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# Review of Environmental Factors Barton Park Precinct

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## Appendix F: Flora and Fauna Assessment (Eco Logical Australia, 2021)

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August 2021



# Barton Park Precinct – Flora and Fauna Assessment

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**Bayside Council**

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Template 2.8.1

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## Abbreviations

Abbreviation	Description
BAM	Biodiversity Assessment Methodology
BC Act	<i>Biodiversity Conservation Act 2016</i>
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
CEMP	Construction Environmental Management Plan
DAWE	Department of Agriculture, Water and the Environment
DCP	Development Control Plan
DPIE	Department of Planning, Industry and Environment
ELA	Eco Logical Australia Pty Ltd
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
FM Act	<i>Fisheries Management Act 1994</i>
KFH	Key Fish Habitat
LEP	Local Environmental Plan
MNES	Matters of National Environmental Significance
OEH	Office of Environment and Heritage (now DPIE)
PCT	Plant Community Type
PW	Priority Weed
SAII	Serious and Irreversible Impacts
SEPP	State Environmental Planning Policy
TEC	Threatened ecological community
WM Act	<i>Water Management Act 2000</i>
WoNS	Weeds of National Significance

## Executive Summary

Eco Logical Australia Pty Ltd (ELA) was engaged by Bayside Council to prepare a Flora and Fauna Assessment report to accompany the Review of Environmental Factors (REF) for the Barton Park Precinct. The REF is to be assessed under Part 5 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) with Bayside Council as the proponent and determining authority.

The 'subject land' refers to the entirety of Barton Park, which located at 88-96 Bestic Street, Banksia (Lot 100 DP 1228008, Lot 1 DP 576148 and Road Reserve). The 'subject site' refers to areas which would be subject to the proposed development footprint and proposed fill and capping.

The proposed works would remove 1.91 ha of native vegetation identified as Mixed Native Plantings or Weeds and Native Plantings, which may provide foraging habitat for the following threatened species:

- *Anthochaera phrygia* (Regent Honeyeater)
- *Artamus cyanopterus cyanopterus* (Dusky Woodswallow)
- *Callocephalon fimbriatum* (Gang-gang Cockatoo)
- *Glossopsitta pusilla* (Little Lorikeet)
- *Lathamus discolor* (Swift Parrot)
- *Chalinolobus dwyeri* (Large-eared Pied-Bat)
- *Pteropus poliocephalus* (Grey-headed Flying-fox).

Wetlands and waterbodies within the subject land would not be directly impacted by the proposed works. However, these areas provide habitat for threatened frogs and birds. The proposed works may result in indirect impacts to these areas, particularly through the increase of artificial lighting and decrease of water quality and quantity. Indirect impacts resulting from the proposed works have the potential to impact on the following threatened species:

- *Crinia tinnula* (Wallum Froglet)
- *Litoria aurea* (Green and Golden Bell Frog)
- *Anseranas semipalmata* (Magpie Goose)
- *Botaurus poiciloptilus* (Australasian Bittern)
- *Burhinus grallarius* (Bush Stone-curlew)
- *Calidris alba* (Sanderling)
- *Calidris ferruginea* (Curlew Sandpiper)
- *Calidris tenuirostris* (Great Knot)
- *Charadrius mongolus* (Lesser Sand-plover)
- *Epthianura albifrons* (White-fronted Chat)
- *Haematopus fuliginosus* (Sooty Oystercatcher)
- *Haematopus longirostris* (Pied Oystercatcher)
- *Ixobrychus flavicollis* (Black Bittern)
- *Limosa limosa* (Black-tailed Godwit).



Tests of Significance in accordance with the NSW *Biodiversity Conservation Act 2016* (BC Act) and Significant Impact Criteria in accordance with the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were undertaken for the above species to assess the impact of the proposed works on each of the threatened entities listed above. Assessments concluded that the proposed works are unlikely to result in a significant impact on the biodiversity values identified as occurring or potentially occurring within the subject land. Therefore, the preparation of a Biodiversity Development Assessment Report (BDAR) or Species Impact Statement (SIS) is not required.

Mitigation measures are provided to avoid impacts prior to, during and post construction.

# 1. Introduction

## 1.1 Purpose of The Report

Eco Logical Australia Pty Ltd (ELA) was engaged by Bayside Council to prepare a Flora and Fauna Assessment (FFA) report to accompany the Review of Environmental Factors (REF) for the Barton Park Precinct. The REF is to be assessed under Part 5 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) with Bayside Council as the proponent and determining authority.

This report describes impacts on native vegetation, threatened species, populations and communities listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and associated habitat features as a result of the proposed works. The impact assessments in this report are based on information gathered from database searches and field investigations. The report sets out the legislative context, methods used, likely impacts to the environment and recommendations to minimise these impacts.

The ‘subject land’ refers to the entirety of Barton Park, which is comprised of the following land parcels (Figure 1):

- Lot 100 DP 1228008
- Lot 1 DP 576148 and Road Reserve.

The ‘subject site’ refers to areas which form part of the proposed development footprint and proposed fill and capping (Figure 1).

## 1.2 Subject Land

Barton Park is located at 88-96 Bestic Street, Banksia to the west of Sydney Airport and 10 km south of the Sydney Central Business District (CBD), extending between Spring Street Drain on the north, Bestic Street on the south, and West Botany Street and Eve Street on the west and Muddy Creek on the east (Figure 1).

The subject land has a history of several land uses, which are summarised below (Edison Environmental and Engineering 2020):

- The site was used as a market garden until early in the twentieth century.
- Parts of the site were used as a sewerage farm for approximately 40 years.
- The sewage farm was decommissioned in the 1940s and filled with waste.
- Following completion of landfill operations, the site was covered with soil, grassed and converted into a series of sports fields in the 1980s.

## 1.3 Proposed Works

Bayside Council are proposing to upgrade Barton Park to achieve the following objectives:

- Provide playing fields and other sporting facilities for active recreation to meet sporting group and user needs.
- Improve amenity and lighting to meet user groups and regulatory requirements.

- Improve interface with the Landing Lights Wetland and other adjacent open space.
- Improve landscape and biodiversity outcomes through increased plantings.
- Identify integrated movement network with connections to adjacent areas.
- Increase safety using Safety by Design (Crime Prevention Through Environmental Design (CPTED)) principles.

To achieve the above, the following upgrades are therefore proposed:

- Demolition of existing grandstand and playing fields
- Site establishment works, including minor vegetation removal
- Remediation works in accordance with the Long-term Site Management Plan and Remediation Action Plan (Edison Environmental and Engineering, 2020 and 2021)
- Construction of a new outdoor sports facility, consisting of:
  - 4 sporting fields
  - 4 tennis courts
  - 2 multi-use courts
  - Training field
  - Play space
  - 4 carparks (totally approximately 241 car spaces)
  - Football and tennis clubhouses and amenities
  - Fitness park
  - Walking / cycling pathways
  - Other associated infrastructure

The locations of these proposed works are presented in Figure 2.







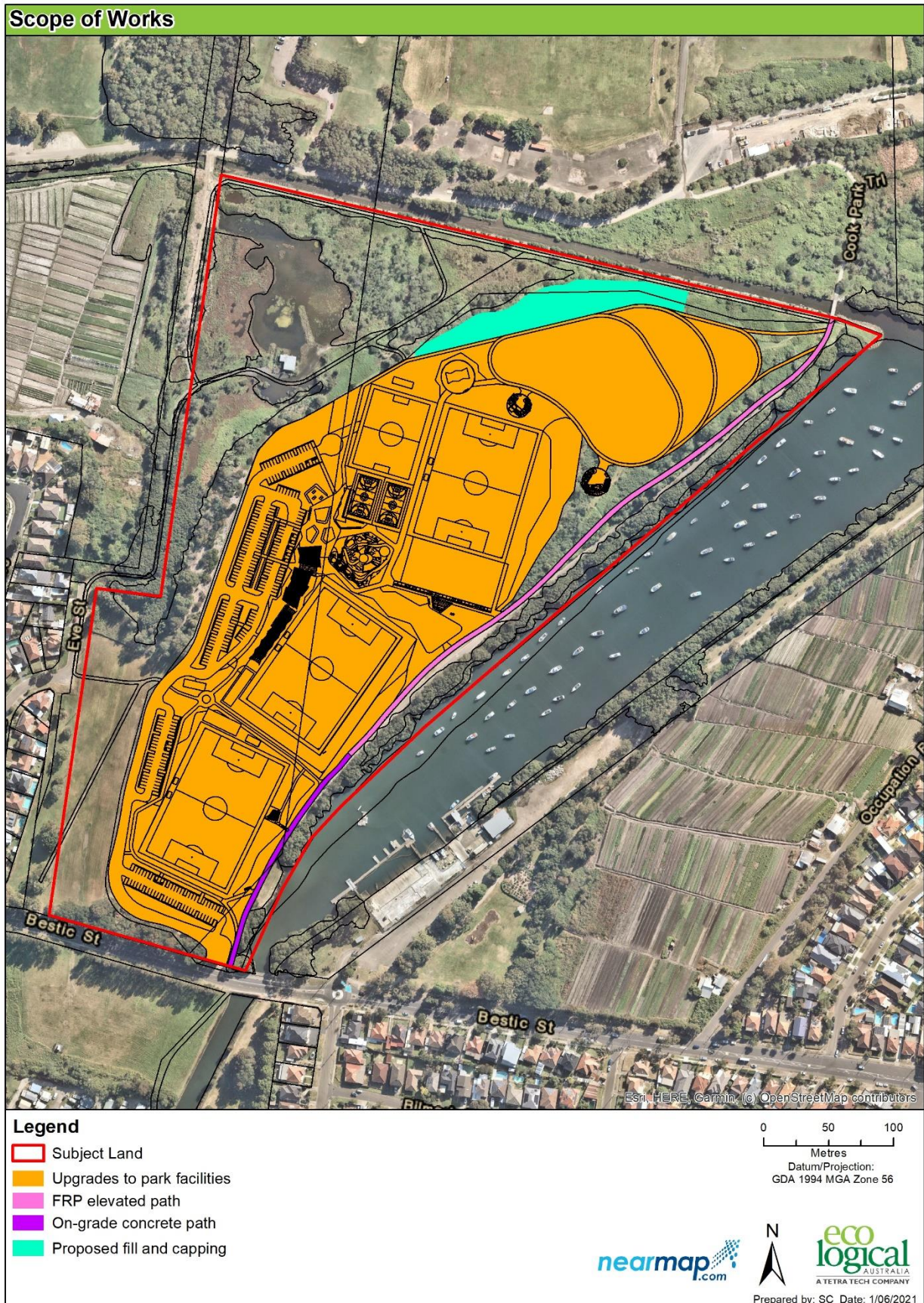


Figure 2: Proposed works



## 2. Legislative Context

Table 1: Legislative context

Name	Relevance to the project	Report Section (if relevant)
<b>Commonwealth</b>		
<i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act)	<p>The EPBC Act protects Matters of National Environmental Significance (MNES), such as threatened species and ecological communities, migratory species (protected under international agreements), and National Heritage places (among others). Any actions that will or are likely to have a significant impact on the MNES require referral and approval from the Australian Government Environment Minister. Significant impacts are defined by the Commonwealth (reference <a href="http://www.environment.gov.au/epbc/guidelines-policies.html">http://www.environment.gov.au/epbc/guidelines-policies.html</a>) for MNES.</p> <p>MNES have been identified within the subject land. A Significance Assessment was undertaken for:</p> <ul style="list-style-type: none"> <li>• <i>Anthochaera phrygia</i> (Regent Honeyeater)</li> <li>• <i>Lathamus discolor</i> (Swift Parrot)</li> <li>• <i>Botaurus poiciloptilus</i> (Australasian Bittern)</li> <li>• <i>Calidris acuminata</i> (Sharp-tailed Sandpiper)</li> <li>• <i>Calidris alba</i> (Sanderling)</li> <li>• <i>Calidris canutus</i> (Red Knot)</li> <li>• <i>Calidris Ferruginea</i> (Curlew Sandpiper)</li> <li>• <i>Calidris tenuirostris</i> (Great Knot)</li> <li>• <i>Charadrius mongolus</i> (Lesser Sand-plover)</li> <li>• <i>Hirundapus caudacutus</i> (White-throated Needletail)</li> <li>• <i>Limosa limosa</i> (Black-tailed Godwit)</li> <li>• <i>Numenius madagascariensis</i> (Eastern Curlew)</li> <li>• <i>Chalinolobus dwyeri</i> (Large-eared Pied-Bat)</li> <li>• <i>Pteropus poliocephalus</i> (Grey-headed Flying-fox)</li> <li>• <i>Litoria aurea</i> (Green and Golden Bell Frog)</li> </ul> <p>The assessments concluded that the proposed works are unlikely to significantly impact these species.</p>	Section 5.4, Appendix A and Appendix D
<b>State</b>		
<i>Environmental Planning and Assessment Act 1979</i> (EP&A Act)	<p>The EP&amp;A Act is the principal planning legislation for NSW. It provides a framework for the overall environmental planning and assessment of proposals.</p> <p>As Council is the proponent, the works are to be assessed as 'development permissible without consent' under Part 5 of the EP&amp;A Act. This FFA was prepared to accompany an REF which addresses the requirements of the EP&amp;A Act.</p>	
<i>Biodiversity Conservation Act 2016</i> (BC Act)	<p>The BC Act seeks to conserve biological diversity at bioregional and State scales; to maintain the diversity and quality of ecosystems and enhance their capacity to adapt to change and provide for the needs of future generations; to assess the extinction risk of species and ecological communities and identify key threatening processes through an independent and rigorous scientific process; and to establish a framework to avoid, minimise and offset the impacts of proposed development and land use change on biodiversity.</p>	Section 5.3 and Appendix B

Name	Relevance to the project	Report Section (if relevant)
	<p>Section 7.3 of the Act requires proponents of activities subject to Part 5 of the EP&amp;A Act to determine whether they will have a significant impact on threatened species. The test for significant impact is described in section 7.3 of the Act. A significant impact also occurs if the activity is carried out in an area of outstanding biodiversity value.</p> <p>If a significant impact is likely to occur, the proponent of the activity must prepare a Species Impact Statement (SIS) in accordance with section 7.20 or a Biodiversity Development Assessment Report (BDAR).</p> <p>Tests of Significance were undertaken for the following threatened species:</p> <ul style="list-style-type: none"> <li>• <i>Anthochaera phrygia</i> (Regent Honeyeater)</li> <li>• <i>Artamus cyanopterus cyanopterus</i> (Dusky Woodswallow)</li> <li>• <i>Collocephalon fimbriatum</i> (Gang-gang Cockatoo)</li> <li>• <i>Glossopsitta pusilla</i> (Little Lorikeet)</li> <li>• <i>Lathamus discolor</i> (Swift Parrot)</li> <li>• <i>Anseranas semipalmata</i> (Magpie Goose)</li> <li>• <i>Botaurus poiciloptilus</i> (Australasian Bittern)</li> <li>• <i>Burhinus grallarius</i> (Bush Stone-curlew)</li> <li>• <i>Calidris ferruginea</i> (Curlew Sandpiper)</li> <li>• <i>Calidris tenuirostris</i> (Great Knot)</li> <li>• <i>Charadrius mongolus</i> (Lesser Sand-plover)</li> <li>• <i>Epthianura albifrons</i> (White-fronted Chat)</li> <li>• <i>Haematopus fuliginosus</i> (Sooty Oystercatcher)</li> <li>• <i>Hirundapus caudacutus</i> (White-throated Needletail)</li> <li>• <i>Ixobrychus flavicollis</i> (Black Bittern)</li> <li>• <i>Limosa limosa</i> (Black-tailed Godwit)</li> <li>• <i>Chalinolobus dwyeri</i> (Large-eared Pied-Bat)</li> <li>• <i>Pteropus poliocephalus</i> (Grey-headed Flying-fox)</li> <li>• <i>Crinia tinnula</i> (Wallum Froglet)</li> <li>• <i>Litoria aurea</i> (Green and Golden Bell Frog)</li> </ul> <p>The assessments concluded that the works are unlikely to result in a significant impact to any of these species, and therefore the preparation of a BDAR or SIS is not recommended.</p>	
Biosecurity Act 2015 (BS Act)	<p>Under the BS Act, priority weeds have been identified for local government areas and assigned strategies to contain, remove or manage. Occupiers of land (this includes owners of land) have responsibility for taking appropriate action for priority weeds on the land they occupy.</p> <p>The field survey identified 17 weeds listed as priority weeds in the Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022 which was developed under this Act.</p>	Section 0
Fisheries Management Act 1994 (FM Act)	<p>The FM Act provides for the protection, conservation and recovery of threatened species defined under the Act. It also makes provisions for the management of threats to threatened species, populations and ecological communities defined under the Act, as well as the protection of fish and fish habitat in general.</p> <p>Both Muddy Creek and the Landing Lights Wetland are considered Key Fish Habitat (KFH). However, the proposed works do not involve harm to marine</p>	N/A

Name	Relevance to the project	Report Section (if relevant)
	vegetation, dredging, reclamation or obstruction of fish passage. Therefore, a permit or consultation under the FM Act is not required	
<i>Water Management Act 2000 (WM Act)</i>	<p>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.</p> <p>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.</p> <p>A Controlled Activity Approval (CAA) is typically required for work within waterfront land. Section 91E of the Act creates an offence for carrying out a controlled activity within waterfront land without approval. However, according to Section 41 of the <i>Water Management (General) Regulation 2018</i>, a public authority is exempt from Section 91E (1) of the Act. Therefore, Council does not need to obtain a CAA from the NRAR as part of these works.</p>	N/A
<b>Planning Instruments and Other Plans</b>		
<i>State Environmental Planning Policy (Coastal Management) 2018 (Coastal Management SEPP)</i>	<p>The Coastal Management SEPP aims to manage development within coastal zones and protect the environmental assets of the coast. In accordance with Section 5 of the <i>Coastal Management Act 2016</i>, the term coastal zone is defined as any area of land that is comprised of the following coastal management areas:</p> <ul style="list-style-type: none"> <li>• Coastal wetlands and littoral rainforests</li> <li>• Coastal vulnerability areas</li> <li>• Coastal environment areas</li> <li>• Coastal use areas.</li> </ul> <p>In accordance with the NSW Department of Planning and Environment Coastal Management SEPP Interactive Map, the subject land is mapped as a Coastal Environmental Area, Coastal Wetlands and Proximity Area for Coastal Wetlands (Figure 3). Impact assessments for Waterways, Coastal Wetlands and Aquatic Habitat form part of the REF prepared by ELA.</p>	See REF (ELA 2021)
<i>State Environmental Planning Policy (Koala Habitat Protection) 2021 (Koala Habitat Protection SEPP)</i>	The Koala Habitat Protection SEPP commenced on 17 March 2021. The SEPP only makes reference to 'development' under Part 4 of the EP&A Act, thus excluding Part 5 'activities'. Therefore, the SEPP does not apply.	N/A
<i>Sydney Regional Environmental Plan 33–Cooks Cove (Cooks Cove SREP)</i>	<p>The Cooks Cove SREP aims to establish planning principles for the development of land that promote the ecologically sustainable use of the Cooks Cove site. In accordance with the SEPP, Barton Park is predominantly zoned Open Space. Clause 10(e), the following planning principles, relevant to ecology, must be adhered to:</p> <ul style="list-style-type: none"> <li>• <i>Riparian areas with estuarine and native vegetation are to be established and maintained for the protection and enhancement of the Cooks River estuary and remaining natural areas.</i></li> <li>• <i>The significant wetlands within the Cooks Cove site and along the foreshores of Cooks Cove are to be conserved, and the strategy for conservation is to include—</i></li> </ul>	-



Name	Relevance to the project	Report Section (if relevant)
	<ul style="list-style-type: none"> <li>○ <i>establishing adequate vegetated riparian buffers around the significant wetlands, including the Spring Street, Eve Street and Landing Lights wetlands, and</i></li> <li>○ <i>establishing adequate vegetated corridors between Cooks River and Muddy Creek and the wetlands, and</i></li> <li>○ <i>promoting the on-site recovery of the Green and Golden Bell Frog.</i></li> </ul> <p>The proposed works have been designed with the above principles in mind. Impacts to the Landing Lights Wetland, which provides habitat for the Green and Golden Bell Frog and migratory birds have been avoided and a 20 m buffer has been provided between the wetlands and the proposed construction works. Revegetation works are proposed for the Muddy Creek riparian corridor and Landing Lights Wetland and Bayside Council will implement both a Wetlands Environmental Management Plan and Green and Golden Bell Frog Management Plan in accordance with Clause 17 of the SEPP prior to construction.</p>	

