Appendix H

Biodiversity impact assessment

Sydney Harbour Bridge Southern Cycleway

Biodiversity Assessment

November 2017

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Roads and Maritime Services

Sydney Harbour Bridge Southern Cycleway

Biodiversity Assessment

November 2017

Prepared by Biosis

Contents

Glossary of terms

Definitions

Cumulative impact	The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Refer to Clause 228(2) of the EP&A Regulation 2000 for cumulative impact assessment requirements.
Direct impact	Where a primary action is a substantial cause of a secondary event or circumstance which has an impact on a protected matter (ref http://www.environment.gov.au/system/files/resources/0b0cfb1e-6e28-4b23-9a97-fdadda0f111c/files/environment-assessment-manual.pdf).
Habitat	An area or areas occupied, or periodically or occasionally occupied, by a species, population or ecological community, including any biotic or abiotic component (OEH 2014).
Indirect impact	Where an event or circumstance is a direct consequence of the action (ref http://www.environment.gov.au/system/files/resources/0b0cfb1e-6e28-4b23-9a97-fdadda0f111c/files/environment-assessment-manual.pdf).
Matters of NES	A matter of national environmental significance (NES) protected by a provision of Part 3 of the EPBC Act
Mitchell landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000.
Mitigation	Action to reduce the severity of an impact.
Mitigation measure	Any measure that facilitates the safe movement of wildlife and/or prevents wildlife mortality.
Population	All the individuals that interbreed within a given area.
Proposal area/ Proposal site	The area of land that is directly impacted on by a proposed Major Proposal that is under the EP&A Act, including access roads, and areas used to store construction materials.
Study area	The area directly affected by the development and any additional areas likely to be affected by the development, either directly or indirectly.
Target species	A species that is the focus of a study or intended beneficiary of a conservation action or connectivity measure.

Abbreviations

BBCC	BioBanking Credit Calculator
BC Act	Biodiversity Conservation Act 2016
BVT	Biometric Vegetation Type
CEMP	Construction Environmental Management Plan
DP&E	Department of Planning and Environment
DPI	Department of Primary Industries
EEC	Endangered ecological community
EIS	Environmental Impact Statement
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999 (Federal).
FBA	Framework for Biodiversity Assessment
FM Act	Fisheries Management Act 1994 (NSW)
GDE	Groundwater dependent ecosystems
IBRA	Interim Biogeographically Regionalisation of Australia
MNES	Matters of National Environmental Significance
OEH	Office of Environment and Heritage
PCT	Plant Community Type
REF	Review of Environmental Factors
SEARs	Secretary's Environmental Assessment Requirements

SEPP	State Environmental Planning Policy
TECs	Threatened Ecological Communities
TSC Act	Threatened Species Conservation Act 1995 (NSW)
TSPD	Threatened Species Profile Database
VIS	Vegetation information system

1 Introduction

1.1 Proposal background

Roads and Maritime Services (Roads and Maritime) is proposing to improve cyclist access to the existing cycleway on the western side of the Sydney Harbour Bridge (SHB) deck by:

- Constructing a dedicated cycleway connecting Kent Street cycleway and the Sydney Harbour Bridge (SHB) cycleway.

This biodiversity assessment report assesses the biodiversity values of the SHB Southern Cycleway Proposal (the proposal) and as part of the Review of Environmental Factors (REF) being prepared for the proposal.

The construction and operational footprints for the proposal extend from the Kent Street cycleway in the south to the SHB cycleway in the north and is situated within the urban landscape of the Sydney CBD (Figure 1).

1.2 The proposal

The proposal is to upgrade the cyclist facility linking the Sydney CBD at Kent Street connecting to the SHB, and will include an upgrade of the existing cycleway facility from the Kent Street cycleway to the SHB cycleway.

The proposed works include:

- Provision of a dedicated bi-directional cycleway from the Kent Street cycleway to the Sydney Harbour Bridge cycleway and upgrade of the existing pedestrian footpath from Kent Street to Fort Street Public School. Cyclists and pedestrians will be separated through delineation and contrasting surface treatments.
- Provision of a pedestrian footpath from Fort Street Public School to Watson Road.
- Removal of the existing footbridge crossing the Cahill Expressway, including approach ramps. The existing footbridge will be replaced with a new cyclist and pedestrian bridge crossing the Cahill Expressway with a new alignment.
- Removal of existing pedestrian and cyclist ramp on the southern approach to the Cahill Expressway footbridge. This will be replaced with a new spiral ramp for cyclists and pedestrians with an improved gradient.
- Removal of a 60 metre long section of existing concrete retaining wall adjacent to the Incident Response Area to accommodate the proposed cycleway alignment.
- Construction of a 62 metre long section of new concrete retaining wall between the proposed cycleway alignment and the Incident Response Area.
- Modification of merge treatment between Kent Street and Clarence Street on-ramps from general lane change to a zipper merge.
- Reconfiguration of existing fitness area in Observatory Hill to accommodate proposed cycleway alignment.
- Ancillary works for construction including construction compounds and stockpile sites.
- Utility relocations, including water, sewer mains, telecommunication, electricity and gas services.

The proposal area is defined as all areas potentially impacted by the proposed activities and includes the physical footprint of the proposed cycleway upgrade, a replacement pedestrian and cyclist bridge, and site compounds.

For the project ancillary sites, two compounds are proposed, one at the Observatory Hill outdoor exercise area and another within the National Trust Centre/S.H. Ervin Gallery car park, shown in Figure 2.

The study area for this biodiversity assessment is shown in Figure 2 and includes the proposal area, site compounds, as well as adjacent areas to approximately 50m either side of the centre of the proposed upgrade works.

1.3 Legislative context

This biodiversity assessment was originally prepared in April 2017, prior to the enactment of the NSW *Biodiversity Conservation Act 2016* (BC Act), which repealed the NSW *Threatened Species Conservation Act 1995* (TSC Act), along with several parts and provisions of the NPW Act and provisions under the EP&A Act relevant to threatened species impact assessments.

A REF is prepared to satisfy Roads and Maritime duties under s.111 of the EP&A Act to "examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity" and section 7.8 of the (BC Act) in making decisions on the likely significance of any environmental impacts. Roads and Maritime must also consider impacts to any wilderness area (within the meaning of the *Wilderness Act 1987*) in the locality. This Biodiversity Assessment forms part of the REF being prepared for the SHB Southern Cycleway, and assesses the biodiversity impacts of the proposal to meet the requirements of the EP&A Act.

Sections 5A and 5C of the EP&A Act require that the significance of the impact on threatened species, populations and endangered ecological communities listed under the BC Act is assessed using a five-part test, and seven-part test under the FM Act. Where a significant impact is likely to occur, a species impact statement (SIS) must be prepared in accordance with the Director-General's requirements.

In September 2015, a "strategic assessment" approval was granted by the Federal Minister in accordance with the EPBC Act. The approval applies to Roads and Maritime activities being assessed under Part 5 of the EP&A Act with respect to potential impacts on nationally listed threatened species, ecological communities and migratory species.

As a result, Roads and Maritime proposals assessed via an REF:

- must address and consider potential impacts on nationally listed threatened species, populations, ecological communities and migratory species, including application of the "avoid, minimise, mitigate and offset" hierarchy
- do not require referral to the Federal Department of the Environment for these matters, even if the activity is likely to have a significant impact.

Roads and Maritime must consider impacts to nationally listed threatened species, ecological communities and migratory species as part of the approval process under the strategic assessment. To assist with this, assessments are required in accordance with the *Matters of National Environmental Significance: Significant impact guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999* (DoE 2013).

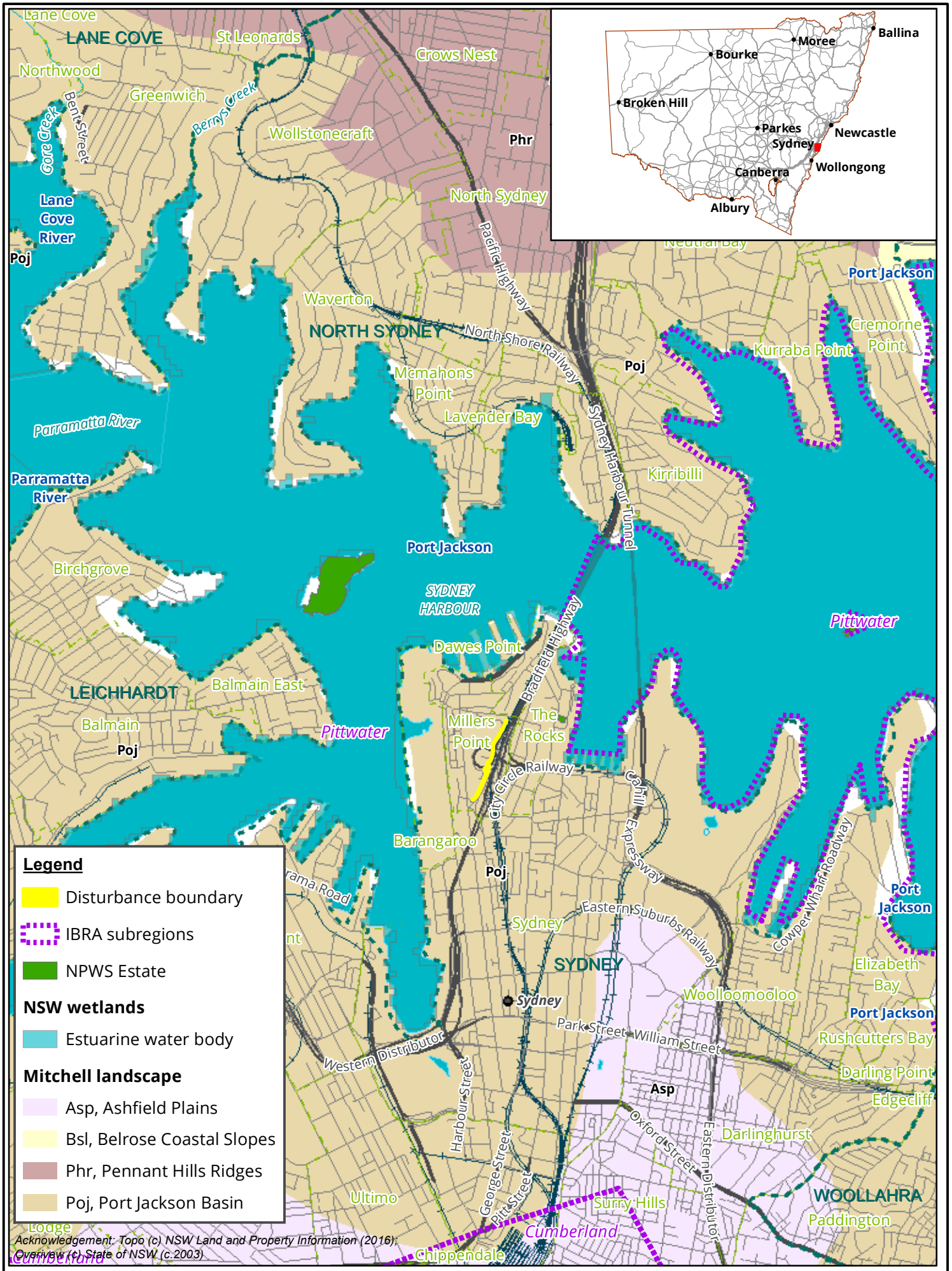

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Figure 1: Proposal context

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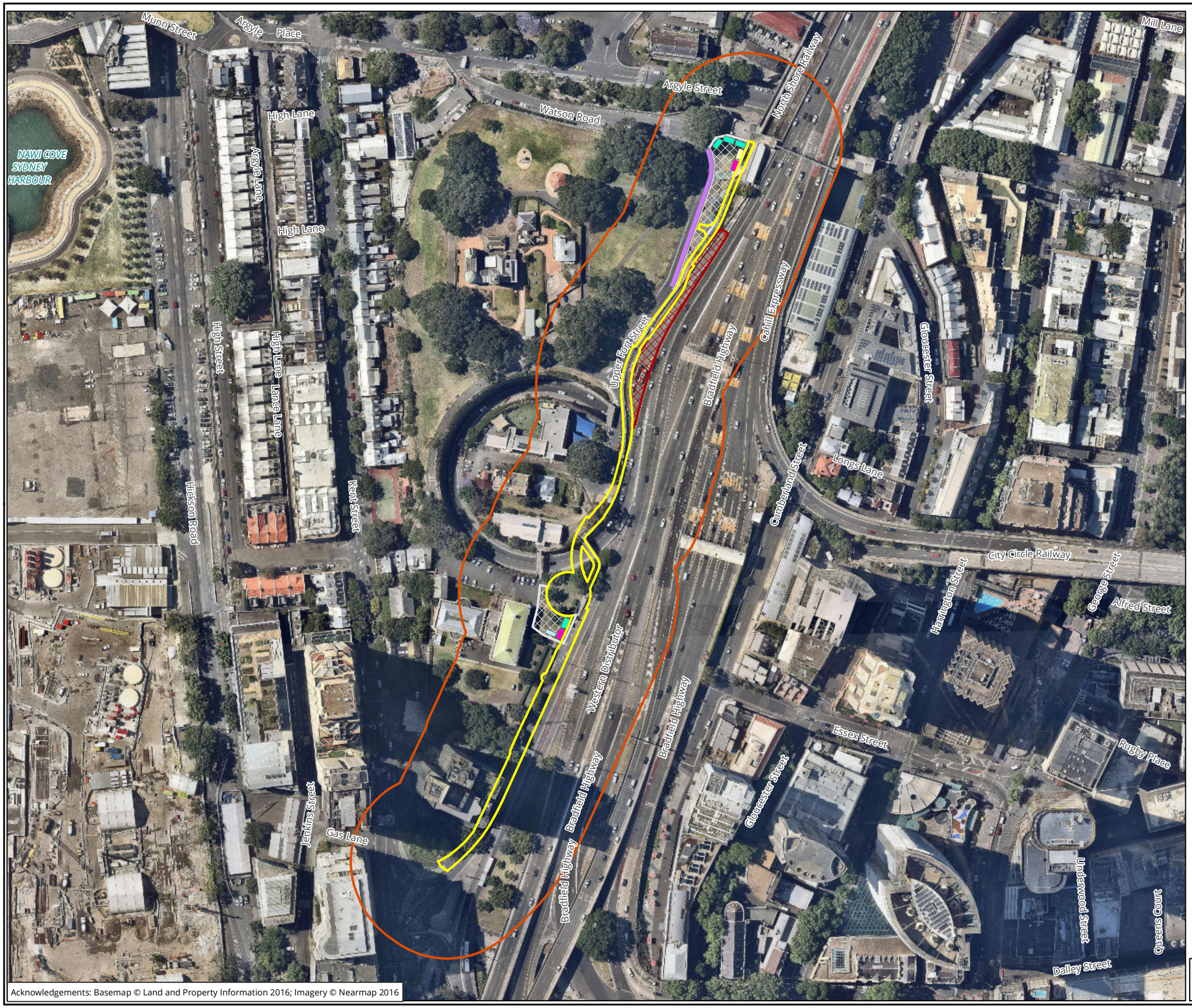

