Flora and fauna assessment conducted as part of the Meadowbank Master Plan.

Shepherd's Bay
Meadowbank, NSW

August 2010

lesryk
ENVIRONMENTAL
CONSULTANTS

Cover photographs:

Photo top left: Looking west along Nancarrow Avenue.
Photo bottom left: Existing landscaped foreshore area.
Photo right: Character of the vegetation within the subject site.

Report prepared at the request of:

Robertson and Marks Architects Pty Ltd

by

LesryK Environmental Consultants
PO BOX 3001
BUNDEENA NSW 2230

Telephone: (02) 9523 2016
Mobile: 0408 25 8129
Facsimile: (02) 9544 1835

Email: admin@lesryk.com.au
www.lesryk.com.au

Please note that, given the dynamic nature of the relevant pieces of environmental legislation considered in this report, the authors consider that this report only has a 'shelf life' of six months. If a development application, review of environmental factors or statement of environmental effect is not submitted to a determining authority for consideration within this time frame, it is recommended that this report be reviewed and revised where required in light of any relevant legislative listings or changes.

TABLE OF CONTENTS

List of Figures

List of Tables

Plate 1: Character of Shepherd's Bay during 1943. Note wharf and semi-rural properties.

List of Appendices

Document Control

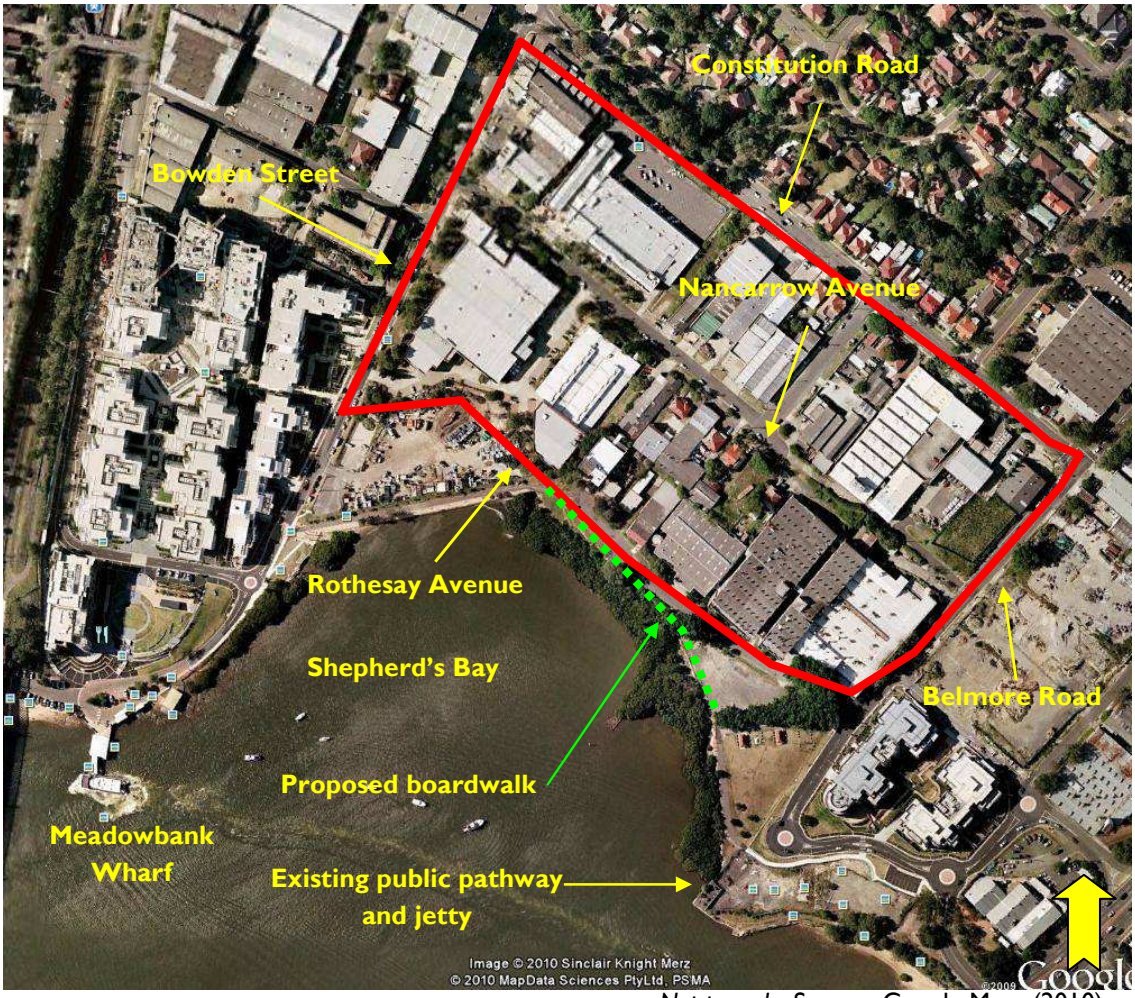
File location: \\LESRYK-03\jenny\ROBERTSON+MARKS ARCHITECTS PTY LTD\0508 Meadowbank Final.doc

Version	Author	Reviewer	Approved For Issue	Date
Draft 1	Deryk Engel (Ecologist/Principal) & Paul Burcher (Botanist)	Deryk Engel	Deryk Engel	5/08/10
Final	Deryk Engel (Ecologist/Principal) & Paul Burcher (Botanist)	Deryk Engel	Deryk Engel	15/10/10

1. Introduction.

At the request of Robertson and Marks Architects Pty Ltd, an ecological assessment has been undertaken at Shepherd's Bay, Meadowbank, NSW (Figure 1). This investigation has been carried out as a Master Plan for the redevelopment of this area from light industrial to residential is being prepared. The area investigated fronts Shepherd's Bay and is bounded by Constitution Road to the north, Belmore Road to the east, Bowden Street to the west, and Rothesay Avenue to the south (Figure 1). The area investigated is dominated by several urban streets and a number of light industrial properties. The area surveyed also includes the northern foreshore of Sheperds Bay, a portion of which is proposed be developed as a boardwalk (Figure 1).

For reference, a photographic record of the area investigated has been provided (Appendix 1).



Not to scale. Source: Google Maps (2010).

Figure 1. Study area and location (redevelopment area bounded by red line).

For the purposes of this investigation:

- Subject site is defined as: the area directly affected by the proposal (as per Department of Environment and Climate Change (DECC) 2007a);
- The proposal is considered to include the redevelopment of the subject site, this including the establishment of residential apartments, open space areas, landscaping works, local roads, services, footpaths, the foreshore boardwalk and infrastructure;

- The study region is considered to include the lands that surround the area surveyed for a distance of ten squared kilometres (km);
- Study area is defined as: the subject site and any additional areas that are likely to be affected by the proposal, either directly or indirectly (as per DECC 2007a);
- A local population of a fauna species comprises those individuals known or likely to occur in the study area, as well as any individuals occurring in adjoining areas (contiguous or otherwise) that are known or likely to utilise habitats in the study area (DECC 2007a);
- "Fish" means marine, estuarine or freshwater fish or other aquatic animal life at any stage of their life history (whether alive or dead) including oysters and other aquatic molluscs, crustaceans, echinoderms, beachworms and other aquatic polychaetes (as per the definitions provided in the *FM Act*);
- Reclamation is defined as the draining, infilling or clearing of land (including a river's bed and/or banks) to make it suitable for use for urban or rural development (NSW Department of Primary Industries [DPI] 2010). This can be the most damaging activity associated with foreshore development, often completely destroying aquatic habitats. Reclamation can reduce the tidal range of an estuary, or the flow of a river, and this may lead to alteration of both water quality and quantity, such as through siltation, and loss of habitat (DPI 2010); and
- Harm in relation to marine vegetation means gather, cut, pull up, destroy, poison, dig up, remove, injure, prevent light from reaching or otherwise harm the marine vegetation, or any part of it (NSW *Fisheries Management Act 1994*).

The assessment of possible impacts associated with the proposed redevelopment of the subject site is based on a field survey of the study area, a literature review of previous studies undertaken in both the region and this portion of the Ryde City Local Government Area (LGA), the consultation of standard databases and the consideration of the objectives of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*), the NSW *Environmental Planning and Assessment Act 1979*, the NSW *National Parks and Wildlife Act 1974* (*NPW Act*), the NSW *Threatened Species Conservation Act 1995* (*TSC Act*), the NSW *Fisheries Management Act 1994 (FM Act)* and any relevant State Environmental Planning Policies (SEPP's).

2. Environmental Setting.

The subject site is located adjacent to the Parramatta River at Meadowbank, this location being within the Ryde City LGA. Current land uses present within the subject site include commercial (office blocks) and light industrial activities (panel beaters, printers etc). Several abandoned factory buildings are also present. The site has experienced a long history of occupation, with the majority of native vegetation being removed. Several landscaped garden beds and roadside verges are present, as are occurrences of weed infestations where site maintenance has not occurred.

Land uses that surround the subject site include new residential apartment blocks to the east and west, the Parramatta River to the south and residential areas to the north.

The foundations of a former jetty/wharf are present within the foreshore portions of the subject site. These foundations have been formed by the placement of sandstone blocks and the depositing of rock fill material. Establishment of the jetty/wharf appears to have altered the localities hydrological regime, with sediments being deposited either side of this structure. At the time of its use/establishment, no mangroves were present near the jetty/wharf, these appearing to have regenerated subsequent to the closure/abandoning of this structure (refer to Plate 1).

Land and Property Management Authority (2010).

Plate 1: Character of Shepherd's Bay during 1943. Note wharf and semi-rural properties.

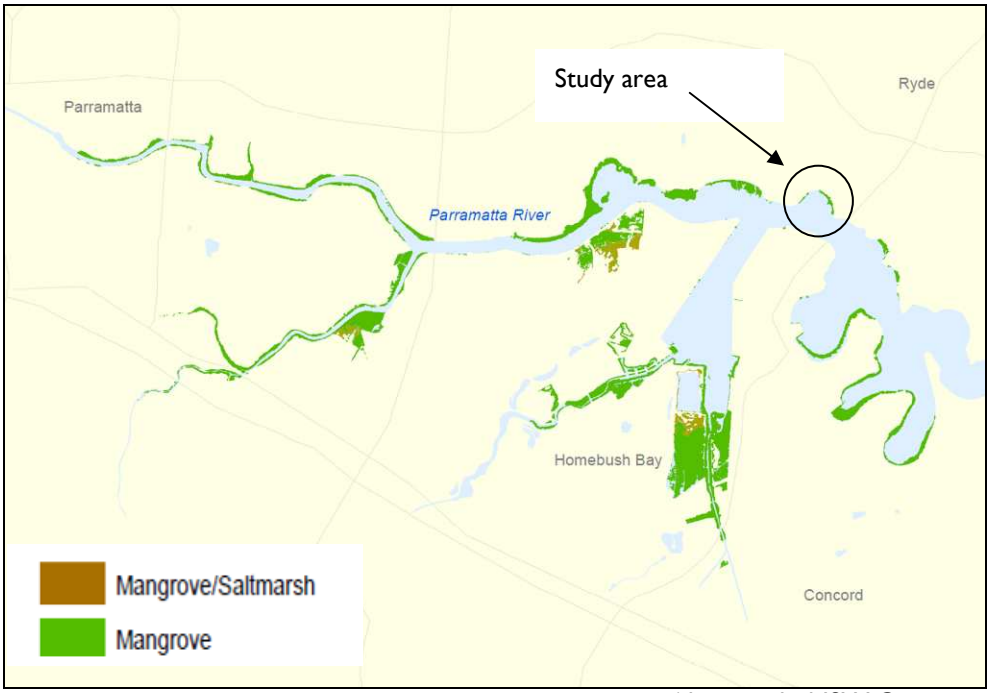
With reference to Plate 1, it appears that all stands of native vegetation, excluding foreshore areas, have been removed from the subject site.

During the field survey evidence of use of this site as an oyster lease was also observed.

Several conservation reserves are found in the vicinity of the subject site, the closest being Bennelong Park to the east. Sydney Olympic Park is located 2.5km south west of the subject site, on the southern banks of the Parramatta River. Nearly half (300 hectares) of the Sydney Olympic Park site provides habitat for listed threatened species, marine vegetation and endangered ecological communities that are all protected under the relevant State and/or Commonwealth legislations (NSW Government 2010a). Components of these areas include the Newington Nature Reserve (this covering an area of 47 hectare (ha)) and the estuarine wetlands of Newington Nature Reserve and Badu Mangroves (which total 100ha). Both of these wetland areas are listed on the Directory of Important Wetlands in Australia (NSW Government 2010a).

A number of mangrove communities line the upper reaches of the Parramatta River (west of Abbotsford), these including the study area (Figure 2). These areas are protected under the NSW *Fisheries Management Act* (*1994*) due to their importance as habitat for fish and sea birds.

Through reference to the listings provided under the *EPBC* and *TSC Acts*, it is noted that no gazetted areas of critical habitat for any flora or fauna species, populations or communities occur within, or in the vicinity of, the study area. Critical habitats are areas of land that are crucial to the survival of particular threatened species, populations and/or ecological communities.



