although the development site lacks areas of dense native mid-storey vegetation, canopy vegetation provides potential habitat for 'small birds' (as a general group under the UESAP), including Yellow Thornbill, Australian Reed-warbler, Superb Fairy-wren, Spotted Pardalote, and Silvereye, all birds of local conservation significance (see Section 2.2.6).

Pteropus poliocephalus (Grey-headed Flying Fox)

The nectar and pollen of native trees provide potential foraging and roosting habitat for Grey-headed Flying-fox, especially species in the families of Myrtaceae (e.g. *Lophostemon confertus*, *Angophora costata*) and Proteaceae (e.g. *Grevillea robusta*) (Eby and Law 2008). The fruit of fig trees (Moraceae family) are another important food source for Grey-headed Flying-fox. Potential foraging habitat for Grey-headed Flying-fox within the development site includes two *Ficus* spp., one *Angophora costata* and 10 juvenile *Lophostemon confertus*, along with a large stand of *Ficus* ssp. adjacent to the south-eastern boundary of the Development site with canopy overhanging the boundary (Figure 12). Potential feed trees are scattered across the development site but are limited in number and occur as individual trees (i.e. not in stands).

1.9.3 Use of local data

Use of local data is not proposed.

1.9.4 Expert reports

Expert reports have not been used as part of this BDAR.

Figure 11: Potential habitat for threatened birds and birds of conservation significance in the development site

Figure 12: Potential habitat for the threatened Grey-headed Flying-fox in the development site

2. Stage 2: Impact assessment (biodiversity values)

2.1 Avoiding impacts

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

The development has been located in a way which substantially avoids and minimises impacts to biodiversity values, as outlined in Table 6.

Table 6: Locating a project to avoid and minimise impacts on vegetation and habitat

Approach	How addressed	Justification
locating the project in areas where there are no biodiversity values	The development site has been located in an area containing very low biodiversity value in general, and lower than the remainder of the Bays Precinct.	The placement of the development site has primarily occurred on areas of existing development and urban infrastructure, containing low biodiversity values, except for the existence of threatened microbat roosting, breeding and foraging habitat within the wharf.
locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition	The development site has been located in an area containing very low density of potential habitat for threatened species and species of local conservation significance. The development site utilises as much as possible, already disturbed sites and existing infrastructure	The development site has been located in the south of Blackwattle Bay. The highest proportion of potential habitat for threatened species and species of local conservation significance is located in the north-eastern and western portions of the Bays Precinct. Additionally, the development site was heavily utilised as an industrial area until recently (2017) and as such is unlikely to be considered important habitat for threatened species. It is likely that Southern Myotis have only inhabited the wharf since 2017 following the reduction of industrial activities at the site.
locating the project in areas that avoid habitat for species and vegetation in high threat categories (e.g. a TEC or CEEC), indicated by the biodiversity risk weighting for a species	No PCTs or TECs have been mapped within the Development site.	No PCTs or TECs have been mapped within the development site.
locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained	The importance of the development site as a Biodiversity Corridor has been depicted in Figure 3. There are currently very low biodiversity values within Blackwattle Bay. Thus, the removal of vegetation or the wharf structure within this area will have a minimal impact on connectivity.	A stand of *Ficus* spp. occurs adjacent to the southern boundary of the development site, and this is more likely to facilitate connectivity in the region. No Figs within this stand will be removed, although canopy may be trimmed where it enters the development site. Additionally, the removal of the wharf is unlikely to result in the fragmentation of habitats

Approach	How addressed	Justification
		for local populations of Southern Myotis because it is a highly mobile species.

2.1.2 Prescribed biodiversity impacts and other impacts

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

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

The development site contains both human-made structures (building and wharf) and non-native vegetation. Additional information regarding consideration of human-made structures is provide below.

Non-native vegetation was identified and assessed for any potential to provide habitat for threatened flora and fauna species, including presence of hollow-bearing trees.

The development site has prescribed impacts as outlined in Table 7.

Table 7: Prescribed biodiversity impacts

Prescribed biodiversity impact	Description in relation to the development site	Threatened species or ecological communities effected
Impacts of development on the habitat of threatened species or ecological communities associated with: karst, caves, crevices, cliffs and other geological features of significance, or rocks, or human made structures, or non-native vegetation	The development site contains multiple microbat roost locations within the existing building and under the existing wharf as well as a small amount of exotic vegetation which lacks tree hollows that could be used as foraging habitat for a range of fauna species. The buildings were inspected during field surveys and one building may provide potential microbat roosting habitat. Targeted surveys were conducted for microbat activity under the wharf and outside the building and it was determined that the human-made structures to be removed provide roosting and potentially breeding habitat for at least one threatened microbat species. The vegetation within the development site contains fruit bearing and nectar producing non-native vegetation canopy, in landscaped areas which will be removed as part of the project.	Potential roosting habitat (in buildings and wharf) for threatened microbat species include: • *Myotis macropus* (Southern Myotis) • *Scoteanax rueppellii* (Greater Broad-nosed Bat) • *Falsistrellus tasmaniensis* (Eastern False Pipistrelle) • Micronomus norfolkensis (Eastern Coastal Free-tailed Ba) • *Miniopterus australis* (Little Bent-winged -Bat) and • *Miniopterus orianae oceanensis* (Large Bent-winged Bat). Potential foraging habitat for other threatened microbat species above non-native vegetation canopy and the existing wharf and buildings. Potential foraging habitat for *Pteropus poliocephalus* (Grey-headed Flying Fox).

Prescribed biodiversity impact	Description in relation to the development site	Threatened species or ecological communities effected
	The project will result in a reduction in the extent of foraging habitat and reduction in availability of their prey items. The project will also result in the removal of potential roosting / breeding habitat for microbats in human-made structures.	
Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	The proposed development will require the removal of non-native vegetation from within the development site. The development will result in a minor reduction in the extent of existing non-native vegetation within the development site which provides stepping stone habitat between urban fragmented patches of vegetation	Reduction in extent of potential foraging habitat for Grey-headed Flying-fox. Reduction in extent of foraging habitat for other threatened microbats. Loss of roosting and potentially breeding habitat for Southern Myotis under the wharf. Loss of roosting habitat for other threatened microbat species within the wharf and buildings. The loss of this microbat roosting habitat will not impact upon the ability of threatened microbat species to move around within their range as there are other potential roosting locations within foraging rage of the Development site.
Impacts of development on movement of threatened species that maintains their lifecycle	The proposed development will result in reduction of vegetation within the development site and marginal loss of connectivity for mobile threatened species.	Grey-headed Flying-fox and microbat species.

Additionally, impacts to habitat for non-threatened (however, locally significant) fauna species was also conducted as part of this assessment. The proposed works would remove approximately 0.19 ha of potential foraging habitat (2 *Ficus* spp., 1 *Angophora costata* and 10 juvenile *Lophostemon confertus*) for Grey-headed Flying-fox, and approximately 0.37 ha of potential foraging habitat for 'small birds' (identified by the UESAP), including Yellow Thornbill, Australian Reed-warbler, Superb Fairy-wren, Spotted Pardalote, and Silvereye (Table 10).

The Development site is located in the southern portion of Blackwattle Bay and has substantially avoided biodiversity impacts to small birds and Grey-headed Flying-fox by utilising, as much as possible, already disturbed sites and existing infrastructure.

2.1.2.1 Locating a project to avoid and minimise prescribed biodiversity impacts

The development has been located in a way which avoids and minimises prescribed biodiversity impacts as outlined in Table 8.

Table 8: Locating a project to avoid and minimise prescribed biodiversity impacts

Approach	How addressed	Justification
Locating the planning proposal to avoid direct impacts on the non- native vegetation and human made structures	Habitat features including foraging habitat for Grey-headed Flying-fox and threatened microbats and roosting / breeding habitat for threatened	The planning proposal has avoided complete removal of vegetation by designing the new development to retain vegetation adjacent to the

Approach	How addressed	Justification
	microbats within the development site which will be removed.	eastern boundary. However, planted vegetation and weeds within the development site will be removed. This has been minimise by locating the design within existing cleared areas as much as possible. Some areas of non-native vegetation and all existing buildings will be removed.
Locating the planning proposal to avoid severing or interfering with corridors connecting different areas of habitat, migratory flight paths to important habitat or preferred local movement pathways	The vegetation with the planning proposal location has been planted and located within a highly urbanised and fragmented environment. Some of the vegetation adjacent to the development site will be retained so the stepping stone corridors may be retained across the development site.	Although the development will result in the removal of some exotic vegetation within the development site, the connectivity will be retained through vegetation adjacent to the eastern boundary.
Optimising project layout to minimise interactions with threatened and protected species and ecological communities, e.g. designing turbine layout to allow buffers around features that attract and support aerial species, such as forest edges, riparian corridors and wetlands, ridgetops and gullies	The proposal has been located in an area which avoids impacts to areas of high biodiversity value in the locality such as the large figs adjacent to the development site.	The development site contains few areas of high biodiversity values. The project layout has utilised existing buildings and paved areas where possible for the development footprint. Some removal of exotic vegetation is required; however, these are limited to low biodiversity values vegetation. The proposal will also result in the removal of buildings and wharf which provides important roosting and potentially breeding habitat for threatened microbat species. A MMP outlines measures to exclude microbats from these structures prior to works, to install compensatory habitat in the form of bat boxes and provisions for the reinstatement of permanent microbat roosting habitat at the site as part of the new structure. These impacts cannot be avoided for the development.

2.1.2.2 Designing a project to avoid and minimise prescribed biodiversity impacts

The development has been designed in a way which avoids and minimises prescribed biodiversity impacts as outlined in Table 9.

Table 9: Designing a project to avoid and minimise prescribed biodiversity impacts

Approach	How addressed	Justification
Engineering solutions, e.g. proven techniques to minimise fracturing of bedrock underlying features of geological significance, water	The development design has utilised the existing cleared, urban and disturbed areas and the works will not	The development design has utilised the zoning which allows over water buildings and therefore reduces the need to conduct deep excavation works

Approach	How addressed	Justification
dependent communities and their supporting aquifers; proven engineering solutions to restore connectivity and favoured movement pathways	involve deep excavations into the bedrock due to the tidal mark.	and thus protect the geological processes. There are no known ground water or water dependent communities within the development site.
Design of project elements to minimise interactions with threatened and protected species and ecological communities, e.g. designing turbines to dissuade perching and minimise the diameter of the rotor swept area, Designing fencing to prevent animal entry to transport corridors	The development design has utilised areas with minimal impacts to biodiversity values.	The development design has utilised existing disturbed areas to minimise interactions with threatened species habitat. The works will impact upon human-made structures which provide habitat for threatened microbat species. A MMP outlines measures to exclude microbats from these structures prior to works, to install compensatory habitat in the form of bat boxes and provisions for the reinstatement of permanent microbat roosting habitat at the site as part of the new structure.
Design of the project to maintain environmental processes critical to the formation and persistence of habitat features not associated with native vegetation	The formation of habitat features such as canopy species has been retained within the development site.	Potential foraging habitat for Grey-headed Flying-fox will be retained adjacent to the development site. The proposed design will impact upon human-made structures which provides habitat for threatened microbat species. A MMP outlines measures to exclude microbats from these structures prior to works, to install compensatory habitat in the form of bat boxes and provisions for the reinstatement of permanent microbat roosting habitat at the site as part of the new structure.
Design of the project to maintain hydrological processes that sustain threatened species and TECs	There are no threatened species or TECs which are depend upon hydrological processes recorded within the development site.	There are no threatened TECs which are dependent upon hydrological processes identified within the subject site or development site. One threatened microbat species (Southern Myotis) is depended upon the presence of waterbodies as part of foraging habitat, however, the design does not impact upon the presence of waterbodies.
Design of the project to avoid and minimise downstream impacts on rivers, wetlands and estuaries by control of the quality of water released from the site.	There are no waterbodies recorded within the development site or in adjoining lands.	The development site is located over an existing waterbody. This waterbody has not been mapped as a river, wetland or estuary.

2.2 Assessment of Impacts

2.2.1 Direct impacts

The direct impacts of the development as assessed using the BAM is outlined below:

- No PCTs were identified within the development site during the site inspection, and thus 0 ha of PCT will be cleared during the proposed works
- A total of 0.37 ha of 'Urban Native and Exotic Cover' would be removed by the proposed works, which includes:
  - Approximately 0.29 ha of native species which has been planted or naturally established would be removed by the proposed works
  - Approximately 0.08 ha of exotic species would be removed by the proposed works
- Direct impacts including the final project footprint (construction and operation) are shown in Figure 13
- None of the Fig trees located along the southern boundary of the study area will be removed, although the canopy of the stand partially overhangs the development site boundary and may require trimming. This report assumes that canopy overhanging the development site will be trimmed, and includes this as a direct impact. Offsets were not assigned for direct impacts.

Table 10: Direct impacts on threatened species, threatened species habitat, and species of local conservation significance

Species	Common Name	Direct impact number of individuals / habitat (ha)	BC Act	EPBC Act
Small birds (As a general group identified by the UESAP. Non-threatened species recorded within 10 km of Development site listed in **Table 23**)		0.37 ha potential foraging habitat	-	-
*Acanthiza nana**	Yellow Thornbill	0.37 ha potential foraging habitat	-	-
*Acrocephalus australis**	Australian Reed-warbler	0.37 ha potential foraging habitat	-	-
*Malurus cyaneus**	Superb Fairy-wren	0.37 ha potential foraging habitat	-	-
*Pardalotus punctatus**	Spotted Pardalote	0.37 ha potential foraging habitat	-	-
*Zosterops lateralis**	Silvereye	0.37 ha potential foraging habitat	-	-
Microbats				
Falsistrellus tasmaniensis	Eastern False Pipistrelle	0.37 ha potential foraging and non-breeding roosting habitat	V	-
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	0.37 ha potential foraging and non-breeding roosting habitat	V	-
Miniopterus australis	Little Bent-winged Bat	Approximately 0.55 ha of non-breeding winter roosting habitat	V	-
Miniopterus orianae oceanensis	Large Bent winged Bat	Approximately 0.55 ha of non-breeding winter roosting habitat	V	-

Species	Common Name	Direct impact number of individuals / habitat (ha)	BC Act	EPBC Act
Myotis macropus	Southern Myotis	Approximately 0.55 ha of roosting, breeding, and foraging habitat	V	-
Pteropus poliocephalus	Grey-headed Flying-fox	0.19 ha potential foraging habitat (2 *Ficus* spp., 1 *A. costata* and 10 juvenile *L. confertus*, trimming of Fig stand on southern boundary of Development site)	V	V
Scoteanax rueppellii	Greater Broad-nosed Bat	0.37 ha potential foraging and non-breeding roosting habitat	V	

*species of local conservation significance under the UESAP

V = VULNERABLE

2.2.2 Change in vegetation integrity

No PCTs were identified within the development site, and thus a vegetation integrity assessment has not been conducted.

2.2.3 Indirect impacts

The potential indirect impacts of the development, if no mitigation measures are in place, are outlined in the following documents:

- SLR 2018. New Sydney Fish Market SSDA Noise Impact Assessment. Prepared for UrbanGrowth NSW
- Thelm 2018. Sydney Fish Market Development Construction Environment Management Plan (CEMP) - Stage 1 Demolition and Early Works, and Stage 2 Main Works. Prepared for UrbanGrowth NSW
- Cardno 2018. Flooding and Water Quality Assessment Draft Report - Sydney Fish Market Concept Design and Stage 1 Works. Prepared for UrbanGrowth NSW
- JBS&G 2018. Hazardous Materials Management Plan - Proposed Fish Markets 1A to 1C Bridge Road, Glebe NSW. Prepared for UrbanGrowth NSW.

Indirect impact zones are shown on Figure 14 and includes a 10 m indirect impact area surrounding the development site boundary.

Table 11: Indirect impacts if not mitigated

Indirect impact	Project phase	Nature of impact if not mitigated	Extent	Frequency	Duration	Timing
Sedimentation and contaminated and/or nutrient rich run-off	Construction	Runoff during construction works	10 m from development site boundary	During heavy rainfall or storm events	During rainfall events	Short-term impacts
Noise, dust or light spill	Construction / operation	Noise and dust created from machinery (no	Noise, dust, and light are likely to carry	Daily/nightly, during	Sporadic throughout	Short-term impacts during construction

Indirect impact	Project phase	Nature of impact if not mitigated	Extent	Frequency	Duration	Timing
		night works proposed, therefore no light spill). Potential light spill from Development into adjacent retained vegetation	further than 10 m from development site boundary	construction works	construction period	Long-term impacts from Development
Inadvertent impacts on adjacent habitat or vegetation	Construction	Damage to adjacent habitat or vegetation	10 m from Development site boundary	Daily/nightly, during construction works	Throughout construction period	Short-term impacts
Transport of weeds and pathogens from the site to adjacent vegetation	Construction	Spread of weed seed or pathogens	Potential for spread into adjacent habitat	Daily, during construction works	Sporadic throughout construction period	Short-term impacts
Vehicle strike	Construction / operation	Potential for native fauna to be struck by working machinery and moving vehicles	Within Development site	Daily, during both construction works	During working hours for construction Potential at any point during operation of the new Sydney Fish Markets	During working hours for construction Potential at any point during operation of the new Sydney Fish Markets
Rubbish dumping	Construction / operation	Illegal dumping by local residents/ construction crews	Potential for rubbish to spread via wind into adjacent vegetation	Potential to occur at any time throughout construction or operational phases	During working hours for construction Potential at any point during operation of the new Sydney Fish Markets	During working hours for construction Potential at any point during operation of the new Sydney Fish Markets
Increase in pest animal populations	Construction / operation	Potential to increase if not mitigated	Potential for pest species to utilise open areas for foraging and	Potential to occur during construction and following	Potential at any point during operation of the new	Throughout life of project

Indirect impact	Project phase	Nature of impact if not mitigated	Extent	Frequency	Duration	Timing
			vegetation and build environments for sheltering	the completion of works	Sydney Fish Markets	

2.2.4 Prescribed biodiversity impacts and other impacts

An assessment of impacts of the development on prescribed biodiversity impacts is outlined in Table 12 in accordance with Section 9.2.1of the BAM.

The proposed works would remove approximately 0.19 ha of potential foraging habitat (2 *Ficus* spp., 1 *Angophora costata* and 10 juvenile *Lophostemon. Confertus*, trimming of Fig stand canopy on southern boundary of Development site) for Grey-headed Flying-fox, and approximately 0.37 ha of potential foraging habitat for non-threatened 'small birds' (As a general group identified by the UESAP), including Yellow Thornbill, Australian Reed-warbler, Superb Fairy-wren, Spotted Pardalote, and Silvereye (Table 10).

Impacts on threatened species and species of local conservation significance under the BC Act

No PCTs were recorded within the development site during the site inspection, and thus no potential habitat for Grey-headed Flying-fox or for small birds (as a general group of local conservation significance under the UESAP) are recognised under the BC Act.

Impact on threatened species under the EPBC Act

One MNES (threatened species) was presumed to be present within the development site, being the Grey-headed Flying Fox, which is listed as V*ulnerable* under the EPBC Act.

A habitat assessment and Likelihood of Occurrence (Appendix A) indicated that this species was considered likely to forage on a limited number of feed trees within the development site and potentially be impacted by the proposed works. Known records exist for the species in the locality within proximity to the development site, and therefore was assumed to be present. Further details including level of impacts, project specific mitigation measures and required offsets are discussed **in Section 2.1.7.**

An assessment in accordance with the Commonwealth Significant Impact Guidelines (Commonwealth of Australia 2013) for the Grey-headed Flying-fox is provided in Appendix C. This assessment concluded that a significant impact on the Grey-headed Flying-fox is unlikely to occur as a result of the works. Consequently, an EPBC Act referral is not unlikely to be required.

Table 12: Direct impacts on prescribed biodiversity impacts

BAM Criteria	Justification
9.2.1.3 The assessment of the impacts of the development on the habitat of threatened species or ecological communities associated with human made structures	
a) identify the human made structures with potential to be habitat for threatened species or ecological communities	The development site is located within a highly urbanised area. The proposed development will result in the removal

BAM Criteria	Justification
	of a number of existing buildings and the wharf for redevelopment. Targeted surveys identified the presence of two threatened microbat species with potential to utilise human-made structures within the development site, Large Bent-winged Bat and Southern Myotis. The targeted surveys identified one building which provides suitable habitat for threatened microbat species. Additionally, the entire wharf contains roosting habitat for both species as well as potential breeding habitat for Southern Myotis, whilst the waters of Blackwattle Bay also provide foraging habitat for Southern Myotis. The location of targeted surveys is provided in Figure 10.
b) identify the species and ecological communities likely to use the habitat	The following threatened microbat species may utilise buildings as occasional roosting habitat: Falsistrellus tasmaniensis (Eastern False Pipistrelle), Micronomus norfolkensis (Eastern Coastal Free-tailed Bat), *Miniopterus australis* (Little Bent-winged Bat) *Miniopterus orianae oceanensis* (Large Bent Winged Bat) and Scoteanax rueppellii (Greater Broad-nosed Bat). There are BioNet records for these species within a 10 km radius. Southern Myotis has been recorded utilising the wharf for roosting and potentially for roosting/breeding habitat. Blackwattle Bay is foraging habitat for this species.
c) describe the nature, extent and duration of short and long-term impacts	The impact involves the permanent removal of several buildings and a large elevated wharf. This is considered a long-term impact. Construction of new buildings and wharf may result in the production of noise and vibration which is considered a short-term impact. The removal of the buildings is considered to be a non-significant impact to microbats considering the lack of evidence of use gathered during seven nights of ultrasonic detector surveys outside the building in February and March 2020. However, the removal of the wharf may result in permanent loss of important roosting habitat for Southern Myotis.
d) describe, with reference to relevant literature the importance within the bioregion of the habitat of these species or ecological communities	According to literature documented in Australian Bat (Churchill 2009) the preferred roosting habitat of the following species includes: Little Bent-winged Bat – this species forms specific maternity roosts in caves outside of the Sydney Basin and will occasionally utilise buildings in the absence of other alternative roost locations (such as mines, culverts, bridges and tunnels). There are a few known Little Bent-winged Bat roosts on the outskirts of the Sydney region. There is potential that this species may on occasion utilise buildings or wharves as an alternative roost location, however, none were recorded during targeted surveys. Large Bent-winged Bat – this species also forms specific maternity roosts in caves outside of the Sydney Basin, and will occasionally utilise buildings in the absence of other alternative roost locations (such as mines, culverts, bridges and tunnels). There are several non-breeding roosts of this

BAM Criteria	Justification
	species in the Sydney region, including in the north - eastern and eastern suburbs as well as in the western suburbs. This species was recorded during targeted surveys via ultrasonic call recording. There is potential that this species may on occasion utilise buildings or wharves as a non-breeding roost location throughout the year or as winter roosting habitat. Southern Myotis - this species will use tree hollows, bridges, culverts, caves, mines, tunnels, and wharves as roosting habitat. There are several known Southern Myotis maternity roosts within Sydney Harbour (Gonsalves and Law 2017) and this species is also known from the Hawkesbury River region, the Cumberland Plain area surrounding the Nepean and Georges River systems and within Royal National Park on the Hacking River. This species was recorded within the development site via ultrasonic call recording and emergence surveys. This species roosts under the wharf and may permanently inhabit the site using roosts under the wharf as maternity roosts over summer. The water under the wharf also provides foraging habitat. Eastern False Pipistrelle's, Eastern Coastal Free-tailed Bats and Greater Broad-nosed Bats are known to roost in buildings and tree hollows, although none of these species was recorded during surveys. These species primarily occur in the Cumberland Plain west of the Sydney CBD where there is a larger extent of woodland remaining that provides suitable foraging and roosting habitat for these three species.
e) predict the consequences of the impacts for the local and bioregional persistence of the suite of threatened species and communities likely to use these areas as habitat, with reference to relevant literature and other published sources of information.	While these species of microbats have been known to utilise human structures for roosting, other than Southern Myotis the preferred roosting habitat for these species are non-human made structures (tree hollows or caves). The other species of microbats may use the buildings on occasion while traversing through the landscape or if other alternative roosting resources are not present. It should be noted that the development site provides marginal foraging and alternative roosting habitat in the form of the buildings and wharves for a number of microbat species. The building within the development site is unlikely to contain important roosting habitat for these species. There is potential that the removal of the buildings may affect the number of available roosting resources for microbats migrating to breeding or non-breeding habitats such as the two Bent-winged Bat species. There is no available literature which has considered the impacts of removal of human made structures on microbat species. The wharf structure provides habitat for Southern Myotis and potential non-breeding habitat for Little and Large Bent-winged Bats. The targeted surveys identified a moderate number of Southern Myotis calls and indicate that the colony is likely to be in the order of 10-30 bats. The

BAM Criteria	Justification
	timing of the calls indicates that Southern Myotis are roosting beneath the wharf. Removal of the wharf may result in the loss of roosting/breeding and over wintering habitat for this species. The Southern Myotis habitat within the development site is one of several known roosting and breeding sites for this species within Sydney Harbour (Gonsalves and Law 2017). Loss of this habitat is unlikely to affect local populations because Southern Myotis are able to travel at least 10km from roosts to forage each night and several other known roost sites are known within 10 km of the development site. However preparation of a Microbat Management Plan will be required in order to minimise impacts to microbats prior to, during and post construction.
9.2.1.4 The assessment of the impacts of development on the habitat of threatened species or ecological communities associated with non-native vegetation	
a) identify the species and ecological communities likely to use the habitat	Several non-native tree species are present in the development site which have been planted or are invasive weeds. Non-native species which have been identified as potential foraging species for Grey-headed Flying fox.
(b) describe the nature, extent and duration of short and long-term impact	The proposed development will result in the permanent removal of a small number of non-native trees which provide potential foraging habitat for Grey-headed Flying-fox.
(c) describe, with reference to relevant literature and other reliable published sources of information, the importance within the bioregion of the habitat to these species or ecological communities	These non-native species are in relatively low abundance within the development site and most species would provide only small amounts of secondary foraging habitat.
(d) predict the consequences of the impacts for the local and bioregional persistence of the suite of threatened species and communities likely to use these areas as habitat, with reference to relevant literature and other published sources of information.	The consequences of the permanent removal of those species listed above for the local and bioregional persistence of the Grey-headed Flying-fox is predicted to be negligible.

2.2.5 Mitigating and managing impacts

General measures proposed to minimise impacts at the development site before, during and after construction are outlined in Table 13. Specific details on mitigating impacts on microbats will be addressed in a Microbat Management Plan (MMP) to be prepared and implemented prior to the commencement of construction. The MMP will provide details on timing and methodology of works in areas of potential Southern Myotis habitat. It is recommended that the old building is also included in the MMP as it contains potential microbat habitat.

