# FLORA AND FAUNA ASSESSMENT

## Chullora Material Receipt Facility

Prepared for
**RailCorp c/o Savills Project Management Pty Ltd**

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# Executive Summary

This document represents an ecological impact assessment for proposed works within the proposed Chullora material receipt facility. The works will involve the importation and treatment of contaminated soils currently located within the former Macdonaldtown Gasworks site. This document reports on the ecological values within the study area and assesses the impacts of the proposed works on the ecological values of the study area in relation to the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Further, it recommends mitigation measures, which if included as part of the proposed works, would seek to reduce impacts on ecological values within the study area.

Investigation of ecological values within the study area involved a review of existing documentation including vegetation mapping, threatened species records and the results of previous surveys, in addition to a field survey.

The vegetation recorded within the study area was characterised by scattered native trees over an understorey dominated by exotic grasses and herbs. A total of 57 flora species were observed within the study area, including seven indigenous species, two non- indigenous native species and 48 exotic species. Of the 48 exotic species recorded within the study area, five are listed as noxious weeds for the Municipality of Strathfield Local Government Area. No threatened flora species or Endangered Ecological Communities were recorded within the study area.

A total of two (2) fauna species, including one (1) native bird and one (1) introduced bird species, were observed during the field survey. None of these species are listed under the TSC or EPBC Act. Further, all the fauna species observed are considered disturbance tolerant species which are commonly found in urban and highly modified landscapes. Habitat elements for fauna within the study area were limited to isolated patches of native canopy vegetation and exotic ground-cover vegetation. The absence of habitat elements such as hollow-bearing trees, stags and leaf litter as well as the previous and ongoing disturbance from trains and other works in the study area were considered to contribute to the minimal habitat value of the site. In general, the study area was considered to represent minimal habitat for common species able to tolerate disturbance.

Two (2) threatened species recorded within 10km of the study area were considered to have the potential to occur: Green and Golden Bell Frog *(Litoria aurea)* and Grey Headed Flying Fox (*Pteropus poliocephalus*).

The impacts of the proposed works on Green and Golden Bell Frog and Grey Headed Flying Fox were considered against the Part 3A Threatened Species Assessment guidelines, and against the EPBC Act Administrative Guidelines on Significance. It was concluded that the proposed works were unlikely to significantly impact upon these threatened species, as the proposal would result in the temporary impacts on a very minimal amount of highly degraded marginal habitat.

While the proposed works were considered unlikely to impact significantly upon threatened species, it was recommended that weed control strategies and stormwater runoff management measures be adopted into the Construction Environmental Management Plan (CEMP).

# 1 Introduction

This Flora and Fauna Assessment has been prepared by Eco Logical Australia for a proposal to treat contaminated materials at lands identified within the Chullora Railway Workshops site, part of Lot 1 DP 318734, (hereafter referred to as 'the study area'). The contaminated material for treatment will be excavated from the former Macdonaldtown Gasworks site, Lot 50 DP 1001467.

The objective of this report is to assess the impact of the proposal on flora and fauna, and specifically on any threatened species, populations, ecological communities or their habitats.

## 1.1 SITE DESCRIPTION

The study area is a small land parcel covering approximately 0.99 ha, within the Chullora Railway Workshops (**Figure 1**: Chullora Study Area Location). Details of the study area are summarised in **Table 1** below.

The study area has been heavily disturbed by past and current land uses, which have included a scale test track and generic storage of railway equipment. The study area has little native vegetation present, and the majority of the study area is covered with exotic grasses and herbs, exposed blue metal and ballast, and old sleepers and train parts. Several trees are scattered throughout the study area, particularly in the northern portion. The study area is relatively flat with several low-lying areas containing standing water.

## 1.2 PROPOSED WORKS

The proposal will involve site establishment and demolition works in the study area prior to the importation of contaminated soils from the Macdonaldtown site for treatment and subsequent off-site disposal. Sediment controls as identified in the EMP for Chullora (JBS Environmental 2011) will be installed to contain sediment run-off generated by rainfall events.

The methods that are proposed for soil treatment at the Chullora site may include:

- Immobilisation: A process of blending the impacted soils with commercial agents to effectively immobilise the soil contaminants. DECCW approvals can be used with immobilisation results to revise waste classifications of immobilised materials prior to off-site disposal; and/or
- Bioremediation: A process which utilises naturally occurring soil organisms to chemically break down soil contaminants into less toxic / non toxic forms by metabolic processes.

Further details of the proposal are available in the Environmental Assessment for the remediation of the Macdonaldtown Gasworks Site (EcoLogical February 2011).

**Table 1: Chullora Site Details**

| DETAIL | CHULLORA |
|---|---|
| Street Address | Worth St, Chullora NSW 2190 |
| Lot and DP Number | Part of Lot 1 in DP 318734 |
| Geographical Coordinates | 6248950N; 320800E |
| Owner | Rail Corporation NSW |
| Current/Proposed Land Use | Vacant / Commercial-Industrial (for rail-related operations) |
| Local Government Area | Municipality of Strathfield |


**Figure 1: Chullora Study Area Location**

# 2 Legislative and Policy Framework

This section provides a brief review of the legislation and policy framework relevant to the proposed remediation and this flora and fauna assessment.

## 2.1 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The Commonwealth *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act) establishes a process for assessing the environmental impact of activities and developments which occur on Commonwealth land, may impact Commonwealth land or where 'matters of national environmental significance' (NES) may be affected. NES matters relevant to the current study include threatened species, ecological communities and migratory species (JAMBA/CAMBA/ ROKAMBA/Bonn Convention) that are listed under the EPBC Act.

Under the Act, any action which "has, will have, or is likely to have a significant impact on a matter of national environmental significance" is defined as a "controlled action", and requires approval from the Commonwealth Department Sustainability, Environment, Water, Population and Communities (SEWPaC) which is responsible for administering the EPBC Act (formerly the Department of Environment, Water, Heritage and the Arts, DEWHA).

Actions that may have a significant impact on one or more matters of NES need to be referred to the Department under the EPBC Act. The EPBC Act referrals process can produce one of three outcomes:

i. Non-controlled action (NCA): Assessment and approval under the EPBC Act is **not required**. The project may proceed without further approval under the EPBC Act.

ii. Non-controlled action – specified manner (NCA-SM): Assessment and approval under the EPBC Act is **not required** provided the action is undertaken in a specific way (similar to conditions of consent).

iii. Controlled Action (CA): The project will, or is likely, to have a significant impact on one or more matters of national environmental significance. The project **will require** full assessment and approval before it can proceed.

This report highlights any EPBC NES matters and advises if a referral to SEWPaC is required.

## 2.2 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

The Environmental Planning and Assessment Act 1979 (EP&A Act) provides the legal framework for development assessment and determination. The remediation project will be assessed in accordance with the requirements and framework provided by the EP&A Act 1979 and the EP&A Regulations 2000. There are three assessment pathways for development in NSW, Part 3A, Part 4 and Part 5.

This project application is made under Part 3A of the EP&A Act and seeks the Minister's approval of a project under Section 75E of the EP&A Act. Under Part 3A, the proponent and consent authority must consider all aspects of the environment, including biological, physical, social and economic factors and the principles of ecologically sustainable development, when assessing the impacts of the project.

Assessment under Part 3A of the EP&A Act includes consideration of threatened species, endangered populations and communities listed under the TSC Act.

### *2.2.1 Part 3A Threatened Species Assessment Guidelines*

Section 75F of the EP&A Act 1979 provides for the adoption of guidelines for environmental assessment of Part 3A projects. Draft Guidelines (DECC&DPI, 2005) have been prepared for the assessment of threatened species in Part 3A projects. The Assessment Guidelines outline principles for the provision of information to:

> *"…enable decision makers to ensure that developments deliver the following environmental outcomes:*
>
> *1. Maintain or improve biodiversity values (i.e. there is no net impact on threatened species or native vegetation);*
>
> *2. Conserve biological diversity and promote Environmentally Sustainable Development (ESD);*
>
> *3. Protect areas of High Conservation value (including areas of critical habitat);*
>
> *4. Prevent the extinction of threatened species;*
>
> *5. Protect the long-term viability of local populations of a species, population or ecological community; and*
>
> *6. Protect aspects of the environment that are matters of National Environmental Significance "(pursuant to the EPBC Act)".*

These questions have been addressed in **Appendix C** of this document. Where a proposal cannot avoid or mitigate impacts on threatened species, populations and ecological communities, according to key thresholds, other measures, including undertaking a suitable and approved offset action, may need to be taken.

## 2.3 THREATENED SPECIES CONSERVATION ACT 1995

The Threatened Species Conservation Act 1995 (TSC Act) objectives are to protect and encourage the recovery of threatened species, populations and communities listed under the Act. Two (2) threatened species listed under the TSC Act were identified as potentially occurring within the study area. Potential impacts on these species and their habitats are assessed as part of the Part 3A assessment process with reference to the Assessment Guidelines (DECC & DPI 2005) described above.

# 3 Methods

## 3.1 DATA REVIEW

A data review was undertaken by Eco Logical Australia (ELA) prior to the commencement of the field assessment in order to determine the location and extent of previous surveys, identify the representative spectrum of flora and fauna within the study area, and identify the presence of any previously recorded threatened species, populations and ecological communities listed under the TSC Act and the EPBC Act, or that could be expected to occur. To this end, the following documentation was reviewed prior to the conduct of the field investigations:

- Topographic maps and aerial photography of the study area and the surrounds, as well as vegetation mapping (NPWS 2002);
- Review of available relevant literature for the study area pertaining to flora and fauna, in particular the *Draft Management Plan for the Green and Golden Bell Frog Key Population at Greenacre* (DECC 2007); and
- A search of NSW DECCW Wildlife Atlas database and EPBC online Protected Matters Database Search (May 2011 - Point Search, coordinates 33° 53' 5", 151° 3' 43" buffered at 10km).

