# Flora & Fauna Impact Assessment Report, for Major Project 10-0189, Royal Rehabilitation Centre Sydney 600-640 Victoria Road, Ryde

*Prepared for*
**Frasers Putney**

**17 January 2011**

*Prepared by*
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# Certification

I, Judith Rawling Managing Director of UBM Ecological Consultants Pty Ltd hereby state that this Report, a **Flora and Fauna Impact Assessment Report for MP 10-0189 at #600-640 Victoria Road Ryde** has been prepared in accordance with the NSW *Environmental Planning & Assessment Act S75O* to which Part 3A is applicable and set out in the Conditions of Consent detailed by the Minster NSW Planning (23 March 2006).

The UBM project team charged with preparing this Report were:

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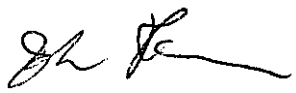
# Disclaimer

The preparation of this Report has been in accordance with the brief provided by the Client Frasers Putney and has relied upon the data and results collected at or under the times and conditions specified in the Report. All findings, conclusions or recommendations contained within the Report are based only on the aforementioned circumstances.

The Report has been prepared for use by the Client, and no responsibility for its use by other parties is accepted by UBM Ecological Consultants Pty Ltd.



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17th January 2011

# Definitions & Abbreviations

**DECCW** – NSW Department of Environment, Climate Change and Water (formerly DECC and prior DEC)

**DEWHA -** Commonwealth Department of Environment, Water, Heritage & the Arts (now renamed Dept. of Sustainability, Environment, Water, Population, & Communities – SEWPAC).

**Ecological Community** – described as an assemblage of species occupying a particular area.

**EEC/Endangered Ecological Community** – a community that is likely to become extinct unless the circumstances and factors threatening its survival cease to operate, and is listed under State and/or Commonwealth threatened species legislation.

**EP&A Act –** NSW *Environmental Planning & Assessment Act 1979*

**EPBC Act**– Commonwealth *Environment Protection & Biodiversity Conservation Act 1999*

**Habitat** – an area or areas occupied, or periodically or occasionally occupied by a species, population or ecological community, and including any biotic or abiotic components present.

**LGA –** Local Government Area

**Locality** – generally, an area within 1-2 kilometres of the Study Area

**NPWS** – National Parks & Wildlife Unit of DECCW

**Noxious Weed** – as gazetted for the LGA under the *Noxious Weeds Act 1993* (amended 2005)

**RCC** – Ryde City Council

**RRCS –** Royal Rehabilitation Centre Sydney

**SCIVI** – Southeast NSW Native Vegetation Classification and Mapping by Tozer *et al* .2010 for the NSW Department of Environment, Climate Change & Water (DECCW)[1].

**Subject Site** – the area to be directly impacted by Stage 1 of the Proposal, (see Figure 1.2)

**Study Area** – for the purposes of this Report, the Study Area comprises Lot 1010 in DP 836975 and Lot 102 in DP 826426 located in the grounds of the Royal Rehabilitation Centre Sydney.

**Study Region** – an area approximately 10 kilometres in diameter, centred on the Study Area.

**Threatened Species** – a species of flora or fauna listed under State and/or Commonwealth threatened species legislation.

**TSC Act** – NSW *Threatened Species Conservation Act 1995*

**UBM** – UBM Ecological Consultants Pty Ltd: formerly trading as Urban Bushland Management Consultants ('UBMC')

**WoNS** – Weed of National Significance

1 Reference: Tozer, M.G., Turner, K., Simpson, C., Keith, D.A., Beukers, P., MacKenzie, B., Tindall, D. & Pennay, C. Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands, in *Cunninghamia* 11(3), 2010.

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# 1 INTRODUCTION

## 1.1 Background Information

UBM Ecological Consultants Pty Ltd ('UBM') has been commissioned by Frasers Putney to prepare a *Flora and Fauna Impact Assessment Report* for land within the existing facility at Ryde proposed for redevelopment.

Major Project #10-0189 was prepared under Section 75B of the NSW *Environmental Planning & Assessment Act 1979,* to which Part 3A of the Act applies. The Project has been granted Concept Approval by the NSW Minister for Planning (23 March 2006) subject to a number of Terms and Conditions.

The Concept Approval relates to the *Urban Design Principles Site Analysis and Development Plan Volume 2*: the *Preferred Project Revised Concept Plan* prepared by BSA Architects (December 2005), which includes:

- A new purpose built specialised rehabilitation and disability facility;
- No more than 50 residential dwellings per hectares on land excluding the new purpose built specialised rehabilitation and disability facility;
- Landscaped public and private open space;
- Associated services and infrastructure; and
- Land use distribution, building heights, densities, swelling mixes and types.

The Subject Property at Putney is currently owned by the RRCS. Title will shortly be transferred to Frasers Putney for land within the Stage 1 development only.

Under the Proposal and in accordance with the Concept Plan, Lots 1, 2 and 8 are zoned 'General Residential' under *Ryde Local Environmental Plan 2010* (LEP 2010). The current Development Application relates primarily to Lot 8, the first stage of residential development, with road access through Lots 1 and 2.

The Director General Planning's Conditions of Consent (Part C, Condition C9) require the Proponent RRCS to lodge a Construction Management Plan prior to any development being undertaken on the site. Of relevance to the current Ecological Report is the clause relating to the management of native flora and fauna.

The Director General's Conditions further state that the Environmental Assessment prepared in support of the Proposal shall address impacts on flora and fauna, including threatened species, populations and endangered ecological communities and their habitats and steps taken to mitigate identified impacts.

This Ecological Report comprises an assessment of the conservation significance of the flora and fauna populations known to occur in the Locality in regards to current State *Threatened Species Conservation Act* 1995 and Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 environmental legislation. The occurrence of flora and fauna species, and populations with regional significance within the district and Region[2] are also addressed.

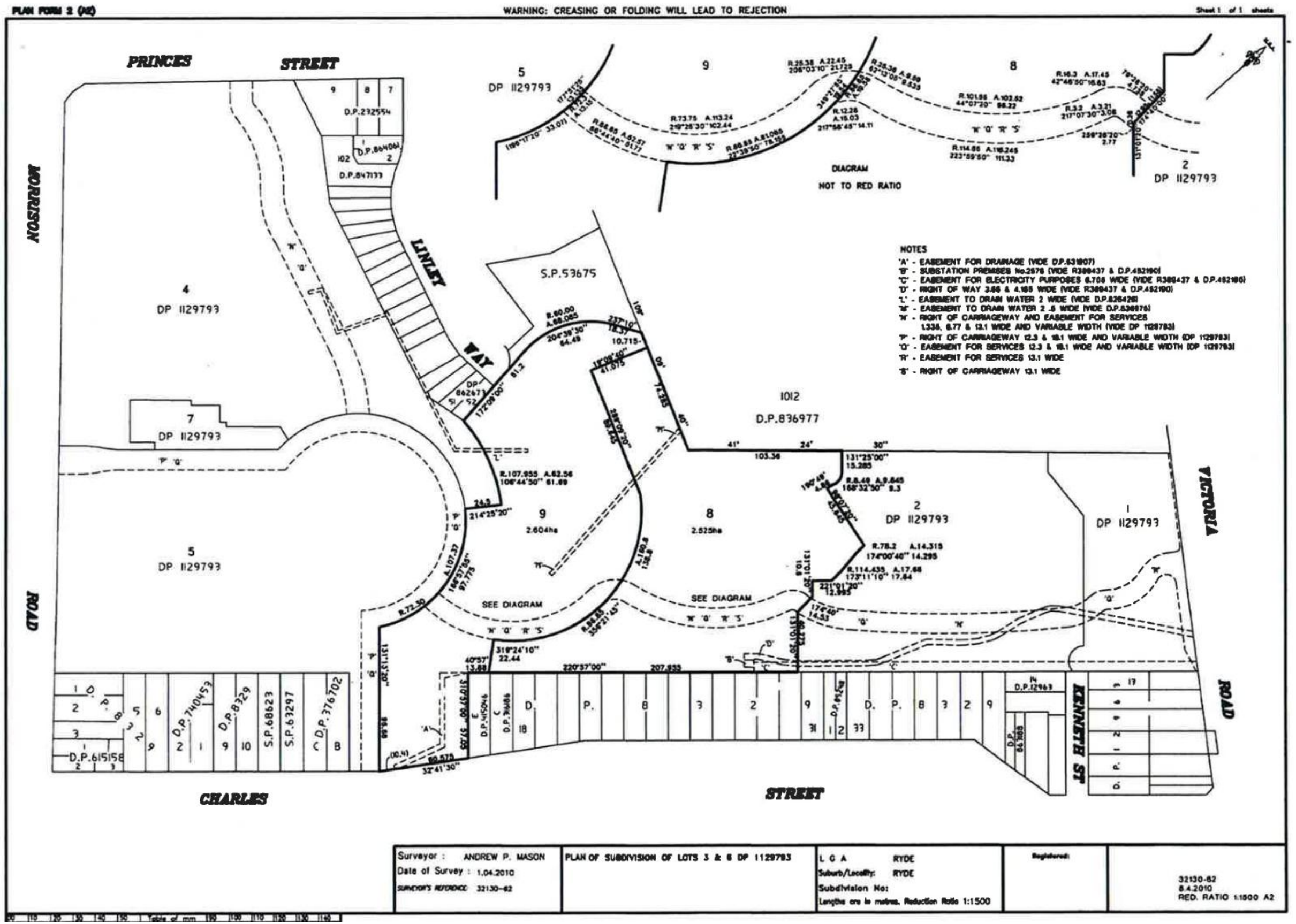
[2] Region is defined as an area within an approximate 10 kilometre radius of the Study Area.

The positioning of the Subject Property in the Locality is shown on Figure 1.1.

The current Ecological Report addresses only Stage 1 of the Project, which relates to development in Lots 1, 2 and new Lot 8 (previously known as Lot 3)(see Figure 1.2).

**Figure 1.1: The Subject Property**

**Figure 1.2: Revised Concept Plan, with Stage 1 of the Development shown as Lots 1, 2 and new Lot 8**



## 1.2 Legal & Planning Framework

A number of local government planning policies, State and Commonwealth Acts and Policies apply to the management of native vegetation (bushland) in Ryde LGA and New South Wales. While this list is not exhaustive, the most relevant of these are listed in Table 1.1 below.

**Table 1.1: Summary of Environmental Policies, Planning & Legislative Requirements**

| GOVERNMENT LEVEL | RELEVANT POLICY /LEGISLATION | RELEVANCE TO MANAGEMENT OF THE STUDY AREA |
|---|---|---|
| **LOCAL** | *Ryde Local Environmental Plan 2010* | For the purpose of this Report, the relevant LGA is Ryde City Council ('RCC').<br>Land within the Subject Property is zoned as follows:<br>▪ Lots 1, 2 and 3, 4 & 7 - R1 General Residential,<br>▪ Lot 6 – RE1 Public Recreation; and<br>▪ Lot 5 - SP1 Special Activities<br>The current Study Area addresses proposed development of Lots 1, 2 and (new) Lot 8. |
| **STATE** | *Environmental Planning & Assessment Act (Major Projects) 2005* | The Proposal is a Major Project under Section 3A of the Act as it meets the criteria in Schedule 1, Clause 13; residential retail and commercial.<br>The project is considered to be of 'State significance' and is worth $100M; accordingly the project is deemed to be a 3A development by the Minister for Planning. |
| | *Threatened Species Conservation Act 1995* | The *TSC Act* aims to conserve threatened species, populations and ecological communities; to promote their recovery; and manage the processes that threaten or endanger them.<br>No threatened ecological communities, flora species or populations were recorded within the Study Area (see Section 3.1).<br>One (1) vulnerable fauna species – the Grey-headed Flying Fox – was recorded within the Study Area (see Section 3.2). As this species does not roost in the site, there will be no impacts as a result of the Proposal. Therefore an Assessment of Significance evaluating the impact of the Proposal on this threatened fauna species has not been undertaken.<br>Suitable habitat exists for the Green & Golden Bell Frog (*Litoria aurea*). Although targeted, it was not located. However under the Precautionary Principle, Assessments of Significance have been undertaken for this species (see Appendix 1). |
| | Noxious Weeds Act 1993 (Amended 2005) | The Act aims to streamline administration and improve the implementation of noxious weed control. The NW Act allows for the declaration of noxious plants in five (5) classes – these being |

| GOVERNMENT LEVEL | RELEVANT POLICY /LEGISLATION | RELEVANCE TO MANAGEMENT OF THE STUDY AREA |
|---|---|---|
| | | grouped according to the control actions required.<br>Six (6) noxious weed species were recorded within the Study Area (see Section 3.1.2). As the landowner, the RRCS is responsible to implement the requirements of the Act on its own land. |
| | *State Environmental Planning Policy No 19 – Bushland in Urban Areas* | SEPP-19 aims to protect and preserve bushland within the Sydney Metropolitan area, and in other areas of the State that nominate for the inclusion under the terms of the Policy. SEPP-19 refers only to community (or public) land.<br>Clause 9 of the Policy requires public authorities to be cognisant of the aims of SEPP-19 when considering development on adjoining community/public land. No land within the Study Area or Subject Property is zoned as community land, and no adjoining land is so zoned. Therefore the requirements of SEPP-19 do not apply. |
| | *Environment Protection & Biodiversity Conservation Act 1999* | The *EPBC Act* includes mechanisms for the protection and recovery of ecological communities and species threatened with extinction.<br>No ecological communities, populations or flora species listed under the schedules of this Act occur within the Study Area.<br>One (1) vulnerable fauna species was recorded within the Study Area – the Grey-headed Flying Fox – was recorded within the Study Area (see Section 3.2). As this species does not roost in the site, there will be no impacts as a result of the Proposal. Therefore an Assessment of Significance evaluating the impact of the Proposal on this threatened fauna species has not been undertaken.<br>Suitable habitat exists for the Green & Golden Bell Frog (*Litoria aurea*). Although targeted, it was not located. However under the Precautionary Principle, an Assessment of Significance has been undertaken for this species. |

**Plate 1.1: View of Study Area looking from Open Grassland to the RRCS at top of hill (LHS)**

## 1.3 Site Description

The Subject Property is located in the suburb of Putney in Ryde LGA, north-western Sydney. Part of the land is occupied by the existing facilities of the RRCS, which has a dual frontage to Victoria Road and Morrison Road. Access is also available from Charles Street. Princess Street bounds the Property to the west and Charles Street to the east. The Calvary Retirement Village is located at the corner of Victoria Road and Princess Street (see Figure 2.1 for Site Details).

For the purposes of this Ecological Report, the Study Area was determined to be Lots 1, 2 and new Lot 8 (the latter formerly Lot 3).

It includes Lot 1, which is currently occupied by 'Moorong' -one of the three (3) existing health care facilities on the site[3] - an access driveway from Victoria Road, internal roads, recreational facilities, and incorporating extensive areas of lawn, specimen trees and landscaped gardens.

Lot 2 extends from the rear of Moorong, running downslope (south-east) and incorporating an internal road paralleling Charles Street, with mown lawns, areas of disused 'hardstand', and a large number of mature canopy trees, many of which are thought to have been planted.