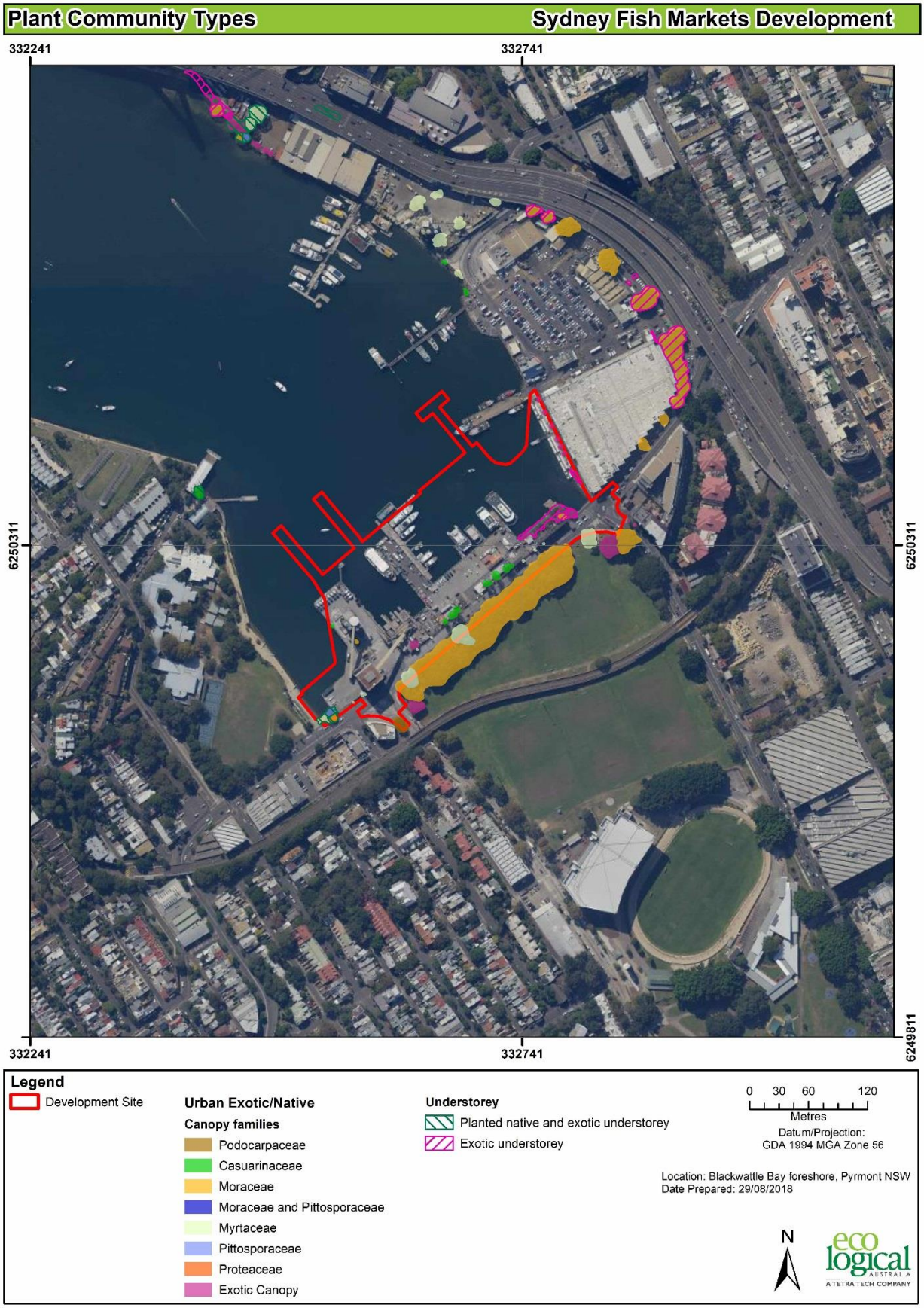

Figure 13: Development site (includes construction and operational footprints)

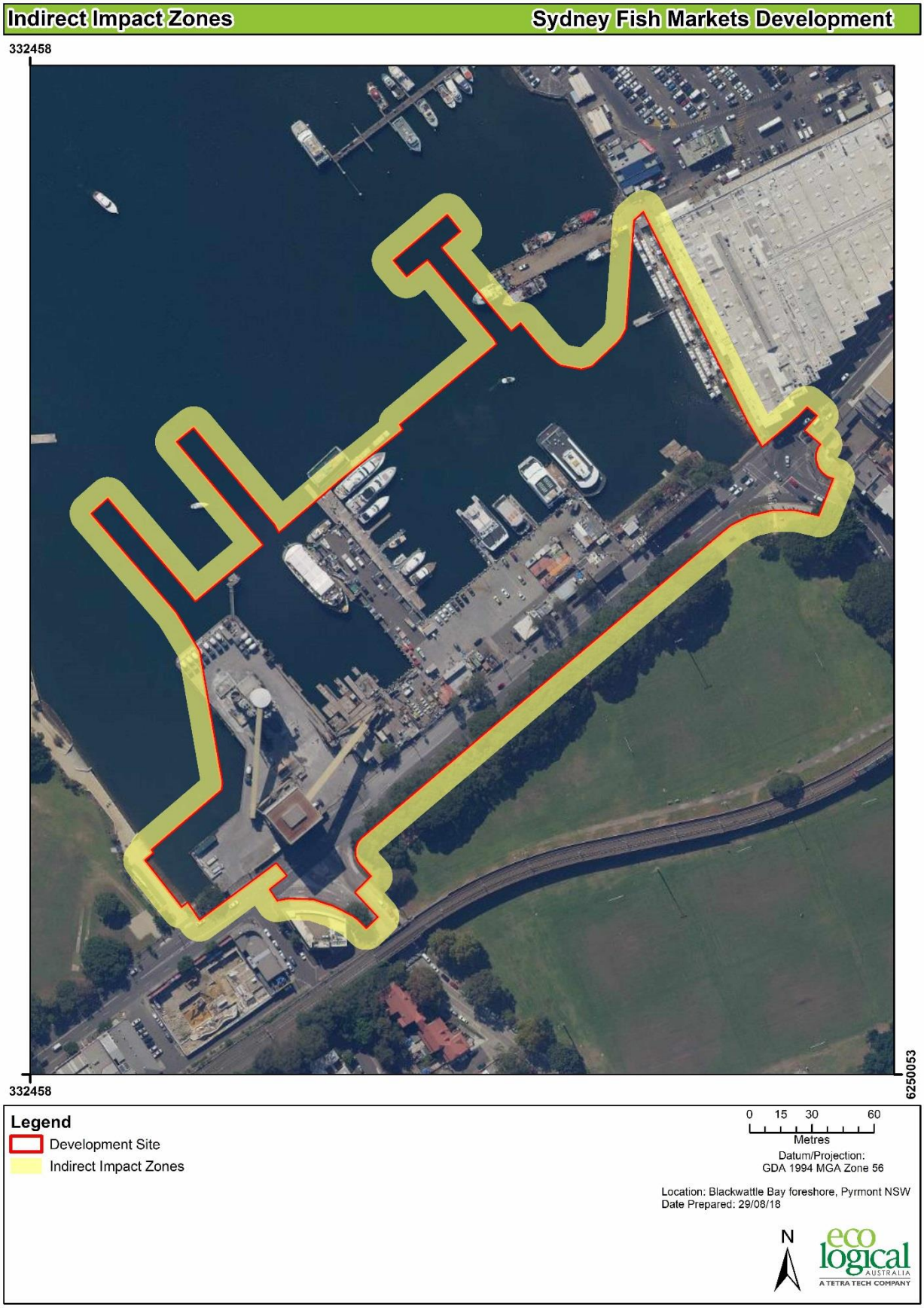

Figure 14: Indirect impact zones within the development site

Table 13: Measures proposed to minimise impacts

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Displacement of resident fauna	Moderate	Minor	In lieu of identified habitat trees (e.g. hollow-bearing trees) within the development site, if fauna are located within the development site during the proposed works a qualified ecologist/licensed wildlife handler must be contacted during tree removal in accordance with best practise methods. A MMP will outline compensatory habitat to be installed prior to exclusion of microbats from the Development site.	Relocation of fauna in a sensitive manner	Prior to and during clearing works	Project Manager
Instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed wildlife handler during clearing events	Moderate	Minor	Pre-clearance survey of buildings or wharf to be removed and identification/location of habitat by a suitably qualified ecologist. Exclusion of roosting microbats from the Development site as per instructions in the MMP. Supervision by a qualified ecologist/licensed wildlife handler during tree removal in accordance with best practise methods. Any removal of microbat habitat (as described in the MMP) is to be undertaken by a suitably qualified fauna ecologist.	Any fauna utilising habitat within the development site will be identified and managed to ensure clearing works minimise the likelihood of injuring resident fauna	During clearing works	Project Manager / Ecologist
Installing artificial habitats for fauna in adjacent areas retained or human made structures to replace the habitat resources lost and encourage animals to move from the impacted site, e.g. nest boxes	High	Moderate	Any building or wharf section to be removed should be conducted according to the MMP. If it is impractical to use salvaged wharf sections with hollows for reuse within the development site, compensatory microbat boxes should be installed in suitable locations within the new Sydney Fish Markets and installed in suitable locations as near to the development site as possible.	Replacement of habitat features removed	Prior to and during clearing works and in accordance with the MMP	Project Manager/ Ecologist

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	High	Moderate	Construction staff to be briefed prior to work commencing to be made aware of any sensitive biodiversity values present and environmental procedures such as: Microbat habitat (old buildings and under wharf) Exclusion zones What to do in case of environmental emergency (chemical spills, fire, injured fauna) Key contacts in case of environmental emergency	All staff entering the development site 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 development site. Site briefings should be updated based on phase of the work and when environmental issues become apparent.	Project Manager
Timing works to avoid critical life cycle events such as breeding or nursing	Moderate	Minor	Winter/early spring is breeding/nesting period for birds and fruit bats (including Grey-headed Flying Fox). Observe trees for fauna if works are to be conducted during this period, and if fauna are utilising trees, notify a qualified ecologist/licensed wildlife handler. The removal of the buildings and wharf should be conducted in accordance with the MMP. This includes excluding microbats from the Development site between late March and the end of May to minimise impacts to breeding and over-wintering microbats	Impacts to fauna during nesting/nursing avoided	Prior to and during clearing works	Project Manager
Sediment barriers or sedimentation ponds to control the quality of water released from the site into the receiving environment	Minor	Negligible	Appropriate controls will be utilised to manage exposed soil surfaces and stockpiles to prevent sediment discharge into waterways Ensure all works within proximity to the drainage lines have adequate sediment and erosion controls	Erosion and sedimentation will be controlled	For the duration of construction works	Project Manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
			Commence revegetation as soon as practicable to minimise the risks of erosion			
Noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise	Minor	Negligible	Winter/early spring is breeding/nesting period for birds and fruit bats (including Grey-headed Flying Fox). Observe trees for fauna if works are to be conducted during this period, and if fauna are utilising trees, notify a qualified ecologist/licensed wildlife handler. Select quieter options of mechanic plant and equipment Maximise the offset distance between noisy plant items and nearby noise-sensitive receivers Avoiding the coincidence of noisy plant working simultaneously close together and adjacent to sensitive receivers Orienting equipment away from noisy receivers Carrying out loading and unloading away from noise sensitive areas Localised shielding of noisy equipment Minimising consecutive works in the same locality Considering periods of respite.	Noise impacts associated with the development will be managed in accordance with guidelines	For the duration of construction works	Project Manager
Light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill	Minor	Negligible	Consider construction works only to occur during daylight hours, and consider not using night lights If required, lights installed as part of the new Sydney Fish Markets should be directional so as to avoid shining into adjacent retained vegetation, adjacent to the southern boundary of the Development site.	Light impacts associated with construction will be avoided by prioritising all works to occur during daylight hours Light impact to adjacent vegetation to be minimised	For the duration of construction works	Project Manager
Adaptive dust monitoring programs to control air quality	Minor	Negligible	Dust suppression measures will be implemented during construction works to limit dust on site	Mitigate dust created during construction activities	For the duration of construction works	Project Manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
			Commence revegetation as soon as practicable to minimise areas likely to create dust External design of the building envelope to consider wind mitigation devices Erection of hoardings around high risk activities where practical to prevent migration of dust from site Erection of shade cloth along ATF fencing and perimeter fencing to prevent migration of dust from site Dust suppression through water application Visual dust monitoring will be conducted throughout the project and following receipt of any legitimate complaints and works modified if necessary; If contamination is discovered and identified within the dust, works will cease, the areas will be stabilised and an investigation will be conducted. Areas of ground disturbance will be stabilised as soon as possible to prevent windblown dust Equipment and vehicles will be maintained in good operating conditions and be subject to regular servicing, daily inspections will be conducted to identify and plant or equipment that is causing visible emissions Plant or equipment will be switched off when not in use Truck loads will be covered when removing spoil off site Any stockpiles will either be located appropriately for protection from wind or covered Works that are likely to generate high levels of dust or air borne particles will not be carried out during strong winds.			

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Impact to Fig stand on the southern boundary of the Development site. Canopy of these trees occur within the Development site.	Moderate	Minor	Fig tree canopy will only be trimmed where required, and will only be trimmed where canopy enters the development site An arborist report will assess the stand of Fig trees A project arborist will be appointed to ensure the trees are not damaged during construction of Bridge Road.	Minimize impact to stand of Fig trees on southern boundary of Development site, and ensure none are removed.	For the duration of the construction works.	Project Manager

2.2.6 Serious and Irreversible Impacts (SAII)

The development site does not contain any Serious and Irreversible Impacts (SAII).

2.3 Risk assessment

A risk assessment has been undertaken for any residual impacts likely to remain after the mitigation measures (Section 2.2.5, Table 17) have been applied. Likelihood criteria, consequence criteria and the risk matrix are provided in Table 14**,** Table 15**,** and Table 16 respectively and the risk assessment outcome is presented in Table 17.

Table 14: Likelihood criteria

Likelihood criteria	Description
Almost certain (Common)	Will occur, or is of a continuous nature, or the likelihood is unknown. There is likely to be an event at least once a year or greater (up to ten times per year). It often occurs in similar environments. The event is expected to occur in most circumstances.
Likely (Has occurred in recent history)	There is likely to be an event on average every one to five years. Likely to have been a similar incident occurring in similar environments. The event will probably occur in most circumstances.
Possible (Could happen, has occurred in the past, but not common)	The event could occur. There is likely to be an event on average every five to twenty years.
Unlikely (Not likely or uncommon)	The event could occur but is not expected. A rare occurrence (once per one hundred years).
Remote (Rare or practically impossible)	The event may occur only in exceptional circumstances. Very rare occurrence (once per one thousand years). Unlikely that it has occurred elsewhere; and, if it has occurred, it is regarded as unique.

Table 15: Consequence criteria

Consequence category	Description
Critical (Severe, widespread long-term effect)	Destruction of sensitive environmental features. Severe impact on ecosystem. Impacts are irreversible and/or widespread. Regulatory and high-level government intervention/action. Community outrage expected. Prosecution likely.
Major (Wider spread, moderate to long term effect)	Long-term impact of regional significance on sensitive environmental features (e.g. wetlands). Likely to result in regulatory intervention/action. Environmental harm either temporary or permanent, requiring immediate attention. Community outrage possible. Prosecution possible.
Moderate (Localised, short-term to moderate effect)	Short term impact on sensitive environmental features. Triggers regulatory investigation. Significant changes that may be rehabilitated with difficulty. Repeated public concern.
Minor (Localised short-term effect)	Impact on fauna, flora and/or habitat but no negative effects on ecosystem. Easily rehabilitated. Requires immediate regulator notification.
Negligible (Minimal impact or no lasting effect)	Negligible impact on fauna/flora, habitat, aquatic ecosystem or water resources. Impacts are local, temporary and reversible. Incident reporting according to routine protocols.

Table 16: Risk matrix

Consequence	Likelihood				
	Almost certain	**Likely**	**Possible**	**Unlikely**	**Remote**
Critical	Very High	Very High	High	High	Medium
Major	Very High	High	High	Medium	Medium
Moderate	High	Medium	Medium	Medium	Low
Minor	Medium	Medium	Low	Low	Very Low
Negligible	Medium	Low	Low	Very Low	Very Low

Table 17: Risk assessment

Potential impact	Project phase	Risk (pre-mitigation)	Risk (post mitigation)
Vegetation clearing	Construction / operation	Medium	Low
Sedimentation and contaminated and/or nutrient rich run-off	Construction	Medium	Very Low
Noise, dust or light spill	Construction	Medium	Very Low
Inadvertent impacts on adjacent habitat or vegetation	Construction	Low	Very Low
Vehicle strike	Construction / operation	Low	Very Low
Rubbish dumping	Construction / operation	Low	Very Low
Sedimentation and contaminated and/or nutrient rich run-off	Construction	Low	Very Low

2.4 Adaptive management strategy

This section is required for those impacts that are infrequent, cumulative or difficult to predict. Impacts associated with the proposed development have been considered and addressed Section 2.2.5 and no further impacts are considered to be addressed.

2.5 Impact summary

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

2.5.1 Serious and Irreversible Impacts (SAII)

The development does not have any SAII.

2.5.2 Impacts requiring offsets

No PCTs or threatened species credit species were recorded within the Development site, and therefore, no offsets are required.

2.5.3 Impacts not requiring offsets

Impacts from the proposed works that do not require offset are mapped in Figure 15 and detailed Table 18.

Table 18: Impacts within the development site footprint not requiring offset

Species	Common Name	Direct impact number of individuals / habitat (ha)	BC Act	EPBC Act
Small birds (As a general group identified by the UESAP. Non-threatened species recorded within 10 km of Development site listed in **Table 23**		0.37 ha potential foraging habitat	-	-
*Acanthiza nana**	Yellow Thornbill	0.37 ha potential foraging habitat	-	-
*Acrocephalus australis**	Australian Reed-warbler	0.37 ha potential foraging habitat	-	-
*Malurus cyaneus**	Superb Fairy-wren	0.37 ha potential foraging habitat	-	-
*Pardalotus punctatus**	Spotted Pardalote	0.37 ha potential foraging habitat	-	-
*Zosterops lateralis**	Silvereye	0.37 ha potential foraging habitat	-	-
Microbats				
*Miniopterus australis***	Little Bent-winged Bat	0.55 ha of winter roosting habitat	Vulnerable	-
*Miniopterus orianae oceanensis***	Large Bent-winged Bat	0.55 ha of winter roosting habitat	Vulnerable	-
*Myotis macropus***	Southern Myotis	0.55 ha of roosting and potential breeding habitat	Vulnerable	-

Species	Common Name	Direct impact number of individuals / habitat (ha)	BC Act	EPBC Act
Megabat				
Pteropus poliocephalus	Grey-headed Flying-fox	0.19 ha potential foraging habitat (2 *Ficus* spp., 1 *A. costata* and 10 juvenile *L. confertus*, trimming of Fig stand on southern boundary of Development site)	Vulnerable	Vulnerable

*SPECIES OF LOCAL CONSERVATION SIGNIFICANCE UNDER THE UESAP
** SPECIES ARE ASSESSED AS PRESCRIBED IMPACTS.

2.5.4 Areas not requiring assessment

The Development site includes large wharves and land-based structures such as buildings, gates and roads. These areas do not require assessment under BAM, and have been mapped in Figure 16.

2.5.5 Credit summary

The proposed works does not require any offsets under BAM, and thus no ecosystem credits or species credits are required.

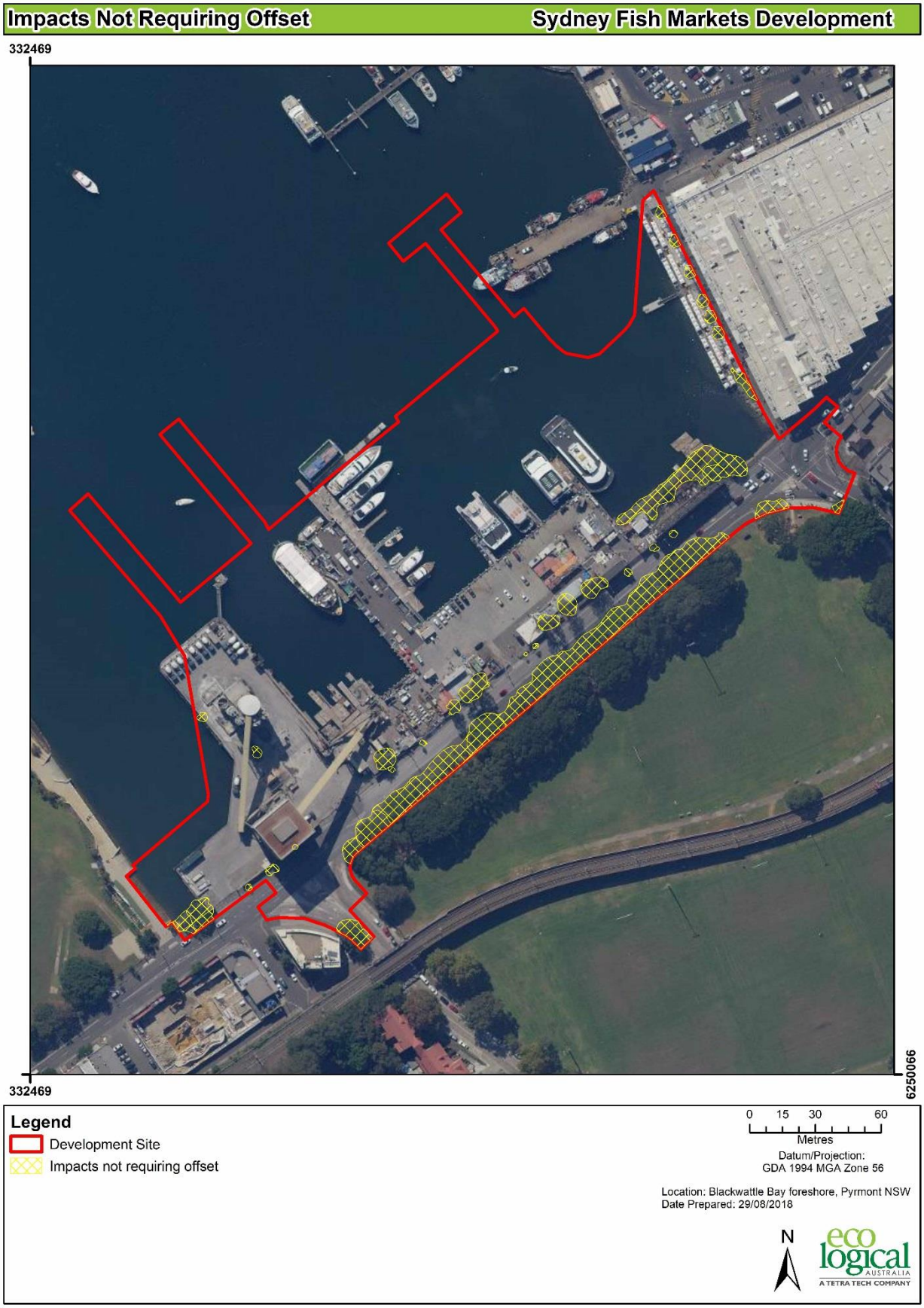

Figure 15: Impacts not requiring offset under the BAM within the development site

Figure 16: Areas within the development site where no assessment is required

2.6 Consistency with legislation and policy

Additional matters relating to impacts on flora and fauna which are not covered by the BC Act must also be addressed for the proposed development. Potential Matters of National Environmental Significance (MNES) in accordance with the EPBC Act have been addressed in Section 2.6.1. Matters relating to City of Sydney Council planning instruments have been addressed in Section 2.6.3.

2.6.1 *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

The EPBC Act establishes a process for assessing the environmental impact of activities and developments where Matters of National Environmental Significance (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 Department of the Environment and Energy (DoEE), which is responsible for administering the EPBC Act (DoEE 2014).

The process includes conducting impact assessments for listed threatened species and ecological communities affected by the proposed action. Significant impact guidelines (DoEE 2014) that outline several criteria have been developed by the Commonwealth, to provide assistance in conducting the assessment.

A habitat assessment and Likelihood of Occurrence was completed and one MNES *Pteropus poliocephalus* (Grey-headed Flying-fox) was assessed under the act as there are BioNet records for this species within the broader landscape (5 km radius) of the development site.

According to the National Flying-fox Monitoring Program, no Grey-headed Flying-fox camps currently occur or have ever been recorded within the Development site (DotE 2018). The nearest historic camp occurred approximately 2 km to the east of the Development site, within the Royal Botanic Gardens, although no Grey-headed Flying-fox camps currently occur there. The nearest active camp is located at Centennial Park camp is known from the locality to be within 5 km of the development site (OEH 2019c). The vegetation within the development site provides potential foraging habitat. It is considered likely that this species would use the site on occasion for foraging purposes. An impact assessment under the EPBC Act is provided in Appendix C and concluded that the works are unlikely to result in a significant impact to this species.

2.6.2 Coastal Management Act 2016

The aim of the Act is to:

Focus on ecologically sustainable development that:

- protects and enhances sensitive coastal environments, habitats and natural processes
- strategically manages risks from coastal hazards
- maintains and enhances public access to scenic areas, beaches and foreshores
- supports the objectives for our marine environments under the Marine Estate Management Act 2014
- protects and enhances the unique character, cultural and built heritage of our coastal areas, including Aboriginal cultural heritage.

The four coastal management areas are:

- Coastal wetlands and littoral rainforests area – areas which display the characteristics of coastal wetlands or littoral rainforests that were previously protected by SEPP 14 and SEPP 26
- Coastal vulnerability area – areas subject to coastal hazards such as coastal erosion and tidal inundation
- Coastal environment area – areas that are characterised by natural coastal features such as beaches, rock platforms, coastal lakes and lagoons and undeveloped headlands. Marine and estuarine waters are also included
- Coastal use area – land adjacent to coastal waters, estuaries and coastal lakes and lagoons

The development site has been mapped as Coastal Environment Area and Coastal Use Area under the Coastal Management Act 2016 and under the SEPP Coastal Management 2018.

2.6.3 SEPP Coastal Management 2018

The State Environmental Planning Policy (SEPP) Coastal Management 2018 defines the coastal zone and establishes state-level planning priorities and development controls to guide decision-making for development within the coastal zone.