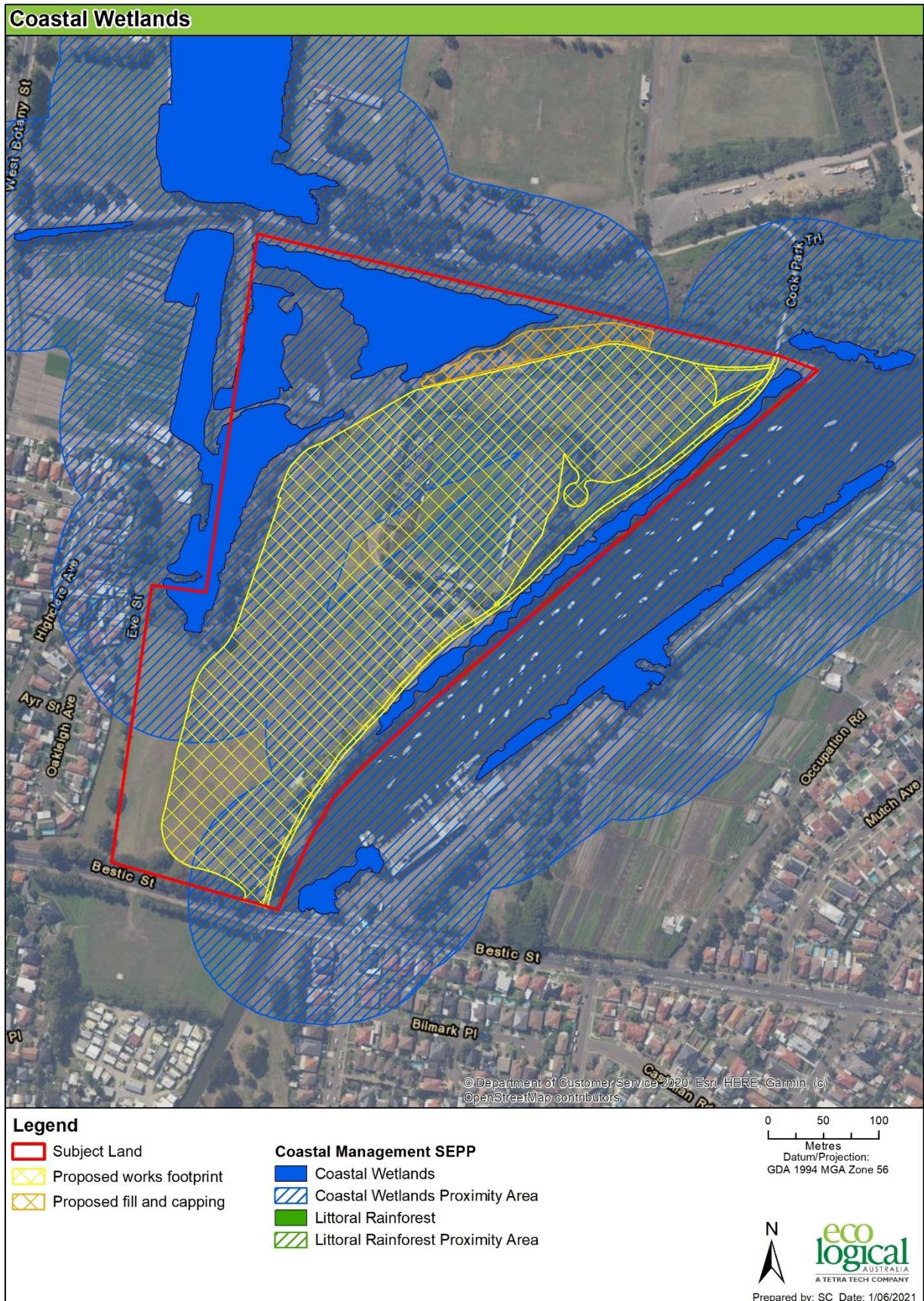


Figure 3: Coastal Management SEPP in relation to the subject land



## 3. Methods

### 3.1 Literature and Data Review

Database records and relevant literature pertaining to the ecology of the subject land and locality were reviewed. This included:

- The Native Vegetation of the Sydney Metropolitan Area (Office of Environment and Heritage (OEH) now Department of Planning Industry and Environment (DPIE) 2016)
- EPBC Act Protected Matters Search Tool (10 km)
- NSW BioNet / Atlas of NSW Wildlife database search (10 km) (DPIE 2021a)
- NSW Threatened Species Profiles (DPIE 2021b)
- Addendum Species Impact Statement for Cook Cove Inlet Pty Ltd (Cumberland Ecology 2017)
- Green and Golden Bell Frog Monitoring, Arncliffe, September-November 2020 Prepared by AMBS Ecology & Heritage Pty Ltd for NSW Roads and Maritime Services
- Green and Golden Bell Frog Monitoring, Arncliffe, December 2020 - February 2021 Prepared by AMBS Ecology & Heritage Pty Ltd for Transport for NSW
- Landing Lights Wetland Bird Surveys June 2017 Prepared by Avifauna Research & Services Pty Ltd.

Aerial photography of the subject land and surrounds were also used to investigate the extent of vegetation cover and landscape features. In addition, relevant Geographic Information Systems (GIS) datasets (soil, geology, drainage) were reviewed to guide the field survey component.

A 10 km radial search of the BioNet Atlas of Wildlife and Protected Matters Search Tool was undertaken on 29 April 2021. The results of these searches were combined to produce a list of threatened species, populations and ecological communities that may occur within the subject land (Appendix A). Likelihood of occurrences for threatened species, endangered populations and threatened ecological communities in the subject land were then made based on location of database records, the likely presence or absence of suitable habitat within the subject land, and knowledge of the species' ecology. A list of potentially affected species was then identified, based on those species defined as 'yes', 'likely' or having 'potential' to occur within the subject land. The terms for the likelihood of occurrence are listed in Appendix A.

Note that assessments for the likelihood of occurrence were made both prior to field survey and following field survey. The pre-survey assessments were performed to determine which species were 'affected species', and hence determine which sorts of habitat to search for during field survey. The post-survey assessments to determine final affected species were made after observing the available habitat in the subject land.

### 3.2 Field survey

ELA ecologist Nicole McVicar conducted a site inspection throughout the entire subject land for eight person hours on 4 May 2021. The field survey focused on the following:

- Validation of existing vegetation mapping, determining type, condition and extent within the subject land.
- Threatened flora and fauna habitat assessment, including spatially recording hollow bearing trees.
- Opportunistic fauna sightings.

### 3.2.1 Threatened Flora and Fauna Habitat Assessment

The presence of threatened flora and fauna species identified as having potential to occur in the subject land was determined through a habitat assessment. Where important habitat features, such as hollow bearing trees, rocky outcrops, deep leaf litter, waterways or abandoned buildings were observed, their location was noted.

### 3.2.2 Survey Limitations

This assessment was not intended to provide an inventory of all species present across the subject land but instead an overall assessment of the ecological values of the subject land. The survey was conducted with an emphasis on threatened species, threatened ecological communities and key fauna habitat features. It is important to note that some species may not have been detected within the subject land during the inspection as they may be cryptic or seasonal and only detectable during flowering or during breeding. In this case the likelihood of their occurrence has been assessed based on the presence of potential habitat. The field survey was undertaken using hand-held GPS units. It should be noted that these units can have errors in accuracy of up to 20 m (subject to availability of satellites on the day).

## 4. Results

### 4.1 Literature and Data Review

#### 4.1.1 Vegetation mapping

Five vegetation types, including four native Plant Community Types (PCTs), were previously mapped within the subject land (OEH 2016) (Figure 4):

- **PCT 920:** Mangrove Forests in estuaries of the Sydney Basin Bioregion and South East Corner Bioregion (Estuarine Mangrove Forest)
- **PCT 1126:** Saltmarsh in estuaries of the Sydney Basin Bioregion and South East Corner Bioregion (Estuarine Saltmarsh)
- **PCT 1234:** Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion (Estuarine Swamp Oak Forest)
- **PCT 1808:** Common Reed on the margins of estuaries and brackish lagoons along the New South Wales coastline (Estuarine Reedland)
- Urban exotic/native.

#### 4.1.2 Threatened Flora and Fauna

The BioNet and Protected Matters Search tools returned 13 threatened ecological communities (TECs), 24 threatened flora species and 88 threatened fauna species (including migratory species) either known or considered likely to occur within a 10 km radius of the subject land.

Threatened species previously recorded within the subject land are presented in Table 2.

**Table 2: Threatened species recorded within the subject land**

Scientific name	Common name	BC Act listing	EPBC Act listing	Reference
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Not listed	Migratory	Avifauna Research & Services Pty Ltd 2017
<i>Calidris alba</i>	Sanderling	Vulnerable	Migratory	DPIE 2021a
<i>Calidris ferruginea</i>	Curlew Sandpiper	Endangered	Critically endangered, Migratory	DPIE 2021a
<i>Crinia tinnula</i>	Wallum Froglet	Vulnerable	Not listed	DPIE 2021a
<i>Ixobrychus flavicollis</i>	Black Bittern	Vulnerable	Not listed	DPIE 2021a
<i>Limosa limosa</i>	Black-tailed Godwit	Vulnerable	Migratory	DPIE 2021a
<i>Litoria aurea</i>	Green and Golden Bell Frog	Endangered	Vulnerable	DPIE 2021a, AMBS Ecology & Heritage 2020 & 2021
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Vulnerable	Vulnerable	DPIE 2021a
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	Endangered	Vulnerable	DPIE 2021a

An assessment of the likelihood of occurrence of threatened flora and fauna species within the subject land is presented in Appendix B.

The closest Nationally Important Flying-fox camp is approximately 2 km to the northwest of the subject land in Wolli Creek and had an individual count of 500-2,499 in February 2019 (Department of Agriculture, Water and the Environment (DAWE) 2021).



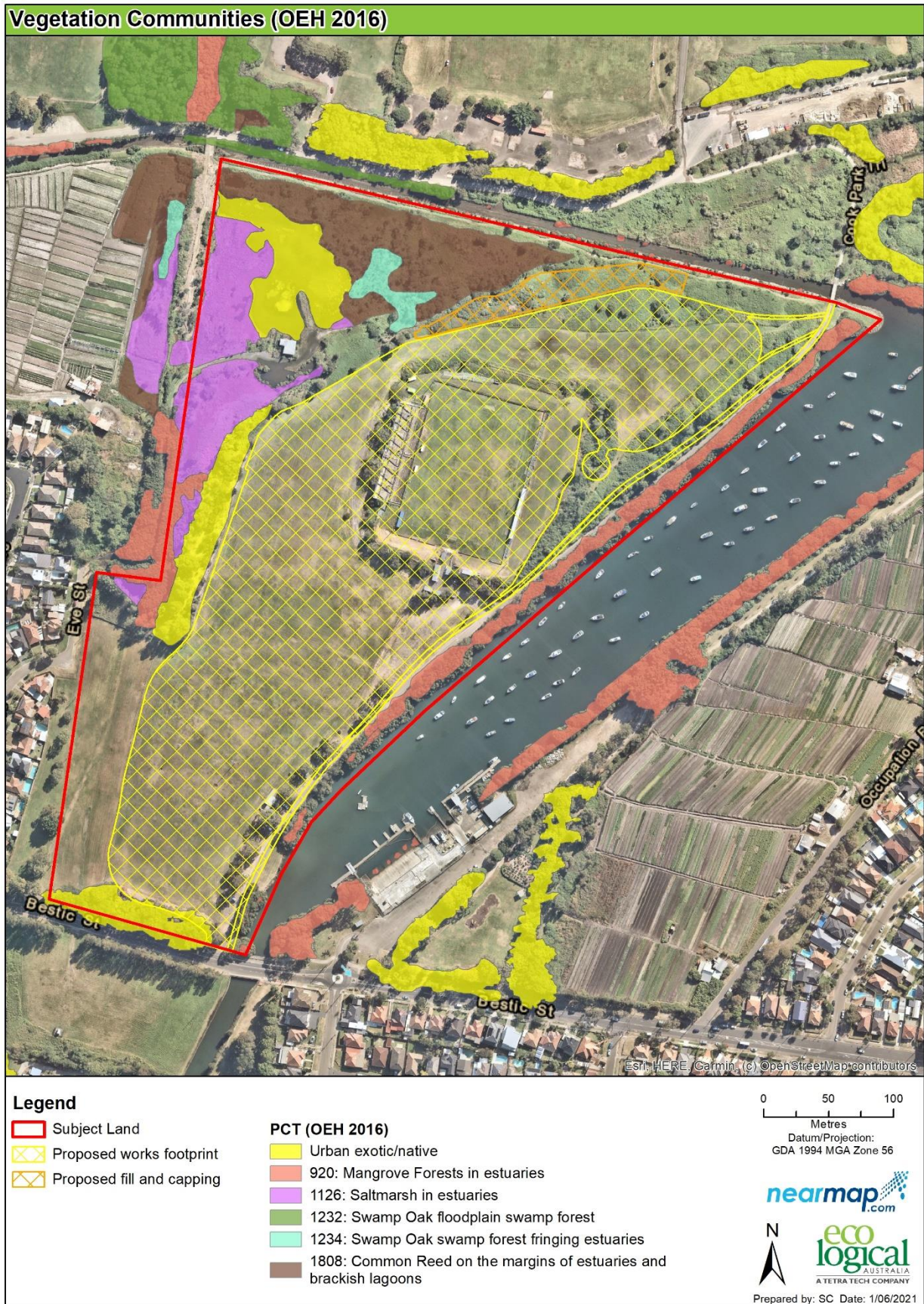


Figure 4: Previous vegetation mapping (OEH 2016)





Figure 5: BioNet threatened species records within the vicinity of the subject land



## 4.2 Field Survey

### 4.2.1 Vegetation Validation

Field survey identified the same PCTs as those identified from the literature and data review, with slightly different boundaries (Figure 6). These are listed below:

- **PCT 920:** Estuarine Mangrove Forest
- **PCT 1126:** Estuarine Saltmarsh
- **PCT 1234:** Estuarine Swamp Oak Forest
- **PCT 1808:** Estuarine Reedland.

Field survey also identified areas of ‘mixed native plantings’ and ‘weeds and native plantings’ and sports fields were comprised of mown grassland, none of which meet the description of any native PCTs. A description of each vegetation type and justification for whether or not they meet the definition of a TEC is provided in Table 3 to Table 9 below.

A full list of flora species recorded during field survey is provided in Appendix B.

Table 3: PCT 920 description


PCT 920: Mangrove Forests in estuaries of the Sydney Basin Bioregion and South East Corner Bioregion (Estuarine Mangrove Forest)	
Associated TEC	Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
BC Act Conservation Status	Endangered
EPBC Act Conservation Status	Vulnerable
Vegetation Description	<p>Occurrences of PCT 920 dominated the eastern boundary of the subject land abutting Muddy Creek, with another smaller patch present along the western boundary (Figure 6). PCT 920 was characterised by a canopy dominated by <i>Avicennia marina</i> var. <i>australasica</i> (Grey Mangrove), with <i>Casuarina glauca</i> (Swamp Oak). Midstorey was relatively sparse and comprised <i>Acacia longifolia</i> subsp. <i>longifolia</i> (Sydney Golden Wattle) (likely from plantings) and exotic species <i>Lantana camara</i> (Lantana) <i>Opuntia monacantha</i> (Drooping Pear). The groundcover present was a mixture of native and exotic species and included species such as <i>Tetragonia tetragonoides</i> (New Zealand Spinach), <i>Solanum nigrum</i> (Blackberry Nightshade), <i>Panicum antidotale</i> (Giant Panic Grass), <i>Bidens pilosa</i> (Cobbler's Peg), <i>Chloris gayana</i> (Rhodes Grass) and <i>Eragrostis curvula</i> (African Love Grass)</p> <p>*Occurrences of PCT 920 within the subject land did not meet the definition for the endangered <i>Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>, as described in the BC Act Final Determination, due to the absence of characteristic vascular species and dominance of <i>A. marina</i> var. <i>australasica</i>.</p> <p>**Occurrences of PCT 920 within the subject land did not meet the definition for vulnerable <i>Subtropical and Temperate Coastal Saltmarsh</i>, as described in the EPBC Act Conservation Advice, because it did not meet the following key diagnostic characteristics:</p> <ul style="list-style-type: none"> <li>• “Consists of dense to patchy areas of characteristic coastal saltmarsh plant species (i.e., salt-tolerant herbs, succulent shrubs or grasses, that may also include bare sediment as part of the mosaic)</li> <li>• Proportional cover by tree canopy such as mangroves, Melaleucas or Casuarinas is not greater than 50% nor is proportional ground cover by seagrass greater than 50%”</li> </ul>
Area within subject land (ha)	1.13
Photo	

Table 4: PCT 1126 description

PCT 1126: Saltmarsh in estuaries of the Sydney Basin Bioregion and South East Corner Bioregion (Estuarine Saltmarsh)	
Associated TEC	Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
BC Act Conservation Status	Endangered
EPBC Act Conservation Status	Vulnerable
Vegetation Description	<p>Occurrences of PCT 1126 within the subject land were present along the western boundary (Figure 6). As is characteristic of this PCT, occurrences of PCT 1126 within the subject land largely lacked a canopy. <i>C. glauca</i> and <i>A. marina</i> var. <i>australasica</i> saplings were scattered throughout the midstorey. These areas were dominated by a mix of native and exotic groundcover species, including <i>Suaeda australis</i> (Seablite) and <i>Sarcocornia quinqueflora</i> (Samphire) and <i>Juncus acutus</i> (Spiny Rush). Weeds were also present within the saltmarsh and includes species such as <i>Asparagus aethiopicus</i> (Asparagus Fern), <i>Stenotaphrum secundatum</i> (Buffalo Grass), <i>Atriplex patula</i>, <i>Vinca major</i> (Greater Periwinkle), <i>Lantana camara</i> (Lantana), <i>Cynodon dactylon</i> (Couch), <i>Hydrocotyle bonariensis</i> (Kurnell Curse), <i>Solidago canadensis</i> var. <i>scabra</i> (Golden Rod) and <i>Medicago polymorpha</i> (Burr Medic)</p> <p>PCT 1126 within the subject land met the description and key diagnostic characteristics for <i>Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>, as set out by the Final Determination and Conservation Advice. This ecological community is listed as endangered under the BC Act and vulnerable under the EPBC Act, under the name <i>Subtropical and Temperate Coastal Saltmarsh</i>.</p>
Area within subject land (ha)	1.09
Photo	

Table 5: PCT 1234 description


PCT 1234: Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion (Estuarine Swamp Oak Forest)	
Associated TEC	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
BC Act Conservation Status	Endangered
EPBC Act Conservation Status	Endangered
Vegetation Description	<p>One small occurrence of PCT 1234 was identified south of the waterbody present in the northwest of the subject land (Figure 6). PCT 1234 contained similar species as vegetation identified as PCT 1126, however PCT 1234 differed in that it was dominated by stands of <i>C. glauca</i> regrowth.</p> <p>PCT 1234 within the subject land met the description for <i>Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i> as set out by the Final Determination. This TEC is listed as endangered under the BC Act as well as the EPBC Act, under the name <i>Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community</i>. PCT 1234 within the subject land met the key diagnostic and condition thresholds for the Federally listed TEC in Category C condition because it was greater than 0.5 ha, less than 2 ha and had a predominantly native understorey.</p>
Area within subject land (ha)	0.09
Photo	



Table 6: PCT 1808 description


PCT 1808: Common Reed on the margins of estuaries and brackish lagoons along the New South Wales coastline (Estuarine Reedland)	
Associated TEC	Sydney Freshwater Wetlands in the Sydney Basin Bioregion
BC Act Conservation Status	Endangered
EPBC Act Conservation Status	Not Listed
Vegetation Description	<p>The largest occurrence of PCT 1808 within the subject land was adjacent to the waterbody in the northwest, with a smaller patch present along the western boundary (Figure 6). As is characteristic of this PCT, occurrences of PCT 1808 within the subject land lacked a canopy. The midstorey and groundcover were dominated by a mix of native <i>Phragmites australis</i> (Common Reed), and exotic species <i>Paspalum dilatatum</i> (Paspalum), <i>Cynodon dactylon</i> (Couch), <i>Pennisetum clandestinum</i> (Kikuyu), <i>Foeniculum vulgare</i> (Fennel), <i>Eragrostis curvula</i> (African Love Grass), <i>Cestrum parqui</i> (Green Cestrum), <i>Gomphocarpus fruticosus</i> (Narrow-leaved Cotton Bush) and <i>Lantana camara</i> (Lantana).</p> <p>According to the BioNet Vegetation Classification, PCT 1808 can be associated with two TECs, <i>Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i> (listed as endangered under the BC Act) and <i>Sydney Freshwater Wetlands in the Sydney Basin Bioregion</i> (listed as endangered under the BC Act and not listed under the EPBC Act). Occurrences of PCT 1808 within the subject land met the description for <i>Sydney Freshwater Wetlands</i> as set out by the Final Determination. However, occurrences of PCT 1808 within the subject land did not meet the description for <i>Swamp Oak Floodplain Forest</i> as set out by the Final Determination, because the PCT did not have a dominant tree canopy. This TEC is also listed under the EPBC Act, however PCT 1808 is not associated with the Federally listed TEC.</p>
Area within subject land (ha)	0.85
Photo	

Table 7: Mixed Native Plantings description


Mixed Native Plantings	
Associated TEC	N/A
BC Act Conservation Status	-
EPBC Act Conservation Status	-
Vegetation Description	Vegetation along the roadside of Bestic Street and the road along the eastern boundary of the subject land was identified as native plantings which did not conform to a PCT or TEC. The canopy was dominated by <i>Ficus macrophylla</i> (Moreton Bay Fig), with scattered <i>Eucalyptus grandis</i> (Flooded Gum), <i>Corymbia maculata</i> (Spotted Gum) and exotic <i>Celtis occidentalis</i> (Hackberry). Native plantings were also scattered throughout the midstorey, including <i>Banksia integrifolia</i> (Coast Banksia), <i>Callistemon citrinus</i> (Crimson Bottlebrush) and <i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark). Groundcover was dominated by mulch with occasional <i>Lomandra longifolia</i> (Spiny-headed Mat-rush) plantings and incursions of exotic species, <i>Ehrharta erecta</i> (Vasey Grass). This assemblage of native species did not conform to a PCT or TEC.
Area within subject land (ha)	0.47
Photo	

Table 8: Weeds and Native Plantings description

Weeds and Native Plantings	
Associated TEC	N/A
BC Act Conservation Status	-
EPBC Act Conservation Status	-
Vegetation Description	<p>Weeds and native plantings were prevalent throughout the subject land. Occurrences of vegetation identified as 'weeds and native plantings' differed from 'mixed native plantings' by the increased density of exotic species. Dominant weed species included <i>Lantana camara</i> (Lantana), <i>Cenchrus clandestinus</i> (Kikuyu) and <i>Cestrum parqui</i> (Green Cestrum). Vegetation identified as weeds and native plantings did not conform to a PCT or TEC.</p>
Area within subject land (ha)	4.04
Photo	



Table 9: Mown Grassland description

Mown Grassland	
Associated TEC	N/A
BC Act Conservation Status	-
EPBC Act Conservation Status	-
Vegetation Description	Sports fields were comprised entirely of mown grassland dominated by exotic species, including <i>Poa annua</i> (Annual Poa), <i>Pennisetum clandestinus</i> and <i>Sida rhombifolia</i> (Paddy's Lucerne). These areas dominated the subject land and do not conform to any native PCT or TEC.