Lot 8 is vacant land within the north-eastern sector of the Subject Property, currently occurring as open grassland with some regenerating bushland, and including disturbed areas which show signs of recent excavation. Swampy or boggy areas in the open grassland have been created as the result of this excavation. The open grassland is concurrent with a disturbed area of land (new Lot 9) which is proposed for a future stormwater detention basis.

The current Study Area represents Stage 1 of a larger redevelopment project for the RRCS. This entails residential development in Lot 8, with road access to Victoria Road provided through Lots 1 and 2.

For field survey purposes, the Study Area was divided into three (3) main Survey Zones, totalling ~236 hectares in size. These were:

- Survey Zone 1 – Lot 1, being Moorong, with its landscaped gardens and lawns;
- Survey Zone 2 – Lot 2, being the tree plantation, lawns and areas of hardstand; and
- Survey Zone 3 - Lot 8, which is mainly open grassland with scattered trees and shrubs regenerating on disturbed soils.

(see Figure 2.1 for Survey Zone details)

**Note**: due to highly disturbed topography, there may be some overlap in the survey results recorded for new Lots 6, 8 and 2.

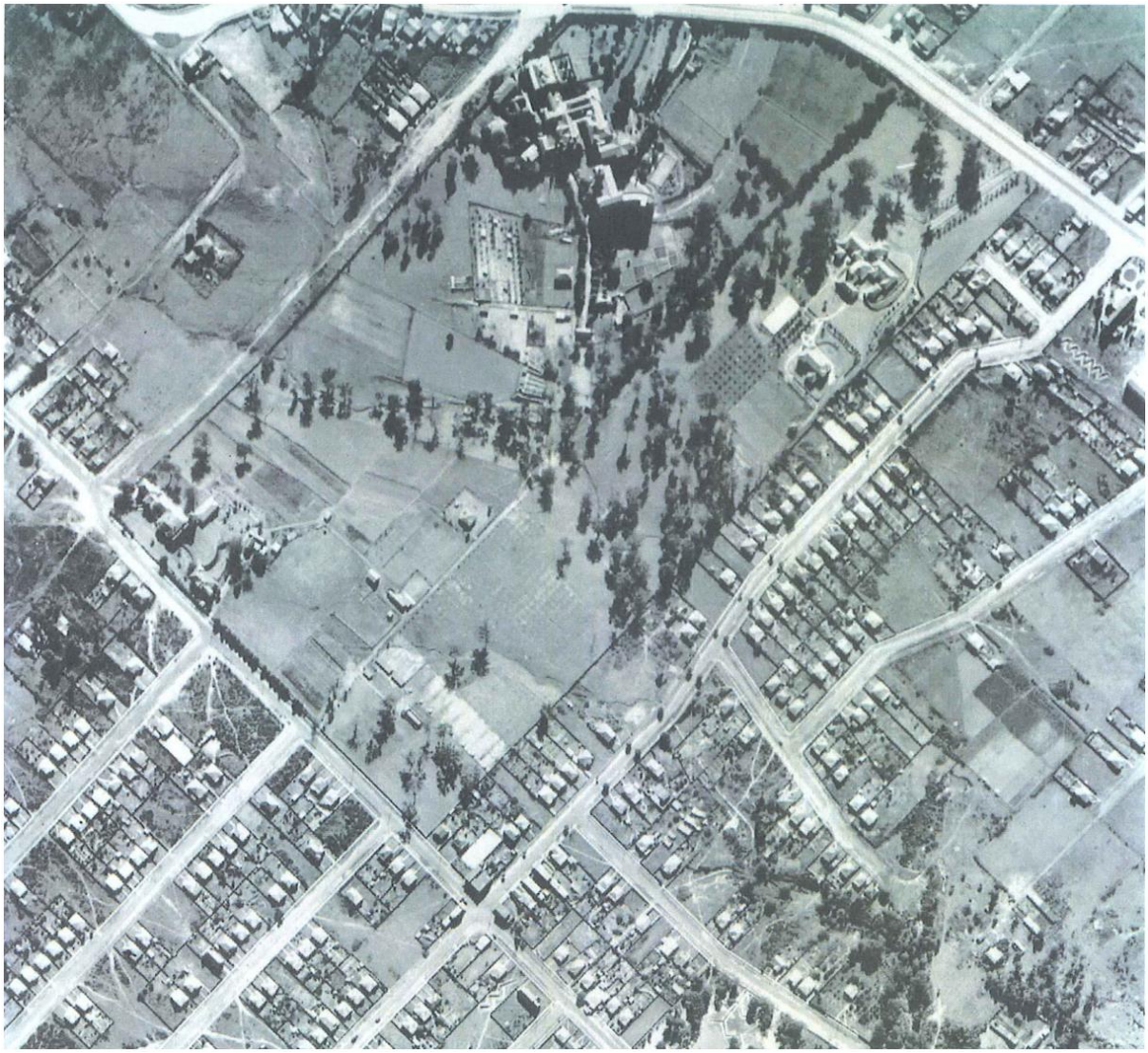
Vegetation in the Locality has long been cleared; initially in the 19th century for agriculture, and from the 20th Century onwards for suburban development. The closest stands of bushland occur along Buffalo and Strangers Creek in the Field of Mars Nature Reserve to the north-east and in Morrison Park, located along

[3] The other healthcare facilities are Weemala and Coorabel, located in the south west and south east of the Property respectively

the Parramatta River. Small remnants of the original vegetation have been preserved as trees (only) in several local parks – e.g. Parry Park and Cudal Reserve.

Past land uses included some agricultural and; with cultivated fields and an orchard clearly visible in the aerial photograph from 1943. However, facilities for the RRCS were already in place at that time (see Figure 1.3).

**Figure 1.3: Aerial Photograph of the RRCS in 1943 (RTA archives)**



### Table 1.2: Summary of Study Area and Physical Environment

| | |
|---|---|
| **CO-ORDINATES:** | Easting: -33.82, Northing: 151.11 |
| **SIZE OF STUDY AREA** | Current Study Area is Lot 1 (1.07 ha); Lot 2 ( 2,47 ha), and Lot 8 (2,792 ha) = 6.332 ha |
| **SOIL LANDSCAPE UNIT:** | Majority of Subject Property is the Glenorie (gn) SLU, with a small area of West Pennant Hills (wp) to the northwest, and a small area of Lucas Heights (lu) to the southeast. (see Figure 1.4)<br>Glenorie and West Pennant Hills SLUs are based on the Wianamatta Shales (clay soils), while Lucas Heights comprises the Mittagong Formation in which shale and sandstone –based soils occur. (Chapman *et al.* 1989) |
| **LANDHOLDER:** | Royal Rehabilitation Centre Sydney: soon to be sold to Frasers Putney |
| **LOCAL GOVERNMENT AREA:** | Ryde |
| **WATER BODIES & DRAINAGE LINES:** | No natural drainage lines occur within the Study Area, although a minor swale was observed running between Lots 1 and 2. – this area having been landscaped some years ago.<br>Boggy patches and swampy areas occur in the open grassland and lower part of the Property as the result of previous excavations. |
| **VEGETATION COMMUNITIES:** | No native vegetation community remains *in situ*. Given its topographical location and the geology/soil, the community prior to clearing was likely to have been Turpentine Ironbark Margin Forest, grading into Sandstone Gully Forest towards the Parramatta River. |
| **HABITAT TYPES:** | 1. Open Grassland with Isolated trees and shrubs, and Landscaped Gardens;<br>2. Swamp Marsh; and<br>3. Remnant and Planted Vegetation(trees) |
| **CORRIDOR VALUE:** | Very minor, linking Field of Mars (north-east) to local parks (south-east) and then only through locally retained/planted trees in private gardens and as street plantings. |
| **CLIMATIC DETAILS:** | The annual mean daily maximum temperature is 22.8 °C with the highest temperatures recorded in December, January and February.<br>The annual mean daily minimum temperature is 11.2 °C, with lowest temperatures recorded in June, July and August.<br>Mean annual rainfall is 1136.8 mm; with January, February and March recording the highest mean levels (Bureau of Meteorology 2010, Macquarie Park (Willandra Village), AWS # 066156). |

**Figure 1.4: Soil Landscape Units (Chapman *et al.* 1989)**

# 2 METHODOLOGY

## 2.1 Literature Review & Compilation of Existing Data

During the preparation of this Report, relevant databases and other documents were assessed; previous studies and investigations for the Region, and local history sources were consulted. As this Report is intended to serve as a 'stand alone' document, data and other background information has been sourced from these documents, and where appropriate incorporated into the Report. All such information has been appropriately referenced.

With reference to previous ecological surveys conducted in the Locality and Region, the main documents referenced for the Report were:

- Western Sydney: Urban Bushland Biodiversity Survey (NPWS 1997);
- Native Vegetation of the Cumberland Plain (NPWS 2002); and
- Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands. Version 1.0. (Tozer *et al.* 2010).

In addition, the *Environment Protection and Biodiversity Conservation Act* Online Database (SEWPAC 2010a; search area five (5) km radius around the Subject Property), the NPWS Atlas of New South Wales Wildlife Database (DECCW 2010a); search area 10 km x 10 km centred on the Subject Property (Coordinates: Easting: -33.82°, Northing: 151.11°) and NSW DECCW Data Request (DECCW 2010a; search area 10 km x 10 km centred on the Subject Property) were accessed to identify previous recordings of flora and fauna species of conservation significance within the Region.

A range of other reports and databases were reviewed and drawn upon as required (see Section 5 Bibliography). Particular attention was paid to records of species listed under the Schedules of the Commonwealth *EPBC Act* and the NSW *TSC Act* which have previously been recorded in the Region[4].

Plant identifications were made according to nomenclature in Pellow *et al.* (2009) and the Botanic Gardens Trust -Plantnet (2010). Stands of vegetation were described by their structural and floristic characteristics according to Specht (1981) and Tozer *et al.* (2010). Threatened ecological communities were classified and named according to NSW Scientific Committee's Preliminary and Final Determinations (various dates). Collected flora specimens will be lodged with the Janet Cosh Herbarium, University of Wollongong.

Noxious weeds were determined using lists from the weeds declared for Ryde Local Government Area, as gazetted under the *Noxious Weeds Act 1993 (Amended 2005*).

Field guides and standard texts used during the fauna fieldwork were:

- Cronin (2001) – reptiles and amphibians;
- Slater *et al.*(2003) – birds;
- Strahan (2008) – mammals;

[4] Where 'Region' is defined as an area approximately 10km in diameter from the nominated Study Area.

- Churchill (2009) – Australian bats;
- Triggs (2004) – identification of scats, tracks and markings; and
- Bayley and Brouwer (2004) – habitat type and structure.

The naming of those fauna species recorded within or immediately surrounding the Study Area follows the nomenclature presented in these texts, or as described on the Schedules to the *EPBC* and *TSC Acts*. By identifying those species likely to occur, particularly any threatened fauna, the most appropriate species-specific survey techniques were then selected. Suitability of the habitat present within the Study Area was considered.

The literature search also ensures that the results from surveys conducted during different climatic, seasonal and date periods are considered and drawn upon as required, thereby avoiding any issues inherent with a one-off "snap shot" study (such as that unavoidably presented by the current surveys). This approach increases the probability of considering the presence of, and possible impacts on, all known and likely native species, particularly any species of Regional, State and/or National conservation concern.

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

- The *EPBC* and *TSC Acts* (National and State context respectively), and for plants (only);
- The NPWS Western Sydney Urban Bushland Biodiversity Survey 1997 (local and regional context).

The NPWS *Western Sydney Urban Bushland Biodiversity Survey* (1997) is a regional list based on records of species within its defined boundaries, and indicates species which are considered to be '*significant*' only within the Western Sydney area as at 1997. This list is currently being updated by DECCW.

**Figure 2.1: Site Details and Study Area**

## 2.2 Flora Field Survey

***The Study Area***

The Study Area is located in the generally north-eastern sector of the Subject Property bounded by Victoria Road (north-east), a retirement village to the west, and residential development on Charles Street to the east. The extent of the Study Area to the south-west was largely determined by the large area of disturbed vacant land, which is understood to have been excavated at some time in the past for a development which did not proceed.

For survey purposes, the Study Area Lots 1, 2 and 3 were divided into three (3) separate Zones. These Zones, which roughly correlated to fauna habitat types[5] , were:

1. Open Grassland with Isolated trees and shrubs, and Landscaped Gardens;
2. Swamp Marsh
3. Remnant Vegetation

Field surveys were undertaken by restoration ecologist Judith Rawling $_{(BA,DipEd,DipEvnStud,MEnvStud)}$ on the 3rd, 5th January and botanist Belinda Pellow $_{(Dip.App.Sc.[Ag)}$ on the 7th January 2011. In total approximately five (5) hours were spent actively surveying the vegetation within the Study Area. Another hour was spent in laboratory time.

Vegetation occurring within the Study Area was assessed in a 'general' survey carried out on foot and using the 'Random Meander' method as described by Cropper (1993). The use of the Random Meander Method ensures that all vegetation is investigated. A targeted search was then undertaken for the threatened flora species listed under the Schedules of the NSW *TSC Act* and Commonwealth *EPBC Act,* with emphasis on searching for those species which have been identified as occurring, or potentially occurring, in the Locality and Region.

All vascular flora species sighted during the searches were recorded.

Descriptions of floristic structure followed Specht (1981). The dominant introduced (weed) species in the Study Area were also recorded.

***Identifying the Type and Extent of Vegetation Communities Present***

Over the past 10 years, the NSW Department of Environment, Climate Change & Water ('DECCW') has been developing vegetation maps for the greater Sydney area and New South Wales south coast. This is an ongoing process of revision and addition as new surveys and community verification take place. Until fairly recently, DECCW recommended the use of what has been know as the NPWS 2002 *Cumberland Plain Vegetation Maps* for determining the type and locations of native vegetation communities for western Sydney. These maps have since been superseded by the release of a new series of maps, the "*Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands*, *Version*

[5] See Figure 3.3. for fauna habitat types

*1.0*." (Tozer *et al.* 2010) - known as 'SCIVI' – this mapping system is now recommended by DECCW for use when assessing vegetation communities from Sydney to the border of Victoria and west to the ranges.

Accompanying the SCIVI mapping series is a report which provides vegetation community descriptions and a method for field assessment using a standard 0.4 ha test plot area ('quadrat') and a set of diagnostic flora species for each community type.

As the structure of the vegetation present within the Study Area was generally severely degraded and few native species were present in the ground and shrub layer, a test plot could not be used to determine the type of vegetation community present. Instead all native species seen were recorded and compared with the above-mentioned diagnostic species lists to confirm the potential vegetation community present. Once determined, the vegetation community can be considered for its potential to be either an '*endangered ecological community*' ('EEC') or a component of such a community.

## 2.3 Fauna Field Survey

The diurnal and nocturnal fauna surveys were undertaken by field biologist Cameron Radford (B. Env.Sc,MWldlfeHlth) on the Thursday 23/12/2010 (diurnal). A second diurnal survey was undertaken by C. Radford on 11th January in order to identify any frog calls, given that rain was falling at that time.