Legend

- Study area
- Proposed construction and operational footprint

Compound

- Amenities
- Construction parking
- Container
- Extent of hardstand/construction compound
- Incident Response Area
- Lunch room/crib shed
- Site office

Figure 2: The proposal

0 20 40 60 80 100

Metres

Scale: 1:2,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

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2 Methods

2.1 Personnel

The background research, field survey and reporting of the biodiversity values of the study area have been undertaken by Carl Corden (Zoologist), Luke Stone (Research Assistant) and Jane Raithby-Veall (Principal Ecologist) of Biosis Pty Ltd.

2.2 Background research

Background research is required to collect and review information on the presence or likelihood of occurrence of:

- Threatened and protected terrestrial and aquatic flora and fauna species and their habitat
- Endangered populations
- Threatened ecological communities
- Important habitat for migratory species
- Critical habitats
- Noxious weeds.

A number of previous studies and relevant documents were reviewed to provide background information for the current biodiversity assessment. These included:

- Harbour Village North Cycleway – Feasibility and Concept Design Report (Group GSA 2015)
- SHB Southern Cycleway – Heritage Report (City Plan Services 2015)
- Harbour Village North Cycleway – Arboricultural Impact Assessment (Tree IQ 2016)
- SHB Southern Toll Plaza precinct upgrade – REF (Parsons Brinckerhoff 2012)
- Urban Ecology Strategic Action Plan (City of Sydney 2014).

The following database searches were undertaken in preparation of the biodiversity assessment:

- BioNet- the website for the Atlas of NSW Wildlife and OEH BioBanking Threatened Species Profile Database: http://www.bionet.nsw.gov.au/
- NSW Department of Primary Industries (DPI) Fisheries Fish Records Viewer: http://www.dpi.nsw.gov.au/fisheries/species-protection/records/viewer
- The federal Department of Environment's Protected Matters Search Tool: http://environment.gov.au/erin/ert/epbc/index.html
- Critical habitat register available on the OEH website at http://www.environment.nsw.gov.au/criticalhabitat/CriticalHabitatProtectionByDoctype.htm and on the DPI NSW (Fisheries) website at http://www.dpi.nsw.gov.au/fisheries/species-protection/conservation/what/register and on the federal Department of the Environment website at http://www.environment.gov.au/cgi-bin/sprat/public/publicregisterofcriticalhabitat.pl
- OEH vegetation information system (VIS) database: http://www.environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx
- NSW Office of Environment and Heritage (OEH) Vegetation Types Database: http://www.environment.nsw.gov.au/projects/BiometricTool.htm
- The federal Bureau of Meteorology's Atlas of Groundwater Dependent Ecosystems (GDE): http://www.bom.gov.au/water/groundwater/gde/map.shtml
- Department of Environment's directory of important wetlands: http://www.environment.gov.au/cgi-bin/wetlands/search.pl?smode=DOIW
- Department of Environment's interactive flying-fox web viewer: http://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf
- Department of Planning's SEPP 14 wetlands spatial data: http://www.planning.nsw.gov.au/spatial-data-download
- DPI's database for aquatic TECs: http://www.dpi.nsw.gov.au/fisheries/species-protection/conservation/what-current.

Current nominations and preliminary listings under the BC Act, FM Act and the EPBC Act were also considered.

2.3 Habitat assessment

The results of background research and database searches were used to prepare a habitat assessment table (Appendix A) to assess the likelihood of each threatened species, population or community (threatened biodiversity) identified with the potential to occur in the study area. All threatened biodiversity identified by literature and database searches were considered.

The likely occurrence of threatened biodiversity was based on the presence, condition and type of habitat and previous records. Species were considered likely to occur where:

- the geographic distribution of the species is known or predicted to include the Interim Biogeographically Regionalisation of Australia (IBRA) subregion in which the study area is located
- the study area contains habitat features or suitable habitat components associated with the species
- past surveys undertaken at the study area indicate that the species is present.

The results of the habitat assessment were used to guide the field survey, and to determine the potential requirement to undertake further targeted survey effort once all habitat components in the study area had been identified.

2.4 Field survey

A field survey of the study area was undertaken on 14 November 2016 (spring) by one ecologist over two hours. Conditions during the field survey were warm and dry.

The aim of the field survey was to ground-truth the results of the background research and habitat assessment and to determine whether targeted flora and fauna surveys were required (in accordance with relevant EPBC Act and/or TSC Act survey guidelines).

Based on the results of the field survey it was determined that no targeted surveys were required for the biodiversity assessment. Table 1 below outlines the targeted survey methods that were considered.

Table 1: Targeted survey method considered for the biodiversity assessment

Method	Justification
Vegetation surveys in line with the Framework for Biodiversity Assessment (FBA) (OEH 2014) employing plot-based full floristic surveys within 20m × 50m quadrats	Not undertaken for the biodiversity assessment. No native vegetation communities present within the proposal area. And no threatened flora species listed under the EPBC Act or BC Act were considered to have a moderate or high likelihood of occurrence within the study area, therefore no targeted flora surveys were required.
Diurnal or nocturnal fauna surveys	Not undertaken for the biodiversity assessment. The whole study area was adequately surveyed during the field survey for the presence of all threatened fauna species listed under the EPBC Act, BC Act or FM Act that were considered to have a moderate or high likelihood of occurrence.
Ultrasonic bat call detection (e.g. 'Anabat')	Not undertaken for the biodiversity assessment. No suitable microbat roosting or breeding habitat present. Presence of foraging microbats was assumed based on habitat present and nearby

Method	Justification
	records. This method was not recommended in the context of the current proposal given it is in a very public area near busy roads.

During the field survey, the types and qualities of habitat(s) present were assessed and the investigation focussed on locations containing stands of vegetation, waterbodies and locations of potential connective links. Particular attention was given to searching for threatened biodiversity and their habitats.

The field survey timing (spring), conditions and survey effort were considered adequate to assess the biodiversity values of the study area. The results of the field survey determined that potential occurrence of, and impacts to, native vegetation and/or threatened biodiversity could be adequately assessed without the requirement for additional targeted surveys.

2.5 Limitations

Ecological surveys provide a sampling of flora and fauna at a given time and season. There are a number of reasons why not all species will be detected at a site during survey, such as species dormancy, seasonal conditions, and migration and breeding behaviours of some fauna. Given the condition of the study area and the scope of works, these factors do not present a significant limitation to assessing the overall biodiversity values of the proposal. Database searches, and associated conclusions on the likelihood of species to occur within the study area, are reliant upon external data sources and information managed by third parties.

3 Existing environment

The study area is located in the Pittwater subregion of the Sydney Basin Bioregion, in the Port Jackson Basin Mitchell Landscape. The underlying geology of the study area is mapped as Triassic period medium to coarse grained quartz sandstone with very minor shale and laminate lenses (Herbert 1983).

The study area is mapped as the Gymea soil landscape. This is an erosional soil landscape of undulating to rolling rises and low hills on Hawkesbury Sandstone. Soils are shallow to moderately deep and include yellow earths; earthy, siliceous and leached sands; and gleyed and yellow podzolic soils (Chapman and Murphy 1989).

The study area is located entirely within the urban landscape of the Sydney CBD and is bounded by established buildings, landscaped parks and gardens to the west, and the Bradfield Highway and Cahill Expressway to the east.

Biodiversity values of the study area are limited to those associated with heavily urbanised landscapes. The existing biodiversity values of the study area are shown in Figure 3 and are discussed further below.

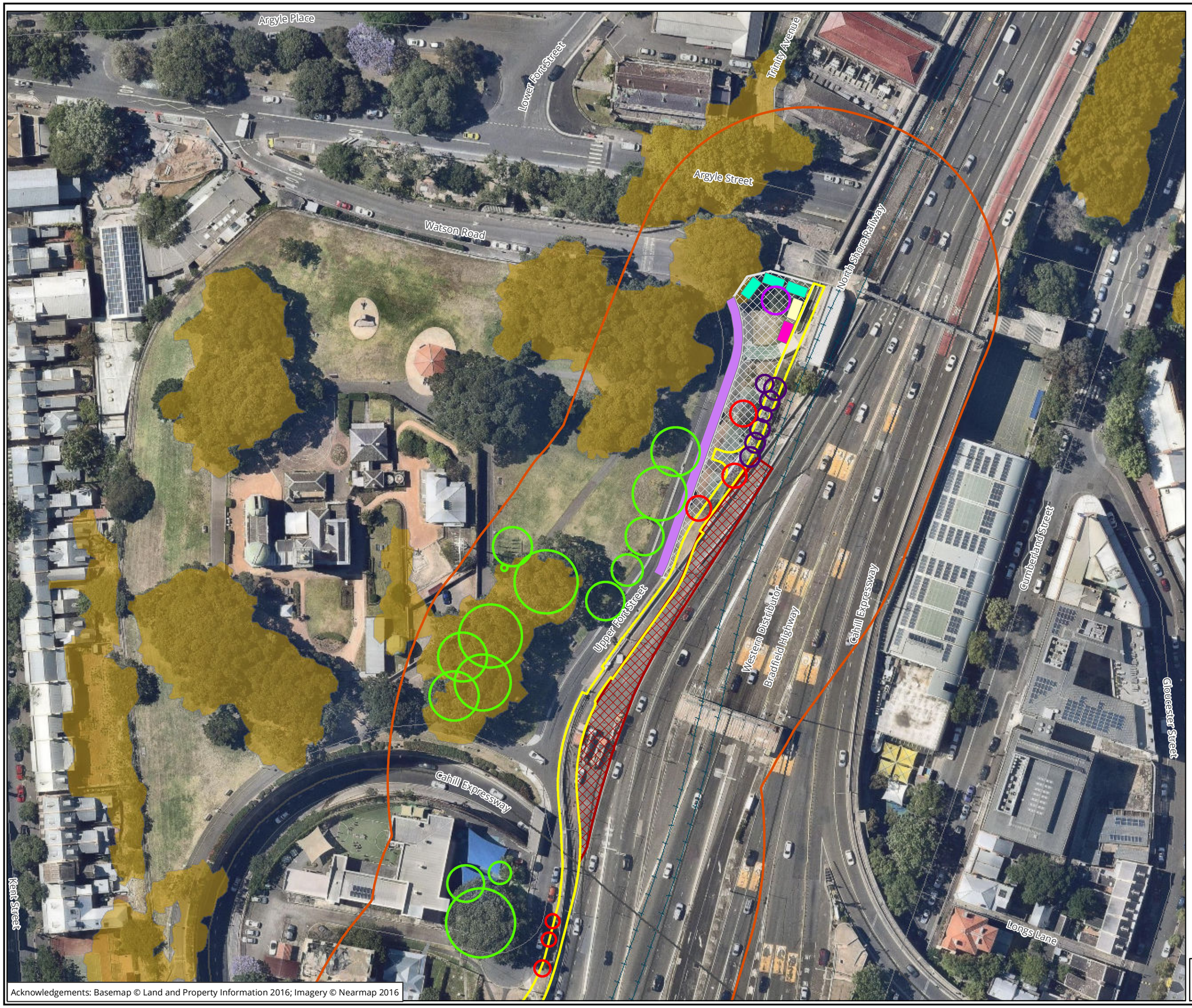
3.1 Vegetation

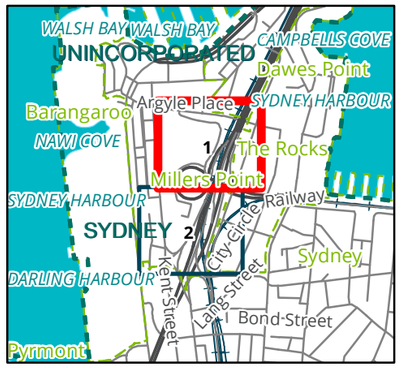
Historically the study area is most likely to have supported a native vegetation community of the Coastal Sandstone Outcrop Complex as defined in the Urban Ecology Strategic Action Plan (City of Sydney 2014). Current vegetation mapping (see Figure 3) shows that the locality of the study area no longer supports any native vegetation communities. Vegetation within and surrounding the study area is mapped as Urban Exotic/Native (OEH 2016b).

