Appendix A

EPBC Protected Matters Search Report

Australian Government
Department of Sustainability, Environment, Water, Population and Communities

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 14/09/12 09:26:05

Coordinates
Buffer: 5.0Km

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	2
National Heritage Places:	2
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	31
Listed Migratory Species:	32

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	18
Commonwealth Heritage Places:	2
Listed Marine Species:	36
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	113
State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	18
Nationally Important Wetlands:	2
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Status
Australian Convict Sites	NSW	Declared property
Australian Convict Sites - Old Government House and Domain - Buffer Zone	NSW	Declared property

National Heritage Properties [Resource Information]

Name	State	Status
Historic		
Old Government House and the Government Domain	NSW	Listed place
Parramatta Female Factory Precinct	NSW	Nominated place

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	Critically Endangered	Community likely to occur within area
Shale/Sandstone Transition Forest	Endangered	Community likely to occur within area
Turpentine-Ironbark Forest in the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Endangered	Species or species habitat likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Vulnerable	Species or species habitat likely to occur within area
Sternula nereis nereis Fairy Tern (Australian) [82950]	Vulnerable	Species or species habitat may occur within area
Fish		
Epinephelus daemelii Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat likely to occur within area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area
Mixophyes balbus Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area
Isoodon obesulus obesulus Southern Brown Bandicoot (Eastern) [68050]	Endangered	Species or species habitat may occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat may occur within area
Pseudomys novaehollandiae New Holland Mouse [96]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
Acacia pubescens Downy Wattle, Hairy Stemmed Wattle [18800]	Vulnerable	Species or species habitat likely to occur within area
Bothriochloa biloba Lobed Blue-grass [3153]	Vulnerable	Species or species habitat likely to occur within area
Caladenia tessellata Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area
Melaleuca biconvexa Biconvex Paperbark [5583]	Vulnerable	Species or species habitat may occur within area
Pelargonium sp. Striatellum (G.W.Carr 10345) Omeo Stork's-bill [84065]	Endangered	Species or species habitat may occur within area
Pimelea curviflora var. curviflora [4182]	Vulnerable	Species or species habitat may occur within area
Pimelea spicata [20834]	Endangered	Species or species habitat likely to occur within area
Pterostylis saxicola Sydney Plains Greenhood [64537]	Endangered	Species or species habitat may occur within area
Streblus pendulinus Siah's Backbone, Sia's Backbone, Isaac Wood [21618]	Endangered	Species or species habitat likely to occur within area
Tetratheca glandulosa Glandular Pink-bell [2350]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Hoplocephalus bungaroides Broad-headed Snake [1182]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat may occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Migratory Marine Species		
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Breeding likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Breeding may occur within area
Xanthomyza phrygia Regent Honeyeater [430]	Endangered*	Species or species habitat likely to occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Foraging, feeding or related behaviour known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Foraging, feeding or related behaviour known to occur within area
Calidris canutus Red Knot, Knot [855]		Foraging, feeding or related behaviour known to occur within area
Calidris ferruginea Curlew Sandpiper [856]		Foraging, feeding or related behaviour known to occur within area
Calidris ruficollis Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area
Calidris tenuirostris Great Knot [862]		Foraging, feeding or related behaviour known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Foraging, feeding or related behaviour known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]		Foraging, feeding or related behaviour known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]		Foraging, feeding or related behaviour known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Foraging, feeding or related behaviour known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Foraging, feeding or related behaviour known to occur within area
Limosa limosa Black-tailed Godwit [845]		Foraging, feeding or

Name	Threatened	Type of Presence
		related behaviour known to occur within area
Numenius madagascariensis Eastern Curlew [847]		Foraging, feeding or related behaviour known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Vulnerable*	Species or species habitat likely to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Foraging, feeding or related behaviour known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Australian & Overseas Telecommunications Corporation
Commonwealth Land - Australian Postal Commission
Commonwealth Land - Australian Postal Corporation
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Australian Telecommunications Corporation
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Defence Service Homes Corporation
Commonwealth Land - Director of War Service Homes
Commonwealth Land - Reserve Bank of Australia
Commonwealth Land - Telstra Corporation Limited
Commonwealth Land - War Service Homes Commissioner
Defence - 1/15 RNSWL - LANCER BARRACKS - PARRAMATTA
Defence - ADFRU PARRAMATTA
Defence - LIDCOMBE MULTI-USER DEPOT
Defence - MERRYLANDS
Defence - NEWINGTON
Defence - TIMOR BARRACKS - DUNDAS

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Historic		
Lancer Barracks	NSW	Listed place
Lancer Barracks Precinct	NSW	Listed place

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Ardea alba Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Foraging, feeding or related behaviour known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Foraging, feeding or related behaviour known to occur within area
Calidris canutus Red Knot, Knot [855]		Foraging, feeding or related behaviour known to occur within area
Calidris ferruginea Curlew Sandpiper [856]		Foraging, feeding or related behaviour known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Foraging, feeding or related behaviour known to occur within area
Calidris ruficollis Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area
Calidris tenuirostris Great Knot [862]		Foraging, feeding or related behaviour known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Foraging, feeding or related behaviour known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]		Foraging, feeding or related behaviour known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]		Foraging, feeding or related behaviour known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Foraging, feeding or related behaviour known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Foraging, feeding or related behaviour known to occur within area

Name	Threatened	Type of Presence
Himantopus himantopus Black-winged Stilt [870]		Foraging, feeding or related behaviour known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Foraging, feeding or related behaviour known to occur within area
Limosa limosa Black-tailed Godwit [845]		Foraging, feeding or related behaviour known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Breeding likely to occur within area
Numenius madagascariensis Eastern Curlew [847]		Foraging, feeding or related behaviour known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Foraging, feeding or related behaviour known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Foraging, feeding or related behaviour known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Breeding may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Vulnerable*	Species or species habitat likely to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Foraging, feeding or related behaviour known to occur within area

Extra Information

Places on the RNE [Resource Information]

Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
Dundas Valley, Corridor through Time	NSW	Indicative Place
Hill Road Wetlands	NSW	Indicative Place
Parramatta and Lane Cove Rivers Landscapes	NSW	Indicative Place
Ermington Bay Wetlands	NSW	Registered
Haslams Creek Wetlands	NSW	Registered
Homebush Bay Wetlands	NSW	Registered
Lower Duck River Wetlands	NSW	Registered
Meadowbank Park Foreshore Wetland	NSW	Registered
Silverwater Saltmarsh	NSW	Registered
Historic		
Auburn Fire Station	NSW	Indicative Place
Camellia Railway Underbridge	NSW	Indicative Place
Cumberland Hospital Landscape	NSW	Indicative Place
Evesham	NSW	Indicative Place
Granville Town Hall	NSW	Indicative Place
House	NSW	Indicative Place
House	NSW	Indicative Place
House	NSW	Indicative Place
House	NSW	Indicative Place
Hoyts Crest Theatre (former)	NSW	Indicative Place
Lidcombe Post Office	NSW	Indicative Place
Lockerbie and Keswick	NSW	Indicative Place
Police Station	NSW	Indicative Place
Prince Alfred Park	NSW	Indicative Place
Remnant Garden from Old Benevolent Society	NSW	Indicative Place
St Andrews Uniting Church & Halls	NSW	Indicative Place
The Stormwater Drains of Rookwood Cemetery	NSW	Indicative Place
Vauxhall Inn	NSW	Indicative Place
Willow Grove	NSW	Indicative Place
Wistaria Gardens	NSW	Indicative Place
Accommodation Block Spinal Range for Wards 2 and 3	NSW	Registered
Administration Building	NSW	Registered
All Saints Anglican Church, Grounds & Trees	NSW	Registered
All Saints Parochial School	NSW	Registered
Auxiliary Buildings former Kings School	NSW	Registered
Boat House	NSW	Registered
Boer War Memorial	NSW	Registered
Boorbri and Grounds	NSW	Registered
Boundary Stone	NSW	Registered
Brislington	NSW	Registered
Burnside Homes	NSW	Registered
Catholic Cemetery	NSW	Registered
Centennial Clock	NSW	Registered
Central Block former Kings School	NSW	Registered
Chief Attendants Cottage (former)	NSW	Registered
Cottage	NSW	Registered
Cottage	NSW	Registered
Day Room for Wards 4 and 5 (former)	NSW	Registered
Dispensary (former)	NSW	Registered
Elizabeth Farm House	NSW	Registered
Endrim	NSW	Registered
Experiment Farm Cottage	NSW	Registered
Female Orphan School Precinct	NSW	Registered
Girls Training School Precinct	NSW	Registered
Governor Brisbanes Observatory Remnants	NSW	Registered
Governors Bath House (former)	NSW	Registered
Governors Dairy Cottage (former)	NSW	Registered
Gowan Brae Group	NSW	Registered
Gowan Brae House	NSW	Registered
Hambledon	NSW	Registered

Name	State	Status
Harborne including Ground and Trees	NSW	Registered
Headmasters Residence former Kings School	NSW	Registered
Hostel (former) now Administration Building	NSW	Registered
Kia Ora (former)	NSW	Registered
Kings School (former) Group	NSW	Registered
Kings School Chapel	NSW	Registered
Kitchen Block	NSW	Registered
Lancer Barracks	NSW	Registered
Lancer Barracks Precinct	NSW	Registered
Lennox Bridge	NSW	Registered
Lennox House and Outbuilding	NSW	Registered
MacArthur House	NSW	Registered
Macquarie Street Gatehouse	NSW	Registered
Mays Hill Cemetery	NSW	Registered
McDonalds Farm House	NSW	Registered
Medical Superintendents House (former)	NSW	Registered
Newington	NSW	Registered
Newington Arms Depot Conservation Area	NSW	Registered
Newington Chapel	NSW	Registered
Norfolk House and Contemporary Outbuilding	NSW	Registered
Obelisk	NSW	Registered
Old Government House	NSW	Registered
Parramatta Convalescent Home	NSW	Registered
Parramatta Gaol (former)	NSW	Registered
Parramatta Park	NSW	Registered
Parramatta Park Gatehouse	NSW	Registered
Parramatta Post Office (former)	NSW	Registered
Parramatta Psychiatric Centre Precinct	NSW	Registered
Perth House	NSW	Registered
Public School (former) and Convict Wall	NSW	Registered
Redstone	NSW	Registered
River Terraces	NSW	Registered
Riverview House, Outbuildings and Garden	NSW	Registered
Rookwood Cemetery	NSW	Registered
Roseneath Cottage	NSW	Registered
Roxy Cinema	NSW	Registered
Sandstone Buildings	NSW	Registered
Sandstone Walls and Ha Ha	NSW	Registered
Southern Gatehouse	NSW	Registered
St Johns Anglican Provisonal Cathedral	NSW	Registered
St Johns Cemetery and Boundary Wall	NSW	Registered
St Patricks Catholic Cathedral & Presbytery	NSW	Registered
Town Hall	NSW	Registered
Travellers Rest Inn	NSW	Registered
Travellers Rest Inn Group	NSW	Registered
Two Cannons	NSW	Registered
Ward 1	NSW	Registered
Ward 2 Courtyard Shelter Shed	NSW	Registered
Ward 2 North Range	NSW	Registered
Ward 4 North Range	NSW	Registered
Ward 4 West Range	NSW	Registered
Ward 5 North Range	NSW	Registered
Ward 5 South Range (former)	NSW	Registered
Wavertree including Grounds and Trees	NSW	Registered

State and Territory Reserves

[Resource Information]

Name	State
Newington	NSW

Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Frogs		
Bufo marinus Cane Toad [1772]		Species or species habitat likely to occur within area
Mammals		
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat may occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Bicentennial Park	NSW
Newington Wetlands	NSW

Coordinates

-33.82668 151.03538

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Appendix B

Listed Species, Populations and Communities

Table 12 Flora Species Summary Table

Name	Status	Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area	Likelihood of Occurrence in Project Area
Species				
Acacia bynoeana Bynoe's Wattle	Vulnerable	Endangered	**Medium:** Within the Sydney Metropolitan Area the community is known to occur within forested wetlands. The Project Area contains forested wetlands. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.
Acacia pubescens Downy Wattle	Vulnerable	Vulnerable	**High:** Within the Sydney Metropolitan Area, the species is known to occur within highly disturbed areas with no or no native vegetation. There are 11 recorded locations of the species occurring in the Locality, seven of which also occur in the Study Area (refer **Figure 6** and **Figure 8**).	**High:** There are two known recorded locations of the species occurring within the foreshore fringing the Project Area (refer **Figure 6** and **Figure 8**).
Acacia terminalis subsp. *terminalis* Sunshine Wattle	Endangered	Endangered	**Medium:** Within the Sydney Metropolitan Area the community is known to occur within forested wetlands. The Project Area contains forested wetlands. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and heathlands) have been previously recorded in the Project Area.
Allocasuarina glareicola	Endangered	Endangered	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low**: Neither the species nor its other preferred habitats (Castlereagh woodland on laterite soils, open woodland with *Eucalyptus parramattansis*, *Eucalyptus fibrosa*, *Angophora bakeri*, *Eucalyptus sclerophylla* and *Melaleuca decora,* and associated with understorey species *Melaleuca nodosa*, *Hakea dactyloides*, *Hakea sericea*, *Dillwynia tenuifolia*, *Micromyrtus minutiflora*, *Acacia elongata*, *Acacia brownei*, *Themeda australis* and *Xanthorrhoea minor*) have been previously recorded in the Project Area.

Name	Status	Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area	Likelihood of Occurrence in Project Area
Allocasuarina portuensis Nielsen Park She-oak	Endangered	Endangered	**Medium:** Within the Sydney Metropolitan Area, the species is known to occur within highly disturbed areas with no or no native vegetation, and in forested wetlands, both of which occur in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and grassy woodlands) have been previously recorded in the Project Area.
Asterolasia elegans	Endangered	Endangered	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitat (sheltered forests on Hawkesbury sandstone) have been previously recorded in the Project Area.
Bothriochloa biloba Lobed Blue-grass	Vulnerable		**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats (cleared eucalypt forests and relict grassland, often dominated by Purple Wiregrass (*Aristida ramosa*), Red-leg Grass (*Bothriochloa macra*), Red Grass (*B. decipiens*), Queensland Bluegrass (*Dicanthium sericeum*) or *Austrostipa aristiglumis* (Bean, 1999)) have been previously recorded in the Project Area.
Caladenia tessellata Thick-lipped Spider-orchid, Daddy Long-legs	Vulnerable	Endangered	**Medium:** Within the Sydney Metropolitan Area the community is known to occur within forested wetlands. The Project Area contains forested wetlands. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, grassy woodlands and heathlands) have been previously recorded in the Project Area.
Callistemon linearifolius Netted Bottle Brush		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the community is known to occur within forested wetlands. The Project Area contains forested wetlands. There are three recorded locations of the species occurring in the Locality, and one record of the species occurring in the Study Area (refer **Figure 8**).	**Low:** The closest known recorded location of the species is at Rosehill around 1.6 km west of the Project Area (refer **Figure 8**). Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, grassy woodlands and heathlands) have been previously recorded in the Project Area.