Fauna field surveys were aimed at assessing the species richness of the site, to investigate the range of fauna habitats present, and the occurrence or potential for local threatened fauna species to occur. The fauna survey incorporated a range of techniques designed to target species from all fauna groups, including amphibians, birds, mammals and reptiles. These techniques included a series of diurnal bird censuses, ultrasonic call detection for microchiropteran bats, nocturnal census (spotlighting, owl call playback and frog searches), searches for active herpetofauna (reptiles and amphibians), and recording of indirect evidence of fauna presence (e.g. tracks, scats, nests, diggings, bones and other traces). In addition, all opportunistic sightings of fauna were recorded.

All relevant previous reports and databases were reviewed and drawn upon. A comprehensive list identifying all fauna species previously located within the Region close to the Study Area has been included at the end of each respective chapter. Particular attention was paid to records of species listed under the Schedules of the *EPBC* or *TSC Acts,* and to those species considered to be regionally significant, according to NPWS 1997.

While walking through different terrains and vegetation types, the condition and structure of the fauna habitats present were identified, and a consideration of their potential to support locally-occurring populations of threatened fauna was determined. Potential threats or the impacts of introduced fauna, weed invasion and clearing, bushfire reduction clearing or burning, and bush regeneration works (clearing weed thickets etc) on significant fauna habitats were also noted.

***Diurnal Birds***

Formal bird point censuses were conducted in various fauna habitat types present within the Study Area. The formal census involved 'point counts' made along designated transects (along tracks/trails where

possible to minimise disturbance). This method was used in addition to the opportunistic bird census conducted over the remaining areas of each Study Area. Approximately 15-20 minutes was spent at each survey point during early morning or late afternoon sessions, where birds were identified on the basis of visual identification and by their characteristic calls. All opportunistic observations of bird species were recorded while undertaking general field survey activities.

***Nocturnal Birds***

Nocturnal birds were surveyed using playback of pre-recorded calls of threatened owl species at all sites where nocturnal surveys were carried out.

Calls were played at the start of the spotlighting surveys. These surveys involved initial listening periods for 15 minutes; followed by playing the species' recorded call for approximately five (5) minutes duration. Each call was followed by a 10 minute listening period for an audible response before commencing with the next species' call. The end of the last call was followed by a five (5) minute listening period for any audible response, then spotlighting for approximately 10 minutes.

The pre-recorded calls were played through a portable MP3 player and broadcast via a megaphone. Species targeted included the Powerful Owl (*Ninox strenua*) and Barking Owl (*Ninox connivens*).

Searches and listening for the calls of other nocturnal birds was undertaken during the spotlighting surveys.

***Herpetofauna Census***

Reptiles and amphibians were surveyed using hand-searches in suitable habitat, by spotlighting for nocturnal species and frog call playbacks. Call playbacks were played after rain and at dusk. For reptiles, hand searches concentrated on areas containing high woody debris or urban refuse, those near watercourses and around the base of trees; and this included techniques such as carefully turning over rocks or logs wherever these were encountered. These were replaced *in situ* after inspection.

All opportunistic sightings of active herpetofauna were noted. Wherever appropriate, nocturnal searches were conducted around water sights using a head torch to survey for active frogs. Frogs were identified on the basis of their characteristic calls, and wherever possible, by direct observation. Furthermore, playback using pre-recorded calls of threatened amphibians was used for surveying around potential amphibian habitat including ponds and swampy areas. The process was similar to that of the owl playbacks.

***Mammals***

Spotlighting was undertaken for all terrestrial and arboreal mammals and for nocturnal birds using a Lightforce 100 Watt hand-held spotlight with a red filter. The locations of all fauna sightings were recorded during the spotlighting surveys. The spotlighting session lasted for at least 1.5 hrs, and was carried out during and after dusk, generally on formal pathways to minimise disturbance created by the observer.

***Bats***

A stationary ultrasonic bat call detector (Anabat II, Titley Electronics) was used with a SD1 unit to record bat calls at all sites. The unit was positioned adjacent to waterways, forest edges and vehicle tracks where predicted 'fly-ways' exist. Calls were recorded continuously before and during spotlighting activities. Recorded calls were later identified to genus or species level where possible using computer frequency analysis software.

In relation to the analysis of those microchiropteran calls obtained, it is noted that some insectivorous bat species have distinctive echolocation calls that are unlikely to be confused with those of other species. Other bats species overlap in both call frequency and structure, making identification problematic in some cases.

The degree of confidence or reliability associated with call identifications will depend on the quality of the recordings as well as the activity of the bat at the time of recording and flight direction. In some instances, a particular species may be identified with confidence, while at other times its identification will be less certain. For this Report, echolocation call identifications have been assigned to three (3) categories with regard to the reliability of identification.

These are:

- D = Definite;
- P = Probable; and
- Po = Possible Identification.

Spotlighting and listening for calls of megachiropteran bats (*Pteropus* spp) was conducted during the spotlighting activities.

***Searches for Evidence of Species Presence***

Searches were conducted for animal scats of both predatory and non-predatory species. Where these were encountered, scats were identified *in situ,* to genus and then to species level, wherever possible. The search concentrated on the ground area beneath trees, as well as around hollow logs, and around tracks and trails.

Searches were also made for other characteristic signs of fauna species' presence; including tracks, bones, hair, shed skins and animal remains, as well as nests, diggings, chew marks, scratchings and pellets (indicative of birds of prey).

## 2.4 Limitations to Ecological Field Surveys

The diversity of the flora species recorded during the current field surveys is expected to be influenced by seasonal factors, with some species likely to be inconspicuous, or absent from the above-ground populations during particular times of the year. For these reasons, survey results can always be improved by extending the time allowed to provide an investigation in all seasons.

Similarly, the list of fauna species recorded by the current field surveys should not be regarded as being fully comprehensive, but rather as providing an indication of the species present at the time of the survey

(December 2010/January 2011). Surveys carried out during different periods of the day and across all seasons are needed to identify all of the species present in an area, especially as some species are only present at certain times of the year (e.g. migratory birds), while others may require specific weather patterns and seasonal conditions for optimum levels of detection, e.g. amphibians.

Therefore, when establishing the suite of resident native species occurring or potentially occurring in an area by utilising the habitat requirements and associations of these animals, the diversity of other native species that could occur on occasion can be determined. For example, if a hollow-associated owl is detected, then there is the potential that, if previously recorded in the vicinity of the Study Area, other species of owls with similar nesting requirements may also be present. By using those species recorded to predict the full range of fauna potentially present in the Study Area helps to overcome some of the limitations associated with seasonal constraints and of surveys of limited duration.

In some sites, terrain or dense vegetation may limit the extent of the field survey. Areas in sites with extremely dense, sharp vegetation (such as Blackberry or Lantana thickets*),* swampy areas or muddy creek lines were not always surveyed thoroughly.

## 2.5 GPS Methodology

A Garmin SCx60 unit was used to log data in the field, with locations being recorded when relative points of interest were observed. The Global Positioning Unit ('GPS') is a hand-held unit, accurate to 3.5 metres, and allowing for rapid translation of data into a Geographical Information System ('GIS').

**Note:** the GPS unit used provides an *average accuracy* of 3.5 metres under *favourable* conditions. However, due to the challenging terrain, areas of dense canopy vegetation which blocks satellite detection, and at times overcast or unfavourable weather conditions, the accuracy of some readings may have been affected. As a precaution, all data derived from GPS records provided in this Report should be regarded as indicative only.

# 3 SURVEY RESULTS

### Table 3.1: Summary of Survey Effort

| | | |
|---|---|---|
| **DATESOF INVESTIGATION:** | | Diurnal & nocturnal investigations: 23rd December 2010 and 11th January 2011 (fauna)<br>Diurnal Investigation: 3, 5 & 6th January 2011 (flora) |
| **WEATHER:** | | Diurnal investigation: (1) hot temperatures (29°C-33°C), and a slight breeze (max 7 km/hr); (2) overcast with light rain, and (3 & 4) overcast with light rain and temperatures ~28-30°C. |
| **SURVEY TIME** | **FLORA:** | 5 person hours plus 1 hour laboratory time |
| | **DIURNAL FAUNA:** | 3 person hours plus opportunistic sightings |
| | **NOCTURNAL FAUNA:** | 3 person hours |
| **FLORA SURVEY METHOD:** | **THREATENED SPECIES SEARCH:** | Random Meander |
| | **VEGETATION COMMUNITY DETERMINATION:** | Random Meander |
| **FAUNA SURVEY METHOD (also see Figure 3.2)** | **BIRD SURVEY:** | Two (2) 20 minute Point Counts, each visited early morning and on dusk. Random observations |
| | **HERPTOFAUNA SEARCH:** | Random meander and targeted habitat searches |
| | **CALL PLAYBACKS** | One (1) x half (1/2) hour timed call play back for owls and frogs each, plus a further hour for secondary call playbacks. |
| | **SPOTLIGHTING:** | Two (2) hour timed transect conducted by one (1) person |
| | **ANABAT:** | One (1) overnight session between dusk and dawn for ~10 hrs using two (2) Anabat SD1 located in different habitat types |

## 3.1 Flora Investigation Results

The Study Region is known to support a number of '*vulnerable*' or '*threatened entities'*; being those flora and fauna species, populations and vegetation communities listed under the NSW *TSC Act* and/or Commonwealth *EPBC Act*. In particular, the Study Area is known to have once supported the vegetation community known as 'Sydney Turpentine Margin Forest', which is listed under the TSC Act as the endangered ecological community Sydney Turpentine Ironbark Forest.

### 3.1.1 Indigenous Flora Species

A total of 20 locally indigenous flora species were recorded during the field survey. The remainder (105) of the total 125 species recorded were non-indigenous native species, horticultural introductions, or weeds.

A list of indigenous plant species recorded for the Study Area[6] is provided in Appendix 2. This is not intended to be a comprehensive list of all species present, and represents only those species that were recorded for the determination of vegetation communities and while undertaking searches for native species of National or State conservation significance known for, or expected to occur in the Region. In particular, the horticultural plantings in Lot 1 (RRCS gardens) were not fully recorded.

***Threatened Species***

A number of threatened species have previously been recorded within a 10 km radius of the Study Area (see Table 3.2). However, no threatened flora species or populations were located by UBM during the current field survey.

**Table 3.2: Flora Species of State or National Conservation Significance occurring in the Region**

**Source of Records**
1 = DECCW (2010). Search area: 10 x 10 km centred on the Study Area (State Significance)
2 = SEWPAC (2010). Search area: 5 km radius centred on the Study Area (National Significance)

**Key to status under TSC ACT:**
V- Vulnerable
E1 - Endangered
E2- Endangered Population
E4A- Critically Endangered Species

| SCIENTIFIC NAME | COMMON NAME | STATUS | SOURCE | |
|---|---|---|---|---|
| | | | 1 | 2 |
| *Acacia bynoeana* | Bynoe's Wattle | E1 | X | |
| *Acacia pubescens* | Downy Wattle | V | X | |
| *Callistemon linearifolius* | Netted Bottle Brush | V | X | |
| *Caladenia tessellata* | Thick-lipped Spider-orchid | V | | X |
| *Cryptostylis hunteriana* | Leafless Tongue-orchid | V | | X |
| *Darwinia biflora* | | V | X | X |

[6] This being Lots 1, 2 and 8 only

| SCIENTIFIC NAME | COMMON NAME | STATUS | SOURCE | |
|---|---|---|---|---|
| | | | 1 | 2 |
| *Deyeuxia appressa* | | E1 | X | X |
| *Dillwynia tenuifolia* | | V | X | |
| *Epacris purpurascens var. purpurascens* | | V | X | |
| *Eucalyptus camfieldii* | Heart-leaf Stringybark | V | X | |
| *Eucalyptus nicholii* | Narrow-leafed Peppermint | V | X | |
| *Genoplesium baueri* | Bauer's Midge Orchid | V | X | |
| *Hypsela sessiliflora* | | E1 | X | X |
| *Leptospermum deanei* | Dean's Paperbark | V | X | |
| *Melaleuca biconvexa* | Biconvex Paperbark | V | | X |
| *Melaleuca deanei* | Deane's Melaleuca | V | X | X |
| *Pimelea curviflora var. curviflora* | | V | X | X |
| *Persoonia hirsuta* | Hairy Geebung | E1 | X | |
| *Pomaderris prunifolia* | | E2 | X | |
| *Prostranthera marifolia* | Seaforth Mintbush | E4A | X | X |
| *Pterostylis saxicola* | Sydney Plains Greenhood | E | | X |
| *Tetratheca glandulosa* | | V | X | X |
| *Tetratheca juncea* | Black-eyed Susan | V | X | |
| *Wahlenbergia multicaulis* | Tadgell's Bluebell | E2 | X | |
| *Wilsonia backhousei* | Narrow-leafed Wilsonia | V | X | |

None of the threatened species listed above was recorded in the Study Area.

***Regionally Significant Species***

Flora species recorded which are considered to be of regional or local significance in Ryde (Kubiak 2005) are listed in Table 3.3. This was done in order to consider the significance of the Study Area in the regional context. This allows for an assessment of the site that incorporates the regional setting, as well as the State and National context. Although considered to be '*vulnerable*' within the Region, these species are relatively common to widespread, and are well represented in the system of reserves across the Study Region. No species listed in Table 3.1 were recorded in the Study Area.

Five (5) flora species recorded within the Study Area have been listed in Kubiak (2005) as being of regional or local significance in Ryde LGA: *Brunoniella australis, Eucalyptus acmenoides, Eucalyptus paniculata, Eucalyptus punctata,* and *Notodanthonia longifolia* (see Table 3.3).

**Note**: It is however possible that one or more of these 'significant' tree species was planted as part of an earlier 'generally Australian native' landscape design. As most of the trees on the lower part of Lot 1 and the tree plantation on Lot 2 are of a similar age, there is no way of knowing if this is the case.

**Table 3.3: Species considered regionally significant in Ryde**

| SPECIES | COMMON NAME | SIGNIFICANCE |
|---|---|---|
| *Brunoniella australis* | Blue Trumpet | Very Rare (Ryde)<br>Rare (Northern Sydney) |
| *Eucalyptus acmenoides* | White Mahogany | Rare (Regional) |
| *Eucalyptus paniculata* | Grey Ironbark | Not Common (Ryde) |
| *Eucalyptus punctata* | Grey Gum | Uncommon (Ryde) |
| *Notodanthonia longifolia* | Wallaby Grass | Rare (Ryde Status) |

*Key for Significance
Regional: plant species considered significant within the Sydney region
Northern Sydney: species regarded as significant in the context of northern Sydney's bushland
Ryde: species considered locally significant in Ryde's bushland

### 3.1.2 Weed Species

There were a large number of exotic introductions, as well as environmental and noxious weed species present within the Study Area, occurring throughout the Property, but found in dense thickets underneath and around the tree plantations at the rear of Lot 1 and on Lot 2(see Plates).

Of the total number of weeds or introductions present, 12 plants are declared to be 'noxious weeds' in Ryde LGA: (see Table 3.4).

Two (2) of these introduced species have also been declared as Weeds of National Significance ('WoNS'), *Lantana camara,* and *Rubus fruticosus* (aggregate).