The results of the field survey confirmed that the study area does not support any native vegetation communities. Vegetation within the study area is comprised of a mixture of landscaped planted native (both indigenous and non-indigenous) and exotic trees, shrubs and grasses. The Arboricultural Assessment Report (Tree IQ 2016) provides comprehensive details and mapping of all landscape trees occurring within the study area.

The Urban Exotic/Native vegetation of the study area would not meet the criteria specified in listing advice or scientific determinations for any of the threatened ecological communities known to occur in the wider locality.

Photograph 1: Urban Exotic/Native vegetation of the study area





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- Site office

Tree data

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- Tree to be removed
- Tree to be transplanted
- Tree to be transplanted if possible otherwise remove
- Tree removed (entity unknown)
- Tree removed (Sydney Harbour Bridge Southern Toll Plaza Precinct Upgrade project)

The native vegetation of the Sydney metropolitan area

- Urban_E/N: Urban Exotic/Native

Figure 3.1: Ecological features of the study area

0 10 20 30 40 50

Metres

Scale: 1:1,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

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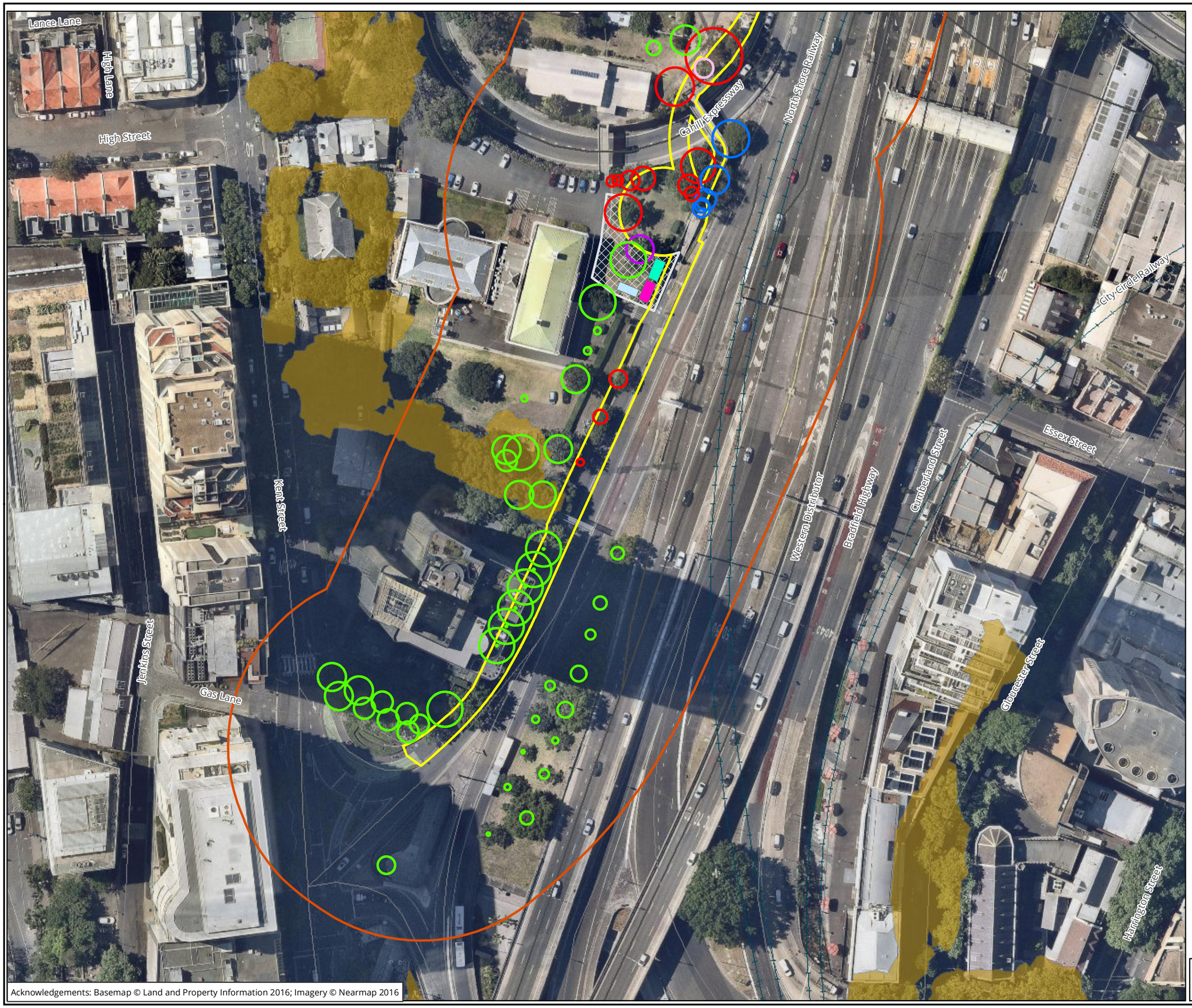

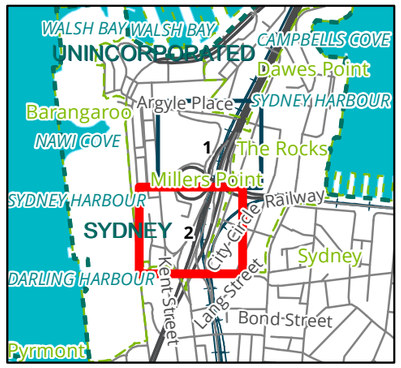

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The native vegetation of the Sydney metropolitan area

- Urban_E/N: Urban Exotic/Native

Figure 3.2: Ecological features of the study area

0 10 20 30 40 50

Metres

Scale: 1:1,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

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Acknowledgements: Basemap © Land and Property Information 2016; Imagery © Nearmap 2016

3.2 Threatened species and populations

Habitat assessment (see Appendix A) determined that three threatened fauna known from the locality were considered to have a 'Moderate' or higher potential to occur within the study area. The likelihood for all of the other threatened flora and fauna species or populations known from the locality to occur within the study area was considered to be 'Low' or 'None' given the study area does not provide suitable habitat for these species. Table 2 summarises the results of the habitat assessment and the field survey.

Table 2: Habitat assessment and survey results

Scientific name	Common Name	Status		Potential occurrence (Low, Moderate, High, Recorded)
		BC Act	EPBC Act	
Ninox strenua	Powerful Owl	V	-	Moderate
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	Moderate
Pteropus poliocephalus	Grey-headed Flying-fox	V	VU	Moderate

The results of the field survey determined that the three species listed in Table 2 have a moderate likelihood to occur within the study area given the number of recent records of these species within the locality and the presence of forage habitat for these species. The habitat values for each of these species within the study area are discussed below.

3.2.1 Powerful Owl (*Ninox strenua*)

The results of database searches indicated that there are 154 current records of the Powerful Owl within 10kms of the study area (OEH 2016a). This species occupies large home ranges consisting of a mosaic of habitat types. The Powerful Owl requires large hollow-bearing trees within tall, dense (usually riparian) vegetation for breeding. Roosting occurs in similar dense vegetation, usually near nest trees during breeding.

This species preys primarily on arboreal mammals and birds. Suitable forage habitat includes a range of native forest types as well as adjacent urban and suburban environments.

The study area does not provide any suitable roosting (i.e. tall dense vegetation) or breeding (i.e. large hollow-bearing trees within tall dense forest) habitat for the Powerful Owl. Given the proximity of recent records for this species it is likely that the study area may lie within the large home range of the Powerful Owl and may therefore provide occasional forage habitat only.

3.2.2 Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)

Database searches indicated that there are 63 current records of the Eastern Bentwing-bat within 10kms of the study area (OEH 2016a). This is a cave-roosting species but will also use artificial structures such as bridges, culverts and tunnels. The Eastern Bentwing-bat is known to roost in late spring and summer in large maternity caves then across winter, large numbers of Eastern-Bentwing-bats move to alternate winter roost habitats where temperatures remain low enough for bats to enter into a state of torpor.

The Eastern Bentwing-bat forages on small flying insects in a range of habitats, including urban environments. Bats may forage some distance from suitable roost habitats.

The study area does not provide any suitable roosting, breeding or winter torpor habitat for the Eastern Bentwing-bat. Given the proximity of recent records for this species it is likely that the

study area may provide occasional forage habitat for Eastern Bentwing-bats roosting in the wider locality.

3.2.3 Grey-headed Flying-fox (*Pteropus poliocephalus*)

Database searches indicated that there are 292 current records of the Grey-headed Flying-fox within 10kms of the study area (OEH 2016a). This species roosts and breeds in large noisy colonies or 'camps'. At night individuals may range considerable distances from camps to forage on the nectar or fruit of a wide range of native and exotic trees and shrubs. The Grey-headed Flying-fox is known to utilise a wide range of habitats for roosting and foraging (e.g. fig trees), including urban environments, and is a common occurrence throughout the broader locality of the study area.

No flying-fox camps were recorded within the study area during the field survey. The nearest known camp for the Grey-headed Flying-fox is located at Royal Botanic Garden Sydney which is approximately 1.2km from the study area (DEE 2017).

Given the proximity of recent records for this species and the presence of suitable forage tree species it is highly likely that the Grey-headed Flying-fox would forage within the study area when suitable blossom or fruits are present.

3.3 Matters of National Environmental Significance

The Grey-headed Flying-fox is listed as Vulnerable under the EPBC Act and as such, any impacts to this species would be considered a Matter of National Environmental Significance (NES).

The study area does not support any active camps of the Grey-headed Flying-fox, and is not located adjacent to any camps. The proposal would therefore not directly or indirectly impact on roosting or breeding habitat for this species.

The study area provides suitable forage resources for the Grey-headed Flying-fox which is a commonly recorded species in the locality. However, the proposal will only require potential impacts to 28 trees. Nineteen trees are proposed for removal, seven to be transplanted and two to be transplanted if possible, or removed if not possible. No large fig trees will be removed. Similar forage habitat for the Grey-headed Flying-fox is abundant in the locality, and the overall impact of the proposal on forage habitat for the Grey-headed Flying-fox would therefore not be considered significant.

No other threatened flora, fauna or ecological communities listed under the EPBC Act were considered to have a moderate or high likelihood of occurrence within the study area.

A number of migratory fauna are listed under the EPBC Act. Although migratory birds may overfly the study area, the study area does not provide suitable habitat for any migratory species.

Given the urban setting of the proposal, the limited habitat resources present within the study area and the scale of proposed impacts, it is considered highly unlikely that the proposal would trigger any biodiversity related Matters of NES and would therefore not require referral to the minister for impacts on biodiversity.

3.4 Other biodiversity values

The Urban Exotic/Native vegetation of the study area provides only very limited habitat resources for highly mobile species such as birds and bats. The study area does not support any habitat features such as hollow-bearing trees, dense understorey vegetation, leaf litter and fallen debris.

Two artificial nest boxes were recorded during the field survey. One nest box was in disrepair and highly unlikely to provide shelter or breeding habitat for any native fauna. The second

nest box was intact and, although no signs of occupation were recorded during the field survey, this nest box would provide suitable breeding habitat for common birds such as the Rainbow Lorikeet (*Trichoglossus moluccanus*).

No areas of critical habitat for flora or fauna have been declared within the study area.

There are no mapped groundwater-dependent ecosystems present within the study area, and none were recorded during the site investigation. No aquatic features (such as ponds or drainage lines) were recorded within the study area. The site does not provide suitable habitat for any aquatic flora or fauna.

The study area does not lie within any mapped potential habitat linkages (City of Sydney 2014). Mature trees within the study area would provide only 'stepping stone' connectivity for highly mobile species such as birds and bats.

No State Environmental Planning Policies (SEPPS) are considered applicable to the biodiversity assessment for the proposal.

4 Impact assessment

The proposal has the potential to impact on the biodiversity values of the study area at both construction and operational phases. Given the urban setting of the proposal, the small scale of the proposed works and the results of the biodiversity assessment, the following potential biodiversity impacts are considered relevant to the proposal:

- Removal of native vegetation and threatened flora
- Removal of threatened fauna species habitat and habitat features
- Injury and mortality of fauna
- Wildlife connectivity and habitat fragmentation
- Invasion and spread of weeds
- Noise, light and vibration.

These potential biodiversity impacts of the proposal are addressed below.

4.1 Construction impacts

4.1.1 Removal of native vegetation and threatened flora

The study area does not support any native vegetation communities. Construction for the proposal will not therefore result in any impacts to any native vegetation or to any threatened or non-threatened ecological communities.

No threatened flora species were recorded within the study area during the field survey. The biodiversity assessment has determined that none of the threatened flora species known from the locality would occur within the study area. The proposal will therefore not result in any impacts to threatened flora species.

4.1.2 Removal of threatened fauna habitat

The study area does not support any shelter, roosting or breeding habitat for any of the threatened fauna species considered likely to occur. The study area provides forage resources only for these species, and suitable forage habitat for all species also occurs throughout the locality.