Name	Status	Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area	Likelihood of Occurrence in Project Area
Cynanchum elegans White-flowered Wax Plant	Endangered	Endangered	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (maritime grasslands, coastal valley grassy woodlands and dry rainforest vegetation) have been previously recorded in the Project Area
Chamaesyce psammogeton Sand Spurge		Endangered	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.
Cryptostylis hunteriana Leafless Tongue-orchid	Vulnerable	Vulnerable	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats (swamp heath and woodland) have been previously recorded in in Project Area.
Darwinia biflora	Vulnerable	Vulnerable	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and heathlands) have been previously recorded in the Project Area.
Deyeuxia appressa	Endangered	Endangered	**Medium:** Within the Sydney Metropolitan Area the community is known to occur within forested wetlands and wet sclerophyll forests. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.
Dillwynia tenuifolia		Vulnerable	**Medium:** There is one recorded location of the species occurring in the Locality, but no recorded locations of the species occurring in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and grassy woodlands) have been previously recorded in the Project Area.

Name	Status	Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area	Likelihood of Occurrence in Project Area
Epacris purpurascens var. purpurascens		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the community is known to occur within forested wetlands. The Project Area contains forested wetlands. There are 45 recorded locations of the species occurring in the Locality, but no record of the species occurring in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.
Eucalyptus camfieldii Camfield's Stringybark	Vulnerable	Vulnerable	**Medium:** Within the Sydney Metropolitan Area, the species is known to occur within highly disturbed areas with no or no native vegetation, within forested wetlands and freshwater wetlands, all of which occur in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and heathlands) have been previously recorded in the Project Area.
Genoplesium baueri Bauer's Midge Orchid		Endangered	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and heathlands) have been previously recorded in the Project Area.
Grammitis stenophylla Narrow-leaf Finger Fern		Endangered	**Medium:** Within the Sydney Metropolitan Area the community is known to occur within wet sclerophyll forests. There are forested wetlands containing sclerophyll vegetation in the Project Area. There is one recorded location of the species occurring in the Locality, but no recorded locations of the species occurring in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.
Grevillea caleyi Caley's Grevillea	Endangered	Endangered	**Medium:** Within the Sydney Metropolitan Area the community is known to occur within forested wetlands. The Project Area contains forested wetlands. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.

Name	Status	Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area	Likelihood of Occurrence in Project Area
Grevillea parviflora subsp. Parviflora Small-flower Grevillea	Vulnerable	Vulnerable	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.
Gyrostemon thesioides		Endangered	**Medium:** Within the Sydney Metropolitan Area the community is known to occur within forested wetlands. The Project Area contains forested wetlands. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.
Haloragodendron lucasii	Endangered	Endangered	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.
Hibbertia puberula		Endangered	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan area (dry sclerophyll forests and heathlands) have been previously recorded in the Project Area
Hibbertia sp. Bankstown	Critically Endangered	Critically Endangered	**Medium:** Within the Sydney Metropolitan Area, the species is known to occur within highly disturbed areas with no or no native vegetation. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and heathlands) have been previously recorded in the Project Area.
Hibbertia superans		Endangered	**Medium:** There are 42 recorded locations of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.
Hypsela sessiliflora	Extinct	Endangered	**Medium:** Within the Sydney Metropolitan Area the community is known to occur within forested wetlands. The Project Area contains forested wetlands. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and grassy woodlands) have been previously recorded in the Project Area.

Name	Status	Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area	Likelihood of Occurrence in Project Area
Leptospermum deanei	Vulnerable	Vulnerable	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.
Leucopogon exolasius Woronora Beard-heath	Vulnerable	Vulnerable	**Medium:** Within the Sydney Metropolitan Area the community is known to occur within forested wetlands. The Project Area contains forested wetlands. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.
Maundia triglochinoides		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the community is known to occur within forested wetlands, freshwater wetlands, all of which occur in the Project Area. The species is also known to occur along rivers and streams, which ecosystems run adjacent to the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low**: The species has not been previously recorded in the Project Area.
Melaleuca biconvexa Biconvex Paperbark	Vulnerable	Vulnerable	**Medium:** The species is known to occur within damp places often near streams or low lying areas, which habitat features are present in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** The species has not been previously recorded in the Project Area.
Melaleuca deanei Deane's Melaleuca	Vulnerable	Vulnerable	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and heathlands) have been previously recorded in the Project Area.
Microtis angusii Angus's Onion Orchid	Endangered	Endangered	**Medium:** Within the Sydney Metropolitan Area, the species is known to occur within highly disturbed areas with no or no native vegetation. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** The species has not been previously recorded within the Project Area.

Name	Status	Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area	Likelihood of Occurrence in Project Area
Pelargonium sp. striatellum Omeo Stork's-bill	Endangered	Endangered	**Medium:** The species is known to occur above the high water level of irregularly inundated or ephemeral lakes, and at wetland communities, all of which occur in the Project Area. The species is also known to occur in aquatic environments, which ecosystems occur in the rivers adjacent to the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** The species has not been previously recorded in the Project Area.
Persoonia nutans Nodding Geebung	Endangered	Endangered	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.
Pimelea curviflora var. *curviflora*	Vulnerable	Vulnerable	**Medium:** There are six recorded locations of the species occurring in the Locality, but no record of the species occurring in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.
Pimelea spicata	Endangered	Endangered	**Medium:** There are two recorded locations of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (grassy woodlands) have been previously recorded in the Project Area.
Pomaderris prunifolia in the Parramatta, Auburn, Strathfield and Bankstown LGAs		Endangered	**Medium:** Within the Sydney Metropolitan Area, the species is known to occur along water courses. There are four recorded locations of the species occurring in the Locality, three of which also occur in the Study Area (refer **Figure 8**).	**Low:** The closest known recorded location of the species is at Ermington around 1.2 km north of the Project Area (refer **Figure 8**). Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (shale to sandstone, woodland habitats and in gully lines) have been previously recorded in the Project Area.
Prasophyllum fuscum Slaty Leek Orchid	Vulnerable	Critically Endangered	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and grassy woodlands) have been previously recorded in the Project Area.

Name	Status	Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area	Likelihood of Occurrence in Project Area
Prostanthera marifolia Seaforth Mintbush	Critically Endangered	Critically Endangered	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats (localised patches of, or in close proximity to, Duffys Forest EEC) have been previously recorded in the Project Area.
Pterostylis gibbosa Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood	Endangered	Endangered	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats (open forests and woodlands) have been previously recorded in the Project Area.
Pterostylis sp. Botany Bay Botany Bay Bearded Orchid	Endangered	Endangered	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and heathlands) have been previously recorded in the Project Area.
Pterostylis saxicola Sydney Plains Greenhood	Endangered	Endangered	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (heathlands and wallum sand heaths) have been previously recorded in the Project Area.
Pultenaea pedunculata Matted Bush-pea		Endangered	**Medium:** Within the Sydney Metropolitan Area, the species is known to occur within highly disturbed areas with no or no native vegetation. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and grassy woodlands) have been previously recorded in the Project Area.
Streblus pendulinus Siah's Backbone, Sia's Backbone, Isaac Wood	Endangered		**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats (rainforests predominately along watercourses, galley forest and dry seasonal forest) have been previously recorded in the Project Area.

Name	Status	Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area	Likelihood of Occurrence in Project Area
Syzygium paniculatum Magenta Lilly Pilly	Vulnerable	Endangered	**Medium:** Within the Sydney Metropolitan Area the species is known to occur within forested wetlands and wet sclerophyll forests. Sclerophyll vegetation has been previously recorded within the wetlands in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and rainforests) have been previously recorded in the Project Area.
Tetratheca glandulosa Glandular Pink-bell	Vulnerable	Vulnerable	**Medium:** Within the Sydney Metropolitan Area the community is known to occur within forested wetlands. The Project Area contains forested wetlands. There is one recorded location of the species occurring in the Locality, which also occurs within the Study Area (refer **Figure 8**).	**Low:** The closest known recorded location of the species is adjacent to Duck River, around 1.9 km south-west of the Project Area (refer **Figure 8**). Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, heathlands and rainforests) have been previously recorded in the Project Area.
Triplariana imbricata Creek Triplariana	Endangered	Endangered	**Medium:** The species is known to occur alongside watercourses. There are four recorded locations of the species occurring in the Locality, but no recorded locations of the species occurring in the Study Area.	**Low:** Neither the species nor its preferred habitats (in association with *Tristaniopsis laurina* Water Gum) have been previously recorded in the Project Area.
Wahlenbergia multicaulis Tadgell's Bluebell in the LGAs of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield		Endangered	**Medium:** Within the Sydney Metropolitan Area, the species is known to occur within disturbed areas and on the edges of watercourses and wetlands. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (sites closely aligned with the Villawood Soil Series that are poorly drained and with yellow podsolic extensively permeated with fine, concretionary ironstone (laterite), forests, woodlands, scrub, grassland, typically amongst other herbs rather than in the open) have been previously recorded in the Project Area.

Name	Status	Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area	Likelihood of Occurrence in Project Area
Wilsonia backhousei Narrow-leafed Wilsonia		Vulnerable	**High:** Within the Sydney Metropolitan Area, the species is known to occur within saline wetlands including mangrove swamps. There are 89 records of the species occurring in the Locality, and 31 recorded locations of the species occurring in the Study Area (refer **Figure 6** and **Figure 8**).	**High:** There are six known recorded locations of the species occurring in the intermittent areas of saltmarsh along the foreshore fringing the Project Area (refer **Figure 6** and **Figure 8**).
Communities				
Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion		Endangered Ecological Community	**Medium:** The community is known to occur within the Sydney Metropolitan Area. There are no records of the community occurring in the Locality or in the Study Area.	**Low:** Neither the community nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.
Duffys Forest Ecological Community in the Sydney Basin Bioregion		Endangered Ecological Community	**Low:** There are no records of the community occurring in the Locality or in the Study Area.	**Low:** Neither the community nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.
Eastern Suburbs Banksia Scrub in the Sydney Basin Bioregion	Endangered Ecological Community	Endangered Ecological Community	**Low:** There are no records of the community occurring in the Locality or in the Study Area.	**Low:** Neither the community nor its preferred habitats within the Sydney Metropolitan Area (heathlands, particularly Wallum sand heaths) have been previously recorded in the Project Area.
Shale Gravel Transition Forest in the Sydney Basin Bioregion, also known as the Cumberland Plain Shale Woodland and Shale-Gravel Transition Forest	Critically Endangered Ecological Community	Endangered Ecological Community	**Medium:** The community is known to occur within the Sydney Metropolitan Area. There are no records of the community occurring in the Locality or in the Study Area.	**Low:** Neither the community nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.

Name	Status	Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area	Likelihood of Occurrence in Project Area
Shale/Sandstone Transition Forest		Endangered Ecological Community	**Medium:** The community is known to occur within the Sydney Metropolitan Area. There are no records of the community occurring in the Locality or in the Study Area.	**Low:** Neither the community nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.
Southern Sydney sheltered forest on transitional sandstone soils in the Sydney Basin Bioregion		Endangered Ecological Community	**Medium:** The community is known to occur within the Sydney Metropolitan Area. There are no records of the community occurring in the Locality or in the Study Area.	**Low:** Neither the community nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		Endangered Ecological Community	**Low:** There are no records of the community occurring in the Locality or in the Study Area.	**Low:** Neither the community nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and rainforests) have been previously recorded in the Project Area.
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		Endangered Ecological Community	**High:** This community occurs as intermittent stands along the foreshore and within the wetland in the Project Area and as intermittent stands along the foreshore of both Duck and Parramatta rivers (refer **Figure 6**).	**High:** The community has been previously recorded on the Project Area and as intermittent stands along the foreshore of both Duck and Parramatta rivers (refer **Figure 6**).

Name	Status	Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area	Likelihood of Occurrence in Project Area
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		Endangered Ecological Community	**Medium:** Within the Sydney Metropolitan Area the community is known to occur within forested wetlands. The Project Area contains forested wetlands.	**Low:** Neither the community nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and grassy woodlands) have been previously recorded in the Project Area.
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		Endangered Ecological Community	**High:** Within the Sydney Metropolitan Area the community is known to occur within forested wetlands. Sclerophyll vegetation has been previously recorded within the wetlands in the Project Area.	**High:** Sclerophyll vegetation has been previously recorded in the forested wetlands in the Project Area.
Sydney Freshwater Wetlands in the Sydney Basin Bioregion		Endangered Ecological Community	**High:** The Project Area contains wetlands (refer **Figure 6**).	**High:** Wetlands have been previously recorded in the Project Area (refer **Figure 6**).
Sydney Turpentine-Ironbark Forest	Critically Endangered Ecological Community	Endangered Ecological Community	**Medium:** Within the Sydney Metropolitan Area the community is known to occur within wet sclerophyll forests. Sclerophyll vegetation has been previously recorded within the wetlands in the Project Area.	**Low:** Neither the community nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.

Name	Status	Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area	Likelihood of Occurrence in Project Area
Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions		Endangered Ecological Community	**High:** Within the Sydney Metropolitan Area this community is known to occur in maritime grasslands. The Project Area contains maritime grasslands in the form of estuarine saltmarshes.	**Low:** Foreshore vegetation along the fringes of the Project Area meets characteristics of this EEC, and also meets some characteristics of Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregion (refer **Figure 6**).
Blue Gum High Forest in the Sydney Basin Bioregion		Critically Endangered Ecological Community	**Medium:** Within the Sydney Metropolitan Area the community is known to occur within wet sclerophyll forests. The wetlands on the Project Area contain sclerophyll vegetation.	**Low:** The community has not been previously recorded in the Project Area.
Cumberland Plain Woodland in the Sydney Basin Bioregion		Critically Endangered Ecological Community	**Medium:** The community is known to occur within the Sydney Metropolitan Area. There are no records of the community occurring in the Locality or in the Study Area.	**Low:** Neither the community nor its preferred habitats within the Sydney Metropolitan Area (grassy woodlands) have been previously recorded in the Project Area.
Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion		Vulnerable Ecological Community	**Medium:** The community is known to occur within the Sydney Metropolitan Area. There are no records of the community occurring in the Locality or in the Study Area	**Low:** Neither the community nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.
Western Sydney Dry Rainforest in the Sydney Basin Bioregion		Endangered Ecological Community	**Medium:** The community is known to occur within the Sydney Metropolitan Area. There are no records of the community occurring in the Locality or in the Study Area.	**Low:** Neither the community nor its preferred habitats within the Sydney Metropolitan Area (higher rainfall, clay soils in sheltered elevated sites on the broader Cumberland Plain) have been previously recorded in the Project Area.

Name	Status	Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area	Likelihood of Occurrence in Project Area
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		Endangered Ecological Community	**High:** The community is known to occur within the Sydney Metropolitan Area. The SMCMA maps the EEC as occurring in the Project Area (refer **Figure 6**).	**High:** The EEC has been previously recorded in the foreshore vegetation fringing the Project Area (refer **Figure 6**). This riparian vegetation also meets characteristics of Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions.

Table 13 Terrestrial Fauna Species Summary Table

Species Name	Status		Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
	EPBC Act	TSC Act		
Birds				
Anthochaera Phrygia Regent Honeyeater (Mi)	Endangered	Critically Endangered	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in forested wetlands. These habitat features occur in the Project Area. There are two recorded locations of the species occurring in the Locality, but no record of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and grassy woodlands) have been previously recorded in the Project Area.
Botaurus poiciloptilus Australasian Bittern	Endangered	Endangered	**Medium:** Within the Sydney Metropolitan Area, the species is known to occur within forested wetlands, freshwater wetlands and saline wetlands. The Project Area contains these habitat features. There are two recorded locations of the species occurring in the Locality, but no record of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, grassy woodlands and other water bodies generally) have been previously recorded in the Project Area
Burhinus grallarius Bush Stone-curlew		Endangered	**Medium:** Within the Sydney Metropolitan Area, the species is known to occur within highly disturbed areas with no or no native vegetation, wet sclerophyll forests, freshwater wetlands and saline wetlands. These habitat features occur in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, heathlands and other water bodies generally) have been previously recorded in the Project Area
Calidris alba Sanderling		Vulnerable	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (marine environments) have been previously recorded in the Project Area.