**Table 3.4: Significant Weed Species Recorded in the Study Area at RRCS– Noxious and Keystone Environmental Weeds for Control**

| SCIENTIFIC NAME | COMMON NAME | NOXIOUS CLASS* | WONS |
|---|---|---|---|
| ***Woody Weeds*** | | | |
| *Cestrum parqui* * | Green Cestrum | 3 | |
| *Cinnamomum camphora* * | Camphor laurel | 4 | |
| *Genista monspessulana* * | Cape Broom | 4 | |
| *Lantana camara* * | Lantana | 4 | WoNS |
| *Ligustrum lucidum* * | Large-leaf Privet | 4 | |
| *Olea europaea subsp cuspidata* * | African Olive | 5 | |
| *Rubus fruticosus (* aggregate) * | Blackberry | 4 | WoNS |
| ***Herbaceous Weeds*** | | | |
| *Grasses* | | | |
| *Cortaderia selloana* * | Pampas Grass | 3 | |
| *Eragrostis curvula* | African Love Grass | | |

| SCIENTIFIC NAME | COMMON NAME | NOXIOUS CLASS* | WONS |
|---|---|---|---|
| *Pennisetum clandestinum* | Kikuyu Grass | | |
| *Senecio madagascariensis* * | Fireweed | | |
| *Flowering Forbs* | | | |
| *Ageratina adenophora* | Crofton Weed | | |
| *Ricinus communis* * | Castor Oil Plant | 4 | |
| *Vines, Climbers & Scramblers* | | | |
| *Cardiospermum grandiflora* * | Balloon Vine | 4 | |
| *Ipomoea indica* * | Morning Glory Vine | 4 | |
| *Tradescantia fluminensis* * | Wandering Jew | 4 | |

*Noxious weed gazetted for Ryde LGA

A large number of non-indigenous native species were also recorded in the Study Area, especially in Lots 1 and 2. These species represent one or more earlier landscaping program which focused on using 'generally' Australian native plants – although not necessarily locally occurring species (see Appendix 2).

**Plate3.1: View of Remnant Ironbark on Lot 2 with weedy understorey**

### 3.1.3 Type and Condition of Vegetation Communities within the Study Area

Despite the presence of small patches of retained and/or regenerating native vegetation, the current Study Area does not support any area with an intact native plant community – i.e. bushland.

Those native species that do occur as either retained (mainly trees) or regenerating vegetation are representative of the Turpentine Ironbark Margin which would have once occupied the site.

Earlier mapping of the Cumberland Plain vegetation by NPWS (*Cumberland Plain Vegetation Maps* 2002) does not record any native vegetation within the Subject Property, but it does record small stands of Turpentine Ironbark Margin Forest and other 'unclassified' vegetation occurring to the south-east, presumably being in Parry Park and Cudal Reserve. At January 2011, no native bushland occurs in either of these small neighbourhood parks; with only remnant trees having been retained over mown lawns.

Similarly, more recent mapping undertaken by Tozer *et al*. for DECCW (SCIVI 2006-2010) does not record *any* native vegetation community within the Subject Property, nor does it record native vegetation in Parry Park or Cudal Reserve (see Figure 3.2).

This is because the more recent mapping does not consider areas which were previously mapped (NPWS 2002) as TX and TXU, which means trees over lawns, gardens or urban development. Tozer *et al*. (2010) has also changed the mapping classifications so that the two mapping systems are not directly comparable.

**Figure 3.1: General locations of remnant STIF trees in the Study Area**

**Figure 3.2: Mapped Vegetation Communities (SCIVI 2010)**

## 3.2 Fauna Investigation Results

The current fauna survey was undertaken to describe the current status of the fauna in, and adjacent to the Study Area. The value of the fauna in the National, State, and regional context has been considered in relation to habitat types, fauna populations and species.

The Methodology used in the fauna investigation has been detailed in Section 2 of this Report. A summary of the survey effort is provided in Figure 3.1.

### 3.2.1 Fauna Species

Previous fauna surveys and compilation lists prepared for the Region have identified 15 amphibians, 41 mammals; one (1) threatened invertebrate, 220 birds, and 25 reptiles (see Appendix 2).

By the completion of the current field survey, three (3) native mammals, two (2) native reptiles, two (2) amphibians, and 11 native birds had been detected within, or were observed flying over the Study Area, or identified from their characteristic calls and signs (Tables 3.5 and 3.6).

**Table 3.5: Fauna Species Identified During Field Survey**

***Observation Type:***

| | | | | | |
|---|---|---|---|---|---|
| O | Observed | D | Dog kill | S | Shot |
| B | Burnt | W | Heard call | N | Not located |
| F | Tracks/scratchings | C | Cat kill | X | In scat |
| T | Trapped or netted | Z | In raptor/owl pellet | A | Stranding/Beached |
| H | Hair, feathers, or skin | V | Fox kill | I | Subfossil/Fossil Remains |
| Y | Bone or teeth | E | Nest/roost/den | U | Anabat |
| R | Road kill | K | Dead | G | Feeding Sign |
| P | Scat | M | Miscellaneous | | |

* - indicates introduced species.

^ - indicates species of regional conservation significance (as per NPWS 1997).

TSC – indicates species listed vulnerable under the *TSC Act*. 'V' = Vulnerable, 'E1' = Endangered

EPBC – indicates species listed under the *EPBC Act.*

| COMMON NAME | SCIENTIFIC NAME | OBSERVATION METHOD | COUNT |
|---|---|---|---|
| **AVES** | | | |
| Australian White Ibis | *Threskiornis molucca* | O/W | 20+ |
| Australian Wood Duck | *Chenonetta jubata* | O | 1 |
| Australian Magpie | *Cracticus tibicen* | O | 2 |
| Australian Raven | *Corvus coronoides* | O/W | 7 |
| Common Myna * | *Acridotheres tristis* | O/W | 10+ |
| Crested Pigeon | *Ocyphaps lophotes* | O/W | 5 |
| Grey Butcherbird | *Cracticus torquatus* | W | 2 |
| Laughing Kookaburra | *Dacelo novaeguineae* | W | 3 |

| COMMON NAME | SCIENTIFIC NAME | OBSERVATION METHOD | COUNT |
|---|---|---|---|
| Noisy Miner | *Manorina melanocephala* | O/W | 10+ |
| Pied Butcherbird | *Cracticus nigrogularis* | O/W | 2 |
| Rainbow Lorikeet | *Trichoglossus haematodus* | O/W | 7 |
| Sulphur-crested Cockatoo | *Cacatua galerita* | O | 4 |
| **MAMMALIA** | | | |
| Common Brushtail Possum | *Trichosurus vulpecula* | O | 1 |
| Dog* | *Canus lupus* | P | 5 |
| Gould's Wattled Bat | *Chalinolobus gouldii* | U | 3 |
| **Grey-headed Flying Fox V** | ***Pteropus poliocephalus*** | O/W | 2 |
| **REPTILIA** | | | |
| Eastern Water Skink | *Eulamprus quoyii* | O | 1 |
| Pale-flecked Garden Skink | *Lampropholis guichenoti* | O | 10+ |
| **AMPHIBIA** | | | |
| Striped Marsh Frog | *Limnodynastes peroni* | W | 10+ |
| Bibron's Toadlet | *Pseudophryne bibronii* | W | 5 |

### Table 3.6: Microbats Recorded using the Anabat

**D** = Definite; **P** = Probable; **Po** = Possible Identification
**Bold** = Threatened Species listed in the NSW *TSC Act*

| DATE | COMMON NAME | SPECIES DETECTED | RELIABILITY/NUMBER OF PASSES RECORDED | | |
|---|---|---|---|---|---|
| | | | D | P | Po |
| 22.11.2010 | Gould's Wattled Bat | *Chalinolobus gouldii* | 2 | 1 | - |

The Grey-headed Flying Fox was observed flying over the Study Area during the nocturnal survey. It was not observed to be using any of the trees within the Study Area for foraging. It would likely use some of the native eucalypt trees on site for foraging on occasion, but due to its large feeding range and lack of suitable feed trees in the Study Area, it is considered that the Proposal will not have an impact on long-term survival of this species.

As suitable habitat (although largely ephemeral) exists for the Green and Golden Bell Frog (*Litoria aurea*) on part of the site, two (2) non-current surveys were undertaken targeting this species. No calls were recorded for this species during either survey event. However, under the Precautionary Principle, and given that at least one sighting has been recorded for the Region, Assessments of Significance were undertaken for this species (see Appendix 1).

### 3.2.2 Threatened Species

A total of 32 threatened species listed under the NSW TSC Act are known to occur in or around the locality of the Study Area consisting of 20 birds, 8 mammals, three (3) amphibians, one (1) reptile and one (1) invertebrate. A total of 13 threatened species under the national EPBC Act are known to occur in or around the locality of the Study Area consisting of two (2) birds, four (4) mammals and two (2) amphibians. Furthermore, a total of nine (9) species occurring in or around the location of the Study Area are listed as '*Migratory*' under the Commonwealth *EPBC Act*. As such, targeted surveys for these species, or their necessary habitats, were undertaken during the current field investigations.

**Table 3.7: Threatened Species that may utilise the Study Area**

| COMMON NAME | SCIENTIFIC NAME | LEGAL STATUS | | COUNT** | HABITAT REQUIREMENTS AND DISTRIBUTION IN THE REGION | ASSESSMENT CONSIDERATIONS |
|---|---|---|---|---|---|---|
| | | TSC ACT | EPBC ACT | | | |
| **AMPHIBIANS** | | | | | | |
| Giant Burrowing Frog | *Heleioporus australiacus* | V | V | - | Occurs in hanging swamps on sandstone shelves and beside perennial creeks, in heath, woodland and open forest with sandy soils. | Targeted but not located during field investigations. Suitable breeding and foraging habitat is not present.<br>**Further assessment IS NOT required** |
| Green and Golden Bell Frog | *Litoria aurea* | E1 | V | 10 | Prefers sandstone areas, breeds in grass and debris beside non-perennial creeks or gutters. Individuals can also be found under logs and rocks in non breeding periods. | Targeted but not located during field investigations. Suitable breeding and foraging habitat is present, but this habitat is largely ephemeral, depending on heavy rain to maintain the pools and puddles.<br>**Further assessment IS required (see Appendix 1)** |
| Red-crowned Toadlet | *Pseudophryne australis* | V | | 8 | Prefers sandstone areas, breeds in grass and debris beside non- | Targeted but not located during field investigations. Suitable habitat is not present on |

| COMMON NAME | SCIENTIFIC NAME | LEGAL STATUS | | COUNT** | HABITAT REQUIREMENTS AND DISTRIBUTION IN THE REGION | ASSESSMENT CONSIDERATIONS |
|---|---|---|---|---|---|---|
| | | TSC ACT | EPBC ACT | | | |
| | | | | | perennial creeks or gutters. Individuals can also be found under logs and rocks in non breeding periods. | the site; therefore no important habitat is likely to be modified to compromise the local existence of this species.<br>**Further assessment IS NOT required** |
| **AVES** | | | | | | |
| Australasian Bittern | *Botaurus poiciloptilus* | V | - | 2 | In summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. Favours old growth attributes for nesting and roosting. | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species.<br>**Further assessment IS NOT required** |
| Bush Stone-curlew | *Burhinus grallarius* | E | - | 1 | Inhabits open forests and woodlands with sparse grassy groundlayer and fallen timber. Nest on the ground, mostly nocturnal. | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species.<br>**Further assessment IS NOT required** |
| Great Knot | *Calidris tenuirostris* | V | - | 1 | Occurs within sheltered lagoons, coastal habitats containing large, intertidal mudflats or sandflats, including inlets, bays, harbours, | Targeted but not identified during field surveys. No suitable habitat is present.<br>**Further assessment IS NOT required** |

| COMMON NAME | SCIENTIFIC NAME | LEGAL STATUS | | COUNT** | HABITAT REQUIREMENTS AND DISTRIBUTION IN THE REGION | ASSESSMENT CONSIDERATIONS |
|---|---|---|---|---|---|---|
| | | TSC ACT | EPBC ACT | | | |
| | | | | | estuaries and lagoons. Feeds on aquatic invertebrates. | |
| Gang-gang Cockatoo | *Callocephalon fimbriatum* | V | - | 1 | In summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. Favours old growth attributes for nesting and roosting. | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species.<br>**Further assessment IS NOT required** |
| Glossy Black-Cockatoo | *Calyptorhynchus lathami* | V | - | 18 | Prefers open forests with *Allocasuarina* species as the main food source. Uses hollows for nesting. | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species.<br>**Further assessment IS NOT required** |
| Great Sand-plover | *Charadrius leschenaultia* | V | - | 1 | Restricted to coastal areas, mainly on sheltered beaches or estuaries with large intertidal mudflats or sandbanks. Foragers for aquatic invertebrates. | Targeted but not identified during field surveys. No suitable habitat is present.<br>**Further assessment IS NOT required** |
| Varied Sittella | *Daphoenositta chrysoptera* | V | - | 31 | Occurs in woodlands and forests preferring rough and stringy barked trees where it searches for insects. | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local |

| COMMON NAME | SCIENTIFIC NAME | LEGAL STATUS | | COUNT** | HABITAT REQUIREMENTS AND DISTRIBUTION IN THE REGION | ASSESSMENT CONSIDERATIONS |
|---|---|---|---|---|---|---|
| | | TSC ACT | EPBC ACT | | | |
| | | | | | Builds nests in forks of trees. | existence of this species.<br>**Further assessment IS NOT required** |
| Black-necked Stork | *Ephippiorhynchus asiaticus* | E | - | 1 | Occurs on shallow, permanent, freshwater terrestrial wetlands and surrounding marginal aquatic vegetation as well as adjacent grasslands, paddocks and open savannah woodlands. Eels are an important staple food source but will also forage for other fish, frogs, turtles, snakes and small invertebrates. | Targeted but not identified during field surveys. No suitable habitat is present.<br>**Further assessment IS NOT required** |
| White-fronted Chat | *Epithianura albifrons* | E | - | - | Occur in saltmarsh of Newington Nature Reserve and around Sydney Olympic Park and on grassland on the northern bank of the Parramatta River, and Towra Point Nature Reserve feeding on insects. | Targeted but not identified during field surveys. No suitable habitat is present.<br>**Further assessment IS NOT required** |
| Little Lorikeet | *Glossopsitta pusilla* | V | - | 8 | Foraging habitat includes eucalyptus tree canopies with nectar and pollen available. Requires hollow bearing trees for breeding. | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species.<br>**Further assessment IS NOT required** |
| Little Eagle | *Hieraaetus morphnoides* | V | - | 3 | Occupies open eucalypt forest, | Targeted but not located during field |