Photo





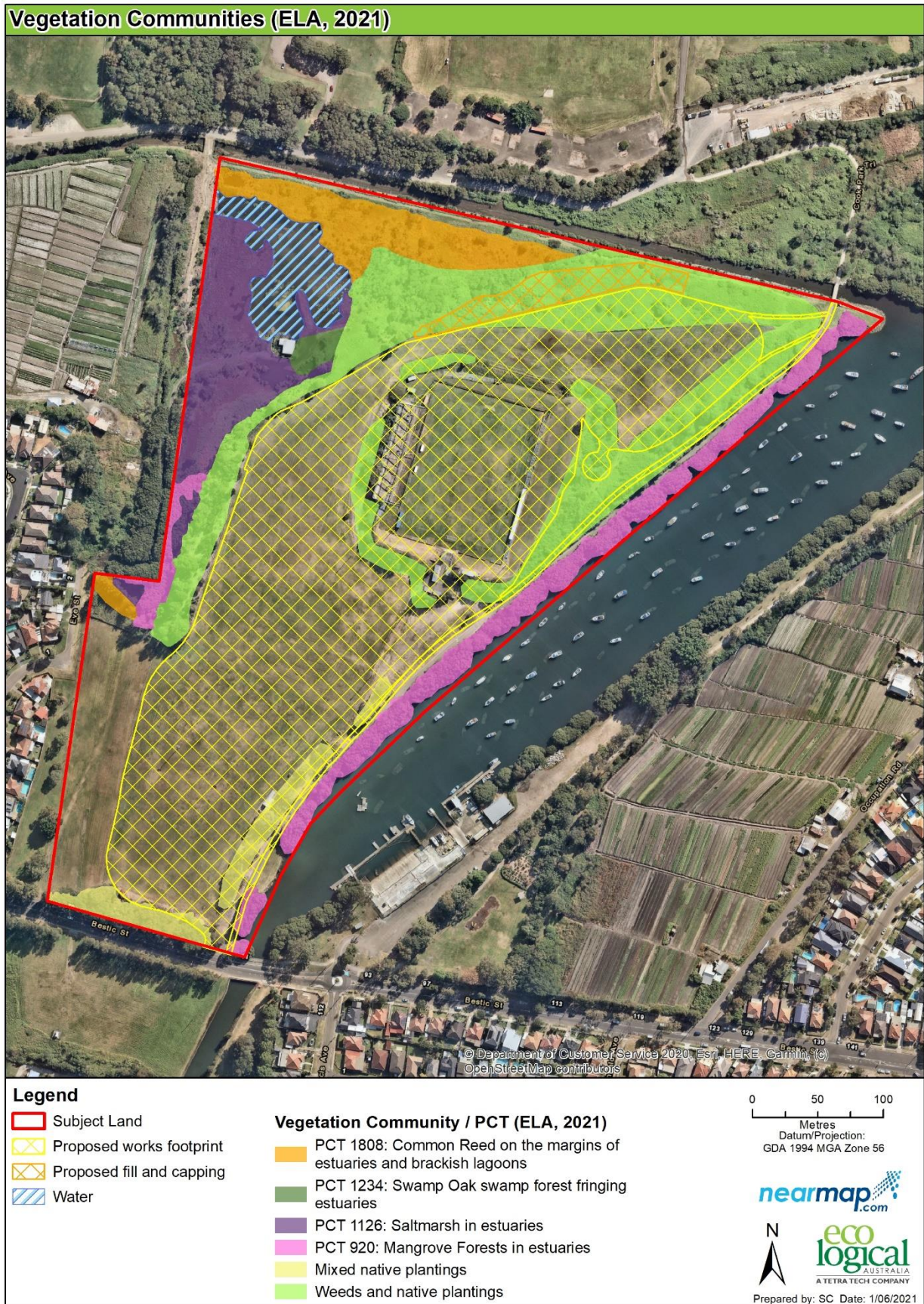


Figure 6: Validated vegetation within the subject land (ELA 2021)



#### 4.2.2 Flora

A total of 88 flora species were identified within the subject land (Appendix B).

##### 4.2.2.1 Threatened Flora Species and Habitat

Two *Syzygium paniculatum* (Magenta Lilly Pilly) individuals were identified within the subject land during survey. *S. paniculatum* is listed as endangered under the BC Act and vulnerable under the EPBC Act. However, the natural habitat for this species is restricted to remnant stands of littoral rainforest, which were not observed within the subject land. Horticultural varieties of this species are regularly planted throughout Sydney. The *S. paniculatum* species identified within the subject land were horticultural specimens and therefore do not require further assessment.

No habitat for threatened flora species was identified within the subject land.

##### 4.2.2.2 Priority Weeds

Of the weeds identified during the field survey, three species are listed as a state priority weed, two are listed as regional priority level weeds and the remaining 12 weeds are listed as other weeds of regional concern. The weeds present, their priority listing under the Act, their associated asset / value at risk and whether they are Weeds of National Significance (WoNS), are presented in Table 10.

**Table 10: State level determined priority weeds and other weeds of concern present**

Scientific name	Common name	WoNS	Priority weed obligations
<b>State Level Priority Weeds</b>			
<i>Asparagus aethiopicus</i>	Ground Asparagus	Yes	Asset protection
<i>Lantana camara</i>	Lantana	Yes	Asset protection
<i>Opuntia monacantha</i>	Drooping Pear	Yes	Asset protection
<b>Regional Priority Level Weed</b>			
<i>Cestrum parqui</i>	Green Cestrum	No	Asset protection
<i>Olea europaea</i> subsp. <i>cuspidata</i>	African Olive	No	Containment
<b>Other Priority Weeds</b>			
<i>Acacia saligna</i>	Golden Wreath Wattle	No	Other regional weeds
<i>Acetosa sagittata</i>	Turkey Rhubarb	No	Other regional weeds
<i>Ageratina riparia</i>	Mistflower	No	Other regional weeds
<i>Araujia sericifera</i>	Moth Vine	No	Other regional weeds
<i>Celtis australis</i>		No	Other regional weeds
<i>Cenchrus clandestinus</i>	Kikuyu	No	Other regional weeds
<i>Chloris gayana</i>	Rhodes Grass	No	Other regional weeds
<i>Eragrostis curvula</i>	African Lovegrass	No	Other regional weeds
<i>Ipomoea indica</i>	Morning Glory	No	Other regional weeds
<i>Juncus acutus</i>	Spiny Rush	No	Other regional weeds
<i>Parietaria judaica</i>	Asthma Weed	No	Other regional weeds
<i>Phoenix canariensis</i>	Canary Island Date Palm	No	Other regional weeds

### 4.2.3 Fauna

A full list of fauna species recorded during field survey is provided in Appendix B.

#### 4.2.3.1 Threatened Fauna Species and Habitat

No threatened fauna species were observed within the subject land during survey.

A list of threatened fauna known to occur within the subject land or identified as likely or having the potential to occur within the subject land (Appendix A) was compiled based on a review of the existing literature and habitat assessments conducted as part of the field survey. This list is presented in Table 11.

**Table 11: Fauna species known from the subject land, or considered likely/potentially occurring within the subject land**

Scientific name	Common name	BC Act listing	EPBC Act listing	Available habitat
<b>Frogs</b>				
<i>Crinia tinnula</i>	Wallum Froglet	Vulnerable	Not listed	Waterbodies and surrounding vegetation
<i>Litoria aurea</i>	Green and Golden Bell Frog	Endangered	Vulnerable	Waterbodies and surrounding vegetation
<b>Woodland Birds</b>				
<i>Anthochaera phrygia</i>	Regent Honeyeater	Critically endangered	Critically endangered	Presence of feed trees, particularly <i>Corymbia maculata</i> (Spotted Gum)
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	Vulnerable	Not listed	Native vegetation, particularly Eucalypts
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Vulnerable	Not listed	Native vegetation, particularly Eucalypts
<i>Glossopsitta pusilla</i>	Little Lorikeet	Vulnerable	Not listed	Native vegetation, particularly Eucalypts
<i>Lathamus discolor</i>	Swift Parrot	Endangered	Critically endangered	Presence of feed autumn-winter feed trees, particularly Eucalypts
<b>Wetland Birds</b>				
<i>Anseranas semipalmata</i>	Magpie Goose	Vulnerable	Not listed	Wetlands
<i>Botaurus poiciloptilus</i>	Australasian Bittern	Endangered	Endangered	Wetlands
<i>Burhinus grallarius</i>	Bush Stone-curlew	Endangered	Not listed	Wetlands, saltmarsh and surrounding vegetation
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Not listed	Migratory	Wetlands
<i>Calidris alba</i>	Sanderling	Vulnerable	Migratory	Wetlands
<i>Calidris canutus</i>	Red Knot	Not listed	Endangered; Migratory	Wetlands
<i>Calidris ferruginea</i>	Curlew Sandpiper	Endangered	Critically endangered, Migratory	Wetlands

Scientific name	Common name	BC Act listing	EPBC Act listing	Available habitat
<i>Calidris tenuirostris</i>	Great Knot	Vulnerable	Critically endangered, Migratory	Wetlands
<i>Charadrius mongolus</i>	Lesser Sand-plover	Vulnerable	Endangered, Migratory	Wetlands
<i>Epthianura albifrons</i>	White-fronted Chat	Vulnerable	Not listed	Wetlands
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	Vulnerable	Not listed	Wetlands
<i>Haematopus longirostris</i>	Pied Oystercatcher	Endangered	Not listed	Wetlands
<i>Hirundapus caudacutus</i>	White-throated Needletail	Not listed	Migratory	Wooded areas and wetlands
<i>Ixobrychus flavicollis</i>	Black Bittern	Vulnerable	Not listed	Wetlands
<i>Limosa limosa</i>	Black-tailed Godwit	Vulnerable	Migratory	Wetlands
<i>Numenius madagascariensis</i>	Eastern Curlew	Not listed	Critically endangered, Migratory	Wetlands
<b>Bats</b>				
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Vulnerable	Vulnerable	Potential roosting habitat in <i>Petrochelidon ariel</i> (Fairy Martin) mud nests
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Vulnerable	Vulnerable	Presence of feed trees, including <i>Corymbia maculata</i> (Spotted Gum) and <i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark).

## 5. Impact Assessment

### 5.1.1 Native Vegetation

The proposed works would remove 1.91 ha of native vegetation identified as Mixed Native Plantings or Weeds and Native Plantings from within the subject site (Table 12).

A total of 3.17 ha, made up of the following PCTs, would not be directly impacted by the proposed works:

- **PCT 920:** Mangrove Forests in estuaries of the Sydney Basin Bioregion and South East Corner Bioregion (Estuarine Mangrove Forest)
- **PCT 1126:** Saltmarsh in estuaries of the Sydney Basin Bioregion and South East Corner Bioregion (Estuarine Saltmarsh)
- **PCT 1234:** Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion (Estuarine Swamp Oak Forest)
- **PCT 1808:** Common Reed on the margins of estuaries and brackish lagoons along the New South Wales coastline (Estuarine Reedland).

No TECs would be directly impacted by the proposed works.

**Table 12: Direct impacts to PCTs and other areas with native plantings**

PCT	Direct impacts (ha)
<b>PCT 920:</b> Mangrove Forests in estuaries of the Sydney Basin Bioregion and South East Corner Bioregion (Estuarine Mangrove Forest)	None
<b>PCT 1126:</b> Saltmarsh in estuaries of the Sydney Basin Bioregion and South East Corner Bioregion (Estuarine Saltmarsh)	None
<b>PCT 1234:</b> Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion (Estuarine Swamp Oak Forest)	None
<b>PCT 1808:</b> Common Reed on the margins of estuaries and brackish lagoons along the New South Wales coastline (Estuarine Reedland)	None
Mixed Native Plantings	0.28
Weeds and Native Plantings	1.63
<b>TOTAL</b>	<b>1.91</b>

### 5.1.2 Threatened Flora

The *S. paniculatum* species identified within the subject land were horticultural specimens which do not correspond to the threatened species, and therefore do not require further assessment.

No habitat for threatened flora species was identified within the subject land.

### 5.1.3 Threatened Fauna

No threatened fauna was recorded during field survey. However, a list of species known from the subject land or identified as potentially occurring within the subject land is provided in Table 11.

## 5.2 Indirect Impacts

Indirect impacts are those impacts that do not directly affect habitat and individuals but that have the potential to interfere through indirect action.

### 5.2.1 During Construction

Indirect impacts considered for this assessment are site impacts (noise, light, weed invasion and pathogens) and downwind impacts (sedimentation, dust, accidental spills and leaks). During the construction, noise, dust and to a small degree vibration will be emitted which could have an indirect impact on local fauna. These impacts result from the operation of heavy machinery to clear vegetation and construct the buildings and infrastructure. These impacts are short term only and therefore are unlikely to significantly impact fauna. Also, during the construction period there is a risk that sediment runoff may impact adjacent native vegetation and nearby tributaries if appropriate sediment and erosion measures are not in place. These impacts will be managed via an appropriate sediment and erosion control plan. The overall impacts are likely to be minor.

### 5.2.2 Weeds

Possible increase in weed infestation can result if weed propagules are introduced or moved around by machinery during construction. Weed control measures are recommended to minimise this risk.

### 5.2.3 Pathogens

Pathogens are agents such as bacterium, virus or fungus that cause disease in flora and fauna, which are spread on footwear, vehicles or machinery. The three most common pathogens found in NSW include:

- **Phytophthora (*Phytophthora cinnamomi*):** A soil-borne fungus that attacks the roots of native plant species, causing them to rot and eventually die.
- **Chytrid fungus (*Batrachochytrium dendrobatidis*):** A waterborne fungus that affects native frog species.
- **Myrtle rust (*Uredo rangelli*):** An introduced fungus that attacks young leaves, shoot tips and stems of Myrtaceous plants (such as Bottle Brush, Tea Tree, Lilly Pilly and Turpentine), eventually killing the plant.

Chytrid fungus is listed as a Key Threatening Process for the Green and Golden Bell Frog, which is known from the subject land. Construction works on development sites have the potential to promote the spread of pathogens. If the occurrence of pathogens is known within the locality, a test for presence through soil or water tests should be undertaken.

Indirect impacts to threatened species and native vegetation are unlikely to be substantial and would be managed. Mitigation measures relevant to the Green and Golden Bell Frog are provided in Section 6.

### 5.2.4 Lighting

Many aquatic organisms that inhabit wetlands depend on daily cycles of light and dark, and artificial lights can disrupt behaviours in some species (Rich and Longcore 2013). Artificial lighting can decrease the amount of daily vertical migration of aquatic invertebrates within the wetland waterbodies. This can potentially impact on ecosystem health through enhanced concentrations of algae, causing a deterioration of water quality and odour problems.

Amphibians are also particularly vulnerable to artificial lighting and increases in illumination can cause temporary reductions in visual acuity (Rich and Longcore 2013). Some amphibians only forage at low light levels so, artificial lighting can also disrupt foraging behaviours.

Additionally, artificial lighting has potential to reduce the abundance and diversity of microbat species utilising the wetlands. The impacts of artificial lighting on microbats are complex as it involves a number of factors, including but not limited to, the microbat's response to lighting, the microbat species' normal flight speed and how their prey items (mosquitoes) respond to artificial lighting (Rich and Longcore 2013).

The subject land is located within an urbanised setting where it is already subject to impacts resulting from artificial light emanating from surrounding residences, the M5 and Sydney Airport. It is understood that the current lighting within Barton Park is obtrusive to neighbouring properties and the Landing Lights Wetland (Figure 7). The currently operating lights are non-dimmable, metal halide flood lights, which do not have glare control and are angled and/or incorrectly aimed vertically and not facing down to the ground. The newly proposed lighting system has glare shields and will not be angled above 5° to avoid the current issues faced by nearby residents (Cundall, 2021).



**Figure 7: Current obtrusive light on neighbouring properties in Banksia (Community member – Garnet Brownbill)**

The proposed lighting poles and flood lights have the potential to impact of native fauna and nearby residents. As a worst-case scenario, if it were assumed that there was a major game being played on Field One, all luminaires would be required to operate at 100% on each field and in the carpark. In this scenario, the Landing Lights Wetland would still only achieve a minimal light level of 1 lx average to just beyond the boundary of Barton Park (Cundall, 2021). This is well below the maximum allowable value of 10 lx. The control of the luminaires will manage and mitigate impacts to native fauna. Furthermore, general operation hours can be reduced during peak migratory bird dates, where only Fields One and

To ensure that the visual impact of lighting on native fauna is minimised, operational hours may be put in place by Council and agreed upon through community consultation. By ensuring that lights are switched off or dimmed outside operational hours, the visual impacts from lighting will be minimal beyond typical usage periods. Management of light spill to the Lighting Land Wetland should be included within the overall WEMP and GGBFMP.

### 5.2.5 Key Threatening Processes

The key threatening process, “clearing of native vegetation”, is associated with the proposed works. However, impacts resulting from this process would be minimal given that vegetation removal would be limited to areas dominated by native plantings or weeds, and that 3.17 ha of native vegetation would be retained within the subject land.

The following key threatening processes are also associated with the proposed works:

- Invasion of native plant communities by exotic perennial grasses
- Invasion of native plant communities by African Olive *Olea europaea* subsp. *cuspidata*
- Invasion, establishment and spread of Lantana.

Impacts resulting from these processes are minimal given that the subject land already contains the exotic species included in the threatening processes listed above. Weed control measures are recommended to minimise these key threatened processes.

The key threatening process, “alteration to the natural flow regimes of rivers, streams, floodplains & wetlands,” is also associated with the proposed works. SPORTENG Civil (2021) undertook MUSIC Modelling to predict the quantity and quality of surface and groundwater flows both pre- and post-development. The results, presented in full in the REF prepared by ELA (2021), indicate that both water quantity and quality exiting the proposed development will decrease post-development. A 20 m buffer has been provided between the wetlands and the proposed work to lessen indirect impacts on the Landing Lights Wetland, which provides habitat for the Green and Golden Bell Frog and migratory birds. Mitigation measures to address this key threatened process are presented in the REF (ELA 2021).

## 5.3 Biodiversity Conservation Act 2016

### 5.3.1 Test of Significance

If a species, population, or ecological community listed under Schedules 1 or 2 of the BC Act is likely to be impacted, the factors set out to establish if there is likely to be a significant impact on that species, population, ecological community or habitat, must be assessed. Section 7.3 of the BC Act sets out five factors that must be addressed as part of a Test of Significance. This enables a decision to be made as to whether there is likely to be a significant impact on the species and if a BDAR or Species Impact Statement (SIS) is required.