A total of 44 trees were identified within the study area for the Arboricultural Assessment Report (Tree IQ 2016). At the time of preparation of the original biodiversity assessment report (April 2017) it was anticipated that 31 of these trees would require removal for the proposal, including 10 specimens which are considered to provide potential forage resources (blossoms or fruit) for the Grey-headed Flying-fox. Subsequent alterations to the project design and the removal of five trees as part of the Sydney Harbour Bridge Southern Toll Plaza Precinct Upgrade project and one tree removed by others (entity not confirmed) have resulted in changes to the number of trees that will be impacted as a result of the proposed construction. Nineteen trees are proposed to be removed, in addition to the five trees as part of the Sydney Harbour Bridge Southern Toll Plaza Precinct Upgrade project and one tree removed by others (entity not confirmed). Seven trees are proposed to be transplanted. An additional two trees may be removed if they cannot be transplanted. Trees to be removed include nine specimens which are considered to provide potential forage resources (blossoms or fruit) for the Grey-headed Flying-fox. These are:

- 2 x Moreton Bay Fig (*Ficus macrophylla*)
- 3 x Old Man Banksia (*Banksia serrata*)
- 1 x Sugar Gum (*Eucalyptus cladocalyx*)
- 1 x Gum tree (*Eucalyptus* sp.)
- 2 x Port Jackson Fig (*Ficus rubiginosa*).

The two specimens that are proposed to be transplanted, but may require removal, are Moreton Bay Fig trees. As such if they do require removal this will result in the removal of a maximum of 11 specimens which are considered to provide potential forage resources for the Grey-headed Flying-fox.

No very large fig trees will be removed during construction for the proposal. Trees to be removed for the proposal represent only a small portion of forage resources available for the Grey-headed Flying-fox in the wider locality. The potential removal of forage resources for the proposal will not therefore result in any significant reduction of forage resources available in the locality.

Construction for the proposal is highly unlikely to result in any reduction of potential forage resources for the Powerful Owl or the Eastern Bentwing-bat within the study area.

The proposal will not result in any significant impacts to any threatened fauna or fauna habitat. As such, no Assessments of Significance using Five Part Tests (BC Act), Seven Part Tests (FM ACT) or Significant Impact Criteria Assessments (EPBC Act) are required for the proposal.

4.1.3 Injury and mortality

The study area provides limited habitat for a number of common native and introduced fauna species. Although highly unlikely given the scale of the proposed works, construction for the proposal has the potential to result in injury and/or mortality of individuals of these species.

The key responsibility of RMS is to undertake works in a manner that will not result in any fauna injury or mortality during the construction phase of the proposal. Recommendations to avoid fauna injury and mortality are provided in Section 5.2.

4.2 Indirect/operational impacts

4.2.1 Wildlife connectivity and habitat fragmentation

The study area does not lie within any mapped potential habitat linkages (City of Sydney 2014). Mature trees within the study area would provide only 'stepping stone' connectivity for highly mobile species such as birds and bats. It is not anticipated that removal during construction of the proposal of a small number of trees within the study area would result in any significant reduction in wildlife connectivity in the locality.

The Urban Native/Exotic vegetation within the study area provides only limited habitat for highly mobile fauna. Removal of trees for construction would not contribute to habitat fragmentation in the locality.

4.2.2 Invasion and spread of weeds

The study area supports two specimens of Chinese Hackberry (*Celtis sinensis*). These trees are identified as trees 24 and 28 in the Arboricultural Assessment Report (Tree IQ 2016). Chinese Hackberry is declared as a class 4 noxious weed within the City of Sydney LGA (DPI 2016). The management of class 4 noxious weeds requires "*the growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed*".

The key responsibility of Roads and Maritime is to undertake works in a manner that will not enable noxious weeds to spread from the works areas. Recommendations for dealing with these weeds are provided in Section 5.2.

4.2.3 Noise, light and vibration

The study area provides only limited biodiversity values, primarily as forage habitat for highly mobile species adapted to urban environments. Noise, light and vibration impacts are already present within the study area due to existing infrastructure (e.g. major roads) and development. The proposal is not considered likely to exacerbate any potential impacts on biodiversity due to noise, light or vibration.

4.3 Impact summary

The proposal will not result in any direct or indirect impacts to biodiversity due to; removal of native vegetation, loss of threatened communities or flora species, reduction of wildlife connectivity, habitat fragmentation or noise, light and vibration.

The proposal is still considered to have limited potential to result in impacts to biodiversity due to; removal of 11 Grey-headed Flying-fox forage trees, injury and mortality of fauna and invasion and spread of weeds. These potential impacts are summarised in Table 3. Recommendations to avoid, minimise and mitigate these impacts are provided in Section 5.

Table 3: Summary of impacts

Impact	Biodiversity values	Nature of impact Direct, indirect, cumulative	Extent of impact Site based, Local, Regional, State, National	Duration Short term Long term	Does the proposal constitute or exacerbate a key threatening process?	Confidence in assessment Known, Unknown, unpredictable or irreversible
Removal of threatened fauna forage resources	Limited forage resources for Grey-headed Flying-fox	Direct	Maximum of 11 potential forage trees Site based only	Long term	No	Known
Injury and mortality of fauna	Limited to unlikely occurrence of fauna within work areas	Direct	Unlikely Site based only	Short term	No	Unpredictable
Invasion and spread of weeds	N/A	Indirect	Site based only	Short term	No	Known

5 Avoid, minimise and mitigate impacts

The proposal has the potential to impact on forage habitat for threatened fauna, potential for injury and mortality to non-threatened fauna and potential for the spread of noxious weeds. Measures to avoid, minimise or mitigate these impacts during construction and operational phases of the proposal are provided below.

5.1 Avoidance and minimisation

Where possible, removal of trees has been avoided through the following means:

- Modification of the proposal to relocate site compound and storage areas off site (see Section 1.2), thus reducing the overall construction footprint of the proposal
- Further refinement to the design of the proposal to avoid, where possible, removal of individual trees, particularly species identified as potential forage trees for the Grey-headed Flying-fox.

5.2 Mitigation measures

The following recommendations have been made to mitigate potential impacts of the proposal:

- Minimise to the fullest extent practicable disturbance to trees, particularly fig trees, eucalypts and banksias, within and/or next to the study area
- Appropriate measures should be implemented to protect trees to be retained during construction as per recommendations of the Arboricultural Assessment Report (Tree IQ 2016)
- Remove and (where required) repair the two nest boxes located within the study area prior to removal of the host tree, and re-install outside of the proposed works area
- Minimise top soil transportation within, into or out of the study area to reduce the spread of weeds
- Appropriate measures should be implemented to remove the two Chinese Hackberry noxious weeds
- Appropriate erosion and sediment control measures should be installed at all sites to avoid sedimentation of receiving water bodies or other indirect impacts to surrounding biodiversity values.

Table 4 provides a summary of mitigation measures recommended to mitigate potential impacts of the proposal during construction and operational phases.

Table 4: Mitigation measures

Impact	Mitigation measures	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated
Removal of threatened species forage trees and nest boxes	Removal of potential Grey-headed Flying-fox forage trees will be minimised through detailed design.	Detailed design	Effective	None
	Existing nest boxes will be translocated in accordance with *Guide 8: Nest boxes* of the *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).	During construction	Effective	
Injury and mortality of fauna	A suitably qualified ecologist must undertake a pre-construction survey to ensure that no wildlife has taken up occupancy within trees on and adjacent to the site.	Pre-construction	Effective	None
	If encountered, fauna will be managed in accordance with *Guide 9: Fauna handling* of the *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).	During construction	Effective	None
	If unexpected threatened fauna or flora species are discovered, stop work immediately and follow the *Unexpected threatened species find procedure in Roads and Maritime's Biodiversity Guidelines – Guide 1 (Pre-clearing process)* (RTA 2011)	During construction	Effective	None
Invasion and spread of weeds	The two specimens of Chinese Hackberry within the study area will be removed in accordance with *Guide 6: Weed management* of the *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).	During construction	Effective	None

6 Conclusion

In summary the following represents the key findings of this biodiversity assessment:

- The study area does not support any native vegetation communities, threatened ecological communities or threatened flora species
- The Urban Native/Exotic vegetation within the study area would provide limited forage habitat only for Powerful Owl, Eastern Bentwing-bat and Grey-headed Flying-fox. The proposal would result in the removal of 11 trees that provide potential forage habitat for the Grey-headed Flying-fox
- The proposal has the potential to result in injury and mortality of non-threatened fauna species and/or spread of a noxious weed species
- Provided the avoidance and mitigation measures specified herein are adhered to it is not considered likely that the proposal will result in any significant impacts to biodiversity
- Key mitigation measures include avoid removal of trees through refinement of design and manage removal of trees, fauna habitat and noxious weeds in accordance with relevant guidelines.

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Appendix A – Habitat assessment table

Likelihood of occurrence criteria

Likelihood	Criteria
Recorded	The species was observed in the study area during the current survey
High	It is highly likely that a species inhabits the study area and is dependant on identified suitable habitat (ie. for breeding or important life cycle periods such as winter flowering resources), has been recorded recently in the locality (10km) and is known or likely to maintain resident populations in the study area. Also includes species known or likely to visit the study area during regular seasonal movements or migration.
Moderate	Potential habitat is present in the study area. Species unlikely to maintain sedentary populations, however may seasonally use resources within the study area opportunistically or during migration. The species is unlikely to be dependent (ie. for breeding or important life cycle periods such as winter flowering resources) on habitat within the study area, or habitat is in a modified or degraded state. Includes cryptic flowering flora species that were not seasonally targeted by surveys and that have not been recorded.
Low	It is unlikely that the species inhabits the study area and has not been recorded recently in the locality (10km). It may be an occasional visitor, but habitat similar to the study area is widely distributed in the local area, meaning that the species is not dependent (ie. for breeding or important life cycle periods such as winter flowering resources) on available habitat. Specific habitat is not present in the study area or the species are a non-cryptic perennial flora species that were specifically targeted by surveys and not recorded.
None	Suitable habitat is absent from the study area.