| COMMON NAME | SCIENTIFIC NAME | LEGAL STATUS | | COUNT** | HABITAT REQUIREMENTS AND DISTRIBUTION IN THE REGION | ASSESSMENT CONSIDERATIONS |
|---|---|---|---|---|---|---|
| | | TSC ACT | EPBC ACT | | | |
| | | | | | woodland or open, sheoak, acacia or riparian woodland with abundant prey (birds, reptiles and small mammals including rabbits). Requires tall, living tree in remnant patch for nesting. | investigations and no important habitat is likely to be modified to compromise the local existence of this species. **Further assessment IS NOT required** |
| Black Bittern | *Ixobrychus flavicollis* | V | - | 2 | Inhabits terrestrial and estuarine wetlands with permanent water and dense vegetation. Feeds on frogs, reptiles, fish and invertebrates. | Targeted but not identified during field surveys. No suitable habitat is present. **Further assessment IS NOT required** |
| Swift Parrot | *Lathamus discolour* | E1 | E | 1 | Migrates to the south-east mainland during winter feeding on pollen and nectar from eucalypts, generally in regions less than 5km from the coast. | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species. **Further assessment IS NOT required** |
| Broad-billed Sandpiper | *Limicola falcinellus* | V | - | 1 | Favour sheltered coast such as estuarine sand flats and mudflats, harbours, lagoons, saltmarshes and reefs for roosting and feeding habitat. Feeds on aquatic invertebrates. | Targeted but not identified during field surveys. No suitable habitat is present. **Further assessment IS NOT required** |
| Black-tailed Godwit | *Limosa limosa* | V | - | 7 | Migratory wading bird, primarily on the coast. In sheltered bays, estuaries and lagoons. May occur | Targeted but not identified during field surveys. No suitable habitat is present. |

| COMMON NAME | SCIENTIFIC NAME | LEGAL STATUS | | COUNT** | HABITAT REQUIREMENTS AND DISTRIBUTION IN THE REGION | ASSESSMENT CONSIDERATIONS |
|---|---|---|---|---|---|---|
| | | TSC ACT | EPBC ACT | | | |
| | | | | | inland around muddy lakes and swamps, and even wet fields and sewerage treatment works. Forage for aquatic invertebrates. | **Further assessment IS NOT required** |
| Cotton Pygmy-goose | *Nettapus coromandelianus* | E1 | - | 4 | A rare visitor to NSW, it occurs in freshwater lakes, lagoons, swamps and dams, particularly those with waterlilies. Uses standing dead trees with hollows close to water for nesting and roosting. | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species.<br>**Further assessment IS NOT required** |
| Barking Owl | *Ninox connivens* | V | - | 3 | Inhabits principally woodlands but also open forests and partially cleared land and utilises hollows for nesting. | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species.<br>**Further assessment IS NOT required** |
| Powerful Owl | *Ninox strenua* | V | - | 26 | Forests containing mature trees for shelter or breeding & densely vegetated gullies for roosting. | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species.<br>**Further assessment IS NOT required** |
| Osprey | *Pandion haliaetus* | V | - | 2 | Favour coastal areas, especially mouths of rivers, lagoons and lakes. Feed on fish over clear, open water. Build huge nests in dead | Targeted but not identified during field surveys. No suitable habitat is present.<br>**Further assessment IS NOT required** |

| COMMON NAME | SCIENTIFIC NAME | LEGAL STATUS | | COUNT** | HABITAT REQUIREMENTS AND DISTRIBUTION IN THE REGION | ASSESSMENT CONSIDERATIONS |
|---|---|---|---|---|---|---|
| | | TSC ACT | EPBC ACT | | | |
| | | | | | trees. | |
| Scarlet Robin | *Petroica boodang* | V | - | 1 | Lives in dry woodlands with abundant logs and fallen timber. In winter may live in open grasslands. Forage for small invertebrates. | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species. **Further assessment IS NOT required** |
| Flame Robin | *Petroica phoenicea* | V | - | 0 | Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Nests are often near the ground and are built in sheltered sites, such as shallow cavities in trees, stumps or banks. | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species. **Further assessment IS NOT required** |
| Pink Robin | *Petroica rodinogaster* | V | - | - | Inhabits rainforest and tall, open eucalypt forest. Catches insects by perch-and-pouch, normally close to the ground | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species. **Further assessment IS NOT required** |
| Superb Fruit Dove | *Ptilinopus superbus* | V | - | 1 | Inhabits rainforests and closed forests, foraging high in the canopy for fruits. | Targeted but not identified during field surveys. No suitable habitat is present. **Further assessment IS NOT required** |
| Freckled Duck | *Stictonetta naevosa* | V | - | 1 | Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. Feed at dawn and dusk | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species. |

| COMMON NAME | SCIENTIFIC NAME | LEGAL STATUS | | COUNT** | HABITAT REQUIREMENTS AND DISTRIBUTION IN THE REGION | ASSESSMENT CONSIDERATIONS |
|---|---|---|---|---|---|---|
| | | TSC ACT | EPBC ACT | | | |
| | | | | | on algae, seeds and aquatic vegetation and rest during the day in dense cover. | **Further assessment IS NOT required** |
| Grass Owl | *Tyto capensis* | V | - | 1 | Occur in tall grass, swampy areas, grassy plains, swampy heath and cane grass or sedges on flood plains. Nest on 'forms' and often have tunnels through the vegetation. Prey mainly on rodents. | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species.<br>**Further assessment IS NOT required** |
| Masked Owl | *Tyto novaehollandiae* | V | - | 1 | Large home range (500-1000ha) of dry open woodland. Often hunts along edges of forests for small mammals. Uses large tree hollows for nesting. | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species.<br>**Further assessment IS NOT required** |
| Regent Honeyeater | *Xanthomyza phrygia* | E1 | - | 4 | Flagship threatened woodland bird (Box Ironbark/riparian River Sheoak for breeding). Generalist forager of nectar, honeydew and insects. | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species.<br>**Further assessment IS NOT required** |
| **MAMMALS** | | | | | | |
| Eastern Pygmy Possum | *Cercartetus nanus* | V | V | 32 | Occurs in a broad range of habitats from rainforest through sclerophyll forest to woodlands and heath in which it prefers. Feeds on nectar, | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species. |

| COMMON NAME | SCIENTIFIC NAME | LEGAL STATUS | | COUNT** | HABITAT REQUIREMENTS AND DISTRIBUTION IN THE REGION | ASSESSMENT CONSIDERATIONS |
|---|---|---|---|---|---|---|
| | | TSC ACT | EPBC ACT | | | |
| | | | | | pollen and insects. Shelters in most forms of refuge. | **Further assessment IS NOT required** |
| Large-eared Pied-bat | *Chalinolobus dwyeri* | V | V | - | Prefers sandstone outcrops for roosting and possibly tree hollows in dry or wet sclerophyll forest. | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species.<br>**Further assessment IS NOT required** |
| Spotted-tailed Quoll | *Dasyurus maculates* | V | E | 1 | Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, and rocky-cliff faces as den sites. Mostly nocturnal; spends most of the time on the ground, although also an excellent climber and may raid possum/glider dens and prey on roosting birds; also eats carrion and takes domestic fowl. | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species.<br>**Further assessment IS NOT required** |
| Southern Brown Bandicoot (eastern) | *Isoodon obesculus obesculus* | E1 | E | 182 | Crepuscular, found in heath or open forest with a healthy understory on sandy friable soils. Feed on ground dwelling invertebrates and fruit-bodies of underground fungi, often leaving conical holes in the soil. Nest during the day in a covered | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species.<br>**Further assessment IS NOT required** |

| COMMON NAME | SCIENTIFIC NAME | LEGAL STATUS | | COUNT** | HABITAT REQUIREMENTS AND DISTRIBUTION IN THE REGION | ASSESSMENT CONSIDERATIONS |
|---|---|---|---|---|---|---|
| | | TSC ACT | EPBC ACT | | | |
| | | | | | depression under shrubs or in rabbit burrows. | |
| Eastern Bentwing-bat | *Miniopterus schreibersii oceanensis* | V | - | 11 | Prefers areas where there are caves, old mines, old buildings, storm water drains & well timbered areas. This species may travel large distances from roosting site for foraging. | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species.<br>**Further assessment IS NOT required** |
| Koala | *Phascolarctos cinereus* | V | - | 1 | Populations exist in the Wedderburn/ Campbelltown area, in the Blue Mountains in Wollemi National Park and the Colo River area and likely around Little Cattai Creek and the O'Haras Creek/Cattai Creek catchment area. Inhabits eucalypt forest and woodlands with specific primary food trees depending on region. | Targeted but not located during field investigations. Suitable habitat including primary feed trees is not present within the Study Area.<br>**Further assessment IS NOT required.** |
| Grey-headed Flying-fox | *Pteropus poliocephalus* | V | V | 5 | Occur in sub-tropical and temperate forests and urban areas. Roost in trees near food sources (nectar/pollen/fruits). Large numbers in roosts used for breeding and young rearing. Site fidelity is high. | Targeted and identified flying over the Subject Property during field investigations. Was not observed feeding in the Subject Property and no important habitat is likely to be affected by the Proposal to compromise the local existence of this species<br>**Further assessment IS NOT required** |

| COMMON NAME | SCIENTIFIC NAME | LEGAL STATUS | | COUNT** | HABITAT REQUIREMENTS AND DISTRIBUTION IN THE REGION | ASSESSMENT CONSIDERATIONS |
|---|---|---|---|---|---|---|
| | | TSC ACT | EPBC ACT | | | |
| Greater Broad-nosed Bat | *Scoteanax rueppellii* | V | E | 7 | Inhabits areas containing moist river & creek systems especially tree lined creeks. | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species.<br>**Further assessment IS NOT required** |
| **REPTILES** | | | | | | |
| Rosenberg's Goanna | *Varanus rosenbergi* | V | - | - | Found in heath, open forest and woodlands. This species uses termite mounds for nests which are critical habitat. Feed on carrion, birds, eggs, reptiles and small mammals. | Targeted but not located during field investigations and no important habitat is likely to be modified to compromise the local existence of this species.<br>**Further assessment IS NOT required** |

### 3.2.3 Non-Indigenous Fauna Species

Feral animal invasion and subsequent competition with native species is well recognised as a risk to native fauna, and depending on the habitat type invaded, this may present either a minor or a significant 'environmental problem'. Due to the disturbed nature of the Study Area, such as large open clearings, introduced species occur in this area.

During the field investigations two (2) non-indigenous fauna species, the Domestic Dog (*Canis lupus familiaris*) and the Common Myna (*Acridotheres tristis*), were identified within the Study Area.

**Domestic Dogs** although fed on a regular basis, being a naturally predatory species, can pose threats to native reptiles, amphibians and ground-dwelling mammals.

*Pet owners living in the Study Area and on neighbouring land should be informed about the impacts their pets can have on native fauna populations and they should keep their dogs on leads when moving through native fauna habitat areas.*

The **Common Myna** was observed frequently in the Study Area. These birds aggressively drive out native birds from territories and tree hollows even if they are not needed. Any fledglings nesting in tree hollows will be killed by these birds.

*If the Myna population persists post development, trapping programs is recommended so that this species can be cleared from the Subject Property and encourage native species to recolonise.*

### 3.2.4 Condition of Fauna Habitat

The following three (3) habitat types were recorded in the Study Area:

- Grassland with Isolated Trees and Shrubs, and Landscaped Gardens;
- Swamp Marsh
- Remnant and/or Planted Native Vegetation

***Grassland with Isolated Trees and Shrubs, and Landscaped Gardens***

Vegetation Type: Introduced and native grasses; sparse canopy of native and introduced trees; native and introduced shrubs.

Habitat Value: Low

The grassy sward in this habitat type has some value as fauna habitat, as it provides refuge for small terrestrial mammals and reptiles. It also provides good grazing opportunity for medium to large herbivores, which are however, unlikely to be present.

Some of the trees in this habitat were very large and contained tree hollows. These trees provide foraging and nesting opportunities and refuge for arboreal and flying mammals, reptiles, and birds. Tree hollows increase the importance of these trees as they provide essential nesting habitat for some species of mammals and birds. The introduced Palm Trees at the northern end of the Study Area are important habitat trees for the Australian White Ibis and nestlings were observed.

There were two (2) dead trees located within this habitat type. These trees are extremely important habitat for small arboreal mammals as they provide many refuge, shelter and nesting opportunities.

**Plates 3.1-3.4: Grassland with Isolated Trees and Shrubs, and Landscaped Gardens**

***Remnant and/or Planted Native Vegetation Patch***

Vegetation Type: Native and introduced grasses; native and introduced shrubs; and native and introduced trees.

Habitat Value: Low

The long grass in this habitat type provides good shelter and refuge for a wide range of small terrestrial fauna taxa, including reptiles, small mammals and invertebrates. The ground habitat value was fairly poor with minimal leaf and bark refuge.

The shrubs in this habitat type provide cover for terrestrial mammals and mammals.

The trees in this habitat type provide foraging and nesting opportunities and refuge for arboreal mammals and reptiles, and birds.

There were two (2) dead trees located within this habitat type. These trees provide local habitat for small arboreal mammals as they provide many refuge, shelter and nesting opportunities.

**Plates 3.5 to 3.6: Remnant and/or Planted Native Vegetation Stand**

***Swamp Marsh***

Vegetation Types: Introduced and native sedges and grasses.

Habitat Value: Low

This habitat type provides refuge and breeding opportunities for amphibians and aquatic invertebrates. Although aquatic invertebrates were identified, no amphibians were recorded to be present. The water level was only approximately 10-20 cm deep maximum, and there was minimal vegetative cover. Furthermore, this habitat type was situated within an area that had recently been excavated; therefore, no amphibian taxa are likely to likely to inhabit this area.

**Plates 3.7 - 3.8: Swamp Marsh Habitat**

**Figure 3.3: Location of Fauna Habitats for survey purposes**

# 4 CONCLUSIONS

The Study Area comprises Lots 1, 2 and (new) Lot 8; the latter being the area proposed as Stage 1 of the proposed residential development project at Putney. Road access to Victoria Road is proposed via Lots 1 and 2.

There is no intact native bushland within the Subject Property; however individuals or small stands of mature native trees thought to be remnants of the Sydney Turpentine Ironbark Forest which once occurred in the Locality were recorded in a number of locations (see Figure 3.1).

There are no threatened species issues for the current Study Area.

There were no threatened flora species or populations recoded for the Study Area; although a small number of trees listed as 'locally significant' species in Ryde LGA were found to be present. Due to the remnant's highly disturbed and degraded nature no potential habitat for any threatened flora species was identified within the Study Area.

The majority of the trees and shrubs present within the larger Subject Property are horticultural plantings, comprising both exotic introductions and non-indigenous native species: this landscaping theme is in keeping with the fashion for using Australian native plants in the latter half of the 20$^{th}$ Century. The earlier landscape design may have incorporated some naturally-occurring native canopy trees as stands of trees are present in the 1943 aerial photograph located in the RTA archives. At that time, a large part of the Subject Property was being used as a farm (see Figure 1.3).

One (1) listed fauna species under the TSC Act and the *EPBC Act* was located during this survey, being the Grey-headed Flying-fox (*Pteropus poliocephalus*). Habitat trees exist within the Study Area, although they make up a very small minority of the large foraging range of this species. The Study Area was not being used as a roosting camp for the Grey-headed Flying-fox and therefore the Proposal is not likely to have an adverse effect of the local population of this species. Hence, no Assessment of Significance (the 7-part Test) was carried out for the Grey-headed Flying-fox.

Habitat does occur for native amphibians, and potentially for the threatened Green and Golden Bell Frog (*Litoria aurea*). Targeted searches carried out in favourable weather conditions over two (2) non-consecutive evenings failed to locate this species within the Study Area, although several non-threatened amphibians were located in the marsh land created by previous excavations (mainly Lot 8). In accordance with the precautionary principle, the 7-part Test) was carried out for the Green and Golden Bell Frog (see Appendix 1). This Test concluded that the Proposal to develop Lot 8 for residential living was not be significant, and that no further studies were required.