Not to scale. NSW Government (2010b).

Figure 2. Distribution of mangroves along the upper reaches of the Parramatta River.

3. Literature review and field guides.

To identify the diversity of vegetation communities, flora and fauna species known for, or potentially occurring in, the study area, previous ecological studies prepared in the surrounding region, and known databases, were consulted prior to the undertaking of any fieldwork. Relevant studies prepared and databases consulted were:

- A flora and fauna investigation undertaken to assess the establishment of a proposed substation within Bicentennial Park, Homebush Bay (Lesryk Environmental Consultants 2010);
- A flora and fauna study of the Ryde Bushland Reserves (Biosphere Environmental Consultants 2008);
- Vegetation mapping and a description of the bushland present within the Ryde LGA (Oculus 2001);
- Vegetation mapping of the Cumberland Plain (DECC 2007b);
- Ryde City Council's State of the Environment Report (Ryde City Council 2008/09);
- The Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) Protected Matters Search Tool (DSEWPC 2010);
- The Department of Environment, Climate Change and Water's (DECCW) Atlas of NSW Wildlife (DECCW 2010a); and
- The DECCW Threatened Species site (DECCW 2010b).

Other documents, websites and databases referred to are provided within the bibliography section of this report.

When accessing the DSEWPC and DECCW databases the search area criteria specified was a 5km buffer around the project area. The database searches were undertaken on the 12th July 2010.

From the DECCW's Threatened Species site, a list of threatened species, populations and communities was generated by conducting a geographic search using the Pittwater (Part B) sub-region of the Sydney Metro Catchment Management Area (CMA) area as the search parameter. The geographic search tool on DECCW's Threatened Species site also allows sorting of the generated list

by vegetation type (based on Keith 2004). Accordingly, the list generated was further filtered by only selecting those species, populations or communities that had associated Keith vegetation types (as per Keith 2004) (i.e. habitat) indicated as occurring in the study area by DECC (2007b).

Databases and reports were reviewed and drawn upon where relevant. Particular attention was paid to identifying records of species listed (or currently being considered for listing) under the Schedules to the *EPBC*, *TSC* and/or *FM Acts*, animals, plants and vegetation communities that have been recorded within the vicinity of the project area.

Field guides and standard texts used were:

- Harden (1992, 1993, 2000 and 2002) and Fairley and Moore (2000) (used for the identification of plants);
- Cogger (2004) (reptiles and frogs);
- Simpson and Day (2004) (birds);
- Van Dyck and Strahan (2008) (non-flying mammals);
- Churchill (2008) (insectivorous bats); and
- Triggs (1996) (identification of scats, tracks and markings).

The naming of those species recorded or known for the region follows the nomenclature presented in these texts, or as described on the Schedules to the *EPBC*, *TSC* and *FM Acts*.

Stands of vegetation were described by their structural characteristics according to Specht (1981). Where applicable, any endangered ecological communities were classified and named according to the NSW Scientific Committee's Final and Preliminary Determinations (various dates).

The conservation significance of those plants, animals and vegetation communities recorded is made with reference to:

- A publication on Rare or Threatened Australian Plants (ROTAP's) (Briggs and Leigh 1996);
- Ryde City Council's State of the Environment Report (Ryde City Council 2008/09);
- Keith (2004); and
- The *EPBC*, *TSC* and/or *FM Acts*.

4. Results of the literature review.

4.1. Flora.

4.1.1. Vegetation mapping.

On behalf of Ryde City Council, Biosphere Environmental Consultants undertook "base-line" biodiversity surveys in thirty-five of the small reserves and parks present throughout the Ryde LGA during 2006-2008. Anderson Reserve, which occurs between the southern edge of the subject site and the Parramatta River, was not surveyed. The *TSC Act* listed endangered ecological community, Coastal Saltmarsh was found to occur in nearby Settlers Park. This being to the east.

In 2001, Oculus undertook vegetation mapping and prepared descriptions for the bushland present in the Ryde LGA (Oculus 2001). Their mapping was based on aerial photograph interpretation and soil mapping with restricted ground truthing of endangered ecological communities. Their survey indicates the presence of "Estuarine Complex" along that part of the Parramatta River foreshore that adjoins the site and small areas of "Other vegetation" along the western half of Constitution Road and the northern part of Belmore Street.

Vegetation mapping of the Cumberland Plain was updated and finalised in 2007 (DECC 2007b). This mapping indicates that one native vegetation community, Mangrove/Saltmarsh Complex, occurs along the southern foreshore of the study area. The Saltmarsh component of this vegetation type is listed as an endangered ecological community on the *TSC Act* (as "Coastal saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions").

DECC (2007b) also indicates the present of Turpentine-Ironbark Margin Forest and Turpentine-Ironbark Forest within 5km of the subject site. These two vegetation types are components of the *TSC Act*-listed endangered ecological community, "Sydney Turpentine-Ironbark Forest", and the *EPBC Act*-listed critically endangered ecological community, "Turpentine-Ironbark Forest of the Sydney Basin Bioregion". The likelihood of these endangered ecological communities occurring at the subject site is assessed in Appendix 2.

4.1.2 Threatened flora species.

A review of the DECCW and DSEWPC databases (Appendix 2) indicated that 21 state and/or nationally listed threatened plant species have been previously recorded within a 5km radius of the subject site or are interpreted by the parameters in these databases to have suitable habitat available in the local area.

4.2. Fauna.

4.2.1. Terrestrial animals.

A review of the DSEWPC and DECCW databases, and those ecological studies previously prepared in this locality, indicates that 50 state and/or nationally listed threatened terrestrial animals (including several that are currently being considered for listing under the *EPBC Act* [Nominations] and / or *TSC Act* [including Preliminary Determinations]) have been previously recorded within a 5km radius of the subject site (Appendix 3). A further 22 threatened terrestrial animals are listed for the Pittwater (Part B) sub-region of the Sydney Metro CMA on the DECCW database, this area encompassing both the study area and a significant portion of the Sydney Metropolitan area.

Based on a consideration of the habitat needs of these threatened species (as provided in standard texts – refer to bibliography for those used), combined with the identification of those habitats present within the study area, there is the possibility that several of the birds and flying mammals could occur within, or in the vicinity of, the subject site (these being listed in Appendix 2). As such, during the course of the field investigations, targeted surveys for these terrestrial animals, or their necessary habitats, were undertaken.

It is acknowledged that several threatened frogs and salt water turtles have been recorded within the study region (e.g. Green and Golden Bell Frog (*Litoria aurea)* at Homebush Bay and Loggerhead Turtle (*Caretta caretta)* in Sydney Harbour (DECCW2010a, Australian Museum Business Services [AMBS] 2010)). Although these species have been recorded within the study region it is noted that no areas of their necessary habitats are present within the subject site. Therefore, within the project area no resident populations of any of these previously recorded threatened frogs or reptiles would occur. As such no further consideration into the impacts of the development on these groups of animals is considered necessary.

Similarly, given the level of development experienced by the study area, and the distinct lack of any significant stands of vegetation, no resident populations of any ground dwelling threatened or protected native mammals (e.g. the Long-nosed Bandicoot *Perameles nasuta*) would be present. As no locally viable populations of these animals would be present, it is not considered that the development of the subject site would have an adverse impact on these species, their populations or habitats.

4.2.2. Aquatic animals.

Over 550 species of fish are known to occupy those habitats present within Sydney Harbour or occasionally enter this area (Australian Museum 2010). Of these species:

- the Grey Nurse Shark (*Carcharias taurus*), is listed as a critically endangered species under both the *EPBC Act* and Schedule 4a of the *FM Act*; and

- the Black Rockcod (*Epinephelus daemelii*), is listed as vulnerable under Schedule 5 of the *FM Act*.

The Grey Nurse Shark tends to live in shallow inshore waters (Department of the Environment, Water, Heritage and the Arts 2007). This species prefers habitats that have sandy-bottomed gutters or rocky caves and are close to inshore rocky reefs or islands (Pollard 2008). This shark is primarily active at night, feeding upon fish, smaller sharks, rays, squid and crustaceans (Department of the Environment, Water, Heritage and the Arts 2007, Pollard 2008).

The Black Rockcod is found along the east coast of Australia from Queensland through to eastern Victoria (Pogonoski 2008). Throughout this area it can be found occupying those rocky reefs, reef caves, gutters and bommies that are present near shore and at depths of at least 50 metres (m) (Pogonoski 2008). The Black Rockcod is an opportunistic carnivore that preys on fishes and crustaceans and is generally found within/on coastal reefs, estuaries and deeper offshore waters. This species actively defends its territory and may occupy a particular cave for life (Pogonoski 2008). Like many groupers, the Black Rockcod is protogynous hermaphrodites (Pogonoski 2008).

Within the foreshore portions of the project area, the necessary habitats for both the Grey Nurse Shark and Black Rockcod were not observed. As such, neither of these fish would be present as a resident population within or near the subject site. Given the proximity of the Parramatta River to the project area, there is the potential for individual Grey Nurse Sharks and Black Rockcods, like all fish, to occur on occasion. Whilst this is the case, the proposal is not considered to adversely affect any major aquatic habitats such that any fish populations would be adversely affected.

As neither of these fish are expected to occur or be affected by the redevelopment of the subject site, it is not considered that any further consideration into the likely impacts of the works on these aquatic animals is required.

4.3. Priorities action statement, recovery and threat abatement plans.

Of those threatened species previously recorded in the surrounding region, DECCW (2010c) has prepared, or is in the process of preparing, recovery plans for:

- *Pimelea spicata;*
- *Acacia pubescens*; and
- The Green and Golden Bell Frog (*Litoria aurea*).

Similarly, the Australian Government has adopted these plans, or is in the process of preparing recovery plans for:

- *Pimelea spicata*;
- *Acacia pubescens*;
- The Grey-headed Flying-fox (*Pteropus poliocephalus*); and
- Green and Golden Bell Frog.

As part of these recovery plans certain objectives have been established. Given the high level of disturbance exhibited by the subject site, and the minimal extent, and type, of habitat to be modified, it is considered that the further development of the subject site would not breach any of these objectives such that there would be a significant impact on these species or their necessary habitats.

For all listed threatened species with no recovery plan prepared, DECCW has prepared a Priorities Action Statement to promote the recovery of threatened species and the abatement of key threatening processes in NSW (DECCW 2010d). The Priorities Action Statement identifies 25 broad recovery strategies, none of which would be relevant to the current proposal. Therefore, no further action in regards to this matter is considered necessary.

5. Field survey methods.

A survey of the study area was undertaken by Deryk Engel $_{(B.Env.Sc.HONS)}$ and Paul Burcher $_{(B.App.\ Sc)}$ on the 5 July 2010. The weather conditions experienced during this investigation were overcast skies (approximately 90% cloud cover), cold temperatures (around 10.0˚C) and winds from the west.

The survey methods employed during the field investigation were:

- The direct observation of any fauna species present within, or adjacent to, the subject site;
- The identification of all plants within the area of likely disturbance, including both direct and indirect impacts;
- The identification of the structure of those vegetation communities and fauna habitats present;
- The identification of indirect evidence, such as tracks, scats, diggings and scratchings; and
- Targeted searches for those species of state and/or national conservation concern, or their likely habitat areas, that were identified during the literature review stage of the project.

The purpose of the field investigations was to locate within the area surveyed any plants, animals or vegetation communities that are of state and/or national conservation significance. When conducting the field investigations, the 'Random Meander Method' (as per Cropper 1993), or an adaptation of this, was employed. This method is suitable for covering large areas and for locating any rare species (and their associated vegetation communities/habitat types) that may occur within a project site. The method involves walking randomly across a particular survey area whilst sampling all of the various habitat types and vegetation communities present until no new species have been recorded for at least thirty minutes.

Whilst conducting the fauna survey, efforts were made to document the diversity, structure and value of those habitats present within the areas surveyed for those protected, as defined under the *NPW Act*, and threatened, species potentially occurring. This involved assessing the structure of the flora and fauna habitats present and determining their significance for native species, particularly any that are of national and/or state conservation concern. Whilst conducting the habitat assessments, efforts were made to identify features such as mature trees with hollows, connectivity of fauna corridors, aquatic environments and other habitat features important to the life cycle needs of those threatened species known or likely to occur in the study region.

Stands of vegetation were described by their structural characteristics according to Specht (1981), and mapping and community names by Benson and Howell (1994). Where applicable, endangered ecological communities were classified and named according to the NSW Scientific Committee's Final and Preliminary Determinations (various dates).

Given the high level of habitat modification and clearing exhibited by the subject site, combined with the observations made during the field survey, it was not considered necessary to undertake any nocturnal work. The level of survey effort employed was considered satisfactory given the condition of the subject site, its development and occupation history and the lack of any resources important to the local occurrence of any resident populations of native plants or animals.

No limitations to the outcomes of the site investigations were encountered, including adverse seasonal or climatic conditions. Access to all parts of the study area was possible, thereby ensuring that all portions of the site and their adjacent environments were sampled.