The development site has been mapped as **coastal environment area** and **coastal use area** under the SEPP. Coastal environment areas aim to protect and improve natural coastal processes, features and environmental values. However, under the Sydney Regional Environmental Plan the development objectives for the coastal environment area do not apply to Foreshores and Waterway Areas. Therefore, the Coastal Management SEPP is not applicable to this project.

2.6.4 Darling Harbour Development Plan No 1 1985

The development site is mapped as land application under the Darling Harbour Development Plan No. 1.

The objectives of this plan are:

- to promote the development of the Darling Harbour area as part of the State's Bicentennial Program,
- to encourage the development of a variety of tourist, educational, recreational, entertainment, cultural and commercial facilities within that area, and
- to make provision with respect to controlling development within that area.

The means whereby this plan aims to achieve its objects are:

- by providing that certain kinds of development may not be carried out in the Darling Harbour area otherwise than in accordance with the terms of a permit,
- by prohibiting all other kinds of development within that area, and
- by ensuring that the controls that apply in that area in relation to the carrying out of development apply also in relation to the demolition and renovation of buildings and works.

The development requires consent for the establishment of the tourism facility. This is in line with Clause 6 of the Development Plan.

2.6.5 Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005

The proposal is located within the Sydney Harbour Catchment and is subject to the SREP (Sydney Harbour Catchment) 2005, in particular, Clause 21: biodiversity, ecology and environment protection.

Water-based recreation and entertainment facilities which have a direct structural connection to the foreshore are currently prohibited in this W1 zone. S89E(3) of the EP&A Act provides that development consent may be granted to State Significant Development despite the development being partly prohibited by an environmental planning instrument. Notwithstanding this provision, an amendment is sought to the planning controls applying to the site to ensure the proposed development is wholly permissible. This amendment has been concurrently lodged with this EIS.

2.6.6 Sydney Local Environmental Plan 2012 (LEP)

The development site is not zoned under the LEP. The development site has been mapped as Foreshores and Waterways Area Boundary and Water Zoning under the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005. Provisions for the LEP do not apply to the development site.

2.6.7 Sydney Development Control Plan 2012 (DCP)

Clause 3.5 Urban Ecology of the DCP objectives are as follows:

- Protect existing habitat features within and adjacent to development sites.
- Improve the diversity and abundance of locally indigenous flora and fauna species across the LGA

The provisions of the clause are as follows:

- Development is to be consistent with the Street Tree Master Plan, Park Tree Management Plans and the Landscape Code.
- Existing habitat features including cliff lines, rocky outcrops, waterbodies, trees, shrubs and groundcover vegetation are to be retained.
- New habitat features including trees, shrubs and groundcover vegetation, waterbodies, rockeries and green roofs and walls are to be included, wherever possible.
- Link and enhance existing and potential biodiversity corridors wherever possible.
- Landscaping is to comprise a mix of locally indigenous tree, shrub and groundcover species as outlined in City's Landscape Code. Where this is not possible it is preferred that plants native to Australia are used.
- Shrubs are to be densely planted and trees are to be well-spaced, as outlined in the City's Landscape Code.

The proposed development has, as much as possible, aimed to conserve the majority of the native planted vegetation within the development site and minimise unnecessary damage or removal of trees. Landscaping will be conducted in accordance with the above clause and include revegetation using locally indigenous native flora species.

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Appendix A: Likelihood of Occurrence Assessment

An assessment of likelihood of occurrence was made for threatened species, migratory species, and species of local conservation significance (referred to in UESAP and SSROC CCB), as identified from the literature review. The literature review included records from the BioNet Search (OEH 2017b) and EPBC Act Protected Matters Search (DotEE 2017a). 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.

An assessment of significance was conducted for threatened species or ecological communities that were recorded within the Development site 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 Development site intermittently for foraging.

Information provided in the habitat associations' column has primarily been extracted (and modified) from the Commonwealth Species Profile and Threats Database (DotEE 2017b), the NSW Threatened Species Profiles (OEH. 2017b), the Atlas of Living Australia (ALA 2017), and BirdLife Australia (BLA 2017).

Table 19: Likelihood of occurrence and requirement of impact assessment for threatened fauna species and species of local conservation significance

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Amphibians						
Amphibians (As a general group identified by the UESAP. Non-threatened species recorded within 5 km of Development site listed in Table 23)		-	-	Swamps, marshes, streams, rivers, ponds, inundations, drainage lines and generally moist areas.	Potential	No, there is no specific potential habitat located within the Development site
Crinia tinnula	Wallum Froglet	V		Acidic swamps on coastal sand plains (typically in sedgelands and wet heathlands), drainage lines, and swamp sclerophyll forests.	No. No suitable habitat on or near the Development site	No
Heleioporus australiacus	Giant Burrowing Frog	V	V	Heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.	No. No suitable habitat on or near the Development site	No
Litoria aurea	Green and Golden Bell Frog	E1	V	Marshes, dams and stream-sides, particularly those containing Typha spp. (bullrushes) or Eleocharis spp. (spikerushes). Some populations occur in highly disturbed areas.	No. No suitable habitat on or near the Development site	No
*Litoria fallax**	Eastern Dwarf Tree Frog	-	-	Coastal wetlands, swamps, dams and streams, and can also be found in urban areas.	Potential	No
*Litoria peronii**	Peron's Tree Frog	-	-	Most forest habitats, but will also forage open grassland and other open areas.	Potential	No
Mixophyes balbus	Stuttering Frog	E1	V	Rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range.	No.	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
					No suitable habitat on or near the Development site	
Pseudophryne australis	Red-crowned Toadlet	V		Open forests, mostly on Hawkesbury and Narrabeen Sandstones.	No. No suitable habitat on or near the Development site	No
Birds						
Small birds (As a general group identified by the UESAP. Non-threatened species recorded within 5 km of Development site listed in Table 23)		**-**	**-**	**A variety of vegetated habitats, dependant on the species.**	**Potential. Suitable potential habitat occurs within the Development site**	**Yes**
Freshwater wetland birds (As a general group identified by the UESAP. Non-threatened species recorded within 5 km of Development site listed in Table 23)		-	-	Coastal and inland wetlands, pond, inundations, dense sedge sand reeds.	Unlikely. Marginal suitable habitat on or near the Development site	No
Acanthiza nana*	**Yellow Thornbill**	**-**	**-**	**Found in open forests, woodlands and shrublands which are dominated by Casuarinas, Acacias or paperbarks rather than eucalypts. Often seen in parks and gardens, preferring more established areas.**	**Potential. Suitable potential habitat occurs within the Development site**	**Yes**
Actitis hypoleucos	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. Marginal suitable habitat on or near the Development site	No
Acrocephalus australis*	**Australian Reed-warbler**	**-**	**-**	**A freshwater wetland species of local conservation significance. Prefers dense vegetation alongside water, especially thick reed beds, as well as tall crops, bamboo thickets and lantana.**	**Potential. Suitable potential habitat occurs within the Development site**	**Yes**

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Anous stolidus	Common Noddy		M	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Anseranas semipalmata	Magpie Goose	V		Shallow wetlands, floodplains, grasslands, pastures, dams and crops.	Unlikely. Marginal suitable habitat on or near the Development site	No
Anthochaera phrygia	Regent Honeyeater	E4A	CE	Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of Casuarina cunninghamiana (River Oak).	Unlikely. Marginal suitable habitat on or near the Development site	No
Apus pacificus	Fork-tailed Swift		M	Riparian woodland, swamps, low scrub, heathland, saltmarsh, grassland, Spinifex sandplains, open farmland and inland and coastal sand-dunes.	Unlikely. Marginal suitable habitat on or near the Development site	No
Ardenna carneipes	Flesh-footed Shearwater	V	M	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Ardenna pacificus	Wedge-tailed Shearwater		M	Islands, offshore.	Unlikely. Marginal suitable habitat on or near the Development site.	No
Ardenna tenuirostris	Short-tailed Shearwater		M	Islands, offshore.	Marginal suitable habitat on or near	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
					the Development site	
Arenaria interpres	Ruddy Turnstone		M	Tidal reefs and pools; pebbly, shelly and sandy shores; mudflats; inland shallow waters; sewage ponds, saltfields; ploughed ground.	Unlikely. Marginal suitable habitat on or near the Development site	No
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V		Woodlands and dry open sclerophyll forest, usually eucalypts and mallee associations. Also have recordings in shrub and heathlands and various modified habitats, including regenerating forests. In western NSW, this species is primarily associated with River Red Gum/Black Box/Coolabah open forest/woodland and associated with larger river/creek systems.	Unlikely	No
Botaurus poiciloptilus	Australasian Bittern	E1	E	Permanent freshwater wetlands with tall, dense vegetation, particularly Typha spp. (bullrushes) and Eleocharis spp. (spikerushes).	No	No
Burhinus grallarius	Bush Stone-curlew	E1		In NSW, it occurs in lowland grassy woodland and open forest.	No	No
Calidris acuminata	Sharp-tailed Sandpiper		M	Shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.	Unlikely. Marginal suitable habitat on or near the Development site	No
Calidris alba	Sanderling	V	M	Coastal areas on low beaches of firm sand, near reefs and inlets, along tidal mudflats and lagoons; rarely recorded in near-coastal wetlands.	Unlikely. Marginal suitable habitat on or near the Development site	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Calidris bairdii	Baird's Sandpiper		M	Sandy beaches, mudflats, saltponds, sewage ponds and shores of lakes and lagoons.	Unlikely. Marginal suitable habitat on or near the Development site	No
Calidris canutus	Red Knot		E, M	Intertidal mudflats, sandflats sheltered sandy beaches, estuaries, bays, inlets, lagoons, harbours, sandy ocean beaches, rock platforms, coral reefs, terrestrial saline wetlands near the coast, sewage ponds and saltworks. Rarely inland lakes or swamps.	Unlikely. Marginal suitable habitat on or near the Development site	No
Calidris ferruginea	Curlew Sandpiper	E1	CE, M	"Littoral and estuarine habitats, including intertidal mudflats, non-tidal swamps, lakes and lagoons on the coast and sometimes inland."	Unlikely. Marginal suitable habitat on or near the Development site	No
Calidris melanotos	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. Marginal suitable habitat on or near the Development site	No
Calidris ruficollis	Red-necked Stint		M	Tidal mudflats, saltmarshes, sandy and shelly beaches, saline and freshwater wetlands, saltfields, sewage ponds.	Unlikely. Marginal suitable habitat on or near the Development site	No
Calidris subminuta	Long-toed Stint		M	Coastal and inland shallow wetlands, sewage ponds, tidelines, tidal mudflats.	Unlikely. Marginal suitable habitat on or near	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
					the Development site	
Calidris tenuirostris	Great Knot	V	CE, M	Intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons.	Unlikely. Marginal suitable habitat on or near the Development site	No
Calonectris leucomelas	Streaked Shearwater		M	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Calyptorhynchus lathami	Glossy Black-Cockatoo	V		Open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur.	Unlikely. Marginal suitable habitat on or near the Development site	No
Charadrius bicinctus	Double-banded Plover		M	Beaches, bays and inlets, exposed reefs and rock platforms, harbours, margins of fresh or saline terrestrial wetlands such as lakes, lagoons and swamps; shallow estuaries, rivers, saltmarsh, grasslands, pasture. Sometimes associated with coastal lagoons, inland saltlakes, saltworks, seagrass beds, kelp beds.	Unlikely. Marginal suitable habitat on or near the Development site	No
Charadrius leschenaultii	Greater Sand-plover	V	V, M	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. Marginal suitable habitat on or near the Development site	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Charadrius mongolus	Lesser Sand-plover	V	E, M	Almost entirely coastal in NSW, using sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats, sandy beaches, coral reefs and rock platforms.	Unlikely. Marginal suitable habitat on or near the Development site	No
Charadrius ruficapillus	Red-capped Plover		Mar	Occurs on sandy beaches, coastal lagoons, estuaries, bays and inland saline wetlands.	Unlikely. Marginal suitable habitat on or near the Development site	No
Charadrius veredus	Oriental Plover		M	Open plains, ploughed land, inland swamps, tidal mudflats, claypans, coastal marshes, grassy airfields, playing fields, lawns.	Unlikely. Marginal suitable habitat on or near the Development site	No
Charadrius veredus	Oriental Plover		M	Open plains, ploughed land, inland swamps, tidal mudflats, claypans, coastal marshes, grassy airfields, playing fields, lawns.	Unlikely. Marginal suitable habitat on or near the Development site	No
Chlidonias leucopterus	White-winged Black Tern		M	Large coastal and inland wetlands, saltfields, tidal estuaries, lagoons, grassy swamps, and sewage ponds.	Unlikely. Marginal suitable habitat on or near the Development site	No
Cuculus saturatus	Oriental Cuckoo			Occupies rainforests, monsoon forests and vine thickets with dense vegetation and closed canopies	No. No suitable habitat on or near the Development site	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Daphoenositta chrysoptera	Varied Sittella	V		Inhabits eucalypt forests and woodlands, mallee and Acacia woodland.	Unlikely	No
Dasyornis brachypterus	Eastern Bristlebird	E1	E	Central and southern populations inhabit heath and open woodland with a heathy understorey. In northern NSW, habitat comprises open forest with dense tussocky grass understorey.	No	No
Diomedea antipodensis	Antipodean Albatross	V	V	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Diomedea antipodensis gibsoni	Antipodean Albatross	V	V	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Diomedea epomophora	Southern Royal Albatross		Mar	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Diomedea exulans	Wandering Albatross	E1	V, M	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Diomedea gibsoni	Gibson's Albatross	V	V	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Diomedea sanfordi	Northern Royal Albatross		Mar	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Egretta sacra	Eastern Reef Egret			Beaches, rocky shores, tidal rivers and inlets, mangroves, and exposed coral reefs.	Unlikely. Marginal suitable habitat on or near the Development site	No
*Elseyornis melanops**	Black-fronted Dotterel	-	-	A freshwater wetland species of local conservation significance. Found in the shallow margins of wetlands, lakes, rivers, sewage farms, storm drains and marshes. It is normally always near freshwater and is not often seen on the coast.	Unlikely. Marginal suitable habitat on or near the Development site	No
Epthianura albifrons	White-fronted Chat population in the Sydney Metropolitan Catchment Management Area	E2		"Saltmarsh of Newington Nature Reserve and in grassland on the northern bank of the Parramatta River. Saltmarsh and on the sandy shoreline of a small island of Towra Point Nature Reserve."	No. No suitable habitat on or near the Development site	No
Epthianura albifrons	White-fronted Chat	V		Saltmarsh vegetation, open grasslands and sometimes low shrubs bordering wetland areas.	Unlikely. Marginal suitable habitat on or near the Development site	No
Erythrotriorchis radiatus	Red Goshawk	E4A	V	Open woodland and forest, often along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and coastal riparian Eucalyptus forest.	Unlikely	No
Falco subniger	Black Falcon	V		Woodland, shrubland and grassland, especially riparian woodland and agricultural land. Often associated with streams or wetlands.	Unlikely	No
Fregata ariel	Lesser Frigatebird		M	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Fregata minor	Great Frigatebird		M	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Fregetta grallaria grallaria	White-bellied Storm-Petrel	V	V	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Gallinago hardwickii	Latham's Snipe		M	Freshwater, saline or brackish wetlands up to 2000 m above sea-level; usually freshwater swamps, flooded grasslands or heathlands.	Unlikely. Marginal suitable habitat on or near the Development site	No
Gallinago megala	Swinhoe's Snipe		M	Breeds in Siberia and Mongolia. In Australia found around edges of fresh and brackish wetlands. This includes swamps, billabongs, river pools, small streams and sewage ponds. They are also found in drying claypans and inundated plains.	Unlikely. Marginal suitable habitat on or near the Development site	No
Gallinago stenura	Pin-tailed Snipe		M	Breeds in Siberia. Habitat specific to Australia includes dense clumps of grass and rushes round the edges of fresh and brackish wetlands. This includes swamps, billabongs, river pools, small streams and sewage ponds. During non-breeding period occurs most often in or at the edges of shallow freshwater swamps, ponds and lakes with emergent, sparse to dense cover of grass/sedge or other vegetation. Also found in drier, more open wetlands such as claypans, inundated with plains pitted with crab holes and also commonly seen at sewage ponds; not normally in saline or inter-tidal wetlands.	Unlikely. Marginal suitable habitat on or near the Development site	No
*Gallirallus philippensis**	Buff-banded Rail	-	-	A freshwater wetland species of local conservation significance. Seen singly or in pairs in dense reeds and vegetation bordering many types of wetlands or crops. It makes widespread use of artificial wetlands like sewage ponds and drainage channels.	Unlikely. Marginal suitable habitat on or near the Development site	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Glossopsitta pusilla	Little Lorikeet	V		Dry, open eucalypt forests and woodlands, including remnant woodland patches and roadside vegetation.	Unlikely	No
Grantiella picta	Painted Honeyeater	V	V	Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests.	No	No
Haematopus fuliginosus	Sooty Oystercatcher	V		Rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries.	Unlikely. Marginal suitable habitat on or near the Development site	No
Haematopus longirostris	Pied Oystercatcher	E1		Intertidal flats of inlets and bays, open beaches and sandbanks.	Unlikely. Marginal suitable habitat on or near the Development site	No
Haliaeetus leucogaster	White-bellied Sea-Eagle	V		Freshwater swamps, rivers, lakes, reservoirs, billabongs, saltmarsh and sewage ponds and coastal waters. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest and urban areas.	Unlikely. Marginal suitable habitat on or near the Development site	No
Hieraaetus morphnoides	Little Eagle	V		Open eucalypt forest, woodland or open woodland, including sheoak or Acacia woodlands and riparian woodlands of interior NSW.	Unlikely	No
Himantopus himantopus	Black-winged Stilt	-	Mar	A freshwater wetland species of local conservation significance. A social species, and is usually found in small groups. Black-winged Stilts prefer freshwater and saltwater marshes, mudflats, and the shallow edges of lakes and rivers.	No	No
Hirundapus caudacutus	White-throated Needletail		M	Occur most often over open forest and rainforest, as well as heathland, and remnant vegetation in farmland.	Unlikely. Marginal suitable habitat on or near the Development site	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Hydroprogne caspia	Caspian Tern		M	Coastal offshore waters, beaches, mudflats, estuaries, rivers, lakes.	Unlikely. Marginal suitable habitat on or near the Development site	No
Ixobrychus flavicollis	Black Bittern	V		Terrestrial and estuarine wetlands. Also flooded grassland, forest, woodland, rainforest and mangroves where permanent water is present.	Unlikely. Marginal suitable habitat on or near the Development site	No
Lathamus discolor	Swift Parrot	E1	CE	Box-ironbark forests and woodlands.	No	No
Limicola falcinellus	Broad-billed Sandpiper	V	M	Sheltered parts of the coast such as estuarine sandflats and mudflats, harbours, embayments, lagoons, saltmarshes and reefs.	Unlikely. Marginal suitable habitat on or near the Development site	No
Limosa lapponica	Bar-tailed Godwit		M	Intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons, bays, seagrass beds, saltmarsh, sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. Rarely inland wetlands, paddocks and airstrips.	Unlikely. Marginal suitable habitat on or near the Development site	No
Limosa limosa	Black-tailed Godwit	V	M	"Usually sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found around muddy lakes and swamps."	Unlikely. Marginal suitable habitat on or near the Development site	No
Lophochroa leadbeateri	Major Mitchell's Cockatoo	V		Wide range of treed and treeless inland habitats, always within easy reach of water.	Unlikely. Marginal suitable habitat on or near the Development site	No
Lophoictinia isura	Square-tailed Kite	V		Timbered habitats including dry woodlands and open forests, particularly timbered watercourses.	Unlikely. Marginal suitable habitat on	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
					or near the Development site	
Macronectes giganteus	Southern Giant Petrel	E1	E, M	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Macronectes halli	Northern Giant-Petrel	V	V, M	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Malurus cyaneus*	**Superb Fairy-wren**	-	-	**A species of local conservation significance. Seen in most habitat types where suitable dense cover and low shrubs occur. They are common in urban parks and gardens, and can be seen in small social groups. These groups normally consist of one male and several females and young birds.**	**Potential. Suitable potential habitat occurs within the Development site**	**Yes**
Monarcha melanopsis	Black-faced Monarch		M	Rainforest, open eucalypt forests, dry sclerophyll forests and woodlands, gullies in mountain areas or coastal foothills, Brigalow scrub, coastal scrub, mangroves, parks and gardens.	No	No
Motacilla flava	Yellow Wagtail		M	Swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land, lawns.	Unlikely. Marginal suitable habitat on or near the Development site	No
Myiagra cyanoleuca	Satin Flycatcher		M	Eucalypt-dominated forests, especially near wetlands, watercourses, and heavily-vegetated gullies.	Unlikely. Marginal suitable habitat on or near the Development site	No
Neophema chrysogaster	Orange-bellied Parrot	E4A	CE	Winter habitat is mostly within 3 km of the coast in sheltered bays, lagoons, estuaries, coastal dunes and saltmarshes. Also	No	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
				small islands and peninsulas, saltworks, golf courses, low samphire herbland and taller coastal shrubland.		
Neophema pulchella	Turquoise Parrot	V		Eucalypt and cypress pine open forests and woodlands, ecotones between woodland and grassland, or coastal forest and heath.	No	No
Nettapus coromandelianus	Cotton Pygmy-Goose	E1		Freshwater lakes, lagoons, swamps and dams.	Unlikely. Marginal suitable habitat on or near the Development site	No
Ninox connivens	Barking Owl	V		Woodland and open forest, including fragmented remnants and partly cleared farmland, wetland and riverine forest.	Unlikely	No
Ninox strenua	Powerful Owl	V		Woodland, open sclerophyll forest, tall open wet forest and rainforest.	Unlikely	No
Numenius madagascariensis	Eastern Curlew		CE, M	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. Marginal suitable habitat on or near the Development site	No
Numenius minutus	Little Curlew		M	Dry grasslands, open woodlands, floodplains, margins of drying swamps, tidal mudflats, airfields, playing fields, crops, saltfields, sewage ponds.	Unlikely. Marginal suitable habitat on or near the Development site	No
Numenius phaeopus	Whimbrel		M	Estuaries, mangroves, tidal flats, coral cays, exposed reefs, flooded paddocks, sewage ponds, grasslands, sports fields, lawns.	Unlikely. Marginal suitable habitat on or near the Development site	No
Onychoprion fuscata	Sooty Tern	V		Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Pandion cristatus	Eastern Osprey	V		Rocky shorelines, islands, reefs, mouths of large rivers, lagoons and lakes.	Unlikely. Marginal suitable habitat on or near the Development site	No
Pandion haliaetus	Osprey		M	Coastal areas near shallow waters.	Unlikely. Marginal suitable habitat on or near the Development site	No
Pachyptila turtur subantarctica	Fairy Prion		V	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Pardalotus punctatus*	**Spotted Pardalote**	**-**	**-**	**A species of local conservation significance. The Spotted Pardalote is mostly found in eucalypt forests and woodlands but occurs in parks and gardens with well-established eucalypt canopy.**	**Potential. Suitable potential habitat occurs within the Development site**	**Yes**
Petroica boodang	Scarlet Robin	V		Dry eucalypt forests and woodlands, and occasionally in mallee, wet forest, wetlands and tea-tree swamps.	Unlikely	No
Petroica phoenicea	Flame Robin	V		Breeds in upland tall moist eucalypt forests and woodlands. In winter uses dry forests, open woodlands, heathlands, pastures and native grasslands. Occasionally occurs in temperate rainforest, herbfields, heathlands, shrublands and sedgelands at high altitudes.	Unlikely	No
Phaethon lepturus	White-tailed Tropicbird		M	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Philomachus pugnax	Ruff		M	Terrestrial wetlands including lakes, swamps, pools, lagoons, tidal rivers, swampy fields and floodlands. Occasionally harbours, estuaries, seashores, sewage farms and saltworks.	Unlikely. Marginal suitable habitat on or near the Development site	No
Phoebetria fusca	Sooty Albatross	V	V	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
*Phylidonyris novaehollandiae**	New Holland Honeyeater	-	-	A species of local conservation significance. Common in heath, forests, woodland and gardens, mainly where grevilleas and banksias are found. It is inquisitive and approaches humans. It also mixes with other types of honeyeaters.	Unlikely. Marginal suitable habitat on or near the Development site	No
Phoebetria fusca	Sooty Albatross	V	V, M	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
*Platalea regia**	Royal Spoonbill	-	-	A freshwater wetland species of local conservation significance. Found in shallow freshwater and saltwater wetlands, intertidal mud flats and wet grasslands. Both permanent and temporary inland waters are used when available in the arid zone. Will also use artificial wetlands such as sewage lagoons, saltfields, dams and reservoirs.	Unlikely. Marginal suitable habitat on or near the Development site	No
Pluvialis fulva	Pacific Golden Plover		M	Estuaries, mudflats, saltmarshes, mangroves, rocky reefs, inland swamps, ocean shores, paddocks, sewage ponds, ploughed land, airfields, playing fields.	Unlikely. Marginal suitable habitat on or near the Development site	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Pluvialis squatarola	Grey Plover		M	Mudflats, saltmarsh, tidal reefs and estuaries.	Unlikely. Marginal suitable habitat on or near the Development site	No
Pterodroma leucoptera leucoptera	Gould's Petrel	V	E	"Marine. Nesting habitat is located within steeply sloping rock scree gullies with a canopy of Cabbage Tree Palms."	Unlikely. Marginal suitable habitat on or near the Development site	No
Pterodroma neglecta neglecta	Kermadec Petrel (west Pacific subspecies)	V	V	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Ptilinopus superbus	Superb Fruit-Dove	V		Rainforest and closed forests. May also forage in eucalypt or acacia woodland where there are fruit-bearing trees.	No	No
Puffinus carneipes	Flesh-footed Shearwater		M, Mar	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Recurvirostra novaehollandiae	Red-necked Avocet			Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Rhipidura rufifrons	Rufous Fantail		M	Wet sclerophyll forests, subtropical and temperate rainforests. Sometimes drier sclerophyll forests and woodlands.	Unlikely	No
Rostratula australis	Australian Painted Snipe	E1	E	Swamps, dams and nearby marshy areas.	No	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Stagonopleura guttata	Diamond Firetail	V		"Grassy eucalypt woodlands, open forest, mallee, Natural Temperate Grassland, secondary derived grassland, riparian areas and lightly wooded farmland."	No	No
Stercorarius longicaudus	Long-tailed Jaeger		M	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Stercorarius parasiticus	Arctic Jaeger		M	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Stercorarius pomarinus	Pomarine Jaeger		M	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Sterna albifrons	Little Tern		M, Mar	The Little Tern is mainly coastal, being found on beaches, sheltered inlets, estuaries, lakes, sewage farms, lagoons, river mouths and deltas	Unlikely. Marginal suitable habitat on or near the Development site	No
Sterna hirundo	Common Tern		M	Offshore waters, ocean beaches, estuaries, large lakes. Less commonly freshwater swamps, floodwaters, sewage farms and brackish and saline lakes.	Unlikely. Marginal suitable habitat on or near the Development site	No
Sternula albifrons	Little Tern	E1	M	Sheltered coastal environments, harbours, inlets and rivers.	Unlikely. Marginal suitable habitat on or near the Development site	No
Sternula nereis nereis	Australian Fairy Tern		V	Embayments of a variety of habitats including offshore, estuarine or lake islands, wetlands and mainland coastline. Nests on	Unlikely. Marginal suitable habitat on	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
				sheltered sandy beaches, spits and banks above the high tide line and below vegetation.	or near the Development site	
Stictonetta naevosa	Freckled Duck	V		Freshwater swamps and creeks, lakes, reservoirs, farm dams and sewage ponds.	No	No
Sula dactylatra	Masked Booby	V		Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Thalassarche bulleri	Buller's Albatross		V	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Thalassarche cauta cauta	Shy Albatross	V	V	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Thalassarche chrysostoma	Grey-headed Albatross		E	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Thalassarche eremita	Chatham Albatross		E	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Thalassarche impavida	Campbell Albatross		V	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No