Species Name	Status		Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
	EPBC Act	TSC Act		
Calidris ferruginea Curlew Sandpiper (Ma, Mi, W)		Endangered	**Medium:** The species is known to occur in estuarine habitats including non-tidal swamps and intertidal mudflats and non-tidal swamps. These habitat features occur in the Project Area. There are 332 records of the species occurring in the Locality, and two recorded locations of the species occurring in the Study Area (refer **Figure 11**).	**Low:** The closest known recorded location of the species is at Newington, around 1.3 km south-east from the Project Area (refer **Figure 11**). Neither the species nor its other preferred habitats (littoral and estuarine habitats, including lakes and lagoons, and sand beaches) have been previously recorded in the Project Area.
Calidris tenuirostris Great Knot (Mi, W,)		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in saline wetlands including mangrove swamps and saltmarshes. There is one recorded location of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (marine environments) have been previously recorded in the Project Area.
Callocephalon fimbriatum Gang-gang Cockatoo		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in wet sclerophyll forests and forested wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are two recorded locations of this species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, grassy woodlands and rainforests) a have been previously recorded in the Project Area.
Calyptorhynchus lathami Glossy-black Cockatoo		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur within wet sclerophyll forests. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.
Charadrius leschenaultii Greater Sand-plover (Ma, Mi, W)		Vulnerable	**Medium:** There is one recorded location of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (marine environments) have been previously recorded in the Project Area.

Species Name	Status		Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
	EPBC Act	TSC Act		
Charadrius mongolus Lesser Sand-plover (Ma, Mi, W)		Vulnerable	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (marine environments) have been previously recorded in the Project Area.
Chthonicola sagittata Speckled Warbler		Vulnerable	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and grassy woodlands) have been previously recorded in the Project Area.
Circus assimilis Spotted Harrier		Vulnerable	**Medium:** Within the Sydney Metropolitan Area, the species is known to occur within highly disturbed areas with no or no native vegetation, forested wetlands, freshwater wetlands and saline wetlands. The Project Area contains these habitat features. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (grasslands, grassy woodlands and marine environments) have been previously recorded in the Project Area.
Climacteris picumnus subsp. *Victoriae* Brown Treecreeper		Vulnerable	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and grassy woodlands) have been previously recorded in the Project Area.
Daphoenositta chrysoptera Varied Sittella		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur within wet sclerophyll forests and forested wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, grassy woodlands and heathlands) have been previously recorded in the Project Area.
Dasyornis brachypterus Eastern Bristlebird	Endangered	Endangered	**Medium:** Within the Sydney Metropolitan Area the species is known to occur within forested wetlands and freshwater wetlands. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and heathlands) have been previously recorded in the Project Area.

Species Name	Status		Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
	EPBC Act	TSC Act		
Ephippiorhynchus asiaticus Black-necked Stork		Endangered	**Medium:** Within the Sydney Metropolitan Area the species is known to occur within forested wetlands, freshwater wetlands and saline wetlands. These habitat features are present in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** The species has not been previously recorded in the Project Area.
Epthianura albifrons White-fronted Chat		Vulnerable	**Medium:** Within the Sydney Metropolitan Area, the population is known to occur within highly disturbed areas with no or no native vegetation. Other preferred habitats of the population include saltmarshes and wetlands. All of these habitats occur in the Project Area. The population is also known to occur within the grasslands on the northern bank of the Parramatta River. There are 208 records of the species occurring in the Locality, and eight recorded locations of the species occurring in the Study Area (refer **Figure 11**).	**Low:** The closest known recorded location of the species is at Newington, around 1.3 km south-east of the Project Area (refer **Figure** 11). The species has not been previously recorded in the Project Area.
Erythrotriorchis radiatus Red Goshawk	Vulnerable	Critically Endangered	**Medium:** The species is known to occur in riparian habitats along or near watercourses or wetlands. These habitat features are present in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats (open woodland and forest) have been previously recorded in the Project Area.
Esacus magnirostris Beach stone-curlew		Critically Endangered	**Medium:** Within the Sydney Metropolitan Area the species is known to occur within saline wetlands and saltmarshes. These habitat features are present in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (marine environments and rocky islands) have been previously recorded in the Project Area.
Glossopsitta pusilla Little Lorikeet		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in forested wetlands and wet sclerophyll forests. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are four recorded locations of the species occurring in the Locality, but no record of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and grassy woodlands) have been previously recorded in the Project Area.

Species Name	Status		Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
	EPBC Act	TSC Act		
Grantiella picta Painted Honeyeater		Vulnerable	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats (Bore, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests) have been previously recorded in the Project Area.
Haematopus fuliginosus Sooty Oystercatcher		Vulnerable	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (marine environments and rocky islands) have been previously recorded in the Project Area.
Haematopus longirostris Pied Oystercatcher		Endangered	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in saline wetlands including mangrove swamps and saltmarshes. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (marine environments and rocky islands) have been previously recorded in the Project Area.
Hieraaetus morphnoides Little Eagle		Vulnerable	**Medium:** Within the Sydney Metropolitan Area, the species is known to occur within highly disturbed areas with no or no native vegetation, forested wetlands, freshwater wetlands, and saline wetlands. The Project Area contains these habitat features. There are two recorded locations of the species occurring in the Locality, and one recorded location of the species occurring in the Study Area (refer **Figure 11**).	**Low:** The closest known recorded location of the species is at Narawang Wetland around 1.6 km east of the Project Area (refer **Figure** 11). Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, grasslands, grassy woodlands, heathlands, marine environments, rocky cliffs, major rock outcrops, rocky islands and other water bodies generally) have been previously recorded in the Project Area.
Ixobrychus flavicollis Black Bittern		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in forested wetlands, freshwater wetlands and saline wetlands. These habitat features are present in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (grassy woodlands and water bodies generally) have been previously recorded in the Project Area.

Species Name	Status		Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
	EPBC Act	TSC Act		
Lathamus discolor Swift Parrot	Endangered	Endangered	**Medium:** Within the Sydney Metropolitan Area, the species is known to occur within highly disturbed areas with no or no native vegetation. There are five recorded locations of the species occurring in the Locality, but no record of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and heathlands) have been previously recorded in the Project Area.
Limicola falcinellus Broad-billed Sandpiper		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in saline wetlands including mangrove swamps and saltmarshes. These habitat features occur in the Project Area. There is one recorded location of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (marine environments) have been previously recorded in the Project Area.
Limosa limosa Black-tailed Godwit (Ma, Mi, W)		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur within saline wetlands including mangrove swamps and saltmarshes. These habitat features are present in the Project Area. There are 10 recorded locations of the species occurring in the Locality, and one recorded location of the species occurring in the Study Area (refer **Figure 11**).	**Low:** The closest known recorded location of the species is at the Millennium Parklands around 1.9 km east of the Project Area (refer **Figure 11**). Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (marine environments and other water bodies generally) have been previously recorded in the Project Area.
Melanodryas cucullata subsp. *Cucullata* Hooded Robin		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in forested wetlands. These habitat features are present in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, grasslands and grassy woodlands) have been previously recorded in the Project Area.
Melithreptus gularis subsp. *Gularis* Black-chinned Honeyeater		Vulnerable	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and grassy woodlands) have been previously recorded in the Project Area.

Species Name	Status		Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
	EPBC Act	TSC Act		
Neophema chrysogaster Orange-bellied Parrot	Critically Endangered	Critically Endangered	**Medium:** Within the Sydney Metropolitan Area the species is known to occur within saline wetlands. The Project Area contains these habitat features. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (heathlands) have been previously recorded in the Project Area.
Nettapus coromandelianus Cotton Pygmy-Goose		Endangered	**Low:** There are no records of the species occurring in the Locality or in the Study Area	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (water bodies generally, other than wetlands) have been previously recorded in the Project Area.
Ninox connivens Barking Owl		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in forested wetlands. The Project Area contains these habitat features. There are three recorded locations of the species occurring in the Locality, but no record of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and grassy woodlands) have been previously recorded in the Project Area.
Ninox strenua Powerful Owl		Vulnerable	**Medium:** The species is known to occur in wet sclerophyll forests and forested wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are seven recorded locations of the species occurring in the Locality, and one recorded location of the species occurring in the Study Area (refer **Figure 11**).	**Low:** The closest known recorded location of the species is at Dundas, around 2 km north of the Project Area (refer **Figure 11**). Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and rainforests) have been previously recorded in the Project Area
Pandion cristatus Eastern Osprey		Vulnerable	**Medium:** Within the Sydney Metropolitan area the species is known to occur in saline wetlands. The Project Area contains wetlands. There is one recorded location of the species occurring in the Locality, but no records of the species occurring in the Study Area	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (marine environments, rocky islands and other water bodies generally) have been previously recorded in the Project Area.

Species Name	Status		Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
	EPBC Act	TSC Act		
Petroica boodang Scarlet Robin		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in forested wetlands. These habitat features occur in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and grassy woodlands) have been previously recorded in the Project Area.
Petroica phoenicea Flame Robin		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in forested wetlands. These habitat features occur in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, grasslands and grassy woodlands) have been previously recorded in the Project Area.
Pezoporus wallicus subsp. *Wallicus* Eastern Ground Parrot		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in freshwater wetlands. These habitat features occur in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (heathlands) have been previously recorded in the Project Area.
Ptilinopus superbus Superb Fruit-Dove		Vulnerable	**Medium:** There are two recorded locations of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its preferred habitats (rainforests, and eucalypt or Acacia woodland) have been previously recorded in the Project Area.
Rostratula australis Australian Painted Snipe (Ma, Mi, W)	Vulnerable	Endangered	**Medium:** Within the Sydney Metropolitan Area, the species is known to occur within highly disturbed areas with no or no native vegetation and freshwater wetlands. These habitat features occur in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (other water bodies generally) have been previously recorded in the Project Area.
Stagonopleura guttata Diamond Firetail		Vulnerable	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and grassy woodlands) have been previously recorded in the Project Area.

Species Name	Status		Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
	EPBC Act	TSC Act		
Sterna nereis nereis Fairy Tern	Vulnerable		**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats (sheltered sandy beaches, spits and banks above the high tide line and below vegetation) have been previously recorded in the Project Area.
Sternula albifrons Little Tern		Endangered	**Medium:** There are two recorded locations of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (marine environments and rocky islands) have been previously recorded in the Project Area.
Stictonetta naevosa Freckled Duck		Vulnerable	**Medium:** The species is known to use freshwater swamps and ephemeral swamps with heavy growth of Cumbungi as habitat. The Project Area contains these habitat features. There is one recorded location of the species occurring in the Locality, but no record of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats (permanent waters such as lakes, reservoirs, farm dams and sewage ponds) have been previously recorded at the Project Area.
Tyto longimembris Eastern Grass Owl		Vulnerable	**Medium:** The species is known to occur in swamp areas. These habitat features occur in the Project Area. There is one recorded location of the species occurring in the Locality, but no record of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats (tall grass including grass tussocks, grassy plains, swampy heaths, and cane grasses and sedges in flood plains) have been previously recorded in the Project Area.
Tyto novaehollandiae Masked Owl		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in wet sclerophyll forests and forested wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, grassy woodlands and rainforests) have been previously recorded in the Project Area.

Species Name	Status		Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
	EPBC Act	TSC Act		
Xenus cinereus Terek Sandpiper		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in saline wetlands including mangrove swamps and saltmarshes. These habitat features are present in the Project Area. There is one recorded location of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (marine environments) have been previously recorded in the Project Area.
Frogs				
Heleioporus australiacus Giant Burrowing Frog	Vulnerable	Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in wet sclerophyll forests and freshwater wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, heathlands, and other water bodies generally) have been previously recorded in the Project Area.
Litoria aurea Green and Golden Bell Frog	Vulnerable	Endangered	**High:** Within the Sydney Metropolitan Area, the species is known to occur within highly disturbed areas with no or no native vegetation, within forested wetlands, freshwater wetlands and saline wetlands. These habitats occur in the Project Area. The species is also known to occur in wet sclerophyll forests. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are 11,731 records of the species occurring in the Locality, seven of which occur in the Project Area (refer **Figure 9** and **Figure 11**).	**High:** The species has been previously recorded as occurring in the Project Area, and the Project Area contains a known population of the species (refer **Figure 9** and **Figure 11**).
Mixophyes balbus Stuttering Frog	Vulnerable	Endangered	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in wet sclerophyll forests and forested wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, rainforests, and other water bodies generally) have been previously recorded in the Project Area.

Species Name	Status		Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
	EPBC Act	TSC Act		
Mixophyes iteratus Giant Barred Frog, Southern Barred Frog	Endangered	Endangered	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in wet sclerophyll forests and forested wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, rainforests, and other water bodies generally) have been previously recorded in the Project Area.
Pseudophryne australis Red-crowned Toadlet		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in wet sclerophyll forests, forested wetlands and freshwater wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, rocky cliffs and other water bodies generally) have been previously recorded in the Project Area.
Crinia tinnula Wallum Froglet		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in forested wetlands and freshwater wetlands. These habitat features are present in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (other water bodies generally) have been previously recorded in the Project Area.
Litoria brevipalmata Green-thighed Frog		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in wet sclerophyll forests, forested wetlands and freshwater wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, grasslands, other water bodies generally and rainforests) have been previously recorded in the Project Area.
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog	Vulnerable	Endangered	**Medium:** The species is known to occur in Typha swamps and other water bodies where Cumbungi or other common reeds are present, swamps, marshes, along floodplains and river valleys, fallen timber and bark, rocks, grass clumps and deep soil cracks. These habitat features occur in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats (Permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, and River Red Gum swamps, billabongs, irrigated rice crops, lagoons, lakes, and farm dams) have been previously recorded in the Project Area.

Species Name	Status		Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
	EPBC Act	TSC Act		
Mammals				
Cercartetus nanus Eastern Pygmy-possum		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in wet sclerophyll forests and freshwater wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and heathlands) have been previously recorded in the Project Area.
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat	Vulnerable	Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in wet sclerophyll forests, forested wetlands and freshwater wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Medium:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, grassy woodlands, heathlands, rocky cliffs, major rock outcrops and rainforests) have been previously recorded in the Project Area. The report prepared by Eco Logical (refer **Appendix C**) has identified that, based on the Project Area's location and the roosting habitat available there, it is likely that this Microbat species could occasionally roost within the stacks at the Project Area.
Dasyurus maculatus maculatus Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll	Endangered	Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur within wet sclerophyll forests, forested wetlands, freshwater and wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are two recorded locations of the species occurring in the Locality, and one recorded location of the species occurring in the Study Area (refer **Figure 11**).	**Low:** The closest known recorded location of the species is at Granville, around 2 km south-west of the Project Area (refer **Figure** 11). Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forest, grassy woodlands, heathlands, rocky cliffs, major rock outcrops and rainforests) have been previously recorded in the Project Area.