## 3.2 FIELD SURVEY

Field survey was conducted on 2 May 2011 by Eco Logical Australia botanist Michael Ward. The field survey involved a traverse of the entire study area recording all flora and fauna species observed (Figure 2). Additionally, notes on habitat types and habitat attributes were made so that an assessment of any threatened flora or fauna species likely to utilise the study area could be made.

# 4 Results

## 4.1 DATA REVIEW

No native vegetation communities are mapped as occurring across the study area (NPWS 2002). Searches of the NPWS Wildlife Atlas and EPBC Act MNES databases indicated a total of three (3) endangered ecological communities (EECs), 51 threatened flora species, 64 threatened fauna species, and 14 listed migratory species as having been recorded or having potential to occur within the locality (10 km radius).

Based on an assessment of these search results and review of aerial photography, vegetation mapping, and topographical maps, two (2) threatened species, Green and Golden Bell Frog *(Litoria aurea)* and Grey Headed Flying Fox (*Pteropus poliocephalus*), were considered to have the potential to occur within the study area. The remaining threatened flora and fauna were considered unlikely to occur due the study area's highly disturbed nature, lack of native vegetation, and the surrounding urban landscape.

## 4.2 FIELD SURVEYS

### 4.2.1 Flora

A total of 57 flora species were observed within the study area, including seven (7) indigenous species, two (2) non-indigenous native species and 48 exotic species (**Appendix A**). The vegetation recorded within the study area was characterised by scattered native trees over an understorey dominated by exotic grasses and herbs. No threatened flora species or Endangered Ecological Communities were recorded within the study area.

A total of 9 trees were recorded within the study area, none of which included any hollows (**Figure 2**: Survey Methods and Results**; Table 2**). All of these trees were in moderate health. Small clumps of *Casuarina glauca* (Swamp Oak) were present in both the northern and southern portions of the study area, and a single *Grevillea robusta* (Silky Oak) was adjacent to a shed near the middle of the study area (**Figure 2**: Survey Methods and Results**; Table 2**).

**Table 2: Tree Data**

| # | Scientific Name | Common Name | DBH (cm) | Height (m) |
|---|---|---|---|---|
| T1 | *Casuarina glauca* | Swamp Oak | 6 | 3.5 |
| T2 | *Casuarina glauca* | Swamp Oak | 18 | 8 |
| T3 | *Casuarina glauca* | Swamp Oak | 12 | 8 |
| T4 | *Casuarina glauca* | Swamp Oak | 14 | 9 |
| T5 | *Casuarina glauca* | Swamp Oak | 12 | 7 |
| T6 | *Grevillea robusta* | Silky Oak | 6 | 5 |
| T7 | *Casuarina glauca* | Swamp Oak | 5 | 3.5 |
| T8 | *Casuarina glauca* | Swamp Oak | 20 | 9 |
| T9 | *Casuarina glauca* | Swamp Oak | 5 | 4 |

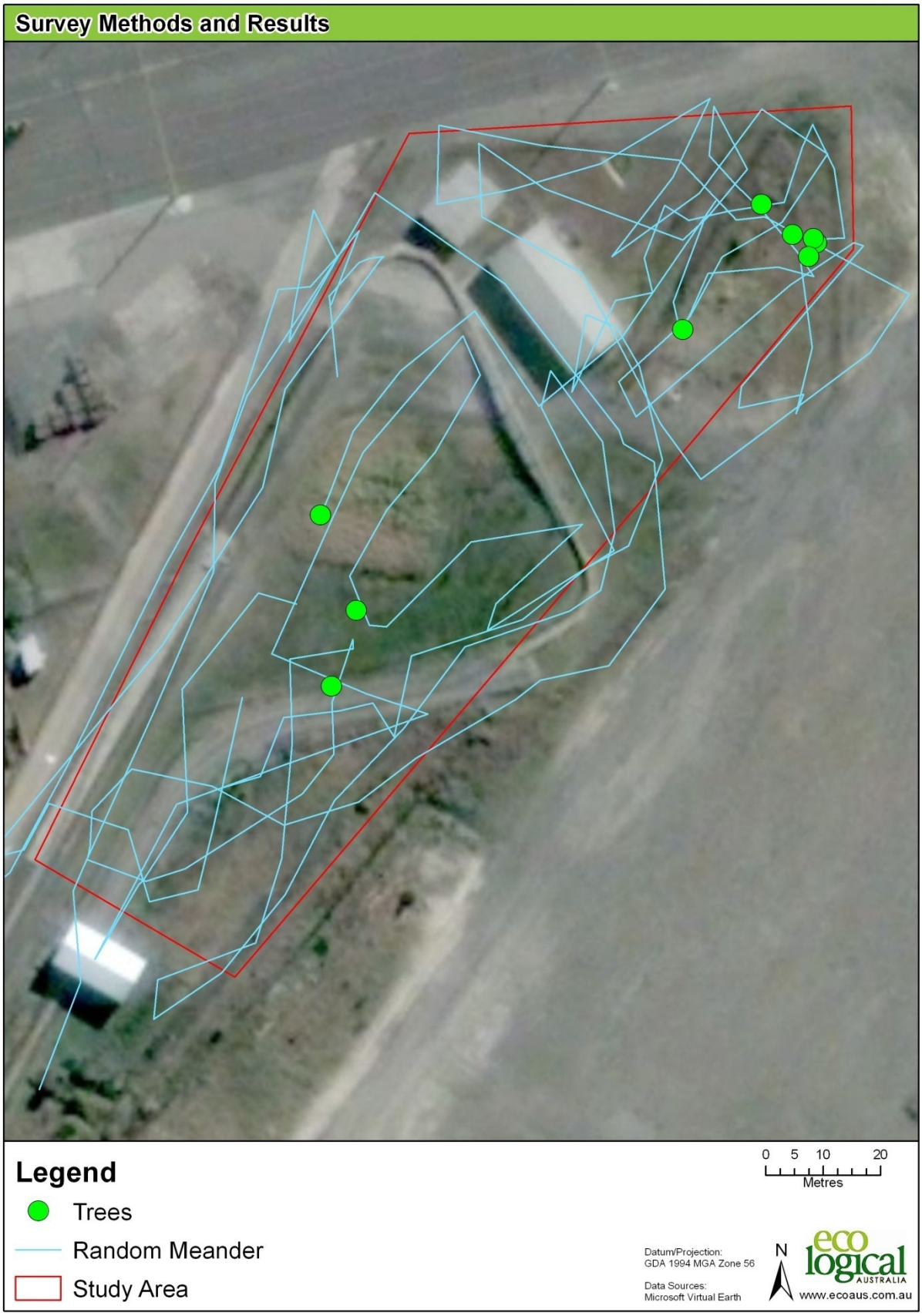


**Figure 2: Survey Methods and Results**

Of the 48 exotic species recorded within the study area, five (5) are listed as noxious weeds for the Strathfield Local Government Area (**Table 3**). The implications of different noxious weed categories, under the Noxious Weed Act 1993, are outlined in **Table 4**.

**Table 3: Noxious Weeds Recorded within the Study Area**

| Scientific Name | Common Name | Noxious Weed Class |
|---|---|---|
| *Asparagus asparagoides* | Bridal Creeper | 4 |
| *Cestrum parqui* | Green Cestrum | 3 |
| *Lantana camara* | Lantana | 4 |
| *Ligustrum lucidum* | Large-leaved Privet | 4 |
| *Ligustrum sinense* | Small-leaved Privet | 4 |

**Table 4: Noxious Weed Classes**

| Noxious Weed Class | Weed Type | Example Control Requirements |
|---|---|---|
| Class 3 | Plants that pose a potentially serious threat to primary production or the environment of a region to which the order applies, are not widely distributed in the area and are likely to spread in the area or to another area. | The plant must be fully and continuously suppressed and destroyed. |
| Class 4 | Plants that pose a potentially serious threat to primary production, the environment or human health, are widely distributed in an area to which the order applies and are likely to spread in the area or to another area. | The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority. |

### 4.2.2 Fauna

A total of two (2) fauna species, including one (1) native bird and one (1) introduced bird species, were observed during the field survey (**Appendix A**). None of these species are listed under the TSC or EPBC Act. Further all the fauna species observed are considered disturbance tolerant species which are commonly found in urban and highly modified landscapes.

### 4.2.3 Fauna Habitat Elements

Habitat elements for fauna within the study area were limited to isolated patches of native canopy vegetation (Figure 2) and relatively dense exotic ground-cover vegetation. Other habitat elements which may be utilised by fauna, such as hollow-bearing trees, stags and leaf litter, were absent from the study area. The absence of these and other habitat elements as well as the previous and ongoing disturbance from trains and other works in the study area were considered to contribute to the reduction in habitat value of the site. In general, the study area was considered to represent minimal habitat for common species able to tolerate disturbance.

Green and Golden Bell Frog (*Litoria aurea)* Habitat Assessment

Elements that characterise green and golden bell frog (*Litoria aurea*) habitat remain largely unclear. This may be a result of the ecology of the species as a colonising species and its ability to utilise a wide range of habitat types (Hamer *et al* 2008). Thus a strict definition of green and golden bell frog habitat remains a challenge.