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Thalassarche melanophris	Black-browed Albatross	V	V	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Thalassarche salvini	Salvin's Albatross	V		Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Thalassarche steadi	White-capped Albatross		V	Marine.	Unlikely. Marginal suitable habitat on or near the Development site	No
Tringa brevipes (also listed as Heteroscelus brevipes)	Grey-tailed Tattler		M	"Sheltered coasts with reefs and rock platforms or intertidal mudflats; intertidal rocky, coral or stony reefs; shores of rock, shingle, gravel or shells; embayments, estuaries and coastal lagoons; lagoons and lakes; and ponds in sewage farms and saltworks.	Unlikely. Marginal suitable habitat on or near the Development site	No
Tringa glareola	Wood Sandpiper		M	Well-vegetated, shallow, freshwater wetlands, such as swamps, billabongs, lakes, pools and waterholes; inundated grasslands; floodplains; irrigated crops; sewage ponds; reservoirs; large farm dams; bore drains; rarely brackish wetlands and saltmarsh.	Unlikely. Marginal suitable habitat on or near the Development site	No
Tringa incana (also listed as Heteroscelus incanus)	Wandering Tattler		M	Rocky coasts with reefs and platforms, offshore islands, shingle beaches or beds; occasionally coral reefs or beaches.	Unlikely. Marginal suitable habitat on or near the Development site	No
Tringa nebularia	Common Greenshank		M	Terrestrial wetlands (swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans, saltflats, sewage farms and saltworks dams, inundated rice crops and bores) and sheltered coastal habitats (mudflats, saltmarsh,	Unlikely. Marginal suitable habitat on or near the Development site	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
				mangroves, embayments, harbours, river estuaries, deltas, lagoons, tidal pools, rock-flats and rock platforms).		
Tringa stagnatilis	Marsh Sandpiper		M	Swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, intertidal mudflats, sewage farms and saltworks, reservoirs, waterholes, soaks, bore-drain swamps and flooded inland lakes.	Unlikely. Marginal suitable habitat on or near the Development site	No
Tryngites subruficollis	Buff-breasted Sandpiper	-	M	Short grasslands, freshwater or saline wetlands, tidal mudflats.	Unlikely. Marginal suitable habitat on or near the Development site	No
Tyto novaehollandiae	Masked Owl	V		Dry eucalypt forests and woodlands from sea level to 1100 m.	No	No
Tyto tenebricosa	Sooty Owl	V		Dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests.	No	No
Xenus cinereus	Terek Sandpiper	V	M	Mudbanks and sandbanks near mangroves, rocky pools and reefs, and occasionally up to 10 km inland around brackish pools.	Unlikely. Marginal suitable habitat on or near the Development site	No
Zosterops lateralis*	**Silvereye**	**-**	**-**	**A species of local conservation significance. Coastal heath, shrublands, forests, farms, and urban areas.**	**Potential. Suitable potential habitat occurs within the Development site**	**Yes**
Mammals (excluding bats)						
Arctocephalus forsteri	New Zealand Fur-seal	V		Prefers rocky parts of islands with jumbled terrain and boulders.	No. No suitable habitat on or near the Development site	No

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Arctocephalus pusillus doriferus	Australian Fur-seal	V		Rocky parts of islands with flat, open terrain.	No. No suitable habitat on or near the Development site	No
Aepyprymnus rufescens	Rufous Bettong	V		From tall wet sclerophyll forests on the coast to the dry forests and open woodlands west of the Great Dividing Range.	No	No
Cercartetus nanus	Eastern Pygmy-possum	V		Rainforest, sclerophyll forest (including Box-Ironbark), woodland and heath.	No	No
Dasyurus maculatus	Spotted-tailed Quoll	V	E	Rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	No	No
Dasyurus maculatus maculatus (SE mainland population)	Spotted-tailed Quoll	V	E	Rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	No	No
Dasyurus viverrinus	Eastern Quoll	E1	E	Dry sclerophyll forest, scrub, heathland and cultivated land.	No	No
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	E1	E	Heath or open forest with a heathy understorey on sandy or friable soils.	No	No
Perameles nasuta	Long-nosed Bandicoot, North Head	E2		Occupies a variety of habitats on North Head.	No	No
Perameles nasuta	Long-nosed Bandicoot population in inner western Sydney	E2		Backyards, parkland.	No	No
Petaurus australis	Yellow-bellied Glider			The habitat on the Bago Plateau consists of tall wet sclerophyll forest dominated by Eucalyptus delegatensis (Alpine Ash), E. dalrympleana (Mountain Gum), E. radiata (Narrow-leaved Peppermint), and E. rubida (Candlebark).	No	No
Petauroides volans	Greater Glider population in the	E2	V	Eucalypt forests and woodlands.	No	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
	Eurobodalla local government area					
Petrogale penicillata	Brush-tailed Rock-wallaby	E1	V	Rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges.	No	No
Phascolarctos cinereus	Koala	V	V	Eucalypt woodlands and forests.	No	No
Pseudomys novaehollandiae	New Holland Mouse		V	Open heathlands, woodlands and forests with a heathland understorey, vegetated sand dunes.	No	No
Microbats and Fruit Bats						
Austronomus australis	White-striped Freetail Bat	-	-	A priority fauna species under UESAP. Urban areas, forests, woodlands, shrublands, agricultural areas with scattered trees, grasslands and deserts. Roosts in tree hollows but known to roost in an old building at Sydney Olympic Park.	Potential	No. Potentially recorded on site. Non-threatened species does not require impact assessment
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country. Roosts in caves, crevices in cliffs, mines and occasionally disused mud nests of birds	Unlikely. No roosting habitat present on Development site.	No
*Chalinolobus gouldii**	Gould's Wattled Bat	-	-	A priority fauna species under UESAP. Utilises a wide variety of habitats including rainforests, eucalypt forest and woodlands, grasslands, desert, and urban areas. Roosts commonly in tree hollows, but may also utilise buildings.	Potential	No. Recorded on site. Non-threatened species does not require impact assessment
Chalinolobus morio	Chocolate Wattled Bat	-	-	A priority fauna species under UESAP. Utilises a wide variety of habitats including rainforests, eucalypt forest and woodlands,	Potential	No. Recorded on site. Non-

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
				grasslands, desert, and urban areas. Roosts commonly in tree hollows, but may also utilise buildings, culverts and bridges.		threatened species does not require impact assessment
Falsistrellus tasmaniensis	**Eastern False Pipistrelle**	**V**		**Tall (greater than 20m) moist habitats. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.**	**Potential**	**Yes, assessed as prescribed impacts**
Miniopterus australis	**Little Bent-Winged Bat**	**V**		**Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Roosts in caves, mines, tunnels, culverts and bridges, occasionally buildings and tree hollows**	**Potential**	**Yes, assessed as prescribed impacts**
Miniopterus orianae oceanensis	**Large Bent Winged Bat**	**V**		**Rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland. Roosts in caves, mines, tunnels, culverts and bridges.**	**Potential**	**Yes. Recorded on site, Assessed as prescribed impacts**
Micronomus norfolkensis	**Eastern Coastal Free-tailed Bat**	**V**		**Dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roosts in tree hollows and occasionally in buildings.**	**Potential**	**Yes, assessed as prescribed impacts**
Myotis macropus	**Southern Myotis**	**V**		**Foraging habitat is waterbodies (including streams, or lakes or reservoirs) and fringing areas of vegetation up to 20m. Roosts in caves, tunnels, culverts, bridges, mines and tree hollows.**	**Potential**	**Yes. Recorded on site. Assessed as prescribed impacts**
Nyctophilus geoffroyi	Lesser Long-eared Bat	-	-	A priority fauna species under UESAP. Widespread including rainforests, wet and dry sclerophyll forests, agricultural land and urban areas. Roosts in crevices under lifting and peeling bark, in tree hollows and buildings.	Potential	No. Potentially recorded on site. Non-threatened species does not

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
						require impact assessment
Nyctophilus gouldi	Gould's Long-eared Bat	-	-	A priority fauna species under UESAP. Widespread including rainforests, wet and dry sclerophyll forests, woodlands, Melaleuca woodlands. Roosts in tree hollows and under bark.	Potential	No. Potentially recorded on site. Non-threatened species does not require impact assessment
Ozimops planiceps	South-eastern Freetail Bat	-	-	A priority fauna species under UESAP. Inland of the Great Dividing Range. Tall forests, dry open forests, river red-gum, box-ironwood and cypress pine woodlands, mallee grasslands, coastal heathland. Adapts well to urbanisation. Roosts in tree hollows and buildings.	Unlikely. Does not occur east of Great Dividing Range.	No. Non-threatened species does not require impact assessment
Ozimops ridei	Ride's Freetail Bat	-	-	A priority fauna species under UESAP. Rainforest, Melaleuca forest, tall open forest, riparian open forest and dry sclerophyll forests. Roosts in tree hollows, also under bark and in buildings and cracks in posts.	Potential	No. Recorded on site. Non-threatened species does not require impact assessment
Pteropus poliocephalus	**Grey-headed Flying-fox**	**V**	**V**	**Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.**	**Likely. Suitable potential habitat occurs within the Development site**	**Yes**
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V		Almost all habitats, including wet and dry sclerophyll forest, open woodland, open country, mallee, rainforests, heathland and waterbodies. Roosts in tree hollows.	Unlikely, no roosting habitat present within the Development site	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Scoteanax rueppellii	**Greater Broad-nosed Bat**	**V**		**Associated with moist gullies in mature coastal forest, or rainforest, east of the Great Dividing Range tending to be more frequently located in more productive forests. Roosts in tree hollows and occasionally in buildings**	**Potential**	**Yes, assessed as prescribed impact**
Scotorepens greyii	Little Broad-nosed Bat	-	-	A priority fauna species under UESAP. Not known from the coastal areas of NSW. Melaleuca forest, tall open forest, open forest, open woodland, mixed shrubland, escarpment, commonly near water. Roosts in tree hollows, also telegraph poles and buildings	Unlikely. No suitable habitat present.	No.
Scotorepens orion	Eastern Broad-nosed Bat	-	-	A priority fauna species under UESAP. Rainforest, tall wet forest, vine forest, low open forest, cypress pine woodland, stringybark and mixed species woodland. Roosts in tree hollows and buildings.	Potential	No. Non-threatened species does not require impact assessment
Vespadelus darlingtoni	Large Forest Bat	-	-	A priority fauna species under UESAP. Rainforest, wet and dry sclerophyll forest, blackwood swamps, open forest, sclerophyll regrowth and coastal mallee. Roosts in tree hollows and sometimes in buildings.	Potential	No. Non-threatened species does not require impact assessment
Vespadelus regulus	Southern forest Bat	-	-	A priority fauna species under UESAP. Rainforest, wet and dry sclerophyll forest, shrubland and low shrub woodland, mallee and open woodland. Sensitive to forest fragmentation, avoids small remnants, corridors and open areas.	Unlikely. Suitable habitat not present.	No.
Vespadelus vulturnus *	Little Forest Bat	-	-	A priority fauna species under UESAP. Wet and dry sclerophyll forests and woodland, often in riverine habitats. Roosts in tree hollows and also in buildings.	Potential.	No. Potentially recorded on site. Non-threatened species does not require impact assessment

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Reptiles						
Reptiles (As a general group identified by the UESAP. Non-threatened species recorded within 5 km of Development site listed in Table 23)		-	-	A wide variety of urban and rural habitats which contain shelters such as cracks, crevices, hollows, and dappled to full exposure of sunlight.	Unlikely. The Development site does not contain any specific potential habitat for this general group	No
Amphibolurus muricatus*	Jacky Lizard	-	-	A species of local conservation significance. Sclerophyll forests, coastal woodlands, usually in areas with some native vegetation.	Unlikely. The Development site does not contain any specific potential habitat for this species	No
Chelonia mydas	Green Turtle	V	V	Marine. Nesting occurs on beaches.	Unlikely. No suitable habitat on or near the Development site	No
Dermochelys coriacea	Leatherback Turtle	E1	M	Marine. Nesting occurs on beaches.	Unlikely. No suitable habitat on or near the Development site	No
*Eulamprus tenuis**	Bar-sided Skink	-	-	A species of local conservation significance. Forest and woodland areas.	Unlikely. The Development site does not contain any specific potential habitat for this species	No
Hoplocephalus bungaroides	Broad-headed Snake	E1	V	Dry and wet sclerophyll forests, riverine forests, coastal heath swamps, rocky outcrops, heaths, grassy woodlands.	No. No suitable habitat on or near	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
					the Development site	
*Saproscinus spectabilis**	Gully Skink	-	-	A species of local conservation significance. Cool shaded gullies with rocky outcrops, ground cover, and rocky cracks.	Unlikely. The Development site does not contain any specific potential habitat for this species	No
*Tiliqua scincoides scincoides**	Eastern Blue-tongue	-	-	A species of local conservation significance. This species inhabits semi-desert, mixed woodland, and scrubland areas of Australia, New Guinea, and Tasmania.	Unlikely. The Development site does not contain any specific potential habitat for this species	No
Invertebrates						
Pommerhelix duralensis	Dural Land Snail		E	The Dural Land Snail is endemic to NSW and is confined to the northwest fringes of the Cumberland Plain. The snail has a strong preference for dry shale-influenced transitional landscapes. Associated with open eucalypt forests, particularly Shale-Sandstone Transition Forest and Sydney Turpentine – Ironbark Forest. Found under fallen logs, debris and in bark and leaf litter around the trunk of gum trees (particularly Eucalyptus punctata) or burrowing in loose soil around clumps of grass.	No	No

^BC Act: E1 = Endangered, E2 = Endangered Population, E4 = Extinct, E4A = Critically Endangered, V = Vulnerable; EPBC Act: M = Migratory, E = Endangered, CE – Critically Endangered, Mar = Marine;
*species of local conservation significance under the UESAP

Table 20: Likelihood of occurrence and requirement of impact assessment for threatened flora species

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Acacia bynoeana	Bynoe's Wattle	E1	V	Heath or dry sclerophyll forest on sandy soils.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Acacia gordonii		E1	E	Sclerophyll forest and heathlands amongst or within rock platforms on sandstone outcrops.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Acacia pubescens	Downy Wattle	V	V	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.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Acacia terminalis subsp. terminalis	Sunshine Wattle	E1	E	Coastal scrub and dry sclerophyll woodland on sandy soils.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Allocasuarina glareicola	-	E1	E	Castlereagh woodland on lateritic soil. Found in open woodland with Eucalyptus parramattensis, Eucalyptus fibrosa, Angophora bakeri, Eucalyptus sclerophylla and Melaleuca decora.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Allocasuarina portuensis	Nielsen Park She-oak	E1	E	The original habitat is tall closed woodland, above a sandstone shelf approximately 20 m above the harbour. Soils are shallow and sandy; plantings have occurred on similar soils.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Amperea xiphoclada var. pedicellata	-	E4		Heath, woodland and forest in low-fertility, sandy soils. Known only from the type specimen collected in 1892 from Sydney. Has not been observed since and is presumed extinct.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Asterolasia buxifolia	-	E1		Restricted to dense riparian scrub along rocky watercourses with a granitic substrate.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Asterolasia elegans	-	E1	E	"Hawkesbury sandstone. Found in sheltered forests on mid- to lower slopes and valleys."	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Caladenia tessellata	Thick Lip Spider Orchid	E1	V	Grassy sclerophyll woodland on clay loam or sandy soils, or low woodland with stony soil.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Callistemon linearifolius	Netted Bottle Brush	V		Dry sclerophyll forest.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Cryptostylis hunteriana	Leafless Tongue Orchid	V	V	"Coastal heathlands, margins of coastal swamps and sedgelands, coastal forest, dry woodland, and lowland forest."	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Darwinia biflora	-	V	V	Woodland, open forest or scrub-heath on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Deyeuxia appressa	-	E1	E	Moist conditions.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Dichanthium setosum	Bluegrass	V	V	Cleared woodland, grassy roadside remnants and highly disturbed pasture, on heavy basaltic black soils and red-brown loams with clay subsoil.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Dillwynia tenuifolia	-	V		Scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest, transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland, and disturbed escarpment woodland on Narrabeen sandstone.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Diuris arenaria	Sand Doubletail	E1		"Coastal heath and dry grassy eucalypt forest.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Doryanthes palmeri	Giant Spear Lily	V		"Exposed rocky outcrops, cliff-tops and on steep cliff-faces in montane heath next to subtropical rainforest, warm temperate rainforest or wet eucalypt forest."	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Epacris purpurascens var. purpurascens	-	V		Sclerophyll forest, scrubs and swamps. Most habitats have a strong shale soil influence.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Eucalyptus camfieldii	Camfield's Stringybark	V	V	"Coastal heath on shallow sandy soils overlying Hawkesbury sandstone, mostly on exposed sandy ridges."	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Eucalyptus fracta	Broken Back Ironbark	V		Dry eucalypt woodland in shallow soils along the upper escarpment of a steep sandstone range.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Eucalyptus leucoxylon subsp. pruinosa	Boland Yellow Gum	V		In NSW, occurs at the bases of sandy rises and on loamy clay flats on the floodplains of the Murray River and its tributaries.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Eucalyptus nicholii	Narrow-leaved Black Peppermint	V	V	Dry grassy woodland, on shallow soils of slopes and ridges.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Eucalyptus pulverulenta	Silver-leafed Gum	V	V	Open forest typically dominated by Eucalyptus mannifera (Brittle Gum), E. macrorhynca (Red Stringybark), E. dives (Broad-leafed Peppermint), E. sieberi (Silvertop Ash) and E. bridgesiana (Apple Box), on shallow soils.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Eucalyptus scoparia	Wallangarra White Gum	E1	V	"Open eucalypt forest, woodland and heaths on well-drained granite/rhyolite hilltops, slopes and rocky outcrops, typically at high altitudes.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Genoplesium baueri	Bauer's Midge Orchid	E1	E	Dry sclerophyll forest and moss gardens over sandstone.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Grammitis stenophylla	Narrow-leaf Finger Fern	E1		Rainforest and moist eucalypt forest, usually near streams, on rocks or in trees.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Grevillea caleyi	Caley's Grevillea	E4A	E	Open forest, generally dominated by Eucalyptus sieberi and E. gummifera on a ridgetop, in association with laterite soils.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Hibbertia puberula		E1		Low heath, dry sclerophyll woodland, upland swamps, on sandy soils or clay.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Hibbertia spanantha	Julian's Hibbertia	E4A		Endemic to the Sydney Basin bioregion. Grows in forest with canopy species including Eucalyptus pilularis, E. resinifera, Corymbia gummifera and Angophora costata. The understorey is open with species of Poaceae, Orchidaceae, Fabaceae and Liliaceae. Soil identifies as light clay occurring on shale sandstone soil transition.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Lasiopetalum joyceae	-	V		Heath on lateritic to shaley ridgetops over sandstone.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Leptospermum deanei		V	V	Woodland, riparian scrub and open forest on lower hill slopes or near creeks, on sand or sandy alluvial soil.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Macadamia tetraphylla	Rough-shelled Bush Nut	V		Subtropical rainforest, usually near the coast.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Melaleuca biconvexa	Biconvex Paperbark	V	V	Damp places, often near streams or low-lying areas on alluvial soils.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Melaleuca biconvexa	Biconvex Paperbark	V	V	Damp places, often near streams or low-lying areas on alluvial soils.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Melaleuca deanei	Deane's Paperbark	V	V	Heath on sandstone.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Microtis angusii	Angus's Onion Orchid			"Ingleside location is highly disturbed and dominated by the introduced weeds Coolatai grass (Hyparrhenia hirta) and Acacia saligna. The area is likely to have originally supported the Duffys Forest Vegetation Community, which ranges from open forest to low open forest and woodland."	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Pelargonium sp. Striatellum	Omeo Storksbill	E1	E	Irregularly inundated or ephemeral lakes, in the transition zone between surrounding grasslands or pasture and wetland or aquatic communities.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Persoonia hirsuta	Hairy Geebung	E1	E	Sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Persoonia nutans	Nodding Geebung	E1	E	Northern populations: sclerophyll forest and woodland (Agnes Banks Woodland, Castlereagh Scribbly Gum Woodland and Cooks River / Castlereagh Ironbark Forest) on aeolian and alluvial sediments. Southern populations: tertiary alluvium, shale sandstone transition communities and Cooks River / Castlereagh Ironbark Forest.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Pimelea curviflora var. curviflora		V	V	Woodland, mostly on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Pimelea spicata	Spiked Rice-flower	E1	E	"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."	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Prasophyllum fuscum	Slaty Leek Orchid	E4A	V	Moist heath, often along seepage lines	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Prostanthera marifolia	Seaforth Mintbush	E4A		In or in close proximity to the endangered Duffys Forest ecological community, on deeply weathered clay-loam soils associated with ironstone and scattered shale lenses.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Pterostylis saxicola	Sydney Plains Greenhood	E1	E	Small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines, adjacent to sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Pultenaea parviflora		E1	V	"Dry sclerophyll forest, especially Castlereagh Ironbark Forest, Shale Gravel Transition Forest and transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland."	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Sarcochilus hartmannii	Hartman's Sarcochilus	V		On volcanic rocks, in sclerophyll forest or exposed sites, from 500 to 1000 m. Rarely on bases of trees.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Syzygium paniculatum	Magenta Lilly Pilly	E1	V	"Subtropical and littoral rainforest on gravels, sands, silts and clays.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Tetratheca glandulosa		V		"Heath, scrub, woodlands and open forest on upper-slopes and mid-slope sandstone benches. Soils generally shallow, consisting of a yellow, clayey/sandy loam.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Tetratheca juncea	Black-eyed Susan	V	V	Low open forest/woodland, heathland and moist forest, mainly on low nutrient soils associated with the Awaba Soil Landscape.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Thesium australe	Austral Toadflax	V	V	Grassland on coastal headlands or grassland and grassy woodland away from the coast.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No
Triplarina imbricata	Creek Triplarina	E1	E	Along watercourses in low open forest with Tristaniopsis laurina (Water Gum).	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No

Scientific Name	Common Name	TSC Status (BC Act)	EPBC Status	Habitat	Likelihood of Occurrence	Impact Assessment Required
Wilsonia backhousei	Narrow-leafed Wilsonia	V		Margins of salt marshes and lakes.	No. The Development site is located on land which has been cut and filled (see Section 1.3.7), and does not contain potential habitat for this species. This species was not identified within the Development site during the site inspection.	No

^BC Act: E1 = Endangered, E2 = Endangered Population, E4 = Extinct, E4A = Critically Endangered, V = Vulnerable; EPBC Act: M = Migratory, E = Endangered, CE – Critically Endangered, Mar = Marine;

Appendix B: Flora and fauna species list

Table 21: Flora species recorded within the development site

Family	Species Name	Common Name	Planted (^)	Exotic (*), Naturalised (^)	Priority Weed / WoNS
Agavaceae	*Agave americana*	Century Plant		*	
Alliaceae	*Agapanthus praecox*	Lily of the Nile		*	
Araceae	*Monstera deliciosa*	Fruit Salad Plant / Swiss Cheese Plant		*	
Araceae	*Philodendron* sp.	-		*	
Araliaceae	*Hedera helix*	English Ivy		*	
Araliaceae	*Hydrocotyle laxiflora*	Stinking Pennywort			
Araliaceae	*Schefflera actinophylla*	Umbrella tree		*	
Arecaceae	*Livistona australis*	Cabbage Tree Palm			
Arecaceae	*Phoenix canariensis*	Canary Island Date Palm		*	
Arecaceae	*Syagrus romanzoffanium*	Cocos Palm / Queen Palm		*	
Asparagaceae	*Asparagus aethiopicus*	Asparagus fern		*	
Asparagaceae	*Dracaena* sp.	Dragon Tree		*	
Asphodelaceae	*Aloe vera*	-		*	
Aspleniaceae	*Asplenium nidus*	Birds Nest Fern		*	
Asteraceae	*Bidens pilosa*	Cobblers Pegs		*	
Asteraceae	*Conyza* sp.	Fleabane		*	
Asteraceae	*Hypochaeris radicata*	Catsear		*	
Berberidaceae	*Nandina domestica*	Sacred bamboo		*	
Caryophyllaceae	*Stellaria media*	Chickweed		*	
Casuarinaceae	*Casuarina glauca*	Swamp Oak			
Cupressaceae	*Cupressus arizonica*	Arizona Cypress		*	
Cupressaceae	*Cupressus sempervirens*	Italian Cypress		*	
Doryanthaceae	*Doryanthes excelsa*	Gymea Plant Lily	^		
Euphorbiaceae	*Ricinus communis*	Castor Oil Plant		*	
Fabaceae subf. Faboideae	*Acacia binervata*	Two-veined Hickory	^		
Fabaceae subf. Faboideae	*Trifolium repens*	White Clover		*	
Fabaceae subf. Mimosoideae	*Acacia ulicifolia*	Prickly Moses	^		
Geraniaceae	*Geranium* sp.	Geranium		*	