The fauna habitat occurring in the Study Area overall is generally of 'low value' and is not likely to be important for any of the other threatened species occurring in the Locality and Region.

A number of potential constraints were identified through the course of this study, the most significant of these being:

- The presence of a number of remnant Sydney Turpentine Ironbark Margin Forest trees, found in a number of locations, which should if at all possible[7] be retained and incorporated into the new landscape design for the development (see Figure 3.1).
- The presence of a number of ponds and pools which support a range of native fauna, including two (2) species of amphibians.
- A large population of breeding Australian Ibis using the palm trees at the front of the Subject Site on the Victoria Road side.

These potential constraints have been addressed through further assessment where required (see Appendix 1) and within recommendations which provide for:

- The retention of existing habitat trees as is practical, especially those with hollows and holding breeding birds such as the Australian Ibis.
- Where stands of mature indigenous and/or introduced trees are found to be healthy, attempts should be made to retain these trees, both for their landscape and habitat values. Note there is no legal requirement to retain such trees.
- Where any of the large habitat trees cannot be retained, any existing hollows are to be excised and relocated. These should be placed high next to and on forks in existing trees. Where this is impractical nest boxes should be erected.
- Future landscape design should endeavour to utilise predominantly locally occurring species, in particular those trees / large shrubs identified as being part of the former Sydney Turpentine Ironbark Margin Forest which once occupied the site. This will help to retain local landscape character.
- When Lot 8 is developed, a representative of WIRES should be commissioned to attend the site during the initial excavation phase in case any native fauna are present. Any native fauna disturbed as a result of the excavation (e.g. amphibians) are to be relocated in the nearest suitable habitat.
- The design and implementation of a vegetation management plan to guide conservation and rehabilitation efforts within those areas proposed for retention of native trees and/or future landscaping.

It is anticipated that by adopting these recommendations an appropriate balance between development and conservation can be reached and that the Proposal provides opportunities for a net environmental benefit.

[7]With tree retention being dependent on their SULE; as determined by a qualified arborist.

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# 6 APPENDICES

## Appendix 1: Assessments of Significance for the Green and Golden Bell Frog

Although no Green and Golden Bell Frog (Litoria aurea) were recorded within the Study Area during recent investigations, adopting the *Precautionary Principle*, the following assessments examine the likely impact of the Proposal on the Green and Golden Bell Frog, should it occur within the site.

### Commonwealth Legislative Considerations

With reference to the *EPBC Act Policy Statement 1.1: Significant impact Guidelines* for an *endangered species* and an adoption of the *Precautionary Principle*, it was determined whether the proposed works has, will have, or is likely to have a significant impact on a matter of National Environmental Significance (i.e. the Green and Golden Bell Frog).

### *Green and Golden Bell Frog*

The Green and Golden Bell Frog (GGBF) has not been previously recorded within the Study Area and was not recorded in the current survey. This species inhabits marshes, dams and stream sides, habitats which are present within the Subject Property. The GGBF is classed as 'vulnerable' under the *EPBC Act*. The following is an Assessment of Significance for the GGBF:

An action is likely to have a significant impact on the Green and Golden Bell Frog if there is a real chance or possibility that it will:

***…lead to a long-term decrease in the size of a population***

Potential habitat exists on the Subject Property for the GGBF. No previous sightings have been recorded in the Study Area and no sightings were recorded for this present study. Therefore, it is presumed that this species does not occur in the Study Area. Therefore, the Subject Proposal will not lead to a long-term decrease in the size of the population because there has been no population of GGBFs detected within the Study Area, even though potential habitat exists.

***…reduce the area of occupancy of the species***

As no GGBFs have been identified within the Study Area, the Proposal is not likely to reduce the area of occupancy of this species. No nearby sightings have been recorded for this species and there is no linking corridor habitat that would enable this species to migrate to the Subject Site.

***...fragment an existing important population into two or more populations***

As no GGBFs have been recorded in or near the Study Area, the Proposal will not cause an existing population to fragment into two or more populations.

***…adversely affect habitat critical to the survival of a species***

Currently, no critical habitat has been declared for the GGBF. Therefore, the Proposal will not adversely affect any habitat critical to the survival of a species.

***…disrupt the breeding cycle of a population***

As no GGBFs have been identified in or near the Study Area, the Proposal will not disrupt the breeding cycle of a population 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***

The Proposal is likely to modify, destroy, remove or isolate or decrease the availability or quality of habitat for the GGBF. However, as this species has not been detected in or near the Study Area it will not cause the species to decline.

***…result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat***

The invasive species listed in the GGBF Recovery Plan that are a threat to the GGBF are the European Red Fox (*Vulpes vulpes*) and the Plague Minnow (*Gambusia holbrooki*). These two species are recognized as major threats to the GGBF through predation. These species were not identified during the current survey although it is likely that the Red Fox will use the Study Area on occasion. The Proposal will actual cause the Study Area to become less inhabitable for these invasive species.

***…introduce disease that may cause the species to decline; or***

Infection by Frog Chytrid Fungus, a water born fungal pathogen, is a major threatening process to the GGBF. This disease causes infection through water borne zoospores which can survive for over 24 hours. This disease is unlikely to be present within the Study Area as the water present is due to rain and not flow from other sources, hence, the disease is unlikely to be introduced. Furthermore, as there are no GGBFs present within the Study Area, there is no risk of this species becoming infected. Therefore, Frog Chytrid Fungus will not cause the GGBF to decline.

***…interfere substantially with the recovery of the species***

A Recovery Plan has been prepared for the GGBF. Threats to the GGBF discussed in this Recovery Plan that are most relevant to the Proposal include disease (Frog Chytrid Fungus), water flow and quality issues, predation by Plague Minnow and the Red Fox and habitat loss and alteration. As there have been no recordings of the GGBF within or near the Study Area, none of these threats or the Recovery Plan are relevant to the Proposal. Therefore, the Proposal will not interfere substantially with the recovery of this species.

**Therefore, it is considered that the matter WOULD NOT require Referral to the Federal Minister for the Sustainability Environment, Water, Population and Communities (SEWPAC) for consideration or approval in terms of the Green and Golden Bell Frog (*Litoria aurea*).**

## NSW State Legislative Considerations

An assessment using the criteria provided under Section 5A of the *Environmental Planning and Assessment Act 1979* with an adoption of the *Precautionary Principle*, has been applied to determine "whether there is likely to be a significant effect on the Green and Golden Bell Frog or its habitat" listed on the Schedules to the *TSC Act*, and consequently, whether a Species Impact Statement is required. To consider the impact of the proposal on this species, a Seven-part test has been undertaken:

### *Green and Golden Bell Frog*

The Green and Golden Bell Frog (GGBF) has previously been recorded within the Study Area and the surrounding Region. This species inhabits marshes, dams and stream sides, habitats which are present within PNR (DECCW 2010b). It is classed as Endangered under the *TSC Act*. This species was not identified during surveying but due to previous recordings and habitat occurring in the Study Area; it is expected to occur within the Study Area. The following is an Assessment of Significance for the GGBF:

***(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…"***

Potential habitat exists on the Subject Property for the GGBF. No previous sightings have been recorded in the Study Area and no sightings were recorded for this present study. Therefore, it is presumed that this species does not occur and is not breeding in the Study Area. Therefore, the Subject Proposal is not likely to have an adverse effect on the life cycle of this species such that a viable local population of the GGBF is likely to be placed at risk of extinction.

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

An 'endangered population' is defined as a "population specified in Part 2 of Schedule 1" of the *TSC Act.* The GGBF is not listed as 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..."***

An Endangered Ecological Community means an ecological community specified in Part 3 of Schedule 1 of the *TSC Act*. GGBF is not listed as an Endangered Ecological Community.

***(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 is likely to remove or modify the potential habitat on the Subject Property for the GGBF. However, as this species has not been detected in or near the Study Area it will not cause the species to decline.

***(i) "…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***

There is no connecting habitat to the potential habitat on the Subject Property for the GGBF. Furthermore, there have been no sightings of the GGBF within or near the Study Area. Therefore, the Proposal will not cause the potential habitat within the Subject Property to become fragmented or isolated from other areas of habitat.

***(i) "…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…"***

As there have been no recordings or sightings of the GGBF within or near the Study Area, the habitat within the Subject Property is not very important to the long-term survival of the GGBF.

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

There is no listed critical habitat for the GGBF.

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

A Recovery Plan has been prepared for the GGBF. Threats to the GGBF discussed in this Recovery Plan that are most relevant to the Proposal include disease (Frog Chytrid Fungus), water flow and quality issues, predation by Plague Minnow and the Red Fox and habitat loss and alteration. As there have been no recordings of the GGBF within or near the Study Area, none of these threats or the Recovery Plan are relevant to the Proposal. Therefore, the Proposal is consistent with the objectives of the GGBF Recovery Plan.

***(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..."***

Key threatening processes that would apply to the GGBF include clearing of native vegetation, infection of frogs by amphibian chytrid causing the disease chytridiomycosis, invasion and establishment of the cane toad (*Bufo marinus*), predation by the European red fox (*Vulpes vulpes*) and predation by *Gambusia holbrooki* (plague minnow or mosquito fish). The Proposal would constitute the clearing of native vegetation, however, as there are no GGBFs within or near the Study Area, the Proposal will have no affect on the long-term survival of this species.

**Therefore, the preparation of a Species Impact Statement which further considers the impacts of the Proposal on the Green and Golden Bell Frog (*Litoria aurea*) is NOT REQUIRED.**

## Appendix 2: Flora Species Recorded Within the Study Area Lots 1, 2 and 8 at RRCS, Putney

**KEY**

* = Introduced/exotic or non-indigenous native species

N = noxious weed in Ryde LGA

Bold = Species considered to be diagnostic for Sydney turpentine Ironbark Forest (NSW Scientific Committee 1998 & Tozer et al. 2010)

| FAMILY | SPECIES | COMMON NAME | AREAS SURVEYED FOR STAGE 1 | | |
|---|---|---|---|---|---|
| | | | Lot 1 RRCS, Lawns & Gardens | Lot 2 w/ Tree Plantation | New Lot 8 Open Grassland w/ Swamps |
| | | | | | |
| CYATHEACEAE | *Cyathea cooperi** | Soft Tree Fern | | √ | |
| CYATHEACEAE | *Calochlaena dubia* | False Bracken Fern | √ | | |
| FILICOPSIDA | | | | | |
| Davalliaceae | *Nephrolepis cordifolia** | Fishbone Fern | √ | √ | |
| DICOTYLEDONS | | | | | |
| Acanthaceae | ***Brunoniella australis*** | Blue Trumpet | | √ | |
| Apiaceae | ***Centella asiatica*** | Indian Pennywort | √ | | √ |
| Apiaceae | *Ciclospermum leptophyllum** | Slender Celery | | | √ |
| Apocynaceae | *Nerium oleander** | Oleander | √ | | |
| Asclepiadaceae | *Araujia sericifera** | White Moth Vine | | √ | √ |
| Asteraceae | *Bidens pilosa** | Cobbler's Pegs | √ | √ | √ |
| Asteraceae | *Cassinia arcuata* | Sifton Bush | | √ | √ |

| FAMILY | SPECIES | COMMON NAME | AREAS SURVEYED FOR STAGE 1 | | |
|---|---|---|---|---|---|
| | | | Lot 1 RRCS, Lawns & Gardens | Lot 2 w/ Tree Plantation | New Lot 8 Open Grassland w/ Swamps |
| Asteraceae | *Cirsium vulgare** | Spear Thistle | | √ | √ |
| Asteraceae | *Conyza* spp.* | Fleabanes | √ | √ | √ |
| Asteraceae | *Ageratina adenophora ** | Crofton Weed | | √ | √ |
| Asteraceae | *Gamochaeta americana** | Cudweed | √ | | √ |
| Asteraceae | *Hypochaeris radicata** | Catsear | √ | | √ |
| Asteraceae | *Senecio madagascariensis** | Fireweed | | | √ |
| Asteraceae | *Sonchus oleraceus** | Common Sow Thistle | | | √ |
| Asteraceae | *Taraxacum officinale** | Dandelion | √ | | √ |
| Bignoniaceae | *Tecoma capensis** | Tecoma | √ | | |
| Campanulaceae | *Wahlenbergia gracilis* | Sprawling Bluebell | √ | √ | √ |
| Caryophyllaceae | *Spergularia bocconii** | Bocconi's Sand-spurrey | | | √ |
| Caryophyllaceae | *Spergularia levis** | | | | √ |
| Casuarinaceae | *Allocasuarina glauca* | Swamp Oak | | | √ |
| Casuarinaceae | *Allocasuarina littoralis* | Black Sheoak | | | √ |
| Celastraceae | *Eumonys japonicas ** | Spindle Bush | √ | | |
| Chenopodiaceae | *Einadia nutans* ssp. *nutans* | | | √ | √ |
| Convolvulaceae | ***Dichondra repens*** | Kidney Weed | | √ | |
| Convolvulaceae | Ipomoea indica *N | Morning Glory Vine | | √ | |

| FAMILY | SPECIES | COMMON NAME | AREAS SURVEYED FOR STAGE 1 | | |
|---|---|---|---|---|---|
| | | | Lot 1 RRCS, Lawns & Gardens | Lot 2 w/ Tree Plantation | New Lot 8 Open Grassland w/ Swamps |
| Cupressaceae | *Juniperina* sp.* | Juniper Trees | √ | | |
| Euphorbiaceae | *Euphorbia peplus** | Petty Spurge | √ | | √ |
| Fabaceae: Faboideae | ***Glycine clandestina*** | | | √ | √ |
| | *Trifolium repens** | White Clover | √ | | √ |
| Fabaceae: Faboideae | *Vicia* sp.* | | √ | | √ |
| Fabaceae: Mimosaceae | ***Acacia decurrens*** | Green Wattle | | | √ |
| Fabaceae: Mimosaceae | ***Acacia falcata*** | Sickle Wattle | | √ | |
| Fabaceae: Mimosaceae | ***Acacia parramattensis*** | Parramatta Green Wattle | | | √ |
| Fabaceae: Mimosaceae | *Acacia fimbriata* | Fringed Wattle | | | √ |
| Fabaceae: Mimosaceae | *Genista monspessulana** N | Broom / Teline | | | √ |
| Fagaceae | *Quercus palustris** | Pin Oak | √ | | |
| Gentianaceae | *Centaurium erythraea** | Common Centaury | √ | | √ |
| Altingiaceae | *Liquidambar styraciflua** | Liquidambar | √ | | |
| Lamiaceae | *Wisteria sinense** | Wisteria | √ | | |
| Lauraceae | *Cinnamomum camphora*N* | Camphor laurel | √ | | √ |
| Lythraceae | *Lagerstroemia sp.** | Crepe Myrtle | √ | | |
| Malvaceae | *Malva* sp.* | Mallow | √ | | √ |
| Malvaceae | *Modiola caroliniana** | Red-flowered Mallow | | √ | √ |