Species Name	Status		Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
	EPBC Act	TSC Act		
Falsistrellus tasmaniensis Eastern False Pipistrelle		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur within wet sclerophyll forests. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Medium:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area. The report prepared by Eco Logical (refer **Appendix C**) has identified that, based on the Project Area's location and the roosting habitat available there, it is likely that this Microbat species could occasionally roost within the stacks at the Project Area.
Isoodon obesulus obesulus Southern Brown Bandicoot	Endangered	Endangered	**Medium:** Within the Sydney Metropolitan Area, the population is known to occur within highly disturbed areas with no or no native vegetation. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats in the Sydney Metropolitan Area (dry sclerophyll forests) have been previously recorded in the Project Area.
Miniopterus australis Little Bentwing-bat		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur within wet sclerophyll forests, forested wetlands and freshwater wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats (dry sclerophyll forests, grassy woodlands, heathlands, rocky cliffs and major rock outcrops, and rainforests) have been previously recorded in the Project Area.

Species Name	Status		Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
	EPBC Act	TSC Act		
Miniopterus schreibersii oceanensis Eastern Bentwing Bat		Vulnerable	**Medium:** Within the Sydney Metropolitan Area, the species is known to occur within highly disturbed areas with no or no native vegetation, wet sclerophyll forests, forested wetlands, and saline wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are18 recorded locations of the species occurring in the Locality, and four recorded locations of the species occurring in the Study Area (refer **Figure 10**).	**Medium:** The closest known recorded location of the species is at Millennium Parklands around 1.7 km east of the Project Area (refer **Figure 10**). Neither the species nor its other preferred habitats in the Sydney Metropolitan Area (dry sclerophyll forests, grasslands, grassy woodlands, heathlands, rocky cliffs and major rock outcrops, rocky islands, rainforests, and other water bodies generally) have been previously recorded in the Project Area. The report prepared by Eco Logical (refer **Appendix C**) has identified that, based on the Project Area's location and the roosting habitat available there, it is likely that this Microbat species could occasionally roost within the stacks at the Project Area.
Mormopterus norfolkensis Eastern Freetail-bat		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in wet sclerophyll forests, forested wetlands, freshwater and wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are three recorded locations of the species occurring in the Locality, and two recorded locations of the species occurring in the Study Area (refer **Figure 10**).	**Medium:** The closest known recorded location of the species is at Millennium Parklands around 1.7 km east of the Project Area (refer **Figure 10**). Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, grassy woodlands, heathlands, rainforests) have been previously recorded in the Project Area. The report prepared by Eco Logical (refer **Appendix C**) has identified that, based on the Project Area's location and the roosting habitat available there, it is likely that this Microbat species could occasionally roost within the stacks at the Project Area.

Species Name	Status		Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
	EPBC Act	TSC Act		
Myotis macropus Southern Myotis		Vulnerable	**Medium:** Within the Sydney Metropolitan Area, the population is known to occur within highly disturbed areas with no or no native vegetation, wet sclerophyll forests, forested wetlands and freshwater wetlands. There are no records of the population occurring in the Locality or in the Study Area.	**Medium:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, grassy woodlands, marine environments, rainforests and other water bodies generally) have been previously recorded in the Project Area. The report prepared by Eco Logical (refer **Appendix C**) has identified that, based on the Project Area's location and the roosting habitat available there, it is likely that this Microbat species could occasionally roost within the stacks at the Project Area.
Petaurus norfolcensis Squirrel Glider	Vulnerable	Vulnerable	**Low:** There are no records of the population occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats (old growth Box, Box-Ironbark woodlands and River Red Gum forest, mixed species with shrub or Acacia midstorey) have been previously recorded in the Project Area.
Petaurus poliocephalus Grey-headed Flying-fox	Vulnerable	Vulnerable	**High:** Within the Sydney Metropolitan Area, the species is known to occur within highly disturbed areas with no or no native vegetation. The species is also known to occur in swamps, which same habitat also occurs in the Project Area. There are 50 records of the species occurring in the Locality, and nine recorded locations of the species occurring in the Study Area, (refer **Figure 10**).	**High:** There is one known recorded location of the species occurring in the wetlands at the Project Area (refer **Figure 10**). The report prepared by Eco Logical (refer **Appendix C**) has identified that, based on the Project Area's location and the roosting habitat available there, it is likely that this Microbat species could occasionally roost within the stacks at the Project Area.
Petrogale penicillata Brush-tailed Wallaby	Vulnerable	Endangered	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats (rocky escarpments, outcrops and cliffs, and caves) have been previously recorded in the Project Area.

Species Name	Status		Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
	EPBC Act	TSC Act		
Phascolarctos cinereus Koala	Vulnerable	Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in forested wetlands and grassy wetlands. These habitat features are present in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, heathlands and rainforests) have been previously recorded in the Project Area.
Potorous tridactylus tridactylus Long-nosed Potoroo (SE mainland)	Vulnerable	Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in wet sclerophyll forests. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats (dry sclerophyll forests and coastal heaths) have been previously recorded in the Project Area.
Pseudomys novaehollandiae New Holland Mouse	Vulnerable		**Medium:** Within the Sydney Metropolitan Area the species is known to occur in wet sclerophyll forests, forested wetlands and freshwater wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats (dry sclerophyll forests and heathlands) have been previously recorded in the Project Area.
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat		Vulnerable	**Medium:** The species is known to utilise buildings and mammal burrows for roosting, and to forage in most habitats, with and without trees. These habitat features occur in the Project Area. There are two recorded locations of the species occurring in the Locality, and two recorded locations of the species occurring in the Study Area (refer **Figure 10**).	**Low:** The closest known recorded location of the species is at Millennium Parklands around 1.7 km east of the Project Area (refer **Figure 10**). Neither the species nor its other preferred habitat features (i.e. suitable tree hollows) have been previously recorded in the Project Area.

Species Name	Status		Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
	EPBC Act	TSC Act		
Scoteanax rueppellii Greater Broad-nosed Bat		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in wet sclerophyll forests and forested wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There is one recorded location of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Medium:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, grassy woodlands, heathlands and rainforests) have been previously recorded in the Project Area. The report prepared by Eco Logical (refer **Appendix C**) has identified that, based on the Project Area's location and the roosting habitat available there, it is likely that this Microbat species could occasionally roost within the stacks at the Project Area.
Reptiles				
Varanus rosenbergi Rosenberg's Goanna		Vulnerable	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in wet sclerophyll forests, forested wetlands and freshwater wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, heathlands, and other water bodies generally) have been previously recorded in the Project Area.
Hoplocephalus bungaroides Broad-headed Snake	Vulnerable	Endangered	**Medium:** Within the Sydney Metropolitan Area the species is known to occur in wet sclerophyll forests, forested wetlands and freshwater wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, rocky cliffs and major rock outcrops) have been previously recorded in the Project Area.
Gastropods				
Meridolum corneovirens Cumberland Land Snail		Endangered	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests and grassy woodlands) have been previously recorded in the Project Area.

Species Name	Status		Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
	EPBC Act	TSC Act		
Populations				
White-fronted Chat population in the Sydney Metropolitan Catchment Management Area (*Epthianura albifrons*)		Endangered	**Medium:** Within the Sydney Metropolitan Area, the population is known to occur within highly disturbed areas with no or no native vegetation. Other preferred habitats of the population include saltmarshes and wetlands. All of these habitats occur in the Project Area. The population is also known to occur within the grasslands on the northern bank of the Parramatta River. There are 208 records of the species occurring in the Locality, and eight recorded locations of the species occurring in the Study Area (refer **Figure 11**).	**Low:** The closest known recorded location of this population is at Newington, around 1.3 km south-east of the Project Area (refer **Figure 11**). The population has not been previously recorded in the Project Area.
Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas (*Callocephalon fimbriatum*)		Endangered	**Medium:** Within the Sydney Metropolitan Area the community is known to occur in wet sclerophyll forests and forested wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are two recorded locations of this community occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the community nor its other preferred habitats within the Sydney Metropolitan Area (dry sclerophyll forests, grassy woodlands and rainforests) a have been previously recorded
Long-nosed Bandicoot population in inner western Sydney (*Perameles nasuta*)		Endangered	**Medium:** Within the Sydney Metropolitan Area, the population is known to occur within highly disturbed areas with no or no native vegetation. There are no records of the population occurring in the Locality or in the Study Area.	**Low:** The species has not been previously recorded in the Study Area or the Project Area.
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll	Endangered		**Medium:** Within the Sydney Metropolitan Area the population is known to occur in wet sclerophyll forests, forested wetlands and freshwater wetlands. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are two recorded locations of the species occurring in the Locality, and one recorded location of the species occurring in the Study Area (refer **Figure 11**).	**Low:** The closest known recorded location of the species is at Granville, around 2 km south-west of the Project Area (refer **Figure** 11). Neither the population nor its other preferred habitats (dry sclerophyll forests, grassy woodlands, heathlands, rocky cliffs, major rock outcrops and rainforests) have been previously recorded in the Project Area.

Table 14 Marine Fauna Species Summary Table

Species Name	Status		Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
	EPBC Act	TSC Act		
Birds				
Rostratula benghalensis (sensu lato) Painted Snipe (Mi)	Vulnerable		**Medium:** The species is known to occur in shallow terrestrial water including occasionally wetlands, swamps and saltmarshes. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats (temporary and permanent lakes, claypans, inundated or waterlogged grasslands, dams, rice crops, sewage farms and bore drains, and grasslands) have been previously recorded in the Project Area.
Fish				
Epinephelus daemelii Black Rockcod	Vulnerable		**Medium:** There are no records of the species occurring in the Locality or in the Study Area. Within the Sydney Metropolitan Area the species is known to occur in estuarine environments, which same habitat features occur at the Project Area (i.e. Mangroves).	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (marine environments) have been previously recorded in the Project Area.
Macquaria australasica Macquarie Perch	Endangered		**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats (rivers, lakes, pools and creeks with clear water and deep, rocky holes) have been previously recorded in the Project Area.
Prototroctes maraena Australian Grayling	Vulnerable		**Medium:** There are no records of the species occurring in the Locality or in the Study Area. Within the Sydney Metropolitan Area the species is known to occur in freshwater estuarine environments, which same habitat features occur at the Project Area (i.e. freshwater wetlands and Mangroves).	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (marine environments) have been previously recorded in the Project Area.

Species Name	Status		Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
	EPBC Act	TSC Act		
Reptiles				
Caretta caretta Loggerhead Turtle (Mi)	Endangered	Endangered	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (marine environments) have been previously recorded in the Project Area.
Chelonia mydas Green Turtle (Mi)	Vulnerable	Vulnerable	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (marine environments, rocky islands and other water bodies generally) have been previously recorded in the Project Area.
Dermochelys coriacea Leatherback Turtle (Mi)	Endangered	Endangered	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (marine environments) have been previously recorded in the Project Area.
Eretmochelys imbricata Hawksbill Turtle (Mi)	Vulnerable		**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (marine environments) have been previously recorded in the Project Area.
Natator depressus Flatback Turtle (Mi)	Vulnerable		**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (marine environments) have been previously recorded in the Project Area.

Table 15 Migratory Species Summary Table

Species Name	Status	Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
Birds			
Apus pacificus Fork-tailed Swift	Marine/Migratory	**Medium:** The species is known to occur in urbanised areas. There is one recorded location of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats (inland plains, foothills, cliffs and beaches, islands and marine environments) have been previously recorded in the Project Area.
Ardea alba Great Egret, White Egret	Marine/Migratory/ Wetland	**High:** The species is known to occur in wetland habitats. These habit features are present in the Project Area. The species has been previously recorded at the wetlands in the north-east of the Project Area (refer **Figure 11**).	**High:** The species has been previously recorded at the wetlands in the north-east of the Project Area (refer **Figure 11**).
Ardea ibis Cattle Egret	Marine/Migratory/ Wetland	**Medium:** The species is known to occur in terrestrial wetlands. These habitat features occur in the Project Area. There are 95 records of the species occurring in the Locality, but no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats (grasslands, wooded areas and agricultural lands) have been previously recorded in the Project Area.
Arenaria interpres Ruddy Turnstone	Marine/Migratory/ Wetland	**Low:** There are six recorded locations of the species occurring in the Locality, but no records of the species occurring or in the Study Area.	**Low:** Neither the species nor its other preferred habitats (coastal habitats including rocks, coral reefs, platforms and shelves, tidal pools, beaches, estuaries, bays, coastal harbour environments and coastal lagoons) have been previously recorded in the Project Area.
Calidris acuminata Sharp-tailed Sandpiper	Marine/Migratory/ Wetland	**Medium:** The species is known to occur in wetlands, saltmarshes, lagoons and intertidal mudflats. These habitat features are present in the Project Area. There are 591 records of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats (other estuarine environments) have been previously recorded in the Project Area.

Species Name	Status	Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
Calidris canutus Red Knot, Knot	Migratory/Wetland	**Medium:** The species is known to occur in intertidal mudflats. These habitat features occur in the Project Area. There are 13 records of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats (coastal harbour environments, sandy beaches, estuaries, bays, inlets and lagoons) have been previously recorded in the Project Area.
Calidris ruficollis Red-necked Stint	Marine/Migratory/ Wetland	**Medium:** The species is known to occur in intertidal mudflats. These habitat features are present in the Project Area. There are 40 records of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats (sheltered inlets, bays, lagoons, estuaries and coastal harbour environments) have been previously recorded in the Project Area.
Acrocephalus stentoreus Clamorous Reed-warbler	Marine/Migratory	**High:** The species has been previously recorded at the wetlands in the north-east of the Project Area.	**High:** The species has been previously recorded at the wetlands in the north-east of the Project Area.
Charadrius bicinctus Double-banded Plover	Marine/Migratory/ Wetland	**Medium:** The species is known to occur in fresh or saline terrestrial wetlands, saltmarshes and swamps. These habitat features are present in the Project Area. There are two recorded locations of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats (grasslands, pasture, beaches, bays and inlets, lakes, and lagoons) have been previously recorded in the Project Area.
Gallinago hardwickii Latham's Snipe	Marine/Migratory/ Wetland	**Medium:** The species is known to occur within habitats located close to humans or human activity, freshwater wetlands and swamps. These habitat features occur in the Project Area. There are 449 records of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats (flooded grasslands and heathlands) have been previously recorded in the Project Area.
Haliaeetus leucogaster White-bellied Sea-Eagle	Marine/Migratory	**Medium:** The species is known to occur in terrestrial wetlands and swamps. These habitat features occur in the Project Area. There are 147 records of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats (large rivers, marine environments and coastal habitats generally) have been previously recorded in the Project Area.