Habitat assessment table

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Flora					
Bynoe's Wattle (*Acacia bynoeana*)	VU	E1	Semi prostrate shrub growing in central eastern NSW spanning from the Hunter District, west to the Blue Mountains and south to the Southern Highlands. Grows in a variety of communities including; Southern Tableland Dry Sclerophyll Forests, Sydney Hinterland Dry Sclerophyll Forests, Coastal Valley Grassy Woodlands and Sydney Coastal Heaths. Prefers open, slightly disturbed sites on sandy soils.	2 (OEH)	Low
(*Acacia gordonii*)	EN	E1	Erect or spreading shrub confined to a disjunct distribution in the Lower Blue	1 (OEH)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			Mountains and the Maroota-Glenorie area. Grows on sandstone outcrops and platforms in Sydney Coastal Dry Sclerophyll Forests, Sydney Hinterland Dry Sclerophyll Forests, Coastal Heath Swamps, Sydney Coastal Heaths and Sydney Montane Heaths. Grows on shallow soils.		
Gosford Wattle (*Acacia prominens*)		E2	Erect or spreading tree growing in a few sites at Carss Park and along the railway line at Penshurst. Grows in a variety of communities including Cumberland Dry Sclerophyll Forests, Sydney Coastal Dry Sclerophyll Forests, Eastern Riverine Forests and Northern Hinterland Wet Sclerophyll Forests. Grows in moist, protected areas in loamy and clay soils.	1 (OEH)	Low
Sunshine Wattle - Sydney region (*Acacia terminalis* subsp*. terminalis* MS)	EN	EN	Erect or spreading shrub limited to coastal areas spanning from the northern shores of Sydney Harbour to Botany Bay. Grows on creek banks, hillslopes or in shallow soil in rock crevices and sandstone platforms in cliffs in Sydney Coastal Dry Sclerophyll Forests, Coastal Headland Heaths, Sydney Coastal Heaths and Wallum Sand Heaths. Grows in sandy soils.	0 (PMST)	Low
Nielsen Park She-oak (*Allocasuarina portuensis*)	EN	E1	Slender shrub originally from one site at Neilsen Park in Woollahra, now propagated and planted at Neilsen Park, Gap Bluff, Hermit Point and Vaucluse House. Grows in tall, closed woodland on the slope of sandstone headlands in Sydney Coastal Dry Sclerophyll Forests and Coastal Headland Heaths. Grows in coarse textured, highly siliceous sand soils.	6 (OEH)	Low
(*Amperea xiphoclada* var*. pedicellata*)	E	E4	Erect shrub, believed extinct. Known from only one specimen collected in 1892 from Sydney. Once widely distributed in heath,	1 (OEH)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			woodland and forest communities. Grows in low-fertility, sandy soils.		
Thick Lip Spider Orchid (*Caladenia tessellata*)	VU	E1	Small orchid recorded from the Wyong, Ulladulla and Braidwood regions with the Kiama and Queanbeyan populations believed to be extinct. Found in a wide variety of communities including Central Gorge Dry Sclerophyll Forests, Cumberland Dry Sclerophyll Forests, Coastal Floodplain Woodlands and Subalpine Woodlands. Grows on clay loam or sandy soils.	0 (PMST)	Low
Leafless Tongue Orchid (*Cryptostylis hunteriana*)	VU	V	Orchid with a distribution spanning from Gibraltar Range National Park southwards to the coastal area near Orbost in Victoria. Grows in a variety of communities including Sydney Coastal Dry Sclerophyll Forests, Coastal Heath Swamps, New England Dry Sclerophyll Forests and Sydney Coastal Heaths. Grows in sandy soils.	0 (PMST)	Low
Bluegrass (*Dichanthium setosum*)	VU	V	Upright grass, growing on the New England Tablelands, North West Slopes and Plains, and the Central Western Slopes of NSW. Grows in moderately disturbed areas including cleared woodlands, roadside remnants and agricultural pasturelands in a variety of communities including Inland Riverine Forests, Northern Tableland Dry Sclerophyll Forests, Western Slopes Grassy Woodlands and Coastal Valley Grassy Woodlands. Grows on heavy black basaltic soils and red-brown loams with clay subsoils.	1 (OEH)	Low
Heart-leaved Stringybark (*Eucalyptus camfieldii*)	VU	V	Mallee tree restricted to a narrow band stretching from Raymond Terrace to the north and Waterfall in the south. Grows in scattered, localised distributions including sites at Norah Head, Terrey Hills, North	4 (OEH)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			Head, Menai, Mt Colah, Peats Ridge and Elvina Bay Trail. Grows in scattered stands near the boundries of tall coastal heath and low open woodland in a variety of communities including Sydney Coastal Dry Sclerophyll Forests, Eastern Riverine Forests, Sydney Coastal Heaths and Wallum Sand Heaths. Grows in sandy soils on Hawkesbury sandstone.		
Broken Back Ironbark (*Eucalyptus fracta*)		V	Small tree or mallee, confined to State Forest on the Northern Broken Back range near Cessnock. Grows as a dominant tree along the upper escarpment of a steep sandstone range in Sydney Coastal Dry Sclerophyll Forests and Sydney Hinterland Dry Sclerophyll Forests. Grows on shallow soils.	1 (OEH)	Low
Narrow-leaved Black Peppermint (*Eucalyptus nicholii*)	VU	V	Medium sized tree, sparsely distributed from Nundle through to the north of Tenterfield, also in urban tree plantings. Grows on slopes and ridges in a variety of communities including New England Dry Sclerophyll Forests, Western Slopes Dry Sclerophyll Forests, New England Grassy Woodlands and Tableland Clay Grassy Woodlands. Grows on shallow, infertile soils on shale substrates.	5 (OEH)	Low
Silver-leafed Gum (*Eucalyptus pulverulenta*)	VU	V	Mallee or small tree found in two separate locations in the Lithgow to Bathurst area and the Monaro area from Bredbo to Bombala. Grows as an understorey plant in a variety of communities including Upper Riverina Dry Sclerophyll Forests, Southern Tableland Dry Sclerophyll Forests, Southern Tableland Grassy Woodlands and Tableland Clay Grassy Woodlands. Grows in shallow, infertile soils.	1 (OEH)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Bauer's Midge Orchid (*Genoplesium baueri*)	EN	E1	Terrestrial orchid with 13 populations totalling 200 plants distributed between Ulladulla and Port Stephens. Grows on moss gardens in a variety of communities including Sydney Coastal Dry sclerophyll Forests, Sydney Coastal Heaths, Sydney Montane Heaths, Southern Lowland Wet Sclerophyll Forests and Sydney Hinterland Dry Sclerophyll Forests. Grows on sandstone substrates	0 (PMST)	Low
(*Hibbertia puberula*)		E1	Shrublet with a distribution extending from Wollemi National Park south to Morton National Park and the south coast near Nowra. Grows in a variety of communities including Southern Tableland Dry Sclerophyll Forests, Sydney Coastal Dry Sclerophyll Forests, Sydney Hinterland Dry Sclerophyll Forests, Coastal Heath Swamps, Coastal Valley Grassy Woodlands and Sydney Coastal Heaths. Grows on sandy soils, occasionally on clay soils.	1 (OEH)	Low
Deane's Paperbark (*Melaleuca deanei*)	VU	V	Medium sized shrub found growing in two distinct populations in the Ku-ring-gai/Berowra and Holsworthy/Wedderburn areas along with a few outliers at Springwood and in the Wollemi National Park, Yalwal and the Central Coast regions. Grows in ridgetop woodland in a variety of communities including Sydney Coastal Dry Sclerophyll Forests, South East Dry Sclerophyll Forests, Sydney HInterland Dry Sclerophyll Forests, Coastal Valley Grassy Woodlands, Sydney Coastal Heaths. Grows on sandstone substrates in alluvial soils.	1 (OEH)	Low
Omeo Stork's Bill (*Pelargonium* sp.	EN		Tufted perennial herb with a severely fragmented distribution in the Hawkesbury-	0 (PMST)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Striatellum (G.W.Carr 10345))			Nepean, Murrumbidgee, Southern Rivers and North East Natural Resource Management Regions of NSW. Found growing just above the high water level of irregularly indundated or ephemeral lakes as well as exposed lake beds in Upland Wetlands of the New England Tablelands and Natural Temperate Grassland of the Southern Tablelands of NSW and the ACT.		
Hairy Geebung (*Persoonia hirsuta*)	EN	E1	Spreading, hairy shrub with a scattered distribution throughout Sydney from Singleton to the north, the east coast of Bargo to the south and the Blue Mountains to the west. Grows at elevations between 350 - 600 metres in a variety of communities including Southern Tableland Dry Sclerophyll Forests, Sydney Hinterland Dry Sclerophyll Forests, Western Slopes Dry Sclerophyll Forests, Coastal Valley Grassy Woodlands, Sydney Coastal Heaths and Southern Escarpment Wet Sclerophyll Forests. Grows in sandy soils on sandstone substrates.	3 (OEH)	Low
(*Pimelea curviflora* var. *curviflora*)	VU	V	Small to medium sized shrub restricted to the coastal areas of Sydney between northern Sydney and Maroota with an outlying population at Croom Reserve near Albion Park in the Illawarra region. Grows on ridgetops and upper slopes amongst grasses and sedges in a variety of communities including Cumberland Dry Sclerophyll Forests, Sydney Hinterland Dry Sclerophyll Forests, Coastal Valley Grassy Woodlands, Sydney Coastal Heaths and Northern Hinterland Wet Sclerophyll Forests. Can be inconspicuous amongst grasses and sedges although easier to find	0 (PMST)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			in October to May when flowering. Grows on sandstone substrates in shale/lateritic soils and shale/sandstone transition soils.		
Seaforth Mintbush (*Prostanthera marifolia*)	CE	E4A	Small erect straggly shrub restricted to a single population fragmented by urbanisation into three sites located in the northern Sydney suburb of Saeforth. Found growing on ridge tops in association with Silvertop-ash Eucalyptus sieberi and Red Bloodwood Corymbia gummifera within or in close proximity to Duffys Forest and in Sydney Coastal Dry Sclerophyll Forests. Grows in deeply weathered clay associated with ironstone nodules and scattered shale lenses.	4 (OEH)	Low
Magenta Lilly Pilly (*Syzygium paniculatum*)	VU	E1	Small to medium sized rainforest tree restricted to a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. Found growing on stabilized dunes near the sea in South Coast Sands Dry Sclerophyll Forests, Coastal Swamp Forests, Coastal Headland Heaths, Littoral Rainforests, Northern Hinterland Wet Sclerophyll Forests and Southern Lowland Wet Sclerophyll Forests. Grows on grey sandy, gravelly, silty or clay soils over sandstone substrates.	35 (OEH)	Low
(*Tetratheca glandulosa*)		V	Small, spreading shrub with 150 populations confined to the Baulkham Hills, Gosford, Hawkesbury, Ku-ring-gai, Pittwater, Ryde and Wyong Local Government Areas. Found growing in a variety of communities including Sydney Sandstone Ridgetop Woodland, Sydney Coastal Dry Sclerophyll Forests, Eastern Riverine Forests, Coastal Valley Grassy Woodlands, Sydney Montane Heaths and	1 (OEH)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			North Coast Wet Sclerophyll Forests. Grows in the shallow, yellow clay/sandy loams that are typical of shale/sandstone transition soils where shale caps occur over sandstone substrates such as the Lucas Heights, Gymea, Lambert and Faulconbridge soil landscapes.		
Black-eyed Susan (*Tetratheca juncea*)	VU	V	Small shrub confined to the northern area of the Sydney Basin bioregion and the southern area of the North Coast bioregion in the Wyong, Lake Maquarie, Newcastle, Port Stephens, Great Lakes and Cessnock Local Government Areas. Found growing at well drained sites which experience annual rainfall levels between 1000 and 1200 mm at elevations below 200 metres in swampy heath and moist forests. Usually found growing in soils from the Awaba soil landscape comprising of low nutrient sandy, skeletal soils, sandy loam soils and clay soils on sandstone or conglomerate substrates.	2 (OEH)	Low
Austral Toadflax (*Thesium australe*)	VU	V	Small, straggling herb with a distribution comprising of small populations scattered along the coast of eastern NSW including the Northern and Southern Tablelands, Tasmania, Queensland and eastern Asia. A root parasite found growing on damp sites in grassland, grassy woodlands and coastal headlands often in association with Kangaroo Grass Themeda triandra in a variety of communities including New England Dry Sclerophyll Forests, Western Slopes Grasslands, Northern Tableland Wet Sclerophyll Forests, Brigalow Clay Plain Woodlands, Subalpine Woodlands and Maritime Grasslands.	1 (OEH)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Fauna					
Giant Burrowing Frog (*Heleioporus australiacus*)	VU	V	Prefers hanging swamps on sandstone shelves adjacent to perennial non-flooding creeks. Can also occur within shale outcrops within sandstone formations. Known from wet and dry forests and montane woodland in the southern part range. Individuals can be found around sandy creek banks or foraging along ridge-tops during or directly after heavy rain. Males often call from burrows located in sandy banks next to water. Spends the majority of its time in non-breeding habitat 20-250m from breeding sites.	0 (PMST)	Low
Green and Golden Bell Frog (*Litoria aurea*)	VU	E1	Most existing locations for the species occur as small, coastal, or near coastal populations, with records occurring between south of Grafton and northern VIC. The species is found in marshes, dams and stream sides, particularly those containing bullrushes or spikerushes. Preferred habitat contains water bodies that are unshaded, are free of predatory fish, have a grassy area nearby and have diurnal sheltering sites nearby such as vegetation or rocks, although the species has also been recorded from highly disturbed areas including disused industrial sites, brick pits, landfill areas and cleared land..	0 (PMST)	Low
Red-crowned Toadlet (*Pseudophryne australis*)		V	Occurs on wetter ridge tops and upper slopes of sandstone formations on which the predominant vegetation is dry open forests and heaths. This species typically breeds within small ephemeral creeks characterised by a series of shallow pools that feed into larger semi-perennial streams.	49 (OEH)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Magpie Goose (*Anseranas semipalmata*)		V	Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges. They are often seen walking and grazing on land; feeds on grasses, bulbs and rhizomes.. Nests are formed in trees over deep water; breeding is unlikely in south-eastern NSW. Often seen in trios or flocks on shallow wetlands, dry ephemeral swamps, wet grasslands and floodplains; roosts in tall vegetation.	10 (OEH)	Low
Regent Honeyeater (*Anthochaera phrygia*)	CE	E4A	Regent Honeyeaters are semi-nomadic, occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests. Nectar and fruit from mistletoes are also eaten. This species usually nest in tall mature eucalypts and sheoaks.	1 (OEH)	Low
Australasian Bittern (*Botaurus poiciloptilus*)	EN	E1	The Australasian Bittern is distributed across south-eastern Australia. Often found in terrestrial and estuarine wetlands, generally where there is permanent water with tall, dense vegetation including Typha spp. and Eleoacharis spp.. Typically this bird forages at night on frogs, fish and invertebrates, and remains inconspicuous during the day. The breeding season extends from October to January with nests being built amongst dense vegetation on a flattened platform of reeds.	1 (OEH)	Low
Bush Stone-curlew (*Burhinus grallarius*)		E1	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. Occrrs in lightly timbered	5 (OEH)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			open forest and woodland, or partly cleared farmland with remnants of woodland, with a ground cover of short sparse grass and few or no shrubs where fallen branches and leaf litter are present.		
Red Knot (*Calidris canutus*)	EN		Typically located within intertidal mudflats, sandflats and sandy beaches of sheltered coasts. Occasionally found on sandy open beaches or shallow pools, or in saline wetlands close to the coast.	0 (PMST)	Low
Curlew Sandpiper (*Calidris ferruginea*)	CE	E1	Inhabits sheltered intertidal mudflats. Also non-tidal swamps, lagoons and lakes near the coast. Infrequently recorded inland.	8 (OEH)	Low
Great Knot (*Calidris tenuirostris*)	CE	V	Mainly found on intertidal mudflats, sandflats and sandy beaches.	0 (PMST)	Low
Glossy Black-Cockatoo (*Calyptorhynchus lathami*)		V	Inhabits forest with low nutrients, characteristically with key Allocasuarina species. Tends to prefer drier forest types. Often confined to remnant patches in hills and gullies. Breed in hollows stumps or limbs, either living or dead.	2 (OEH)	Low
Greater Sand-plover (*Charadrius leschenaultii*)	VU	V	Entirely coastal in NSW, foraging on intertidal sand and mudflats in estuaries and roosting during high tide on sandy beaches or rocky shores. Individuals have been recorded on inshore reefs, rock platforms, small rocky islands and sand cays on coral reefs, within Australia. Occasional sightings have also occurred on near-coast saltlakes, brackish swamps, shallow freshwater wetlands and grassed paddocks.	0 (PMST)	Low
Lesser Sand-plover (*Charadrius mongolus*)	EN	V	In Australia, the species is known to favour coastal environs including beaches, mudflats and mangroves. Within NSW, individuals have been observed on intertidal	0 (PMST)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			sand and mudflats in estuaries or roosting on sandy beaches or rocky shores at high tide.		
Speckled Warbler (*Chthonicola sagittata*)		V	Chthonicola sagittata occurs on the hills and tablelands of the Great Dividing Range. Found in eucalypt and cypress woodlands with a grassy understorey, often on ridges or gullies. The species nests on the ground in grass tussocks, dense litter and fallen branches. They forage on the ground for arthropods and seeds.	1 (OEH)	Low
Varied Sittella (*Daphoenositta chrysoptera*)		V	The Varied Sittella is a sedentary species which inhabits a wide variety of dry eucalypt forests and woodlands, usually with either shrubby understorey or grassy ground cover or both, in all climatic zones of Australia. Usually inhabit areas with rough-barked trees, such as stringybarks or ironbarks, but also in mallee and acacia woodlands, paperbarks or mature Eucalypts. The Varied Sittella feeds on arthropods gleaned from bark, small branches and twigs. It builds a cup-shaped nest of plant fibres and cobweb in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.	1 (OEH)	Low
Eastern Bristlebird (*Dasyornis brachypterus*)	EN	E1	Found in coastal woodlands, dense scrub and heathlands, particularly where it borders taller woodlands.	0 (PMST)	Low
Antipodean Albatross (*Diomedea antipodensis*)	VU	V	A marine pelagic species rarely visiting Australia.	0 (PMST)	Low
Southern Royal Albatross (*Diomedea epomophora* (sensu stricto))	VU		During the non-breeding season, it has a wide and possibly circumpolar distribution, ranging north to about 35°S. The Royal Albatross is moderately common	0 (PMST)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			throughout the year in offshore waters of southern Australia, mostly off southeastern NSW, Victoria and Tasmania. Off South Australia, they are mostly seen May to September.		
Wandering Albatross (*Diomedea exulans*)	VU	E1	A marine, pelagic and aerial species. Versatile feeders in pelagic and shelf waters. Breed on subantarctic and antarctic islands.	1 (OEH)	Low
Wandering Albatross (*Diomedea exulans* (sensu lato))	VU	E1	A marine, pelagic and aerial species. Versatile feeders in pelagic and shelf waters. Breed on subantarctic and antarctic islands.	0 (PMST)	Low
Gibson's Albatross (*Diomedea gibsoni*)	VU	V	A marine pelagic species which breeds on the Auckland islands, New Zealand.	0 (PMST)	Low
Northern Royal Albatross (*Diomedea sanfordi*)	EN		The Northern Royal Albatross ranges widely over the Southern Ocean, with individuals seen in Australian waters off south-eastern Australia. The Northern Royal Albatross feeds regularly in Tasmanian and South Australian waters, and less frequently in NSW waters.	0 (PMST)	Low
White-fronted Chat (*Epthianura albifrons*)		V, E2	The White-fronted Chat occupies foothills and lowlands below 1000 m above sea level. In NSW it occurs mostly in the southern half of the state, occurring in damp open habitats along the coast, and near waterways in the western part of the state.	2 (OEH)	Low
Red Goshawk (*Erythrotriorchis radiatus*)	VU	E4A	Occur in forest and woodland habitat near permanent water. In NSW prefer Melaleuca swamp forest and open eucalypt woodland. Require greater than 20 m tall trees for nesting.	1 (OEH)	Low
Little Penguin population, Manly Point		E2	This is a marine species.	66 (OEH)	None