By the completion of the field investigation, approximately five (5) person-hours of active searches had been accumulated – active searches being defined as the time spent actively searching for observations/evidence of fauna and flora species. Given the size of the subject site, and its highly degraded condition, this length of time is considered more than adequate when endeavouring to determine the diversity of native species present, their associated habitats, and the conservations status of both of these.

6. Vegetation and habitat description.

Two habitat types that would be utilised by native species were observed within the study area, these being:

- A riparian environment; and
- A modified environment.

For reference descriptions of each of these are provided, it being recommended that these be read in conjunction with a review of the photographic record provided.

6.1. Riparian environment

The riparian environment supports a stand of Grey Mangrove (*Avicennia marina*), these plants forming a low closed forest that is around 8m in height. The stand occurs as a band of vegetation that is around 6m to 8m wide and 290m long. The tree canopy of this stand is relatively continuous, though a 1m to 2m wide gap was evident, this being created by members of the public wishing to access the water front. Within the ground cover layer, few mangrove seedlings are present, which is possibly as a result of wave action from large vessels such as the River Cat disrupting their establishment. As a result of the mangrove's urban location, and their ensnaring nature, accumulations of urban refuse and tidal borne debris are common.

The riparian environment is tidally influenced, the former jetty/wharf mentioned previously being exposed at low tide.

Two "small" areas of mud flats occur either side of the former jetty/wharf, these being exposed at low tide. The mudflats have the potential to be utilised by several of the estuarine migratory birds previously recorded in the surrounding region. As the field investigation was undertaken at a time when these birds would be over-wintering in the northern hemisphere, a precautionary approach as to their occurrence has been adopted. Therefore, the impacts of the proposal on the occurrence of these birds have been assessed using the criteria provided within the *EPBC Act's* Significant Impact Guidelines for a migratory species (refer to Sections 8.1.2.[a]). In regards to the presence of these species, given the limited size of the mudflats and the lack of any sand bars/other roosting areas, if present the subject site would only be used as a foraging area by migratory birds, not as a roosting/sheltering environment. Given the habitats present at Homebush Bay, this area is more likely to be the environment used by roosting/sheltering migratory birds.

Upslope, north of the band of mangroves, a rank grassland is present. Within this grassland, Native Reed (*Phragmites australis*) and several exotic species such as Kikuyu (*Pennisetum clandestinum*), Fennel (*Foeniculum vulgare*), Crofton Weed (*Ageratina adenophora*) and *Atriplex prostrata* are present, as is one native tree, a Rough-barked Apple (*Angophora floribunda*). This tree is around 10m in height and is not hollow bearing.

Landscaped parklands that support exotic species and maintained lawns also occur north of the band of mangroves. These parklands include barbeque facilities, toilet blocks and children's play equipment.

The construction of a boardwalk is proposed to be included as part of the site's redevelopment. The boardwalk is proposed to follow the site's foreshore alignment and is expected to link in with similar structures that currently exist to the east and west. Within the subject site, given the general lack of any native vegetation along the alignment of the proposed boardwalk, it is not considered that any native species would require clearing, trimming or disturbance particularly any of those mangrove plants present.

The construction of the boardwalk is not considered to result in either the "harming of marine vegetation" or the undertaking of any "reclamation works". As such application for a Part 7 *Fisheries Management Act* permit would not be required.

The provision of the boardwalk would provide opportunities for the rehabilitation and protection of those mangrove present. Associated with the construction of this structure would be the possibility of restricting members of the public accessing portions of this community through the erection of fencing and the establishment of desire lines. Restricting access to the foreshore areas by members of the public and their domestic pets would benefit those native species, particularly the migratory birds that may utilise this site.

6.2. Modified environment

The majority of the subject site is a built environment which supports some limited roadside vegetation including planted native and exotic trees and shrubs and maintained grass verges. Tree species include Tallowwood (*Eucalyptus microcorys*), Narrow-leaved Black Peppermint (*E.nicholli*), Pepper Tree (*Schinus areira*), Swamp Oak (*Casuarina glauca*), Brush Box (*Lophostemon confertus*), Lemon-scented Gum (*Corymbia citriodora*), Camphor Laurel (*Cinnamomum camphora*), Jacaranda (*Jacaranda mimosiifolia*), Paperbark (*Melaleuca quenquinervia*), Hill's Fig (*Ficus hilli*) and Cocos Palm (*Arecastrum romanzoffianum*). Planted shrub species include Bottlebrushes (*Callistemon spp*) and Oleander (*Oleander neriifolia*). These trees and shrubs present are of varying ages, depending on their time since planting. Few of the plants present are expected to be older than around 50 years of age.

In unmaintained areas there is rank growth of weeds such as Lantana (*Lantana camara*), Large-leaf Privet (*Ligustrum lucidum*), Scotch Broom (*Cytisus scoparius*) and Blackberry (*Rubus ulmifolius*), all of which are declared noxious weeds in the Ryde LGA under the *Noxious Weeds Act 1993*, as is Camphor Laurel.

It is noted that none of those trees present contain any hollows suitable for the life cycle needs of any hollow-dependant native animals. Further, there is little to no understorey vegetation present throughout the site.

The habitats recorded within the limits of the redevelopment area are not considered to be of any particular importance for any of the threatened plants or other animals known to occur within the study region.

7. Species recorded.

7.1. Flora.

A number of flora species were recorded at the subject site. These are detailed in Section 6.1 and 6.2. Most of the species recorded are either planted or self-introduced exotic species (weeds). The only threatened flora species recorded was Narrow-leaved Black Peppermint (*Eucalyptus nichollii*), which is commonly planted as a street and garden tree in Sydney. Although this species is listed as vulnerable on both the *TSC* and *EPBC Act,* is not considered to be of conservation significance at the subject site.

7.2. Fauna.

As would be expected for a highly disturbed, significantly modified urban area, few native species were recorded. Those species that were observed, along with their detection method, are presented in Table 1.

Table 1. Fauna species recorded within, or in close proximity to, the study area.

- indicates a species that is listed under the *EPBC* and *TSC Acts*.
* - introduced species.

Common Name	Family and Scientific Name	Detection Method
MAMMALS		
	Phalangeridae	
Common Brushtail Possum	*Trichosurus vulpecula*	Characteristic scratching observed on a smooth barked tree
	Pteropodidae	
# Grey-headed Flying-fox	*Pteropus poliocephalus*	Electrocuted individual observed
BIRDS		
	Anhingidae	
Darter	*Anhinga melanogaster*	Observed
Pied Cormorant	*Phalacrocorax varius*	Observed
	Threskiornidae	
Australian White Ibis	*Threskiornis molluca*	Observed
	Laridae	
Silver Gull	*Larus novaehollandiae*	Observed
	Columbidae	
* Spotted Turtle-dove	*Streptopelia chinensis*	Observed/ Heard
* Rock Dove	*Columba livia*	
	Psittacidae	
Rainbow Lorikeet	*Trichoglossus haematodus*	Observed/ Heard
	Maluridae	
Superb Fairy-wren	*Malurus cyaneus*	Observed/ Heard
	Meliphagidae	
Red Wattlebird	*Anthochaera carunculata*	Observed/ Heard
Noisy Miner	*Manorina melanocephala*	Observed/ Heard
	Dicruridae	
Willie Wagtail	*Rhipidura leucophrys*	Observed/ Heard
Magpie Lark	*Grallina cyanoleuca*	Observed/ Heard
	Artamidae	
Australian Magpie	*Gymnorhina tibicen*	Observed/ Heard
	Corvidae	
Australian Raven	*Corvus coronoides*	Observed/ Heard
	Hirundinidae	
Welcome Swallow	*Hirundo neoxena*	Observed
	Pycnonotidae	
* Red-whiskered Bulbul	*Pycnonotus jocosus*	Observed
	Sturnidae	
* Common Starling	*Sturnus vulgaris*	Observed
* Common Myna	*Acridotheres tristis*	Observed/ Heard

Those native animals recorded are all considered to be urban tolerant species birds, mammals and birds that would be regularly observed in the surrounding residential and urban areas. Excluding the Grey-headed Flying-fox (*Pteropus poliocephalus*), which is listed as threatened under both the *EPBC* and *TSC Acts*, all of the species recorded are protected, as defined under the NSW *National Parks and Wildlife Act 1974*, but considered to be common to abundant throughout their distribution ranges. The animals recorded, including the Grey-headed Flying-fox, would not be reliant upon the habitats present within the subject site such that the removal or further disturbance of these would threaten the occurrence of these species. The species recorded are all expected to be present within both the study area and surrounding region post-development. Due to their ability to adapt to, and be tolerant of, urban environments, none of the native species recorded would be adversely affected, such that the viability of a local population of that animal would be placed at risk of extinction. The proposal would not present a barrier to the dispersal patterns of any of the native species recorded, nor would it isolate any of their proximate areas of necessary habitat(s).

7.2.1. Grey-headed Flying-fox.

During the field investigation an electrocuted Grey-headed Flying-fox was observed, this individuals being seen near the intersection of Constitution Road and Belmore Street. At this location a number of trees line Belmore Street, and it is likely that this animals was foraging within these. The individual observed is expected to have originated from the Sydney Botanic Gardens Flying-fox colony, this colony supporting between 5000 and 20000 Grey-headed Flying-foxes (LesryK Environmental Consultants 2008). The Sydney Botanic Garden's Flying-fox colony is located approximately 13km east (down river) of the subject site.

The Grey-headed Flying-fox utilises aural and visual signals, having good eyesight and vocal communications. This mega-bat is a canopy-feeding frugivore, blossom-eater and nectarivore of rainforests, open forests, woodlands, Melaleuca swamps and Banksia woodlands. This species has an important ecosystem function in these habitats through seed dispersal and pollination of many indigenous tree species (NSW Scientific Committee 2010). The Grey-headed Flying-fox also feeds on introduced trees including commercial fruit crops.

The Grey-headed Flying-fox roosts and breeds communally with "camps" containing from 500 to 20,000 individuals (Churchill 2008). The camps are usually located in the branches of large trees in forests, thick scrub, swamps or mangroves. The selection criteria of particular areas as roosting and breeding sites by Flying-foxes has not yet been identified but may include issues such as protection from strong winds, seclusion, occurrence of a particular topographical feature which assists in navigation, proximity to food sources and/or access to up-draughts for flight (Eby 1995). Individuals generally exhibit a high fidelity to traditional camps and return annually to give birth, and rear offspring. Foraging occurs opportunistically, often at distances of up to 30km from camps, and occasionally up to 60km to 70km per night, in response to patchy food resources (NSW Scientific Committee 2010).

The Grey-headed Flying-fox is threatened through the clearing or modification of native vegetation (including both potential camp habitats and foraging resources), uncontrolled culling using destructive methods such as shooting and electrocution, by direct harassment via shooting at roosts and the destruction of camps (NSW Scientific Committee 2010).

Within the study area no active Grey-headed Flying-fox colonies were observed. As mentioned, it is expected that the individual recorded was an animal that had been foraging within those trees that line Belmore Street. The development of the subject site would not significantly remove any foraging resources such that the local viability of this species would be affected. The landscaping of the subject site post-development with native species would ensure that foraging opportunities would be provided such that the overall long-term presence of the Grey-headed Flying-fox would not be affected.

The development of the subject site would not remove or have an effect on any Grey-headed Flying-fox colonies, nor would it significantly affect the extent or amount of foraging resources available.

Whilst no threats to the presence of this species are considered to arise, to further consider the potential for the proposed redevelopment of the subject site to have an adverse impact on the Grey-headed Flying-fox, an assessment using the criteria provided within both the *EPBC Act's* Significant Impact Guidelines and Section 5A of the *Environmental Planning and Assessment Act 1979* has been undertaken (refer to Sections 8.1.2. and 8.2.2. respectively).

8. Ecological assessments.

8.1. Commonwealth - *Environment Protection and Biodiversity Conservation Act 1999*.

8.1.1. Flora

By the completion of the field investigation one flora species listed on this Act was recorded at the subject site, this being Narrow-leaved Black Peppermint (*Eucalyptus nicholllii*). Although this species is listed as vulnerable on this Act, it is commonly planted in urban areas well outside its range[1], particularly in Sydney. As such, it is considered that the local occurrence of the species is not of conservation significance and any impacts upon the species would be trivial and not require approval from the Federal Minister for Sustainability, Environment, Water, Population and Communities.

No ecological communities listed under the Schedules to this Act were recorded within, or in the vicinity of, the subject site. As such, the proposed development of the subject site would not have a detrimental impact on any ecological communities or flora species of national conservation significance.

Therefore, referral to the Federal Minister for Sustainability, Environment, Water, Population and Communities in relation to a botanical matter is not required.

8.1.2. Fauna.

By the completion of the field investigations, one species listed as Vulnerable under the *EPBC Act*, the Grey-headed Flying-fox, had been recorded within the study area. In addition, though not recorded, foraging habitat for several of the migratory birds listed under the *EPBC Act* that have been previously recorded in this locality was observed along the foreshore area. Though the local viability of these species is not considered to be affected by the redevelopment of the subject site, consideration has been given to the assessment criteria provided within the *EPBC Act* Significant Impact Guidelines.