#### 5.3.1.1 Threatened Ecological Communities

The following TECs were identified within the subject land during survey but would not be impacted by the proposed works because they would not be directly removed or indirectly impacted (due to the 20 m buffer between them and the subject site) :

- *Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*
- *Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*
- *Sydney Freshwater Wetlands in the Sydney Basin Bioregion.*



Therefore, no Tests of Significance were undertaken for any TECs.

#### 5.3.1.2 Threatened Flora

Two *S. paniculatum* individuals were identified within the subject land during survey. However, these were identified within the subject land were horticultural specimens and therefore do not require further assessment. No habitat for threatened flora species was identified within the subject land.

Therefore, no Tests of Significance were undertaken for any threatened flora species.

#### 5.3.1.3 Threatened Fauna

The subject land contained habitat for the following threatened species:

- *Anthochaera phrygia* (Regent Honeyeater)
- *Artamus cyanopterus cyanopterus* (Dusky Woodswallow)
- *Callocephalon fimbriatum* (Gang-gang Cockatoo)
- *Glossopsitta pusilla* (Little Lorikeet)
- *Lathamus discolor* (Swift Parrot)
- *Anseranas semipalmata* (Magpie Goose)
- *Botaurus poiciloptilus* (Australasian Bittern)
- *Burhinus grallarius* (Bush Stone-curlew)
- *Calidris ferruginea* (Curlew Sandpiper)
- *Calidris tenuirostris* (Great Knot)
- *Charadrius mongolus* (Lesser Sand-plover)
- *Epthianura albifrons* (White-fronted Chat)
- *Haematopus fuliginosus* (Sooty Oystercatcher)
- *Hirundapus caudacutus* (White-throated Needletail)
- *Ixobrychus flavicollis* (Black Bittern)
- *Limosa limosa* (Black-tailed Godwit)
- *Chalinolobus dwyeri* (Large-eared Pied-Bat)
- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Crinia tinnula* (Wallum Froglet)
- *Litoria aurea* (Green and Golden Bell Frog)

Tests of Significance were undertaken for each of the above and it was determined that the proposed works would not result in a significant impact to any of the above threatened fauna species (Appendix B).

#### 5.3.2 Areas of Outstanding Biodiversity Value

A significant impact also occurs if the activity is carried out in an area of outstanding biodiversity value. The subject land is not included on the Area of Outstanding Biodiversity Value register.

### 5.4 EPBC Act Impact Assessment

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

The process includes the application of Significant Impact Criteria for listed MNES that will be affected as a result of the proposed action. Impact assessment guidelines outline a number of criteria to provide assistance in conducting the assessment and help decide whether a referral to the Commonwealth is recommended. These guidelines were used in applying the Significant Impact Criteria.

#### 5.4.1 Threatened Ecological Communities

One TEC, *Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*, was identified within the subject land during survey. The TEC would not be directly or indirectly impacted by the proposed works because vegetation in this area would be retained and a 20 m buffer would be maintained between the subject site and PCTs. Therefore no Significant Impact Criteria were applied.

#### 5.4.2 Threatened Flora

Two *S. paniculatum* individuals were identified within the subject land during survey. However, these were identified within the subject land were horticultural specimens and therefore do not require further assessment. No habitat for threatened flora species was identified within the subject land.

Therefore, no Significant Impact Criteria were applied for any threatened flora species.

#### 5.4.3 Threatened Fauna

The subject land contained habitat for the following threatened fauna species:

- *Anthochaera phrygia* (Regent Honeyeater)
- *Lathamus discolor* (Swift Parrot)
- *Botaurus poiciloptilus* (Australasian Bittern)
- *Calidris acuminata* (Sharp-tailed Sandpiper)
- *Calidris alba* (Sanderling)
- *Calidris canutus* (Red Knot)
- *Calidris ferruginea* (Curlew Sandpiper)
- *Calidris tenuirostris* (Great Knot)
- *Charadrius mongolus* (Lesser Sand-plover)
- *Hirundapus caudacutus* (White-throated Needletail)
- *Limosa limosa* (Black-tailed Godwit)
- *Numenius madagascariensis* (Eastern Curlew)
- *Chalinolobus dwyeri* (Large-eared Pied-Bat)
- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Litoria aurea* (Green and Golden Bell Frog)

Significant Impact Criteria were applied for each of the above listed species and concluded that the activity is unlikely to constitute a significant impact on any of the potentially occurring threatened fauna species (Appendix D).

## 6. Mitigation Measures

The measures in Table 13 are recommended to lessen the impacts of the proposed works on surrounding biodiversity values.

**Table 13: Mitigation measures**

Environmental Aspect	Mitigation Measures
Compaction of soil	<ul style="list-style-type: none"> <li>• Stabilise all disturbed areas and implement vegetation protection measures as required.</li> <li>• Ensure revegetation of native vegetation is consistent with the relevant vegetation communities or as set out in the Barton Park Masterplan Landscape Plan and WEMP.</li> </ul>
Accidental damage / clearing	<ul style="list-style-type: none"> <li>• Council staff are to undertake a pre-works briefing advising of sensitive areas and relevant safeguards for these areas.</li> <li>• Stop works if any previously undiscovered threatened species are discovered during works. An assessment of the impact and any required approvals must be obtained. Works must not recommence until Council has provided written approval to do so.</li> <li>• Ensure the site-specific Construction Environmental Management Plan (CEMP) includes instructions for dealing with orphaned or injured native animals and ensure the CEMP includes the contact details for the NSW Wildlife Information, Rescue and Education Service Inc (WIRES).</li> <li>• Install temporary barrier fencing to prevent entry into adjacent vegetation and wetlands and appropriate 'no-go zone' signage.</li> <li>• Install tree protection measures around trees to be retained in the subject land. Structures should be adequate to prevent machinery from entering within the drip zone.</li> <li>• Maintain temporary fencing to prevent access into the native vegetation.</li> </ul>
Green and Golden Bell Frog and other amphibians	<p><b>General</b></p> <ul style="list-style-type: none"> <li>• Brief contractors on the presence of threatened species.</li> <li>• Hygiene Guidelines – Protocol to protect priority biodiversity areas in NSW from <i>Phytophthora cinnamomi</i>, myrtle rust, amphibian chytrid fungus and invasive plants (DPIE, 2020) should be adhered to at all times.</li> <li>• In accordance with Clause 17(5) of the Cooks Cove SREP, prepare a Green and Golden Bell Frog Management Plan, which includes the location of existing and proposed habitat, and include proposals covering the following:             <ul style="list-style-type: none"> <li>○ protection of the Green and Golden Bell Frog</li> <li>○ protection of the Green and Golden Bell Frog habitat</li> <li>○ how existing and proposed wetlands relate to protection of the Green and Golden Bell Frog and its habitat</li> <li>○ how stormwater management processes relate to protection of the Green and Golden Bell Frog and its habitat</li> <li>○ how development and management of open space areas and public access relate to protection of the Green and Golden Bell Frog and its habitat</li> <li>○ management of the direct and indirect impacts of the proposed development on the protection of the Green and Golden Bell Frog and its habitat</li> <li>○ measures to mitigate adverse environmental impacts of the proposed development, including habitat enhancement and the provision of compensatory habitat for the Green and Golden Bell Frog</li> </ul> </li> </ul>

Environmental Aspect	Mitigation Measures
	<ul style="list-style-type: none"> <li>○ measures to appropriately manage habitat areas in both the short and long term.</li> <li>• Council must prepare the GGBFMP and serve the Coordinator-General, Environment, Energy and Science (previously the Director-General of the Department of Environment and Conservation) prior to consent being granted for the development in accordance with 17(1) of the Cooks Cove SREP.</li> </ul> <p><b>Chytrid Fungus (<i>Batrachochytrium dendrobatidis</i>)</b></p> <ul style="list-style-type: none"> <li>• Minimise work during excessively wet or muddy conditions.</li> <li>• Programming of works should always move from uninfected areas to infected areas.</li> <li>• Set up exclusion zones with fencing and signage to restrict access into contaminated areas.</li> <li>• All personnel (including visitors) to be inducted on chytrid management measures for the site.</li> <li>• Provide vehicle wash down facility.</li> <li>• Restrict vehicles to designated tracks, trails and parking areas.</li> <li>• Provide parking and turn-around points on hard, well-drained surfaces.</li> <li>• Provide boot wash down facility.</li> <li>• Disinfect with cleaning products containing benzalkonium chloride or 70% methylated spirits in 30% water (DOE, 2015)</li> <li>• Disinfect hands or change gloves between the handling of individual frogs and between each site.</li> <li>• Only handle frogs when necessary. Use the 'one bag-one frog' approach. <ul style="list-style-type: none"> <li>• To avoid cross contamination, generally avoid transferring water between two or more separate waterbodies.</li> </ul> </li> </ul>
Migratory birds	<ul style="list-style-type: none"> <li>• Brief contractors on the presence of threatened species.</li> <li>• If feasible, undertake construction works when migratory birds unlikely to be present. Birds are found in Australia year-round. However, major movements along coastlines take place between March and April, and August and November. Between August and April, shorebird abundance peaks. Smaller numbers are found from April to August.</li> <li>• Refer to Water Quality and Hydrology mitigation measures provided in the REF (ELA 2021) to minimise indirect impacts on adjacent wetlands.</li> <li>• Landscape plans should take into account the required clearance needed between wetlands and vegetation, whereby vegetation within 70 m of roosting sites should be under 5 m in height to ensure safe roosting sites for wetland birds (Lawler 1996).</li> </ul>
Indirect lighting to Landing Lights Wetland	<ul style="list-style-type: none"> <li>• Include management strategy for light spill within both the WEMP and GGBFMP.</li> <li>• Manage artificial lights using motion sensors and timers.</li> <li>• Aim light onto the exact surface area requiring illumination. Use shielding on lights to prevent light spill into the atmosphere and outside the footprint of the target area.</li> <li>• Avoid lights containing short wavelength, violet / blue light and white LEDs.</li> <li>• Avoid high intensity light of any colour.</li> <li>• If feasible, allow for a natural barrier (e.g., vegetation screen) between the Landing Light Wetland and artificial light.</li> <li>• Maintain a dark zone around Landing Lights Wetland.</li> </ul>
Spread and control of priority weeds	<ul style="list-style-type: none"> <li>• Wash down equipment and vehicles prior to and after use, to manage the introduction and spread of weed propagules.</li> <li>• Thoroughly clean all equipment of soil and weed propagules prior to entry into the subject land.</li> </ul>



Environmental Aspect	Mitigation Measures
	<ul style="list-style-type: none"> <li>Remove Priority weeds using best management practices (including appropriate controls to prevent impacts to threatened species) prior to removal of native vegetation. Remove weed propagules offsite.</li> <li>Bag and remove all weed propagules offsite, preferably the same day and dispose of at designated green waste facility.</li> <li>Consider the implementation of a Weed Management Plan and revegetation works following the completion of works for the Muddy Creek riparian corridor and Landing Lights Wetland.</li> </ul>
Introduction/ spread of pathogens	<ul style="list-style-type: none"> <li>Adhere to the <i>Arrive Clean, Leave Clean</i> guidelines (DotE, 2015) at all times (<a href="https://www.environment.gov.au/system/files/resources/773abcd-39a8-469f-8d97-23e359576db6/files/arrive-clean-leave-clean.pdf">https://www.environment.gov.au/system/files/resources/773abcd-39a8-469f-8d97-23e359576db6/files/arrive-clean-leave-clean.pdf</a>). In particular: <ul style="list-style-type: none"> <li>Wash down equipment and vehicles prior to entering the site, to manage the introduction and spread of pathogens. Pay particular attention to cleaning mud flaps and tyres.</li> <li>Thoroughly clean all equipment of soil and vegetation debris prior to entry into the study area.</li> <li>Use a solution of 70% ethanol or methylated spirits in 30% water for wash down and equipment cleaning to effectively disinfect areas.</li> <li>Wash down on a hard, well-drained surface, for example a road, and on ramps if possible. Don't allow wash-down water to drain into native bushland of Landing Lights Wetland.</li> <li>Machinery and equipment must also be cleaned when leaving site.</li> </ul> </li> <li>Wash down protocols are required to control multiple impacts including, pathogens, weeds and contaminated soils. The CEMP should develop a single wash down process that addresses the requirements of all three potential environmental impacts.</li> </ul>

## 7. Conclusion

This Flora and Fauna Assessment report was prepared to accompany the REF for the Barton Park Precinct, which is to be assessed under Part 5 of the EP&A Act with Bayside Council as the proponent and determining authority.

The proposed works would remove 1.91 ha of native vegetation identified as Mixed Native Plantings or Weeds and Native Plantings, which provide foraging habitat for the following threatened species:

- *Anthochaera phrygia* (Regent Honeyeater)
- *Artamus cyanopterus cyanopterus* (Dusky Woodswallow)
- *Callocephalon fimbriatum* (Gang-gang Cockatoo)
- *Glossopsitta pusilla* (Little Lorikeet)
- *Lathamus discolor* (Swift Parrot)
- *Chalinolobus dwyeri* (Large-eared Pied-Bat)
- *Pteropus poliocephalus* (Grey-headed Flying-fox).

Wetlands and waterbodies present within the subject land provide habitat for the following threatened species, which may be indirectly impacted by the proposed works:

- *Crinia tinnula* (Wallum Froglet)
- *Litoria aurea* (Green and Golden Bell Frog)
- *Anseranas semipalmata* (Magpie Goose)
- *Botaurus poiciloptilus* (Australasian Bittern)
- *Burhinus grallarius* (Bush Stone-curlew)
- *Calidris alba* (Sanderling)
- *Calidris ferruginea* (Curlew Sandpiper)
- *Calidris tenuirostris* (Great Knot)
- *Charadrius mongolus* (Lesser Sand-plover)
- *Epthianura albifrons* (White-fronted Chat)
- *Haematopus fuliginosus* (Sooty Oystercatcher)
- *Haematopus longirostris* (Pied Oystercatcher)
- *Ixobrychus flavicollis* (Black Bittern)
- *Limosa limosa* (Black-tailed Godwit).

Assessments undertaken in accordance with the BC Act and EPBC Act concluded that the proposed works are unlikely to result in a significant impact on the biodiversity values identified as occurring or potentially occurring within the subject land. Mitigation measures provided in this report would further ameliorate indirect impacts to biodiversity values prior to, during and post construction.

## 8. References

- Cundall 2021. Email correspondence dated 3 August 2021 regarding potential lighting impacts on Landing Lights Wetland and nearby Residents.
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- Sydney Metropolitan Catchment Management Authority (SMCMA) 2016. *Native Vegetation of the Sydney Metropolitan Area*. OEH, Sydney.

## Appendix A – Likelihood of occurrence

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database search. Five terms for the likelihood of occurrence of species are used in this report. This assessment was based on database or other records, presence or absence of suitable habitat, features of the proposal site, results of the site inspection and professional judgement. Some Migratory or Marine species identified from the Commonwealth database search have been excluded from the assessment, due to lack of habitat. The terms for likelihood of occurrence are defined below:

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

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

The records column refers to the number of records occurring within 10 km of the subject land, as provided by the Atlas of NSW Wildlife (BioNet) and Protected Matters Search Tool database search.

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



Scientific Name	BC Status	Act	EPBC Status	Act	Distribution and habitat	Likelihood of occurrence	Impact Assessment Required
<b>ECOLOGICAL COMMUNITIES</b>							
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion	V / CE		E		Found in the Sydney Basin Bioregion, mostly in the Cumberland IBRA sub-region, with small occurrences in the Sydney Cataract, Wollemi and Burragorang sub-regions. It occurs primarily in the Castlereagh area in the north-west of the Cumberland Plain with other known occurrences near Holsworthy, Kemps Creek and Longneck Lagoon. Occurs primarily on Tertiary sands and gravels of the Hawkesbury-Nepean river system. At Agnes Banks it primarily occurs on aeolian (wind-blown) sands overlying Tertiary alluvium. Found on flat or gently undulating terrain in rain shadow areas typically receiving 700–900 mm annual rainfall. The ecological community occurs primarily at low elevations up to 80 m above sea level (ASL), including old ridges, dunes and terraces.	No – not identified during survey.	No
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community/ Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E		E		This ecological community associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. Floodplains are level landform patterns on which there may be active erosion and aggradation by channelled and overbank stream flow with an average recurrence interval of 100 years or less. Swamp Oak Floodplain Forest generally occurs below 20 m (rarely above 10 m) elevation in the NSW North Coast, Sydney Basin and South East Corner bioregions. The structure of the community may vary from open forests to low woodlands, scrubs or reedlands with scattered trees. Typically these forests, woodlands, scrubs and reedlands form mosaics with other floodplain forest communities and treeless wetlands, and often they fringe treeless floodplain lagoons or wetlands with semi-permanent standing water.	Known – this ecological community was identified during survey.	No – the proposed works would not impact this TEC.
Coastal Upland Swamp in the Sydney Basin Bioregion	E		E		This ecological community includes open graminoid heath, sedgeland and tall scrub associated with periodically waterlogged soils on the Hawkesbury sandstone plateaux. The Coastal Upland Swamp is generally associated with soils that are acidic and vary from yellow or grey mineral sandy loams with a shallow organic horizon to highly organic spongy black peat soils with pallid subsoils. Vegetation may include tall open scrubs, tall closed scrubs, closed heaths, open graminoid heaths, sedgelands and fernlands.	No – not identified during survey.	No

Scientific Name	BC Status	Act	EPBC Status	Act	Distribution and habitat	Likelihood of occurrence	Impact Assessment Required
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	E		CE		Occurs in western Sydney, with the most extensive stands occurring in the Castlereagh and Holsworthy areas. Smaller remnants occur in the Kemps Creek area and in the eastern section of the Cumberland Plain. Mainly occurs on clay soils derived from the deposits of ancient river systems (alluvium), or on shale soils of the Wianamatta Shales.	No – not identified during survey.	No
Eastern Suburbs Banksia Scrub in the Sydney Basin Bioregion	CE		E		Predominantly a sclerophyllous heath or scrub community although, depending on site topography and hydrology, some remnants contain small patches of woodland, low forest or limited wetter areas. Recorded from the local government areas of Botany, Randwick, Waverley, and Manly. Disjunct patches of nutrient poor aeolian (wind blown) dune sand.	No – not identified during survey.	No
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	E		CE		Typically occurs within two kilometres of the coast; in NSW, found in the NSW North Coast, Sydney Basin and South East Corner bioregions. Occurs on dunes and flats, cheniers, berms, cobbles, headlands, scree, seacliffs, marginal bluffs, spits, deltaic deposits, coral rubble and islands.	No – not identified during survey.	No
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	E		CE		Found on the river flats of the coastal floodplains. Known from parts of the Local Government Areas of Port Stephens, Maitland, Singleton, Cessnock, Lake Macquarie, Wyong, Gosford, Hawkesbury, Baulkham Hills, Blacktown, Parramatta, Penrith, Blue Mountains, Fairfield, Holroyd, Liverpool, Bankstown, Wollondilly, Camden, Campbelltown, Sutherland, Wollongong, Shellharbour, Kiama, Shoalhaven, Palerang, Eurobodalla and Bega Valley. Associated with silts, clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains.	No – not identified during survey.	No
Shale Sandstone Transition Forest of the Sydney Basin Bioregion	CE		CE		Occurs at the edges of the Cumberland Plain in western Sydney, most now occurs in the Hawkesbury, Baulkham Hills, Liverpool, Parramatta, Penrith, Campbelltown and Wollondilly local government areas. Intergrade between clay soils from the shale rock and earthy and sandy soils from sandstone, or where shale caps overlay sandstone.	No – not identified during survey.	No
Subtropical and Temperate Coastal Saltmarsh	E		V		Occurs in the intertidal zone along the NSW coast. The intertidal zone on the shores of estuaries and lagoons that are permanently or intermittently open to the sea. Frequently found as a zone on the landward side of mangrove stands.	Known – this ecological community	No – the proposed works would

Scientific Name	BC Status	Act	EPBC Status	Act	Distribution and habitat	Likelihood of occurrence	Impact Assessment Required
						was identified during survey.	not impact this TEC.
Sydney Freshwater Wetlands in the Sydney Basin Bioregion	E		-		A complex of vegetation types largely restricted to freshwater swamps in coastal areas. These also vary considerably due to fluctuating water levels and seasonal conditions. Areas of open water may occur where drainage conditions have been altered and there may also be patches of emergent trees and shrubs.	Known – this ecological community was identified during survey.	No – the proposed works would not impact this TEC.
Turpentine-Ironbark Forest of the Sydney Basin Bioregion	E		CE		Cumberland Lowlands, with remnants also occurring to the west on shale-capped ridges in the Blue Mountains. Restricted to areas with clay soil derived from Wianamatta Shale in an area that generally has an annual rainfall of more than 950 mm.	No – not identified during survey.	No