Green and golden bell frog is considered a largely aquatic species and is generally restricted to these habitats throughout the year (Hamer *et al* 2002). Green and golden bell frog is known to aggregate

around water bodies used for breeding and foraging and thus most research has focussed on this habitat where the species is most obvious (DEC 2005; Hamer *et al* 2002). Characteristics that appear to be associated with green and golden bell frog include shallow slow flowing or still waterbodies without heavy shading and with a high diversity of bank vegetation (DEC 2005; Hamer *et al* 2002; Pyke and White 1996).

Other habitat attributes that have been associated with green and golden bell frog but are less well known, are those used for sheltering from predators, adverse conditions or during reduced metabolic activity over the winter period. These may include debris such as rocks and logs, human refuse such as corrugated iron and bricks, tussock forming vegetation and cracks or holes in mud or dirt often found peripheral to breeding habitat (DEC 2005)

The study area consists primarily of open grassland dominated by exotic species. Several small and shallow waterfilled depressions (Figure 3) and drainage lines were observed on the study area after heavy rainfall. These depressions are unlikely to provide breeding habitat for green and golden bell frog because of their ephemeral nature and the 6-12 week time period required for metamorphosis (Browne *et al* 2003; DEC, 2005). However these areas may facilitate movement throughout the study area or provide foraging opportunities for the species.

Piles of refuse such as old railway sleepers and pieces of cement present on the study area may also provide shelter or overwinter habitat. However it is expected that this type of shelter is abundant throughout areas surrounding the study area.

Although potential shelter, foraging and movement habitat is present on the study area, targeted surveys for the species are unlikely to detect green and golden bell frog because of the largely terrestrial habitat dominated by exotic grassland, the absence of wetland vegetation and the study areas distance from potential breeding habitat where the species is known to aggregate. Potential breeding habitat in the form of Chullora wetlands occurs approx 1.5km to the WSW of the study area and has been identified as potential habitat and possible location for a green and golden bell frog reintroduction program (DECC 2007).

The study area is separated from the known metapopulations at the Juno Parade former brick pit site, the former FreightCorp pond area and Cox's Creek Reserve by over 2km of urban and industrial landuses along with some major roads such as the Hume Highway. Although green and golden bell frog individuals have been observed to move large distances, these barriers to dispersal make migration from these three key metapopulations to or from the study area unlikely.

**Figure 3: Potential GGBF shelter habitat and a shallow water filled depression**

# 5 Impact Assessment

## 5.1 SUMMARY OF IMPACTS

Possible direct and indirect impacts of the proposal were determined to include the following:

- Removal of all vegetation from the study area;
- Flattening of the entire study area;
- Soil compaction;
- The potential movement of contaminated sediments off-site; and
- Spread of weed propagules.

Removal of vegetation on site is relevant to two threatened species listed under both the TSC and EPBC Acts, and a summary of those impacts are discussed in section 5.2 below.

The potential movement of contaminated sediments off-site appears to be the greatest risk to flora and fauna species, as there is the potential for contaminated sediments to be spread off-site by runoff. The Cooks River is approximately 200 metres north of the study area, although a large rail corridor separates the study area from the river. Sediment control measures have been identified in the Environmental Management Plan (EMP) that has been prepared.

The proposed works will involve working in areas which are currently affected by a large number of exotic species including the noxious weeds listed in **Table 3**. Controls to prevent the spread of these weeds are recommended.

## 5.2 IMPACTS TO THREATENED SPECIES

The impacts of the proposed works were considered relevant to two threatened species listed under both the TSC and EPBC Acts. These species are Green and Golden Bell Frog *(Litoria aurea)* and Grey-headed Flying-fox (*Pteropus poliocephalus*), which could potentially use the study area. The impacts of the proposed works on these two species were assessed against the Draft Guidelines for the assessment of impacts on threatened species, populations or ecological communities or their habitats arising from development applications assessed under Part 3A of the EP&A Act (DECC & DPI 2005, **Appendix C**) and the EPBC Act Administrative Guidelines on Significance (**Appendix D**).

It was concluded that the proposed works were unlikely to significantly impact upon these threatened species. The proposal would result in the removal of a very minor amount of highly degraded marginal foraging habitat for Grey-headed Flying-fox, and no current or historic campsites occur within the study area. Vegetation to be removed represents highly degraded marginal habitat for green and golden bell frog, and there are several barriers to the movement of this species onsite. Control of sediment run-off is recommended to prevent impacts on other potential green and golden bell frog habitat outside of the study area.

Based on the Part 3A impact assessments (Appendix C) it was concluded that the proposal is unlikely to have a significant impacts on species listed under the TSC Act with implementation of sediment control measures (see section 6.1). Similarly, it was concluded that the proposal is unlikely to have a significant impact on species listed under the EPBC Act (Appendix D), and as such, no referral to the SEWPAC for assessment and approval by the Environment Minister is necessary.

# 6 Ameliorative Measures

## 6.1 MITIGATION MEASURES

The following measures are recommended to manage the impacts of the proposed development on flora and fauna species and habitat.

- Stormwater runoff management via erection of sediment fences or equivalent, to prevent the spread of sediments outside of the study area. The sediment fences should be regularly inspected throughout the proposal, and maintained as required. It is noted that the proposed Environmental Management Plan (EMP) already contains sediment control measures.
- Noxious weeds to be removed or controlled using appropriate weed control techniques. All weed vegetative material removed is to be taken to a site licensed to receive green waste.

The inclusion of the measures above will be satisfactory measures to control impacts of the proposed facility on native flora and fauna. These measures are recommended for inclusion in the EMP or Statement of Commitments for the project. With these mitigation measures the proposal is unlikely to have a significant impact on species listed under the TSC Act or EPBC Act.

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# Appendix A: Species Lists

**Flora**

NB: * indicates an exotic or non-indigenous native species;

Species in **bold** are listed as noxious weed species in Municipality of Strathfield LGA.

| Family | Scientific Name | Common Name |
|---|---|---|
| Apiaceae | *Foeniculum vulgare** | Fennel |
| Arecaceae | *Phoenix dactylifera** | Date Palm |
| Asclepiadaceae | *Araujia sericifera** | Moth Vine |
| Asclepiadaceae | *Gomphocarpus fruticosus** | Narrow-leaved Cotton Bush |
| Asparagaceae | *Asparagus aethiopicus** | Asparagus Fern |
| **Asparagaceae** | ***Asparagus asparagoides**** | **Bridal Creeper** |
| Asteraceae | *Ageratina adenophora** | Crofton Weed |
| Asteraceae | *Ambrosia tenuifolia** | Lacy Ragweed |
| Asteraceae | *Aster subulatus** | Wild Aster |
| Asteraceae | *Bidens pilosa** | Cobbler's Pegs |
| Asteraceae | *Cirsium vulgare** | Spear Thistle |
| Asteraceae | *Conyza bonariensis** | Flaxleaf Fleabane |
| Asteraceae | *Coreopsis lanceolata** | Coreopsis |
| Asteraceae | *Osteospermum* sp.* | Daisy |
| Asteraceae | *Senecio madagascariensis** | Fireweed |
| Asteraceae | *Soliva sessilis** | Bindyi |
| Asteraceae | *Sonchus oleraceus** | Common Sowthistle |
| Casuarinaceae | *Casuarina glauca* | Swamp Oak |
| Commelinaceae | *Commelina cyanea* | Native Wandering Jew |
| Convolvulaceae | *Polymeria calycina* | |
| Cyperaceae | *Cyperus polystachyos* | |
| Fabaceae (Faboideae) | *Cytisus scoparius** | Broom |
| Fabaceae (Faboideae) | *Glycine tabacina* | Glycine |
| Fabaceae (Faboideae) | *Trifolium repens** | White Clover |
| Fabaceae (Faboideae) | *Vicia sp.** | |
| Fabaceae (Mimosoideae) | *Acacia longifolia* | |
| Fabaceae (Mimosoideae) | *Acacia saligna** | Golden Wreath Wattle |
| Geraniaceae | *Geranium sp.* | |
| Juncaceae | *Juncus cognatus** | |
| Lauraceae | *Cinnamomum camphora** | Camphor Laurel |
| Lomandraceae | *Lomandra longifolia* | Spiny-headed Mat-rush |
| Malvaceae | *Sida rhombifolia** | Paddy's Lucerne |
| **Oleaceae** | ***Ligustrum lucidum**** | **Large-leaved Privet** |
| **Oleaceae** | ***Ligustrum sinense**** | **Small-leaved Privet** |
| Plantaginaceae | *Plantago lanceolata** | Lamb's Tongues |
| Poaceae | *Andropogon virginicus** | Whisky Grass |
| Poaceae | *Briza maxima** | Quaking Grass |
| Poaceae | *Chloris gayana** | Rhodes Grass |
| Poaceae | *Chloris virgata** | Feathertop Rhodes Grass |
| Poaceae | *Cortaderia selloana** | Pampas Grass |
| Poaceae | *Cynodon dactylon* | Common Couch |
| Poaceae | *Echinochloa crus-galli** | Barnyard Grass |

| | | |
|---|---|---|
| Poaceae | *Eleusine indica** | Crowsfoot Grass |
| Poaceae | *Melinis repens** | Red Natal Grass |
| Poaceae | *Paspalum dilatatum** | Paspalum |
| Poaceae | *Pennisetum clandestinum** | Kikuyu Grass |
| Poaceae | *Setaria parviflora** | Slender Pigeon Grass |
| Poaceae | *Sorghum halepense** | Johnson Grass |
| Polygonaceae | *Rumex crispus** | Curled Dock |
| Portulacaceae | *Portulaca oleracea** | Pigweed |
| Primulaceae | *Anagallis arvensis** | Scarlet/Blue Pimpernel |
| Proteaceae | *Grevillea robusta** | Silky Oak |
| Rubiaceae | *Richardia* sp.* | |
| **Solanaceae** | ***Cestrum parqui**** | **Green Cestrum** |
| Solanaceae | *Solanum nigrum** | Black-berry Nightshade |
| **Verbenaceae** | ***Lantana camara**** | **Lantana** |
| Verbenaceae | *Verbena bonariensis** | Purpletop |

**Fauna**

| Class | Scientific Name | Common Name |
|---|---|---|
| Aves | *Strepera graculina* | Pied Currawong |
| Aves | *Acridotheres tristis* | Common Myna |

# Appendix B: Threatened Species Likelihood of Occurrence

Searches of the Atlas of NSW Wildlife and EPBC Protected Matters search tool were performed for the study area on 02/06/10. Searches used a radius of 10 km around the site.