"Land clearance" has been listed as a Key Threatening Process under the *EPBC Act*. This Key Threatening Process applies to both threatened and non-threatened native species. Whilst the scope of works proposed would result in the clearing of some native plants, the impact of this is not considered to:

- cause a native species or an ecological community to become eligible for listing in any category, other than conservation dependant;
- cause a listed threatened species or a listed threatened ecological community to become eligible to be listed in another category representing a higher degree of endangerment; and
- adversely affect 2 or more listed threatened species (other than conservation dependant) or 2 or more listed threatened ecological communities.

[1] This being the Northern Tablelands of northern NSW.

8.1.2. (a) *EPBC* Assessment on migratory birds.

With reference to the *EPBC Act* Significant Impact Guidelines that are relevant to a migratory species, an action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- *substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;*

An area of 'important habitat' for a migratory species is:

a. habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or
b. habitat that is of critical importance to the species at particular life-cycle stages, and/or
c. habitat utilised by a migratory species which is at the limit of the species range, and/or
d. habitat within an area where the species is declining.

The foreshore portions of the subject site are not considered to constitute important habitat for any of those migratory birds which occupy mud flats and have been previously recorded in this locality. Nonetheless, as neither of the mud flat areas would be disturbed, the redevelopment of the subject site is not considered to limit the overall extent of foraging opportunities currently available to those migratory waders that may be recorded at this location.

Construction of the boardwalk and the restriction of access to the foreshore areas by members of the public would increase the value of those mud flats present.

- *result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species;*

The redevelopment of the subject site would not result in the establishment of any invasive species that are harmful to the presence of those migratory birds that have been previously recorded in this locality. Rehabilitation and management of the rank grassland that is present along the foreshore area would remove an exotic species from the subject site.

- *seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.*

The proposal would not seriously disrupt the lifecycle of any of those migratory birds that occupy mud flats such that their lifecycles would be affected. The works would not require the removal or disturbance of any areas of mud flat that are exposed during periods of low tide. The works would not result in the removal of disturbance of any of those mangroves present.

8.1.2. (b) Conclusion.

The proposal is not considered to have a significant impact on any of those migratory birds that occupy mud flats. Therefore, it is considered unnecessary that the matter be referred to the Federal Minister for Sustainability, Environment, Water, Population and Communities for further consideration or approval.

8.1.2. (c) *EPBC* Assessment on the Grey-headed Flying-fox.

With reference to the *EPBC Act* Significant Impact Guidelines that are relevant to a vulnerable species, an action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- *lead to a long-term decrease in the size of an important population of a species;*

The proposed redevelopment of the subject site would not decrease the size of an important population of this species in either the short or long term. The works may result in the removal of a small percentage of foraging habitat available to the Grey-headed Flying-fox (i.e. those road side plants present), though the impact of this is not considered to be significant. The inclusion of suitable native plants that produce fruits and nectar within the development landscaping works would ensure that foraging opportunities remain within the study area for this species.

- *reduce the area of occupancy of an important population;*

The proposal would not reduce the area of occupancy available to an important population of this species.

- *fragment an existing important population into two or more populations;*

The Grey-headed Flying-fox's ability to fly and negotiate open spaces and urban infrastructure would ensure that the proposal does not fragment an existing population into two or more populations.

- *adversely affect habitat critical to the survival of a species*;

No habitat critical to the survival of this species was recorded within the study area.

- *disrupt the breeding cycle of an important population*;

No active or historic Flying-fox colonies were observed within the study area. The undertaking of the proposal would not disturb the breeding cycle of this species.

- *modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*;

This species is not considered to be reliant upon the foraging resources offered by the subject site such that the modification, clearing, removal or reduction of these areas would cause the Grey-headed Flying-fox to decline.

- *result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat*;

Invasive species are already present within the study area. The works are not considered to exacerbate this situation such that the foraging resources offered by the study area are reduced.

- *introduce disease that may cause the species to decline*;

The proposal is unlikely to introduce diseases that may cause the Grey-headed Flying-fox to decline.

- *or interfere substantially with the recovery of the species.*

Given the scope and extent of the proposed action and the fact that there are no known Grey-headed Flying-fox populations in the study area, it is considered that the proposed action would not interfere with the recovery of this megachiropteran.

8.1.2. (d) Conclusion.

As the proposal is not considered to have a significant impact on the Grey-headed Flying-fox, it is not considered necessary that the matter be referred to the Federal Minister for Sustainability, Environment, Water, Population and Communities.

8.2. State - *Environmental Planning and Assessment Act 1979.*

8.2.1. Flora.

By the completion of the field investigation one flora species listed on this Act was recorded at the subject site, this beings Narrow-leaved Black Peppermint (*Eucalyptus nichollii*). Although this species is listed as vulnerable on this Act, it is commonly planted in urban areas well outside its range, particularly in Sydney. As such, it is considered that the local occurrence of the species is not of conservation significance and it is superfluous to conduct an assessment of significance drawing on the criteria listed under Section 5A of the *Environmental Planning and Assessment Act 1979*.

The vegetation at the site does not conform to any endangered ecological communities listed on this Act, nor were any endangered plant populations listed on this Act detected.

8.2.2. Fauna.

An assessment using the criteria provided under Section 5A of the *Environmental Planning and Assessment Act 1979* has been undertaken to determine whether the redevelopment of the subject site would have an adverse impact on the Grey-headed Flying-fox. The Section 5A assessment criteria are used to determine "whether there is likely to be a significant effect on this species, its population, ecological community or habitat", and consequently whether a Species Impact Statement is required.

8.2.2. (a) Grey-headed Flying-fox.

(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 proposal would require the removal/disturbance of several stands of roadside and landscape plantings. Though Grey-headed Flying-fox's may forage within these trees on occasion, the loss/disturbance of this vegetation is not considered to effect the life cycle of this megachiropteran such that the viability of its local population is placed at risk of extinction. Adjacent areas would be retained and these would provide foraging opportunities for this species. The loss of the existing plants is also expected to be offset through the planting of similar, locally endemic species.

(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…",*

An endangered population is defined under the *TSC Act* as 'a population specified in Part 2 of Schedule 1'. At the present time, there are no endangered populations of this species listed under the *Act.* As such, the proposal would not be significantly compromising an endangered population.

(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 to a threatened species.

(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

The proposal would require the removal/disturbance of several stands of roadside and landscape plantings.

(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

The Grey-headed Flying-fox can easily negotiate open areas, urban environments and infrastructure. The proposal would therefore not have an impact on this species' foraging or movement patterns.

(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…"

The vegetation present within the study area is not considered to be important for the long-term survival of the Grey-headed Flying-fox. Whilst habitat available to the foraging needs of this species would be removed the works are not considered to limit the extent of this resource. Similarly, the works are not considered to limit the sheltering or breeding opportunities available to this species in this locality.

(e) *"…whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)…"*

No critical habitat will be adversely affected by the proposed development. The study area is not listed as critical habitat under Part 3 Division 1 of the *TSC Act.*

(f) *"… whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan…",*

To date, there is no recovery plan or threat abatement plan prepared for the Grey-headed Flying-fox. The DECCW has identified 10 Priority Actions to help the recovery of this species (DECCW 2010e), none of which are the responsibility of the proponent.

(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…".*

Currently 31 Key Threatening Processes for mainland NSW are listed under Schedule 3 of the *TSC Act.* Of these, "clearing of native vegetation" would be applicable to the current proposal. Whilst some planted native species would be cleared, the loss of these plants would not have a significant effect on this species or its foraging requirements.

8.2.2. (b) Expected impact on Grey-headed Flying-fox

Habitat potentially available for the foraging needs of the Grey-headed Flying-fox occurs within the study area. No known roosting/breeding camps are present within, or near, the proposed redevelopment area. The undertaking of the scope of works would result in the removal/disturbance of several stands of roadside and landscape plantings, however when compared to the amount of similar vegetation present adjacent to, and surrounding the subject site, this is not considered to constitute a significant loss. Therefore, the redevelopment of the subject site is not considered to have a significant impact on the local status of the Grey-headed Flying-fox.

Therefore, the preparation of a Species Impact Statement that further considers the impacts of the proposal on this species is not required.

8.3. State - *Fisheries Management Act 1994*.

None of the threatened fish previously recorded within, or occasionally occupying, Sydney Harbour are considered to utilise those aquatic environments recorded within, or adjacent to, the subject site. As such, no threatened fish are considered to occur. Therefore, it is considered that the proposal would not have a significant impact on any threatened fish or their habitats. As no threatened fish are likely to be significantly affected by the redevelopment of the subject site, the preparation of a Species Impact Statement is not required.

The mangroves present within the study area are protected under Part 7 Division 4 - "Protection of mangroves and certain other marine vegetation" of the *FM Act*.

Mangroves and seagrasses are important fish nursery grounds, and sources of food and shelter for fish and other aquatic organisms (NSW Government 1995). Under Section 205 of the *FM Act*, the Minister's consent is required for any cutting, removal, damage or destruction of mangroves, seagrasses or any other prescribed marine vegetation on:

a. Crown land, or
b. land vested in a public authority (or trustees for public recreation or for any other public purpose), or
c. an aquaculture lease, or
d. the foreshore of any such land or lease.

The construction of the boardwalk would not require either the "harming of marine vegetation" or the undertaking of "reclamation works". As such, approval from the Minister to permit the construction of the boardwalk would not be required.

As an aside, though the "Degradation of native riparian vegetation along NSW water courses" has been listed as a Key Threatening Process (KTP) under Schedule 6 of the *FM Act* it is noted that estuarine and marine waters are excluded from the definition for this KTP.

9. Conclusions.

By the completion of the field surveys, two species listed under the *EPBC* and *TSC Acts* had been recorded within the project area, these being:

- Narrow-leaved Black Peppermint (*Eucalyptus nichollii*); and
- the Grey-headed Flying-fox (*Pteropus poliocephalus*).

In addition, though not recorded, habitat for several estuarine associated migratory birds listed under the *EPBC Act* was observed within, and adjacent to, the foreshore sections of the area investigated.

Within the proposed redevelopment area, no state or nationally listed endangered ecological communities were recorded. Similarly, no resident populations of any threatened fauna, or any major occurrences of their necessary habitats, were detected.

Although Narrow-leaved Black Peppermint species is listed as vulnerable on both the *EPBC* and *TSC Acts*, it is commonly planted in urban areas well outside its range. As such, it is considered that the local occurrence of the species is not of conservation significance and any impacts upon the species would be trivial. Referral of the matter to the Federal Minister for Sustainability, Environment, Water, Population and Communities for further consideration is therefore not required. Similarly, the preparation of a Species Impact Statement to further consider the impacts of the proposal on this species, its community or habitat is not required.

With reference to the assessment criteria provided under the *EPBC Act* Significant Impact Guidelines, it was considered that neither the Grey-headed Flying-fox nor any of the estuarine associated migratory birds that could potentially occur would be adversely affected by the redevelopment of the project site. Similarly, with reference to the criteria provided under Section 5A of the *Environmental*

Planning and Assessment Act 1979, it was not considered that the presence of the Grey-headed Flying-fox would be adversely affected. The redevelopment of the project sire is not considered to have a significant effect on any threatened species, populations, ecological communities or their habitats. As such, referral of the matter to the Federal Minister for Sustainability, Environment, Water, Population and Communities or the preparation of a Species Impact Statement is not required.

Based on the results of the flora and fauna surveys, and the review of known literature and database sources, it is not considered that there are any ecological constraints to the redevelopment of the landward portions of the subject site proceeding as planned. The development of this area, which is highly disturbed and modified due to its land use history, would not significantly affect any populations of any native plants or animals such that they are placed at risk of extinction. Similarly the development of the site would not remove, isolate, fragment or significantly affect any habitats of local, regional, state or national conservation concern.

No fish listed under the *EPBC* or *FM Acts* are considered to occur as resident populations within, or near, the foreshore portions of the study area. The redevelopment of the site would not affect or have a significant impact on any fishes, their populations, communities or habitats.

10. Recommendations.

Based on the principles of Ecologically Sustainable Development, as identified in Schedule 2 of the Environmental Planning and Assessment Regulation, the following recommendations are provided:

- The construction of the boardwalk should be carried out during the winter months, when migratory birds have left the area.

- The design of the boardwalk should be such that it restricts access to those mangrove stands that front the subject site.

- Stormwater runoff from the redevelopment site should be filtered prior to its discharge into Shepherds Bay.

- To filter any stormwater runoff, this should be directed into a landscaped pond/water feature that is vegetated by native aquatic plants.

- Garden beds, road verges, foot paths and landscaped areas should include a suite of native plants. Plants should be locally occurring species, particularly those shrubs and trees that are pollen, nectar and fruit bearing.

- Infestation of those noxious weeds recorded, these including Lantana, Large-leaf Privet, Scotch Broom, Blackberry and Camphor Laurel should be treated. The control of these weeds should be subject to any biological control or other control program directed by the Local Control Authority (i.e. Ryde City Council).