Key: V = vulnerable, E = endangered, CE = critically endangered, - = Not listed

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 10 km	Likelihood of occurrence within the subject land	Impact Assessment Required
<b>FAUNA</b>							
<i>Actitis hypoleucos</i>	Common Sandpiper	-	M	Summer migrant. In NSW, widespread along coastline and also occurs in many areas inland. Coastal wetlands and some inland wetlands, especially muddy margins or rocky shores. Also estuaries and deltas, lakes, pools, billabongs, reservoirs, dams and claypans, mangroves.	0	Unlikely – suitable habitat present for this species is present, however there are no local records..	No
<i>Anseranas semipalmata</i>	Magpie Goose	V	-	In NSW, found in central and northern parts of the state, with vagrants as far as south-eastern NSW. Shallow wetlands, floodplains, grasslands, pastures, dams and crops.	28	Potential – suitable habitat (i.e., wetlands) present.	Yes
<i>Anthochaera phrygia</i>	Regent Honeyeater	E4A	CE	Inland slopes of south-east Australia, and less frequently in coastal areas. In NSW, most records are from the North-West Plains, North-West and South-West Slopes, Northern Tablelands, Central Tablelands and Southern Tablelands regions; also recorded in the Central Coast and Hunter Valley regions. Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of <i>Casuarina cunninghamiana</i> (River Oak).	18	Potential – suitable habitat (i.e., feed trees) present.	Yes
<i>Apus pacificus</i>	Fork-tailed Swift	-	M	Recorded in all regions of NSW. Riparian woodland., swamps, low scrub, heathland, saltmarsh, grassland, Spinifex sandplains, open farmland and inland and coastal sand-dunes.	0	Unlikely – suitable habitat present for this species is present, however there are no local records..	No
<i>Ardea ibis</i>	Cattle Egret	-	Mar	Widespread and common across NSW. Grasslands, wooded lands and terrestrial wetlands.	0	Unlikely – suitable habitat present for this species is present, however there are no local records..	No



Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 10 km	Likelihood of occurrence within the subject land	Impact Assessment Required
<i>Arenaria interpres</i>	Ruddy Turnstone	-	M	Summer migrant to most coastal regions, with occasional records inland, including in NSW. Tidal reefs and pools; pebbly, shelly and sandy shores; mudflats; inland shallow waters; sewage ponds, saltfields; ploughed ground.	0	Unlikely – suitable habitat present for this species is present, however there are no local records..	No
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V	-	Widespread in NSW from coast to inland including the western slopes of the Great Dividing Range and farther west. Species have also been recorded in southern and southwestern Australia. 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.	17	Potential – suitable habitat (i.e., feed trees) present.	Yes
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E1	E	Found over most of NSW except for the far north-west. Permanent freshwater wetlands with tall, dense vegetation, particularly <i>Typha</i> spp. (bullrushes) and <i>Eleocharis</i> spp. (spikerushes).	11	Potential – suitable habitat (i.e., wetlands) present.	Yes
<i>Burhinus grallarius</i>	Bush Stone-curlew	E1	-	In NSW, found sporadically in coastal areas, and west of the divide throughout the sheep-wheat belt. In NSW, it occurs in lowland grassy woodland and open forest.	5	Potential – suitable habitat (i.e., wetlands, saltmarsh and surrounding vegetation) present.	Yes
<i>Calamanthus fuliginosus</i>	Striated Fieldwren	E1	-	South-eastern NSW into southern Victoria, south-east SA and Tasmania. Swampy coastal heaths, tussock grasslands and swamp margins.	1	Unlikely – preferred habitat absent.	No
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	-	M	Summer migrant. Widespread in most regions of NSW, especially in coastal areas, but sparse in the south-central	0	Known – this species has been observed at	Yes

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 10 km	Likelihood of occurrence within the subject land	Impact Assessment Required
				Western Plain and east Lower Western Regions. Shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.		the Landing Lights Wetlands (Avifauna 2017).	
<i>Calidris alba</i>	Sanderling	V	M	Occur along the NSW coast, with occasional inland sightings. Arrives from September and leaves by May (some may overwinter in Australia). Coastal areas on low beaches of firm sand, near reefs and inlets, along tidal mudflats and lagoons; rarely recorded in near-coastal wetlands.	11	Known – previously recorded within subject land.	Yes
<i>Calidris canutus</i>	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.	1,009	Potential – suitable habitat (i.e., wetlands) present.	Yes
<i>Calidris ferruginea</i>	Curlew Sandpiper	E1	CE, M	Occurs along the entire coast of NSW, and sometimes in freshwater wetlands in the Murray-Darling Basin. Littoral and estuarine habitats, including intertidal mudflats, non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	1,792	Known – previously recorded within subject land.	Yes
<i>Calidris melanotos</i>	Pectoral Sandpiper	-	M	Summer migrant to Australia. Widespread but scattered in NSW. East of the Great Divide, recorded from Casino and Ballina, south to Ulladulla. West of the Great Divide, widespread in the Riverina and Lower Western regions. Shallow fresh to saline wetlands, including coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	0	Unlikely – suitable habitat present for this species is present, however there are no local records.	No
<i>Calidris ruficollis</i>	Red-necked Stint	-	M	Summer migrant to Australia, widespread coastal and inland NSW. Tidal mudflats, saltmarshes, sandy and shelly beaches, saline and freshwater wetlands, saltfields, sewage ponds.	0	Unlikely – suitable habitat present for this species is present,	No

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						however there are no local records.	
<i>Calidris subminuta</i>	Long-toed Stint	-	M	Summer migrant to Australia. Widely scattered irregular records in NSW: the estuary of the Richmond River, Kooragang Island, Pitts Town Lagoon, McGrath's Hill, Bushell's Lagoon, the Hawkesbury River, Shell Point, Botany Bay, Parkes, Fivebough Swamp, Tullakool Saltworks, Dareton, Mortanally Billabong, Wentworth and Cobar. Coastal and inland shallow wetlands, sewage ponds, tidelines, tidal mudflats.	0	Unlikely – suitable habitat present for this species is present, however there are no local records.	No
<i>Calidris tenuirostris</i>	Great Knot	V	CE, M	In NSW, recorded at scattered sites along the coast down to about Narooma. It has also been observed inland at Tullakool, Armidale, Gilgandra and Griffith. Intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons.	76	Potential – suitable habitat (i.e., wetlands) present.	Yes
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V	-	In NSW, distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. Isolated records known from as far north as Coffs Harbour and as far west as Mudgee. Tall mountain forests and woodlands in summer; in winter, may occur at lower altitudes in open eucalypt forests and woodlands, and urban areas.	9	Potential – suitable habitat (i.e., feed trees) present.	Yes
<i>Calyptorhynchus lathamii</i>	Glossy Black-Cockatoo	V	-	In NSW, widespread along coast and inland to the southern tablelands and central western plains, with a small population in the Riverina. Open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur.	56	Potential – suitable habitat (i.e., feed trees) present.	No – feed trees would not be removed by proposed works.
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V	-	In NSW it extends from the coast inland as far as the Pilliga, Dubbo, Parkes and Wagga Wagga on the western slopes. Rainforest, sclerophyll forest (including Box-Ironbark), woodland and heath.	2	Unlikely – preferred habitat absent.	No

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<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Recorded from Rockhampton in Qld south to Ulladulla in NSW. Largest concentrations of populations occur in the sandstone escarpments of the Sydney basin and the NSW north-west slopes. Wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country.	2	Potential – suitable roosting habitat (i.e., Fairy Martin mud nests) present.	Yes
<i>Charadrius mongolus</i>	Lesser Sand-plover	V	E, M	Summer migrant to Australia. Found around the entire coast but in NSW most common on north coast. Rarely recorded south of the Shoalhaven estuary, and there are few inland records. Almost entirely coastal in NSW, using sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats, sandy beaches, coral reefs and rock platforms.	280	Potential – suitable habitat (i.e., wetlands) present.	Yes
<i>Charadrius veredus</i>	Oriental Plover	-	M	Regular summer migrant to Australia, recorded all states including coastal NSW. Open plains, ploughed land, inland swamps, tidal mudflats, claypans, coastal marshes, grassy airfields, playing fields, lawns.	0	Unlikely – suitable habitat present for this species is present, however there are no local records.	No
<i>Circus assimilis</i>	Spotted Harrier	V	-	Found throughout the Australian mainland, except in densely forested or wooded habitats, and rarely in Tasmania. Grassy open woodland, inland riparian woodland, grassland, shrub steppe, agricultural land and edges of inland wetlands.	2	Unlikely – preferred habitat absent.	No
<i>Crinia tinnula</i>	Wallum Froglet	V	-	Along the coastal margin from Litabella National Park in south-east Qld to Kurnell in Sydney. Acidic swamps on coastal sand plains (typically in sedgelands and wet heathlands), drainage lines, and swamp sclerophyll forests.	4	Known – previously recorded within subject land.	Yes
<i>Dasyurus maculatus maculatus</i>	Spotted-tailed Quoll	V	E	Found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Qld. Rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	0	No – preferred habitat absent, no local records.	No



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<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E1	-	Coastal and subcoastal northern and eastern Australia, south to central-eastern NSW and with vagrants recorded further south and inland. In NSW, floodplain wetlands of the major coastal rivers are key habitat. Also minor floodplains, coastal sandplain wetlands and estuaries.	1	Potential – this highly mobile species may occasionally fly over the subject land on feeding forays. However, more suitable habitat is available for this species beyond the subject land.	No
<i>Epthianura albifrons</i>	White-fronted Chat	V	-	<b>Occurs mostly in the southern half of the state, in damp open habitats along the coast, and near waterways in the western part of the state. Saltmarsh vegetation, open grasslands and sometimes low shrubs bordering wetland areas.</b>	290	<b>Potential – suitable habitat (i.e., wetlands) present.</b>	<b>Yes</b>
<i>Erythroriorchis radiatus</i>	Red Goshawk	E4A	V	In NSW, extends to ~30°S. Recent records confined to the Northern Rivers region north of 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.	1	Unlikely – preferred habitat absent.	No
<i>Esacus magnirostris</i>	Beach Stone-curlew	E4A	-	Across northern and north-eastern Australia, south to the Manning River in north-eastern NSW, with occasional vagrants to south-eastern NSW and Victoria. Exclusively along the coast, on beaches, islands, reefs and in estuaries, and edges of or near mangroves.	2	Unlikely – preferred habitat absent.	No
<i>Falco hypoleucos</i>	Grey Falcon	E1	-	Arid and semi-arid zones. In NSW, found chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Shrubland, grassland and wooded watercourses, occasionally in open woodlands near the coast, and near wetlands.	0	No – the subject land is located outside of the main distribution for this species, no local records.	No
<i>Gallinago hardwickii</i>	Latham's Snipe	-	M	Migrant to east coast of Australia, extending inland west of the Great Dividing Range in NSW. Freshwater, saline or brackish	0	Unlikely – suitable habitat present for this	No

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				wetlands up to 2000 m above sea-level; usually freshwater swamps, flooded grasslands or heathlands.		species is present, however there are no local records.	
<i>Glossopsitta pusilla</i>	Little Lorikeet	V	-	In NSW, found from the coast westward as far as Dubbo and Albury. Dry, open eucalypt forests and woodlands, including remnant woodland patches and roadside vegetation.	4	Potential – suitable habitat (i.e., feed trees) present.	Yes
<i>Grantiella picta</i>	Painted Honeyeater	V	V	Widely distributed in NSW, predominantly on the inland side of the Great Dividing Range but avoiding arid areas. Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests.	0	No – preferred habitat absent, no local records.	No
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V	-	Distributed along the entire NSW coast. Rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries.	42	Potential – suitable habitat (i.e., wetlands) present.	Yes
<i>Haematopus longirostris</i>	Pied Oystercatcher	E1	-	Thinly scattered along the entire NSW coast. Intertidal flats of inlets and bays, open beaches and sandbanks.	5,766	Potential – suitable habitat (i.e., wetlands) present.	Yes
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	-	Distributed along the coastline of mainland Australia and Tasmania, extending inland along some of the larger waterways, especially in eastern Australia. 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.	92	Potential – this highly mobile species may occasionally fly over the subject land on feeding forays. However, more suitable habitat is available for this species beyond the subject land.	No
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	South eastern NSW and Victoria, in two distinct populations: a northern population in the sandstone geology of the Sydney Basin as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. Heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.	0	No – preferred habitat absent, no local records.	No

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<i>Hieraaetus morphnoides</i>	Little Eagle	V	-	Throughout the Australian mainland, with the exception of the most densely-forested parts of the Dividing Range escarpment. Open eucalypt forest, woodland or open woodland, including she-oak or Acacia woodlands and riparian woodlands of interior NSW.	4	Potential – this highly mobile species may occasionally fly over the subject land on feeding forays. However, more suitable habitat is available for this species beyond the subject land.	No
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	M	All coastal regions of NSW, inland to the western slopes and inland plains of the Great Divide. Occur most often over open forest and rainforest, as well as heathland, and remnant vegetation in farmland.	103	Potential – suitable habitat (i.e., wooded areas and wetlands) present.	Yes
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	E1	V	Largely confined to Triassic and Permian sandstones within the coast and ranges in an area within approximately 250 km of Sydney. Dry and wet sclerophyll forests, riverine forests, coastal heath swamps, rocky outcrops, heaths, grassy woodlands.	0	No – preferred habitat absent, no local records.	No
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	E1	E	Found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River. Heath or open forest with a heathy understorey on sandy or friable soils.	0	No – preferred habitat absent, no local records.	No
<i>Ixobrychus flavicollis</i>	Black Bittern	V	-	Terrestrial and estuarine wetlands. Also flooded grassland, forest, woodland, rainforest and mangroves where permanent water is present.	4	Known – previously recorded within subject land.	Yes
<i>Lathamus discolor</i>	Swift Parrot	E1	CE	Migrates from Tasmania to mainland in Autumn-Winter. In NSW, the species mostly occurs on the coast and south west slopes. Box-ironbark forests and woodlands.	41	Potential – suitable habitat (i.e., feed trees) present.	Yes
<i>Limicola falcinellus</i>	Broad-billed Sandpiper	V	M	Occur occasionally on the southern Australian coast. In NSW, mainly recorded in Hunter River estuary, with birds occasionally reaching the Shoalhaven estuary. There are few records for	10	Unlikely - the subject land is located outside of	No

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				inland NSW. Sheltered parts of the coast such as estuarine sandflats and mudflats, harbours, embayments, lagoons, saltmarshes and reefs.		the main distribution for this species.	
<i>Limosa lapponica baueri</i>	Bar-tailed Godwit	-	M	Summer migrant to Australia. Widespread along the coast of NSW, including the offshore islands. Also numerous scattered inland records. Intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons, bays, seagrass beds, saltmarsh, sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. Rarely inland wetlands, paddocks and airstrips.	3	Unlikely – preferred habitat absent.	No
<i>Limosa limosa</i>	Black-tailed Godwit	V	M	Arrives in August and leaves in March. In NSW, most frequently recorded at Kooragang Island, with occasional records elsewhere along the coast, and inland in the Murray-Darling Basin, on the western slopes of the Northern Tablelands and in the far north-western corner of the state. "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.	194	Known – previously recorded within subject land.	Yes
<i>Litoria aurea</i>	Green and Golden Bell Frog	E1	V	Since 1990, recorded from ~50 scattered sites within its former range in NSW, from the north coast near Brunswick Heads, south along the coast to Victoria. Records exist west to Bathurst, Tumut and the ACT region. Marshes, dams and stream-sides, particularly those containing <i>Typha</i> spp. (bullrushes) or <i>Eleocharis</i> spp. (spikerushes). Some populations occur in highly disturbed areas.	952	Known – previously recorded within subject land.	Yes
<i>Lophoictinia isura</i>	Square-tailed Kite	V	-	In NSW, it is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast.	8	Unlikely – preferred habitat absent.	No



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				Timbered habitats including dry woodlands and open forests, particularly timbered watercourses.			
<i>Merops ornatus</i>	Rainbow Bee-eater	-	Mar	Distributed across much of mainland Australia, including NSW. Open forests and woodlands, shrublands, farmland, areas of human habitation, inland and coastal sand dune systems, heathland, sedgeland, vine forest and vine thicket.	0	Unlikely – suitable habitat present for this species is present, however there are no local records.	No
<i>Miniopterus australis</i>	Little Bentwing-bat	V	-	East coast and ranges south to Wollongong in NSW. Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub.	6	Unlikely - lack of hollow bearing trees or abandoned human-made structures, which represent suitable habitat for this species within the subject land. This highly mobile species may occasionally fly over the subject land on feeding forays. However, more suitable habitat is available for this species beyond the subject site.	No
<i>Miniopterus orianae oceanensis</i>	Eastern Bentwing-bat	V	-	In NSW it occurs on both sides of the Great Dividing Range, from the coast inland to Moree, Dubbo and Wagga Wagga. Rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland.	173	Unlikely - lack of hollow bearing trees or abandoned human-made structures, which represent suitable habitat for this species within the subject land. This highly mobile	No

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						species may occasionally fly over the subject land on feeding forays. However, more suitable habitat is available for this species beyond the subject site.	
<i>Monarcha melanopsis</i>	Black-faced Monarch	-	M	In NSW, occurs around the eastern slopes and tablelands of the Great Divide, inland to Coutts Crossing, Armidale, Widden Valley, Wollemi National Park and Wombeyan Caves. It is rarely recorded farther inland. Rainforest, open eucalypt forests, dry sclerophyll forests and woodlands, gullies in mountain areas or coastal foothills, Brigalow scrub, coastal scrub, mangroves, parks and gardens.	0	Unlikely – some habitat is present, however there are no local records.	No
<i>Monarcha trivirgatus</i>	Spectacled Monarch	-	M	Coastal eastern Australia south to Port Stephens in NSW. Mountain/lowland rainforest, wooded gullies, riparian vegetation including mangroves.	0	Unlikely – some habitat is present, however there are no local records.	No
<i>Motacilla flava</i>	Yellow Wagtail	-	M	Regular summer migrant to mostly coastal Australia. In NSW recorded Sydney to Newcastle, the Hawkesbury and inland in the Bogan LGA. Swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land, lawns.	0	Unlikely – some habitat is present, however there are no local records.	No
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	-	M	In NSW, widespread on and east of the Great Divide and sparsely scattered on the western slopes, with very occasional records on the western plains. Eucalypt-dominated forests, especially near wetlands, watercourses, and heavily-vegetated gullies.	0	Unlikely – some habitat is present, however there are no local records.	No

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<i>Myotis macropus</i>	Southern Myotis	V	-	In NSW, found in the coastal band. It is rarely found more than 100 km inland, except along major rivers. Foraging habitat is waterbodies (including streams, or lakes or reservoirs) and fringing areas of vegetation up to 20m.	14	Potential – suitable habitat (i.e., waterbodies) present.	No – waterbodies would not be removed as part of the proposed works.
<i>Neophema chrysogaster</i>	Orange-bellied Parrot	E4A	CE	Breeds in Tasmania and migrates in autumn to spend the winter on the mainland coast of south-eastern SA and southern Victoria. Occasional reports from NSW, most recently Shellharbour and Maroubra in May 2003. Winter habitat is mostly within 3 km of the coast in sheltered bays, lagoons, estuaries, coastal dunes and saltmarshes. Also small islands and peninsulas, saltworks, golf courses, low samphire herbland and taller coastal shrubland.	1	Unlikely – preferred habitat absent.	No
<i>Neophema pulchella</i>	Turquoise Parrot	V	-	Occurs along the length of NSW from the coastal plains to the western slopes of the Great Dividing Range. Eucalypt and cypress pine open forests and woodlands, ecotones between woodland and grassland, or coastal forest and heath.	2	Unlikely – preferred habitat absent.	No
<i>Ninox strenua</i>	Powerful Owl	V	-	In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains. Woodland, open sclerophyll forest, tall open wet forest and rainforest.	210	Potential – this highly mobile species may occasionally fly over the subject land on feeding forays. However, more suitable habitat is available for this species beyond the subject land.	No
<i>Numenius madagascariensis</i>	Eastern Curlew	-	CE, M	Summer migrant to Australia. Primarily coastal distribution in NSW, with some scattered inland records. Estuaries, bays, harbours, inlets and coastal lagoons, intertidal mudflats or	14,893	Potential – suitable habitat (i.e., wetlands) present.	Yes