Family	Species Name	Common Name	Planted (^)	Exotic (*), Naturalised (^)	Priority Weed / WoNS
Lauraceae	*Cinnamomum camphora*	Camphor Laurel		*	
Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush			
Lomandraceae	*Lomandra longifolia*	Matt Rush			
Lomariopsidaceae	***Nephrolepis cordifoli***	**Fishbone Fern**		*	**Weed of Regional Concern - Environmental Risk**
Magnoliaceae	*Magnolia grandiflora*	Southern Magnolia		*	
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne		*	
Moraceae	*Ficus elastica*	Variegated Rubber Plant			
Moraceae	*Ficus macrophylla*	Moreton Bay Fig			
Moraceae	*Ficus microcarpa* var. *hillii*	Hill's Weeping Fig			
Moraceae	*Ficus rubiginosa*	Port Jackson Fig			
Moraceae	*Morus alba*	White Mulberry		*	
Myrtaceae	*Angophora costata*	Sydney Red Gum			
Myrtaceae	*Callistemon citrinus*	Crimson Bottlebrush	^		
Myrtaceae	*Eucalyptus botryoides*	Bangalay			
Myrtaceae	*Eucalyptus robusta*	Swamp Mahogany			
Myrtaceae	*Eucalyptus saligna*	Sydney Blue Gum	^		
Myrtaceae	*Lophostemon confertus*	Brush Box			
Myrtaceae	*Syzygium leuhmanni*	Small Leaf Lillypilly	^	*	
Oleaceae	*Olea europaea* subsp. *cuspidata*	African Olive		*	
Phormiaceae	*Dianella caerulea*	Blue Flax-lily			
Pittosporaceae	*Pittosporum undulatum*	Native Daphne			
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongue		*	
Poaceae	*Axonopus compressus*	Broad-leafed Carpet Grass		*	
Poaceae	*Cenchrus setaceus (*previously *Pennisetum setaceum)*	Fountain Grass		#	
Poaceae	*Cynodon dactylon*	Couch		*	
Poaceae	*Ehrharta erecta*	Veldtgrass		*	
Poaceae	*Eragrostis curvula*	African Love Grass		*	
Poaceae	*Setaria* sp.	-		*	
Podocarpaceae	*Podocarpus elatus*	Brown Pine	^		

Family	Species Name	Common Name	Planted (^)	Exotic (*), Naturalised (^)	Priority Weed / WoNS
Proteaceae	*Grevillea banksii × Grevillea bipinnatifida* ('Supurb')	Superb Grevillea	^		
Proteaceae	*Grevillea robusta*	Silky Oak			
Rosaceae	*Cotoneaster* sp.			*	
Rosaceae	*Cotoneaster glaucophyllus*	Glaucous Cotoneaster		*	
Rosaceae	*Malus pumila*	Apple		*	
Rosaceae	*Rhaphiolepis* sp.	-		*	
Ulmaceae	*Celtis sinensis*	Japanese Hackberry		*	
Verbenaceae	***Lantana camara***	**Lantana**		*	**State Priority Weed - Assest Protection Risk; WoNS**

WoNS - Weed of National Significance

Table 22: Fauna species recorded within the Development site

Family	Species Name	Common Name	Introduced (*)
Columbidae	*Columba livia*	Rock Dove	*
Corvidae	*Corvus coronoides*	Australian Raven	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull	
Miniopteridae	*Miniopterus orianae oceanensis*^*	Large Bent-winged Bat	
Molossidae	*Ozimops ridei*^	Ride's Free-tailed Bat	
Pelecanidae	*Pelecanus onocrotalus*	Pelican	
Phalangeridae	*Trichosurus vulpecula*	Common Brushtail Possum	
Psittaculidae	*Trichoglossus moluccanus*	Ranbow Lorikeet	
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail	
Threskiornithidae	*Threskiornis moluccus*	Australian White Ibis	
Vespertilionidae	*Chalinolobus gouldii*^	Gould's Wattled Bat	
Vespertilionidae	*Chalinolobus morio*^	Chocolate Wattled Bat	
Vespertilionidae	*Myotis macropus*^*	Southern Myotis	

* Threatened species listed under the BC Act, ^ recorded ultrasonically

Table 23: Non-threatened native species records from within 10 km of the Development site, relevant to 'Priority Fauna Groups' as identified in the UESAP

Family	Species Name	Common Name
Amphibians - As a general group identified by the UESAP		
HYLIDAE	*Litoria caerulea*	Green Tree Frog
HYLIDAE	*Litoria chloris*	Red-Eyed Tree Frog
HYLIDAE	*Litoria citropa*	Blue Mountains Tree Frog
HYLIDAE	*Litoria dentata*	Bleating Tree Frog
HYLIDAE	*Litoria ewingii*	Brown Tree Frog
HYLIDAE	*Litoria fallax*	Eastern Dwarf Tree Frog
HYLIDAE	*Litoria freycineti*	Freycinet's Frog
HYLIDAE	*Litoria infrafrenata*	Giant Tree Frog
HYLIDAE	*Litoria jervisiensis*	Jervis Bay Tree Frog
HYLIDAE	*Litoria latopalmata*	Gunther's Frog
HYLIDAE	*Litoria lesueuri*	Lesueur's Frog
HYLIDAE	*Litoria nasuta*	Rocket Frog
HYLIDAE	*Litoria peronii*	Peron's Tree Frog
HYLIDAE	*Litoria phyllochroa*	Leaf-Green Tree Frog
HYLIDAE	*Litoria rothii*	Northern Laughing Tree Frog
HYLIDAE	*Litoria rubella*	Little Red Tree Frog
HYLIDAE	*Litoria tyleri*	Tyler's Tree Frog
HYLIDAE	*Litoria verreauxii*	Verreaux's Frog
LIMNODYNASTIDAE	*Adelotus brevis*	Tusked Frog
LIMNODYNASTIDAE	*Heleioporus albopunctatus*	Western Spotted Frog
LIMNODYNASTIDAE	*Heleioporus australiacus*	Giant Burrowing Frog
LIMNODYNASTIDAE	*Limnodynastes dumerilii*	Eastern Banjo Frog
LIMNODYNASTIDAE	*Limnodynastes peronii*	Brown-Striped Frog
LIMNODYNASTIDAE	*Limnodynastes tasmaniensis*	Spotted Grass Frog
LIMNODYNASTIDAE	*Neobatrachus fulvus*	Tawny Frog
MYOBATRACHIDAE	*Crinia signifera*	Common Froglet
MYOBATRACHIDAE	*Crinia tinnula*	Wallum Froglet
MYOBATRACHIDAE	*Paracrinia haswelli*	Haswell's Frog
MYOBATRACHIDAE	*Pseudophryne bibronii*	Brown Toadlet
MYOBATRACHIDAE	*Uperoleia laevigata*	Smooth Toadlet
MYOBATRACHIDAE	*Uperoleia tyleri*	Tyler's Toadlet
Small birds - As a general group identified by the UESAP		
ACANTHIZIDAE	*Acanthiza (Acanthiza) apicalis*	Inland Thornbill
ACANTHIZIDAE	*Acanthiza (Acanthiza) pusilla*	Brown Thornbill

Family	Species Name	Common Name
ACANTHIZIDAE	*Acanthiza (Geobasileus) chrysorrhoa*	Yellow-Rumped Thornbill
ACANTHIZIDAE	*Acanthiza (Geobasileus) iredalei*	Slender-Billed Thornbill
ACANTHIZIDAE	*Acanthiza (Geobasileus) reguloides*	Buff-Rumped Thornbill
ACANTHIZIDAE	*Acanthiza (Subacanthiza) lineata*	Striated Thornbill
ACANTHIZIDAE	*Acanthiza (Subacanthiza) nana*	Yellow Thornbill
ACANTHIZIDAE	*Chthonicola sagittata*	Speckled Warbler
ACANTHIZIDAE	*Gerygone fusca*	Western Gerygone
ACANTHIZIDAE	*Gerygone mouki*	Brown Gerygone
ACANTHIZIDAE	*Gerygone olivacea*	White-Throated Gerygone
ACANTHIZIDAE	*Origma solitaria*	Rockwarbler
ACANTHIZIDAE	*Sericornis (Sericornis) citreogularis*	Yellow-Throated Scrubwren
ACANTHIZIDAE	*Sericornis (Sericornis) frontalis*	White-Browed Scrubwren
ACCIPITRIDAE	*Hamirostra melanosternon*	Black-Breasted Buzzard
ACCIPITRIDAE	*Lophoictinia isura*	Square-Tailed Kite
ALCEDINIDAE	*Ceyx azureus*	Azure Kingfisher
ALCEDINIDAE	*Dacelo (Dacelo) novaeguineae*	Kookaburra
ALCEDINIDAE	*Todiramphus (Lazulena) macleayii*	Forest Kingfisher
ALCEDINIDAE	*Todiramphus (Todiramphus) sanctus*	Sacred Kingfisher
APODIDAE	*Apus (Apus) pacificus*	Fork-Tailed Swift
APODIDAE	*Hirundapus caudacutus*	Spine-Tailed Swift
ARTAMIDAE	*Artamus (Angroyan) cinereus*	Black-Faced Woodswallow
ARTAMIDAE	*Artamus (Artamus) leucorynchus*	White-Breasted Woodswallow
ARTAMIDAE	*Artamus (Campbellornis) personatus*	Masked Woodswallow
ARTAMIDAE	*Artamus (Campbellornis) superciliosus*	White-Browed Woodswallow
ARTAMIDAE	*Cracticus nigrogularis*	Pied Butcherbird
ARTAMIDAE	*Cracticus tibicen*	Australian Magpie
ARTAMIDAE	*Cracticus torquatus*	Grey Butcherbird
CACATUIDAE	*Cacatua (Licmetis) sanguinea*	Little Corella
CACATUIDAE	*Cacatua (Licmetis) tenuirostris*	Long-Billed Corella
CACATUIDAE	*Eolophus roseicapillus*	Galah
CAMPEPHAGIDAE	*Coracina (Coracina) novaehollandiae*	Black-Faced Cuckoo-Shrike
CISTICOLIDAE	*Cisticola (Cisticola) exilis*	Golden-Headed Cisticola
CLIMACTERIDAE	*Climacteris (Climacterobates) erythrops*	Red-Browed Treecreeper
CLIMACTERIDAE	*Cormobates leucophaea*	White-Throated Treecreeper
COLUMBIDAE	*Chalcophaps indica*	Emerald Dove
COLUMBIDAE	*Columba (Columba) livia*	Rock Pigeon

Family	Species Name	Common Name
COLUMBIDAE	*Ducula (Myristicivora) bicolor*	Pied Imperial-Pigeon
COLUMBIDAE	*Geopelia cuneata*	Diamond Dove
COLUMBIDAE	*Geopelia humeralis*	Bar-Shouldered Dove
COLUMBIDAE	*Geopelia striata*	Peaceful Dove
COLUMBIDAE	*Macropygia (Macropygia) amboinensis*	Brown Cuckoo-Dove
COLUMBIDAE	*Ocyphaps lophotes*	Crested Pigeon
COLUMBIDAE	*Phaps (Phaps) chalcoptera*	Common Bronzewing
COLUMBIDAE	*Phaps (Phaps) elegans*	Brush Bronzewing
COLUMBIDAE	*Ptilinopus (Megaloprepia) magnificus*	Wompoo Fruit-Dove
COLUMBIDAE	*Ptilinopus (Ptilinopus) superbus*	Superb Fruit-Dove
COLUMBIDAE	*Streptopelia (Spilopelia) chinensis*	Spotted Dove
COLUMBIDAE	*Streptopelia (Spilopelia) roseogrisea*	Barbary Dove
COLUMBIDAE	*Streptopelia (Spilopelia) senegalensis*	Laughing Turtle-Dove
CORACIIDAE	*Eurystomus orientalis*	Dollarbird
CUCULIDAE	*Cacomantis (Cacomantis) variolosus*	Brush Cuckoo
CUCULIDAE	*Cacomantis (Vidgenia) flabelliformis*	Fan-Tailed Cuckoo
CUCULIDAE	*Chrysococcyx basalis*	Horsfield's Bronze-Cuckoo
CUCULIDAE	*Chrysococcyx lucidus*	Shining Bronze-Cuckoo
CUCULIDAE	*Chrysococcyx minutillus*	Little Bronze-Cuckoo
DICRURIDAE	*Dicrurus bracteatus*	Spangled Drongo
ESTRILDIDAE	*Erythrura (Chloebia) gouldiae*	Gouldian Finch
ESTRILDIDAE	*Lonchura (Lonchura) punctulata*	Nutmeg Munia
ESTRILDIDAE	*Lonchura (Munia) flaviprymna*	Yellow-Rumped Munia
ESTRILDIDAE	*Lonchura (Padda) oryzivora*	Java Sparrow
ESTRILDIDAE	*Neochmia (Aegintha) temporalis*	Red-Browed Finch
ESTRILDIDAE	*Neochmia (Neochmia) phaeton*	Crimson Finch
ESTRILDIDAE	*Neochmia (Neochmia) ruficauda*	Star Finch
ESTRILDIDAE	*Poephila (Neopoephila) personata*	Masked Finch
ESTRILDIDAE	*Stagonopleura (Stagonopleura) guttata*	Diamond Firetail
ESTRILDIDAE	*Stagonopleura (Zonaeginthus) bella*	Beautiful Firetail
ESTRILDIDAE	*Stizoptera bichenovii*	Double-Barred Finch
ESTRILDIDAE	*Taeniopygia guttata*	Zebra Finch
FRINGILLIDAE	*Carduelis carduelis*	European Goldfinch
FRINGILLIDAE	*Carduelis chloris*	European Greenfinch
FRINGILLIDAE	*Carduelis chloris*	Greenfinch
FRINGILLIDAE	*Chloris chloris*	European Greenfinch

Family	Species Name	Common Name
HIRUNDINIDAE	*Cheramoeca leucosterna*	White-Backed Swallow
HIRUNDINIDAE	*Hirundo (Hirundo) neoxena*	Welcome Swallow
HIRUNDINIDAE	*Petrochelidon (Hylochelidon) nigricans*	Tree Martin
HIRUNDINIDAE	*Petrochelidon (Petrochelidon) ariel*	Fairy Martin
LARIDAE	*Sterna (Sterna) striata*	White-Fronted Tern
LARIDAE	*Sterna nereis*	Fairy Tern
MALURIDAE	*Malurus (Leggeornis) lamberti*	Variegated Fairy-Wren
MALURIDAE	*Malurus (Leggeornis) pulcherrimus*	Blue-Breasted Fairy-Wren
MALURIDAE	*Malurus (Malurus) cyaneus*	Superb Fairy-Wren
MALURIDAE	*Malurus (Malurus) splendens*	Splendid Fairy-Wren
MALURIDAE	*Malurus (Musciparus) leucopterus*	White-Winged Fairy-Wren
MALURIDAE	*Stipiturus malachurus*	Southern Emu-Wren
MEGALURIDAE	*Megalurus timoriensis*	Tawny Grassbird
MELIPHAGIDAE	*Acanthagenys rufogularis*	Spiny-Cheeked Honeyeater
MELIPHAGIDAE	*Acanthorhynchus tenuirostris*	Eastern Spinebill
MELIPHAGIDAE	*Anthochaera (Anellobia) chrysoptera*	Little Wattlebird
MELIPHAGIDAE	*Anthochaera (Anthochaera) carunculata*	Red Wattlebird
MELIPHAGIDAE	*Anthochaera (Anthochaera) paradoxa*	Yellow Wattlebird
MELIPHAGIDAE	*Anthochaera (Xanthomyza) phrygia*	Regent Honeyeater
MELIPHAGIDAE	*Caligavis chrysops*	Yellow-Faced Honeyeater
MELIPHAGIDAE	*Entomyzon cyanotis*	Blue-Faced Honeyeater
MELIPHAGIDAE	*Epthianura (Epthianura) albifrons*	White-Fronted Chat
MELIPHAGIDAE	*Epthianura (Parepthianura) tricolor*	Crimson Chat
MELIPHAGIDAE	*Gavicalis virescens*	Singing Honeyeater
MELIPHAGIDAE	*Gliciphila melanops*	Tawny-Crowned Honeyeater
MELIPHAGIDAE	*Grantiella picta*	Painted Honeyeater
MELIPHAGIDAE	*Lichenostomus melanops*	Yellow-Tufted Honeyeater
MELIPHAGIDAE	*Lichmera (Lichmera) indistincta*	Brown Honeyeater
MELIPHAGIDAE	*Manorina (Manorina) melanophrys*	Bell Miner
MELIPHAGIDAE	*Manorina (Myzantha) flavigula*	Yellow-Throated Miner
MELIPHAGIDAE	*Manorina (Myzantha) melanocephala*	Noisy Miner
MELIPHAGIDAE	*Meliphaga (Meliphaga) lewinii*	Lewin's Honeyeater
MELIPHAGIDAE	*Meliphaga (Meliphaga) notata*	Yellow-Spotted Honeyeater
MELIPHAGIDAE	*Melithreptus (Eidopsarus) brevirostris*	Brown-Headed Honeyeater
MELIPHAGIDAE	*Melithreptus (Eidopsarus) gularis*	Black-Chinned Honeyeater
MELIPHAGIDAE	*Melithreptus (Melithreptus) chloropsis*	

Family	Species Name	Common Name
MELIPHAGIDAE	*Melithreptus (Melithreptus) lunatus*	White-Naped Honeyeater
MELIPHAGIDAE	*Myzomela (Cosmeteira) obscura*	Dusky Honeyeater
MELIPHAGIDAE	*Myzomela (Myzomela) sanguinolenta*	Scarlet Honeyeater
MELIPHAGIDAE	*Nesoptilotis leucotis*	White-Eared Honeyeater
MELIPHAGIDAE	*Philemon (Microphilemon) citreogularis*	Little Friarbird
MELIPHAGIDAE	*Phylidonyris (Meliornis) niger*	White-Cheeked Honeyeater
MELIPHAGIDAE	*Phylidonyris (Meliornis) novaehollandiae*	New Holland Honeyeater
MELIPHAGIDAE	*Phylidonyris (Phylidonyris) pyrrhoptera*	Crescent Honeyeater
MELIPHAGIDAE	*Plectorhyncha lanceolata*	Striped Honeyeater
MELIPHAGIDAE	*Ptilotula fusca*	Fuscous Honeyeater
MELIPHAGIDAE	*Ptilotula ornata*	Yellow-Plumed Honeyeater
MELIPHAGIDAE	*Ptilotula penicillata*	White-Plumed Honeyeater
MELIPHAGIDAE	*Sugomel niger*	Black Honeyeater
MEROPIDAE	*Merops (Merops) ornatus*	Rainbow Bee-Eater
MONARCHIDAE	*Grallina cyanoleuca*	Magpie-Lark
MONARCHIDAE	*Monarcha (Monarcha) melanopsis*	Black-Faced Monarch
MONARCHIDAE	*Myiagra (Myiagra) rubecula*	Leaden Flycatcher
MONARCHIDAE	*Myiagra (Piezorhynchus) alecto*	Shining Flycatcher
MONARCHIDAE	*Myiagra (Seisura) inquieta*	Restless Flycatcher
MOTACILLIDAE	*Anthus (Anthus) novaeseelandiae*	Australian Pipit
MOTACILLIDAE	*Motacilla (Budytes) flava*	Yellow Wagtail
NECTARINIIDAE	*Dicaeum (Dicaeum) hirundinaceum*	Mistletoebird
NEOSITTIDAE	*Daphoenositta (Neositta) chrysoptera*	Varied Sittella
ORIOLIDAE	*Oriolus (Mimeta) sagittatus*	Olive-Backed Oriole
ORIOLIDAE	*Sphecotheres vieilloti*	Australasian Figbird
PACHYCEPHALIDAE	*Colluricincla (Colluricincla) harmonica*	Grey Shrike-Thrush
PACHYCEPHALIDAE	*Falcunculus frontatus*	Crested Shrike-Tit
PACHYCEPHALIDAE	*Pachycephala (Alisterornis) rufiventris*	Rufous Whistler
PACHYCEPHALIDAE	*Pachycephala (Pachycephala) melanura*	Mangrove Golden Whistler
PACHYCEPHALIDAE	*Pachycephala (Pachycephala) pectoralis*	Golden Whistler
PARDALOTIDAE	*Pardalotus (Pardalotinus) striatus*	Striated Pardalote
PARDALOTIDAE	*Pardalotus (Pardalotus) punctatus*	Spotted Pardalote
PASSERIDAE	*Passer (Passer) domesticus*	House Sparrow
PASSERIDAE	*Passer (Passer) montanus*	Eurasian Tree Sparrow
PETROICIDAE	*Eopsaltria (Eopsaltria) australis*	Eastern Yellow Robin
PETROICIDAE	*Eopsaltria (Eopsaltria) griseogularis*	Western Yellow Robin

Family	Species Name	Common Name
PETROICIDAE	*Eopsaltria (Quoyornis) georgiana*	White-Breasted Robin
PETROICIDAE	*Melanodryas (Melanodryas) cucullata*	Hooded Robin
PETROICIDAE	*Microeca (Microeca) fascinans*	Jacky Winter
PETROICIDAE	*Petroica (Erythrodryas) rosea*	Rose Robin
PETROICIDAE	*Petroica (Littlera) phoenicea*	Flame Robin
PETROICIDAE	*Petroica (Petroica) boodang*	Scarlet Robin
PETROICIDAE	*Petroica (Petroica) goodenovii*	Red-Capped Robin
PETROICIDAE	*Petroica (Petroica) multicolor*	Pacific Robin
PHALACROCORACIDAE	*Microcarbo melanoleucos*	Little Pied Cormorant
PHASIANIDAE	*Coturnix (Synoicus) ypsilophora*	Brown Quail
PITTIDAE	*Pitta (Pitta) versicolor*	Noisy Pitta
POMATOSTOMIDAE	*Pomatostomus (Morganornis) ruficeps*	Chestnut-Crowned Babbler
POMATOSTOMIDAE	*Pomatostomus (Pomatostomus) temporalis*	Grey-Crowned Babbler
PSITTACIDAE	*Alisterus scapularis*	Australian King-Parrot
PSITTACIDAE	*Glossopsitta concinna*	Musk Lorikeet
PSITTACIDAE	*Lathamus discolor*	Swift Parrot
PSITTACIDAE	*Melopsittacus undulatus*	Budgerigar
PSITTACIDAE	*Parvipsitta pusilla*	Little Lorikeet
PSITTACIDAE	*Platycercus (Platycercus) elegans*	Crimson Rosella
PSITTACIDAE	*Platycercus (Violania) adscitus*	Pale-Headed Rosella
PSITTACIDAE	*Platycercus (Violania) eximius*	Eastern Rosella
PSITTACIDAE	*Platycercus (Violania) icterotis*	Western Rosella
PSITTACIDAE	*Polytelis anthopeplus*	Regent Parrot
PSITTACIDAE	*Polytelis swainsonii*	Superb Parrot
PSITTACIDAE	*Psephotus (Psephotellus) chrysopterygius*	Golden-Shouldered Parrot
PSITTACIDAE	*Psephotus (Psephotus) haematonotus*	Red-Rumped Parrot
PSITTACIDAE	*Trichoglossus chlorolepidotus*	Scaly-Breasted Lorikeet
PSITTACIDAE	*Trichoglossus haematodus*	Rainbow Lorikeet
PSOPHODIDAE	*Cinclosoma (Cinclosoma) punctatum*	Spotted Quail-Thrush
PSOPHODIDAE	*Psophodes (Psophodes) olivaceus*	Eastern Whipbird
PYCNONOTIDAE	*Pycnonotus (Pycnonotus) jocosus*	Red-Whiskered Bulbul
RALLIDAE	*Rallina (Rallina) tricolor*	Red-Necked Crake
RHIPIDURIDAE	*Rhipidura (Howeavis) dryas*	Arafura Fantail
RHIPIDURIDAE	*Rhipidura (Howeavis) rufifrons*	Rufous Fantail
RHIPIDURIDAE	*Rhipidura (Rhipidura) albiscapa*	Grey Fantail
RHIPIDURIDAE	*Rhipidura (Rhipidura) fuliginosa*	New Zealand Fantail

Family	Species Name	Common Name
RHIPIDURIDAE	*Rhipidura (Sauloprocta) leucophrys*	Willie Wagtail
SCOLOPACIDAE	*Philomachus pugnax*	Ruff
STURNIDAE	*Acridotheres tristis*	Common Myna
STURNIDAE	*Sturnus (Sturnus) tristis*	Common Myna
STURNIDAE	*Sturnus (Sturnus) vulgaris*	Common Starling
TIMALIIDAE	*Zosterops lateralis*	Silvereye
TURDIDAE	*Turdus merula*	Blackbird
TURNICIDAE	*Turnix (Alphaturnia) velox*	Little Button-Quail
TURNICIDAE	*Turnix (Austroturnix) varius*	Painted Button-Quail
TURNICIDAE	*Turnix (Ortygodes) maculosus*	Red-Backed Button-Quail
TURNICIDAE	*Turnix pyrrhothorax*	Red-Chested Button-Quail
Freshwater wetland birds - As a general group identified by the UESAP		
ACROCEPHALIDAE	*Acrocephalus (Acrocephalus) australis*	Australian Reed Warbler
ANATIDAE	*Anas (Anas) platyrhynchos*	Mallard Duck
ANATIDAE	*Anas (Anas) superciliosa*	Pacific Black Duck
ANATIDAE	*Anas (Nettion) castanea*	Chestnut Teal
ANATIDAE	*Anas (Nettion) gracilis*	Grey Teal
ANATIDAE	*Anas (Spatula) rhynchotis*	Australasian Shoveler
ANATIDAE	*Anser anser*	Greylag Goose
ANATIDAE	*Aythya (Nyroca) australis*	Hardhead
ANATIDAE	*Biziura lobata*	Musk Duck
ANATIDAE	*Chenonetta jubata*	Australian Wood Duck
ANATIDAE	*Cygnus (Chenopis) atratus*	Black Swan
ANATIDAE	*Cygnus (Cygnus) olor*	Mute Swan
ANATIDAE	*Dendrocygna (Dendrocygna) arcuata*	Wandering Whistling-Duck
ANATIDAE	*Dendrocygna (Leptotarsis) eytoni*	Grass (Plumed) Whistling Duck
ANATIDAE	*Malacorhynchus membranaceus*	Pink-Eared Duck
ANATIDAE	*Stictonetta naevosa*	Freckled Duck
ANATIDAE	*Tadorna (Casarca) tadornoides*	Australian Shelduck
ANATIDAE	*Tadorna (Radjah) radjah*	Rajah Shelduck
ANHINGIDAE	*Anhinga novaehollandiae*	Australasian Darter
ANSERANATIDAE	*Anseranas semipalmata*	Magpie Goose
ARDEIDAE	*Botaurus poiciloptilus*	Australasian Bittern
ARDEIDAE	*Butorides striatus*	Striated Heron
ARDEIDAE	*Egretta novaehollandiae*	White-Faced Heron
ARDEIDAE	*Ixobrychus minutus*	Little Bittern