Species Name	Status	Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
Heteroscelus brevipes Grey-tailed Tattler	Marine/Migratory/ Wetland	**Medium:** The species is known to occur in intertidal mudflats. These habitat features occur in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats (sheltered coasts with reefs and rock platforms) have been previously recorded in the Project Area.
Hirundapus caudacutus White-throated Needletail	Marine/Migratory	**Low:** There are eight records of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its preferred habitats (wooded areas, open forests and rainforests) have been previously recorded in the Project Area.
Limosa lapponica Bar-tailed Godwit	Marine/Migratory/ Wetland	**Medium:** The species is known to occur in mudflats. These habitat features occur in the Project Area. There are 772 records of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats (coastal habitats such as intertidal sandflats, banks, estuaries, inlets, coastal lagoons and bays) have been previously recorded in the Project Area.
Merops ornatus Rainbow Bee-eater	Marine/Migratory	**Medium:** The species is known to occur in areas located in close proximity to permanent water. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats (open forests, woodlands, shrublands, farmlands, and in inland and coastal sand dune systems,) have been previously recorded in the Project Area.
Monarcha melanopsis Black-faced Monarch	Marine/Migratory	**Medium:** There are seven records of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its preferred habitats (rainforests, eucalyptus forests and coastal scrub) have been previously recorded in the Project Area.
Myiagra cyanoleuca Satin Flycatcher	Marine/Migratory	**Medium:** The species is known to occur in mangroves. These habitat features occur in the Project Area. There are five records of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats (eucalyptus forests, woodlands, coastal forests and open forests) have been previously recorded in the Project Area.

Species Name	Status	Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
Numenius madagascariensis Eastern Curlew	Marine/Migratory/ Wetland	**Medium:** The species is known to occur in intertidal mudflats. These habitat features occur in the Project Area. There are 27 records of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats (coastal habitats such as estuaries, bays, inlets and coastal lagoons, and areas with large intertidal sandflats) have been previously recorded in the Project Area.
Numenius minutus Little Curlew, Little Whimbrel	Marine/Migratory/ Wetland	**Medium:** The species is known to occur in areas that are seasonally inundated, saltmarshes, coastal swamps, mudflats and wetlands. These habitat features occur in the Project Area. There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its other preferred habitats (grasslands, sedgelands, freshwater pools, sandflats, estuaries, sheltered beaches, mown lawns, gardens, recreational areas, ovals, racecourses and verges of roads and airstrips) have been previously recorded in the Project Area.
Numenius phaeopus Whimbrel	Marine/Migratory/ Wetland	**Medium:** There is one record of the species occurring in the Locality, but no record of the species occurring in the Study Area.	**Low:** Neither the species nor its preferred habitats (lagoons, estuaries and river deltas and coastal harbour environments) have been previously recorded in the Project Area.
Pluvialis fulva Pacific Golden Plover	Marine/Migratory/ Wetland	**Medium:** The species is known to occur in mudflats, mangroves and saltmarshes. These habitat features occur in the Project Area. There are 293 records of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats (coastal habitats such as beaches, sandflats, estuaries, lagoons and coastal harbour environments) have been previously recorded in the Project Area.
Rhipidura rufifrons Rufous Fantail	Marine/Migratory	**Medium:** The species is known to occur in wet sclerophyll forests. There are forested wetlands containing sclerophyll vegetation in the Project Area. There are 15 records of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats (dry sclerophyll forests, woodlands and rainforests) have been previously recorded in the Project Area.
Tringa stagnatilis Marsh Sandpiper	Marine/Migratory/ Wetland	**Medium:** The species is known to occur in wetlands, including swamps, saltmarshes and intertidal mudflats. These habitat features occur in the Project Area. There are 40 records of the species occurring in the Locality, but no records of the species occurring in the Study Area.	**Low:** Neither the species nor its other preferred habitats (lagoons, billabongs, saltpans, estuaries and pools) have been previously recorded in the Project Area.

Species Name	Status	Likelihood of Occurrence in Study Area	Likelihood of Occurrence in Project Area
Sharks			
Lamna nasus Porbeagle, Mackeral Shark	Marine/Migratory	**Low:** There are no records of the species occurring in the Locality or in the Study Area.	**Low:** Neither the species nor its preferred habitats within the Sydney Metropolitan Area (marine environments) have been previously recorded in the Project Area.

Appendix C

Eco Logical Microbat Assessment (2012)

ECO LOGICAL AUSTRALIA PTY LTD
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Kathryn Duchatel
AECOM
Level 21
420 George St
Sydney NSW 2000

Ref/Job No: 12SYDECO-0095

25 October 2012

Dear Kathryn,

RE: Shell Clyde Refinery - Bats

I refer to your request dated 16 October 2012 (and subsequent emails) for Eco Logical Australia to provide advice on potential habitat and occupation by bats in old buildings and towers at the Shell Refinery at Clyde (Sydney, NSW).

We understand that this request originated from an historical anecdote that bats were observed in one of the three disused towers on site. However, more recent inspections of the castings and towers have failed to locate any bat species. It is understood that future works at the refinery may require demolition of some of these structures.

We further note that due to OH&S restrictions not allowing electronic devices on site due to spark and ignition risks, the use of Anabats to record bat species is not an option.

As such, the enclosed advice relates to:

- previous records of bats in the locality
- identify a list of the likely species that could be found roosting within the towers/abandoned building
- whether the infrequent roosting in the external casings of the towers would be likely to represent a significant impact if lost; and
- a brief summary of mitigation measures in the event bats are found and need to be relocated.

Please do not hesitate to call if there are any questions, or matters that need clarification.

Regards

Mark Adams
Director

Background

It is understood from AECOM that previous conversations with Shell staff reported bats using the site, in particular one of the towers on site. As a result of pending works on site and AECOM advice to Shell, a Shell employee scaled the towers and performed an inspection on 18th October 2012. The inspection was reported to have included searches of the exterior casings and insulations and found no evidence or roosting microbats.

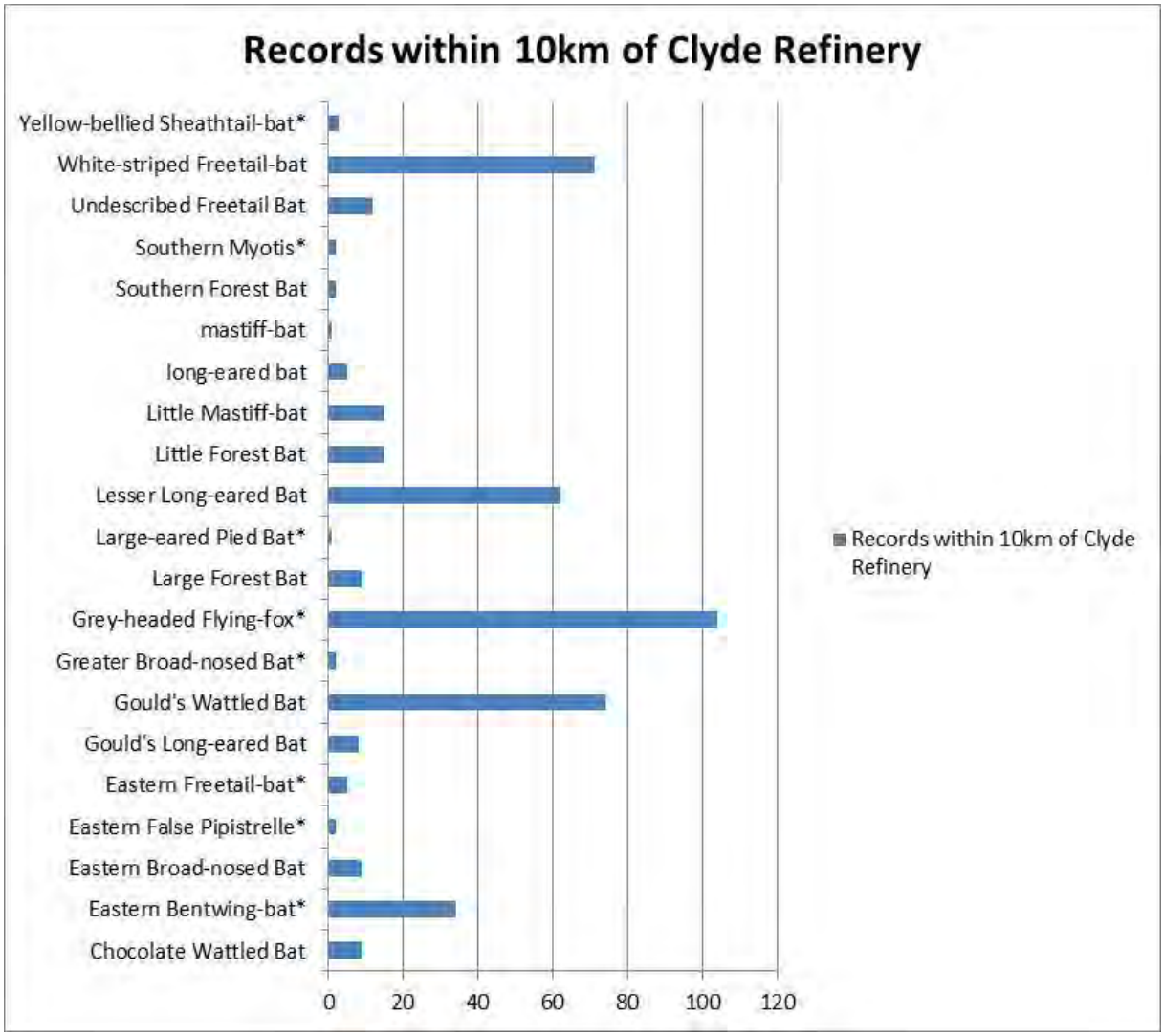
Further information from Shell employees revealed that:

1. 'bats' were observed a few years ago
2. but have not been seen since
3. generally fly up from the mangroves
4. can be easily seen

Previously recorded Bats in the vicinity

A desktop search from the NSW Wildlife Atlas reveals a number of records of bat species in the area. These records are illustrated in **Figures 1 & 2**.

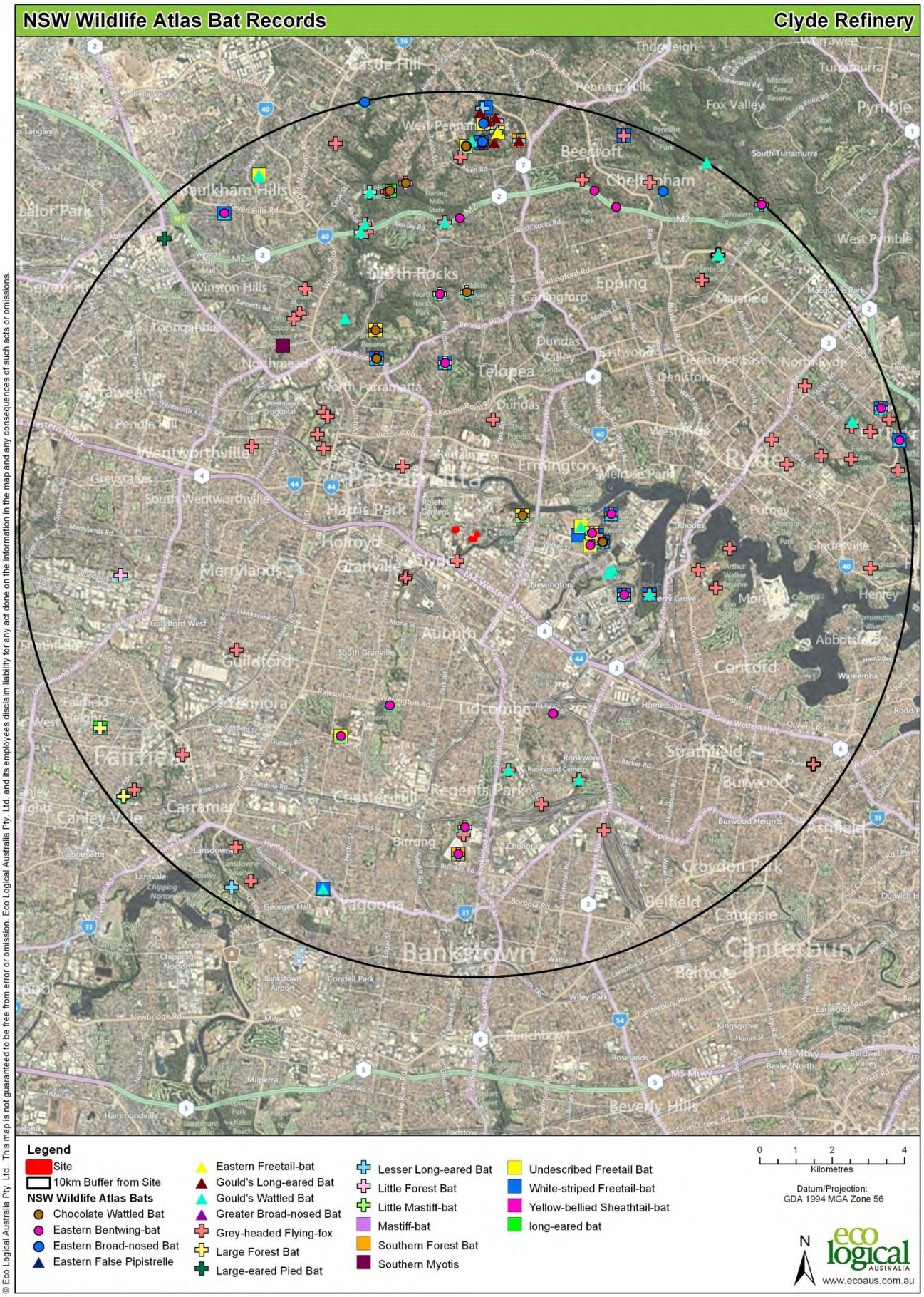
Figure 1: Histogram of local bat records



* TSC Act listed species

These records include both roost sites and bats observed foraging. In the context of the refinery, there is little to no foraging habitat on site, further, the report was of small bats roosting in a tower.

Figure 2: Map of bat records within 10kms of Clyde Refinery



Bats that are known to use man-made structures

All microbats require roost sites for both day and night time resting, predator protection, social contact and breeding. Individual species are very specific in their choice of roost sites ranging from hollows and cavities in trees to rock overhangs, caves and subterranean tunnels. They have been found to occupy a range of roost types but can generally be split into two main groups, that of cave dwelling and tree-hollow dependant species. Structures such as buildings, bridges and culverts fall into the range of cave dwelling species. They may also use stormwater culverts, flood mitigation structures and the underside of timber and concrete bridges. These sites often alternate due to different weather, seasons or even on a daily basis (DECC 2007).

Whilst all bat roost sites are important for day to day survival, roosts used for winter, cold weather hibernation and breeding (maternity sites) are most significant. These sites are often used seasonally. This means that the species may only be present at certain times of the year. To determine the significance of roost sites, assessments may be required over a number of seasons (DECC 2007). Significant subterranean roost sites often have a combination of mainly near- horizontal tunnels that may range from several metres long to deep complex mines or caves with interconnecting passageways. Vertical shafts are infrequently used (DECC 2007). The vertical alignment of the towers on site would not be considered ideal. In particular, disturbance of maternity colonies during spring and summer breeding and raising of young and during winter when animals congregate for warmth, can result in a significant impact on regional populations (DECC 2007).

Based on the site location and roosting habitat available within the towers it is likely that the microbat species in **Table 1** could occasionally roost within the tower(s).

Table 1: Potential Tower Roosting Species at Clyde.