- A vegetation management plan should be developed. This plan should include features such as the treatment of those exotic plants that occur up slope of the mangrove area, the removal of urban debris from the mangrove area, the restriction of access to the mangrove area by members of the public, inclusion of suitable fencing that restricts domestic pets accessing the mangrove areas and the regeneration of those portions of the mangroves that have been disturbed/cleared by members of the public.

- Public footpaths that are located upslope of the mangrove area should not result in the disturbance or clearing of any component of this community. An alignment should be selected that negates the removal of both mangroves and the Rough-barked Apple.

11. Bibliography.

AMBS (2002) *Monitoring the Green and Golden Bell Frog at Homebush Bay June 2000-May 2001*. Report to NSW NPWS by the Sydney Olympic Park Authority.

Australian Museum (2010) *Fishes of Sydney Harbour*. http://australianmuseum.net.au/Fishes-of-Sydney-Harbour [Accessed August 2010].

Benson, D. and Howell, J. (1994) The natural vegetation of the Sydney 1:100,000 map sheet. *Cunninghamia* 3(4).

Biosphere Environmental Consultants (2008) *Ryde Flora and Fauna Study - Ryde Bushland Reserves*. Report prepared by Biosphere Environmental Consultants on behalf of Ryde City Council http://www.ryde.nsw.gov.au/WEB/SITE/RESOURCES/DOCUMENTS/PDF/Environment/Ryde_Flora_Fauna_Study_2008.pdf [Accessed July 2010]

Briggs, J. and Leigh, J. (1996) *Rare or Threatened Australian Plants.* CSIRO Publishing, Collingwood, Victoria.

Chafer, C., Brandis, C. and Wright, D. (1999) *A handbook of birds found in the Illawarra, Shoalhaven and adjacent tablelands.* Illawarra Bird Observers Club, Wollongong.

Churchill, S. (2008) *Australian bats*. Reed - New Holland, Frenches Forest, NSW.

Cogger, H. (2004) *Reptiles and amphibians of Australia*. Reed Books, Chatswood, NSW.

Cropper, S. (1993) *Management of Endangered Plants*. CSIRO, Melbourne, Victoria.

Department of Environment and Climate Change (2007a) *Threatened species assessment guidelines: The assessment of significance.* Department of Environment and Climate Change, Hurstville, NSW.

Department of the Environment and Climate Change (2007b) *Change in the distribution of Cumberland Plain Woodland 2007. Department of Environment and Climate Change, Hurstville.* Accessed via http://maps.environment.nsw.gov.au/terms.aspx?file=Cumberland_Plain.zip [Accessed July 2010].

Department of Environment, Climate Change and Water (2010a) *Atlas of NSW Wildlife Database*. http://wildlifeatlas.npws.gov.au [Accessed July 2010].

Department of Environment, Climate Change and Water (2010b) *Threatened species: Sydney CMA - Pittwater B sub-region.* http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/cma_subregion_list.aspx?id=180 [Accessed July 2010].

Department of Environment, Climate Change and Water (2010c) *Recovery plans*. http://www.environment.nsw.gov.au/threatenedspecies/recoveryplans.htm [Accessed July 2010].

Department of Environment, Climate Change and Water (2010d) *Threatened species, populations and ecological communities – recovery and threat abatement. Find priority actions by type of threatened species*. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/pas_speciestype.aspx [Accessed July 2010].

Department of Environment, Climate Change and Water (2010e) *Grey-headed Flying-fox - Priority Actions*. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/pas_profile.aspx?id=10697 [Accessed July 2010].

Department of Environment, Climate Change and Water (2010f) *Threatened species, populations and ecological communities*. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/home_species.aspx [Accessed July 2010].

Department of the Environment, Water, Heritage and the Arts (2007) *Australian Threatened Species: Grey Nurse Shark*. http://www.environment.gov.au/biodiversity/threatened/publications/grey-nurse.html [Accessed July 2010].

Department of Sustainability, Environment, Water, Population and Communities (2010) *Environment Protection and Biodiversity Conservation Act Online Database*. http://www.environment.gov.au/epbc/db/index.html [Accessed July 2010].

Department of Primary Industries (2010) *Fishing and aquaculture*. http://www.dpi.nsw.gov.au/fisheries/habitat/protecting-habitats/activities-requiring-a-permit [Accessed July 2010].

Eby, P. (1995) *The biology and management of flying foxes in NSW*. NSW National Parks and Wildlife Service, Hurstville, NSW.

Fairley, A. and Moore, P. (2000) *Native plants of the Sydney District: an identification guide.* Kangaroo Press, Kensington, NSW.

Frith, H.J. (Ed) (2007) Complete book of Australian birds. Readers Digest, Surry Hills, NSW.

Google Maps (2010) *Maps*. http://maps.google.com.au/maps?hl=en&tab=wl [Accessed July 2010].

Harden, G. (Ed) (1992-2002) *Flora of New South Wales Vols 1,2,3 and 4*. NSW University Press, Kensington, NSW.

Keith, D. (2004) *Ocean Shores to Desert Dunes; the native vegetation of New South Wales and the ACT*. NSW National Parks & Wildlife Service, Sydney.

Land and Property Management Authority (2010) *Six Viewer*. http://imagery.maps.nsw.gov.au/ [Accessed July 2010].

LesryK Environmental Consultants (2008) *EPBC referral of proposed action – relocation of a flying-fox colony from the Royal Botanic Gardens, Sydney*. Report prepared for the Botanic Gardens Trust by LesryK Environmental Consultants, Bundeena, NSW.

LesryK Environmental Consultants (2010) *Ecological assessment for a proposed electrical substation, Bicentennial Park, Homebush Bay, NSW*. Report prepared at the request of LandScope Environmental Consultants by LesryK Environmental Consultants, Bundeena, NSW.

NSW Government (1995) *Fish Habitat Protection Plan No. 1*. http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0008/202688/FISH-HABITAT-PROTECTION-PLAN-NO-1.pdf [Accessed July 2010].

NSW Government (2010a) *Education and Learning - Environment*. http://www.sydneyolympicpark.com.au/education_and_learning/environment [Accessed July 2010].

NSW Government (2010b) *Mapping the estuarine habitats of NSW - Port Jackson (map 2)*. http://www.dpi.nsw.gov.au/research/areas/aquatic-ecosystems/estuarine-habitats-maps/IINSW_EstMac_map39b.pdf [Accessed July 2010].

NSW National Parks and Wildlife Service (1999) *Threatened Species Management – Species Information*. NSW National Parks and Wildlife Service, Hurstville, NSW.

NSW Scientific Committee (2010) *Preliminary and Final Determinations*. http://www.npws.nsw.gov.au/news/tscdets/index.html [Accessed July 2010].

Oculus (2001) *Urban Bushland in the Ryde LGA*. Unpublished report prepared for Ryde City Council.

Pogonoski , J. (2008) *Black Rockcod - Epinephelus daemelii. Threatened Fish Profile*. Australian Society for Fish Biology. http://www.asfb.org.au/research/Threatened%20Spp%20Profiles/tfp_brockcod.htm [Accessed July 2010].

Pollard, D. (2008) *Grey Nurse Shark* Carcharias taurus*. Threatened Fish Profile*. Australian Society for Fish Biology. http://www.asfb.org.au/research/Threatened%20Spp%20Profiles/tfp_gnshark.htm [Accessed July 2010].

Robinson, L. (2003) *Field guide to the native plants of Sydney*. Second edition. Kangaroo Press, Sydney, NSW.

Ryde City Council (2009) *State of the Environment Report*. Ryde City Council.

Simpson, K. and Day, N. (2004) *Field guide to the birds of Australia*. 7th Edition. Penguin Books Australia, Victoria.

Smith, P. (1990) The Biology and Management of Waders (Suborder Charadrii) in New South Wales. *Species Management Report 9*. Hurstville, NSW: NSW National Parks and Wildlife Service.

Specht, R.L. (1981) Major vegetation formations in Australia. In: *Ecological Biogeography of Australia* (A.Keast [Ed.]) Dr.W. Junk by Publishers, The Hague.163–297.

Sydney Olympic Park Authority (2006a) *Environmental Monitoring Report - Reptile Survey of Sydney Olympic Park 2005-2006*. http://www.sydneyolympicpark.com.au/__data/assets/pdf_file/0009/77733/Reptile_survey_2005-2006-final.pdf [Accessed July 2010].

Sydney Olympic Park Authority (2006b) *Environmental Monitoring Report - Bat Survey of Sydney Olympic Park 2005-2006*. http://www.sydneyolympicpark.com.au/__data/assets/pdf_file/0008/77732/Bat_survey_2005-2006_final.pdf [Accessed July 2010].

Sydney Olympic Park Authority (2007) *Environmental Monitoring Report - Nocturnal waterbird survey 2007*. http://www.sydneyolympicpark.com.au/__data/assets/pdf_file/0006/88197/EcoReport_-_Nocturnal_Waterbird_Survey_2007.pdf [Accessed July 2010].

Triggs, B. (1996) *Tracks, scats and other traces: A field guide to Australian mammals*. Oxford University Press, Melbourne, Victoria.

Van Dyck, S. and Strahan, R. (Eds) (2008) *The mammals of Australia* (3rd edition). Reed New Holland, Sydney, NSW.

Appendix 1: Photographic record of the survey area.

Plate 2: Looking north towards the study site from the end of the remains of the jetty foundations (foreground).

Plate 3: Looking west along Rothesay Avenue.

Plate 4: Looking north across Shepherd's Bay towards Rothesay Avenue.

Plate 5: Looking west along Nancarrow Avenue.

Appendix 2: Threatened ecological communities, flora and fauna species previously recorded in the study region**.**

Key

V - Vulnerable. E - Endangered.
CE - Critically Endangered. M - Migratory.
EP- endangered population. N - Nominated for listing under the *EPBC Act*. P - Preliminary listing under the *TSC Act*.

Flora species underlined are those that are known to occur in the Pittwater (Part B) subcatchment of the Sydney CMA and may have suitable habitat at the subject site as indicated by DECC (2007).

Flora species highlighted in **bold** are those *EPBC Act*-listed species that have not been recorded within 5km of the site but according to the *EPBC* Protected Matter search tool may, or are likely to, have habitat within the search area.

* based on DECCW (2010f), Harden (1992-2002), Robinson (2003), Frith (2007), Chafer *et al*. (1999), NSW Scientific Committee (various dates) and.

	Status		**Habitat ***	**Likelihood of occurrence**
	EPBC	***TSC***		
FLORA				
Plants				
Apatophyllum constablei	E		Restricted to the vicinity of Wollemi National Park where it occurs in dry sclerophyll forest on slopes with a north to north-westerly aspect.	Nil
Caladenia tessellata **Thick-lipped Spider-orchid**	V	E	Grassy sclerophyll woodland on clay loam or sandy soils.	Nil
Callistemon linearifolius Netted Bottlebrush	V	V	Rock platforms in dry sclerophyll forest on the coast and adjacent ranges.	Nil
Cryptostylis hunteriana **Leafless Tongue-orchid**	V	V	Occurs in a range of communities, including swamp-heath and woodland.	Nil
Darwinia biflora	V	V	Woodland and heath on clayey ridge-tops.	Nil
Dillwynia tenuifolia	V	V	Vegetation similar to Cumberland Plain Woodland, on Wianamatta Shale soils.	Nil
Downy Wattle* *Acacia pubescens*	V	V	Woodland and open forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland. Soils are characteristically gravely soils, often with ironstone.	Nil
Epacris purpurascens var. purpurascens		V	Shale ridges and beside creeks.	Nil
Eucalyptus nicholii Narrow-leaved Black Peppermint	V	V	Northern Tablelands species widely planted as a street and garden tree outside its natural range.	Recorded. Often planted as a street tree.

	Status		Habitat *	Likelihood of occurrence
	EPBC	***TSC***		
Genoplesium baueri Bauer's Midge Orchid	V	V	Moss gardens on sandstone outcrops in woodland and heath. All local records pre 1900.	Nil
Hairy Geebung *Persoonia hirsuta*	E	E	Sandy soils in dry sclerophyll open forest, woodland and heath on sandstone. One local record 1923.	Nil
Leptospermum deanei	V	V	Woodland on lower hill slopes or riparian scrub near creeks. One local record 1883.	Nil
Melaleuca biconvexa **Biconvex Paperbark**	V	V	Scattered and dispersed populations of this species are found in the Jervis Bay and the Gosford-Wyong areas. It occurs in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.	Nil
Melaleuca deanei Deane's Paperbark	V	V	Woodland and heath on clayey ridge-tops. One local record 1914.	Nil
Pimelea curviflora var. curviflora	V	V	Woodland and heath on clayey ridge-tops. All local records pre 1920.	Nil
Pomaderris prunifolia		EP[2]	Known from only three sites within the listed local government areas, at Rydalmere, within Rookwood Cemetery and at The Crest of Bankstown.	Nil
Prostanthera marifolia **Seaforth Mintbush**	Ex	CE	Known only from Seaforth where it occurs in localised patches in or in close proximity to the endangered Duffys Forest ecological community.	Nil
Spiked Rice-flower *Pimelea spicata*	E	E	On the Cumberland Plain associated with Grey Box and Ironbark on well-structured clay soils.	Nil
Tetratheca glandulosa **Glandular Pink-bell**	V	V	Open forest, woodland and heath on clayey ridge-tops.	Nil
Wilsonia backhousei Narrow-leafed Wilsonia		V	Saltmarsh.	Low- could conceivably occur at the landward edge of the mangroves.
Endangered Ecological Communities				
Coastal saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions		E	Intertidal zone on the shores of estuaries and lagoons.	Low- small areas could conceivably occur at the landward edge of the mangroves.
Sydney Turpentine-Ironbark Forest/ Turpentine-Ironbark Forest in the Sydney Basin Bioregion	CE	E	Close to the shale/sandstone boundary on the more fertile shale influenced soils, in higher rainfall areas on the higher altitude margins of the Cumberland Plain, and on the shale ridge caps of sandstone plateaus.	Low- subject site is heavily modified. Possibility that some remnant trees remain that are included in the NSW definition of the community.