Family	Species Name	Common Name
ARDEIDAE	*Nycticorax caledonicus*	Nankeen Night-Heron
CHARADRIIDAE	*Charadrius (Charadrius) bicinctus*	Banded Dotterel
CHARADRIIDAE	*Charadrius (Charadrius) ruficapillus*	Red-Capped Dotterel
CHARADRIIDAE	*Charadrius (Eupoda) australis*	Inland Plover
CHARADRIIDAE	*Elseyornis melanops*	Black-Fronted Dotterel
CHARADRIIDAE	*Erythrogonys cinctus*	Red-Kneed Dotterel
CHARADRIIDAE	*Pluvialis squatarola*	Grey Plover
CHARADRIIDAE	*Vanellus (Lobipluvia) miles*	Masked Plover
LARIDAE	*Chroicocephalus novaehollandiae*	Silver Gull
LARIDAE	*Larus novaehollandiae*	Silver Gull
LARIDAE	*Sternula albifrons*	Little Tern
LARIDAE	*Thalasseus bergii*	Crested Tern
MEGALURIDAE	*Megalurus gramineus*	Little Grassbird
PELECANIDAE	*Pelecanus conspicillatus*	Australian Pelican
PHALACROCORACIDAE	*Phalacrocorax (Phalacrocorax) carbo*	Great Cormorant
PHALACROCORACIDAE	*Phalacrocorax (Phalacrocorax) varius*	Pied Cormorant
PHALACROCORACIDAE	*Phalacrocorax melanoleucos*	Little Cormorant
PODICIPEDIDAE	*Poliocephalus poliocephalus*	Hoary-Headed Grebe
PODICIPEDIDAE	*Tachybaptus novaehollandiae*	Australasian Grebe
RALLIDAE	*Fulica atra*	Eurasian Coot
RALLIDAE	*Gallinula (Gallinula) tenebrosa*	Dusky Moorhen
RALLIDAE	*Gallirallus philippensis*	Banded Rail
RALLIDAE	*Lewinia pectoralis*	Lewin's Rail
RALLIDAE	*Porphyrio (Porphyrio) porphyrio*	Purple Swamphen
RALLIDAE	*Porphyrio melanotus*	Pukeko
RALLIDAE	*Porzana (Porzana) fluminea*	Australian Spotted Crake
RALLIDAE	*Porzana (Porzana) pusilla*	Baillon's Crake
RALLIDAE	*Porzana (Porzana) tabuensis*	Spotless Crake
RECURVIROSTRIDAE	*Himantopus himantopus*	Australasian Pied Stilt
RECURVIROSTRIDAE	*Recurvirostra novaehollandiae*	Australian Red-Necked Avocet
ROSTRATULIDAE	*Rostratula australis*	Australian Painted Snipe
SCOLOPACIDAE	*Calidris (Ereunetes) ruficollis*	Red-Necked Stint
SCOLOPACIDAE	*Calidris (Erolia) acuminata*	Sharp-Tailed Sandpiper
SCOLOPACIDAE	*Calidris (Erolia) ferruginea*	Curlew Sandpiper
SCOLOPACIDAE	*Gallinago (Gallinago) hardwickii*	Latham's Snipe
SCOLOPACIDAE	*Limosa lapponica*	Bar-Tailed Godwit

Family	Species Name	Common Name
RALLIDAE	*Gallirallus philippensis*	Banded Rail
SCOLOPACIDAE	*Tringa (Rhyacophilus) stagnatilis*	Marsh Sandpiper
SULIDAE	*Morus serrator*	Australasian Gannet
THRESKIORNITHIDAE	*Platalea (Platalea) regia*	Royal Spoonbill
THRESKIORNITHIDAE	*Threskiornis molucca*	Australian White Ibis
THRESKIORNITHIDAE	*Threskiornis spinicollis*	Straw-Necked Ibis
Other bird species records		
ACANTHIZIDAE	*Gerygone levigaster*	Mangrove Gerygone
ACANTHIZIDAE	*Hylacola pyrrhopygia*	Chestnut-Rumped Heathwren
ACANTHIZIDAE	*Sericornis (Arfakornis) magnirostra*	Large-Billed Scrubwren
ACANTHIZIDAE	*Smicrornis brevirostris*	Weebill
ACCIPITRIDAE	*Accipiter (Leucospiza) fasciatus*	Brown Goshawk
ACCIPITRIDAE	*Accipiter (Leucospiza) novaehollandiae*	Grey Goshawk
ACCIPITRIDAE	*Accipiter (Paraspizias) cirrocephalus*	Collared Sparrowhawk
ACCIPITRIDAE	*Aquila (Uroaetus) audax*	Wedge-Tailed Eagle
ACCIPITRIDAE	*Aviceda (Aviceda) subcristata*	Pacific Baza
ACCIPITRIDAE	*Circus approximans*	Swamp Harrier
ACCIPITRIDAE	*Circus assimilis*	Spotted Harrier
ACCIPITRIDAE	*Elanus axillaris*	Black-Shouldered Kite
ACCIPITRIDAE	*Elanus scriptus*	Letter-Winged Kite
ACCIPITRIDAE	*Erythrotriorchis radiatus*	Red Goshawk
ACCIPITRIDAE	*Haliaeetus (Pontoaetus) leucogaster*	White-Bellied Sea-Eagle
ACCIPITRIDAE	*Haliastur indus*	Brahminy Kite
ACCIPITRIDAE	*Haliastur sphenurus*	Whistling Kite
ACCIPITRIDAE	*Hieraaetus (Hieraaetus) morphnoides*	Little Eagle
ACCIPITRIDAE	*Milvus migrans*	Black Kite
ACCIPITRIDAE	*Pandion cristatus*	Eastern Osprey
ACCIPITRIDAE	*Pandion haliaetus*	Osprey
AEGOTHELIDAE	*Aegotheles (Aegotheles) cristatus*	Australian Owlet-Nightjar
ALAUDIDAE	*Alauda arvensis*	Eurasian Skylark
ALAUDIDAE	*Mirafra (Mirafra) javanica*	Horsfield's Bushlark
ALCEDINIDAE	*Todiramphus (Cyanalcyon) pyrrhopygius*	Red-Backed Kingfisher
ANATIDAE	*Cereopsis novaehollandiae*	Cape Barren Goose
ANATIDAE	*Nettapus (Cheniscus) coromandelianus*	Cotton Pygmy-Goose
ANATIDAE	*Nettapus (Cheniscus) pulchellus*	Green Pygmy-Goose
ANATIDAE	*Oxyura australis*	Blue-Billed Duck

Family	Species Name	Common Name
ANATIDAE	*Tadorna variegata*	Paradise Shelduck
ANHINGIDAE	*Anhinga melanogaster*	Darter
ARDEIDAE	*Ardea (Ardea) pacifica*	White-Necked Heron
ARDEIDAE	*Ardea (Bubulcus) ibis*	Cattle Egret
ARDEIDAE	*Ardea (Casmerodius) modesta*	Eastern Great Egret
ARDEIDAE	*Ardea (Mesophoyx) intermedia*	Intermediate Egret
ARDEIDAE	*Ardea alba*	
ARDEIDAE	*Ardea cinerea*	Grey Heron
ARDEIDAE	*Egretta garzetta*	Little Egret
ARDEIDAE	*Egretta sacra*	Eastern Reef Egret
ARDEIDAE	*Ixobrychus dubius*	Australian Little Bittern
ARDEIDAE	*Ixobrychus flavicollis*	Black Bittern
ARTAMIDAE	*Strepera (Neostrepera) versicolor*	Grey Currawong
ARTAMIDAE	*Strepera (Strepera) fuliginosa*	Black Currawong
ARTAMIDAE	*Strepera (Strepera) graculina*	Pied Currawong
BURHINIDAE	*Burhinus (Burhinus) grallarius*	Bush Stone-Curlew
BURHINIDAE	*Esacus magnirostris*	Beach Stone-Curlew
CACATUIDAE	*Cacatua (Cacatua) galerita*	Sulphur-Crested Cockatoo
CACATUIDAE	*Callocephalon fimbriatum*	Gang-Gang Cockatoo
CACATUIDAE	*Calyptorhynchus (Calyptorhynchus) banksii*	Red-Tailed Black Cockatoo
CACATUIDAE	*Calyptorhynchus (Zanda) funereus*	Yellow-Tailed Black-Cockatoo
CACATUIDAE	*Lophochroa leadbeateri*	Major Mitchell's Cockatoo
CACATUIDAE	*Nymphicus hollandicus*	Cockatiel
CACATUIDAE	*Probosciger aterrimus*	Palm Cockatoo
CAMPEPHAGIDAE	*Coracina (Coracina) papuensis*	White-Bellied Cuckoo-Shrike
CAMPEPHAGIDAE	*Coracina (Edolisoma) tenuirostris*	Cicadabird
CAMPEPHAGIDAE	*Coracina (Paragraucalus) lineata*	Barred Cuckoo-Shrike
CAMPEPHAGIDAE	*Lalage (Lalage) sueurii*	White-Winged Triller
CAPRIMULGIDAE	*Eurostopodus (Eurostopodus) mystacalis*	White-Throated Nightjar
CASUARIIDAE	*Dromaius novaehollandiae*	Emu
CENTROPODIDAE	*Centropus (Polophilus) phasianinus*	Pheasant Coucal
CHARADRIIDAE	*Charadrius (Charadrius) leschenaultii*	Greater Sand Plover
CHARADRIIDAE	*Charadrius (Charadrius) mongolus*	Mongolian Dotterel
CHARADRIIDAE	*Charadrius (Eupoda) veredus*	Oriental Dotterel
CHARADRIIDAE	*Charadrius hiaticula*	Ringed Plover
CHARADRIIDAE	*Pluvialis dominica*	American Golden Plover

Family	Species Name	Common Name
CHARADRIIDAE	*Pluvialis fulva*	Pacific Golden Plover
CHARADRIIDAE	*Vanellus (Lobivanellus) tricolor*	Banded Lapwing
CICONIIDAE	*Ephippiorhynchus (Ephippiorhynchus) asiaticus*	Black-Necked Stork
COLUMBIDAE	*Columba (Janthoenas) leucomela*	White-Headed Pigeon
COLUMBIDAE	*Leucosarcia melanoleuca*	Wonga Pigeon
COLUMBIDAE	*Lopholaimus antarcticus*	Topknot Pigeon
COLUMBIDAE	*Ptilinopus (Ptilinopus) regina*	Rose-Crowned Fruit-Dove
CORCORACIDAE	*Corcorax melanorhamphos*	White-Winged Chough
CORCORACIDAE	*Struthidea cinerea*	Apostlebird
CORVIDAE	*Corvus bennetti*	Little Crow
CHARADRIIDAE	*Charadrius (Charadrius) leschenaultii*	Greater Sand Plover
CORVIDAE	*Corvus coronoides*	Australian Raven
CORVIDAE	*Corvus mellori*	Little Raven
CORVIDAE	*Corvus orru*	Torresian Crow
CORVIDAE	*Corvus tasmanicus*	Forest Raven
CUCULIDAE	*Cacomantis (Vidgenia) pallidus*	Pallid Cuckoo
CUCULIDAE	*Chrysococcyx osculans*	Black-Eared Cuckoo
CUCULIDAE	*Cuculus (Cuculus) optatus*	Oriental Cuckoo
CUCULIDAE	*Eudynamys orientalis*	Pacific Koel
CUCULIDAE	*Scythrops novaehollandiae*	Channel-Billed Cuckoo
DASYORNITHIDAE	*Dasyornis (Dasyornis) brachypterus*	Eastern Bristlebird
DIOMEDEIDAE	*Diomedea antipodensis*	Antipodean Albatross
DIOMEDEIDAE	*Diomedea epomophora*	Southern Royal Albatross
DIOMEDEIDAE	*Diomedea exulans*	Wandering Albatross
DIOMEDEIDAE	*Phoebetria fusca*	Sooty Albatross
DIOMEDEIDAE	*Thalassarche bulleri*	Buller's Albatross
DIOMEDEIDAE	*Thalassarche cauta*	Shy Albatross
DIOMEDEIDAE	*Thalassarche chlororhynchos*	Yellow-Nosed Albatross
DIOMEDEIDAE	*Thalassarche chrysostoma*	Grey-Headed Albatross
DIOMEDEIDAE	*Thalassarche impavida*	Campbell Albatross
DIOMEDEIDAE	*Thalassarche melanophris*	Black-Browed Albatross
DIOMEDEIDAE	*Thalassarche salvini*	Salvin's Albatross
ESTRILDIDAE	*Lonchura (Munia) castaneothorax*	Chestnut-Breasted Munia
ESTRILDIDAE	*Lonchura (Munia) malacca*	
FALCONIDAE	*Falco (Falco) longipennis*	Australian Hobby
FALCONIDAE	*Falco (Hierofalco) peregrinus*	Peregrine Falcon

Family	Species Name	Common Name
FALCONIDAE	*Falco (Ieracidea) berigora*	Brown Falcon
FALCONIDAE	*Falco (Tinnunculus) cenchroides*	Nankeen Kestrel
FREGATIDAE	*Fregata ariel*	Lesser Frigatebird
GLAREOLIDAE	*Glareola (Glareola) maldivarum*	Oriental Pratincole
GRUIDAE	*Grus (Mathewsia) rubicunda*	Brolga
HAEMATOPODIDAE	*Haematopus finschi*	South Island Pied Oystercatcher
HAEMATOPODIDAE	*Haematopus fuliginosus*	Sooty Oystercatcher
HAEMATOPODIDAE	*Haematopus longirostris*	Pied Oystercatcher
JACANIDAE	*Irediparra gallinacea*	Comb-Crested Jacana
LARIDAE	*Anous minutus*	Black Noddy
LARIDAE	*Anous stolidus*	Common Noddy
LARIDAE	*Chlidonias (Chlidonias) leucopterus*	White-Winged Black Tern
LARIDAE	*Chlidonias (Pelodes) hybrida*	Whiskered Tern
LARIDAE	*Gelochelidon nilotica*	Gull-Billed Tern
LARIDAE	*Gygis alba*	White Tern
LARIDAE	*Hydroprogne caspia*	Caspian Tern
LARIDAE	*Larus (Larus) dominicanus*	Kelp Gull
LARIDAE	*Larus (Larus) pacificus*	Pacific Gull
LARIDAE	*Larus pipixcan*	Franklin's Gull
LARIDAE	*Onychoprion fuscata*	Sooty Tern
LARIDAE	*Procelsterna cerulea*	Grey Ternlet
LARIDAE	*Sterna (Sterna) hirundo*	Common Tern
LARIDAE	*Sterna (Sterna) paradisaea*	Arctic Tern
LARIDAE	*Sternula nereis*	Fairy Tern
MALURIDAE	*Malurus (Musciparus) melanocephalus*	Red-Backed Fairy-Wren
MEGALURIDAE	*Cincloramphus (Cincloramphus) cruralis*	Brown Songlark
MEGALURIDAE	*Cincloramphus (Maclennania) mathewsi*	Rufous Songlark
MEGAPODIIDAE	*Alectura lathami*	Australian Brush-Turkey
MELIPHAGIDAE	*Anthochaera (Anellobia) lunulata*	Western Wattlebird
MELIPHAGIDAE	*Epthianura (Aurepthianura) aurifrons*	Orange Chat
MELIPHAGIDAE	*Philemon (Tropidorhynchus) corniculatus*	Noisy Friarbird
MENURIDAE	*Menura (Menura) novaehollandiae*	Superb Lyrebird
MONARCHIDAE	*Myiagra (Myiagra) cyanoleuca*	Satin Flycatcher
MONARCHIDAE	*Symposiachrus trivirgatus*	Spectacled Monarch
NUMIDIDAE	*Numida meleagris*	Helmeted Guineafowl
OCEANITIDAE	*Oceanites oceanicus*	Wilson's Storm-Petrel

Family	Species Name	Common Name
OCEANITIDAE	*Pelagodroma marina*	White-Faced Storm-Petrel
OTIDIDAE	*Ardeotis australis*	Australian Bustard
PEDIONOMIDAE	*Pedionomus torquatus*	Plains-Wanderer
PHAETHONTIDAE	*Phaethon lepturus*	White-Tailed Tropicbird
PHAETHONTIDAE	*Phaethon rubricauda*	Red-Tailed Tropicbird
PHALACROCORACIDAE	*Phalacrocorax (Phalacrocorax) sulcirostris*	Little Black Cormorant
PHALACROCORACIDAE	*Phalacrocorax melanoleucos*	Little Pied Cormorant
PHASIANIDAE	*Coturnix (Coturnix) pectoralis*	Stubble Quail
PHASIANIDAE	*Excalfactoria chinensis*	King Quail
PHASIANIDAE	*Gallus gallus*	Red Junglefowl
PHASIANIDAE	*Pavo cristatus*	Indian Peafowl
PHASIANIDAE	*Phasianus colchicus*	Common Pheasant
PODARGIDAE	*Podargus strigoides*	Tawny Frogmouth
PODICIPEDIDAE	*Podiceps cristatus*	Great Crested Grebe
PROCELLARIIDAE	*Ardenna bulleri*	Buller's Shearwater
PROCELLARIIDAE	*Ardenna carneipes*	Flesh-Footed Shearwater
PROCELLARIIDAE	*Ardenna grisea*	Sooty Shearwater
PROCELLARIIDAE	*Ardenna pacifica*	Wedge-Tailed Shearwater
PROCELLARIIDAE	*Ardenna tenuirostris*	Short-Tailed Shearwater
PROCELLARIIDAE	*Calonectris leucomelas*	Streaked Shearwater
PROCELLARIIDAE	*Daption capense*	Cape Petrel
PROCELLARIIDAE	*Fulmarus glacialoides*	Southern Fulmar
PROCELLARIIDAE	*Halobaena caerulea*	Blue Petrel
PROCELLARIIDAE	*Lugensa brevirostris*	Kerguelen Petrel
PROCELLARIIDAE	*Macronectes giganteus*	Southern Giant-Petrel
PROCELLARIIDAE	*Macronectes halli*	Northern Giant-Petrel
PROCELLARIIDAE	*Pachyptila belcheri*	Slender-Billed Prion
PROCELLARIIDAE	*Pachyptila desolata*	Antarctic Prion
PROCELLARIIDAE	*Pachyptila salvini*	Salvin's Prion
PROCELLARIIDAE	*Pachyptila turtur*	Fairy Prion
PROCELLARIIDAE	*Pachyptila vittata*	Broad-Billed Prion
PROCELLARIIDAE	*Pelecanoides urinatrix*	Common Diving-Petrel
PROCELLARIIDAE	*Procellaria (Procellaria) aequinoctialis*	White-Chinned Petrel
PROCELLARIIDAE	*Procellaria (Procellaria) parkinsoni*	Black Petrel
PROCELLARIIDAE	*Pseudobulweria rostrata*	Tahiti Petrel
PROCELLARIIDAE	*Pterodroma (Aestrelata) cervicalis*	White-Necked Petrel

Family	Species Name	Common Name
PROCELLARIIDAE	*Pterodroma (Cookilaria) leucoptera*	Gould's Petrel
PROCELLARIIDAE	*Pterodroma (Cookilaria) nigripennis*	Black-Winged Petrel
PROCELLARIIDAE	*Pterodroma (Hallstroma) neglecta*	Kermadec Petrel
PROCELLARIIDAE	*Pterodroma (Pterodroma) lessonii*	White-Headed Petrel
PROCELLARIIDAE	*Pterodroma (Pterodroma) macroptera*	Great-Winged Petrel
PROCELLARIIDAE	*Pterodroma (Pterodroma) solandri*	Providence Petrel
PROCELLARIIDAE	*Pterodroma cookii*	Cook's Petrel
PROCELLARIIDAE	*Pterodroma inexpectata*	Mottled Petrel
PROCELLARIIDAE	*Pterodroma mollis*	Soft-Plumaged Petrel
PROCELLARIIDAE	*Puffinus (Puffinus) assimilis*	Little Shearwater
PROCELLARIIDAE	*Puffinus (Puffinus) gavia*	Fluttering Shearwater
PROCELLARIIDAE	*Puffinus (Puffinus) huttoni*	Hutton's Shearwater
PROCELLARIIDAE	*Puffinus (Puffinus) lherminieri*	Audubon's Shearwater
PROCELLARIIDAE	*Puffinus griseus*	Sooty Shearwater
PROCELLARIIDAE	*Puffinus tenuirostris*	Short-Tailed Shearwater
PSITTACIDAE	*Aprosmictus erythropterus*	Red-Winged Parrot
PSITTACIDAE	*Barnardius zonarius*	Australian Ringneck
PSITTACIDAE	*Cyanoramphus novaezelandiae*	Red-Crowned Parakeet
PSITTACIDAE	*Neophema (Neonanodes) chrysogaster*	Orange-Bellied Parrot
PSITTACIDAE	*Neophema (Neonanodes) chrysostoma*	Blue-Winged Parrot
PSITTACIDAE	*Northiella haematogaster*	Bluebonnet
PSITTACIDAE	*Pezoporus wallicus*	Ground Parrot
PTILONORHYNCHIDAE	*Ailuroedus crassirostris*	Green Catbird
PTILONORHYNCHIDAE	*Ptilonorhynchus violaceus*	Satin Bowerbird
PTILONORHYNCHIDAE	*Scenopoeetes dentirostris*	Tooth-Billed Bowerbird
PTILONORHYNCHIDAE	*Sericulus (Sericulus) chrysocephalus*	Regent Bowerbird
RALLIDAE	*Crex crex*	Corncrake
RALLIDAE	*Rallus pectoralis*	Lewin's Rail
RALLIDAE	*Tribonyx ventralis*	Black-Tailed Native-Hen
RECURVIROSTRIDAE	*Cladorhynchus leucocephalus*	Banded Stilt
ROSTRATULIDAE	*Rostratula benghalensis*	Painted Snipe
SCOLOPACIDAE	*Actitis hypoleucos*	Common Sandpiper
SCOLOPACIDAE	*Arenaria interpres*	Ruddy Turnstone
SCOLOPACIDAE	*Bartramia longicauda*	Upland Sandpiper
SCOLOPACIDAE	*Bartramia longicauda*	Upland Sandpiper
SCOLOPACIDAE	*Calidris (Calidris) canutus*	Lesser Knot

Family	Species Name	Common Name
SCOLOPACIDAE	*Calidris (Calidris) tenuirostris*	Great Knot
SCOLOPACIDAE	*Calidris (Crocethia) alba*	Sanderling
SCOLOPACIDAE	*Calidris (Erolia) melanotos*	Pectoral Sandpiper
SCOLOPACIDAE	*Calidris bairdii*	Baird's Sandpiper
SCOLOPACIDAE	*Limicola falcinellus*	Broad-Billed Sandpiper
SCOLOPACIDAE	*Limosa limosa*	Black-Tailed Godwit
SCOLOPACIDAE	*Numenius (Mesoscolopax) minutus*	Little Whimbrel
SCOLOPACIDAE	*Numenius (Numenius) madagascariensis*	Eastern Curlew
SCOLOPACIDAE	*Numenius (Phaeopus) phaeopus*	Whimbrel
SCOLOPACIDAE	*Tringa (Glottis) nebularia*	Common Greenshank
SCOLOPACIDAE	*Tringa (Heteroscelus) brevipes*	Siberian (Grey-Tailed) Tattler
SCOLOPACIDAE	*Tringa (Heteroscelus) incana*	Wandering Tattler
SCOLOPACIDAE	*Tringa (Rhyacophilus) glareola*	Wood Sandpiper
SCOLOPACIDAE	*Tryngites subruficollis*	Buff-Breasted Sandpiper
SCOLOPACIDAE	*Xenus cinereus*	Terek Sandpiper
SPHENISCIDAE	*Eudyptula minor*	Little Penguin
STERCORARIIDAE	*Catharacta skua*	Great Skua
STERCORARIIDAE	*Stercorarius antarcticus*	Brown Skua
STERCORARIIDAE	*Stercorarius longicaudus*	Long-Tailed Jaeger
STERCORARIIDAE	*Stercorarius maccormicki*	South Polar Skua
STERCORARIIDAE	*Stercorarius parasiticus*	Arctic Jaeger
STERCORARIIDAE	*Stercorarius pomarinus*	Pomarine Jaeger
STRIGIDAE	*Ninox (Hieracoglaux) connivens*	Barking Owl
STRIGIDAE	*Ninox (Ninox) novaeseelandiae*	Southern Boobook
STRIGIDAE	*Ninox (Rhabdoglaux) strenua*	Powerful Owl
SULIDAE	*Sula dactylatra*	Masked Booby
SULIDAE	*Sula leucogaster*	Brown Booby
SULIDAE	*Sula sula*	Red-Footed Booby
THRESKIORNITHIDAE	*Platalea (Platibis) flavipes*	Yellow-Billed Spoonbill
THRESKIORNITHIDAE	*Plegadis falcinellus*	Glossy Ibis
TURDIDAE	*Turdus philomelos*	Song Thrush
TURDIDAE	*Zoothera (Zoothera) heinei*	Russet-Tailed Thrush
TURDIDAE	*Zoothera (Zoothera) lunulata*	Bassian Thrush
TYTONIDAE	*Tyto (Megastrix) novaehollandiae*	Masked Owl
TYTONIDAE	*Tyto (Megastrix) tenebricosa*	Sooty Owl
TYTONIDAE	*Tyto (Tyto) javanica*	Eastern Barn Owl