| FAMILY | SPECIES | COMMON NAME | AREAS SURVEYED FOR STAGE 1 | | |
|---|---|---|---|---|---|
| | | | Lot 1 RRCS, Lawns & Gardens | Lot 2 w/ Tree Plantation | New Lot 8 Open Grassland w/ Swamps |
| Malvaceae | *Hibiscus spp*.* | Hibiscus hyrbids | √ | | |
| Malvaceae | *Sida rhombifolia** | Paddy's lucerne | √ | | √ |
| Moraceae | *Ficus hillii** | Hill's Fig | √ | | |
| Moraceae | *Ficus rubiginosa** | Port Jackson Fig | | | √ |
| Moraceae | *Ficus pumila** | Creeping Fig | √ | | |
| Myrtaceae | ***Angophora costata*** | Sydney Red Gum | √ | √ | √ |
| Myrtaceae | *Callistemon citrinus** | Red Bottlebrush | √ | | |
| Myrtaceae | *Callistemon* viminalis* | Weeping Bottlebrush | √ | | √ |
| Myrtaceae | *Corymbia citriodora** | Lemon-scented Gum | √ | √ | √ |
| Myrtaceae | *Corymbia maculata** | Spotted Gum | √ | √ | √ |
| Myrtaceae | ***Eucalyptus acmenoides*** | White Mahogany | | √ | √ |
| Myrtaceae | ***Eucalyptus deanei*** | Deanes Blue Gum | | √ | |
| | *Eucalyptus elata* | River Peppermint | | | √ |
| Myrtaceae | *Eucalyptus ficifolia** | Red flowering Gum | √ | | |
| Myrtaceae | ***Eucalyptus fibrosa*** | Broad-leaf Ironbark | | √ | |
| Myrtaceae | *Eucalyptus crebra* | Narrow-leaf Ironbark | | | √ |
| Myrtaceae | *Eucalyptus microcorys** | Tallowwood | | √ | √ |
| Myrtaceae | ***Eucalyptus paniculata*** | Grey Ironbark | | | √ |

| FAMILY | SPECIES | COMMON NAME | AREAS SURVEYED FOR STAGE 1 | | |
|---|---|---|---|---|---|
| | | | Lot 1 RRCS, Lawns & Gardens | Lot 2 w/ Tree Plantation | New Lot 8 Open Grassland w/ Swamps |
| Myrtaceae | *Eucalyptus pilularis* | Blackbutt | √ | | |
| Myrtaceae | ***Eucalyptus punctata*** | Grey Gum | √ | √ | |
| Myrtaceae | ***Eucalyptus resinifera* ssp. *resinifera*** | Red Mahogany | √ | | |
| Myrtaceae | *Eucalyptus scoparia** | Wallangarra White Gum | √ | √ | |
| Myrtaceae | *Melaleuca armillaris** | Willow-leaf Paperbark | √ | | |
| Myrtaceae | *Melaleuca quinquenervia** | Broad-leaf Paperbark | | √ | √ |
| Myrtaceae | *Melaleuca styphelioides** | | | √ | √ |
| Myrtaceae | *Metrosideros sp.** | New Zealand Christmas Bush | √ | | |
| Myrtaceae | *Lophostemon confertus** | Queensland Brush Box | √ | | √ |
| Myrtaceae | ***Syncarpia glomulifera*** | Turpentine | | | √ |
| Myrtaceae | *Tristaniopsis laurina** | Water Gum | | √ | |
| Oleaceae | *Ligustrum lucidum*N* | Large-leaved Privet | | | √ |
| Oleaceae | *Olea europaea* ssp. *cuspidata*N* | African Olive | √ | √ | √ |
| Oxalidaceae | *Oxalis sp.* | | | √ | |
| Pinaceae | *Picea pungens** | Blue Spruce | √ | | |
| Pittosporaceae | ***Bursaria spinosa*** | Blackthorn | | | √ |
| Pittosporaceae | ***Pittosporum undulatum*** | Sweet Pittosporum | √ | √ | √ |

| FAMILY | SPECIES | COMMON NAME | AREAS SURVEYED FOR STAGE 1 | | |
|---|---|---|---|---|---|
| | | | Lot 1 RRCS, Lawns & Gardens | Lot 2 w/ Tree Plantation | New Lot 8 Open Grassland w/ Swamps |
| Plantaginaceae | *Plantago lanceolata** | Plantain | √ | | √ |
| Podocarpaceae | *Podocarpus sp.** | Plum Pine | √ | | |
| Polygonaceae | *Rumex crispus** | Swamp Dock | | | √ |
| Primulaceae | *Anagallis arvensis** | Scarlett Pimpernel | √ | | √ |
| Proteaceae | *Banksia ericifolia* | Pine-leaf Banksia | √ | | |
| Proteaceae | *Grevillea* spp.* | Grevillea hybrids | √ | | |
| Proteaceae | *Grevillea robusta** | Silky Oak | √ | √ | √ |
| Proteaceae | *Macadamia tetraphylla** | Rough-shelled Queensland Nut | | | √ |
| Rosaceae | *Rubus fruticosus (agg)*N* | Blackberry | | | √ |
| Rosaceae | *Rosa sp.** | Rose hybrids | √ | | |
| Rutaceae | *Citrus limon ** | Lemon Tree | √ | | |
| Sapindaceae | *Cardiospermum grandiflorum *N* | Balloon Vine | | | |
| Solanaceae | *Cestrum parqui *N* | Green Cestrum | √ | | √ |
| Solanaceae | *Solanum mauritianum ** | Tobacco Tree | | | |
| Sterculiaceae | *Brachychiton acerifolius** | Illawarra Flame Tree | √ | | |
| Theaceae | *Camellia* sp.* | Camellia | √ | | |
| Verbenaceae | *Lantana camara *N* | Lantana | | √ | √ |

| FAMILY | SPECIES | COMMON NAME | AREAS SURVEYED FOR STAGE 1 | | |
|---|---|---|---|---|---|
| | | | Lot 1 RRCS, Lawns & Gardens | Lot 2 w/ Tree Plantation | New Lot 8 Open Grassland w/ Swamps |
| Verbenaceae | *Verbena bonariensis* * | Purpletop | | | √ |
| Verbenaceae | *Verbena officinalis* * | Verbena | | | √ |
| MONOCOTYLEDONS | | | | | |
| Alliaceae | *Agapanthus* sp.* | Agapanthus | √ | | |
| Arecaceae | *Phoenix* canariensis* | Date Palm | √ | | √ |
| Commelinaceae | *Tradescantia fluminensis*N* | Wandering Jew | | | √ |
| Cyperaceae | *Cyperus eragrostis** | Umbrella Sedge | | | √ |
| Cyperaceae | *Cyperus gracilis* | | | √ | |
| Juncaceae | *Juncus usitatus* | Soft Tussock Rush | | | √ |
| Liliaceae | *Canna indica* * | Yellow Shot | | | √ |
| Liliaceae | *Phormium tenax* * | New Zealand Flax | √ | | |
| Palmae | *Palm* spp* | Palms various) | √ | | |
| Lomandraceae | ***Lomandra longifolia*** | Matt-rush | √ | | |
| Poaceae | *Briza subaristata** | | √ | | √ |
| Poaceae | *Cortaderia selloana * N* | Pampas Grass | | | √ |
| Poaceae | *Cynodon dactylon** | Common Couch | √ | | √ |
| Poaceae | *Ehrharta erecta** | Panic Veldt Grass | √ | √ | √ |
| Poaceae | *Eragrostis curvula** | African Love Grass | | | √ |
| Poaceae | ***Microlaena stipoides* var.** | Weeping Meadow Grass | √ | √ | √ |

| FAMILY | SPECIES | COMMON NAME | AREAS SURVEYED FOR STAGE 1 | | |
|---|---|---|---|---|---|
| | | | Lot 1 RRCS, Lawns & Gardens | Lot 2 w/ Tree Plantation | New Lot 8 Open Grassland w/ Swamps |
| | ***stipoides*** | | | | |
| Poaceae | *Notodanthonia longifolia* | Wallaby Grass | | | √ |
| Poaceae | ***Oplismenus aemulus*** | | | √ | |
| Poaceae | *Paspalum dilatatum** | Paspalum | √ | √ | √ |
| Poaceae | *Paspalum urvillei ** | Vasey Grass | | | √ |
| Poaceae | *Pennisetum clandestinum** | Kikuyu Grass | √ | √ | √ |
| Poaceae | *Setaria gracilis** | Slender Pigeon Grass | √ | | √ |
| Poaceae | *Sporobolus virginicus ** | Parramatta Grass | √ | | √ |
| Poaceae | *Stenotaphrum secundatum** | Buffalo Grass | √ | √ | √ |
| Typhaceae | *Typha sp.* | Bulrush | | | √ |

**Note**: there maybe some overlap with the species recorded in the lower part of Lot 2 and the upper part of Lot 8 as it was not possible to determine the exact boundary between these two Lots in the field.

## Appendix 3: List of Fauna Species previously recorded within the Study Region

Key
V - Vulnerable
E – Endangered
M – Migratory
* – Introduced
^ – Regionally Significant

Sources
*TSC Act* – Species listed under the *Threatened Species Conservation Act 1995*
*EPBC Act* – Species listed under the *Environment Protection and Biodiversity Conservation Act 1999*

| COMMON NAME | SCIENTIFIC NAME | TSC ACT | EPBC ACT |
|---|---|---|---|
| **FROGS** | | | |
| Bleating Tree Frog | *Litoria dentate* | | |
| Brown-striped Frog | *Limnodynastes peronii* | | |
| Cane Toad* | *Rhinella marina* | | |
| Common Eastern Froglet | *Crinia signifera* | | |
| Eastern Dwarf Tree Frog | *Litoria fallax* | | |
| Giant Burrowing Frog | *Heleioporus australiacus* | V | V |
| Green and Golden Bell Frog | *Litoria aurea* | E | V |
| Green Tree Frog [Δ] | *Litoria caerulea* | | |
| Leaf-green Tree Frog | *Litoria phyllochroa* | | |
| Lesueur's Frog | *Litoria lesueuri* | | |
| Peron's Tree Frog | *Litoria peronii* | | |
| Red-crowned Toadlet | *Pseudophryne australis* | V | |
| Smooth Toadlet [Δ] | *Uperoleia laevigata* | | |
| Spotted Grass Frog | *Limnodynastes tasmaniensis* | | |
| Tyler's Tree Frog | *Litoria tyleri* | | |
| Verreaux's Frog | *Litoria verreauxii* | | |
| **BIRDS** | | | |
| Australasian Bittern | *Botaurus poiciloptilus* | V | |
| Australasian Darter | *Anhinga novaehollandiae* | | |
| Australasian Figbird | *Sphecotheres vieilloti* | | |
| Australasian Grebe | *Tachybaptus novaehollandiae* | | |
| Australasian Shoveler | *Anas rhynchotis* | | |
| Australian Brush-turkey | *Alectura lathami* | | |
| Australian Hobby | *Falco longipennis* | | |
| Australian King-Parrot | *Alisterus scapularis* | | |
| Australian Little Bittern | *Ixobrychus dubius* | | |
| Australian Magpie | *Gymnorhina tibicen* | | |
| Australian Pelican | *Pelecanus conspicillatus* | | |
| Australian Pipit | *Anthus novaeseelandiae* | | |
| Australian Raven | *Corvus coronoides* | | |
| Australian Reed-warbler | *Acrocephalus australis* | | |

| COMMON NAME | SCIENTIFIC NAME | TSC ACT | EPBC ACT |
|---|---|---|---|
| Australian Spotted Crake | *Porzana fluminea* | | |
| Australian White Ibis | *Threskiornis molucca* | | |
| Australian Wood Duck | *Chenonetta jubata* | | |
| Azure Kingfisher | *Ceyx azureus* | | |
| Baillon's Crake | *Porzana pusilla* | | |
| Barking Owl [Δ] | *Ninox connivens* | V | |
| Bar-tailed Godwit | *Limosa lapponica* | | |
| Bell Miner | *Manorina melanophrys* | | |
| Black Bittern | *Ixobrychus flavicollis* | V | |
| Black Falcon | *Falco subniger* | | |
| Black Swan | *Cygnus atratus* | | |
| Black-faced Cuckoo-shrike | *Coracina novaehollandiae* | | |
| Black-faced Monarch | *Monarcha melanopsis* | | M |
| Black-fronted Dotterel | *Elseyornis melanops* | | |
| Black-necked Stalk | *Ephippiorhynchus asiaticus* | E | |
| Black-shouldered Kite | *Elanus axillaris* | | |
| Black-tailed Godwit | *Limosa limosa* | | |
| Black-winged Stilt | *Himantopus himantopus* | | |
| Broad-tailed Sandpiper | *Limicola falcinellus* | | |
| Brown Falcon | *Falco berigora* | | |
| Brown Gerygone | *Gerygone mouki* | | |
| Brown Goshawk | *Accipiter fasciatus* | | |
| Brown Honeyeater | *Lichmera indistincta* | | |
| Brown Quail [Δ] | *Coturnix ypsilophora* | | |
| Brown Songlark | *Cincloramphus cruralis* | | |
| Brown Thornbill | *Acanthiza pusilla* | | |
| Buff-banded Rail | *Gallirallus philippensis* | | |
| Bush Stone-curlew | *Burhinus grallarius* | E | |
| Cattle Egret | *Bubulcus ibis* | | M |
| Channel-billed Cuckoo | *Scythrops novaehollandiae* | | |
| Chestnut Teal | *Anas castanea* | | |
| Collared Sparrowhawk | *Accipiter cirrocephalus* | | |
| Common Blackbird * | *Turdus merula* | | |
| Common Bronzewing [Δ] | *Phaps chalcoptera* | | |
| Common Myna * | *Acridotheres tristis* | | |
| Common Starling * | *Sturnus vulgaris* | | |
| Common Sandpiper | *Actitis hypoleucos* | | |
| Common Tern | *Sterna hirundo* | | |
| Cotton Pygmy-goose | *Nettapus coromandelianus* | E1 | |
| Crested Pigeon | *Ocyphaps lophotes* | | |
| Crested Tern | *Thalasseus bergii* | | |
| Crimson Rosella | *Platycercus elegans* | | |
| Curlew Sandpiper | *Calidris ferruginea* | | |