The results from both searches were compiled into a list of potentially occurring species, populations and communities that may possibly occur within the study area, although listed marine species excluded from this list as they were considered to not be relevant to the study area.

The likelihood of occurrence was considered for all listed species, populations and communities, and is provided for each under the 'likely' column.
Species, populations and communities considered to have the potential to occur, are likely to occur, or do occur are highlighted in yellow. Marine Species have been excluded

TSC Status = Listing under the Threatened Species Conservation Act 1995; EPBC Status = Listing under the Environment Protection and Biodiversity Conservation Act 1999; CE = Critically Endangered; E = Endangered; Ex = Extinct; V = Vulnerable; M = Migratory

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| **FROGS** | | | | | |
| *Crinia tinnula* | Wallum Froglet | V | - | Wallum swamps and associated low land meandering watercourses on coastal plains (Ehmann 1997). Occurs in elevations up to around 50m and is closely related to freshwater habitats in the coastal zone (DECC 2007). Found most commonly in wallum wetlands characterised by low nutrients, highly acidic, tanin-stained waters that are typically dominated by paperbarks and tea-trees. Also found in sedgeland and wet heathland (DECC 2007) | Unlikely |
| *Heleioporus australiacus* | Giant Burrowing Frog | V | V | Forages in woodlands, wet heath, dry and wet sclerophyll forest (Ehmann 1997). Associated with semi-permanent to ephemeral sand or rock based streams (Ehmann 1997), where the soil is soft and sandy so that burrows can be constructed (Environment Australia 2000). | Unlikely |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Litoria aurea* | Green and Golden Bell Frog | E | V | This species has been observed utilising a variety of natural and man-made waterbodies (Pyke & White 1996) such as coastal swamps, marshes, dune swales, lagoons, lakes, other estuary wetlands, riverine floodplain wetlands and billabongs, stormwater detention basins, farm dams, bunded areas, drains, ditches and any other structure capable of storing water (DECC 2007). Fast flowing streams are not utilised for breeding purposes by this species (Mahony 1999). Preferable habitat for this species includes attributes such as shallow, still or slow flowing, permanent and/or widely fluctuating water bodies that are unpolluted and without heavy shading (DECC 2007). Large permanent swamps and ponds exhibiting well-established fringing vegetation (especially bulrushes–Typha sp. and spikerushes–Eleocharis sp.) adjacent to open grassland areas for foraging are preferable (Ehmann 1997; Robinson 1993). Ponds that are typically inhabited tend to be free from predatory fish such as Mosquito Fish (Gambusia holbrooki) (DECC 2007). | Potential |
| *Litoria raniformis* | Southern Bell Frog | E | V | Relatively still or slow-flowing sites such as billabongs, ponds, lakes or farm dams, especially where bulrushes (Typha sp., Eleocharis sp. and Phragmites sp.) are present (DECC 2007; Ehmann 1997). This species is common in lignum shrublands, black box and River Red Gum woodlands, irrigation channels and at the periphery of rivers in the southern parts of NSW (DECC 2007). This species occurs in vegetation types such as open grassland, open forest and ephemeral and permanent non-saline marshes and swamps (DECC 2007). Open grassland and ephemeral permanent non-saline marshes and swamps have also been associated with this species (Ehmann 1997). | Unlikely |
| *Mixophyes balbus* | Stuttering Frog | E | V | A variety of forest habitats from rainforest through wet and moist sclerophyll forest to riparian habitat in dry sclerophyll forest (DECC 2007) that are generally characterised by deep leaf litter or thick cover from understorey vegetation (Ehmann 1997). Breeding habitats are streams and occasionally springs. Not known from streams disturbed by humans (Ehmann 1997) or still water environments (NSW Scientific Committee 2002). | Unlikely |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Pseudophryne australis* | Red-crowned Toadlet | V | - | Red-crowned Toadlets are found in steep escarpment areas and plateaus, as well as low undulating ranges with benched outcroppings on Triassic sandstones of the Sydney Basin (DECC 2007). Within these geological formations, this species mainly occupies the upper parts of ridges, usually being restricted to within about 100 metres of the ridgetop. However they may also occur on plateaus or more level rock platforms along the ridgetop (DECC 2007). Associated with open forest to coastal heath (Ehmann 1997). Utilises small ephemeral drainage lines which feed water from the top of the ridge to the perennial creeks below for breeding, and are not usually found in the vicinity of permanent water (Ehmann 1997). Breeding sites are often characterised by clay-derived soils and generally found below the first sandstone escarpment in the talus slope (NPWS 1997). | Unlikely |
| **REPTILES** | | | | | |
| *Hoplocephalus bungaroides* | Broad-headed Snake | E | V | Typical sites consist of exposed sandstone outcrops and benching where the vegetation is predominantly woodland, open woodland and/or heath on Triassic sandstone of the Sydney Basin (DECC 2007). They utilise rock crevices and exfoliating sheets of weathered sandstone during the cooler months and tree hollows during summer (Webb & Shine 1998b). Some of the canopy tree species found to regularly co-occur at known sites include *Corymbia eximia, C. gummifera, Eucalyptus sieberi, E. punctata* and *E.piperita* (DECC 2007). | Unlikely |
| **DIURNAL BIRDS** | | | | | |
| *Anthochaera Phrygia (aka Xanthomyza phrygia)* | Regent Honeyeater | E | E & M | Associated with temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts, and riparian forests of River Oak (*Casuarina cunninghamiana*) (Garnett 1993). Areas containing Swamp Mahogany (*Eucalyptus robusta*) in coastal areas have been observed to be utilised (NPWS 1997). The Regent Honeyeater primarily feeds on nectar from box and ironbark eucalypts and occasionally from banksias and mistletoes (NPWS 1995). As such it is reliant on locally abundant nectar sources with different flowering times to provide reliable supply of nectar (Environment Australia 2000). | Unlikely |
| *Botaurus poiciloptilus* | Australasian Bittern | V | - | Terrestrial wetlands with tall dense vegetation, occasionally estuarine habitats (Marchant & Higgins 1993). Reedbeds, swamps, streams, estuaries (Simpson & Day 1999). | Unlikely |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Burhinus grallarius* | Bush Stone-curlew | E | - | Associated with dry open woodland with grassy areas, dune scrubs, in savanna areas, the fringes of mangroves, golf courses and open forest / farmland (Pittwater Council 2000; Marchant & Higgins 1993). Forages in areas with fallen timber, leaf litter, little undergrowth and where the grass is short and patchy (Environment Australia 2000; Marchant & Higgins 1993). Is thought to require large tracts of habitat to support breeding, in which there is a preference for relatively undisturbed in lightly disturbed. | Unlikely |
| *Calidris alba* | Sanderling | V | - | Occur in coastal areas on low beaches, near reefs and inlets along tidal mudflats and bare open coastal lagoons (DECC 2007). Rarely seen in near-coastal wetlands such as lagoons, hypersaline lakes, saltponds and samphire flats (DECC 2007) | Unlikely |
| *Callocephalon fimbriatum* | Gang-gang Cockatoo | V-E2 | - | During summer in dense, tall, wet forests of mountains and gullies, alpine woodlands (Morcombe 2004). In winter they occur at lower altitudes in drier more open forests and woodlands, particularly box-ironbark assemblages (Shields & Chrome 1992). They sometimes inhabit woodland, farms and suburbs in autumn/winter (Simpson & Day 2004). | Unlikely |
| *Daphoenositta chrysoptera* | Varied Sittella | V | - | | Unlikely |
| *Charadrius leschenaultii* | Greater Sand Plover | V | - | Entirely coastal in NSW, foraging on intertidal sand and mudflats in estuaries, roosting during high tide on sandy beaches or rocky shores (DECC 2007) | Unlikely |
| *Charadrius mongolus* | Lesser Sand Plover | V | M | Favours coastal areas including beaches, mudflats and mangroves where they forage (DECC 2007). They may be seen roosting during high tide on sandy beaches or rocky shores (DECC 2007). | Unlikely |
| *Diomedea exulans* | Wandering Albatross | E1 | - | The Wandering Albatross visits Australian waters extending from Fremantle, Western Australia, across the southern water to the Whitsunday Islands in Queensland between June and September. It has been recorded along the length of the NSW coast. At other times birds roam the southern oceans and commonly follow fishing vessels for several days. | Unlikely |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Epthianura albifrons* | White-fronted Chat | V | | Regularly observed in the saltmarsh of Newington Nature Reserve (with occasional sightings from other parts of Sydney Olympic Park and in grassland on the northern bank of the Parramatta River). Current estimates suggest this population consists of 8 individuals. Regularly observed in the saltmarsh and on the sandy shoreline of a small island of Towra Point Nature Reserve. This population is estimated to comprise 19-50 individuals. Have been observed breeding from late July through to early March, with 'open-cup' nests built in low vegetation. Nests in the Sydney region have also been seen in low isolated mangroves. Gregarious species, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground (DECC 2005). | Unlikely |