[2] in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas.

	Status		Habitat *	Likelihood of occurrence
	EPBC	*TSC*		
FAUNA				
Mammals				
Grey-headed Flying-fox *Pteropus poliocephalus*	V	V	The Grey-headed Flying Fox is a canopy-feeding frugivore, blossom-eater and nectarivore that inhabits a variety of habitats. They roost and breed communally in 'camps', these containing between 500 to 5,000 individuals. Foraging occurs opportunistically on both native and exotic plants, often at distances between 30 and 70km from camps.	An electrocuted individual was observed at the intersection of Constitution Road and Belmore Street.
Little Bentwing Bat *Miniopterus australis*		V	Preferred habitat includes moist eucalypt forest, rainforest or dense coastal banksia scrub. Little Bentwing-bats roost in caves, tunnels and sometimes tree hollows during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.	Low. No caves or suitable cave substitutes are present.
Large-footed Myotis *Myotis adversus*			Found where there is permanent and/or flowing water, generally in the coastal regions. This species generally roosts within 400m of suitable water bodies, in caves, disused tunnels, old buildings, tree hollows and dense riparian foliage. Emerging at dusk, the Large-footed Myotis feed on aquatic insects "raked" off the waters surface.	Low. Species has the potential to fly over and forage within study area on occasion. No tree hollows or other suitable roosting sites were recorded.
Greater Broad-nosed Bat *Scoteanax rueppellii*			Preferring habitats which range from rainforests through to woodlands, this species usually roosts in tree hollows, though some individuals have been found in the roof spaces of old buildings. This bat feeds on large insects such as beetles, and is also known to take small vertebrates such as mice and other small bats.	Low. Species has the potential to fly over and forage within study area on occasion. No tree hollows or other suitable roosting sites were recorded.
Birds				
Cattle Egret *Ardea ibis*	M		The Cattle Egret is a communal bird that forages mainly within wet pastures. This bird feeds on a variety of insects and, occasionally, small aquatic animals. The Cattle Egret rests and nests colonially in trees and shrub that line waterways.	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.
Great Egret *Ardea alba*	M		This Egret utilises lakes, swamps and dams, foraging within these areas on fish (predominantly), molluscs, frogs, aquatic insects and crustaceans. This species prefers shallow water, particularly when flowing, but may be seen on any watered area, including damp grasslands. This species breeds in colonies, and often in association with cormorants, ibises and other egrets. The Great Egret constructs a nest, a large platform of sticks, in a tree over the water.	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.
Glossy Ibis *Plegadis falcinellus*	M		The glossy ibis inhabits shallow freshwater swamps and mudflats particularly where trees and bushes provide shelter. They nest within braches of trees growing within water in secluded locations.	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.

	Status		Habitat *	Likelihood of occurrence
	EPBC	***TSC***		
Black-necked Stork *Ephippiorhynchus asiaticus*		E	Black-necked Storks are mainly found on shallow, permanent, freshwater terrestrial wetlands, and surrounding marginal vegetation, including swamps, floodplains, watercourses and billabongs, freshwater meadows, wet heathland, farm dams and shallow floodwaters, as well as extending into adjacent grasslands, paddocks and open savannah woodlands. They also forage within or around estuaries and along intertidal shorelines, such as saltmarshes, mudflats and sandflats, and mangrove vegetation. Their diet includes a variety of prey, including eels and other fish, frogs, turtles, snakes, and small invertebrates, such as crabs and small insects.	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.
Ruddy Turnstone *Arenaria interpres*	M		Their habitat includes coastal rock platforms and reefs, beaches and occasionally estuarine sandflats.	Medium. May forage on the exposed mudflats during periods of low tide.
Eastern Curlew *Numenius madagascariensis*	M		The favoured habitat of the Eastern Curlew includes estuaries, mud-flats, mangroves and sand spits.	Medium. May forage on the exposed mudflats during periods of low tide.
Whimbrel *Numenius phaeopus*	M		Favoured habitats are estuaries, mud-flats, mangroves and sand spits. Occasionally occurs inland.	Medium. May forage on the exposed mudflats during periods of low tide.
Grey-tailed Tattler *Heteroscelus brevipes*	M		The Grey-tailed Tattler inhabits estuaries, mangroves, rocky coasts, reefs, mudflats and beaches.	Medium. May forage on the exposed mudflats during periods of low tide.
Common Sandpiper *Actitis hypoleucos*	M		Steep-sided banks of mud or rocks on dams, creeks, pools and swamps. Roosts on objects such as rocks, snags and logs adjacent to water bodies.	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.
Common Greenshank *Tringa nebularia*	M		The Common Greenshank prefers coastal lagoons, estuaries and bays that are sheltered, sandy and muddy. Also found on fresh marshes near streams, dams and sewage farms. Sometimes found at inland lakes.	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.
Marsh Sandpiper *Tringa stagnatilis*	M		They frequent the still edges of extensive shallow open sheets of water.	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.
Terek Sandpiper *Xenus cinereus*		V	Favours mudbanks and sandbanks located near mangroves, but may also be observed on rocky pools and reefs, and occasionally up to 10km inland around brackish pools. Generally roosts communally amongst mangroves of dead trees. The diet includes worms, crabs and other crustaceans, small shellfish and the adults and larvae of various flies, beetles and water-bugs. Feeding is undertaken by moving rapidly and erratically over soft, wet mud, pecking or probing at the surface.	Medium. May forage on the exposed mudflats during periods of low tide.

	Status		Habitat *	Likelihood of occurrence
	EPBC	***TSC***		
Latham's Snipe *Gallinago hardwickii*	M		This species prefers habitats that consist of wet treeless tussocky grasslands, short grasses and marshes along freshwater streams and channels.	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.
Black-tailed Godwit *Limosa limosa*	M	V	Found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found on mudflats and in water less than 10 cm deep, around muddy lakes and swamps. Individuals have been recorded in wet fields and sewerage treatment works.	Medium. May forage on the exposed mudflats during periods of low tide.
Black-tailed Godwit *Limosa limosa*	M	V	In NSW the Black-tailed Godwit is most frequently recorded at Kooragang Island (Hunter River estuary), with occasional records elsewhere along the north and south coast, and inland. This species is usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found on mudflats and in water less than 10 cm deep, around muddy lakes and swamps. Forages for insects, crustaceans, molluscs, worms, larvae, spiders, fish eggs, frog eggs and tadpoles in soft mud or shallow water. Roosts and loafs on low banks of mud, sand and shell bars.	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.
Bar-tailed Godwit *Limosa lapponica*	M	V	The Bar-tailed Godwit inhabits saline and tidal mudflats and sands of coastal inlets, estuaries and nearby salt pans. These birds feed from sands and muds exposed by the tide, and in shallow water.	Medium. May forage on the exposed mudflats during periods of low tide.
Red Knot *Calidris canutus*	M		Red Knots gather in large flocks on the coast in sandy estuaries with tidal mudflats. When foraging, they walk fast, probing rapidly in soft sand and mud for worms, bivalves and crustaceans and also eat spiders, insects, seeds and shoots. Red Knots breed in the far northern hemisphere.	Medium. May forage on the exposed mudflats during periods of low tide.
Great Knot *Calidris* tenuirostris	M	V	The Great Knot Occurs within sheltered, coastal habitats containing large, intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons.	Medium. May forage on the exposed mudflats during periods of low tide.
Sharp-tailed Sandpiper *Calidris acuminata*	M		The Sharp-tailed Sandpiper is a wading bird that prefers tidal mud flats, sand flats, estuaries, brackish swamps and the shores of lakes.	Medium. May forage on the exposed mudflats during periods of low tide.
Pectoral Sandpiper *Calidris melanotus*	M		Grassy coastal and inland swamps.	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.
Red-necked Stint *Calidris ruficollis*	M		Most Red-necked Stints keep to saline or brackish sand flats and tidal muds along the Australian coast. Feeds in inundated muds and areas just above the waterline.	Medium. May forage on the exposed mudflats during periods of low tide.
Curlew Sandpiper *Calidris ferruginea*	M		Whilst occurring sporadically inland on swamps and flood sheets, this species keeps primarily to estuarine and tidal mud and sand flats around the coast.	Medium. May forage on the exposed mudflats during periods of low tide.

	Status		Habitat *	Likelihood of occurrence
	EPBC	***TSC***		
Sanderling *Calidris alba*	M	V	Sanderlings are found predominantly in coastal areas on low beaches of firm sand, near reefs and inlets, along tidal mudflats and bare open coastal lagoons; individuals are rarely recorded in near-coastal wetlands. They feed on insects, larvae and other small invertebrates in the sand, as well as on plants, seeds, worms, crustaceans, spiders, jellyfish and fish, foraging around rotting heaps of kelp, at the edges of shallow pools on sandspits and on nearby mudflats. The Sanderling roosts on bare sand, behind clumps of beach-cast kelp or in coastal dunes. Breeding occurs in the Northern Hemisphere.	Medium. May forage on the exposed mudflats during periods of low tide.
Broad-billed Sandpiper *Limicola falcinellus*		V	Broad-billed Sandpipers favour sheltered parts of the coast such as estuarine sandflats and mudflats, harbours, embayments, lagoons, saltmarshes and reefs as feeding and roosting habitat. Broad-billed Sandpipers roost on banks on sheltered sand, shell or shingle beaches. Their diet includes insects, crustaceans, molluscs, worms and seeds.	Medium. May forage on the exposed mudflats during periods of low tide.
Ruff *Philomachus pugnax*	M		Found along muddy edges of shallow, open swamps and streams both fresh and saline, in coastal and inland areas. Feeds on crustaceans, insects, worms and plant matter in shallows. Breeding occurs in Northern hemisphere.	Medium. May forage on the exposed mudflats during periods of low tide.
Australian Painted Snipe *Rostratula australis*	MV	E	This species lives within muddy ground in boggy swamps. They prefer shallow freshwater swamps where they feed on aquatic insects and earthworms found in soft mud. The Australian Painted Snipe nests in a raised area of damp mud, lined with grass and reeds, surrounded by shallow water often within River Red Gum *Eucalyptus camaldulensis*.	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.
Grey Plover *Pluvialis squatarola*			Grey Plovers occur almost entirely in coastal areas, where they usually inhabit sheltered embayments, estuaries and lagoons with mudflats and sandflats. They also occur around terrestrial wetlands such as near-coastal lakes and swamps, or salt-lakes. This species forage mostly for insects, but may occasionally eat vegetation, usually on large areas of exposed mudflats and beaches of sheltered coastal shores such as inlets, estuaries and lagoons. They roost in sandy areas, such as on unvegetated sandbanks or sand-spits on sheltered beaches.	Medium. May forage on the exposed mudflats during periods of low tide.
Pied Oystercatcher *Haematopus longirostris*		E	Found along beaches and estuaries of Australia feeding on molluscs. Nests on sandy beaches well above the high water mark. Found throughout Australian waters	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.
Sooty Oystercatcher *Haematopus fuliginosus*		V	Commonly found along exposed rocky shores, wave cut platforms, reefs and stony beaches. Feeds mainly on limpets, periwinkles and mussels picked off rocks. They usually fly to offshore islands to breed.	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.