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
area (*Eudyptula minor*)					
White-bellied Storm-Petrel (*Fregetta grallaria grallaria*)	VU	V	The White-bellied Storm-Petrel (Tasman Sea) breeds on small offshore islets and rocks in the Lord Howe Island group, including Roach Island and Balls Pyramid. Its pelagic distribution is poorly understood, but it has been recorded north and east of its breeding islands to the tropics, in the Tasman Sea, Coral Sea, and north of New Zealand, and it is thought that some birds also reach the central Pacific Ocean. It has also been recorded over near-shore waters off the coasts of Queensland, NSW and Tasmania, and a single dead bird has been collected from the southeastern coast of Tasmania.	0 (PMST)	Low
Little Lorikeet (*Glossopsitta pusilla*)		V	Distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range in NSW, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. Mostly occur in dry, open eucalypt forests and woodlands. They feed primarily on nectar and pollen in the tree canopy. Nest hollows are located at heights of between 2 m and 15 m, mostly in living, smooth-barked eucalypts. Most breeding records come from the western slopes.	2 (OEH)	Low
Painted Honeyeater (*Grantiella picta*)	VU	V	Found mainly in dry open woodlands and forests, where it is strongly associated with mistletoe. Often found on plains with scattered eucalypts and remnant trees on farmlands.	0 (PMST)	Low
Pied Oystercatcher (*Haematopus longirostris*)		E1	An intertidal forager found on undisturbed sandy beaches and spits, tidal mudflats and estuaries. Its food supply (beach	4 (OEH)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			macroinvertebrates) has been negatively affected by human impacts. The Pied Oystercatcher is restricted to the littoral zone of beaches and estuaries, nesting on the ground above the tideline. A pair will re-nest in the same spot each year, rarely shifting their territory. Occasionally the Pied Oystercatcher is found in paddocks near the coast.		
White-bellied Sea Eagle (*Haliaeetus leucogaster*)		V	Found in terrestrial and coastal wetlands. Favours deep freshwater swamps, lakes and reservoirs, shallow coastal lagoons and saltmarshes. It hunts over open terrestrial habitats. Feeds on birds, reptiles, fish, mammals, crustaceans and carrion. Roosts and makes nest in trees.	26 (OEH)	Low
Little Eagle (*Hieraaetus morphnoides*)		V	The Little Eagle is most abundant in lightly timbered areas with open areas nearby providing an abundance of prey species. It has often been recorded foraging in grasslands, crops, treeless dune fields, and recently logged areas. The Little Eagle nests in tall living trees within farmland, woodland and forests.	2 (OEH)	Low
Black Bittern (*Ixobrychus flavicollis*)		V	The Black Bittern is found along the coastal plains within NSW, although individuals have rarely being recorded south of Sydney or inland. It inhabits terrestrial and estuarine wetlands such as flooded grasslands, forests, woodlands, rainforests and mangroves with permanent water and dense waterside vegetation. The Black Bittern typically roosts on the ground or in trees during the day and forages at night on frogs, reptiles, fish and invertebrates. The breeding season extends from December to March. Nests are constructed of reeds and	2 (OEH)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			sticks in branches overhanging the water.		
Swift Parrot (*Lathamus discolor*)	CE	E1	The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW.	4 (OEH)	Low
Black-tailed Godwit (*Limosa limosa*)		V	The Black-tailed Godwit is a migratory wading bird that breeds in Mongolia and Eastern Siberia and flies to Australia for the southern summer, arriving in August and leaving in March. In NSW, it is most frequently recorded at Kooragang Island (Hunter River estuary), with occasional records elsewhere along the coast, and inland. Records in western NSW indicate that a regular inland passage is used by the species, as it may occur around any of the large lakes in the western areas during summer, when the muddy shores are exposed.	0 (PMST)	Low
Southern Giant Petrel (*Macronectes giganteus*)	EN	E1	The Southern Giant-Petrel is a marine species found throughout the Antarctic to subtropical waters occasionally venturing to inshore waters.	0 (PMST)	Low
Northern Giant-Petrel (*Macronectes halli*)	VU	V	Marine, pelagic species found mainly in subantarctic waters.	0 (PMST)	Low
Barking Owl (*Ninox connivens*)		V	Generally found in open forests, woodlands, swamp woodlands, farmlands and dense scrub. Can also be found in the foothills and timber along watercourses in otherwise open country. Territories are typically 2000 ha in NSW habitats. Hunts small arboreal mammals or birds and terrestrial mammals when tree hollows are absent.	2 (OEH)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Powerful Owl (*Ninox strenua*)		V	The Powerful Owl occupies wet and dry eucalypt forests and rainforests. It may inhabit both un-logged and lightly logged forests as well as undisturbed forests where it usually roosts on the limbs of dense trees in gully areas. Large mature trees with hollows at least 0.5 m deep are required for nesting. Tree hollows are particularly important for the Powerful Owl because a large proportion of the diet is made up of hollow-dependent arboreal marsupials. Nest trees for this species are usually emergent with a diameter at breast height of at least 100 cm. It has a large home range of between 450 and 1450 ha.	154 (OEH)	Moderate
Eastern Curlew (*Numenius madagascariensis*)	CE		Occurs in sheltered coasts, especially estuaries, embayments, harbours, inlets and coastal lagoons with large intertidal mudflats or sandflats often with beds of seagrass.	0 (PMST)	Low
Sooty Tern (*Onychoprion fuscata*)		V	The Sooty Tern is a pelagic species found over tropical waters were it feeds offshore far away from land. It breeds off the coast of WA and QLD rarely venturing to the south-east of Australia.	2 (OEH)	Low
Fairy Prion (southern) (*Pachyptila turtur subantarctica*)	VU		Fairy Prions (including other subspecies) are often beachcast on the south-eastern coast of Australia, and are commonly seen offshore over the continental shelf and over pelagic waters. Observations are less common off Western Australia and Queensland than in south-eastern Australia. Beachcast birds are found along the whole coast of NSW, and the species is common offshore along the entire Victorian coast, where thousands are sometimes seen.	0 (PMST)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Osprey (*Pandion cristatus*)		V	Found in coastal waters, inlets, estuaries and offshore islands. Occasionally found 100 km inland along larger rivers. It is water-dependent, hunting for fish in clear, open water. The Osprey occurs in terrestrial wetlands, coastal lands and offshore islands. It is a predominantly coastal species, generally using marine cliffs as nesting and roosting sites. Nests can also be made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	3 (OEH)	Low
Gould's Petrel (*Pterodroma leucoptera leucoptera*)	EN	V	The Gould's Petrel is a marine species which only comes to shore to breed. It breeds exclusively on Cabbage Tree Island, 1.4 km offshore from Port Stephens and on nearby Boondelbah Island. The first arrival of Gould's petrel on cabbage tree Island occurs from mid to late September. Fledglings depart the island from late March to early May.	0 (PMST)	Low
Soft-plumaged Petrel (*Pterodroma mollis*)	VU		The Soft-plumaged Petrel is a regular visitor to Australian coastal waters.	1 (OEH)	Low
Kermadec Petrel (west Pacific subspecies) (*Pterodroma neglecta neglecta*)	VU	V	Marine pelagic, in subtropical and tropical waters. They breed on islands, atolls and rock cliff where they nest on the ground or in rock crevices under ferns, shrubs or trees. Forage far away from breed sites (Marchant & Higgins 1990).	0 (PMST)	Low
Superb Fruit-Dove (*Ptilinopus superbus*)		V	The Superb Fruit Dove ranges from northern NSW to as far south as Moruya. It is found in rainforests, closed forests (including mesophyll vine forests) and sometimes in eucalypt and acacia woodlands with fruit-bearing trees. It forages in the canopy of fruiting trees such as figs and palms.	8	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Flesh-footed Shearwater (*Puffinus carneipes*)		V	The Flesh-footed Shearwater is an oceanic species usually found beyond the edge of the continental shelf.	0 (PMST)	Low
Australian Painted Snipe (*Rostratula australis*)	EN	E1	Usually found in shallow inland wetlands including farm dams, lakes, rice crops, swamps and waterlogged grassland. They prefer freshwater wetlands, but have been recorded in brackish waters. Forages on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.	0 (PMST)	Low
Diamond Firetail (*Stagonopleura guttata*)		V	The Diamond Firetail is widely distributed, found in a range of habitat types including open eucalypt forest, mallee and acacia scrubs. Often occur in vegetation along watercourses. Feeds exclusively on the ground on ripe grass and herb seeds, green leaves and insects.	1 (OEH)	Low
Little Tern (*Sterna albifrons*)		E1	The Little Tern favours sheltered coasts, harbours, bays, lakes, inlets, estuaries, coastal lagoons and ocean beaches especially with sand-spits and sand islets. It forages over shallow waters close inshore or over sandbars and reefs.	0 (PMST)	Low
Little Tern (*Sternula albifrons*)		E1	The Little Tern favours sheltered coasts, harbours, bays, lakes, inlets, estuaries, coastal lagoons and ocean beaches especially with sand-spits and sand islets. It forages over shallow waters close inshore or over sandbars and reefs.	2 (OEH)	Low
Fairy Tern (*Sternula nereis nereis*)	VU		The Fairy Tern nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation. This species will also frequent embayments, estuarine habitats, wetlands and mainland coastlines.	0 (PMST)	Low
Freckled Duck		V	The Freckled Duck breeds in permanent	1 (OEH)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
(*Stictonetta naevosa*)			fresh swamps that are heavily vegetated. Found in fresh or salty permanent open lakes, especially during drought. Often seen in groups on fallen trees and sand spits.		
Buller's Albatross (*Thalassarche bulleri*)	VU		A marine pelagic species rarely visiting Australia.	0 (PMST)	Low
Shy Albatross (*Thalassarche cauta* (sensu stricto))	VU	V	The Shy Albatross is a marine pelagic species inhabiting sub-antarctic and subtropical waters, spending the majority of their time at sea. Occasionally it is observed in continental shelf waters in bays and harbours.	0 (PMST)	Low
Shy Albatross (*Thalassarche cauta cauta*)	VU	V	The Shy Albatross is a marine pelagic species inhabiting sub-antarctic and subtropical waters, spending the majority of their time at sea. Occasionally it is observed in continental shelf waters in bays and harbours.	0 (PMST)	Low
White-capped Albatross (*Thalassarche cauta steadi*)	VU		The White-capped Albatross is probably common off the coast of south-east Australia throughout the year. It has been observed that juveniles are rare in New Zealand waters, being more common off south-east Australia and South Africa. Breeding colonies occur on islands south of New Zealand.	0 (PMST)	Low
Chatham Albatross (*Thalassarche eremita*)	EN		The Chatham Albatross is a medium sized albatross, with a wing-span less than 2.1 m. The bright yellow bill has a distinctive black spot near the tip of the lower mandible, allowing discrimination from the similar Shy Albatross. Breeding for the Chatham Albatross is restricted to Pyramid Rock, Chatham Islands, off the coast of New Zealand. The principal foraging range for this species is in coastal waters off eastern and southern New Zealand, and Tasmania.	0 (PMST)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Campbell Albatross (*Thalassarche impavida*)	VU		Inhabits Antarctic, subantarctic and subtropical waters.	0 (PMST)	Low
Black-browed Albatross (*Thalassarche melanophris*)	VU	V	Inhabits Antarctic, subantarctic and subtropical waters. Although generally pelagic the species also occurs on the continental shelf and can be seen from land.	0 (PMST)	Low
Salvin's Albatross (*Thalassarche salvini*)	VU		Salvin's Albatross is a non-breeding visitor to Australian waters.	0 (PMST)	Low
White-capped Albatross (*Thalassarche steadi*)	VU		The White-capped Albatross is probably common off the coast of south-east Australia throughout the year. It has been observed that juveniles are rare in New Zealand waters, being more common off south-east Australia and South Africa. Breeding colonies occur on islands south of New Zealand.	0 (PMST)	Low
Masked Owl (*Tyto novaehollandiae*)		V	The Masked Owl is found in range of wooded habitats that provide tall or dense mature trees with hollows suitable for nesting and roosting. It is mostly seen in open forests and woodlands adjacent to cleared lands. Prey includes hollow-dependent arboreal marsupials and terrestrial mammals.	2 (OEH)	Low
Sooty Owl (*Tyto tenebricosa*)		V	The Sooty Owl is often found in tall old-growth forests, including temperate and subtropical rainforests. It is mostly found on escarpments with a mean altitude <500 m. This species nests and roosts in hollows of emergent trees, mainly eucalypts often located in gullies.	1 (OEH)	Low
Great white shark (*Carcharodon carcharias*)	CE		This is a marine species.	0 (PMST)	None
Black cod	VU		This is a marine species.	0 (PMST)	None