Scientific Name	Common Name	Records within 10km	Status
Chalinolobus gouldii	Gould's Wattled Bat	74	
Chalinolobus morio	Chocolate Wattled Bat	9	
Falsistrellus tasmaniensis	**Eastern False Pipistrelle***	**2**	**Vulnerable**
Miniopterus schreibersii oceanensis	**Eastern Bentwing-bat***	**34**	**Vulnerable**
Myotis macropus	**Southern Myotis***	**2**	**Vulnerable**
Nyctophilus geoffroyi	Lesser Long-eared Bat	62	y
Scoteanax rueppellii	**Greater Broad-nosed Bat***	**2**	**Vulnerable**
Scotorepens orion	Eastern Broad-nosed Bat	9	
Vespadelus darlingtoni	Large Forest Bat	9	y
Vespadelus regulus	Southern Forest Bat	2	y

The Large-eared Pied Bat (*Chalinolobus dwyeri*) although listed under TSC and EPBC Acts, recorded in the locality and known to roost in caves and abandon mines, has not been recorded in man-made structures (NSW DECC 2007, Qld DERM 2011). This bat has been known to roost in disused mine shafts, caves, overhangs and abandoned fairy martin *Hirundo ariel* nests (Schulz 1998). Almost all records are within several kilometres of cliff lines or rocky terrain and the structure of maternity roosts appears to be very specific -arch caves with dome roofs (Qld DERM 2011).

The Grey-headed Flying-fox (*Pteropus poliocephalus*) listed under the TSC and EBPC Acts, whilst it might be observed overflying the sight, there is no suitable roosting habitat for this species on site (http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=186).

Threatened Species Profiles

Slightly more detail has been provided for the Large-footed Myotis, as it is suspected of being the more likely bat species that would have utilised the site given the location of the refinery next to Duck Creek.

Myotis

There is a level of uncertainty relating to the taxonomic status of the Large-footed or Southern Myotis. Published taxonomic work suggests it comprises a species complex in Australia, with at least two species occurring in NSW (Kitchener et al. 1995). The previously used species name *adversus* does not apply to Australian Myotis. However, it is not clear whether *M. macropus* is the only species occurring in NSW, or whether another species *M. moluccarum* also occurs. Recent advice is to refer to *M. macropus* as the Myotis that occurs in NSW (H. Parnaby pers. comm.). Other common names include the Large-footed Mouse-eared Bat.

The Large-footed Myotis is listed as Vulnerable under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and is found in eastern Australia at the Top End, from far south-east South Australia, through Victoria New South Wales and Queensland, and into northern parts of the Northern Territory and northern Western Australia (Gilmore & Parnaby 1994).

It occurs disjunctly throughout this distribution and is considered to be uncommon to rare (Lumsden et al. 1999, Anderson et al. 2006). It is widely but sparsely distributed in coastal regions and adjacent foothills of eastern NSW, extending to the Murray River. It is found along forested streams, rivers and estuaries and also on reservoirs and lakes.

Clearing for agriculture and urban development have reduced and fragmented much of its coastal habitat but a number of core habitats are protected within national parks and nature reserves. The NSW Scientific Committee's reasons for listing this species were 'Population and distribution suspected to be reduced; threatening processes severe; ecological specialist'.

The Large-footed Myotis is a habitat specialist with specific foraging and roosting requirements. Foraging always occurs around permanent water, mostly at low elevations in flat or undulating terrain, usually surrounded by riparian vegetation (Anderson et al. 2006). Large streams are assumed to be crucial foraging habitat during times of low stream flow, particularly in drought. A shortage of suitable roost locations brought about by extensive clearing of its preferred habitat is presumed to limit its distribution and occurrence.

In NSW the Large-footed Myotis is known to roost in suitable voids such as caves, disused mines, tunnels, tree hollows, under bridges, in cracks and holes in drainage culverts and even in buildings (Richards 1995, Lumsden and Menkhorst 1995). It forms roosting colonies, commonly comprising up to two (2) dozen individuals, but recorded at up to several hundred individuals. Colony roosts are typically close to bodies of water and site selection is presumed to vary with season and reproductive status, with winter roosts often differing from maternity sites (Dwyer 1970; Jones and Rayner 1991).

Home range is a concept that is not applicable to this species. It roosts in colonies and forages on suitable water bodies that are accessible from the roost. Relatively little data is available about travel distance but it has been recorded up to ten (10) kilometres from a known roost and there are indications that waterways are important as conduits (flyways) to facilitate movement (Barclay et al. 2000). However, the use of potentially suitable habitat appears to be limited by the proximity of suitable roost sites. Little is known of this species' dispersal behaviour or migration patterns (if any), but it is highly likely that riparian corridors facilitate dispersal.

The Large-footed Myotis forages over the surface of open, smooth-flowing or still water (Dwyer 1970; Jones and Rayner 1991; Richards 1995) and uses its large feet to trawl for aquatic invertebrates and small fish that dwell on the surface of water bodies (e.g. Law and Urquhart 2000). Trawling involves flying 5 to 100 cm above the water before dipping to contact and briefly rake the surface, (Dwyer 1970; Jones and Raynor 1991). Bats may

forage in convoy along the same riparian reach using similar flight paths (Jones and Raynor 1991). There is little indication of whether foraging occurs within adjacent riparian vegetation (Anderson et al. 2006), but vegetation plays an important role in providing suitable habitat for aquatic insects and fish upon which Myotis feed, and can be assumed to directly influence foraging habitat for this species.

Adult male Large-footed Myotis are considered to be territorial within breeding colonies, each defending a territory within the breeding cave and guarding a harem of females, equivalent to one (1) male and up to 12 females (Churchill 2008). In Victoria and most of NSW a single young is born to each female around November – December, but in middle latitudes (south-east Queensland and possibly north-east NSW) two offspring may be born each year; one in early October and the other in late January (Richards 1995).

The Large-footed Myotis' specialised foraging and roosting requirements and restricted occurrence make it susceptible to a number of on-going threats. These threats include direct disturbance at roost sites and indirect impacts of activities that impinge on habitat quality and quantity. Specific threats to the species include: -

- Disturbance of cave roosts by recreational caving and tourism - communal roosting sites are particularly vulnerable and maternity caves are of the utmost conservation significance.
- Clearing of coastal and foothill vegetation - land clearing has been and remains a significant threat to this species throughout its range. Direct habitat loss and the fragmentation of remnant habitats reduce the viability of populations. The clearing of riparian vegetation may be a specific threat as it is likely to impact this species' aquatic insect and small fish prey base.
- Removal or destruction of caves, old timber bridges, other bridges, old mines, culverts and other potentially suitable habitat structures – loss of an important communal roost site could have serious ramifications for a local population.
- Loss of large mature trees supporting hollows – activities such as logging and clearing that lead to the loss of large mature trees supporting suitable hollows are likely to impact this species along with a suite of other hollow-dependent fauna.
- Changes in water quality – water quality is impacted by vegetation clearing and logging (sedimentation), sewage and fertilizer runoff (eutrophication), pesticide/herbicide leakage (chemical pollution) and altered flow regimes (changes to river ecology) (Lumsden et al. 1999). These may impact the preferred prey of the Large-footed Myotis.
- Disturbance to riparian habitats within the vicinity of roosts - wildfires, frequent control burns, vegetation clearing and indiscriminate stock grazing have the potential to degrade riparian vegetation leading to impacts on water quality and the prey base of the Large-footed Myotis.
- Feral predators - fox predation at roost sites has been reported for *Miniopterus schreibersii* (Dwyer 1964) and could also affect this species. It is also possible that cats and possibly rats could predate this species at roost sites.

Eastern Bentwing Bat

There is currently taxonomic assessment underway for this subspecies, and it may be upgraded to full species status. It occurs along the east coast of Australia extending into the Great Dividing Range, from Cape York to Geelong in Victoria (Churchill 2008).

Eastern Bentwing bats are cave dwellers, but are also known to take advantage of man-made structures, such as abandoned mines and road culverts. Populations are centred on a maternity cave that is used annually for the birth and development of young, with each population dispersing to other caves within its own territorial range during the year. Movement between territories is unusual, though has been recorded (Churchill 2008). In the southern Australian winter, Eastern Bentwing hibernate in caves with an ambient temperature cold enough to keep their body temperature low, thereby reducing their metabolic rate and prolonging fat reserves that have built up during the summer.

Eastern Bentwing bats inhabit rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, *Melaleuca* forests, and open grasslands. In forested areas they fly high, whereas in more open areas they may fly within a few metres of the ground. Flight is very fast and relatively level, with swift, shallow dives. This species forages predominantly on moths, with flies, cockroaches, and beetles supplementing the diet. The Eastern Bentwing can forage long distances from the roost site, with some tagged females recorded as having travelled as far as 65km in one night (Churchill 2008).

Eastern False Pipistrelle

The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania (OEH 2012).

The species occurs in sclerophyll forests from the Great Dividing Range to the coast, and generally prefers wet habitats where trees are more than 20 m high. Roosting occurs in hollow trunks of eucalypt trees, usually in single sex colonies in colonies of three to 80 (Churchill 2008), but the species has been recorded roosting in caves under loose bark and occasionally in old wooden buildings (Churchill 1998). Single young are born in later December. Their flight pattern is high and fast and they forage within or just below the tree canopy. They feed on a variety of prey including moths, rove beetles, weevils, plant bugs, flies and ants (OEH 2012).

Greater Broad-nosed Bat

The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m (OEH 2012).

The Greater Broad-nosed Bat utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings (OEH 2012).

Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species where they forage along creek and river corridors at an altitude of 3-6m (OEH 2012).

Little is known of its reproductive cycle, however a single young is born in January; prior to birth, females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of the single young (OEH 2012).

Mitigation Measures

It may be possible to use Anabat's on site as most units are contained within a secondary sealed plastic container. Further clarification and inspection of the Anabat units by Shell OH&S staff would be necessary. If this is possible, monitoring intervals should focus on the spring-summer period; with three by two consecutive night Anabat survey intervals in:

- Spring (October)
- Summer (December)
- Summer (February).

If the utilisation of Anabats is not possible and as microbats have not been seen recently at the site, the best course of action is to perform inspections by refinery staff of the areas to be demolished daily for sign of microbats. Sign includes:

MICROBAT SIGN	EVIDENCE	ACTION
Visual	Obvious cluster of bats or singular dark spots should be investigated as potential roosting bats	Report and investigate
Visual	Works conducted around dusk and dawn (potential for night works) when bats can be seen leaving and returning to roosts; if bat flying activity is witnessed it should be reported and investigated further	Report and investigate
Audible	Bats, when roosting, will periodically emit a chatter type noise. Any suspicion of unusual noises should be reported and investigated further	Report and investigate
Guano	If bats are utilising a roost, even as intermittent roost, guano will occur immediately under the roost site; large permanent roosts will accumulate considerable volumes of material. Notify for further investigation.	Report and investigate
Staining	Where bats frequently access a roost this area can become stained overtime by guano and urine. Any obvious staining should be investigated by Project ecologist.	Report and investigate
Bird Nests	Earth constructed bird nests of swallow or fairy martin are relatively common structures and should be investigated before removal as some bat species will utilise disused nests as an interim roost.	Report and investigate

If bats or bat sign is determined then a qualified ecologist that holds a Scientific License to handle and relocate fauna should be called to inspect and clear the site. The inspection would remove any individuals if they were again roosting on site, seal the entrance to the roost and re-release the bats at dusk. If the roost can't be fully accessed to capture bats a one way valve can be placed over the entrance to allow bats to exit but not re-enter the roost site. This is an effective method to prevent any bats being trapped inside the roost and prevent re occupation once cleared.

As microbats sometimes have multiple roost sites it is suggested that they are released at the same place form where they were found to reduce the chance of the animal becoming disorientated.

It is recommended that this is done prior to demolition and inspections continue periodically during demolition/construction to a point where the tower is decommissioned.

Recommendations

As the site contains limited roosting habitat for microbats, a large amount of foraging habitat consisting of native vegetation in the form of mangroves is available along Duck River. In this habitat there are also other man-made structures such as bridges and culverts that contain potential roosting habitat for both Eastern Bentwing-bat and Large-footed Myotis.

It is our opinion, based on the information provided, that there unlikely to be significant impacts to microbat habitat by the demolition of the towers given:

- The towers and buildings currently being absent of bats
- The likely historic use of the tower being opportunistic and in response to a local food source
- The availability of other man-made or potential artificial bat roosts in the area (e.g.: along Duck Creek)
- The highly industrialised and urbanised context and lack of native vegetation in the vicinity

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Appendix D

Seven-Part Tests

Appendix D Seven-Part Tests

Green and Golden Bell Frog *Litoria Aurea*

The Green and Golden Bell Frog (*Litoria aurea*) (GGBF) is a dull olive to emerald green frog up to 85 mm long. The species is usually distinguished by the irregular markings on its back that range from brown to golden bronze, and by yellow and black dorsal stripes. The species is occurs mainly in coastal lowland areas within NSW and Victoria. The GGBF is listed as an endangered species under the TSC Act. The *Management Plan for the Green and Golden Bell Frog Key Populations of the Parramatta River* (Department of Environment and Climate Change, 2008c) identifies the Clyde Terminal, and the Camellia peninsular/Camellia Industrial Estate/Rosehill area as containing one of the key Parramatta populations of the GGBF (the other two key Parramatta populations being located at Homebush Bay and Merrylands).

Several past records of the GGBF from within the Project Area were recorded in 1999, 2000 and 2005. Two sites at the Project Area were also found to contain live frogs during survey work conducted in October 2012. However in the past, operational management has required that most bunded tanks and associated drainage lines are routinely drained following rainfall. Thus potential habitat for frogs is no longer present in a number of locations where they have been previously recorded.

The GGBF is listed as an endangered species under the *Threatened Species Conservation Act (1995)* (TSC Act) and this population has been identified by the EPA as a Key Population.

Threats to GGBF listed by OEH (OEH, 2012) include:

- Destruction of wetlands;
- Alteration of drainage patterns and stormwater runoff;
- A fungal pathogen known as Frog Chytrid Fungus;
- Predation by feral animals such as foxes;
- Herbicides and other weed control measures;
- Road mortality, where populations are already small due to other threats;
- Predation by exotic fish such as Plague Minnow; and
- Loss of suitable breeding habitat through alteration by infilling and destruction of wetlands.

a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The proposed Project would not impact directly on aspects of this species' life cycle phases of migration and dispersion.

The Clyde Terminal has been identified as containing areas that have been previously used by GGBF for breeding, and that may continue to be used from time to time as breeding habitat (Department of Environment and Climate Change, 2008c).

Sites within the Project Area where the GGBF has been detected or where potential habitat occurs are outlined in **Table 16**.

Table 16 Potential and Known Green and Golden Bell Frog Habitat at the Project Area

Area	GGBF Previous Records	GGBF Potential Habitat
Remnant wetlands	Four male GGBFs were heard actively calling during surveys in October 2012. One GGBF individual was recorded at this location in in 1999, and another two in 2005 (OEH, 2013a; Urban Bushland Management Consultants, 2007).	Man-made and designed to receive clean waste water from the Project Area. Based on past and current records, the remnant wetland is the primary location of GGBF on the Project Area. This area was therefore used as a reference site during the October 2012 GGBF surveys.