	Status		Habitat *	Likelihood of occurrence
	EPBC	***TSC***		
Greater Sand-plover *Charadrius leschenaultii*		V	Found mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks. Roosts during high tide on sandy beaches and rocky shores; foraging on wet ground at low tide, usually away from the edge of the water. This species diet includes insects, crustaceans, polychaete worms and molluscs.	Medium. May forage on the exposed mudflats during periods of low tide.
Mongolian (Lesser) Sand Plover *Charadrius mongolus*	M	V	Preferred habitat includes the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats, occasionally occurring on sandy beaches, coral reefs and rock platforms. Roosting occurs during high tide on sandy beaches, spits and rocky shores. This species forage for insects, crustaceans, molluscs and marine worms on wet ground at low tide, usually away from the water's edge.	Medium. May forage on the exposed mudflats during periods of low tide.
Little Tern *Sterna albifrons*		E	Prefers sheltered coastal habitat, however may occur several kilometres from the sea in harbours, inlets and rivers. Little Terns' nest in small, scattered colonies in low dunes or on sandy beaches just above high tide mark near estuary mouths or adjacent to coastal lakes and islands. They forage for small fish, crustaceans, insects, annelids and molluscs, in the shallow water of channels and estuaries, and in the surf on beaches.	Low. Species unlikely to be recorded within, or reliant upon, those habitats present
Common Tern *Sterna hirundo*	M		The Common Tern is found mainly in near-coastal waters, including ocean beaches, platforms and headlands as well as sheltered bays, harbours and estuaries with muddy, sandy or rocky shores. Sometimes occurring in mangroves or saltmarsh. Common Terns roost on unvegetated, intertidal sandy ocean beaches, sandy islands, shores of estuaries or lagoons, and sandbars, as well as on rocky shores, rock platforms or rocks protruding above the surface of the water. They forage in sheltered embayments, in the surf-zone, and well out to sea, as well as in near-coastal terrestrial wetlands, including estuaries, rivers and swamps.	Medium. May forage on the exposed mudflats during periods of low tide.
Osprey *Pandion haliaetus*		V	A fish eating raptor, the Osprey inhabits mainly coastline areas. Nests are usually constructed in a large, dead tree, though rocky outcrops and artificial structures are also known to be used.	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.
White-bellied Sea-eagle *Haliaeetus leucogaster*	M		Found throughout coastal Australia and large lowland rivers and lakes. Nests constructed in inland water systems being located in tall live or dead trees of which River Red Gums, Forest Red Gum and Southern Mahogany are commonly used.	Low. Species has the potential to fly over and forage within study area on occasion. No nesting sites were recorded.

	Status		Habitat *	Likelihood of occurrence
	EPBC	***TSC***		
Little Eagle *Hieraaetus morphnoides*		V	Occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.	Low. Species has the potential to fly over and forage within study area on occasion. No nesting sites were recorded. Development of the site would not limit any resources relied upon by this species.
Spotted Harrier *Circus assimilis*		V	Occurs in grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. The Spotted Harrier is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. They build a stick nest in a tree, preying on terrestrial mammals (e.g. bandicoots, bettongs, and rodents), birds and reptile, occasionally insects and rarely carrion.	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.
Little Lorikeet *Glossopsitta pusilla*		V	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophoras, Melaleucas and other tree species. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species. Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts.	Low. Species has the potential to fly over and forage within study area on occasion. No hollow bearing trees were recorded. Development of the site would not limit any resources relied upon by this species.
Swift Parrot *Lathamus discolor*		E	The Swift Parrot inhabits eucalypt forests, feeds on eucalypt nectar, and possibly lerps, and breeds in the hollows of mature and senescent trees. When over-wintering on the mainland, this species is dependent on winter-flowering eucalypt species, communities of which it will often return to regularly.	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.
White-throated Needletail *Hirundapus caudacutus*	M		The White-throated Needletail is most commonly associated with the east coast highlands, coastal plains and the hinterlands of arid inland Australia. Within this area it becomes locally nomadic in response to local weather changes. Roosts during the night in trees in forests.	Low. Species has the potential to fly over and forage within study area on occasion. Development of the site would not limit any resources relied upon by this species.
Fork-tailed Swift *Apus pacificus*	M		The Fork-tailed Swift flies across southeastern Australia several times a year following the eastward low pressure systems in the atmosphere. They spend the majority of the day and night on the wing. The Fork-tailed Swift preys on flying insects such as termites, ants, flies and bugs. This bird drinks from inland lakes, and rain water puddles, skimming over the surface.	Low. Species has the potential to fly over and forage within study area on occasion. Development of the site would not limit any resources relied upon by this species.

	Status		Habitat *	Likelihood of occurrence
	EPBC	***TSC***		
Rainbow Bee-eater *Merops ornatus*	M		The Rainbow Bee-eater inhabits woodlands, often near water bodies. This bird roosts at night in shrubs. The Rainbow Bee-eater feeds on insects caught on the wing. They are breeding migrants to Australia. This bird breeds in burrows dug into sandy banks or bare, flat ground.	Low. Species has the potential to fly over and forage within study area on occasion. Development of the site would not limit any resources relied upon by this species.
Varied Sittella *Daphoenositta chrysoptera*		V	This species inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland. The Varied Sittella feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy. It builds a cup-shaped nest of plant fibres and cobweb in an upright tree fork high in the living tree canopy.	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.
White-fronted Chat (population in the Sydney region CMA) *Epthianura albifrons*		E	Current estimates of this population suggest it consists of 8 individuals, these regularly observed in the saltmarsh of Newington Nature Reserve (with occasional sightings from other parts of Sydney Olympic Park and in grassland on the northern bank of the Parramatta River). These insectivores forage on bare or grassy ground in wetland areas. Nests are mainly 'open-cup' nests built in low vegetation, nests in the Sydney region have also been seen in low isolated mangroves	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.
Rufous Fantail *Rhipidura rufifrons*	M		The Rufous Fantail occurs within mangroves, fringing vine scrubs, rainforests and wet sclerophyll forests. This species forages within scrubby understorey and take insects and spiders.	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.
Satin Flycatcher *Myiagra cyanoleuca*	M		The Satin Flycatcher breed within tall wet eucalypt forest on rolling plains and steep gullies, as well as timbered watercourses. After fledging they relocate and forage in drier more open forest.	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.
Black-faced Monarch *Monarcha melanopsis*	M		The Black-faced Monarch prefers wet eucalypt forest and rainforest. They nest in sheeted gullies or within rainforest foraging within the middle storey layers.	Low. Species unlikely to be recorded within, or reliant upon, those habitats present.

Appendix 3: Terrestrial fauna species previously recorded in the study region.

Source of Records
1 = DECCW (2010a).
2 = DSEWPC (2010).

Key
A - Indicates species listed under the *EPBC Act*.
F - Migratory Family listed under the *EPBC Act*.
M - Species listed as migratory listed under the *EPBC Act*.
B - Indicates species listed under the *TSC Act.*
♋ - Indicates an Endangered Population listed under the *TSC Act.*
E - Species is Endangered.
V - Species is Vulnerable.
P - Preliminary determinations to the *TSC Act.*
N - Nominations for listing under the *EPBC Act.*
* - indicates introduced species.

A	B	Common Name	Family and Scientific Name	1	2
		MAMMALS			
			Tachyglossidae		
		Short-beaked Echidna	*Tachyglossus aculeatus*	x	
			Dasyuridae		
V	V	Spotted-tailed Quoll	*Dasyurus maculatus*	x	x
			Peramelidae		
	♋	Long-nosed Bandicoot	*Perameles nasuta*	x	
			Petauridae		
		Sugar Glider	*Petaurus breviceps*	x	
			Pseudocheiridae		
		Common Ringtail Possum	*Pseudocheirus peregrinus*	x	
			Acrobatidae		
		Feathertail Glider	*Acrobates pygmaeus*	x	
			Phalangeridae		
		Common Brushtail Possum	*Trichosurus vulpecula*	x	
			Pteropodidae		
V	V	Grey-headed Flying-fox	*Pteropus poliocephalus*	x	x
			Vespertilioidae		
		Gould's Wattled Bat	*Chalinolobus gouldii*	x	
		Lesser Long-eared Bat	*Nyctophilus geoffroyi*	x	
		Little Forest Bat	*Vespadelus vulturnus*	x	
			Miniopteridae		
	V	Eastern Bentwing Bat	*Miniopterus* (*schreibersii*) *orianae oceanensis*	x	
			Molossidae		
		White-striped Freetail Bat	*Austronomus australis*	x	
		Eastern Freetail Bat	*Mormopterus ridei*	x	
			Muridae		
		* House Mouse	*Mus musculus*	x	
		Bush Rat	*Rattus fuscipes*	x	
		* Black Rat	*Rattus rattus*	x	
			Canidae		
		* Dog	*Canis familiaris*	x	
			Felidae		

A	B	Common Name	Family and Scientific Name	1	2
		* Feral Cat	*Felis catus*	x	
			Leporidae		
		* Rabbit	*Oryctolagus cuniculus*	x	
		BIRDS			
			Pelecanidae		
		Australian Pelican	*Pelecanus conspicillatus*	x	
			Anhingidae		
		Darter	*Anhinga melanogaster*	x	
			Phalacrocoracidae		
		Pied Cormorant	*Phalacrocorax varius*	x	
		Little Pied Cormorant	*Phalacrocorax melanoleucos*	x	
		Great Cormorant	*Phalacrocorax carbo*	x	
		Little Black Cormorant	*Phalacrocorax sulcirostris*	x	
			Podicipedidae		
		Hoary-headed Grebe	*Poliocephalus poliocephalus*	x	
		Australasian Grebe	*Tachybaptus novaehollandiae*	x	
F			**Anatidae**		
		Pacific Black Duck	*Anas superciliosa*	x	
		* Mallard	*Anas platyrhynchos*	x	
		Grey Teal	*Anas gracilis*	x	
		Chestnut Teal	*Anas castanea*	x	
		Australasian Shoveler	*Anas rhynchotis*	x	
		Pink-eared Duck	*Malacorhynchus membranaceus*	x	
		Hardhead	*Aythya australis*	x	
		Australian Wood Duck	*Chenonetta jubata*	x	
	V	Freckled Duck	*Stictonetta naevosa*	x	
		∇ Musk Duck	*Biziura lobata*	x	
			Rallidae		
		Buff-banded Rail	*Gallirallus phillippensis*	x	
		Baillon's Crake	*Porzana pusilla*	x	
		Australian Spotted Crake	*Porzana fluminea*	x	
		Dusky Moorhen	*Gallinula tenebrosa*	x	
		Purple Swamphen	*Porphyrio porphyrio*	x	
		Eurasian Coot	*Fulica atra*	x	
			Ardeidae		
		White-necked Heron	*Ardea pacifica*	x	
		White-faced Heron	*Egretta novaehollandiae*	x	
M		Cattle Egret	*Ardea ibis*	x	x
M		Great Egret	*Ardea alba*	x	x
		Little Egret	*Egretta garzetta*	x	
		Intermediate Egret	*Egretta intermedia*	x	
		Striated Heron	*Butorides striatus*	x	
		Nankeen (Rufous) Night Heron	*Nycticorax caledonicus*	x	
		Little Bittern	*Ixobrychus minutus*	x	
			Threskiornidae		
M		Glossy Ibis	*Plegadis falcinellus*	x	
		Australian White Ibis	*Threskiornis molluca*	x	
		Straw-necked Ibis	*Threskiornis spinicollis*	x	

A	B	Common Name	Family and Scientific Name	1	2
		Royal Spoonbill	*Platalea regia*	x	
		Yellow-billed Spoonbill	*Platalea flavipes*	x	
			Ciconiidae		
	E	Black-necked Stork	*Ephippiorhynchus asiaticus*	x	
F			**Scolopacidae**		
M		Ruddy Turnstone	*Arenaria interpres*	x	x
M		Eastern Curlew	*Numenius madagascariensis*	x	x
M		Whimbrel	*Numenius phaeopus*	x	x
M		Grey-tailed Tattler	*Heteroscelus brevipes*	x	x
M		Common Sandpiper	*Actitis hypoleucos*	x	
M		Common Greenshank	*Tringa nebularia*	x	
		Wood Sandpiper	*Tringa glareola*	x	
M		Marsh Sandpiper	*Tringa stagnatilis*	x	x
M		Latham's Snipe	*Gallinago hardwickii*	x	x
M		Swinhoe's Snipe	*Gallinago megala*		x
M		Pin-tailed Snipe	*Gallinago stenura*		x
M	V	Black-tailed Godwit	*Limosa limosa*	x	x
M		Bar-tailed Godwit	*Limosa lapponica*	x	x
M		Red Knot	*Calidris canutus*	x	x
M	V	Great Knot	*Calidris tenuirostris*		x
M		Sharp-tailed Sandpiper	*Calidris acuminata*	x	x
M		Pectoral Sandpiper	*Calidris melanotus*	x	x
M		Red-necked Stint	*Calidris ruficollis*	x	x
M		Curlew Sandpiper	*Calidris ferruginea*	x	x
M	V	Broad-billed Sandpiper	*Limicola falcinellus*	x	
M		Ruff	*Philomachus pugnax*	x	x
			Rostratulidae		
MV	E	Australian Painted Snipe	*Rostratula australis*		x
F			**Charadriidae**		
		Masked Lapwing	*Vanellus miles*	x	
M		Grey Plover	*Pluvialis squatarola*	x	
		Pacific Golden Plover	*Pluvialis fulva*	x	x
		Red-kneed Dotterel	*Erythrogonys cinctus*	x	
		Double-banded Plover	*Charadrius bicinctus*	x	x
M	V	Greater Sand Plover	*Charadrius leschenaultii*	x	x
		Red-capped Plover	*Charadrius ruficapillus*	x	
M		Mongolian Plover	*Charadrius mongolus*		x
F			**Recurvirostridae**		
		Black-winged Stilt	*Himantopus himantopus*	x	x
		Red-necked Avocet	*Recurvirostra novaehollandiae*	x	
			Laridae		
		Silver Gull	*Larus novaehollandiae*	x	
		Whiskered Tern	*Chlidonias hybrida*	x	
		White-winged Black Tern	*Chlidonias leucopterus*	x	
M	E	Little Tern	*Sterna albifrons*	x	
M		Common Tern	*Sterna hirundo*	x	
		Crested Tern	*Sterna bergii*	x	
F			**Accipitridae**		