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
(*Epinephelus daemelii*)					
Macquarie perch (*Macquaria australasica*)	EN		This is a freshwater species.	0 (PMST)	None
Australian Grayling (*Prototroctes maraena*)	VU		This is a freshwater species.	0 (PMST)	None
Whale shark (*Rhincodon typus*)	VU		This is a marine species.	0 (PMST)	None
New Zealand Fur-seal (*Arctocephalus forsteri*)		V	This is a marine species.	2 (OEH)	None
Australian Fur-seal (*Arctocephalus pusillus doriferus*)		V	This is a marine species.	5 (OEH)	None
Blue Whale (*Balaenoptera musculus*)	EN	E1	This is a marine species.	0 (PMST)	None
Eastern Pygmy-possum (*Cercartetus nanus*)		V	Patchily distributed from the coast to the Great Dividing Range, and as far as Pillaga, Dubbo, Parkes and Wagga Wagga on the western slopes. Inhabits rainforest through to sclerophyll forest and tree heath. Banksias and myrtaceous shrubs and trees are a favoured food source. Soft fruits are eaten when flowers are unavailable and it also feeds on insects. Will often nest in tree hollows, but can also construct its own nest. Because of its small size it is able to utilise a range of hollow sizes including very small hollows.	1 (OEH)	Low
Large-eared Pied Bat (*Chalinolobus dwyeri*)	VU	V	Occurs from the Queensland border to Ulladulla, with largest numbers from the sandstone escarpment country in the Sydney Basin and Hunter Valley. Primarily found in dry sclerophyll forests and woodlands, but also found in rainforest fringes and subalpine woodlands. Forages on small, flying insects below the forest	0 (PMST)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			canopy. Roosts in colonies of between three and 80 in caves, Fairy Martin nests and mines, and beneath rock overhangs, but usually less than 10 individuals..		
Spotted-tailed Quoll (*Dasyurus maculatus*)	EN	V	Occurs along the east coast of Australia and the Great Dividing Range. Uses a range of habitats including sclerophyll forests and woodlands, coastal heathlands and rainforests. Occasional sightings have been made in open country, grazing lands, rocky outcrops and other treeless areas. Habitat requirements include suitable den sites, including hollow logs, rock crevices and caves, an abundance of food and an area of intact vegetation in which to forage. Seventy per cent of the diet is medium-sized mammals, and also feeds on invertebrates, reptiles and birds. Individuals require large areas of relatively intact vegetation through which to forage.	1 (OEH)	Low
Southern Right Whale (*Eubalaena australis*)	EN	E1	This is a marine species.	1 (OEH)	None
Southern Brown Bandicoot (eastern) (*Isoodon obesulus obesulus*)	EN	E1	This species prefers sandy soils with scrubby vegetation and/or areas with low ground cover that are burn from time to time. A mosaic of post fire vegetation is important for this species.	0 (PMST)	Low
Humpback Whale (*Megaptera novaeangliae*)	VU	V	This is a marine species.	0 (PMST)	None
Little Bentwing-bat (*Miniopterus australis*)		V	Occurs from Northern Queensland to the Hawkesbury River near Sydney. Roost sites encompass a range of structures including caves, tunnels and stormwater drains. Young are raised by the females in large maternity colonies in caves in summer. Shows a preference for well	1 (OEH)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			timbered areas including rainforest, wet and dry sclerophyll forests, Melaleuca swamps and coastal forests. The Little Bentwing bat forages for small insects (such as moths, wasps and ants) beneath the canopy of densely vegetated habitats.		
Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)		V	Occurs from Victoria to Queensland, on both sides of the Great Dividing Range. Forms large maternity roosts (up to 100,000 individuals) in caves and mines in spring and summer. Individuals may fly several hundred kilometres to their wintering sites, where they roost in caves, culverts, buildings, and bridges. They occur in a broad range of habitats including rainforest, wet and dry sclerophyll forest, paperbark forest and open grasslands. Has a fast, direct flight and forages for flying insects (particularly moths) above the tree canopy and along waterways.	63 (OEH)	Moderate
Southern Elephant Seal (*Mirounga leonina*)	VU		This is a marine species.	1 (OEH)	None
Eastern Freetail-bat (*Mormopterus norfolkensis*)		V	Distribution extends east of the Great Dividing Range from southern Queensland to south of Sydney. Most records are from dry eucalypt forests and woodland. Individuals tend to forage in natural and artificial openings in forests, although it has also been caught foraging low over a rocky river within rainforest and wet sclerophyll forest habitats. The species generally roosts in hollow spouts of large mature eucalypts (including paddock trees), although individuals have been recorded roosting in the roof of a hut, in wall cavities, and under metal caps of telegraph poles. Foraging generally occurs within a few	10 (OEH)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			kilometres of roosting sites.		
Southern Myotis (*Myotis macropus*)		V	Scattered, mainly coastal distribution extending to South Australia along the Murray River. Roosts in caves, mines or tunnels, under bridges, in buildings, tree hollows, and even in dense foliage. Colonies occur close to water bodies, ranging from rainforest streams to large lakes and reservoirs. They catch aquatic insects and small fish with their large hind claws, and also catch flying insects.	477 (OEH)	Low
Koala (*Phascolarctos cinereus*)	VU	V	In NSW the Koala mainly occurs on the central and north coasts with some populations in the western region. Koalas feed almost exclusively on eucalypt foliage, and their preferences vary regionally. Primary feed trees include Eucalyptus robusta, E. tereticornis, E. punctata, E. haemostoma and E. signata. They are solitary with varying home ranges.	0 (PMST)	Low
Grey-headed Flying-fox (*Pteropus poliocephalus*)	VU	V	Occurs along the NSW coast, extending further inland in the north. This species is a canopy-feeding frugivore and nectarivore of rainforests, open forests, woodlands, melaleuca swamps and banksia woodlands. Roosts in large colonies, commonly in dense riparian vegetation.	292 (OEH)	Moderate
Loggerhead Turtle (*Caretta caretta*)	EN	E1	This is a marine species.	0 (PMST)	None
Green Turtle (*Chelonia mydas*)	VU	V	This is a marine species.	0 (PMST)	None
Leathery Turtle (*Dermochelys coriacea*)	EN	V	This is a marine species.	1 (OEH)	None
Hawksbill Turtle (*Eretmochelys imbricata*)	VU		This is a marine species.	0 (PMST)	None

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Broad-headed Snake (*Hoplocephalus bungaroides*)	VU	E1	Mainly occurs in association with communities occurring on Triassic sandstone within the Sydney Basin. Typically found among exposed sandstone outcrops with vegetation types ranging from woodland to heath. Within these habitats they generally use rock crevices and exfoliating rock during the cooler months and tree hollows during summer.	0 (PMST)	Low
Flatback Turtle (*Natator depressus*)	VU		This is a marine species.	0 (PMST)	None
Migratory					
Common Sandpiper (*Actitis hypoleucos*)	MI		Inhabits a wide range of coastal and inland wetlands, often with muddy or rocky margins. Also known to occur at estuaries, billabongs, dams, pools and lakes, often associated with mangroves.	2 (OEH)	Low
Common Noddy (*Anous stolidus*)	MI			0 (PMST)	Low
Fork-tailed Swift (*Apus pacificus*)	MI		Almost exclusively aerial (foraging). The Fork-tailed Swift breeds in Asia but migrates to Australia from September to April. Individuals or flocks can be observed hawking for insects at varying heights from only a few metres from the ground and up to 300 metres high.	7 (OEH)	Low
Cattle Egret (*Ardea ibis*)	MI		Occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands.	7 (OEH)	Low
Eastern Great Egret (*Ardea modesta*)	MI		Terrestrial wetlands, estuarine and littoral habitats and moist grasslands. Inland, prefer permanent waterbodies on floodplains; shallows of deep permanent lakes (either open or vegetated), semi-permanent swamps with tall emergent vegetation and herb dominated seasonal	9 (OEH)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			swamps with abundant aquatic flora. Also regularly use saline habitats including mangrove forests, estuarine mudflats, saltmarshes, bare saltpans, shallows of salt lakes, salt fields and offshore reefs. Breeding requires wetlands with fringing trees in which to build nests including mangrove forest, freshwater lakes or swamps and rivers.		
Wedge-tailed Shearwater (*Ardenna pacificus*)	MI		Common breeding and non-breeding visitor to coastal and pelagic waters off the east and west coasts of Australia, vagrants to north and south Australian waters. Breeds on vegetated islands, atolls and cays and nests in rock crevices or burrows.	3 (OEH)	Low
Ruddy Turnstone (*Arenaria interpres*)	MI		Inhabits tidal reefs, sandy beaches mudflats and exposed or shallow seaweed beds.	0 (PMST)	Low
Bryde's Whale (*Balaenoptera edeni*)	MI		This Is a marine species.	0 (PMST)	None
Blue Whale (*Balaenoptera musculus*)	EN, MI	E1	This Is a marine species.	0 (PMST)	None
Sharp-tailed Sandpiper (*Calidris acuminata*)	MI		Inland waters, coastal.	38 (OEH)	Low
Red Knot (*Calidris canutus*)	EN, MI		Typically located within intertidal mudflats, sandflats and sandy beaches of sheltered coasts. Occasionally found on sandy open beaches or shallow pools, or in saline wetlands close to the coast.	0 (PMST)	Low
Curlew Sandpiper (*Calidris ferruginea*)	CE, MI	E1	Inhabits sheltered intertidal mudflats. Also non-tidal swamps, lagoons and lakes near the coast. Infrequently recorded inland.	8 (OEH)	Low
Pectoral Sandpiper (*Calidris melanotos*)	MI		Scarce, but regular visitor, usually recorded in summer from November to March. Widespread but scattered records in Australia. Usually found in fresh to saline	1 (OEH)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			wetlands, floodplains, swamps, estuaries and lagoons, sometimes with emergent or fringing vegetation such as grass.		
Red-necked Stint (*Calidris ruficollis*)	MI		Inhabits mainly coastal environments; saltmarshes, tidal mudflats, saline and freshwater wetlands, sandy or shelly beaches and sewage ponds.	0 (PMST)	Low
Great Knot (*Calidris tenuirostris*)	CE, MI	V	Mainly found on intertidal mudflats, sandflats and sandy beaches.	0 (PMST)	Low
Pygmy Right Whale (*Caperea marginata*)	MI		This is a marine species.	0 (PMST)	None
Loggerhead Turtle (*Caretta caretta*)	EN, MI	E1	This is a marine species.	0 (PMST)	None
Double-banded Plover (*Charadrius bicinctus*)	MI		Tidal mudflats, beaches, exposed reefs, salt marshes, freshwater wetlands, inland salt lakes, short grass on golf courses, airfields.	0 (PMST)	Low
Greater Sand-plover (*Charadrius leschenaultii*)	VU, MI	V	Entirely coastal in NSW, foraging on intertidal sand and mudflats in estuaries and roosting during high tide on sandy beaches or rocky shores. Individuals have been recorded on inshore reefs, rock platforms, small rocky islands and sand cays on coral reefs, within Australia. Occasional sightings have also occurred on near-coast saltlakes, brackish swamps, shallow freshwater wetlands and grassed paddocks.	0 (PMST)	Low
Lesser Sand-plover (*Charadrius mongolus*)	EN, MI	V	In Australia, the species is known to favour coastal environs including beaches, mudflats and mangroves. Within NSW, individuals have been observed on intertidal sand and mudflats in estuaries or roosting on sandy beaches or rocky shores at high tide.	0 (PMST)	Low
Green Turtle	VU, MI	V	This a marine species.	0 (PMST)	None