| *Epthianura albifrons* | White-fronted Chat in the Sydney Metropolitan CMA | E2 | | As above. Two isolated sub-populations of White-fronted Chats are currently known from the Sydney Metropolitan Catchment Management Authority (CMA) area; one at Newington Nature Reserve on the Parramatta River and one at Towra Point Nature Reserve in Botany Bay. These sub-populations are separated from each other by 25 km of urbanised land, across which the Chats are unlikely to fly. Therefore, the Newington and Towra Point populations are thought to be disjunct from each other (and from the nearest populations outside Sydney Metropolitan CMA). | Unlikely |
| *Ephippiorhynchus asiaticus* | Black-necked Stork | E | - | Associated with tropical and warm temperate terrestrial wetlands, estuarine and littoral habitats, and occasionally woodlands and grasslands floodplains (Marchant & Higgins 1993). Forages in fresh or saline waters up to 0.5m deep, mainly in open fresh waters, extensive sheets of shallow water over grasslands or sedgeland, mangroves, mudflats, shallow swamps with short emergent vegetation and permanent billabongs and pools on floodplains (Marchant & Higgins 1993; DECC 2007). | Unlikely |
| *Hieraaetus morphnoides* | Little Eagle | V | - | | Unlikely |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Glossopsitta pusilla* | Little Lorikeet | V | - | In New South Wales Little Lorikeets are distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. Little Lorikeets mostly occur in dry, open eucalypt forests and woodlands. They have been recorded from both old-growth and logged forests in the eastern part of their range, and in remnant woodland patches and roadside vegetation on the western slopes. They feed primarily on nectar and pollen in the tree canopy, particularly on profusely-flowering eucalypts, but also on a variety of other species including melaleucas and mistletoes. On the western slopes and tablelands White Box Eucalyptus albens and Yellow Box E. melliodora are particularly important food sources for pollen and nectar respectively. | Unlikely |
| *Haematopus fuliginosus* | Sooty Oystercatcher | V | - | A coastal species that inhabits rock coastlines, coral cays, reefs and occasionally sandy beaches (Marchant & Higgins 1993; Simpson & Day 1999). | Unlikely |
| *Haematopus longirostris* | Pied Oystercatcher | V | - | Roosts and forages on sandy beaches, sand banks, mudflats and estuaries (Marchant & Higgins 1993, Simpson & Day 1999). | Unlikely |
| *Ixobrychus flavicollis* | Black Bittern | V | - | Occurs in both terrestrial and estuarine wetlands generally in areas of permanent water and dense vegetation (DECC 2007). In areas with permanent water it may occur in flooded grassland, forest, woodland, rainforest and mangroves (DECC 2007). | Unlikely |
| *Lathamus discolor* | Swift Parrot | E | E | Breeds in Tasmania between September and January. Migrates to mainland in autumn, where it forages on profuse flowering Eucalypts (Blakers et al. 1984; Schodde and Tidemann 1986; Forshaw and Cooper 1981). Hence, in this region, autumn and winter flowering eucalypts are important for this species. Favoured feed trees include winter flowering species such as Swamp Mahogany (*Eucalyptus robusta*), Spotted Gum (*Corymbia maculata*), Red Bloodwood (*C. gummifera*), Mugga Ironbark (*E. sideroxylon*), and White Box (*E. albens*) (DECC 2007). | Unlikely |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Limicola falcinellus* | Broad-billed Sandpiper | V | M | The eastern form of the Broad-billed Sandpiper breeds in northern Siberia before migrating southwards in winter to Australia (DECC 2007). In Australia, Broad-billed Sandpipers over-winter on the northern coast, particularly in the north-west, with birds located occasionally on the southern coast (DECC 2007). In NSW, the main site for the species is the Hunter River estuary, with birds occasionally reaching the Shoalhaven estuary (DECC 2007). There are few records for inland NSW (DECC 2007). Broad-billed Sandpipers favour sheltered parts of the coast such as estuarine sandflats and mudflats, harbours, embayments, lagoons, saltmarshes and reefs as feeding and roosting habitat (DECC 2007). Occasionally, individuals may be recorded in sewage farms or within shallow freshwater lagoons (DECC 2007). Broad-billed Sandpipers roost on banks on sheltered sand, shell or shingle beaches. | Unlikely |
| *Lophoictinia isura* | Square-tailed Kite | V | - | In coastal areas associated tropical and temperate forests and woodlands on fertile soils with an abundance of passerine birds (Marchant & Higgins 1993, DECC 2007). May be recorded inland along timbered watercourses (DECC 2007). In NSW it is commonly associated with ridge or gully forests dominated by Woollybutt (*Eucalyptus logifloria*), Spotted Gum (*E. maculata*), or Peppermint Gum (*E. elata, E. smithii*) (DECC 2007). | Unlikely |
| *Melithreptus gularis gularis* | Black-chinned Honeyeater (eastern subspecies) | V | - | Predominantly associated with box-ironbark association woodlands and River Red Gum (NSW Scientific Committee, 2001). Also associated with drier coastal woodlands of the Cumberland Plain and the Hunter, Richmond and Clarence Valleys (NSW Scientific Committee, 2001). | Unlikely |
| *Neophema chrysogaster* | Orange-bellied Parrot | E4A | CE | Breeds only in coastal south-west Tasmania and spends the winter in coastal Victoria and South Australia. It nests in hollows in eucalypt trees which grow adjacent to its feeding plains. In early October the birds arrive in the south west and depart after the breeding season usually in March and April.<br>It feeds on the seeds of several sedges and heath plants, including buttongrass. Its main food preferences are found in sedgelands which have not been burned for between 3-15 years. Also included in the diet are seeds of three Boronia species and the everlasting daisy *Helichrysum pumilum*. After breeding, migrating birds move gradually northwards up the west coast, through the Hunter Group and King Island in Bass Strait and on to the mainland. On the journey the birds usually feed on beach-front vegetation including salt tolerant species such as sea rocket *Cakile maritima*. They also eat various coastal native and introduced grasses. | Unlikely |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Neophema pulchella* | Turquoise Parrot | V | - | Steep rocky ridges and gullies, rolling hills, valleys and river flats and the plains of the Great Dividing Range compromise the topography inhabited by this species (Marchant & Higgins 1993). Spends much of the time on the ground foraging on seed and grasses (DECC 2007). It is associated with coastal scrubland, open forest and timbered grassland, especially low shrub ecotones between dry hardwood forests and grasslands with high proportion of native grasses and forbs (Environment Australia 2000). | Unlikely |
| *Nettapus coromandelianus* | Cotton Pygmy-Goose | E1 | - | Freshwater lakes, lagoons, swamps and dams, particularly those vegetated with waterlilies and other floating and submerged aquatic vegetation. The Cotton Pygmy-goose uses standing dead trees with hollows close to water for roosting and breeding. | Unlikely |
| *Pandion haliaetus* | Osprey | V | - | Associated with waterbodies including coastal waters, inlets, lakes, estuaries, beaches, offshore islands and sometimes along inland rivers (Schodde and Tidemann 1986; Clancy 1991; Olsen 1995). Osprey may nest on the ground, on sea cliffs or in trees (Olsen 1995). Osprey generally prefer emergent trees, often dead or partly dead with a broken off crown (Olsen 1995). | Unlikely |
| *Petroica boodang* | Scarlet Robin | V | - | | Unlikely |
| *Petroica phoenicea* | Flame Robin | V | - | | Unlikely |
| *Petroica rodinogaster* | Pink Robin | V | - | The Pink Robin is found in Tasmania and the uplands of eastern Victoria and far south-eastern NSW, almost as far north as Bombala. On the mainland, the species disperses north and west and into more open habitats in winter, regularly as far north as the ACT area, and sometimes being found as far north as the central coast of NSW.<br>Inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies. Breeds between October and January and can produce two clutches in a season. | Unlikely |
| *Ptilinopus superbus* | Superb Fruit-Dove | V | - | Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms (DECC 2007). It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees (ibid.). Part of the population is migratory or nomadic (ibid.). At least some of the population, particularly young birds, moves south through Sydney, especially in autumn (ibid.). Breeding takes place from September to January (ibid.). Will feed in adjacent mangroves or eucalypt forests (Blakers et al. 1984). | Unlikely |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Rostratula australis (a.k.a. R. benghalensis)* | Painted Snipe (Australian subspecies) | E | V | Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber (DECC 2007). Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds (ibid.). Breeding is often in response to local conditions; generally occurs from September to December (DECC 2007). Roosts during the day in dense vegetation (NSW Scientific Committee 2004). Forages nocturnally on mud-flats and in shallow water (DECC 2007). Feeds on worms, molluscs, insects and some plant-matter (ibid.). | Unlikely |
| *Sterna albifrons* | Little Tern | E | - | Almost exclusively coastal, preferring sheltered areas (DECC 2007), however may occur several kilometres inland in harbours, inlets and rivers (Smith 1990). Australian birds breed on sandy beaches and sand spits (Simpson & Day 1999). | Unlikely |
| *Stictonetta naevosa* | Freckled Duck | V | - | Associated with a variety of plankton-rich wetlands, such as heavily vegetated, large open lakes and their shores, creeks, farm dams, sewerage ponds and floodwaters (DECC 2007). | Unlikely |