A	B	Common Name	Family and Scientific Name	1	2
		Pacific Baza	*Aviceda subcristata*	x	
		Black-shouldered Kite	*Elanus axillaris*	x	
M	V	Osprey	*Pandion haliaetus*	x	
		Whistling Kite	*Haliastur sphenurus*	x	
M		White-bellied Sea-eagle	*Haliaeetus leucogaster*	x	x
	V	Little Eagle	*Hieraaetus morphnoides*	x	
		Brown Goshawk	*Accipiter fasciatus*	x	
		Collared Sparrowhawk	*Accipiter cirrocephalus*	x	
		Swamp Harrier	*Circus approximans*	x	
F			**Falconidae**		
		Brown Flacon	*Falco berigora*	x	
		Peregrine Falcon	*Falco peregrinus*	x	
		Australian Hobby	*Falco longipennis*	x	
		Nankeen Kestrel	*Falco cenchroides*	x	
		Black Flacon	*Falco subniger*	x	
			Columbidae		
		White-headed Pigeon	*Columba leucomela*	x	
		* Rock Dove	*Columba livia*	x	
		Peacecful Dove	*Geopelia striata*	x	
		Wonga Pigeon	*Leucosarcia picata*	x	
		Superb Fruit-Dove	*Ptilinopus superbus*	x	
		* Spotted Turtle-dove	*Streptopelia chinensis*	x	
		Common Bronzewing	*Phaps chalcoptera*	x	
		Crested Pigeon	*Ocyphaps lophotes*	x	
			Cacatuidae		
		Yellow-tailed Black Cockatoo	*Calyptorhynchus funereus*	x	
		Galah	*Eolophus roseicpilla*	x	
		Long-billed Corella	*tenuirostris*	x	
		Little Corella	*Cacatua sanguinea*	x	
		Sulphur-crested Cockatoo	*Cacatua galerita*	x	
			Psittacidae		
		Rainbow Lorikeet	*Trichoglossus haematodus*	x	
		Scaly-breasted Lorikeet	*Trichoglossus chlorolepidotus*	x	
		Musk Lorikeet	*Glossopsitta concinna*	x	
	V	Little Lorikeet	*Glossopsitta pusilla*	x	
		Australian King Parrot	*Alisterus scapularis*	x	
E	E	Swift Parrot	*Lathamus discolor*	x	x
		Crimson Rosella	*Platycercus elegans*	x	
		Eastern Rosella	*Platycercus eximius*	x	
		Red-rumped Parrot	*Psephotus haematonotus*	x	
			Cuculidae		
		Pallid Cuckoo	*Cuculus pallidus*	x	
		Fan-tailed Cuckoo	*Cuculus flabelliformis*	x	
		Horsfield's Bronze-Cuckoo	*Chrysococcyx basalis*	x	
		Shining Bronze-Cuckoo	*Chrysococcyx lucidus*	x	
		Common Koel	*Eudynamys scolopacea*	x	
		Channel-billed Cuckoo	*Scthrops novaehollandiae*	x	
			Strigidae		

A	B	Common Name	Family and Scientific Name	1	2
	V	Powerful Owl	*Ninox strenua*	x	
		Southern Boobook	*Ninox novaeseelandiae*	x	
			Tytonidae		
		Barn Owl	*Tyto alba*	x	
			Podargidae		
		Tawny Frogmouth	*Podargus strigoides*	x	
			Apodidae		
M		White-throated Needletail	*Hirundapus caudacutus*		x
M		Fork-tailed Swift	*Apus pacificus*		x
			Halcyonidae		
		Azure Kingfisher	*Alcedo azurea*	x	
		Sacred Kingfisher	*Todiramphus sanctus*	x	
		Laughing Kookaburra	*Dacelo naxaeguineae*	x	
			Meropidae		
M		Rainbow Bee-eater	*Merops ornatus*		x
			Coraciidae		
		Dollarbird	*Eurystomus orientalis*	x	
			Neosittidae		
	V	Varied Sittella	*Daphoenositta chrysoptera*	x	
			Climacteridae		
		White-throated Treecreeper	*Cormobates leucophaeus*	x	
			Maluridae		
		Superb Fairy-wren	*Malurus cyaneus*	x	
		Variegated Fairy-wren	*Malurus lamberti*	x	
			Pardalotidae		
		Spotted Pardalote	*Pardalotus punctatus*	x	
		Striated Pardalote	*Pardalotus striatus*	x	
			Acanthizidae		
		White-browed Scrubwren	*Sericornis frontalis*	x	
		White-throated Gerygone	*Gerygone olivacea*	x	
		Brown Gerygone	*Gerygone mouki*	x	
		Yellow Thornbill	*Acanthiza nana*	x	
		Striated Thornbill	*Acanthiza lineata*	x	
		Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	x	
		Weebill	*Smicrornis brevirostris*	x	
			Meliphagidae		
		Red Wattlebird	*Anthochaera carunculata*	x	
		Little (Brush) Wattlebird	*Anthochaera chrysoptera*	x	
		Striped Honeyeater	*Plectorhyncha lanceolata*	x	
		Noisy Friarbird	*Philemon corniculatus*	x	
ME	E	Regent Honeyeater	*Anthochaera phrygia*	x	x
		Bell Miner	*Manorina melanophrys*	x	
		Noisy Miner	*Manorina melanocephala*	x	
		Lewin's Honeyeater	*Meliphaga lewinii*	x	
		Yellow-faced Honeyeater	*Lichenostomus chrysops*	x	
		White-plumed Honeyeater	*Lichenostomus pencillatus*	x	
		White-naped Honeyeater	*Melithreptus lunatus*	x	
		White-cheeked Honeyeater	*Phylidonyris nigra*	x	

A	B	Common Name	Family and Scientific Name	1	2
		New Holland Honeyeater	*Phylidonryis novaehollandiae*	x	
		∇ Brown Honeyeater	*Lichmera indistincta*	x	
		Eastern Spinebill	*Acanthorhynchus tenuirostris*	x	
		Scarlet Honeyeater	*Myzomela sanguinolenta*	x	
	♋	White-fronted Chat	*Epthianura albifrons*	x	
			Orthonychidae		
		Eastern Whipbird	*Psophodes olivaceus*	x	
			Petroicidae		
		Eastern Yellow Robin	*Eopsaltria australis*	x	
		Jacky Winter	*Microeca fascinans*	x	
			Pachycephalidae		
		Crested Shrike-tit	*Falcunculus frontatus*	x	
		Grey Shrike-thrush	*Colluricincla harmonica*	x	
		Golden Whistler	*Pachycephala pectoralis*	x	
		Rufous Whistler	*Pachycephala rufiventris*	x	
			Dicruridae		
		Grey Fantail	*Rhipidura fuliginosa*	x	
M		Rufous Fantail	*Rhipidura rufifrons*	x	x
		Willie Wagtail	*Rhipidura leucophrys*	x	
		Leaden Flycatcher	*Myiagra rubecula*	x	
M		Satin Flycatcher	*Myiagra cyanoleuca*	x	x
M		Black-faced Monarch	*Monarcha melanopsis*	x	x
		Magpie Lark	*Grallina cyanoleuca*	x	
		Spangled Drongo	*Dicrurus bracteatus*	x	
			Oriolidae		
		Olive-backed Oriole	*Oriolus sagittatus*	x	
		Figbird	*Sphecotheres viridis*	x	
			Ptilonorhynchidae		
		Satin Bowerbird	*Ptilonorhychus violaceus*	x	
			Campephagidae		
		Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	x	
		White-winged Triller	*Lalage sueurii*	x	
			Artamidae		
		White-breasted Woodswallow	*Artamus leucorynchus*	x	
		Dusky Woodswallow	*Artamus cyanopterus*	x	
		Grey Butcherbird	*Cracticus torquatus*	x	
		Australian Magpie	*Gymnorhina tibicen*	x	
		Pied Currawong	*Strepera graculina*	x	
			Corvidae		
		Australian Raven	*Corvus coronoides*	x	
		Little Crow	Corvus benetti	x	
			Hirundinidae		
		Welcome Swallow	*Hirundo neoxena*	x	
		Tree Martin	*Hirundo nigricans*	x	
		Fairy Martin	*Hirundo ariel*	x	
			Motacillidae		
		Richard's Pipit	*Anthus naovaeseelandiae*	x	
F			**Sylviidae**		

A	B	Common Name	Family and Scientific Name	1	2
		∇ Brown Songlark	*Cincloramphus cruralis*	x	
		Australian Reed-warbler	*Acrocephalus australis*	x	
		Golden-headed Cisticola	*Cisticola exilis*	x	
		Tawny Grassbird	*Megalurus timoriensis*	x	
		Little Grassbird	*Megalurus gramineus*	x	
			Passeridae		
		* House Sparrow	*Passer domesticus*	x	
			Fringillidae		
		* European Goldfinch	*Carduelis carduelis*	x	
			Ploceidae		
		∇ Zebra Finch	*Taeniopygia guttata*	x	
		Red-browed Finch	*Neochmia temporalis*	x	
		* Nutmeg Mannikin	*Lonchura puntulata*	x	
			Dicaeidae		
		Mistletoebird	*Dicaeum hirundinaceum*	x	
			Zosteropidae		
		Silvereye	*Zosterops lateralis*	x	
			Pycnonotidae		
		* Red-whiskered Bulbul	*Pycnonotus jocosus*	x	
F			**Muscicapidae**		
		* Common Blackbird	*Turdus merula*	x	
			Sturnidae		
		* Common Starling	*Sturnus vulgaris*	x	
		* Common Myna	*Acridotheres tristis*	x	
		REPTILES			
			Chelidae		
E		Loggerhead Turtle	*Caretta caretta*		x
V		Green Turtle	*Chelonia mydas*		x
E		Leatherback Turtle	Dermochelys coriacea		x
V		Hawkesbill Turtle	**Eretmochelys imbricate**		x
			Agamidae		
		Jacky Lizard	*Amphibolurus muricatus*	x	
		Eastern Water Dragon	*Physignathus lesueurii*	x	
		Bearded Dragon	*Pogona barbata*	x	
			Varanidae		
		Lace Monitor	*Varanus varius*	x	
			Scincidae		
		Wall Skink	*Cryptoblepharus virgatus*	x	
		Striped Skink	*Ctenotus robustus*	x	
		Eastern Water Skink	*Eulamprus quoyii*	x	
		Grass Skink	*Lampropholis delicata*	x	
		Garden Skink	*Lampropholis guichenoti*	x	
		Weasel Skink	*Saproscincus mustelinus*	x	
		Eastern Blue-tongued Lizard	*Tiliqua scincoides*	x	
			Boidae		
		Diamond Python	*Morelia spilota spilota*	x	
			Elapidae		

A	B	Common Name	Family and Scientific Name	1	2
		Yellow-faced Whip Snake	*Demansia psammophis*	x	
		Red-naped Snake	*Furina diadema*	x	
V	E	Broad-headed Snake	*Hoplocephalus bungaroides*		x
		Red-bellied Black Snake	*Pseudechis porphyriacus*	x	
		Eastern Brown Snake	*Pseudonaja textilis*	x	
		Bandy Bandy	*Vermicella annulata*	x	
			Gekkonidae		
		Wood Gecko	*Diplodactylus vittatus*	x	
		Southern Leaf-tailed Gecko	*Phyllurus platurus*	x	
			Pygopodidae		
		Burton's Snake-lizard	*Lialis burtonis*	x	
		Common Scaly-foot	*Pygopus lepidopodus*	x	
			Typhlopidae		
		Blind or Worm Snake	*Ramphotyphlpos wiedii*	x	
		AMPHIBIANS			
			Myobatrachidae		
		Common Eastern Froglet	*Crinia signifera*	x	
V	V	Giant Burrowing Frog	*Heleioporus australiacus*		x
		Striped Marsh Frog	*Limnodynastes peronii*	x	
		Spotted Grass Frog	*Limnodynastes tasmaniensis*	x	
V	E	Stuttering Frog	*Mixophyes balbus*		x
		Red-crowned Toadlet	*Pseudophryne australis*	x	
		Smooth Toadlet	Uperoleia laevigata	x	
			Hylidae		
V	E	Green and Golden Bell Frog	*Litoria aurea*	x	x
		Bleating Tree Frog	*Litoria dentata*	x	
		Eastern Dwarf Tree Frog	*Litoria fallax*	x	
		Peron's Tree Frog	*Litoria peronii*	x	
		Leaf-green Tree Frog	*Litoria phyllochroa*	x	
		Tyler's Tree Frog	*Litoria tyleri*	x	