Family	Species Name	Common Name
TYTONIDAE	*Tyto (Tyto) longimembris*	Eastern Grass Owl
TYTONIDAE	*Tyto alba*	Barn Owl
Microbats - As a general group identified by the UESAP		
MOLOSSIDAE	*Austronomus australis*	White-Striped Freetail-Bat
MOLOSSIDAE	*Mormopterus (Micronomus) norfolkensis*	Eastern Freetail-Bat
MOLOSSIDAE	*Mormopterus (Ozimops) planiceps*	South-Eastern Free-Tailed Bat
MOLOSSIDAE	*Mormopterus (Ozimops) ridei*	Ride's Free-Tailed Bat
VESPERTILIONIDAE	*Chalinolobus morio*	Chocolate Wattled Bat
VESPERTILIONIDAE	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle
VESPERTILIONIDAE	*Nyctophilus geoffroyi*	Lesser Long-Eared Bat
VESPERTILIONIDAE	*Nyctophilus gouldi*	Gould's Long-Eared Bat
VESPERTILIONIDAE	*Scoteanax rueppellii*	Greater Broad-Nosed Bat
VESPERTILIONIDAE	*Scotorepens greyii*	Little Broad-Nosed Bat
VESPERTILIONIDAE	*Scotorepens orion*	Eastern Broad-Nosed Bat
VESPERTILIONIDAE	*Vespadelus darlingtoni*	Large Forest Bat
VESPERTILIONIDAE	*Vespadelus regulus*	Southern Forest Bat
VESPERTILIONIDAE	*Vespadelus vulturnus*	Little Forest Bat
Reptiles - As a general group identified by the UESAP		
ACROCHORDIDAE	*Acrochordus arafurae*	Arafura Filesnake
AGAMIDAE	*Amphibolurus muricatus*	Jacky Lizard
AGAMIDAE	*Chlamydosaurus kingii*	Frilled Lizard
AGAMIDAE	*Ctenophorus caudicinctus*	Ring-Tailed Dragon
AGAMIDAE	*Ctenophorus decresii*	Tawny Dragon
AGAMIDAE	*Ctenophorus nuchalis*	Central Netted Dragon
AGAMIDAE	*Ctenophorus vadnappa*	Red-Barred Dragon
AGAMIDAE	*Intellagama lesueurii*	Water Dragon
AGAMIDAE	*Moloch horridus*	Thorny Devil
AGAMIDAE	*Pogona barbata*	Bearded Dragon
AGAMIDAE	*Pogona henrylawsoni*	Downs Bearded Dragon
AGAMIDAE	*Rankinia diemensis*	Mountain Dragon
CARETTOCHELYIDAE	*Carettochelys insculpta*	Pig-Nosed Turtle
CARPHODACTYLIDAE	*Phyllurus platurus*	Broad-Tailed Gecko
CARPHODACTYLIDAE	*Saltuarius swaini*	Southern Leaf-Tailed Gecko
CARPHODACTYLIDAE	*Underwoodisaurus milii*	Thick-Tailed Gecko
CHELIDAE	*Chelodina (Chelodina) longicollis*	Eastern Long-Necked Turtle
CHELIDAE	*Chelodina (Macrochelodina) oblonga*	

Family	Species Name	Common Name
CHELIDAE	*Emydura macquarii*	Murray Turtle
COLUBRIDAE	*Boiga irregularis*	Brown Tree Snake
COLUBRIDAE	*Dendrelaphis punctulatus*	Common Tree Snake
CROCODYLIDAE	*Crocodylus johnstoni*	Freshwater Crocodile
CROCODYLIDAE	*Crocodylus porosus*	Saltwater Crocodile
DIPLODACTYLIDAE	*Amalosia lesueurii*	Lesueur's Velvet Gecko
DIPLODACTYLIDAE	*Diplodactylus vittatus*	Wood Gecko
DIPLODACTYLIDAE	*Nebulifera robusta*	Robust Velvet Gecko
ELAPIDAE	*Acanthophis antarcticus*	Common Death Adder
ELAPIDAE	*Aipysurus laevis*	Golden Seasnake
ELAPIDAE	*Austrelaps superbus*	Lowland Copperhead
ELAPIDAE	*Cacophis squamulosus*	Golden-Crowned Snake
ELAPIDAE	*Cryptophis nigrescens*	Eastern Small-Eyed Snake
ELAPIDAE	*Demansia psammophis*	Yellow-Faced Whip Snake
ELAPIDAE	*Denisonia devisi*	De Vis' Banded Snake
ELAPIDAE	*Drysdalia rhodogaster*	Mustard-Bellied Snake
ELAPIDAE	*Furina diadema*	Red-Naped Snake
ELAPIDAE	*Hemiaspis signata*	Black-Bellied Swamp Snake
ELAPIDAE	*Hydrophis elegans*	Elegant Seasnake
ELAPIDAE	*Hydrophis platurus*	Yellow-Bellied Seasnake
ELAPIDAE	*Hydrophis stokesii*	Stokes's Seasnake
ELAPIDAE	*Laticauda colubrina*	Wide-Faced Sea Krait
ELAPIDAE	*Notechis scutatus*	Tiger Snake
ELAPIDAE	*Oxyuranus microlepidotus*	Fierce Snake
ELAPIDAE	*Oxyuranus scutellatus*	Taipan
ELAPIDAE	*Parasuta dwyeri*	Dwyer's Snake
ELAPIDAE	*Pseudechis porphyriacus*	Red-Bellied Black Snake
ELAPIDAE	*Pseudonaja textilis*	Eastern Brown Snake
ELAPIDAE	*Vermicella annulata*	Bandy-Bandy
EMYDIDAE	*Trachemys scripta*	Common Slider
GEKKONIDAE	*Gehyra variegata*	Tree Dtella
GEKKONIDAE	*Hemidactylus frenatus*	House Gecko
PYGOPODIDAE	*Lialis burtonis*	Burton's Snake-Lizard
PYGOPODIDAE	*Pygopus lepidopodus*	Common Scaly-Foot
PYGOPODIDAE	*Pygopus schraderi*	Eastern Hooded Scaly-Foot
PYTHONIDAE	*Aspidites melanocephalus*	Black-Headed Python

Family	Species Name	Common Name
PYTHONIDAE	*Aspidites ramsayi*	Woma
PYTHONIDAE	*Morelia spilota*	Carpet Python
SCINCIDAE	*Acritoscincus platynotus*	Red-Throated Skink
SCINCIDAE	*Acritoscincus trilineatus*	Western Three-Lined Skink
SCINCIDAE	*Concinnia tenuis*	Barred-Sided Skink
SCINCIDAE	*Cryptoblepharus pulcher*	Elegant Snake-Eyed Skink
SCINCIDAE	*Cryptoblepharus virgatus*	Striped Snake-Eyed Skink
SCINCIDAE	*Ctenotus labillardieri*	Common South-West Ctenotus
SCINCIDAE	*Ctenotus robustus*	Robust Ctenotus
SCINCIDAE	*Ctenotus taeniolatus*	Copper-Tailed Skink
SCINCIDAE	*Cyclodomorphus gerrardii*	Pink-Tongued Lizard
SCINCIDAE	*Cyclodomorphus michaeli*	Mainland She-Oak Skink
SCINCIDAE	*Egernia cunninghami*	Cunningham's Skink
SCINCIDAE	*Egernia kingii*	King's Skink
SCINCIDAE	*Eulamprus heatwolei*	Yellow-Bellied Water-Skink
SCINCIDAE	*Eulamprus quoyii*	Eastern Water-Skink
SCINCIDAE	*Hemiergis decresiensis*	Three-Toed Earless Skink
SCINCIDAE	*Lampropholis amicula*	Friendly Sunskink
SCINCIDAE	*Lampropholis delicata*	Dark-Flecked Garden Sunskink
SCINCIDAE	*Lampropholis guichenoti*	Pale-Flecked Garden Sunskink
SCINCIDAE	*Liopholis striata*	Nocturnal Desert-Skink
SCINCIDAE	*Liopholis whitii*	White's Skink
SCINCIDAE	*Pseudemoia entrecasteauxii*	Tussock Cool-Skink
SCINCIDAE	*Pseudemoia spenceri*	Trunk-Climbing Cool-Skink
SCINCIDAE	*Saiphos equalis*	Three-Toed Skink
SCINCIDAE	*Saproscincus mustelinus*	Weasel Skink
SCINCIDAE	*Saproscincus spectabilis*	Pale-Lipped Shadeskink
SCINCIDAE	*Tiliqua nigrolutea*	Blotched Blue-Tongue
SCINCIDAE	*Tiliqua rugosa*	Shingle-Back
SCINCIDAE	*Tiliqua scincoides*	Eastern Blue-Tongue
TYPHLOPIDAE	*Anilios bituberculatus*	Prong-Snouted Blind Snake
TYPHLOPIDAE	*Anilios nigrescens*	Blackish Blind Snake
TYPHLOPIDAE	*Anilios polygrammicus*	North-Eastern Blind Snake
TYPHLOPIDAE	*Anilios proximus*	Proximus Blind Snake
VARANIDAE	*Varanus varius*	Lace Monitor

Appendix C: Significance Assessment (EPBC Act)

Pteropus poliocephalus (Grey-headed Flying-fox)

The Grey-headed Flying-fox is listed as a *vulnerable* species under the EPBC Act.

This species utilises a wide variety of habitats (including disturbed areas) for foraging, and have been recorded travelling long distances on feeding forays. Fruits and flowering plants of a wide variety of species are the main food source. The species roosts in large 'camps' of up to 200 000 individuals. Camps are usually formed close to water and along gullies, however, the species has been known to form camps in urban areas (DECCW 2009).

Grey-headed Flying-fox has not been recorded within the Development site but is known from the locality within close proximity to the Development site (OEH 2017b). The vegetation within the Development site provides marginal potential foraging habitat in the form of 2 *Ficus* spp., 1 *Angophora costata*, 10 juvenile *Lophostemon confertus*, and a stand of Fig trees which overhand the southern boundary of the Development site (total of 0.19 ha). It is considered likely that this species would use the site on occasion for foraging purposes. According to the National Flying-fox Monitoring Program, no Grey-headed Flying-fox camps currently occur or have ever been recorded within the Development site (DotE 2018). The nearest historic camp occurred approximately 2 km to the east of the Development site, within the Royal Botanic Gardens, although no Grey-headed Flying-fox camps currently occur there. The nearest active Grey-headed Flying-fox camp occurs approximately 5 km to the south-east of the Development site, within Centennial Park (DotE 2018).

Criterion a: lead to a long-term decrease in the size of an important population of a species

The site does not support key source populations for breeding or dispersal, populations necessary for maintaining genetic diversity, or populations near the limit of the species range. According to the National Flying-fox Monitoring Program, no Grey-headed Flying-fox camps currently occur or have ever been recorded within the Development site (DotE 2018). The nearest historic camp occurred approximately 2 km to the east of the Development site, within the Royal Botanic Gardens, although no Grey-headed Flying-fox camps currently occur there. The nearest active Grey-headed Flying-fox camp occurs approximately 5 km to the south-east of the Development site, within Centennial Park (DotE 2018).

Criterion b: reduce the area of occupancy of an important population

No important populations have been recorded within the development site. Therefore, the proposed action would not reduce the area of occupancy of an important population.

Criterion c: fragment an existing important population into two or more populations

No important populations have been recorded within the Development site. The potential foraging habitat to be removed is marginal relative to adjacent potential habitat within the region. A dense stand of *Ficus* spp. occurs adjacent to the south-eastern boundary of the Development site and canopy slightly overhangs the boundary and is more likely to facilitate connectivity in the region for this highly mobile species.

Whilst 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.

Furthermore, this species has been recorded in urban environments and is likely to continue to forage adjacent to the site and across the broader locality.

Criterion d: adversely affect habitat critical to the survival of a species

The potential foraging habitat to be removed includes 2 *Ficus* spp., 1 *Angophora costata*, 10 juvenile *Lophostemon confertus*, and trimming of the canopy of Fig trees which overhand the southern boundary of the Development site (total of 0.19 ha).

These individual trees represent a negligible amount of potential foraging resources in the locality. Potential foraging habitat will persist adjacent to the Development site in Wentworth Park, and across the locality, and that this species is highly 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

According to the National Flying-fox Monitoring Program, no camps currently occur or have ever been recorded within the Development site (DotE 2018). The nearest historic camp occurred approximately 2 km to the east of the Development site, within the Royal Botanic Gardens, although no camps currently occur there. The nearest active Grey-headed Flying-fox camp occurs approximately 5 km to the south-east of the Development site, within Centennial Park (DotE 2018). Thus, no important population of Grey-headed Flying-fox occurs within the Development site, and the proposed works is unlikely to disrupt the breeding cycle of an important population.

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 includes 2 *Ficus* spp., 1 *Angophora costa*ta and 10 juvenile *Lophostemon confertus*, and trimming of Fig stand canopy on southern boundary of Development site. This potential foraging habitat is marginal and of low quality relative to adjacent potential foraging habitat, including a dense stand of *Ficus* spp. occurs adjacent to the south-eastern boundary of the Development site, in Wentworth Park.

Given the small amount of potential foraging habitat to be removed, that potential foraging habitat will persist adjacent to the Development site and across the locality, and that this species is highly mobile, it is unlikely that the habitat to be removed would cause the species to decline.

Furthermore, according to the National Flying-fox Monitoring Program, no Grey-headed Flying-fox camps currently occur or have ever been recorded within the Development site (DotE 2018). The nearest historic camp occurred approximately 2 km to the east of the Development site, within the Royal Botanic Gardens, although no camps currently occur there. The nearest active camp occurs approximately 5 km to the south-east of the Development site, within Centennial Park (DotE 2018). Therefore, no known Grey-headed Flying-fox roosting camps for this species will be impacted by the proposed works.

Criterion g: Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The proposed works will not result in the establishment of an invasive species that is harmful to Grey-headed Flying-fox.

Criterion h: Introduce disease that may cause the species to decline

The proposed works will not result in the introduction of a disease that is harmful to the Grey-headed Flying-fox.

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 the species.

Conclusion

In consideration of the above, the proposed works are not considered likely to have a significant impact on the Grey-headed Flying-fox.

Appendix D: Microbat Ultrasonic Analysis Report

D1: Project background and site description

Eco Logical Australia (ELA) was commissioned by Infrastructure NSW to prepare a Biodiversity Development Assessment Report (BDAR) for the proposed construction of the new Sydney Fish Market, within Blackwattle Bay (the subject site). The subject site at the head of Blackwattle Bay contains a number of old piers / wharves / jetties constructed from a mixture of materials including timber, concrete and steel. There are also several disused buildings located on the structure.

Upon review of the submitted BDAR (ELA 2019), the Environment Energy and Science (EES) scientific review team from the Department of Environment and Primary Industries (formerly the Office of Environment and Heritage) identified that the BDAR had not assessed the buildings and pier structures for roosting microbats and / or roost habitat. The EES scientific review team stated that:

"The Biodiversity Development Assessment Report (BDAR) prepared by Eco Logical dated 2 April 2019, notes that existing buildings and structures on site may provide roosting habitat for threatened microbat species, including Southern Myotis, Greater Broad-nosed Bat and Eastern False Pipistrelle. There are several recent records of these species from the locality. It does not appear that any targeted surveys were undertaken of the buildings or other structures to search for evidence of microbats. It is noted that the Likelihood of Occurrence Assessment (Appendix A) of the BDAR assesses the likelihood of occurrence of several microbat species, however, the likelihood that they may utilise buildings and other structures on site is not discussed, so it is not clear if it was a consideration in the assessment.

Therefore, it is recommended that further advice is sought from the proponent, to ensure that this issue is addressed."

To fulfil the EES scientific review team's requirements, an ultrasonic detection survey was undertaken at five locations within the new Sydney Fish Market study area. The aim of the survey was to determine if microbats are present within the subject site, which microbat species are present and if they are likely to be roosting within the structures and buildings present within the subject site.

The piers / wharves / jetties and buildings within the subject site contain numerous potential cavities which could be used by multiple species of microbat as roosting habitat. Roosting habitat provides a safe place for microbats to rest, sleep, find refuge and avoid predators during the day as well as facilitating social interactions and other vital aspects in the life cycle of a microbat (e.g. overwinter roosts that allow for extended and undisturbed torpor and breeding (including mating, birthing, rearing of young)).

This report outlines the methodology used for the ultrasonic detection surveys and results of the ultrasonic data analysis.

D2: Methods

Four (4) Anabat Swift (AS) and one (1) Anabat SD1 detector (Titley Electronics) were set to record ultrasonic microbat calls at five locations between the 17 and 21 February 2020 within the new Sydney Fish Market study area. The survey effort was the equivalent of nineteen (19) detector nights (four detectors recorded for four nights, and one detector recorded for three nights).

Each detector was set to record ultrasonic call data across the entire night (e.g. from dusk to dawn). The time and date settings, as well as the recording settings for each detector were set by an ecologist experienced in the use of the detectors deployed during this survey prior to placing them on site. Table 24 provides an overview of the identification number of each detector used to conduct the survey, survey dates, a description of the survey or detector night effort, and a brief summary of the habitat at each survey site.

The survey was conducted in February 2020 within the optimal survey period for recording several threatened microbat species but particularly for detecting activity of Southern Myotis at maternity roost sites (Oct – March) and for detecting Large Bent-winged Bat and Little Bent-winged Bat activity at breeding roosts. Weather conditions experienced during the survey were considered suitable for microbat foraging activity to take place.

Table 24. The Fish Markets detector identification number, survey start and finish dates, survey effort and description of the habitat at each survey site.

Site name and detector identification number	Survey dates	Survey effort	Habitat description
SD04539	17 - 19February 2019	Three (3) survey nights	Microphone is pointing towards disused buildings
Swift SUT01	17 - 20 February 2019	Four (4) survey nights	Beneath the pier structures
Swift SUT02	17 - 20 February 2019	Four (4) survey nights	Beneath the pier structures
Swift WOL01	17 - 20 February 2019	Four (4) survey nights	Beneath the pier structures
SWIFT WOL02	17 - 20 February 2019	Four (4) survey nights	Beneath the pier structures
Total survey nights		19 survey nights	16 detector nights beneath the pier, 3 detector nights at building

D3: Data Analysis

The ultrasonic data was recorded passively using Anabat SD1 and Anabat Swift detectors. SD1 detectors record data in a Zero Crossing (ZC) format, while Anabat Swift detectors record data in a WAV sound file format. Prior to analysing the data, both the ZC and WAV files were subjected to a Decision Tree Analysis (DTA). The DTA is an automated process that applies noise filters and species-specific filters to the data. In this way files that cannot be attributed to microbat echolocation calls (e.g. noises made by insects, vegetation, wind, train and vehicle movement) are removed from the analysis. Files are also sorted by characteristic frequency (one of the key identifiable features of microbat calls) to make the analysis more efficient and to separate files into frequency ranges for further analysis. The filtered data was then reviewed manually in both WAV and ZC formats using Anabat Insight (Titley Electronic: Version 1.9.0-4-g15fdd88) to confirm digitally allocated species identifications and to assign or adjust (where necessary) any incorrect species labels applied during the DTA.

Call analysis and species identification was performed by ELA ecologist Rodney Armistead using Anabat Insight and Analook W (Version 4.4a downloaded 17 September 2018, written by Chris Corben, www.hoarybat.com). Rodney has over five years of experience in the identification of ultrasonic call recordings. Call identifications are made using regional based guides to the echolocation calls of microbats in New South Wales (Pennay et al 2004); and south-east Queensland and north-east New South Wales (Reinhold et al 2001) and the accompanying reference library of over 200 calls from Sydney Basin, NSW (which is available at http://www.forest.nsw.gov.au/research/bats/default.asp) along with an internal ELA reference library of calls gathered from known Myotis macropus (Southern Myotis) roost sites in Northern NSW over the past 13 years. Species identification was guided by considering probability of occurrence based upon the general distribution information that is provided in Churchill (2008); Pennay et al. (2011), Van Dyck and Strahan (2008) and Van Dyck et al. (2013). A technical review of this report and a sample of the calls was performed by Alicia Scanlon also from ELA. Alicia has over 13 years of experience in the identification of ultrasonic call recordings.

To ensure reliable and accurate results the following protocols (adapted from Lloyd et al 2006) were applied:

- Search phase calls are used preferentially when analysing the data, rather than cruise phase calls or feeding buzzes (McKenzie et al 2002).
- Recorded calls containing less than three pulses are not analysed as they are often too short to confidently determine the identity of the species making the call (Law et al 1999). These short sequences (as stated previously) were either removed from the data during the Decision Tree Analysis or manually labelled as being unidentifiable.
- For those calls that are useful to identify the species making the call, two categories of confidence are used (Mills et al1996):
    - Definitely present – the quality and structure of the call profile is such that the identity of the bat species making the calls is not in doubt
    - Potentially present – the quality and structure of the call profile is such that there is some / low probability of confusion with species that produce similar calls profiles.
- Calls made by bats that cannot be used for identification purposes such as social calls, short and low-quality calls, cruise and approach phase calls were removed from the data during the Decision Tree Analysis or manually labelled as unidentifiable.
- Sequences labelled as unidentifiable are of inferior quality and therefore cannot be used to identify any microbat species, they can, however, be used as an indicator of microbat activity at the site.
- Nyctophilus spp. (Long-eared bats) are difficult to identify or separate confidently to species level based upon their recorded calls (Pennay et al 2004). Therefore, we have made no attempt to identify any recorded Nyctophilus spp. calls recorded during this survey to species level. There are two potential Nyctophilus species that could occur in the study area; N. geoffroyi (Lesser Long-eared Bat) and N. gouldii (Gould's Long-eared Bat). Both of these species are relatively common and widely distributed across NSW.
- The Free-tailed Bats (previously referred to as the genus Mormopterus) have recently undergone taxonomic revision (Reardon et al 2014) and published reference calls for this group of species (Pennay et al 2004) are believed to contain errors due to the revised taxonomy (Greg Ford pers comm.). This report uses nomenclature for Free-tailed Bat species as referred to in

Jackson and Groves (2015). The correlation between nomenclature used in this report and that used in NSW State legislation is presented in Table 25 below. All Free-tailed Bats in the new genus Ozimops potentially occurring within the survey area will therefore be referred to as Ozimops species complex.

- Jackson & Groves (2015) list the Eastern Bent-winged Bat (Miniopterus schreibersii oceanensis) under the new name of M. orianae (Large Bent-winged Bat). However, we follow the NSW Department of Planning, Industry and Environment (DPIE) nomenclature as it applies to the eastern form of the species which occurs in NSW as a distinct sub-species: M. o. oceanensis (Large Bentwing Bat) (see https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10534) (NSW Department of Planning, Industry and Environment (formerly the Office Environment and Heritage) 2019).
- Sequences not attributed to microbat echolocation calls (e.g. insect buzzes, wind, train and vehicle movement) were dismissed from the analysis.

Table 25: Correlations between current and previous nomenclature for the Free-tailed bats of NSW

Jackson and Groves 2015	Previously known as	Common Name	BC Act
Austronomus australis	Tadarida australis	White-striped Free-tailed Bat	
Micronomus norfolkensis	Mormopterus norfolkensis	Eastern Coastal Free-tailed Bat	Vulnerable
Ozimops petersi	Mormopterus species 3 (small penis)	Inland Free-tailed Bat	
Ozimops planiceps	Mormopterus species 4 (long penis eastern form)	Southern Free-tailed Bat	
Ozimops ridei	Mormopterus species 2	Ride's Free-tailed Bat	
Setirostris eleryi	Mormopterus species 6	Bristle-faced Free-tailed Bat	Endangered

D4: Call Analysis Limitations

Calls were only positively identified when the defining characteristics were present and there was no chance of confusion between species with overlapping and/or similar calls. In this survey, there were some call sequences that could not be positively identified to species level. Further, some species recorded in this survey can have call profiles that overlap with other species.

When overlap occurs, species with similar call profiles are assigned to multi species groups of two or three potential species depending on the characteristics displayed in the recorded call sequences. Calls with intermediate characteristics were assigned mixed species labels.

The species recorded in this survey with overlapping call profiles are described below.

Chalinolobus gouldii (Gould's Wattled Bat) and Ozimops ridei (Ride's Free-tailed Bat) have calls that overlap in the range 28.5 kHz and 32 kHz. Calls were identified as Ride's Free-tailed Bat if the call shape was flat (initial slope S1 of less than 100 octaves per second) and the frequency was between 28 – 32 kHz. Gould's Wattled Bat was distinguished by a frequency of 27.5 – 32.5 kHz and alternation in call frequency between pulses. Calls with intermediate characteristics were assigned mixed species labels.

The calls of Vespadelus pumilus (Eastern Forest Bat) (50 – 58 kHz), the threatened V. troughtoni (Eastern Cave Bat) (49 – 53.5 kHz) and V. vulturnus (Little Forest Bat) (48.5 – 53 kHz) can overlap in the Sydney basin. All three species have curved calls with upward sweeping tails. Consequently, it can be difficult to separate these three species when the frequency of a call falls between 49 and 54 kHz. However, it is possible to separate these species based on characteristic frequency if a call falls outside the range of overlap (as shown above). When not possible to separate a call based on the characteristic frequency, calls were assigned a multi-species label.

The calls of Southern Myotis are very similar to all Nyctophilus (Long-eared Bat) species and it is often difficult to separate these species on call characteristics alone as the variability in the call profiles overlap. Calls were identified as Nyctophilus spp. when the time between calls (TBC) was higher than 95ms and the initial slope S1 was lower than 300 octaves per second (OPS). Calls were identified as Southern Myotis when the time between calls (TBC) was lower than 75ms and the initial slope S1 was greater than 400 (OPS). Where the TBC was between 75 and 95ms and the OPS was between 300 and 400 calls were assigned a mixed species label of Southern Myotis / Long-eared Bats (Pennay, Law and Reinhold 2004).

Furthermore, calls produced by different bat species differ in fundamental ways related to the foraging mode / activity of each species. Calls of different species and the different types of calls produced by each species (cruise, search, social, approach, attack) are not equally recorded by ultrasonic detectors. Weather and climatic conditions affect the quality and quantity of recorded data as well as the availability of insect prey and therefore the suitability of each site at a given time as microbat foraging habitat. The ultrasonic data gathered during this survey represents a sample of the microbat activity at the site at a single point in time. Microbats change roosts regularly and the absence of microbats from a site during a single survey when potential microbat habitat is present does not discount the possibility that a variety of microbat species may inhabit the site at any time. This ultrasonic survey does not constitute a full inventory of all microbat species that may use the site.

D5: Results

A total of 4,281 files were recorded during this survey. Of these, 527 files (12.31%) were used to enable positive identification of a microbat species to at least genera level. The remaining 3,754 files (87.69%) were excluded from the analysis because:

- the files were automatically removed during the DTA process because they did not meet the criteria to be classified as a microbat call or were of poor quality
- the files contained a microbat call that was not automatically filtered out by the DTA process but was manually removed as it was too short (three pulses or less) or was of poor quality thus preventing positive identification of a microbat species to at least genera level.