| *Xanthomyza phrygia* | Regent Honeyeater | E | E, M | Associated with temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts, and riparian forests of River Oak (*Casuarina cunninghamiana*) (Garnett 1993). Areas containing Swamp Mahogany (*Eucalyptus robusta*) in coastal areas have been observed to be utilised (NPWS 1997). The Regent Honeyeater primarily feeds on nectar from box and ironbark eucalypts and occasionally from banksias and mistletoes (NPWS 1995). As such it is reliant on locally abundant nectar sources with different flowering times to provide reliable supply of nectar (Environment Australia 2000). | Unlikely |
| *Xenus cinereus* | Terek Sandpiper | V | M | A rare migrant to the eastern and southern Australian coasts, being most common in northern Australia, and extending its distribution south to the NSW coast in the east (DECC 2007). The two main sites for the species in NSW are the Richmond River estuary and the Hunter River estuary (DECC 2007). In Australia, has been recorded on coastal mudflats, lagoons, creeks and estuaries (DECC 2007). Favours mudbanks and sandbanks located near mangroves, but may also be observed on rocky pools and reefs, and occasionally up to 10 km inland around brackish pools (DECC 2007). Generally roosts communally amongst mangroves on dead trees, often with related wader species (DECC 2007). | Unlikely |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| **NOCTURNAL BIRDS** | | | | | |
| *Ninox connivens* | Barking Owl | V | - | Associated with a variety of habitats such as savanna woodland, open eucalypt forests, wetland and riverine forest. The habitat is typically dominated by Eucalypts (often Redgum species), however often dominated by Melaleuca species in the tropics (DECC 2007). It usually roosts in dense foliage in large trees such as River She-oak (*Allocasuarina cunninghamiana*), other Casuarina and Allocasuarina, eucalypts, Angophora, Acacia and rainforest species from streamside gallery forests (NPWS 2003). It usually nests near watercourses or wetlands (NPWS 2003) in large tree hollows with entrances averaging 2-29 metres above ground, depending on the forest or woodland structure and the canopy height (Debus 1997). | Unlikely |
| *Ninox strenua* | Powerful Owl | V | - | Powerful Owls are associated with a wide range of wet and dry forest types with a high density of prey, such as arboreal mammals, large birds and flying foxes (Environment Australia 2000, Debus & Chafer 1994). Large trees with hollows at least 0.5m deep are required for shelter and breeding (Environment Australia 2000). | Unlikely |
| *Tyto capensis* | Grass Owl | V | - | Reported habitats include tall grass, swampy, sometimes tidal areas, mangrove fringes, grassy plains, coastal heaths, grassy woodland, cane grass, lignum, sedges, cumbungi, cane fields and grain stubble (Pizzey and Knight, 1997). The Grass Owl nests on the ground within dense tall grass, sedges, reeds and even sugarcane plantations (Pizzey and Knight, 1997). The Grass Owl primarily feeds on rodents, hunting on the wing over heathland, grassland and sedgeland, as well as along the edge of sugar cane, crops and pastureland (Pizzey and Knight, 1997). | Unlikely |
| *Tyto novaehollandiae* | Masked Owl | V | - | Associated with forest with sparse, open, understorey, typically dry sclerophyll forest and woodland (DECC 2007) and especially the ecotone between wet and dry forest, and non forest habitat (Environment Australia 2000). Known to utilise forest margins and isolated stands of trees within agricultural land (Hyem 1979) and heavily disturbed forest where its prey of small and medium sized mammals can be readily obtained (Kavanagh & Peake 1993). | Unlikely |
| **MAMMALS (EXCLUDING BATS)** | | | | | |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Cercartetus nanus* | Eastern Pygmy-possum | V | - | Found in wet and dry eucalypt forest, subalpine woodland, coastal banksia woodland and wet heath (Menkhorst & Knight 2004). Pygmy-Possums feed mostly on the pollen and nectar from banksias, eucalypts and understorey plants and will also eat insects, seeds and fruit (Turner & Ward 1995). The presence of Banksia sp. and Leptospermum sp. are an important habitat feature (DECC 2007). Small tree hollows are favoured as day nesting sites, but nests have also been found under bark, in old birds nests and in the branch forks of tea-trees (Turner & Ward 1995). | Unlikely |
| *Dasyurus maculatus* | Spotted-tailed Quoll | V<br>- | -<br>E | The Spotted-tailed Quoll inhabits a range of forest communities including wet and dry sclerophyll forests, coastal heathlands and rainforests (Mansergh 1984; DECC 2007j), more frequently recorded near the ecotones of closed and open forest. This species requires habitat features such as maternal den sites, an abundance of food (birds and small mammals) and large areas of relatively intact vegetation to forage in (DECC 2007). Maternal den sites are logs with cryptic entrances; rock outcrops; windrows; burrows (Environment Australia 2000). | Unlikely |
| *Dasyurus viverrinus* | Eastern Quoll | E | V | Associated with a variety of habitats, including dry sclerophyll forest, shrub, heath land, riparian forests and agricultural areas. Requires features such as hollow logs and rock piles for shelter (NPWS 1999). | Unlikely |
| *Isoodon obesulus* | Southern Brown Bandicoot | E | E | This species is associated with heath, coastal scrub, heathy forests (Menkhorst & Knight 2004), shrubland and woodland on well drained soils. This species is thought to display a preference for newly regenerating heathland and other areas prone to fire (Menkhorst & Seebeck 1990). | Unlikely |
| *Perameles nasuta* | Long-nosed Bandicoot | E2 | - | The exact area occupied by the population is not clearly defined. For the purpose of this determination, the population includes the local government areas (LGA) of Marrickville and Canada Bay, with the likelihood that it also includes Canterbury, Ashfield and Leichhardt LGAs. | Unlikely |
| *Petaurus australis* | Yellow-bellied Glider | V | - | This species is restricted to tall mature forests, preferring productive tall open sclerophyll forests with a mosaic of tree species including some that flower in winter (Environment Australia 2000, Braithwaite 1984, Davey 1984, Kavanagh 1984; DECC 2007). Large hollows within mature trees are required for shelter, nesting and breeding (Henry and Craig 1984; DECC 2007). | Unlikely |
| *Petrogale penicillata* | Brush-tailed Rock-wallaby | E | V | Rocky areas in a variety of habitats, typically north facing sites with numerous ledges, caves and crevices (Strahan 1995). | Unlikely |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Phascolarctos cinereus* | Koala | V-E2 | - | Associated with both wet and dry Eucalypt forest and woodland that contains a canopy cover of approximately 10 to 70% (Reed et al. 1990), with acceptable Eucalypt food trees. Some preferred Eucalyptus species are: Eucalyptus tereticornis, E. punctata, E. cypellocarpa, E. viminalis | Unlikely |
| *Potorous tridactylus*<br>*Potorous tridactylus tridactylus* | Long-nosed Potoroo<br>Long-nosed Potoroo (SE Mainland Population) | V<br>- | -<br>V | Associated with dry coastal heath and dry and wet sclerophyll forests (Strahan 1998) with dense cover for shelter and adjacent more open areas for foraging (Menkhorst & Knight 2004). | Unlikely |
| *Pseudomys novaehollandiae* | New Holland Mouse | - | V | A small burrowing native rodent with a fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Inhabits open heathlands, open woodlands with a heathland understorey and vegetated sand dunes. A social animal, living predominantly in burrows shared with other individuals. The home range of the New Holland Mouse ranges from 0.44 ha to 1.4 ha and the species peaks in abundance during early to mid stages of vegetation succession typically induced by fire (DSEWPC 2010) | Unlikely |
| **MAMMALS (BATS)** | | | | | |
| *Chalinolobus dwyeri* | Large-eared Pied Bat | V | V | The Large-eared Pied Bat has been recorded in a variety of habitats, including dry sclerophyll forests, woodland, sub-alpine woodland, edges of rainforests and wet sclerophyll forests (Churchill 1998; DECC 2007). This species roosts in caves, rock overhangs and disused mine shafts and as such is usually associated with rock outcrops and cliff faces (Churchill 1998; DECC 2007). | Unlikely |
| *Falsistrellus tasmaniensis* | Eastern False Pipistrelle | V | - | Prefers moist habitats with trees taller than 20m (DECC 2007). Roosts in tree hollows but has also been found roosting in buildings or under loose bark (DECC 2007). | Unlikely |
| *Miniopterus australis* | Little Bent-wing Bat | V | - | Prefers well-timbered areas including rainforest, wet and dry sclerophyll forests, Melaleuca swamps and coastal forests (Churchill 1998). This species shelter in a range of structures including culverts, drains, mines and caves (Environment Australia 2000). Relatively large areas of dense vegetation of either wet sclerophyll forest, rainforest or dense coastal banksia scrub are usually found adjacent to caves in which this species is found (DECC 2007). Breeding occurs in caves, usually in association with M. schreibersii (Environment Australia 2000, DECC 2007). | Unlikely |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Miniopterus schreibersii oceanensis* | Eastern Bent-wing Bat | V | - | Associated with a range of habitats such as rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland (Churchill 1998). It forages above and below the tree canopy on small insects (AMBS 1995, Dwyer 1995, Dwyer 1981). Will utilise caves, old mines, and stormwater channels, under bridges and occasionally buildings for shelter (Environment Australia 2000, Dwyer 1995). | Unlikely |