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				<b>sandflats, ocean beaches, coral reefs, rock platforms, saltmarsh, mangroves, freshwater/brackish lakes, saltworks and sewage farms.</b>			
<i>Numenius minutus</i>	Little Curlew	-	M	Summer migrant to Australia. In NSW, most records scattered east of the Great Dividing Range, from Casino, south to Greenwell Point with a few scattered records west of the Great Dividing Range. Dry grasslands, open woodlands, floodplains, margins of drying swamps, tidal mudflats, airfields, playing fields, crops, saltfields, sewage ponds.	0	Unlikely – some habitat is present, however there are no local records.	No
<i>Numenius phaeopus</i>	Whimbrel	-	M	Summer migrant to Australia. Found along almost the entire coast of NSW; scattered inland records. Estuaries, mangroves, tidal flats, coral cays, exposed reefs, flooded paddocks, sewage ponds, grasslands, sports fields, lawns.	0	Unlikely – some habitat is present, however there are no local records.	No
<i>Oxyura australis</i>	Blue-billed Duck	V		Widespread in NSW, but is most concentrated in the southern Murray-Darling Basin area. Coastal and inland wetlands and swamps.	1	Unlikely - the subject land is located outside of the main distribution for this species.	No
<i>Pandion cristatus</i>	Eastern Osprey	V	-	Common around the northern NSW coast, and uncommon to rare from coast further south. Some records from inland areas. Rocky shorelines, islands, reefs, mouths of large rivers, lagoons and lakes.	28	Potential – this highly mobile species may occasionally fly over the subject land on feeding forays. However, more suitable habitat is available for this species beyond the subject land.	No
<i>Perameles nasuta</i>	Long-nosed Bandicoot, North Head	E2	-	Restricted to North Head in the Manly Local Government Area. Occupies a variety of habitats on North Head.	28	No - the subject land is located outside of the	No



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						main distribution for this species.	
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E1	V	In NSW they occur from the Qld border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges.	0	No – preferred habitat absent, no local records.	No
<i>Petroica boodang</i>	Scarlet Robin	V	-	In NSW, it occurs from the coast to the inland slopes. Dry eucalypt forests and woodlands, and occasionally in mallee, wet forest, wetlands and tea-tree swamps.	2	Unlikely – preferred habitat absent.	No
<i>Phascolarctos cinereus</i>	Koala	V	V	In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. There are sparse and possibly disjunct populations in the Bega District, and at several sites on the southern tablelands. Eucalypt woodlands and forests.	2	Unlikely – preferred habitat absent.	No
<i>Philomachus pugnax</i>	Ruff	-	M	Regular but rare summer migrant to Australia. In NSW, recorded at Kurnell, Tomki, Casino, Ballina, Kooragang Island, Broadwater Lagoon and Little Cattai Creek. Also found around the Riverina, including Windouran Swamp, Wanganella, Fivebough Swamo and the Tullakool Saltworks. Terrestrial wetlands including lakes, swamps, pools, lagoons, tidal rivers, swampy fields and floodlands. Occasionally harbours, estuaries, seashores, sewage farms and saltworks.	0	Unlikely - the subject land is located outside of the main distribution for this species.	No
<i>Pluvialis fulva</i>	Pacific Golden Plover	-	M	Regular widespread summer migrant to Australia, including coastal NSW, Lord Howe and Norfolk Island. Estuaries, mudflats, saltmarshes, mangroves, rocky reefs, inland swamps, ocean shores, paddocks, sewage ponds, ploughed land, airfields, playing fields.	0	Unlikely – suitable habitat present for this species is present, however there are no local records.	No

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<i>Pluvialis squatarola</i>	Grey Plover	-	M	Regular summer migrant to coastal Australia, including NSW. Rarely inland, on passage. Mudflats, saltmarsh, tidal reefs and estuaries.	0	Unlikely – suitable habitat present for this species is present, however there are no local records.	No
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	-	V	Fragmented distribution across eastern NSW. Open heathlands, woodlands and forests with a heathland understorey, vegetated sand dunes.	0	No – preferred habitat absent, no local records.	No
<i>Pseudophryne australis</i>	Red-crowned Toadlet	V	-	Confined to the Sydney Basin, from Pokolbin in the north, the Nowra area to the south, and west to Mt Victoria in the Blue Mountains. Open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings.	3	Unlikely – suitable habitat for this species, (i.e., drainage lines) absent. .	No
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	Along the eastern coast of Australia, from Bundaberg in Qld to Melbourne in Victoria. Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	349,491	Known – previously recorded within subject land.	Yes
<i>Ptilinopus superbus</i>	Superb Fruit-Dove	V	-	Principally from north-eastern Qld to north-eastern NSW. Further south, it is confined to pockets of suitable habitat, and occurs as far south as Moruya. Rainforest and closed forests. May also forage in eucalypt or acacia woodland where there are fruit-bearing trees.	8	Unlikely – preferred habitat absent.	No
<i>Rhipidura rufifrons</i>	Rufous Fantail	-	M	Coastal and near coastal districts of northern and eastern Australia, including on and east of the Great Divide in NSW. Wet sclerophyll forests, subtropical and temperate rainforests. Sometimes drier sclerophyll forests and woodlands.	0	No – preferred habitat absent, no local records.	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 10 km	Likelihood of occurrence within the subject land	Impact Assessment Required
<i>Rostratula australis</i>	Australian Painted Snipe	E1	E	In NSW most records are from the Murray-Darling Basin. Other recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Swamps, dams and nearby marshy areas.	2	Unlikely – preferred habitat absent.	No
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	V	-	There are scattered records of this species across the New England Tablelands and North West Slopes. Rare visitor in late summer and autumn to south-western NSW. Almost all habitats, including wet and dry sclerophyll forest, open woodland, open country, mallee, rainforests, heathland and waterbodies.	8	Unlikely – preferred habitat absent.	No
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	-	Both sides of the great divide, from the Atherton Tableland in Qld to north-eastern Victoria, mainly along river systems and gullies. In NSW it is widespread on the New England Tablelands. Woodland, moist and dry eucalypt forest and rainforest.	3	Unlikely – preferred habitat absent.	No
<i>Stagonopleura guttata</i>	Diamond Firetail	V	-	Widely distributed in NSW, mainly recorded in the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina, and less commonly found in coastal areas and further inland. Grassy eucalypt woodlands, open forest, mallee, Natural Temperate Grassland, secondary derived grassland, riparian areas and lightly wooded farmland.	4	Unlikely – preferred habitat absent.	No
<i>Thinornis rubricollis rubricollis</i>	Hooded Plover	E4A	V	Occurs in coastal NSW north to Sussex Inlet. Occasional records from the Shoalhaven River, Comerong Beach and Lake Illawarra. Sandy ocean beaches, tidal bays and estuaries, rock platforms, rocky or sand-covered reefs, and small beaches in lines of cliffs. Also use near-coastal saline and freshwater lakes and lagoons.	0	Unlikely – suitable habitat present for this species is present, however there are no local records.	No
<i>Tringa brevipes</i>	Grey-tailed Tattler	-	M	Summer migrant to Australia. In NSW, distributed along most of the coast from the Qld border, south to Tilba Lake. More heavily distributed along coastal regions north of Sydney. "Sheltered	0	Unlikely – suitable habitat present for this species is present,	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 10 km	Likelihood of occurrence within the subject land	Impact Assessment Required
				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.		however there are no local records.	
<i>Tringa nebularia</i>	Common Greenshank	-	M	Summer migrant to Australia. Recorded in most coastal regions of NSW; also widespread west of the Great Dividing Range, especially between the Lachlan and Murray Rivers and the Darling River drainage basin, including the Macquarie Marshes, and north-west regions. 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, mangroves, embayments, harbours, river estuaries, deltas, lagoons, tidal pools, rock-flats and rock platforms).	0	Unlikely – suitable habitat present for this species is present, however there are no local records.	No
<i>Tringa stagnatilis</i>	Marsh Sandpiper	-	M	Summer migrant to Australia. Recorded in all regions of NSW but especially the central and south coasts and (inland) on the western slopes of Great Divide and western plains. Swamps, lagoons, billabongs, salt pans, saltmarshes, estuaries, pools on inundated floodplains, intertidal mudflats, sewage farms and saltworks, reservoirs, waterholes, soaks, bore-drain swamps and flooded inland lakes.	0	Unlikely – suitable habitat present for this species is present, however there are no local records.	No
<i>Tyto novaehollandiae</i>	Masked Owl	V	-	Recorded over approximately 90% of NSW, excluding the most arid north-western corner. Most abundant on the coast but extends to the western plains. Dry eucalypt forests and woodlands from sea level to 1100 m.	3	Unlikely – preferred habitat absent.	No
<i>Xenus cinereus</i>	Terek Sandpiper	V	M	A rare migrant to the eastern and southern Australian coasts. The two main sites in NSW are the Richmond River estuary and the Hunter River estuary. Mudbanks and sandbanks near	190	Unlikely - the subject land is located outside of	No



Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 10 km	Likelihood of occurrence within the subject land	Impact Assessment Required
				mangroves, rocky pools and reefs, and occasionally up to 10 km inland around brackish pools.		the main distribution for this species.	
<b>FLORA</b>							
<i>Acacia bynoeana</i>	Bynoe's Wattle	E1	V	Found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. Heath or dry sclerophyll forest on sandy soils.	4	No – not identified during survey, the subject land has been significantly disturbed.	No
<i>Acacia pubescens</i>	Downy Wattle	V	V	Restricted to the Sydney region around the Bankstown-Fairfield-Rookwood and Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. Open woodland and forest, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland. Occurs on alluviums, shales and at the intergrade between shales and sandstones.	252	No – not identified during survey, the subject land has been significantly disturbed.	No
<i>Acacia terminalis</i> subsp. <i>Eastern Sydney</i>	Sunshine Wattle	E1	E	Limited mainly to near-coastal areas from the northern shores of Sydney Harbour south to Botany Bay. Coastal scrub and dry sclerophyll woodland on sandy soils.	1,477	No – not identified during survey, the subject land has been significantly disturbed.	No
<i>Asterolasia elegans</i>	-	E1	E	Occurs north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby local government areas. Also likely to occur in the western part of Gosford local government area. Hawkesbury sandstone. Found in sheltered forests on mid- to lower slopes and valleys.	0	No – not identified during survey, the subject land has been significantly disturbed, no local records.	No
<i>Caladenia tessellata</i>	Thick Lip Spider Orchid	E1	V	Currently known from two disjunct areas; one population near Braidwood on the Southern Tablelands and three populations in the Wyong area on the Central Coast. Grassy sclerophyll woodland on clay loam or sandy soils, or low woodland with stony soil.	5	No – not identified during survey, the subject land has been significantly disturbed.	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 10 km	Likelihood of occurrence within the subject land	Impact Assessment Required
<i>Callistemon linearifolius</i>	Netted Bottle Brush	V	-	Georges River to Hawkesbury River in the Sydney area (limited to the Hornsby Plateau area), and north to the Nelson Bay area of NSW. Also Coalcliff in the northern Illawarra. Dry sclerophyll forest.	7	No – not identified during survey, the subject land has been significantly disturbed.	No
<i>Cryptostylis hunteriana</i>	Leafless Tongue Orchid	V	V	In NSW, recorded mainly on coastal and near coastal ranges north from Victoria to near Forster, with two isolated occurrences inland north-west of Grafton. Coastal heathlands, margins of coastal swamps and sedgelands, coastal forest, dry woodland, and lowland forest.	0	No – not identified during survey, the subject land has been significantly disturbed, no local records.	No
<i>Epacris purpurascens</i> var. <i>purpurascens</i>	-	V	-	Recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. Sclerophyll forest, scrubs and swamps. Most habitats have a strong shale soil influence.	1	No – not identified during survey, the subject land has been significantly disturbed.	No
<i>Eucalyptus camfieldii</i>	Camfield's Stringybark	V	V	Narrow band from the Raymond Terrace area south to Waterfall. Coastal heath on shallow sandy soils overlying Hawkesbury sandstone, mostly on exposed sandy ridges.	0	No – not identified during survey, the subject land has been significantly disturbed, no local records.	No
<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	V	V	New England Tablelands from Nundle to north of Tenterfield. Dry grassy woodland, on shallow soils of slopes and ridges.	6	No – not identified during survey, the subject land has been significantly disturbed.	No
<i>Eucalyptus scoparia</i>	Wallangarra White Gum	E1	V	In NSW it is known from only three locations near Tenterfield. Open eucalypt forest, woodland and heaths on well-drained granite/rhyolite hilltops, slopes and rocky outcrops, typically at high altitudes.	3	No – not identified during survey, the subject land has been significantly disturbed.	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 10 km	Likelihood of occurrence within the subject land	Impact Assessment Required
<i>Genoplesium baueri</i>	Bauer's Midge Orchid	E1	E	Has been recorded from locations between Nowra and Pittwater and may occur as far north as Port Stephens. Dry sclerophyll forest and moss gardens over sandstone.	16	No – not identified during survey, the subject land has been significantly disturbed.	No
<i>Leucopogon exolasius</i>	Woronora Beard-heath	V	V	Upper Georges River area and in Heathcote National Park. Woodland on sandstone.	1	No – not identified during survey, the subject land has been significantly disturbed.	No
<i>Melaleuca biconvexa</i>	Biconvex Paperbark	V	V	Only found in NSW, populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Damp places, often near streams or low-lying areas on alluvial soils.	0	No – not identified during survey, the subject land has been significantly disturbed, no local records.	No
<i>Melaleuca deanei</i>	Deane's Paperbark	V	V	Ku-ring-gai/Berowra area, Holsworthy/Wedderburn area, Springwood (in the Blue Mountains), Wollemi National Park, Yalwal (west of Nowra) and Central Coast (Hawkesbury River) areas. Heath on sandstone.	14	No – not identified during survey, the subject land has been significantly disturbed.	No
<i>Persicaria elatior</i>	Knotweed	V	V	In south-eastern NSW recorded from Mt Dromedary, Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). Beside streams and lakes, swamp forest or disturbed areas.	0	No – not identified during survey, the subject land has been significantly disturbed, no local records.	No
<i>Persoonia hirsuta</i>	Hairy Geebung	E1	E	Scattered distribution around Sydney, from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. Sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	7	No – not identified during survey, the subject land has been significantly disturbed.	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 10 km	Likelihood of occurrence within the subject land	Impact Assessment Required
<i>Pimelea curviflora</i> var. <i>curviflora</i>	-	V	V	Confined to the coastal area of the Sydney and Illawarra regions between northern Sydney and Maroota in the north-west and Croom Reserve near Albion Park in the south. Woodland, mostly on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes.	1	No – not identified during survey, the subject land has been significantly disturbed.	No
<i>Pomaderris brunnea</i>	Brown Pomaderris	E1	V	In NSW, found around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. It also occurs near Walcha on the New England tablelands. Moist woodland or forest on clay and alluvial soils of flood plains and creek lines.	0	No – not identified during survey, the subject land has been significantly disturbed, no local records.	No
<i>Pomaderris prunifolia</i>	P. prunifolia in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas	E2	-	Population is known from only three sites: at Rydalmere, within Rookwood Cemetery and at The Crest of Bankstown. "At Rydalmere it occurs among grass species on sandstone near a creek. At Rookwood Cemetery it occurs in a small gully of degraded Cooks River / Castlereagh Ironbark Forest on shale soils.	1	No – not identified during survey, the subject land has been significantly disturbed.	No
<i>Rhizanthella slateri</i>	Eastern Australian Underground Orchid	V	E	In NSW, currently known from fewer than 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. Sclerophyll forest in shallow to deep loams.	0	No – not identified during survey, the subject land has been significantly disturbed.	No
<i>Senecio spathulatus</i>	Coast Groundsel	E1		Nadgee Nature Reserve (Cape Howe) and between Kurnell in Sydney and Myall Lakes National Park (with a possible occurrence at Cudmirrah). Scattered populations in Victoria from Wilsons Promontory to the NSW border. Frontal dunes in coastal areas.	8	No – not identified during survey, the subject land has been significantly disturbed.	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of records within 10 km	Likelihood of occurrence within the subject land	Impact Assessment Required
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E1	V	Only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. Subtropical and littoral rainforest on gravels, sands, silts and clays.	167	Known – previously recorded within subject land and identified during survey.	No horticultural specimens do not require further assessment.
<i>Thesium australe</i>	Austral Toadflax	V	V	In eastern NSW it is found in very small populations scattered along the coast, and from the Northern to Southern Tablelands. Grassland on coastal headlands or grassland and grassy woodland away from the coast.	0	No – not identified during survey, the subject land has been significantly disturbed, no local records.	No

BC Act Key: v = vulnerable, E1 = endangered, E2 = endangered population, E4A = critically endangered

EPBC Act Key v = vulnerable, E = endangered, CE = critically endangered, X = extinct, C, J, K = migratory under CAMBA, JAMBA, RoKAMBA, Bonn = Migratory under the Bonn convention, Mar = Marine



## Appendix B – Species list

Family	Scientific name	Common name	Exotic (*)	Priority Weed (PW) / Weed of National Significance (WoNS)
<b>FLORA</b>				
Acanthaceae	<i>Avicennia marina</i> var. <i>australasica</i>	Grey Mangrove		
Aizoaceae	<i>Tetragonia tetragonoides</i>	New Zealand Spinach		
Amaranthaceae	<i>Gomphrena celosioides</i>	Gomphrena Weed	*	
Apiaceae	<i>Foeniculum vulgare</i>	Fennel	*	
Apocynaceae	<i>Araujia sericifera</i>	Moth Vine	*	PW
Apocynaceae	<i>Gomphocarpus fruticosus</i>	Narrow-leaf Cotton Bush	*	
Apocynaceae	<i>Vinca major</i>	Periwinkle	*	
Araliaceae	<i>Hydrocotyle bonariensis</i>	Large-leaf Pennywort	*	
Arecaceae	<i>Phoenix canariensis</i>	Canary Island Date Palm	*	PW
Asparagaceae	<i>Asparagus aethiopicus</i>	Ground Asparagus	*	PW, WoNS
Asteraceae	<i>Ageratina adenophora</i>	Crofton Weed	*	PW
Asteraceae	<i>Arctotheca calendula</i>	Capeweed	*	
Asteraceae	<i>Bidens pilosa</i>	Cobbler's Pegs	*	
Asteraceae	<i>Conyza bonariensis</i>	Flax-leaf Fleabane	*	
Asteraceae	<i>Hypochaeris radicata</i>	Catsear	*	
Asteraceae	<i>Solidago altissima</i> subsp. <i>altissima</i>	Goldenrod	*	
Asteraceae	<i>Soliva sessilis</i>	Jo-jo	*	
Asteraceae	<i>Sonchus oleraceus</i>	Common Sowthistle	*	
Asteraceae	<i>Taraxacum officinale</i>	Dandelion	*	
Brassicaceae	<i>Brassica fruticulosa</i>	Twiggy Turnip	*	
Cactaceae	<i>Opuntia monacantha</i>	Drooping Pear	*	PW, WoNS
Cannabaceae	<i>Celtis australis</i>		*	PW
Cannabaceae	<i>Celtis occidentalis</i>	Hackberry	*	
Caryophyllaceae	<i>Paronychia brasiliiana</i>	Chilean Whitlow Wort	*	
Casuarinaceae	<i>Casuarina glauca</i>	Swamp Oak		
Chenopodiaceae	<i>Sarcocornia quinqueflora</i>	Samphire		
Chenopodiaceae	<i>Suaeda australis</i>	Seablite		
Commelinaceae	<i>Commelina cyanea</i>	Scurvy Weed		

Family	Scientific name	Common name	Exotic (*)	Priority Weed (PW) / Weed of National Significance (WoNS)
Convolvulaceae	<i>Ipomoea indica</i>	Morning Glory	*	PW
Crassulaceae	<i>Crassula ovata</i>	Jade Plant	*	
Cyperaceae	<i>Ficinia nodosa</i>	Knobby Club-rush		
Euphorbiaceae	<i>Ricinus communis</i>	Castor Oil Plant	*	
Fabaceae (Faboideae)	<i>Acacia fimbriata</i>	Fringed Wattle		
Fabaceae (Faboideae)	<i>Medicago polymorpha</i>	Burr Medic	*	
Fabaceae (Mimosoideae)	<i>Acacia longifolia</i> subsp. <i>longifolia</i>	Sydney Golden Wattle		
Fabaceae (Mimosoideae)	<i>Acacia saligna</i>	Golden Wreath Wattle	*	PW
Juncaceae	<i>Juncus acutus</i>	Spiny Rush	*	PW
Lomandraceae	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush		
Malvaceae	<i>Abutilon theophrasti</i>		*	
Malvaceae	<i>Malva neglecta</i>	Dwarf Mallow	*	
Malvaceae	<i>Modiola caroliniana</i>	Red-flowered Mallow	*	
Malvaceae	<i>Sida rhombifolia</i>	Paddy's Lucerne	*	
Meliaceae	<i>Melia azedarach</i>	White Cedar		
Moraceae	<i>Ficus macrophylla</i>	Moreton Bay Fig		
Myrtaceae	<i>Acmena smithii</i>	Lilly Pilly		
Myrtaceae	<i>Agonis flexuosa</i>	Willow Myrtle		
Myrtaceae	<i>Callistemon citrinus</i>	Crimson Bottlebrush		
Myrtaceae	<i>Corymbia gummifera</i>	Red Bloodwood		
Myrtaceae	<i>Corymbia maculata</i>	Spotted Gum		
Myrtaceae	<i>Eucalyptus grandis</i>	Flooded Gum		
Myrtaceae	<i>Eucalyptus microcorys</i>	Tallowwood		
Myrtaceae	<i>Kunzea ambigua</i>	Tick Bush		
Myrtaceae	<i>Melaleuca ericifolia</i>	Swamp Paperbark		
Myrtaceae	<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark		
Myrtaceae	<i>Sannantha pluriflora</i>			
Myrtaceae	<i>Syzygium paniculatum</i> (horticultural variety)	Magenta Lilly Pilly (horticultural variety)		
Myrtaceae	<i>Syzygium</i> sp.			
Oleaceae	<i>Olea europaea</i> subsp. <i>cuspidata</i>	African Olive	*	PW