There were at least four (4) and up to nine (9) microbat species recorded during this survey (Table 26 and Table 27). This includes up to two (2) species that are listed as Vulnerable under the NSW Biodiversity Conservation Act 2016 (BC Act) (Table 26 and Table 27, and see also Figure 17- Figure 23). Based on the call profiles, one species listed as Vulnerable under the BC Act was deemed to be definitely present within the study area:

- **Myotis macropus (Southern Myotis)**

One other threatened species ***Vespadelus troughtoni*** **(Eastern Cave Bat)**, which is also listed as Vulnerable under the BC Act, could be present within the study area. The calls of this species overlap with those of other more common and non-threatened *Vespadelus* species known to occur in the Sydney Basin and could not be separated based upon the single call recorded at around midnight on Swift WOL02 at the south western end of the subject site.

Species diversity was relatively low within the study area with at least four (4), and up to nine (9) species recorded (see Table 27). The greatest diversity was recorded on Swift WOL02 at the south-western corner of the subject site with all species either definitely or potentially recorded. In contrast, just two microbat species were recorded on SD04539 outside the building in the north -eastern corner of the subject site and on Swift SUT02 under the pier between the two largest jetties.

Calls from Gould's Wattled Bat and Ride's Free-tailed Bat were widespread across the five detector sites (SD04539, Swift SUT01, Swift SUT02, Swift WOL01 and Swift WOL02) with Gould's Wattled Bat recorded at four of the five detector sites and Ride's Free-tailed Bat recorded at all five detector sites (Table 27). Southern Myotis calls were definitely recorded at four of the five sites, all of which were located under the pier (Swift SUT01, Swift SUT02, Swift WOL01 and Swift WOL02). Southern Myotis or Southern Myotis / Long-eared Bat calls accounted for 389 (73.81%) of the 527 positively identified calls. In contrast, a single unidentified *Vespadelus* species call (Eastern Forest Bat, Eastern Cave Bat or Little Forest Bat) was recorded on Swift WOL02 (Table 27).

D6: Interpretation of results

SOUTHERN MYOTIS

Southern Myotis calls can be easily confused with those of the Nyctophilus group of species because certain elements of the call profiles overlap, and it is not always possible to separate these calls as outlined in Section 4 above. Calls that could attributed to the Southern Myotis or potential Southern Myotis / Long-eared Bats (Lesser Long-eared Bat and / or Gould's Long-eared Bat) were recorded on four of the five detectors (Table 26 and Table 27). These four detectors were all set beneath the pier structures in close proximity to roosting habitat commonly associated with Southern Myotis (subterranean structures directly over water). A recent study of Southern Myotis in Sydney Harbour based largely upon ultrasonic recordings indicated that Southern Myotis were present within the vicinity of Blackwattle Bay but in low densities (Gonsalves and Law 2017).

It is likely that the majority of the recorded calls can be attributed to Southern Myotis because;

- the variable shape and slope of many of the pulses in a sequence is characteristic of Southern Myotis, a feature often observed in Southern Myotis calls recorded around a roost (Alicia Scanlon pers.com. and comparison with reference calls gathered from several northern NSW Southern Myotis roost sites),
- the location where calls were recorded beneath a pier structure and directly over water aligns with the roosting and foraging habitat preferences of Southern Myotis, much less so with those of *Nyctophilus* species.

A total of 88 Southern Myotis and Southern Myotis / Long-eared Bat calls were recorded in the two hour period between 7.00 p.m. to 9.00 p.m. from all detectors over the four night survey period at the subject site with some of these calls recorded before sunset (Table 28). Sunset was between 7:46 p.m. on 17 February and 7.43 p.m. on 20 February 2020.

Microbats are nocturnal and shelter in their roosts during the day, so calls recorded before sunset represent a bat or a group of bats that were either preparing to leave a roost or had left a roost likely within 20 m of the detector sites and begun foraging prior to sunset. For this to have occurred, the conditions beneath the pier at the time these calls were recorded must have been such that these bats felt secure enough to emerge from the safety of their roost earlier than commonly occurs. The absence of predators beneath the pier structure, darkness of the space beneath the pier structure, darkness of the ambient light outside the pier structure due to the overcast conditions experienced during the surveys, tide level and potentially the presence of food are likely to have contributed to this occurrence. This data indicates that a small colony of Southern Myotis (likely in the order of 10-30 microbats) were roosting within the pier structure.

The majority of the identified calls recorded during the four night survey period were from Southern Myotis and Southern Myotis / Long-eared Bats. Calls from Southern Myotis and Southern Myotis / Long-eared Bats were recorded consistently throughout the night with Southern Myotis and Southern Myotis / Long-eared Bats present on all nights during the survey period. The site that recorded the largest number of Southern Myotis and Southern Myotis / Long-eared Bat calls was Swift WOL02 at the south-western end of the subject site, with over half the recorded Southern Myotis and Southern Myotis / Long-eared Bat calls recorded at this site.

Because Southern Myotis and Southern Myotis / Long-eared Bat calls were consistently recorded during the summer breeding period it must also be assumed that Southern Myotis are using parts of the pier structure at the new Fish Markets as a maternity / breeding roost. Southern Myotis are often present at breeding roosts year round with numbers increasing over summer as the young are incorporated into the colony. The only way to confirm whether the pier structure at the new Fish Markets is being used as a maternity roost by Southern Myotis is to set up harp traps to capture the bats and determine whether juvenile bats or lactating females are present. The Southern Myotis breeding season falls between October and February in NSW (Churchill 2008).

EASTERN CAVE BAT

The Eastern Cave Bat is a subterranean roosting species more commonly associated with caves, mines and buildings than bridges, culverts and jetties. Although Eastern Cave Bats are known from the Sydney Basin, there are no confirmed records of this species within a 10 km radius of the subject site. Even if the single recorded *Vespadelus* spp. call was made by an Eastern Cave Bat, the timing of the call and the lack of any further calls from the *Vespadelus* species group throughout the four night survey period suggests that the subject site is not a significant roost site for any *Vespadelus* species.

RHINOLOPHUS MEGAPHYLLUS (EASTERN HORSESHOE BAT)

Several potential calls attributed to *Rhinolophus megaphyllus* (Eastern Horseshoe Bat) were recorded during the day on 17 February 2020 (Figure 22) at the time the detectors were being set in place. It is unusual for microbat calls to be recorded during the day. When detectors are set in close proximity to subterranean roost sites there is a possibility that microbats roosting nearby may arouse and emit calls

or emerge briefly if disturbed. There was no record of microbats observed during the placement of detectors at the site. Eastern Horseshoe Bats are a subterranean roosting species known to roost in caves, abandoned mines, rock piles, buildings, tree roots in undercut banks, stormwater drains and culverts. The pier structure provides suitable roosting habitat for this species and it is likely that individuals or small numbers of this species roost under the pier structure from time to time.

Table 26. Microbat species diversity recorded ultrasonically at the new Sydney Fish Market subject site.

Scientific Name	Common Name	Presence
Chalinolobus gouldii	Gould's Wattled Bat	D
*Myotis macropus**	Southern Myotis	D
Nyctophilus geoffroyi	Lesser Long-eared Bat	P
Nyctophilus gouldii	Gould's Long-eared Bat	P
Ozimops ridei	Ride's Free-tailed Bat	D
Rhinolophus megaphyllus	Eastern Horseshoe Bat	P
Vespadelus pumilus	Eastern Forest Bat	P
*Vespadelus troughtoni**	Eastern Cave Bat	P
Vespadelus vulturnus	Little Forest Bat	P

D = Definitely recorded, P = Potentially recorded. *listed as threatened under the BC Act

Table 27. Microbat species diversity recorded ultrasonically at each of the five new Sydney Fish Market subject sites.

Scientific Name	Common Name	SD04539 (Building)	Swift SUT01 (Under pier)	Swift SUT02 (Under pier	Swift WOL01 (Under pier)	Swift WOL02 (Under pier)
Chalinolobus gouldii	Gould's Wattled Bat	D	D	-	D	D
*Myotis macropus**	Southern Myotis	-	D	D	D	D
Nyctophilus geoffroyi	Lesser Long-eared Bat	-	-	-	P	P
Nyctophilus gouldii	Gould's Long-eared Bat	-	-	-	P	P
Ozimops ridei	Ride's Free-tailed Bat	D	D	D	D	D
Rhinolophus megaphyllus	Eastern Horseshoe Bat	-	-	-	-	P
Vespadelus pumilus	Eastern Forest Bat	-	-	-	-	P
*Vespadelus troughtoni**	Eastern Cave Bat	-	-	-	-	P
Vespadelus vulturnus	Little Forest Bat	-	-	-	-	P

D = Definitely recorded, P = Potentially recorded. *listed as threatened under the BC Act

Table 28: Southern Myotis and Southern Myotis / Long-eared Bat calls recorded hourly on each of four detectors during February 2020 at the new Sydney Fish Markets, Sydney.

Time	Scientific Name	Common Name	Calls by detector				Sum of calls each hour
			Swift SUT01	Swift SUT02	Swift WOL01	Swift WOL02	
7.00 - 8.00 p.m.	*Myotis macropus*	Southern Myotis	13	3	3	0	23
	Myotis macropus / *Nyctophilus* spp.	Southern Myotis / Long-eared Bats	0	2	2	0	
8.00 – 9.00 p.m.	*Myotis macropus*	Southern Myotis	2	0	2	22	65
	Myotis macropus / *Nyctophilus* spp.	Southern Myotis / Long-eared Bats	0	1	6	32	
9.00 - 10.00 p.m.	*Myotis macropus*	Southern Myotis	4	1	1	20	76
	Myotis macropus / *Nyctophilus* spp.	Southern Myotis / Long-eared Bats	1	1	10	38	
10.00 – 11.00 p.m.	*Myotis macropus*	Southern Myotis	6	1	0	16	95
	Myotis macropus / *Nyctophilus* spp.	Southern Myotis / Long-eared Bats	14	0	5	53	
11.00 – 12.00 a.m.	*Myotis macropus*	Southern Myotis	8	0	0	5	44
	Myotis macropus / *Nyctophilus* spp.	Southern Myotis / Long-eared Bats	2	0	5	24	
12.00 – 1.00 a.m.	*Myotis macropus*	Southern Myotis	0	0	0	8	27
	Myotis macropus / *Nyctophilus* spp.	Southern Myotis / Long-eared Bats	1	0	0	18	
1.00 – 2.00 a.m.	*Myotis macropus*	Southern Myotis	2	0	0	1	20
	Myotis macropus / *Nyctophilus* spp.	Southern Myotis / Long-eared Bats	1	0	1	15	
2.00 – 3.00 a.m.	*Myotis macropus*	Southern Myotis	0	0	0	1	11
	Myotis macropus / *Nyctophilus* spp.	Southern Myotis / Long-eared Bats	0	0	1	9	
3.00 – 4.00 a.m.	*Myotis macropus*	Southern Myotis	0	0	1	5	16
	Myotis macropus / *Nyctophilus* spp.	Southern Myotis / Long-eared Bats	1	0	0	9	

Time	Scientific Name	Common Name	Calls by detector				Sum of calls each hour
4.00 – 5.00 a.m.	*Myotis macropus*	Southern Myotis	2	2	0	0	12
	Myotis macropus / *Nyctophilus* spp.	Southern Myotis / Long-eared Bats	1	0	0	7	
	Sum of *Myotis macropus* and *Myotis macropus* / *Nyctophilus* spp. calls		58	11	37	283	389

D7: Example Call Profiles

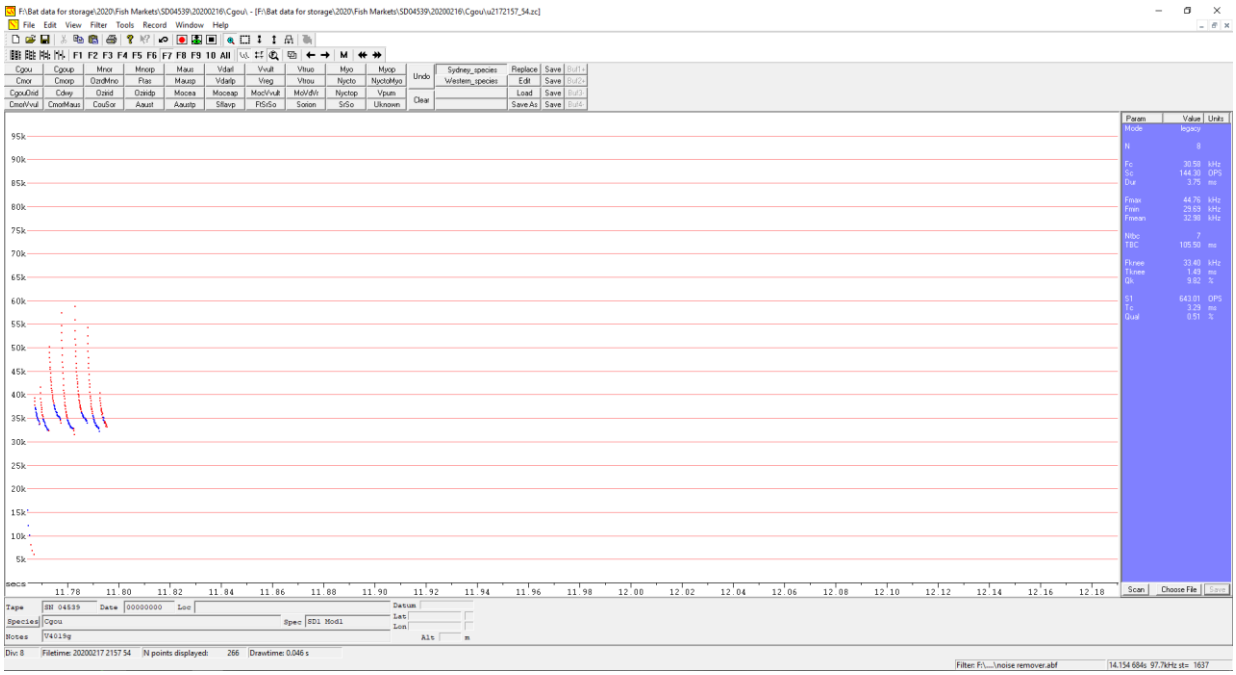

Figure 17. Call profile for *Chalinolobus gouldii* (Gould's Wattled Bat) recorded on SD04539 (outside the building) at 21:57 (9.57 p.m.) on 17 February 2020 (viewed in zero crossing and presented using Analook W).

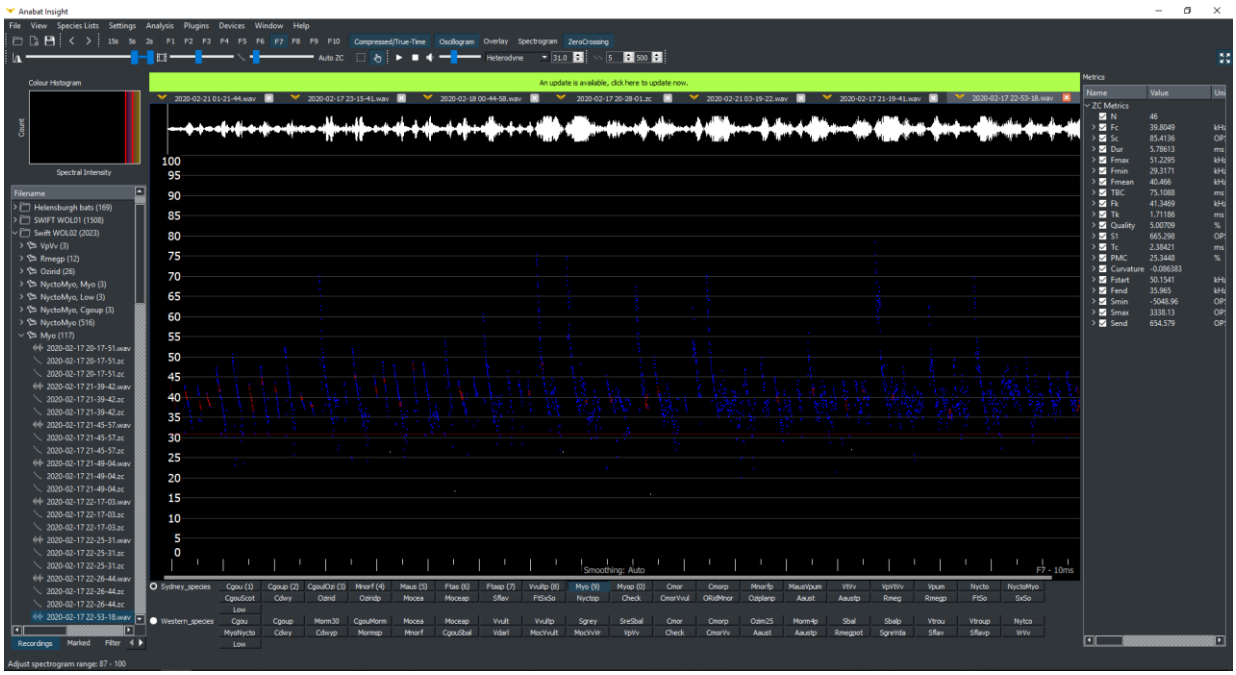

Figure 18. Call profile for *Myotis macropus* (Southern Myotis) recorded on Swift WOL02 at 22:53 (10.53 p.m.) on 17 February 2020 (viewed in full spectrum and presented using Anabat Insight).

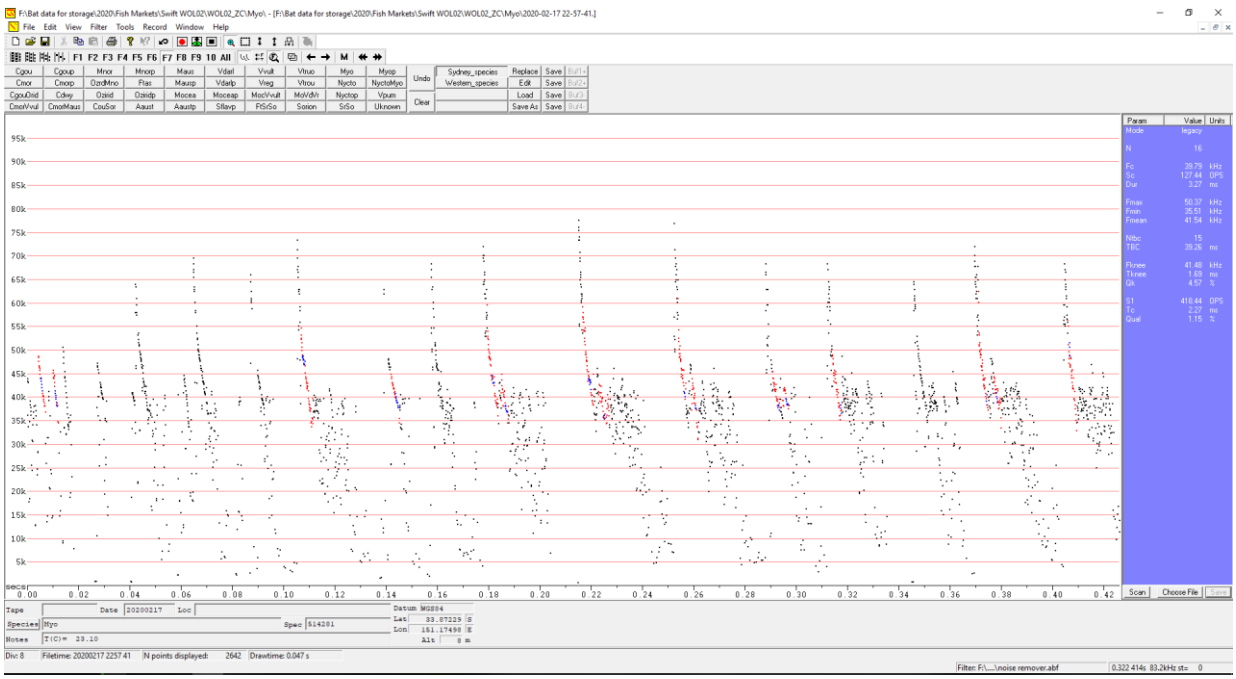

Figure 19. Potential call profile for *Myotis macropus* (Southern Myotis) recorded on Swift WOL02 at 22:57 (10.57 p.m.) on 17 February 2020 (viewed in zero crossing and presented using Analook W).

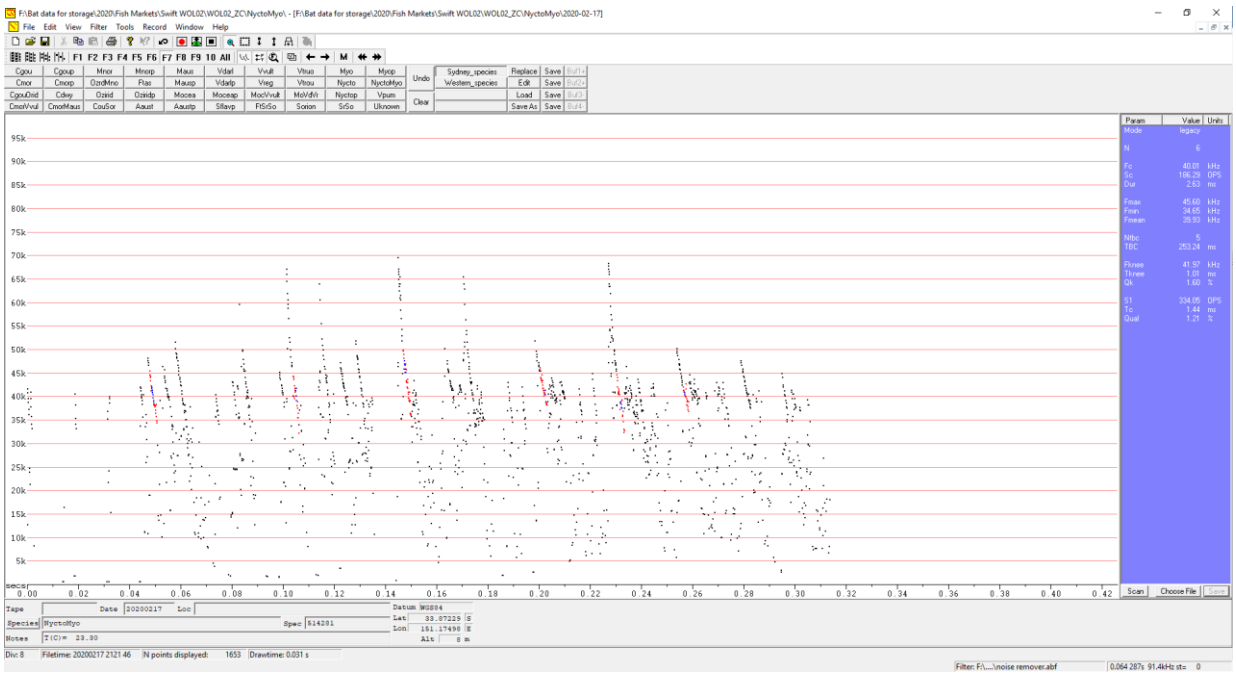

Figure 20. Potential call profile for *Myotis macropus* (Southern Myotis) / *Nyctophilus gouldii* (Gould's Long-eared Bat) / *Nyctophilus geoffroyi* (Lesser Long-eared Bat) recorded on Swift WOL02 at 21:21 (9.21 p.m.) on 17 February 2020 (viewed in zero crossing and presented using Analook W).

Figure 21. Call profile for *Ozimops ridei* (Ride's Free-tailed Bat) recorded on Swift WOL01 at 00:44 (12.44 a.m.) on 18 February 2020 (viewed in full spectrum and presented using Anabat Insight).

Figure 22. Potential call profile for *Rhinolophus megaphyllus* (Eastern Horseshoe Bat) recorded on Swift WOL02 at 12:40 (12.40 p.m.) on 17 February 2020 (viewed in full spectrum and presented using Anabat Insight).

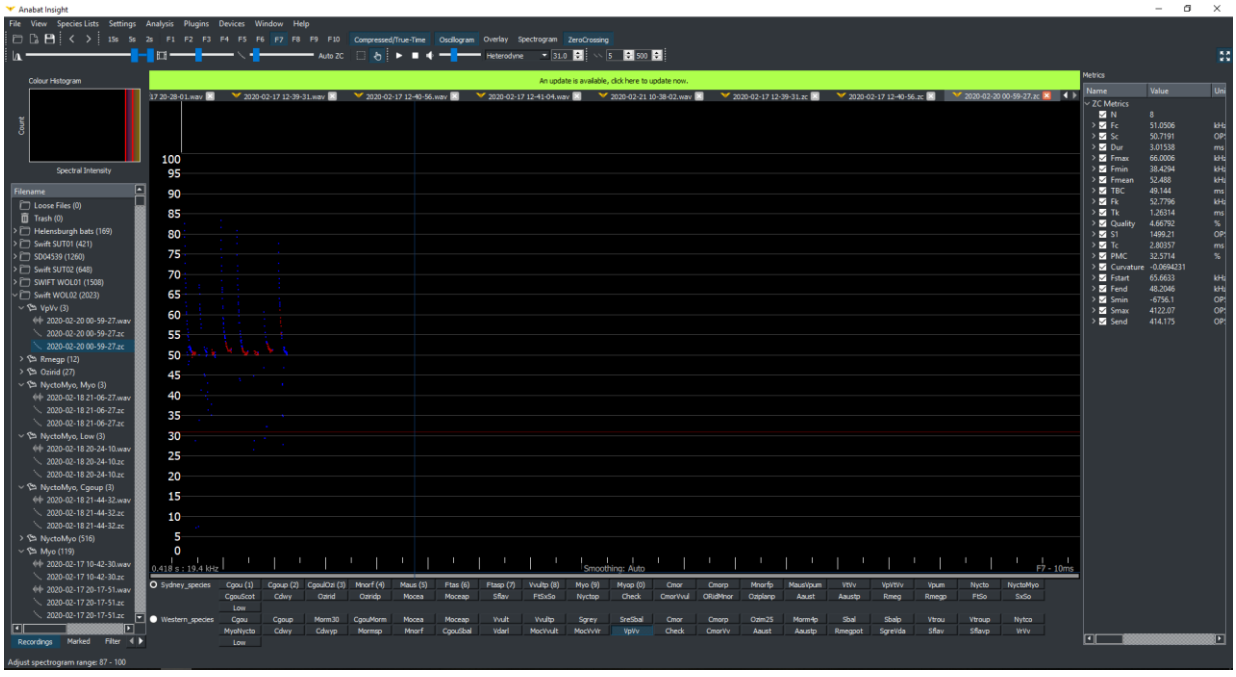

Figure 23. Potential call profile for *Vespadelus pumilus* (Eastern Forest Bat) / *Vespadelus troughtoni* (Eastern Cave Bat) / *Vespadelus vulturnus* (Little Forest Bat) recorded on Swift WOL02 at 00:59 (12.59 a.m.) on 20 February 2020 (viewed in full spectrum and presented using Anabat Insight).

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