Area	GGBF Previous Records	GGBF Potential Habitat
Tankfarm B	Two male GGBFs were heard actively calling during surveys in October 2012. There is anecdotal evidence of tadpoles (species unknown) previously occurring in the waters in the base of Tankfarm B.	Tankfarm B is one of the two tankfarms at the Project Area that retains ponded rain water because drainage appears to have been blocked by a small dense stand of *Typha orientalis* (Cumbungi). Accumulated sediment and soil waste on the floor of the tankfarm also appears to have promoted creation of an artificial pool of water inside the northern bund wall, suggesting that the area may not provide suitable GGBF habitat. Tankfarm B is not hydrologically connected to the remnant wetland in the north east of the Project Area. The closest native vegetation to Tankfarm B is a stand of Swamp Oak floodplain forest fringing Duck River, situated around 170 m to the south-east beyond the rainwater retention basin. However, GGBF are also known to move between sites that have terrestrial connections, and have a relatively large dispersion (the species is known to have travelled between 1-3 km in a single day or night: Department of Environment, Water, Heritage and Arts, 2009b). It is therefore possible that GGBF at Tankfarm B travel through terrestrial corridors (such as the mangroves along Duck and Parramatta Rivers, or throughout the Clyde Terminal site itself) as it moves throughout the Locality. The mangroves and riverside floodplain forest are not impacted by the works in the terminal and would benefit from the improved environmental controls to be implemented as part of the project.
Tank 52	No evidence of GGBF presence was recorded in this location during surveys in October 2012. There are no previous records of GGBFs occurring at this location (OEH, 2013a).	Tank 52 contains a very shallow ponded area with emergent vegetation dominated by the introduced (Umbrella Sedge (*Cyperus eragrostis*). In the absence of rainfall, the ponded area appears to be fed by moisture venting from external tank pipes which condenses into the area as warm water. The surrounding non-ponded areas are a combination of concrete bunds and introduced grasses which are controlled during regular maintenance programs. Ponded water around Tank 52 is also known to be relatively oily (pers.comm. Ian Bell). Due to the presence of ponded water, and given the fact that the area seems to retain water between rainfall events, it is possible that the area is or has been used as GGBF habitat at some point, although this it is considered unlikely for the area to currently provide suitable habitat.
Mobil Tankfarm	No evidence of GGBF presence was recorded in this location during surveys in October 2012. The only signs observed of aquatic fauna were resting water birds. One GGBF individual was recorded at this location in 1999 (OEH, 2013a).	Tanks 201, 203 and 204 lie within a bund in the centre of the six tanks at this tankfarm. On occasions, shallow ponded water is present at this Tankfarm. The condition of tanks 201-204 beneath the ground surface is unknown. Groundwater and surface waters at this location may contain chromium as a legacy of land use prior to Shell's use of the Project Area for refining and related activities. However visual

Area	GGBF Previous Records	GGBF Potential Habitat
		observations and analytical sampling of the standing water within the bund do not indicate contamination (ERM, 2012a). The degraded nature of the Mobil Tankfarm ponded water suggests that the area may not provide suitable GGBF habitat. This may be the reason that the GGBF was not detected during 2012 surveys, when animals were actively calling at two other locations at the Project Area.
Tankfarm E1 (including Tanks 36-41)	No evidence of GGBF presence was recorded in this location during surveys in October 2012. One individual GGBF was recorded in this location in 2000 (OEH, 2013a).	During survey work conducted in 2012, no suitable GGBF habitat was identified in Tankfarm E1.

As indicated in **Table 16**, the sections of the Project Area most commonly used as GGBF habitat (i.e. the remnant wetlands) are therefore unlikely to be impacted on by the Project. GGBF individuals found outside of this remnant wetland habitat within the Project Area would be relocated into this remnant wetland habitat. As such, it is unlikely that significant breeding habitat of the species would be removed, or that access to breeding habitats would be significantly reduced as part of the Project, putting the species at risk of extinction.

b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

Not applicable.

c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or

ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable.

d) In relation to the habitat of a threatened species, population or ecological community:

i. the extent to which habitat is likely to be removed or modified as a result of the action proposed; and

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and

iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

i. The Project would involve modification works to improve tankfarm drainage or demolition of tankfarms at the Project Area that have the potential to be used as GGBF habitat. However, Shell commits to relocating the species to the remnant wetlands in the north-east of the Project Area, which provides superior habitat values for the species, and which would not be impacted on during the Project. Shell would also conserve and enhance that remnant wetland habitat so as to continue to provide secure habitat for this species into the future.

ii. The species is also generally known to have the potential to disperse widely (it is known to have travelled between 1-3 km in a single day or night: DEWHA, 2009b), and the species is known to utilise both aquatic and terrestrial corridors for movement between habitats. The remnant wetlands

in the north-east corner of the Project Area are known to be the primary location of GGBF at the Project Area. It is therefore most likely that the dispersion of GGBF within the Project Area is centred on the remnant wetlands in the north-east, and takes place throughout select sections of the eastern half of the Project Area on occasion. Indeed, it is unlikely that GGBF disperses into the western half of the Project Area, given that there are no previous records of GGBF occurring there (GGBF has only been previously recorded in the eastern half of the Project Area) and also that there are no suitable habitat locations within that section of the Project Area. The infrastructure in the western portion of the Project Area would be almost completely demolished, whereas only selected pieces of infrastructure in the eastern half of the Project Area would be demolished. The Project is therefore unlikely to impact on any established corridors of movement for the GGBF throughout the Project Area and beyond by fragmenting or isolating habitats further. The remnant wetlands in particular would not be impacted on as a result of the Project, and as such, this habitat would not become further isolated or fragmented as a result of the Project.

iii. The Project would involve the removal or degradation of some aquatic or ephemeral GGBF habitats as these tankfarms at the Project Area are currently providing some artificial GGBF habitat. However any such GGBF habitat around tankfarms as identified above is not compatible with supporting viable sub-populations of GGBF into the future, and it is not feasible to promote the conservation of this species at the Project Area into the future through the preservation of redundant tankfarms. It is therefore impractical from an operational, environmental and safety point of view to continue to maintain redundant tank infrastructure providing artificial GGBF habitat, particularly given that the Project Area already contains more suitable GGBF habitat within its remnant wetland area. Indeed, existing habitat within the Project Area, external to the managed remnant wetland, appears incompatible in supporting viable populations of the GGBF into the future, and cannot feasibly be managed long term to balance species conservation and site operations through the use of tankfarms.

Indeed, operational safeguards at the Clyde Terminal discourage the ponding of tankfarms as this decreases the ability of bunds to manage tank spills and overflows. upgrading of these tank bund drainage systems is yet another safety and environmental improvement that Shell is seeking to implement as part of the proposed Project

Prior to the issue of final plans for Project execution, a suitably qualified ecologist would therefore be engaged by Shell to identify and, if necessary, relocate frogs from these areas proposed for demolition or modification works for tankfarm drainage. These GGBF individuals would be relocated to the remnant wetlands within the Project Area, which is where this sub-population is most likely to be centred around. Shell also commits to the preservation of this remnant wetland as GGBF habitat into the future.

e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

The remnant wetlands are the only habitat that can be considered to be critical habitat for the GGBF at the Project Area. These remnant wetlands would not be impacted on, either directly or indirectly, as a result of the Project. Shell would preserve and enhance this habitat through protection and rehabilitation mechanisms.

f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

As part of the Project, Shell has committed to creating a GGBF specific mitigation strategy, included as a sub-plan to the CEMP for the proposed Clyde Terminal conversion, in consultation with the NSW Office of Environment and Heritage. The CEMP GGBF sub-plan is to be prepared in accordance with the following documents:

- *Green and Golden Bell Frog Litoria aurea (Lesson 1829) Draft Recovery Plan* (Department of Environment and Conservation, 2005a);
- *Threatened Species Assessment Guidelines: the Assessment of Significance* (Department of Environment and Climate Change, 2007);
- *Management Plan for the Green and Golden Bell Frog Key Population of the Georges River* (Department of Environment and Climate Change, 2008b);

- *Best practice Guidelines Green and Golden Bell Frog Habitat* (Department of Environment and Climate Change, 2008a); and
- *Threatened Species Management Information Circular No. 6:Hygiene Protocol for the Control of Disease in Frogs* (Department of Environment and Climate Change, 2008d).

The mitigation measures incorporated into the Project would therefore be consistent with the draft recovery plan for GGBF in NSW (DEC, 2005).

g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Of the eight key threatening processes listed for NSW by OEH (2012), the following are relevant to the location, the proposed Project and the species:

- Alteration of drainage patterns and stormwater runoff; and
- A fungal pathogen known as Frog Chytrid Fungus.

The Project has some potential for contributing to these key threatening processes.

The stormwater management of the Project Area would be upgraded as part of the Project to suit reduced operations at the converted Clyde Terminal. However, the areas of stormwater drainage to be upgraded lie in the western half of the Project Area, where GGBF has not been previously recorded. This area is also not known to previously contain significant instances of ponding around tankfarms, and lacks connectivity to other areas of GGBF habitat, e.g. to the remnant wetlands. As such, this amended stormwater management is not likely to impact on GGBF at the Project Area. Furthermore, clean stormwater and clean captured surface water only would continue to be discharged to the remnant wetlands in the north-east of the Project Area.

Shell also commits to abiding by *The Frog Hygiene Protocol* (DECC, 2008b) to prevent the spread of Frog Chytrid Fungus.

As such, the Project is not considered likely to exacerbate either of these relevant key threatening processes.

Conclusion

The Project would result in the loss of some GGBF habitat around tankfarms within the Clyde Terminal. However, such habitat around tankfarms appears incompatible in supporting viable populations of the GGBF into the future, and it is not feasible to promote the conservation of this species at the Project Area into the future through the conservation of redundant tankfarms. It is therefore proposed relocate GGBFs found outside of the remnant wetlands within the Project Area. These frogs would be relocated to the remnant wetlands themselves, and Shell also commits to the preservation of this remnant wetland as GGBF habitat into the future.

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Grey-headed Flying Fox *Petaurus poliocephalus*

The Grey-headed Flying Fox *Petaurus poliocephalus* is a large bat up to 29 cm long with a wingspan of up to 1 m. Its body is covered in dark grey fur, with the fur on the neck being a lighter grey and the head and collar having a russet colour. It also has leg fur extending to the ankle, which helps distinguish it from other bats. The species occurs mainly within 200 km of the east Australia coast. The Grey-headed Flying Fox is listed as a vulnerable species under the TSC Act. There is one known recorded location of the species occurring in the remnant wetlands at the Project Area. The report prepared by Eco Logical (refer to **Appendix C** of the main report attached) has found that the Project Area does not contain important Grey-headed Flying Fox roosting habitat. Therefore this species is unlikely to be affected directly or indirectly by the proposed Clyde Terminal conversion. However individuals of this species may dwell opportunistically at the Project Area. There is thus some residual potential for the species to use the limited habitat available in the remnant wetlands, and the species could occasionally roost within the stacks at the Project Area.

Threats to Grey-headed Flying Fox listed by OEH (OEH, 2013) include:

- Loss of foraging habitat;
- Loss of disturbance of roosting sites;
- Unregulated shooting;
- Electrocution on powerlines, entanglement in netting and on barbed wire;
- Competition with Black Flying-foxes;
- Negative public attitude and conflict with humans;
- Impacts from climate change; and
- Disease.

a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The Project Area contains some suitable habitat that the species may be able to use for opportunistic roosting and foraging such as a large Fig tree, the remnant wetlands, and unused refinery infrastructure. The remnant wetlands in the Project Area may also provide limited breeding habitat for the species, however this is considered unlikely: Grey-headed Flying Foxes tend to breed in camps of hundreds of individuals. Any such activity is therefore likely to have been noticed by Shell personnel or during ecological surveys conducted in the past. The species has not been recently identified in infrastructure planned for demolition as part of the conversion works.

There is no known local population of the species in the near vicinity of the Project Area that may otherwise be indirectly affected by the Project.

b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

Not applicable.

c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

iii. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or

iv. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable.

d) In relation to the habitat of a threatened species, population or ecological community:

iv. the extent to which habitat is likely to be removed or modified as a result of the action proposed; and

v. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and

vi. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

iv. The Project would involve the demolition of redundant refinery infrastructure. There are anecdotal sightings of Bat species being present within such infrastructure at the Project Area. However this Ecological Assessment was unable to locate the presence of individual Bats within these areas planned for demolition, and anecdotal evidence form Shell staff suggests that Bats have not been sighted at the Project Area for some time. There is some residual potential for the Project to involve the demolition of old refinery infrastructure that is being used as Grey-headed Flying Fox roosting habitat. However this is considered unlikely given that Bats have not been sighted at the project Area for some time. Management measures have been put in place so that a qualified ecologist would inspect redundant refinery infrastructure with the potential to provide bat habitat before it is demolished. Indicators are also provided so that the presence of Bats at the Project Area can be identified by other Shell staff and contractors, in the event that they are present. The remnant wetlands would, however, provide the best quality habitat at the Project Area and these wetlands would not be impacted on either directly or indirectly as a result of the Project.

v. The species is also generally known to have the potential to disperse widely and through airborne movement. There are no specific corridors of movement for the Grey-headed Flying Fox throughout the Project Area and beyond. Any Grey-headed Flying Fox habitat in the area would therefore not become more fragmented or isolated from other habitats as a result of the Project. The remnant wetlands in particular would not be impacted on either directly or indirectly as a result of the Project. As such, this habitat would not become further isolated or fragmented as a result of the Project.

vi. Any redundant refining infrastructure at the Project Area that may be found to house Grey-headed Flying Fox would not necessarily be the most suitable habitat for the species, and is likely to provide only opportunistic foraging or roosting habitat. The remnant wetlands at the Project Area provide superior habitat values for many species including Grey-headed Flying Fox, and these wetlands would not be impacted on either directly or indirectly by the Project.

e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

The remnant wetlands and large Fig tree are the only habitat that can be considered to provide potentially significant habitat for the Grey-headed Flying Fox at the Project Area. This habitat is not considered critical for the species. Nevertheless the habitat values of this remnant wetland would not be impacted on either directly or indirectly as a result of the Project. Shell would preserve and enhance this remnant wetland through protection and rehabilitation mechanisms.

f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

There are no specific recovery plans or threat abatement plans for the species. OEH has listed 31 priority actions to promote the recovery of threatened species and the abatement of key threatening processes in relation to Grey-headed Flying Fox (OEH, 2013). The essence of these priority actions is capture by the following activities recommended to assist the species (OEH, 2013):

- Protect roost sites, particularly avoid disturbance September through November;
- Identify and protect key foraging areas;
- Manage and enforce licensed shooting;
- Investigate and promote alternative non-lethal crop protection mechanisms;
- Identify powerline blackspots and implement measures to reduce deaths; implement measures to reduce deaths from entanglement in netting and on barbed-wire;
- Increase public awareness/understanding about flying-foxes, and their involvement in flying-fox conservation;
- Monitor the national population's status and distribution; and

- Improve knowledge on demographics and population structure to better understand ecological requirements of the species.

For this particular Project Shell would monitor the potential for Grey-headed Flying Fox to occur at the Project Area. A qualified ecologist would inspect potential roosting sites prior to demolition works occurring, and Shell staff would continue to monitor the Project Area for signs of the species' presence. Given the fact that it is still considered unlikely that the species would use the Project Area for more than opportunistic foraging and roosting, no further management measures or action plan is required at this time.

g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Of the eight key threatening processes listed for Grey-headed Flying Fox by OEH (2013), the following are relevant to the location, the proposed Project and the species:

- Loss of foraging habitat;
- Loss of disturbance of roosting sites;
- Electrocution on powerlines, entanglement in netting and on barbed wire; and
- Negative public attitude and conflict with humans.