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
(*Chelonia mydas*)					
Oriental Cuckoo (*Cuculus optatus*)	MI		Mainly found in forests, the Oriental cuckoo can inhabit mixed, deciduous and coniferous forest.	0 (PMST)	Low
Monarch Butterfly (*Danaus plexippus*)	MI		The monarch butterfly can be found in a variety of temperate and tropical open habitats.	8 (OEH)	Low
Leathery Turtle (*Dermochelys coriacea*)	EN, MI	V	This is a marine species.	1 (OEH)	None
Southern Royal Albatross (*Diomedea epomophora* (sensu stricto))	VU, MI		During the non-breeding season, it has a wide and possibly circumpolar distribution, ranging north to about 35°S. The Royal Albatross is moderately common throughout the year in offshore waters of southern Australia, mostly off southeastern NSW, Victoria and Tasmania. Off South Australia, they are mostly seen May to September.	0 (PMST)	Low
Wandering Albatross (*Diomedea exulans*)	VU, MI	E1	A marine, pelagic and aerial species. Versatile feeders in pelagic and shelf waters. Breed on subantarctic and antarctic islands.	1 (OEH)	Low
Gibson's Albatross (*Diomedea gibsoni*)	VU, MI	V	A marine pelagic species which breeds on the Auckland islands, New Zealand.	0 (PMST)	Low
Northern Royal Albatross (*Diomedea sanfordi*)	EN, MI		The Northern Royal Albatross ranges widely over the Southern Ocean, with individuals seen in Australian waters off south-eastern Australia. The Northern Royal Albatross feeds regularly in Tasmanian and South Australian waters, and less frequently in NSW waters.	0 (PMST)	Low
Hawksbill Turtle (*Eretmochelys imbricata*)	VU, MI		This is a marine species.	0 (PMST)	None
Southern Right Whale (*Eubalaena australis*)	EN, MI	E1	This is a marine species.	1 (OEH)	None

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Lesser Frigatebird (*Fregata ariel*)	MI		A marine, pelagic species that inhabits tropical and subtropical seas, coastlines and islands.	0 (PMST)	Low
Great Frigatebird (*Fregata minor*)	MI		A marine, pelagic species that inhabits tropical and subtropical seas, coastlines and islands.	0 (PMST)	Low
Latham's Snipe (*Gallinago hardwickii*)	MI		Typically found on wet soft ground or shallow water with good cover of tussocks. Often found in wet paddocks, seepage areas below dams.	5 (OEH)	Low
Grey-tailed Tattler (*Heteroscelus brevipes*)	MI		Found in estuaries, mangroves and tidal mudflats. Also in shallow river margins, both coastal and inland.	0 (PMST)	Low
White-throated Needletail (*Hirundapus caudacutus*)	MI		An aerial species found in feeding concentrations over cities, hilltops and timbered ranges. Breeds in Asia.	6 (OEH)	Low
Caspian Tern (*Hydroprogne caspia*)	MI		Usually coastal, with a preference for sheltered estuaries, inlets, bays, harbours, lagoons with muddy or sandy shores. Keeps close inshore, not out beyond reef line. Also extends well inland on fresh or salt lakes, temporary floodwaters, large rivers, reservoirs, sewage ponds.	2 (OEH)	Low
Dusky Dolphin (*Lagenorhynchus obscurus*)	MI		This is a marine species.	0 (PMST)	Low
Porbeagel, mackerel shark (*Lamna nasus*)	MI		This is a marine species.	0 (PMST)	Low
Bar-tailed Godwit (*Limosa lapponica*)	MI		Coastal species, usually inhabiting intertidal sandflats, spits and banks. Less frequently found in mudflats, estuaries, coastal lagoons and harbours.	5 (OEH)	Low
Black-tailed Godwit (*Limosa limosa*)	MI	V	The Black-tailed Godwit is a migratory wading bird that breeds in Mongolia and	0 (PMST)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			Eastern Siberia and flies to Australia for the southern summer, arriving in August and leaving in March. In NSW, it is most frequently recorded at Kooragang Island (Hunter River estuary), with occasional records elsewhere along the coast, and inland. Records in western NSW indicate that a regular inland passage is used by the species, as it may occur around any of the large lakes in the western areas during summer, when the muddy shores are exposed. The species has been recorded within the Murray-Darling Basin, on the western slopes of the Northern Tablelands and in the far north-western corner of the state.		
Southern Giant Petrel (*Macronectes giganteus*)	EN, MI	E1	The Southern Giant-Petrel is a marine species found throughout the Antarctic to subtropical waters occasionally venturing to inshore waters.	0 (PMST)	Low
Northern Giant-Petrel (*Macronectes halli*)	VU, MI	V	Marine, pelagic species found mainly in subantarctic waters.	0 (PMST)	Low
Reef Manta Ray (*Manta alfredi*)	MI		This is a marine species.	0 (PMST)	None
Giant Manta Ray (*Manta birostris*)	MI		This is a marine species.	0 (PMST)	None
Humpback Whale (*Megaptera novaeangliae*)	VU, MI	V	This is a marine species.	0 (PMST)	None
Black-faced Monarch (*Monarcha melanopsis*)	MI		A migratory species found during the breeding season in damp gullies in temperate rainforests. Disperses after breeding into more open woodland.	15 (OEH)	Low
Spectacled Monarch (Symposiachrus trivirgatus)	MI		0	0 (PMST)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Yellow Wagtail (*Motacilla flava*)	MI		Regular spring-summer visitor in north of Australia, rare vagrant or occasional visitor farther south. Found in marshes, damp paddocks, airfields, cultivated fields, lawns and estuaries.	0 (PMST)	Low
Satin Flycatcher (*Myiagra cyanoleuca*)	MI		Migratory species that occurs in coastal forests, woodlands and scrubs during migration. Breeds in heavily vegetated gullies.	4 (OEH)	Low
Flatback Turtle (*Natator depressus*)	VU, MI		The Flatback Turtle is found only in the tropical waters of northern Australia, Papua New Guinea and Irian Jaya and is one of only two species of sea turtle without a global distribution. Nesting is confined to Australia and four genetic stocks are recognised.	0 (PMST)	None
Eastern Curlew (*Numenius madagascariensis*)	CE, MI		Occurs in sheltered coasts, especially estuaries, embayments, harbours, inlets and coastal lagoons with large intertidal mudflats or sandflats often with beds of seagrass.	0 (PMST)	Low
Little Curlew (*Numenius minutus*)	MI		Short, dry grasslands and sedgelands, including dry floodplains and blacksoil plains, which have scattered, shallow freshwater pools. Mostly feed in dry grassland or sedgeland, either natural or artificial. Foraging sites usually occur within 5km of daytime roosting sites.	2 (OEH)	Low
Whimbrel (*Numenius phaeopus*)	MI		Occurs in intertidal mudflats of sheltered coasts. Also in estuaries, mangroves, coral clays and exposed reefs. Roosts in trees and mangroves.	0 (PMST)	Low
Osprey (*Pandion cristatus*)	MI	V	Found in coastal waters, inlets, estuaries and offshore islands. Occasionally found 100 km inland along larger rivers. It is water-dependent, hunting for fish in clear,	3 (OEH)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			open water. The Osprey occurs in terrestrial wetlands, coastal lands and offshore islands. It is a predominantly coastal species, generally using marine cliffs as nesting and roosting sites. Nests can also be made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.		
White-tailed Tropicbird (*Phaethon lepturus*)	MI		A marine pelagic species which only returns to land based colonies to breed. A vagrant visitor to Australia.	2 (OEH)	Low
Ruff (*Philomachus pugnax*)	MI		Rare migrant from northern Eurasia regularly visits fresh, brackish or saline wetlands with exposed mudflats at edges, usually terrestrial but sometimes found in sheltered coast habitats.	0 (PMST)	Low
Pacific Golden Plover (*Pluvialis fulva*)	MI		Migratory species that visits estuaries mudflats, saltmarshes and ocean shores as well as paddocks, grasslands and swamps near the coast.	2 (OEH)	Low
Gould's Petrel (*Pterodroma leucoptera leucoptera*)	EN, MI	V	The Gould's Petrel is a marine species which only comes to shore to breed. It breeds exclusively on Cabbage Tree Island, 1.4 km offshore from Port Stephens and on nearby Boondelbah Island. The first arrival of Gould's petrel on cabbage tree Island occurs from mid to late September. Fledglings depart the island from late March to early May.	0 (PMST)	Low
Flesh-footed Shearwater (*Puffinus carneipes*)	MI	V	The Flesh-footed Shearwater is an oceanic species usually found beyond the edge of the continental shelf.	0 (PMST)	Low
Whale shark (*Rhincodon typus*)	VU, MI		This is a marine species.	0 (PMST)	None
Rufous Fantail (*Rhipidura rufifrons*)	MI		Migratory species that prefers dense, moist undergrowth of tropical rainforests and	28 (OEH)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			scrubs. During migration it can stray into gardens and more open areas.		
Indo-Pacific Hump-backed Dolphin (*Sousa chinensis*)	MI		This is a marine species.	0 (PMST)	None
Pomarine Jaeger (*Stercorarius pomarinus*)	MI		A marine pelagic species, commonly observed off the NSW coastal waters.	1 (OEH)	Low
Common Tern (*Sterna hirundo*)	MI		Marine, typically well offshore, but also in coastal waters, sheltered bays, estuaries, and on ocean beaches.	15 (OEH)	Low
Little Tern (*Sternula albifrons*)	MI	E1	The Little Tern favours sheltered coasts, harbours, bays, lakes, inlets, estuaries, coastal lagoons and ocean beaches especially with sand-spits and sand islets. It forages over shallow waters close inshore or over sandbars and reefs.	2 (OEH)	Low
Spectacled Monarch (*Symposiachrus trivirgatus*)	MI		Found in darker parts of mountain and lowland rainforest, adjacent to thickly wooded gullies.	3 (OEH)	Low
Buller's Albatross (*Thalassarche bulleri*)	VU, MI		A marine pelagic species rarely visiting Australia.	0 (PMST)	Low
Shy Albatross (*Thalassarche cauta* (sensu stricto))	VU, MI	V	The Shy Albatross is a marine pelagic species inhabiting sub-antarctic and subtropical waters, spending the majority of their time at sea. Occasionally it is observed in continental shelf waters in bays and harbours.	0 (PMST)	Low
Shy Albatross (*Thalassarche cauta cauta*)	VU, MI	V	The Shy Albatross is a marine pelagic species inhabiting sub-antarctic and subtropical waters, spending the majority of their time at sea. Occasionally it is observed in continental shelf waters in bays and harbours.	0 (PMST)	Low
White-capped Albatross	VU, MI		The White-capped Albatross is probably	0 (PMST)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
(*Thalassarche cauta steadi*)			common off the coast of south-east Australia throughout the year. It has been observed that juveniles are rare in New Zealand waters, being more common off south-east Australia and South Africa. Breeding colonies occur on islands south of New Zealand.		
Chatham Albatross (*Thalassarche eremita*)	EN, MI		The Chatham Albatross is a medium sized albatross, with a wing-span less than 2.1 m. The bright yellow bill has a distinctive black spot near the tip of the lower mandible, allowing discrimination from the similar Shy Albatross. Breeding for the Chatham Albatross is restricted to Pyramid Rock, Chatham Islands, off the coast of New Zealand. The principal foraging range for this species is in coastal waters off eastern and southern New Zealand, and Tasmania.	0 (PMST)	Low
Campbell Albatross (*Thalassarche impavida*)	VU, MI		Inhabits Antarctic, subantarctic and subtropical waters.	0 (PMST)	Low
Black-browed Albatross (*Thalassarche melanophris*)	VU, MI	V	Inhabits Antarctic, subantarctic and subtropical waters. Although generally pelagic the species also occurs on the continental shelf and can be seen from land.	0 (PMST)	Low
Salvin's Albatross (*Thalassarche salvini*)	VU, MI		Salvin's Albatross is a non-breeding visitor to Australian waters.	0 (PMST)	Low
White-capped Albatross (*Thalassarche steadi*)	VU, MI		The White-capped Albatross is probably common off the coast of south-east Australia throughout the year. It has been observed that juveniles are rare in New Zealand waters, being more common off south-east Australia and South Africa. Breeding colonies occur on islands south of New Zealand.	0 (PMST)	Low
Common Greenshank	MI		Widely distributed throughout a range of	1 (OEH)	Low

Common Name *(Scientific Name)*	EPBC Act	BC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
(*Tringa nebularia*)			inland wetlands and sheltered coastal habitats. Occurs in habitats with varying salinity.		
Marsh Sandpiper (*Tringa stagnatilis*)	MI		Inhabits permanent or ephemeral wetlands, including swamps, billabongs, lagoons, saltmarshes and estuaries. Forages at the edge of wetlands in shallow water.	2 (OEH)	Low