Family	Scientific name	Common name	Exotic (*)	Priority Weed (PW) / Weed of National Significance (WoNS)
Oxalidaceae	<i>Oxalis</i> sp.		*	
Plantaginaceae	<i>Plantago lanceolata</i>	Plantain	*	
Poaceae	<i>Axonopus fissifolius</i>	Narrow-leaf Carpet Grass	*	
Poaceae	<i>Cenchrus clandestinus</i>	Kikuyu	*	PW
Poaceae	<i>Chloris gayana</i>	Rhodes Grass	*	PW
Poaceae	<i>Cynodon dactylon</i>	Couch	*	
Poaceae	<i>Ehrharta erecta</i>	Vasey Grass	*	
Poaceae	<i>Eleusine indica</i>	Crowsfoot Grass	*	
Poaceae	<i>Eragrostis curvula</i>	African Lovegrass	*	PW
Poaceae	<i>Eragrostis</i> sp.			
Poaceae	<i>Eragrostis tenuifolia</i>	Elastic Grass	*	
Poaceae	<i>Panicum antidotale</i>	Giant Panic Grass	*	
Poaceae	<i>Panicum capillare</i> var. <i>occidentale</i>		*	
Poaceae	<i>Paspalum dilatatum</i>	Paspalum	*	
Poaceae	<i>Phragmites australis</i>	Common Reed		
Poaceae	<i>Poa annua</i>	Annual Poa	*	
Poaceae	<i>Setaria parviflora</i>	Slender Pigeon Grass	*	
Poaceae	<i>Sporobolus africanus</i>	Parramatta Grass	*	
Poaceae	<i>Stenotaphrum secundatum</i>	Buffalo Grass	*	
Polygonaceae	<i>Acetosa sagittata</i>	Turkey Rhubarb	*	PW
Polygonaceae	<i>Rumex crispus</i>	Curled Dock	*	
Proteaceae	<i>Banksia integrifolia</i>	Coast Banksia		
Sapindaceae	<i>Cupaniopsis anacardioides</i>	Tuckeroo		
Solanaceae	<i>Cestrum parqui</i>	Green Cestrum	*	PW
Solanaceae	<i>Solanum nigrum</i>	Black-berry Nightshade	*	
Urticaceae	<i>Parietaria judaica</i>	Asthma Weed	*	PW
Verbenaceae	<i>Lantana camara</i>	Lantana	*	PW, WoNS
Verbenaceae	<i>Verbena bonariensis</i>	Purple Tops	*	
Verbenaceae	<i>Verbena officinalis</i>	Common Verbena	*	

Class	Family	Scientific name	Common name
<b>FAUNA</b>			
Aves	Anatidae	<i>Anas superciliosa</i>	Pacific Black Duck
Aves	Ardeidae	<i>Ardea modesta</i>	Eastern Great Egret
Aves	Ardeidae	<i>Egretta novaehollandiae</i>	White-faced Heron
Aves	Artamidae	<i>Cracticus tibicen</i>	Australian Magpie
Aves	Artamidae	<i>Strepera graculina</i>	Pied Currawong
Aves	Charadriidae	<i>Vanellus miles</i>	Masked Lapwing
Aves	Columbidae	<i>Spilopelia chinensis</i>	Spotted Dove
Aves	Halcyonidae	<i>Dacelo novaeguineae</i>	Laughing Kookaburra
Aves	Hirundinidae	<i>Hirundo neoxena</i>	Welcome Swallow
Aves	Maluridae	<i>Malurus cyaneus</i>	Superb Fairy-wren
Aves	Meliphagidae	<i>Anthochaera carunculata</i>	Red Wattlebird
Aves	Meliphagidae	<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater
Aves	Recurvirostridae	<i>Himantopus himantopus</i>	Black-winged Stilt
Aves	Threskiornithidae	<i>Platalea regia</i>	Royal Spoonbill

## Appendix C – Tests of Significance

The ‘Test of significance’ (5-part test) is applied to species, populations and ecological communities listed on Schedules 1 and 2 of the BC Act. The assessment sets out 5 factors, which when considered, allow proponents to undertake a qualitative analysis of the likely impacts of an action and to determine whether a significant impact is likely. All factors must be considered, and an overall conclusion made based on all factors in combination.

### C1 Frogs

The following two threatened frog species have previously been recorded with the subject land:

- *Crinia tinnula* (Wallum Froglet), listed as vulnerable
- *Litoria aurea* (Green and Golden Bell Frog), listed as endangered.

The description and habitat associations of each species are presented in Appendix A. Neither species was recorded during survey, however each has been recorded previously and suitable habitat for both species was identified in the waterbodies and surrounding vegetation identified along the north and western boundaries of the subject land.

The proposed works would not directly impact waterbodies or fringing vegetation. However, the proposed works have the potential to indirectly impact the species through increased levels of artificial lighting and changes to water quality. The potential for indirect impact was addressed in the design of the proposed works, which include the establishment between the site of the proposed works and the Landing Lights Wetlands. Given that the same habitat features were identified for both species within the subject land, and given that the proposed works pose similar potential impacts to both species, a single Test of Significance was applied for both species.

BC Act	Question	Response
7.3.1 a)	In the case of a threatened species: whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction	The proposed works would not directly impact habitat for the Wallum Froglet and Green and Golden Bell Frog but may have indirect impacts on their habitat through increased levels of artificial light and decreased levels of water quality. These indirect impacts could affect the life cycle of both species through disrupting or changing foraging/breeding behaviour. However, given that habitat for these species is located in the northwest of the subject land, it is likely that the 20 m buffer of vegetation being retained will lessen indirect impacts. Furthermore, indirect impacts would be managed through the implementation of mitigation measures. As such, the proposed works would not have such an adverse effect as to place viable local populations of either species at risk of extinction.
7.3.1 b) i	In the case of an endangered ecological community or critically endangered ecological	Not applicable



BC Act	Question	Response
	community, whether the proposed development or activity:  Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	
7.3.1 b) ii	In the case of an endangered ecological community or critically endangered ecological community:  Whether the proposed development or activity is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.	Not applicable
7.3.1 c) i	In relation to the habitat of a threatened species or ecological community:  The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity	The proposed works would not remove habitat for these threatened species. Frog habitat may be modified through indirect impacts, however these indirect impacts would be managed. The increase of artificial light which could spill from the proposed sporting grounds would be managed by the 20 m buffer between the subject site and the habitat location. Indirect impacts could also result in decreased water quality. However, this is considered unlikely given that the proposed works include a vegetation buffer, stormwater management plans, and sediment and erosion controls.
7.3.1 c) ii	In relation to the habitat of a threatened species or ecological community:  Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity	The site of the proposed works is set back from areas of frog habitat by a 20 m vegetated buffer and would not remove habitat for threatened frogs. Therefore, the proposed works would not fragment or isolate areas of habitat for either species.
7.3.1 c) iii	In relation to the habitat of a threatened species or ecological community:  The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.	Frog habitat within and around Barton Park has been significantly modified over time and is already subject to high levels of artificial light resulting from its proximity to the residences, the M5 and Sydney Airport. Habitat identified within the subject land is considered important because it has been observed to be used by Wallum Froglet and Green and Golden Bell Frog. However, habitat would not be removed, fragmented or isolated and modification to habitat resulting from indirect impacts are considered minimal.
7.3.1 d)	Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).	The subject land does not contain any declared areas of outstanding biodiversity value.
7.3.1 e)	Whether the proposed development or activity is or is part of a key threatening process or is likely	One key threatening process, alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands, is associated with the

BC Act	Question	Response
	to increase the impact of a key threatening process.	proposed works and is relevant to the Wallum Froglet and Green and Golden Bell Frog. The impacts of this key threatening process resulting from the proposed works would be minimised by the establishment of a 20 m vegetation buffer between the direct impacts and areas of frog habitat, and the implementation of mitigation measures.
Conclusion	Is there likely to be a significant impact?	<p>No. The proposed works are unlikely to have a significant impact on the Wallum Froglet or Green and Golden Bell Frog for the following reasons:</p> <ul style="list-style-type: none"> <li>• The proposed works would not remove habitat for these species.</li> <li>• Potential indirect impacts (increased artificial light and decreased water quality) would be minimised by the maintenance of a 20 m vegetation buffer between the wetland and direct impacts, and the implementation of mitigation measures.</li> </ul>

## C2 Woodland birds

The following species were not observed during field survey but have the potential to occur within the subject land:

- *Anthochaera phrygia* (Regent Honeyeater), listed as critically endangered
- *Artamus cyanopterus cyanopterus* (Dusky Woodswallow), listed as vulnerable
- *Callocephalon fimbriatum* (Gang-gang Cockatoo), listed as vulnerable
- *Glossopsitta pusilla* (Little Lorikeet), listed as vulnerable
- *Lathamus discolor* (Swift Parrot), listed as endangered.

These species have varying habitat associations (Appendix B). However, within the context of the proposed works foraging habitat within the subject land was limited to planted Eucalypt species identified within areas of 'mixed native plantings' or 'weeds and native plantings'. The proposed works would remove 1.91 ha of this vegetation. No breeding habitat would be impacted. Given the similarity between foraging habitat within the subject land, a single Test of Significance was applied for the above species.

BC Act	Question	Response
7.3.1 a)	In the case of a threatened species: whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction	The proposed works would remove 1.91 ha of vegetation, containing foraging species for the Regent Honeyeater, Dusky Woodswallow, Gang-gang Cockatoo, Little Lorikeet and Swift Parrot. No breeding habitat would be impacted as part of the proposed works. Therefore, it is considered unlikely that the proposed works would place a viable population of any of these species at risk of extinction. Similar habitat would be retained within the subject land and is also present immediately adjacent to Barton Park.
7.3.1 b) i	In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:  Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Not applicable
7.3.1 b) ii	In the case of an endangered ecological community or critically endangered ecological community:  Whether the proposed development or activity is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.	Not applicable
7.3.1 c) i	In relation to the habitat of a threatened species or ecological community:	The proposed works would remove 1.91 ha of vegetation, containing foraging habitat for the threatened bird species listed above. No breeding habitat would be impacted as part of the proposed works. The extent of this removal is considered minimal given that similar habitat would be

BC Act	Question	Response
	The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity	retained within the subject land and is also present immediately adjacent to Barton Park.
7.3.1 c) ii	In relation to the habitat of a threatened species or ecological community:  Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity	The proposed works would remove 1.91 ha of planted native vegetation from the middle of Barton Park. Feed tree species present within these areas are already relatively fragmented by the urban setting and dominance of weed species in some area. Therefore, the proposed works would not contribute to further fragmenting or isolating of habitat for the threatened species. The species are highly mobile and will still be able to access foraging habitat in Barton Park and surrounds.
7.3.1 c) iii	In relation to the habitat of a threatened species or ecological community:  The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.	The works would remove 1.91 ha of foraging habitat the Regent Honeyeater, Dusky Woodswallow, Gang-gang Cockatoo, Little Lorikeet and Swift Parrot. This habitat to be removed is not considered vital to the long-term survival of this species within the locality because the species is highly mobile and would be able to continue foraging in similar vegetation within Barton Park and surrounds. Furthermore, the proposed works would not remove breeding habitat.
7.3.1 d)	Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).	The proposed works would not impact any declared area of outstanding biodiversity value.
7.3.1 e)	Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.	One key threatening process, clearing of native vegetation, is associated with the proposed works and is relevant to the threatened species. The impacts of this key threatening process resulting from the proposed works are considered to minimal. The species is highly mobile and would be able to continue foraging in similar vegetation retained within Barton Park and available adjacent to the subject land.
Conclusion	Is there likely to be a significant impact?	No. The proposed activity is unlikely to have a significant impact on the Regent Honeyeater, Dusky Woodswallow, Gang-gang Cockatoo, Little Lorikeet or Swift Parrot for the following reasons: <ul style="list-style-type: none"> <li>• The 1.91 ha of habitat are degraded by exotic species and are therefore considered marginal.</li> <li>• Similar habitat for this species will be retained within the subject land and more is available adjacent to the subject land.</li> <li>• No breeding habitat would be removed.</li> </ul>

### C3 Wetland birds

The following threatened wetland birds have previously been recorded with the subject land or were identified as potentially occurring within the subject land:

- *Anseranas semipalmata* (Magpie Goose), listed as vulnerable
- *Botaurus poiciloptilus* (Australasian Bittern), listed as endangered
- *Burhinus grallarius* (Bush Stone-curlew), listed as endangered
- *Calidris alba* (Sanderling), listed as vulnerable
- *Calidris ferruginea* (Curlew Sandpiper), listed as endangered
- *Calidris tenuirostris* (Great Knot), listed as vulnerable
- *Charadrius mongolus* (Lesser Sand-plover), listed as vulnerable
- *Epthianura albifrons* (White-fronted Chat), listed as vulnerable
- *Haematopus fuliginosus* (Sooty Oystercatcher), listed as vulnerable
- *Haematopus longirostris* (Pied Oystercatcher), listed as endangered
- *Ixobrychus flavicollis* (Black Bittern), listed as vulnerable
- *Limosa limosa* (Black-tailed Godwit), listed as vulnerable.

The description and habitat associations of each species are presented in Appendix A. None of the above species was recorded during survey, however Sanderling, Curlew Sandpiper, Black Bittern and Black-tailed Godwit were previously recorded within the subject land. The subject land contains habitat for all of the species listed above, particularly in the mangroves along the eastern boundary which are adjacent to the wetlands of Muddy Creek.

The proposed works would not directly impact the wetlands. However, the proposed works have the potential to indirectly impact the species through increased levels of artificial lighting and changes to water quality. Given that the same habitat features were identified for the above species within the subject land, and given that the proposed works pose similar potential impacts to both species, a single Test of Significance was applied for all of the above species.

BC Act	Question	Response
7.3.1 a)	In the case of a threatened species: whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction	<p>The proposed works would not directly impact habitat for threatened wetland birds, but may have indirect impacts on their habitat through increased levels of artificial light and decreased levels of water quality. These indirect impacts could affect the life cycle of the listed species through disrupting or changing foraging/breeding behaviour.</p> <p>According to the National Light Pollution Guidelines for Wildlife (DAWE 2020), "There is evidence that night-time lighting of migratory shorebird foraging areas may benefit the birds by allowing greater visual foraging opportunities. However, where nocturnal roosts are artificially illuminated, shorebirds may be displaced, potentially reducing their local abundance if the energetic cost to travel between suitable nocturnal roosts and foraging sites is too great."</p>



BC Act	Question	Response
		Given that indirect impacts will be addressed through the implementation of a 20 m vegetated buffer, application of mitigation measures, and the availability of similar habitat throughout Botany Bay, the proposed works would not have such an adverse effect as to place viable local populations of either species at risk of extinction.
7.3.1 b) i	<p>In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:</p> <p>Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or</p>	Not applicable
7.3.1 b) ii	<p>In the case of an endangered ecological community or critically endangered ecological community:</p> <p>Whether the proposed development or activity is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.</p>	Not applicable
7.3.1 c) i	<p>In relation to the habitat of a threatened species or ecological community:</p> <p>The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity</p>	The proposed works would not remove habitat for the threatened species.
7.3.1 c) ii	<p>In relation to the habitat of a threatened species or ecological community:</p> <p>Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity</p>	Habitat for the threatened birds would retain its connectivity with other wetlands and Mangroves in Muddy Creek and the greater Botany Bay area. The proposed works would not fragment or isolate habitat for threatened birds.
7.3.1 c) iii	<p>In relation to the habitat of a threatened species or ecological community:</p> <p>The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.</p>	Bird habitat within and around Barton Park has been significantly modified over time and is already subject to high levels of artificial light resulting from its proximity to the residences, the M5 and Sydney Airport. Habitat identified within the subject land is important but would not be removed, fragmented or isolated and modification to habitat resulting from indirect impacts are considered minimal.
7.3.1 d)	Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).	The subject land does not contain any declared areas of outstanding biodiversity value.
7.3.1 e)	Whether the proposed development or activity is or is part of a key threatening process or is likely	One key threatening process, alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands, is associated with the

BC Act	Question	Response
	to increase the impact of a key threatening process.	proposed works and is relevant to the threatened wetland bird species being assessed. The impacts of this key threatening process resulting from the proposed works would be minimised by the implementation of mitigation measures.
Conclusion	Is there likely to be a significant impact?	<p>No. The proposed works are unlikely to have a significant impact on the Magpie Goose, Australasian Bittern, Bush Stone-curlew, Sanderling, Curlew Sandpiper, Great Knot, Lesser Sand-plover, White-fronted Chat, Sooty Oystercatcher, Pied Oystercatcher, Black Bittern or Black-tailed Godwit for the following reasons:</p> <ul style="list-style-type: none"> <li>• The proposed works would not remove habitat for these species.</li> <li>• Connectivity between areas of habitat within Barton Park and larger areas of habitat in Muddy Creek and Botany Bay would be retained. The highly mobile species would still be able to move between these.</li> <li>• Potential indirect impacts (increased artificial light and decreased water quality) would be minimised by the maintenance of a 20 m vegetated buffer between the wetlands and the proposed works and the application of mitigation measures.</li> </ul>

#### C4 *Chalinolobus dwyeri* (Large-eared Pied Bat)

The Large-eared Pied Bat is listed as vulnerable under the BC Act and EPBC Act. The description and habitat associations of this species are presented in Appendix B. This species was not observed during field survey. The subject site contains habitat for the species in the form of Fairy Martin mud nests, which represent potential roosting habitat, and native vegetation, which represents foraging habitat. Breeding is limited to sandstone caves, therefore no breeding habitat would be impacted

BC Act	Question	Response
7.3.1 a)	In the case of a threatened species: whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction	The proposed works would remove 1.91 ha of vegetation and Fairy Martin nests which may provide roosting and foraging habitat. No breeding habitat in the form of sandstone caves would be impacted as part of the proposed works. It is considered unlikely that the proposed works would place a viable population of the species at risk of extinction.
7.3.1 b) i	In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:  Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Not applicable
7.3.1 b) ii	In the case of an endangered ecological community or critically endangered ecological community:  Whether the proposed development or activity is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.	Not applicable
7.3.1 c) i	In relation to the habitat of a threatened species or ecological community:  The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity	The proposed works would remove roosting and foraging habitat for the species. These impacts are considered negligible given that similar foraging habitat will be retained within Barton Park and is available adjacent to the subject land. The species is highly mobile and could continue to access additional habitat. No breeding habitat (sandstone caves) would be impacted.
7.3.1 c) ii	In relation to the habitat of a threatened species or ecological community:  Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity	The proposed works would remove 1.91 ha of planted native vegetation from the middle of Barton Park. Feed tree species present within these areas are already relatively fragmented by the urban setting and dominance of weed species in some areas. Therefore, the proposed works would not contribute to further fragmenting or isolating of habitat for the threatened species. The species are highly mobile and will still be able to access foraging habitat in Barton Park and surrounds.
7.3.1 c) iii	In relation to the habitat of a threatened species or ecological community:	The works would remove 1.91 ha of foraging habitat for the Large-eared Pied Bat. This habitat to be removed is not considered vital to the long-term survival of this species

BC Act	Question	Response
	The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.	within the locality because the species is highly mobile and would be able to continue foraging in similar vegetation within Barton Park and surrounds. Furthermore, the proposed works would not remove breeding habitat.
7.3.1 d)	Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).	The proposed works would not impact any declared area of outstanding biodiversity value.
7.3.1 e)	Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.	One key threatening process, clearing of native vegetation, is associated with the proposed works and is relevant to the threatened species. The impacts of this key threatening process resulting from the proposed works are considered to minimal. The species is highly mobile and would be able to continue foraging in similar vegetation retained within Barton Park and available adjacent to the subject land.
Conclusion	Is there likely to be a significant impact?	<p>No. The proposed activity is unlikely to have a significant impact on the Large-eared Pied Bat for the following reasons:</p> <ul style="list-style-type: none"> <li>• The extent of habitat to be removed is minimal (1.91 ha).</li> <li>• Similar habitat for this species will be retained within the subject land and more is available adjacent to the subject land.</li> <li>• No breeding habitat would be removed.</li> </ul>

### C5 *Pteropus poliocephalus* (Grey-headed Flying Fox)

The Grey-headed Flying-fox is listed as vulnerable under the BC Act and EPBC Act. The description and habitat associations of this species are presented in Appendix A. This species was not observed during field survey but has been recorded within the subject land in the past. The subject land contains habitat for the species in areas of vegetation identified as ‘mixed native plantings’ or ‘weeds and native plantings’. The proposed works would remove 1.91 ha of this habitat. No breeding habitat (camps) would be impacted.