| *Mormopterus norfolkensis* | East Coast Freetail Bat | V | - | Most records of this species are from dry eucalypt forest and woodland east of the Great Dividing Range (Churchill 1998). Individuals have, however, been recorded flying low over a rocky river in rainforest and wet sclerophyll forest and foraging in clearings at forest edges (Environment Australia 2000; Allison & Hoye 1998). Primarily roosts in hollows or behind loose bark in mature eucalypts, but have been observed roosting in the roof of a hut (Environment Australia 2000; Allison & Hoye 1998). | Unlikely |
| *Myotis macropus* | Southern Myotis | V | - | The Large-footed Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface. In NSW females have one young each year usually in November or December (DECC 2005) | Unlikely |
| *Pteropus poliocephalus* | Grey-headed Flying-Fox | V | V | Inhabits a wide range of habitats including rainforest, mangroves, paperbark forests, wet and dry sclerophyll forests and cultivated areas (Churchill 1998, Eby 1998). Camps are often located in gullies, typically close to water, in vegetation with a dense canopy (Churchill 1998). | Potential |
| *Saccolaimus flaviventris* | Yellow-bellied Sheathtail-bat | V | - | Found in almost all habitats, from wet and dry sclerophyll forest, open woodland (Churchill 1998), open country, mallee, rainforests, heathland and waterbodies (SFNSW 1995). Roosts in tree hollows; may also use caves; has also been recorded in a tree hollow in a paddock (Environment Australia 2000) and in abandoned sugar glider nests (Churchill 1998). The Yellow-bellied Sheathtail-bat is dependent on suitable hollow-bearing trees to provide roost sites, which may be a limiting factor on populations in cleared or fragmented habitats (Environment Australia 2000). | Unlikely |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Scoteanax rueppellii* | Greater Broad-nosed Bat | V | - | Associated with moist gullies in mature coastal forest, or rainforest, east of the Great Dividing Range (Churchill, 1998), tending to be more frequently located in more productive forests (Hoye & Richards 1998). Within denser vegetation types use is made of natural and man made openings such as roads, creeks and small rivers, where it hawks backwards and forwards for prey (Hoye & Richards 1998). | Unlikely |
| **INVERTEBRATES** | | | | | |
| *Meridolum corneovirens* | Cumberland (Large) Land Snail | E | - | Associated with open eucalypt forests, particularly Cumberland Plain Woodland described in Benson (1992). Found under fallen logs, debris and in bark and leaf litter around the trunk of gum trees or burrowing in loose soil around clumps of grass (NPWS 1997; Rudman 1998). Urban waste may also form suitable habitat (NSW NPWS 1997; Rudman 1998). | Unlikely |
| **MIGRATORY TERRESTRIAL SPECIES LISTED UNDER EPBC ACT** | | | | | |
| *Apus pacificus* | Fork-tailed Swift | - | M | Sometimes travels with Needletails. Varied habitat with a possible tendency to more arid areas but also over coasts and urban areas (Simpson & Day 1999). | Unlikely |
| *Haliaeetus leucogaster* | White-bellied Sea-Eagle | - | M | Forages over large open fresh or saline waterbodies, coastal seas and open terrestrial areas (Marchant & Higgins 1993, Simpson & Day 1999). Breeding habitat consists of tall trees, mangroves, cliffs, rocky outcrops, silts, caves and crevices and is located along the coast or major rivers. Breeding habitat is usually in or close to water, but may occur up to a kilometre away (Marchant & Higgins 1993). | Unlikely |
| *Hirundapus caudacutus* | White-throated Needletail | - | M | Forages aerially over a variety of habitats usually over coastal and mountain areas, most likely with a preference for wooded areas (Marchant & Higgins 1993; Simpson & Day 1999). Has been observed roosting in dense foliage of canopy trees, and may seek refuge in tree hollows in inclement weather (Marchant & Higgins 1993). | Unlikely |
| *Merops ornatus* | Rainbow Bee-eater | - | M | Resident in coastal and subcoastal northern Australia; regular breeding migrant in southern Australia, arriving September to October, departing February to March, some occasionally present April to May (Pizzey and Doyle 1988). Occurs in open country, chiefly at suitable breeding places in areas of sandy or loamy soil: sand-ridges, riverbanks, road-cuttings, sand-pits, occasionally coastal cliffs (ibid). Nest is a chamber a the end of a burrow, up to 1.6 m long, tunnelled in flat or sloping ground, sandy back or cutting (*ibid*). | Unlikely |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Monarcha melanopsis* | Black-faced Monarch | - | M | Rainforest and eucalypt forests, feeding in tangled understorey (Blakers et al. 1984). | Unlikely |
| *Myiagra cyanoleuca* | Satin Flycatcher | - | M | Wetter, denser forest, often at high elevations (Simpson & Day 2004). | Unlikely |
| *Rhipidura rufifrons* | Rufous Fantail | - | M | The Rufous Fantail is a summer breeding migrant to southeastern Australia (Morcombe, 2004). The Rufous Fantail is found in rainforest, dense wet eucalypt and monsoon forests, paperbark and mangrove swamps and riverside vegetation (Morcombe, 2004). Open country may be used by the Rufous Fantail during migration (Morcombe, 2004). | Unlikely |
| *Xanthomyza phrygia* | Regent Honeyeater | E | E, M | SEE DIURNAL BIRDS ABOVE | Unlikely |
| **MIGRATORY WETLAND SPECIES LISTED UNDER EPBC ACT** | | | | | |
| *Ardea alba* | Great Egret | - | M | The Great Egret is common and widespread in Australia (McKilligan, 2005). It forages in a wide range of wet and dry habitats including permanent and ephemeral freshwaters, wet pasture and estuarine mangroves and mudflats (McKilligan, 2005). | Unlikely |
| *Ardea ibis* | Cattle Egret | - | M | Cattle Egrets forage on pasture, marsh, grassy road verges, rain puddles and croplands, but not usually in the open water of streams or lakes and they avoid marine environments (McKilligan, 2005). Some individuals stay close to the natal heronry from one nesting season to the next, but the majority leaves the district in autumn and return the next spring. Cattle Egrets are likely to spend the winter dispersed along the coastal plain and only a small number have been recovered west of the Great Dividing Range (McKilligan, 2005). | Unlikely |
| *Charadrius mongolus* | Lesser Sand Plover | V | M | SEE DIURNAL BIRDS ABOVE | Unlikely |
| *Limicola falcinellus* | Broad-billed Sandpiper | V | M | SEE DIURNAL BIRDS ABOVE | Unlikely |
| *Rostratula benghalensis (a.k.a. R. Australis)* | Painted Snipe | - | M | See: *Rostratula australis* | Unlikely |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Xenus cinereus* | Terek Sandpiper | V | M | SEE DIURNAL BIRDS ABOVE | Unlikely |
| **PLANTS** | | | | | |
| *Acacia bynoeana* | Bynoe's Wattle | E | V | The species is found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. It has recently been found in the Colymea and Parma Creek areas west of Nowra (DECC 2007). It is found in heath and dry sclerophyll forest, typically on a sand or sandy clay substrate, often with ironstone gravels (DECC 2007). The species seems to prefer open and sometimes slightly disturbed sites (DECC 2007). Characteristic overstorey species include: *Corymbia gummifera*, *Eucalyptus haemastoma*, *E. gummifera, E. parramattensis*, *E. sclerophylla*, *Banksia serrata* and *Angophora bakeri*. Shrubs often associated with the species include *B. spinulosa*, *B. serrata, A. oxycedrus*, *A. myrtifolia* and *Kunzea* spp. (Winning 1992; James 1997). It flowers from September to March and fruits mature in November. | No |
| *Acacia prominens* | Gosford Wattle, Hurstville and Kogarah Local Government Areas | E2 | | | No |
| *Acacia pubescens* | | V | V | Associated with on Cumberland Plains Woodlands, Shale / Gravel Forest and Shale / Sandstone Transition Forest. Clay soils, often with ironstone gravel (NPWS 1997, Benson and McDougall 1996). | No |
| *Acacia terminalis subsp. terminalis* | *Sunshine Wattle* | E1 | E | Very limited distribution between Botany Bay to the northern foreshore of Port Jackson. Recent collections have only been made from the Quarantine Station, Clifton Gardens, Dover Heights, Parsely Bay, Nielson Park, Cooper Park, Chifley and Watsons Bays. | No |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Allocasuarina glareicola* | | E | E | This species grows on tertiary alluvial gravels, with yellow clayey subsoil and lateritic soil. These soils are low in fertility and are strongly to very strongly acidic. Rainfall in the area is lower than surrounding regions. The median annual rainfall is 803 mm (measured at the University of Western Sydney), with a summer peak (Wilson & Johnson 1989).<br>It is found in the Castlereagh open woodland community, with *Eucalyptus parramattensis, E. fibrosa, E. sclerophylla, Angophora bakeri* and *Melaleuca decora.* Common associated understorey species include *Melaleuca nodosa, Hakea dactyloides, H.sericea, Dillwynia tenuifolia, Micromyrtus minutiflora, Acacia elongata, A. brownei, Themeda australis* and *Xanthorrhoea minor* (Matthes et al. 1996). | No |
| *Bothriochloa biloba* | Lobed Blue-grass | - | V | Grows in woodland on poorer soils (Harden 1994). Flowers in summer. NSW subdivisions: NC, CC, NT, NWS, CWS, NWP, SWP. Other Australian states: Qld. No longer listed as vulnerable on NSW TSC Act. | No |
| *Caesia parviflora var. minor* | | E | - | Associated with heath, woodland and dry sclerophyll (Harden 1994). | No |
| *Caladenia tessellata* | Thick Lip Spider Orchid | E | V | Occurs in grassy sclerophyll woodland, often growing in well-structured clay loams or sandy soils south from Swansea (DECC 2007). Usually in sheltered moist places, in areas of increased sunlight. It flowers from September to November (DECC 2007). | Unlikely |
| *Callistemon linearifolius* | Netted Bottlebrush | V | - | Grows in dry sclerophyll forest on the coast and adjacent ranges (DECC 2007). *C. linearifolius* has been recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. For the Sydney area, recent records are limited to the Hornsby Plateau area near the Hawkesbury River (DECC 2007). | No |