The Project has some residual potential for contributing to these key threatening processes. However, again this is considered unlikely. Any loss of foraging or roosting habitat would not constitute important habitat for the species, and the better-suited wetland habitat and Fig tree at the Project Area would not be impacted on.

The Project would also not involve the commissioning of any significant new infrastructure, but rather the demolition of redundant refining infrastructure. The ongoing operation of the converted Clyde Terminal nevertheless has the potential to continue the existing threats of electrocution and negative human interaction at the Project Area. However the Project would not exacerbate these threats any further than as per the current operational scenario at the Clyde Terminal.

Conclusion

The Project would involve the demolition of redundant refinery infrastructure, including infrastructure that has anecdotally provided historical habitat for Grey-headed Flying Fox. However the attached Ecological Assessment was unable to locate the presence of individual Bats within these areas planned for demolition, and anecdotal evidence form Shell staff suggests that Bats have not been sighted at the Project Area for some time. In any event the remnant wetlands at the Project Area are considered to provide better quality habitat values for many species, including Grey-headed Flying Fox, and these wetlands would not be impacted on directly or indirectly from the Project. Measures have been put in place to confirm the presence of Grey-headed Flying Fox, if any, before redundant refinery infrastructure providing potential roosting habitat is demolished.

Overall the Project is considered highly unlikely to significantly impact on this species.

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Microbat Species

Microbats require both diurnal and nocturnal roosting locations. Generally, Microbat species can therefore be separated into two main groups based on the types of roosting habitats that they prefer to use: cave dwelling species; and tree hollow dependent species. It should be noted that anthropogenic structures such as buildings, bridges and culverts are considered to fall within the roosting habitat of cave dwelling Microbat species. The use of such sites for roosting may vary depending on factors such as weather and seasons, meaning that species may only be present on certain days, and at certain times of the year (Department of Environment and Climate Change, 2007).

To definitely determine the significance of roost sites, assessments may therefore be required over a number of seasons (Department of Environment and Climate Change, 2007). Significant subterranean roost sites often have a combination of mainly near-horizontal tunnels that may range from several metres long to deep complex mines or caves with interconnecting passageways. Vertical shafts are infrequently used and the vertical alignment of the stacks at the Project Area would therefore not be considered ideal (Department of Environment and Climate Change, 2007). Based on the site location and roosting habitat available within the stacks it is likely that the Microbat species listed below could occasionally roost within the stack(s) at the Project Area.

Whilst the Project Area overall contains only limited roosting habitat for Microbats, it does contain a large amount of foraging habitat (mangroves) and other man-made structures (such as bridges and culverts) that provide potential roosting habitat occur along Duck River. This is particularly the case for both the Eastern Bentwing-bat and Large-footed Myotis.

Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)

Eastern False Pipistrelle is a large Microbat around 65 mm in body length and weighing 28 grams. It is dark to reddish-brown fur above with paler grey fur on the underside. The species has long slender ears and sparse nose hairs. It is found on the south-eastern Australia coast (OEH, 2013).

The species occurs in sclerophyll forests from the Great Dividing Range to the coast, and generally prefers wet habitats where trees are more than 20 m high. Roosting occurs in hollow trunks of eucalypt trees, usually in single sex colonies in colonies of three to 80 (Churchill, 2008), but the species has been recorded roosting in caves under loose bark and occasionally in old wooden buildings (Churchill, 2008). Single young are born in later December. Their flight pattern is high and fast and they forage within or just below the tree canopy. They feed on a variety of prey including moths, rove beetles, weevils, plant bugs, flies and ants (OEH, 2013).

Eastern False Pipistrelle is listed as vulnerable under the TSC Act, and OEH has identified the following threats for the species (OEH, 2013):

- Disturbance to winter roosting and breeding sites;
- Loss of trees for foraging and hollow-bearing trees for roosting; and
- Application of pesticides in or adjacent to foraging areas.

Sixteen priority actions for the species have been recommended by OEH, and the three key activities to assist the species are recognised as (OEH, 2013):

- Retain native vegetation that is floristically and structurally diverse;
- Minimise the use of pesticides within or adjacent to areas where insectivorous bats occur; and
- Protect roost sites from disturbance.

Eastern Bentwing Bat (*Miniopterus schreibersii oceanensis*)

The Eastern Bentwing Bat has brown to reddish-brown fur which is a slightly lighter colour on its underside. It has a small snout with a high doomed head and short round ears. Its wing membranes attach to the ankle rather than the base of the toe. The last bone of the third finger is longer than the other fingers, giving the appearance of the bent wing. It is around 6 cm in body length with a wingspan of around 30-35 cm (OEH, 2013).

The species occurs along the east and north-west coasts of Australia (OEH, 2013).

Eastern Bentwing Bat is listed as vulnerable under the TSC Act, and OEH has identified the following threats for the species (OEH, 2013):

- Disturbance by recreational cave climbers and general public accessing the cave and adjacent areas particularly during winter or breeding;
- Loss of foraging habitat;
- Loss of food resources and indirect poisoning of individuals from nearby use of herbicides / insecticides;
- Predation by feral cats and foxes;
- Introduction of exotic pathogens, specifically known White-nosed fungus;
- Threat of cave entrances being blocked for human safety reasons. Also, vegetation encroaching and blocking cave entrances;
- Potential for large scale wildfire to impact on resource availability in surrounding habitat. Direct threats at caves from fire; and
- Weeds (blackberry) encroaching over cave entrances restrict access; need to ensure sympathetic control techniques for blackberry.

Fifteen priority actions for the species have been recommended by OEH, and the four key activities to assist the species are recognised as (OEH, 2013):

- Control foxes and feral cats around roosting sites, particularly maternity caves;
- Retain native vegetation around roost sites, particularly within 300 m of maternity caves;
- Minimise the use of pesticides in foraging areas; and
- Protect roosting sites from damage or disturbance.

Southern Myotis (*Myotis macropus*)

The Southern Myotis has disproportionately large feet that are more than 8 mm long, and widely spaced and hairy toes with curved claws. It is dark-grey to reddish brown with paler fur on its underside. It weighs around 15 grams and has a wingspan of around 28 cm (OEH, 2013).

The species occurs along the coastal band from north-west Australia and across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers (OEH, 2013).

Southern Myotis is listed as vulnerable under the TSC Act, and OEH has identified the following threats for the species (OEH, 2013):

- Loss or disturbance of roosting sites;
- Clearing adjacent to foraging areas;
- Application of pesticides in or adjacent to foraging areas; and
- Reduction in stream water quality affecting food resources.

Fifteen priority actions for the species have been recommended by OEH, and the three key activities to assist the species are recognised as (OEH, 2013):

- Retain native vegetation along streams and rivers and around other waterbodies;
- Minimise the use of pesticides adjacent to foraging areas; and
- Protect roosts from damage or disturbance.

Greater Broad-nosed Bat (*Scoeanax rueppellii*)

The Greater Broad-nosed Bat has a body length of up to 95 mm with a broad head and short square muzzle. It has dark reddish-brown fur and is a lighter colour below. It can be distinguished from other broad-nosed bats by its relatively greater size (OEH, 2013).

The species is found mainly in gullies and river systems draining the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland, and extending to the coast over much of its range (OEH, 2013).

Greater Broad-nosed Bat is listed as vulnerable under the TSC Act, and OEH has identified the following threats for the species (OEH, 2013):

- Disturbance to roosting and summer breeding sites;
- Foraging habitats are being cleared for residential and agricultural developments, including clearing by residents within rural subdivisions;
- Loss of hollow-bearing trees;
- Pesticides and herbicides may reduce the availability of insects, or result in the accumulation of toxic residues in individuals' fat stores; and
- Changes to water regimes are likely to impact food resources, as is the use of pesticides and herbicides near waterways.

Nineteen priority actions for the species have been recommended by OEH, and the 10 key activities to assist the species are recognised as (OEH, 2013):

- Raise landowners' awareness of the presence of this species, and provide information on how their management actions will affect the species' survival;
- Actively encourage the conservation of the riparian vegetation and water quality of streams and rivers;
- Conduct searches for the species in suitable habitat in proposed development areas;
- DEC should be consulted when planning development/s to minimise impact/s on populations;
- Retain stands of native vegetation, especially those with hollow-bearing trees (including dead trees), and retain other structures containing bats;
- Retain a buffer of vegetation around roost sites in vegetated areas;
- Protect hollow-bearing trees for breeding sites, including those on farmland; younger mature trees should also be retained to provide replacements for the older trees as they die and fall over;
- Reduce the use of pesticides in the environment and enter known sites of this species and its potential habitat onto maps used for planned poison spraying activities;
- Encourage regeneration and replanting of local flora species to maintain bat foraging habitat; and
- Assess the site's importance to the species' survival, including linkages provided between ecological resources across the broader landscape.

a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The Project Area contains some suitable habitat that Microbat species may be able to use for opportunistic roosting and foraging such as a large Fig tree, the remnant wetlands, and unused refinery infrastructure. The remnant wetlands in the Project Area may also provide limited breeding habitat for the species, however this is considered unlikely. The species has not been recently identified in infrastructure planned for demolition as part of the conversion works.

There are no known local populations of these species in the near vicinity of the Project Area that may otherwise be indirectly affected by the Project.

b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

Not applicable.

c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

v. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or

vi. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable.

d) In relation to the habitat of a threatened species, population or ecological community:

vii. the extent to which habitat is likely to be removed or modified as a result of the action proposed; and

viii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and

ix. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

vii. The Project would involve the demolition of redundant refinery infrastructure. There are anecdotal sightings of Bat species being present within such infrastructure at the Project Area. However the attached Ecological Assessment was unable to locate the presence of individual Bats within these areas planned for demolition, and anecdotal evidence form Shell staff suggests that Bats have not been sighted at the Project Area for some time. There is some residual potential for the Project to involve the demolition of old refinery infrastructure that is being used as Microbats roosting habitat. However this is considered unlikely given that Bats have not been sighted at the project Area for some time. Management measures have been put in place so that a qualified ecologist would inspect redundant refinery infrastructure with the potential to provide bat habitat before it is demolished. Indicators are also provided so that the presence of Bats at the Project Area can be identified by other Shell staff and contractors, in the event that they are present. The remnant wetlands would, however, provide the best quality habitat at the Project Area and these wetlands would not be impacted on either directly or indirectly as a result of the Project.

viii. These species are known to have the potential to disperse widely and through airborne movement. There are no known specific corridors of movement for Microbats throughout the Project Area, although there is potential for the remnant wetlands and adjoining riparian vegetation to provide a corridor of movement for species along the border of the Project Area and then beyond the Project Area. These wetland/riparian areas would not be directly or indirectly impacted on by the Project. Any Microbat habitat would therefore not become more fragmented or isolated from other habitats as a result of the Project.

ix. Any redundant refining infrastructure at the Project Area that may be found to house Microbats would not necessarily be the most suitable habitat for these species, and is likely to provide only opportunistic foraging or roosting habitat. The remnant wetlands at the Project Area provide superior habitat values for many species including Microbats, and these wetlands would not be impacted on either directly or indirectly by the Project.

e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

The remnant wetlands and large Fig tree are the only habitat that can be considered to provide potentially significant habitat for Microbats at the Project Area. This habitat is not considered critical for the species. Nevertheless the habitat values of this remnant wetland would not be impacted on either directly or indirectly as a result of the Project. Shell would preserve and enhance this remnant wetland through protection and rehabilitation mechanisms.

f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

There are no specific recovery plans or threat abatement plans for these species OEH has listed numerous priority actions to promote the recovery of threatened species and the abatement of key threatening processes in relation to Microbat species. The essence of these priority actions is captured by the following activities recommended to assist these species (OEH, 2013):

- Retain stands of native vegetation, especially those with hollow-bearing trees (including dead trees), and retain other structures containing bats;

- Protect hollow-bearing trees for breeding sites, including those on farmland; younger mature trees should also be retained to provide replacements for the older trees as they die and fall over;
- Actively encourage the conservation of the riparian vegetation and water quality of streams and rivers;
- Encourage regeneration and replanting of local flora species to maintain bat foraging habitat;
- Protect roosting sites from damage or disturbance;
- Retain a buffer of vegetation around roost sites in vegetated areas;
- Minimise the use of pesticides in foraging areas; Protect roost sites from disturbance;
- Control foxes and feral cats around roosting sites, particularly maternity caves;
- Protect roosts from damage or disturbance;
- Raise landowners' awareness of the presence of this species, and provide information on how their management actions will affect the species' survival;
- Conduct searches for the species in suitable habitat in proposed development areas;
- OEH should be consulted when planning development/s to minimise impact/s on populations; and
- Assess the site's importance to the species' survival, including linkages provided between ecological resources across the broader landscape.

The Project would not result in the loss of native vegetation, including hollow-bearing trees, and would involve the active conservation and rehabilitation of the riparian vegetation and water quality management at the Project Area. Shell has also committed to ensuring that site contractors undertaking weed removal or control as part of the Project would be trained or experienced in weed identification and removal (as per the *Pesticide Act 1999*) to prevent the improper use of pesticides, particularly around the riparian vegetation. The ongoing operation of the converted Clyde Terminal has some limited potential to continue the existing threats of predation by feral cats and foxes. However the Project would not exacerbate these threats any further than as per the current operational scenario at the Clyde Terminal.

For this particular Project Shell would monitor the potential for Microbats to occur at the Project Area. A qualified ecologist would inspect potential roosting sites prior to demolition works occurring, and Shell staff would continue to monitor the Project Area for signs of these species' presence. Given the fact that it is still considered unlikely that these species would use the Project Area for more than opportunistic foraging and roosting, no further management measures or action plan is required at this time.

g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Of the key threatening processes listed for Microbats by OEH (2013), the following are relevant to the location, the proposed Project and the species:

- Disturbance to winter roosting and breeding sites;
- Application of pesticides in or adjacent to foraging areas;
- Loss of foraging habitat;
- Predation by feral cats and foxes;
- Loss or disturbance of roosting sites;
- Reduction in stream water quality affecting food resources;
- Disturbance to roosting and summer breeding sites; and
- Changes to water regimes are likely to impact food resources, as is the use of pesticides and herbicides near waterways.

The Project has some residual potential for contributing to these key threatening processes. However, again this is considered unlikely. Any loss of foraging or roosting habitat would not constitute important habitat for the species, and the better-suited wetland habitat and Fig tree at the Project Area would not be impacted on by the Project.

The ongoing operation of the converted Clyde Terminal nevertheless has some limited to continue the existing threats of predation by feral cats and foxes, reduction in stream water quality, changes to water regimes, and the application of pesticides and herbicides at the Project Area. However the Project would not exacerbate these threats any further than as per the current operational scenario at the Clyde Terminal.

Conclusion

The Project would involve the demolition of redundant refinery infrastructure, including infrastructure that has anecdotally provided historical habitat for bat species which may include Microbats. However the attached Ecological Assessment was unable to locate the presence of individual Microbats within these areas planned for demolition, and anecdotal evidence form Shell staff suggests that bats have not been sighted at the Project Area for some time. In any event the remnant wetlands at the Project Area are considered to provide better quality habitat values for many species, including Microbats, and these wetlands would not be impacted on directly or indirectly from the Project. Measures have been put in place to confirm the presence of Microbats, if any, before redundant refinery infrastructure providing potential roosting habitat is demolished.

Overall the Project is considered highly unlikely to significantly impact on these species.

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