BC Act	Question	Response
7.3.1 a)	In the case of a threatened species: whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction	The proposed works would remove 1.91 ha of foraging habitat for the Grey-headed Flying-fox. No breeding habitat in the form of camps would be impacted as part of the proposed works. It is considered unlikely that the proposed works would place a viable population of the species at risk of extinction given that foraging habitat would be retained within Barton Park and surrounds which the highly mobile species could access.
7.3.1 b) i	In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:  Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Not applicable
7.3.1 b) ii	In the case of an endangered ecological community or critically endangered ecological community:  Whether the proposed development or activity is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.	Not applicable
7.3.1 c) i	In relation to the habitat of a threatened species or ecological community:  The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity	The proposed works would remove 1.91 ha of foraging habitat for this species. These impacts are considered minor given that foraging habitat would be retained within Barton Park and surrounds, and the species is highly mobile. No breeding habitat (camps) would be impacted.
7.3.1 c) ii	In relation to the habitat of a threatened species or ecological community:  Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity	The proposed works would remove 1.91 ha of planted native vegetation from the middle of Barton Park. Feed tree species present within these areas are already relatively fragmented by the urban setting and dominance of weed species in some area. Therefore, the proposed works would not contribute to further fragmenting or isolating of habitat for the threatened species. The species are highly mobile and will still be able to access foraging habitat in Barton Park and surrounds.

BC Act	Question	Response
7.3.1 c) iii	<p>In relation to the habitat of a threatened species or ecological community:</p> <p>The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.</p>	The works would remove 1.91 ha of foraging habitat the Grey-headed Flying-fox. This habitat to be removed is not considered vital to the long-term survival of this species within the locality because the species is highly mobile and would be able to continue foraging in similar vegetation within Barton Park and surrounds. Furthermore, the proposed works would not remove breeding habitat.
7.3.1 d)	Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).	The proposed works would not impact any declared area of outstanding biodiversity value.
7.3.1 e)	Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.	The key threatening process, clearing of native vegetation, is associated with the proposed works. However, impacts resulting from these processes are considered to be minimal. The species is highly mobile and would be able to continue foraging in similar vegetation within and adjacent to the subject land.
Conclusion	Is there likely to be a significant impact?	<p>No. The proposed activity is unlikely to have a significant impact on the Grey-headed Flying-fox for the following reasons:</p> <ul style="list-style-type: none"> <li>• The extent of habitat to be removed is minimal (1.91 ha).</li> <li>• Similar habitat for this species will be retained within the subject land and more is available adjacent to the subject land.</li> <li>• No breeding habitat would be removed.</li> </ul>



## Appendix D – Application of Significant Impact Criteria

This assessment has been prepared in accordance with the EPBC Act Matters of National Environmental Significance: Significant Impact Guidelines 1.1 (DAWE 2013). These guidelines have been established to assist proponents to determine whether a proposed action is likely to result in a significant impact on a matter of national environmental significance.

### D1 *Litoria aurea* (Green and Golden Bell Frog)

Criterion	Question	Response
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
1)	lead to a long-term decrease in the size of an important population of a species	All current populations of Green and Golden Bell Frog are regarded as an 'important population'. The proposed works would not directly impact habitat for the Green and Golden Bell Frog but may have indirect impacts on its habitat through increased levels of artificial light and decreased levels of water quality. These indirect impacts could affect the life cycle of the species through disrupting or changing foraging/breeding behaviour. However, these would be managed by stormwater management, sediment controls and maintenance of a vegetated 20 m buffer, therefore this is considered minimal.
2)	reduce the area of occupancy of an important population	The proposed works would not remove habitat for Green and Golden Bell Frog. However, it may have indirect impacts on the area of occupancy of the species by increasing levels of artificial light and decreasing water quality. However, given the proposed 20 m buffer between habitat and the location of the proposed works, and the proposed implementation of mitigation measures, it is considered unlikely that the proposed works would reduce the area of occupancy of the species.
3)	fragment an existing important population into two or more populations	The proposed works only have the potential to indirectly impact habitat for Green and Golden Bell Frog, however these potential impacts would be controlled. Habitat features would still be present within Barton Park and dispersal would still be possible. Therefore, the proposed works would not fragment the existing population.
4)	adversely affect habitat critical to the survival of a species	The proposed works would not adversely affect habitat critical to the survival of the Green and Golden Bell Frog. Habitat for the species would not be removed but might be indirectly impacted by increased artificial lighting and decreased water quality. However, these indirect impacts would be minimised by the 20 m buffer between the habitat and the site of the proposed works as well as the implementation of mitigation measures.
5)	disrupt the breeding cycle of an important population	The proposed works may indirectly impact the breeding cycle of the Green and Golden Bell Frog through increased artificial lighting and decreased water quality. However, these indirect impacts would not disrupt the breeding cycle.

Criterion	Question	Response
		entirely given that habitat would be retained, the maintenance of a 20 m buffer and the implementation of mitigation measures.
6)	modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed works would modify the habitat for Green and Golden Bell Frog through indirect impacts. However, it is unlikely that minimal indirect impacts would cause the species to decline because the establishment of a 20 m buffer and adherence to mitigation measures form part of the proposed works.
7)	result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The proposed action is unlikely to result in the establishment of an invasive species that is harmful to the Green and Golden Bell Frog due to mitigation measures regarding the spread of weed propagules and the 20 m buffer between habitat for the species and the subject site.
8)	introduce disease that may cause the species to decline, or	Infection with <i>Batrachochytrium dendrobatidis</i> (Chytrid Fungus) is listed as a main threat to the Green and Golden Bell Frog. The proposed works are unlikely to introduce the Chytrid Fungus.
9)	interfere substantially with the recovery of the species.	Habitat degradation, including increased light, is a principal threat to Green and Golden Bell Frog. This principal threat would be addressed through the implementation of mitigation measures.
Conclusion	Is there likely to be a significant impact?	<p>No. The proposed action is unlikely to have a significant impact on the Green and Golden Bell Frog for the following reasons:</p> <ul style="list-style-type: none"> <li>• The proposed works would not remove habitat for these species.</li> <li>• Potential indirect impacts (increased artificial light and decreased water quality) would be minimised by the 20 m buffer between the subject site and habitat, and the implementation of mitigation measures.</li> </ul>

## D2 Regent Honeyeater and Swift Parrot

Criterion	Question	Response
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility of the following:		
1)	will the action lead to a long-term decrease in the size of a population	A 'population of a species' refers to a population, or collection of local populations, that occurs within a particular bioregion. The proposed works would remove 1.91 ha of planted native vegetation, containing foraging habitat for Regent Honeyeater and Swift Parrot. No breeding habitat would be impacted as part of the proposed works. Given that the species are highly mobile and can continue to access foraging habitat retained within Barton Park and surrounds, the proposed works would not lead to a long-term decrease in populations of either species.
2)	will the action reduce the area of occupancy of the species	The proposed action would reduce the area of occupancy of both species through the direct removal of 1.91 ha of foraging habitat. More foraging habitat would be retained within the subject land and similar habitat is available adjacent to the subject land. No breeding habitat would be removed.
3)	will the action fragment an existing population into two or more populations	The proposed action would remove 1.91 ha of foraging habitat for the species to use seasonally and sporadically. No breeding habitat would be removed. Subsequently, the proposed works would not fragment populations of either species.
4)	will the action adversely affect habitat critical to the survival of a species	The NSW Scientific Committee Final Determination for this species identifies Mugga Ironbark-box communities as valuable habitat for the Regent Honey Eater. The National Recovery Plan for the Swift Parrot identify critical habitat as those with a "level of site fidelity or possess[ing] phenological characteristics likely to be of importance to the Swift Parrot, or are otherwise identified by the recovery team". The proposed works would not impact critical habitat for either species.
5)	will the action disrupt the breeding cycle of a population	The Regent Honeyeater has three known key breeding areas, none of which contain Barton Park. The Swift Parrot breeds only in Tasmania. The breeding cycle of these species might be impacted by the loss of 1.91 ha of foraging habitat. However, these impacts are considered minimal given the availability of foraging habitat within Barton Park and surrounds.
6) i	will the action modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed works would remove 1.91 ha of foraging habitat available for the species within the subject site. The highly mobile species would still be able to access foraging habitat retained within Barton Park and surrounds.
6) ii	will the action result in invasive species that are harmful to a critically endangered or endangered species becoming established in	The proposed action is unlikely to result in the establishment of an invasive species that is harmful to the Regent Honeyeater or Swift Parrot.

Criterion	Question	Response
	the endangered or critically endangered species' habitat	
7)	will the action introduce disease that may cause the species to decline	The proposed action is unlikely to introduce disease (such as Psittacine Beak and Feather Disease) that may cause the Regent Honeyeater or Swift Parrot to decline.
8)	will the action interfere with the recovery of the species	<p>One threat activity identified within the National Recovery Plan for the Regent Honeyeater 2016 and the National Recovery Plan for the Swift Parrot 2011 is relevant to the proposed development: Habitat degradation/ Habitat loss and alteration.</p> <p>The proposed action would remove 1.91 ha of foraging habitat for these species. However, this threat is considered minimal given that similar habitat would still be available for the highly mobile species within and adjacent to the subject land.</p>
Conclusion	Is there likely to be a significant impact?	<p>No. The proposed activity is unlikely to have a significant impact on the Regent Honeyeater or Swift Parrot for the following reasons:</p> <ul style="list-style-type: none"> <li>• The extent of habitat to be removed is minimal (1.91 ha).</li> <li>• Similar habitat for this species will be retained within the subject land and more is available adjacent to the subject land.</li> <li>• No breeding habitat would be removed.</li> </ul>

### D3 Threatened wetland birds

Criterion	Question	Response
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility of the following:		
1)	will the action lead to a long-term decrease in the size of a population	The proposed works would not directly impact habitat for Australasian Bittern, Red Knot, Curlew Sandpiper, Great Knot, Lesser Sand-plover or Eastern Curlew. The proposed works may have indirect impacts on their habitat through increased levels of artificial light and decreased levels of water quality, however these are considered unlikely to lead to a long-term decrease in the size of a population.
2)	will the action reduce the area of occupancy of the species	The proposed works may have indirect impacts on wetlands which provide habitat for these species, however it is considered unlikely that the area of occupancy of the species would be reduced as a result.
3)	will the action fragment an existing population into two or more populations	A 'population of a species' refers to a population, or collection of local populations, that occurs within a particular bioregion. The Australasian Bittern, Red Knot, Curlew Sandpiper, Great Knot, Lesser Sand-plover and Eastern Curlew are highly mobile and/or migratory species which may use the wetlands adjacent to the subject land seasonally and sporadically and are not known to occupy the subject land as a particular population. Subsequently, the proposed works would not fragment populations of any of these species.
4)	will the action adversely affect habitat critical to the survival of a species	The proposed works would affect habitat for these species through indirect impacts, however the extent and duration of these impacts would be addressed through the implementation of mitigation measures which would lessen any adverse effects.
5)	will the action disrupt the breeding cycle of a population	The proposed action would not remove breeding habitat for these species. Normal foraging/breeding behaviour may be indirectly by the proposed impacts but only to a small extent which would not disrupt the breeding cycle of populations of any of the species.
6) i	will the action modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Bird habitat within and around Barton Park has been significantly modified over time and is already subject to high levels of artificial light resulting from its proximity to the residences, the M5 and Sydney Airport. Habitat identified within the subject land is important but would not be removed, fragmented or isolated and modification to habitat resulting from indirect impacts are considered minimal.
6) ii	will the action result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	The proposed works are unlikely to result in the establishment of an invasive species that is harmful to the threatened wetland birds.

Criterion	Question	Response
7)	will the action introduce disease that may cause the species to decline	The proposed works are unlikely to introduce disease that may cause the Australasian Bittern, Red Knot, Curlew Sandpiper, Great Knot, Lesser Sand-plover or Eastern Curlew to decline.
8)	will the action interfere with the recovery of the species	The proposed works would indirectly impact the recovery of the species through the increase of artificial light and decrease in water quality. However, this would be minimised through the application of mitigation measures and the highly mobile species will still be able to use the habitat and access similar habitat throughout Botany Bay.
Conclusion	Is there likely to be a significant impact?	<p>No. The proposed works are unlikely to have a significant impact on the Magpie Goose, Australasian Bittern, Bush Stone-curlew, Sanderling, Curlew Sandpiper, Great Knot, Lesser Sand-plover, White-fronted Chat, Sooty Oystercatcher, Pied Oystercatcher, Black Bittern or Black-tailed Godwit for the following reasons:</p> <ul style="list-style-type: none"> <li>• The proposed works would not remove habitat for these species.</li> <li>• Connectivity between areas of habitat within Barton Park and larger areas of habitat in Muddy Creek and Botany Bay would be retained. The highly mobile species would still be able to move between these.</li> <li>• Potential indirect impacts (increased artificial light and decreased water quality) would be minimised by the application of mitigation measures.</li> </ul>



## D4 Migratory birds

Criterion	Question	Response
An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:		
1)	substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	The proposed works would not destroy habitat for the Sharp-tailed Sandpiper, Sanderling, White-throated Needletail or Black-tailed Godwit. The proposed works would modify habitat for these species through indirect impacts resulting from increased lighting and decreased water quality. However, the wetlands are already subject to high levels of light and low water quality associated with being in an urban environment containing dense residences, the M5 and Sydney Airport. Connectivity between habitat within Barton Park would be maintained with areas of habitat in Muddy Creek and the larger area of Botany Bay.
2)	result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or	The proposed works are unlikely to result in the establishment of an invasive species that is harmful to these migratory birds.
3)	seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	The proposed works may disrupt the lifecycle of these migratory species through increased artificial lighting and decreased water quality. With the implementation of mitigation measures, the extent of these indirect impacts would not seriously disrupt the lifecycle of an ecologically significant proportion of the various species.
Conclusion	Is there likely to be a significant impact?	<p>No. The proposed works are unlikely to have a significant impact on the Sharp-tailed Sandpiper, Sanderling, White-throated Needletail or Black-tailed Godwit for the following reasons:</p> <ul style="list-style-type: none"> <li>• The proposed works would not remove habitat for these species.</li> <li>• Connectivity between areas of habitat within Barton Park and larger areas of habitat in Muddy Creek and Botany Bay would be retained. The highly mobile species would still be able to move between these.</li> <li>• Potential indirect impacts (increased artificial light and decreased water quality) would be minimised by the application of mitigation measures.</li> </ul>

## D5 *Chalinolobus dwyeri* (Large-eared Pied Bat)

Criterion	Question	Response
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
1)	lead to a long-term decrease in the size of an important population of a species	According to the National Recovery Plan for the Large-eared Pied Bat 2011, important populations, or populations with the largest number of individuals, are known from areas of sandstone escarpments. The proposed works would remove 1.91 ha of vegetation and Fairy Martin nests which may provide roosting and foraging habitat. No breeding habitat in the form of sandstone caves would be impacted as part of the proposed works. Therefore, the removal of this habitat would not lead to the long-term decrease in the size of an important population of Large-eared Pied Bat.
2)	reduce the area of occupancy of an important population	The proposed works would reduce the area of occupancy available for the Large-eared Pied Bat within the subject site by 1.91 ha and a number of Fairy Martin nests. No breeding habitat would be impacted.
3)	fragment an existing important population into two or more populations	Given the lack of sandstone escarpments and that only 2 individuals of the species have previously been recorded within 10 km of the subject land, the proposed works would not fragment an existing important population into two or more populations.
4)	adversely affect habitat critical to the survival of a species	The National Recovery Plan for the Large-eared Pied Bat 2011 identifies diurnal roosting habitat and breeding habitat as habitat critical to the survival of the species. The Fairy Martin nests identified within the subject land represent diurnal roosting habitat and would be removed as part of the proposed works. However, it is not certain whether these nests were being used by Fairy Martins of Large-eared Pied Bats.
5)	disrupt the breeding cycle of an important population	No sandstone caves would be affected by the proposed works. The proposed works would not fragment or isolate populations from foraging habitat. Therefore, the proposed works would not disrupt the breeding cycle of this species.
6)	modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed works would remove up to 1.91 ha of planted vegetation and a number of potential diurnal roosts. It is unlikely that the extent of this habitat removal would cause the species to decline because suitable habitat is available within their foraging range and there is likely to be more roosting habitat beyond the subject land.
7)	result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The proposed works are unlikely to result in the establishment of an invasive species that is harmful to the Large-eared Pied Bat.
8)	introduce disease that may cause the species to decline, or	The proposed works are unlikely to introduce disease that may cause the Large-eared Pied Bat to decline.
9)	interfere substantially with the recovery of the species.	The proposed works would remove foraging and roosting habitat for this species; however, this would not interfere substantially with recovery objectives listed in the National

Criterion	Question	Response
		Recovery Plan for the Large-eared Pied Bat 2011. The proposed action would not affect any breeding habitat.
Conclusion	Is there likely to be a significant impact?	<p>No. The proposed activity is unlikely to have a significant impact on the Large-eared Pied Bat for the following reasons:</p> <ul style="list-style-type: none"> <li>• The extent of habitat to be removed is minimal (1.91 ha).</li> <li>• Similar habitat for this species will be retained within the subject land and more is available adjacent to the subject land.</li> <li>• No breeding habitat would be removed.</li> </ul>

## D6 *Pteropus poliocephalus* (Grey-headed Flying Fox)

Criterion	Question	Response
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
1)	lead to a long-term decrease in the size of a population of the species	No roosting habitat (camps) would be affected by the proposed action. The proposed action would remove 1.91 ha of foraging habitat for the Grey-headed Flying-fox. The Grey-headed Flying-fox is recorded as travelling long distances (up to 20 km) on feeding forays. Given that vegetation within the subject land would be retained and similar foraging habitat is available adjacent to the subject land, the removal of this potential foraging habitat would not lead to the long-term decrease in the size of an important population of Grey-headed Flying-fox.
2)	reduce the area of occupancy of an important population	The proposed action would remove 1.91 ha of foraging habitat for this species. The Grey-headed Flying-fox is not known to occupy the subject land in the form of a camp but may occasionally forage within the subject land. The Grey-headed Flying-fox is recorded as travelling long distances on feeding forays and would likely utilise the potential foraging habitat outside of the subject land.
3)	fragment an existing important population into two or more populations	According to the National Recovery Plan for the Grey-headed Flying-fox 2021, "the Grey-headed Flying-fox is considered to be a single, mobile population with individuals distributed across Queensland, New South Wales, Victoria, South Australia, Tasmania and the ACT." The proposed action would remove 1.91 ha of foraging habitat. No camps would be affected by the proposed action and other areas of foraging habitat are available for this highly mobile species within the subject land and surrounds. Therefore, it would not fragment an existing important population into two or more populations.
4)	adversely affect habitat critical to the survival of a species	The National Recovery Plan for the Grey-headed Flying-fox 2021 identifies 'a continuous temporal sequence of productive foraging habitats, linked by migration corridors or stopover habitats, and suitable roosting habitat within nightly commuting distance of foraging areas' as habitat

Criterion	Question	Response
		critical to the survival of the species. The proposed action would remove 1.91 ha of vegetation. This small amount of vegetation is not considered habitat critical survival to this species because the species is recorded as travelling long distances (20 km) on feeding forays and similar habitat is available within Barton Park and surrounds. Therefore, this impact is considered unlikely to have an adverse effect.
5)	disrupt the breeding cycle of an important population	No camps would be affected by the proposed action. The proposed works would not fragment or isolate camps from foraging areas or reduce the extent of available foraging resources within their foraging range resulting in lack of food. Therefore, proposed works would not disrupt the breeding cycle of the Grey-headed Flying-fox.
6)	modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed works would remove 1.91 ha of planted vegetation, which forms foraging habitat for the Grey-headed Flying-fox. It is unlikely that the extent of this vegetation removal would cause the species to decline because suitable habitat is available within their foraging range.
7)	result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The proposed works are unlikely to result in the establishment of an invasive species that is harmful to the Grey-headed Flying-fox.
8)	introduce disease that may cause the species to decline, or	Grey-headed Flying-fox are reservoirs for the Australian bat lyssavirus, Hendra Virus and Menangle virus, and can cause clinical disease and mortality in Grey-headed Flying-fox. The proposed works would not increase the incidence of this disease.
9)	interfere substantially with the recovery of the species.	The proposed works would remove suitable foraging habitat for this species; however, this would not interfere substantially with recovery objectives listed in the National Recovery Plan for the Grey-headed Flying-fox 2021. The proposed action would not affect any camps and suitable foraging habitat is available near the subject land.
Conclusion	Is there likely to be a significant impact?	<p>No. The proposed activity is unlikely to have a significant impact on the Grey-headed Flying-fox for the following reasons:</p> <ul style="list-style-type: none"> <li>• The extent of habitat to be removed is minimal (1.91 ha).</li> <li>• Similar habitat for this species will be retained within the subject land and more is available adjacent to the subject land.</li> <li>• No breeding habitat would be removed.</li> </ul>