| COMMON NAME | SCIENTIFIC NAME | TSC ACT | EPBC ACT |
|---|---|---|---|
| Dollarbird | *Eurystomus orientalis* | | |
| Double-banded Plover | *Charadrius bicinctus* | | |
| Dusky Moorhen | *Gallinula tenebrosa* | | |
| Dusky Woodswallow | *Artamus cyanopterus* | | |
| Eastern Barn Owl | *Tyto javanica* | | |
| Eastern Curlew | *Numenius madagascariensis* | | |
| Eastern Curlew | *Numenius madagascariensis* | | |
| Eastern Koel | *Eudynamys orientalis* | | |
| Eastern Rosella | *Platycercus adscitus eximius* | | |
| Eastern Shrike-tit | *Falcunculus frontatus* | | |
| Eastern Spinebill | *Acanthorhynchus tenuirostris* | | |
| Eastern Whipbird Δ | *Psophodes olivaceus* | | |
| Eastern Yellow Robin Δ | *Eopsaltria australis* | | |
| Eurasian Coot | *Fulica atra* | | |
| European Goldfinch * | *Carduelis carduelis* | | |
| Fairy Martin | *Petrochelidon ariel* | | |
| Fan-tailed Cuckoo | *Cacomantis flabelliformis* | | |
| Feather-tailed Cuckoo | *Cacomantis flabelliformis* | | |
| Freckled Duck | *Stictonetta naevosa* | V | |
| Fuscous HoneyeaterΔ | *Lichenostomus fuscus* | | |
| Galah | *Eolophus roseicapillus* | | |
| Glossy Ibis | *Plegadis falcinellus* | | |
| Golden Whistler | *Pachycephala pectoralis* | | |
| Golden-headed Cisticola | *Cisticola exilis* | | |
| Grass Owl | *Tyto capensis* | V | |
| Great Cormorant | *Phalacrocorax carbo* | | |
| Great Knot | *Calidris tenuirostris* | V | |
| Great Sand-plover | *Charadrius leschenaultia* | V | |
| Grey Butcherbird | *Cracticus torquatus* | | |
| Grey Fantail | *Rhipidura albiscapa* | | |
| Grey Plover | *Pluvialis squatarola* | | |
| Grey Shrike-thrush | *Colluricincla harmonica* | | |
| Grey Teal | *Anas gracilis* | | |
| Grey-tailed Tattler | *Tringa brevipes* | | |
| Hardhead | *Aythya australis* | | |
| Hoary-headed Grebe | *Poliocephalus poliocephalus* | | |
| Horsfield's Bronze-Cuckoo | *Chalcites basalis* | | |
| House Sparrow * | *Passer domesticus* | | |
| Intermediate Egret | *Ardea intermedia* | | |
| Jacky Winter Δ | *Microeca fascinans* | | |
| King Quail | *Excalfactoria chinensis* | | |
| Latham's Snipe Δ | *Gallinago hardwickii* | | M |
| Laughing Kookaburra | *Dacelo novaeguineae* | | |

| COMMON NAME | SCIENTIFIC NAME | TSC ACT | EPBC ACT |
|---|---|---|---|
| Leaden Flycatcher | *Myiagra rubecula* | | |
| Lewin's Honeyeater | *Meliphaga lewinii* | | |
| Little Black Cormorant | *Phalacrocorax sulcirostris* | | |
| Little Corella | *Cacatua 63elicate* | | |
| Little Curlew | *Numenius minutus* | | |
| Little Eagle[Δ] | *Hieraaetus morphnoides* | V | |
| Little Egret | *Egretta garzetta* | | |
| Little Grassbird | *Megalurus gramineus* | | |
| Little Lorikeet | *Glossopsitta pusilla* | V | |
| Little Pied Cormorant | *Phalacrocorax melanoleucos* | | |
| Little Wattlebird | *Anthochaera chrysoptera* | | |
| Long-billed Corella | *Cacatua tenuirostris* | | |
| Magpie-lark | *Grallina cyanoleuca* | | |
| Mallard * | *Anas platyrhynchos* | | |
| Marsh Sandpiper | *Tringa stagnatilis* | | |
| Masked Lapwing | *Vanellus miles* | | |
| Masked Owl | *Tyto novaehollandiae* | V | |
| Mistletoebird | *Dicaeum hirundinaceum* | | |
| Musk Duck [Δ] | *Biziura lobata* | | |
| Musk Lorikeet | *Glossopsitta concinna* | | |
| Nankeen Kestrel | *Falco cenchroides* | | |
| Nankeen Night Heron | *Nycticorax caledonicus* | | |
| New Holland Honeyeater | *Phylidonyris novaehollandiae* | | |
| Noisy Friarbird | *Philemon corniculatus* | | |
| Noisy Miner | *Manorina melanocephala* | | |
| Nutmeg Mannikin* | *Lonchura punctulata* | | |
| Olive-backed Oriole | *Oriolus sagittatus* | | |
| Osprey | *Pandion haliaetus* | V | |
| Pacific Baza[Δ] | *Aviceda subcristata* | | |
| Pacific Black Duck | *Anas superciliosa* | | |
| Pacific Golden Plover | *Pluvialis fulva* | | |
| Painted Button-quail | *Turnix varius* | | |
| Peaceful Dove [Δ] | *Geopelia placida* | | |
| Pectoral Sandpiper | *Calidris melanotos* | | |
| Peregrine Falcon[Δ] | *Falco 63icolour63s* | | |
| Pied Butcherbird | *Cracticus nigrogularis* | | |
| Pied Cormorant | *Phalacrocorax varius* | | |
| Pied Currawong | *Strepera graculina* | | |
| Pink-eared Duck | *Malacorhynchus membranaceus* | | |
| Powerful Owl | *Ninox strenua* | V | |
| Purple Swamphen | *Porphyrio porphyrio* | | |
| Rainbow Bee-eater | *Merops ornatus* | | |
| Rainbow Lorikeet | *Trichoglossus haematodus* | | |

| COMMON NAME | SCIENTIFIC NAME | TSC ACT | EPBC ACT |
|---|---|---|---|
| Red Wattlebird | *Anthochaera carunculata* | | |
| Red-browed Finch | *Neochmia temporalis* | | |
| Red-capped Plover | *Charadrius ruficapillus* | | |
| Red-kneed Dotterel | *Erythrogonys cinctus* | | |
| Red-necked Avocet | *Recurvirostra novaehollandiae* | | |
| Red-necked Stint | *Calidris ruficollis* | | |
| Red-rumped Parrot | *Psephotus haematonotus* | | |
| Red-whiskered Bulbul * | *Pycnonotus jocosus* | | |
| Regent Honeyeater | *Xanthomyza phrygia* | E | E/M |
| Rock Dove * | *Columba livia* | | |
| Rose Robin | *Petroica rosea* | | |
| Royal Spoonbill | *Platalea regia* | | |
| Ruddy Turnstone | *Arenaria interpres* | | |
| Ruff | *Philomachus pugnax* | | |
| Rufous Fantail | *Rhipidura rufifrons* | | M |
| Rufous Songlark | *Cincloramphus mathewsi* | | |
| Rufous Whistler | *Pachycephala rufiventris* | | |
| Sacred Kingfisher | *Todiramphus sanctus* | | |
| Satin Flycatcher | *Myiagra cyanoleuca* | | M |
| Scaly-breasted Lorikeet | *Trichoglossus chlorolepidotus* | | |
| Sharp-tailed Sandpiper | *Calidris acuminata* | | |
| Scarlet Honeyeater | *Myzomela sanguinolenta* | | |
| Scarlet Robin | *Petroica boodang* | V | |
| Shining Bronze-Cuckoo | *Chalcites lucidus* | | |
| Silver Gull | *Larus novaehollandiae* | | |
| Silvereye | *Zosterops lateralis* | | |
| Southern Boobook | *Ninox boobook* | | |
| Spangled Drongo | *Dicrurus bracteatus* | | |
| Spotted Pardalote | *Pardalotus punctatus* | | |
| Spotted Turtle-Dove * | *Streptopelia chinensis* | | |
| Straw-necked Ibis | *Threskiornis spinicollis* | | |
| Striated Heron | *Butorides striatus* | | |
| Striated Pardalote | *Pardalotus striatus* | | |
| Striated Thornbill | *Acanthiza lineata* | | |
| Striped Honeyeater | *Plectorhyncha lanceolata* | | |
| Sulphur-crested Cockatoo | *Cacatua galerita* | | |
| Superb Fairy-wren | *Malurus cyaneus* | | |
| Superb Fruit-Dove | *Ptilinopus superbus* | | |
| Superb Lyrebird | *Menura novaehollandiae* | | |
| Swamp Harrier | *Circus approximans* | | |
| Swift Parrot | *Lathamus discolour* | E1 | E/M |
| Tawny Frogmouth | *Podargus strigoides* | | |
| Tawny Grassbird | *Megalurus timoriensis* | | |

| COMMON NAME | SCIENTIFIC NAME | TSC ACT | EPBC ACT |
|---|---|---|---|
| Tree Martin | *Petrochelidon nigricans* | | |
| Varied Sittella | *Daphoenositta chrysoptera* | V | |
| Variegated Fairy-wren | *Malurus lamberti* | | |
| Weebill | *Smicrornis brevirostris* | | |
| Welcome Swallow | *Hirundo neoxena* | | |
| Western Sandpiper | *Calidris mauri* | | |
| Whimbrel | *Numenius phaeopus* | | |
| Whiskered Tern | *Chlidonias hybrida* | | |
| Whistling Kite[Δ] | *Haliastur sphenurus* | | |
| White-bellied Sea-Eagle[Δ] | *Haliaeetus leucogaster* | | M |
| White-breasted Woodswallow | *Artamus leucorynchus* | | |
| White-browed Scrubwren | *Sericornis frontalis* | | |
| White-browed Woodswallow | *Artamus superciliosus* | | |
| White-cheeked Honeyeater | *Phylidonyris nigra* | | |
| White-faced Heron | *Egretta novaehollandiae* | | |
| White-fronted Chat | *Epthianura albifrons* | E2 | |
| White-fronted Tern | *Sterna striata* | | |
| White-headed Pigeon | *Columba leucomela* | | |
| White-naped Honeyeater | *Melithreptus lunatus* | | |
| White-necked Heron | *Ardea pacifica* | | |
| White-plumed Honeyeater | *Lichenostomus penicillatus* | | |
| White-throated Gerygone | *Gerygone olivacea* | | |
| White-throated Needletail [Δ] | *Hirundapus caudacutus* | | M |
| White-throated Treecreeper | *Cormobates leucophaea* | | |
| White-winged Black Tern | *Chlidonias leucopterus* | | |
| Willie Wagtail | *Rhipidura leucophrys* | | |
| Wonga Pigeon | *Leucosarcia picata* | | |
| Wood Sandpiper | *Tringa glareola* | | |
| Yellow Thornbill | *Acanthiza nana* | | |
| Yellow-billed Spoonbill | *Platalea flavipes* | | |
| Yellow-faced Honeyeater | *Lichenostomus chrysops* | | |
| Yellow-rumped Thornbill [Δ] | *Acanthiza chrysorrhoa* | | |
| Yellow-tailed Black-Cockatoo | *Calyptorhynchus funereus* | | |
| Yellow-tufted Honeyeater | *Lichenostomus melanops* | | |
| **INVERTEBRATES** | | | |
| Cumberland Plain Land Snail [Δ] | *Meridolum corneovirens* | E | |
| Brown Gardensnail* | *Helix aspersa* | | |
| **MAMMALS** | | | |
| Black Rat * | *Rattus rattus* | | |
| Brown Hare * | *Lepus capensis* | | |
| Bush Rat | *Rattus fuscipes* | | |
| Cat * | *Felis catus* | | |
| Chocolate Wattled Bat | *Chalinolobus morio* | | |

| COMMON NAME | SCIENTIFIC NAME | TSC ACT | EPBC ACT |
|---|---|---|---|
| Common Brushtail Possum | *Trichosurus 66icolour66s* | | |
| Common Dunnart | *Sminthopsis murina* | | |
| Common Ringtail Possum | *Pseudocheirus 66icolour66s* | | |
| Dingo | *Canis lupus dingo* | | |
| Dog * | *Canis lupus familiaris* | | |
| Eastern Bentwing-bat | *Miniopterus schreibersii oceanensis* | V | |
| Eastern Broad-nosed Bat | *Scotorepens orion* | | |
| Eastern Grey Kangaroo Δ | *Macropus giganteus* | | |
| Eastrern Pygmy Possum | *Cercartetus nanus* | | |
| European cattle * | *Bos taurus* | | |
| Feathertail Glider | *Acrobates pygmaeus* | | |
| Fox * | *Vulpes vulpes* | | |
| Goat * | *Capra hircus* | | |
| Gould's Wattled Bat | *Chalinolobus gouldii* | | |
| Grey-headed Flying-fox | *Pteropus poliocephalus* | V | V |
| Horse * | *Equus caballus* | | |
| House Mouse * | *Mus musculus* | | |
| Koala | *Phascolarctos cinereus* | V | |
| Large-eared Pied Bat | *Chalinolobus dwyeri* | V | V |
| Lesser Long-eared Bat | *Nyctophilus geoffroyi* | | |
| Little Forest Bat | *Vespadelus vulturnus* | | |
| Long-nosed Bandicoot | *Perameles nasuta* | V, E2 | |
| Long-nosed Potoroo | *Potorous tridactylus tridactylus* | V | V |
| Pig * | *Sus scrofa* | | |
| Sheep (domestic) * | *Ovis aries* | | |
| Short-beaked Echidna | *Tachyglossus aculeatus* | | |
| Southern Brown Bandicoot (Eastern) | *Isoodon obesulus obesulus* | E1 | |
| Southern Forest Bat | *Vespadelus regulus* | | |
| Spotted-tailed Quoll | *Dasyurus maculatus* | V | E |
| Sugar Glider | *Petaurus breviceps* | | |
| Swamp Wallaby Δ | *Wallabia bicolour* | | |
| Undescribed Freetail Bat | *Mormopterus "Species 2"* | | |
| Unidentified Mastiff-bat | *Mormopterus norfolkensis/sp 1* | | |
| White-striped Freetail-bat | *Tadarida australis* | | |
| **REPTILES** | | | |
| Bandy Bandy | *Vermicella annulata* | | |
| Barred-sided Skink | *Eulamprus tenuis* | | |
| Bearded Dragon Δ | *Pogona barbata* | | |
| Broad-tailed Gecko | *Phyllurus platurus* | | |
| Burton's Snake-Lizard | *Lialis burtonis* | | |
| Common Scaly-foot Δ | *Pygopus lepidopodus* | | |
| Copper-tailed Skink | *Ctenotus taeniolatus* | | |
| Cream-striped Shinning-skink | *Cryptoblepharus virgatus* | | |

| COMMON NAME | SCIENTIFIC NAME | TSC ACT | EPBC ACT |
|---|---|---|---|
| Dark-flecked Garden Sunskink | *Lampropholis delicate* | | |
| Diamand Python [Δ] | *Morelia spilota spilota* | | |
| Eastern Blue-tongue | *Tiliqua scincoides* | | |
| Eastern Brown Snake | *Pseudonaja textilis* | | |
| Eastern Snake-necked Turtle | *Chelodina longicollis* | | |
| Eastern Water Dragon | *Physignathus lesueurii* | | |
| Eastern Water-skink | *Eulamprus quoyii* | | |
| Jacky Lizard | *Amphibolurus muricatus* | | |
| Lace Monitor [Δ] | *Varanus varius* | | |
| Pale-flecked Garden Sunskink | *Lampropholis guichenoti* | | |
| Red-bellied Black Snake | *Pseudechis porphyriacus* | | |
| Red-naped Snake [Δ] | *Furina diadema* | | |
| Robust Ctenotus | *Ctenotus robustus* | | |
| Rosenburg's Goanna | *Varanus rosenbergi* | V | |
| Three-toed Skink | *Saiphos equalis* | | |
| Weasel Skink | *Saproscincus mustelinus* | | |
| White's Skink | *Egernia whitii* | | |
| Yellow-faced Whip Snake | *Demansia psammophis* | | |