| *Camarophyllopsis kearneyi* | | E1 | - | Known only from its type locality in Lane Cove Bushland Park in the Lane Cove local government area in the Sydney metropolitan region. | No |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Cryptostylis hunteriana* | Leafless Tongue Orchid | V | V | It is known from a range of vegetation communities including swamp-heath and woodland (DECC 2007). The larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black Sheoak (*Allocasuarina littoralis*); where it appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (*C. subulata*) and the Tartan Tongue Orchid (*C. erecta*) (DECC 2007). Bell (2001) has identified Coastal Plains Scribbly Gum Woodland and Coastal Plains Smoothed-barked Apple Woodland as potential habitat on the Central Coast. Flowers between November and February, although may not flower regularly (DECC 2007; Bell 2001). | Unlikely |
| *Darwinia biflora* | | V | V | Erect or spreading shrub to 80cm high. Associated with habitats where weathered shale capped ridges intergrade with Hawkesbury Sandstone, where soils have a higher clay content (NPWS 1999, NPWS 1997, Harden 1993). | No |
| *Deyeuxia appressa* | | E | E | Associated with wet ground (Harden 1994). Known from a single historical record made in 1930 (NPWS 2002). | No |
| *Dillwynia tenuifolia* | | V | V | It has a core distribution within the Cumberland Plain, where it may be locally abundant within scrubby, dry heath areas within Castlereagh Ironbark Forest and Shale/Gravel Transition Forest on tertiary alluvium or laterised clays (DECC 2007). May also be common in the ecotone between these areas and Castlereagh Scribbly Gum Woodland (*ibid.*). Flowers sporadically from August to March. | No |
| *Epacris purpurascens* var. *purpurascens* | | V | - | Sydney Sandstone Gully Forest and wet heath with strong clay influences (NPWS 1997). Recorded between Gosford in the north to Avon Dam in the south. Found in a range of habitats, but most have a strong shale soil influence. Killed by fire and re-establishes from soil stored seed (DECC 2007). | No |
| *Eucalyptus nicholii* | Narrow-leaved Black Peppermint | V | V | Grows in dry grassy woodland, on shallow and infertile soils, mainly on granite (DECC 2007). This species is widely planted as an urban street tree and in gardens but is quite rare in the wild (DECC 2007). It is confined to the New England Tablelands of NSW, where it occurs from Nundle to north of Tenterfield (DECC 2007). | No |
| *Eucalyptus scoparia* | Wallangarra White Gum | E1 | - | Occurs in Queensland and reaches its southern limit in NSW. In NSW it is known from only three locations near Tenterfield, including Bald Rock National Park. Found in Sydney area in 2004. Found in open eucalypt forest and woodland on well-drained granite hilltops, slopes and rocky outcrops. | No |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Genoplesium baueri* | Bauer's Midge Orchid | V | - | The species has been recorded from locations between Nowra and Pittwater and may occur as far north as Port Stephens. About half the records were made before 1960 with most of the older records being from Sydney suburbs including Asquith, Cowan, Gladesville, Longueville and Wahroonga. No collections have been made from those sites in recent years. The species has been recorded at locations now likely to be within the following conservation reserves: Berowra Valley Regional Park, Royal National Park and Lane Cove National Park. May occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments. Grows in sparse sclerophyll forest and moss gardens over sandstone. Flowers Dec to Mar. | Unlikely |
| *Grammitis stenophylla* | Narrow-leaf Finger Fern | E | - | In NSW it has been found on the south, central and north coasts and as far west as Mount Kaputar National Park near Narrabrai (DECC 2007). Moist places, usually near streams, on rocks or in trees, in rainforest and moist eucalypt forest (DECC 2007). | No |
| *Hibbertia* sp. Bankstown | | *E4A* | | | No |
| *Hygrocybe anomala var. ianthinomarginata* | | V | - | Occurs in gallery warm temperate forests dominated by Lilly Pilly *(Acmena smithii),* Grey Myrtle *(Backhousia myrtifolia),* Cheese Tree *(Glochidion ferdinandi)* and Sweet Pittosporum *(Pittosporum undulatum).* | No |
| *Hygrocybe aurantipes* | | V | - | See *Hygrocybe anomola var. ianthinomarginata* | No |
| *Hygrocybe austropratensis* | | E1 | - | See *Hygrocybe anomola var. ianthinomarginata* | No |
| *Hygrocybe lanecovensis* | | E1 | - | See *Hygrocybe anomola var. ianthinomarginata* | No |
| *Hygrocybe reesiae* | | V | - | See *Hygrocybe anomola var. ianthinomarginata* | No |
| *Hygrocybe rubronivea* | | V | - | See *Hygrocybe anomola var. ianthinomarginata* | No |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Hypsela sessiliflora* | | E1 | - | Known to grow in damp places, on the Cumberland Plain, including freshwater wetland, grassland/alluvial woodland and an alluvial woodland/shale plains woodland (Cumberland Plain Woodland) ecotone. Currently known from only two adjacent sites on a single private property at Erskine Park in the Penrith LGA. Previous sightings are all from western Sydney, at Homebush and at Agnes Banks. | No |
| *Leptospermum deanei* | | V | - | Associated with lower hillsides & riparian vegetation communities and woodlands on Hawkesbury Sandstones (in NPWS 2003) and alluvial areas along the creeks (DECC 2007). Currently known to occur in areas such as Pennant Hills Park, Kuring-gai Chase, Garigal and Marramarra National Parks. | No |
| *Leucopogon exolasius* | | V | V | Associated with Sydney Sandstone Gully Forest on rocky hillsides and creek banks (NPWS 1997). | No |
| *Marsdenia viridiflora* ssp.. *viridiflora* | *Marsdenia viridiflora* R. Br. subsp. *viridiflora* population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas | E2 | - | Grows in vine thickets and open shale woodland. Recent records are from Prospect, Bankstown, Smithfield, Cabramatta Creek and St Marys. Previously known north from Razorback Range. | No |
| *Maundia triglochinoides* | | V | - | Restricted to coastal NSW and extending into southern Queensland. The current southern limit is Wyong; former sites around Sydney are now extinct (DECC 2007). *Maundia triglochinoides* is an aquatic herbaceous plant found in swamps or shallow fresh water on heavy clay on the north and central NSW coast. | No |
| *Melaleuca biconvexa* | Biconvex Paperbark | V | V | Associated with damp habitats, such as Coastal Narrabeen Moist Forest, Riparian Melaleuca Swamp Woodland (LMCC 2001). This species may occur in dense stands forming a narrow strip adjacent to watercourses, in association with other *Melaleuca* species or as an understorey species in wet forest (NSW Scientific Committee 1998). Flowering occurs over just 3-4 weeks in September and October (DECC 2007). | No |
| *Melaleuca deanei* | Deane's Paperbark | V | V | Found in heath on sandstone (DECC 2007), and also associated with woodland on broad ridge tops and slopes on sandy loam and lateritic soils (Benson and McDougall 1998). | No |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Persoonia hirsuta* | Hairy Geebung | E | E | This species occurs in dry sclerophyll eucalypt woodland/forest (Weston & Johnson 1991; Weston 1995), and in shrub-woodland (Harden 1991). It grows in sandy to stony soils derived from sandstone (Weston & Johnson 1991; Weston 1995) or very rarely on shale (Harden 1991), from near sea level to 600 m altitude (Weston & Johnson 1991; Weston 1995). | No |
| *Persoonia nutans* | | E | E | Associated with dry woodland, Castlereagh Scribbly Gum Woodland, Agnes Banks Woodland and sandy soils associated with tertiary alluvium, occasionally poorly drained (Benson and McDougall 2000). Endemic to the Western Sydney (Benson and McDougall 2000). | No |
| *Pimelea curviflora var curviflora* | | V | E | Associated with the Duffys Forest Community, shale lenses on ridges in Hawkesbury sandstone geology (Pittwater Council 2000). | No |
| *Pimelea spicata* | | E | E | In western Sydney, it occurs on an undulating topography of well structured clay soils, derived from Wianamatta shale (DEC 2004). It is associated with Cumberland Plains Woodland (CPW), in open woodland and grassland often in moist depressions or near creek lines (*Ibid.*). Has been located in disturbed areas that would have previously supported CPW (*Ibid.*). | No |
| *Pomaderris prunifolia* | P. prunifolia in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas | E2 | | | No |
| *Pterostylis gibbosa* | Illawarra Greenhood | E | E | Associated with seasonally hard setting clay soils with approximately 1000mm of rainfall (NPWS 1997). All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage. In the Illawarra region, the species grows in woodland dominated by Forest Red Gum *Eucalyptus tereticornis*, Wollybutt *E. longifolia* and White Feather Honey-myrtle *Melaleuca decora*. Near Nowra, the species grows in an open forest of Spotted Gum *Corymbia maculata*, Forest Red Gum and Grey Ironbark *E. paniculata*. In the Hunter region, the species grows in open woodland dominated by Narrow-leaved Ironbark *E. crebra*, Forest Red Gum and Black Cypress Pine *Callitris endlicheri*. The Illawarra Greenhood is a deciduous orchid that is only visible above the ground between late summer and spring, and only when soil moisture levels can sustain its growth. The leaf rosette grows from an underground tuber in late summer, followed by the flower stem in winter and flowers in spring. | Unlikely |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Pterostylis saxicola* | | E | E | Terrestrial orchid predominantly found in Hawkesbury Sandstone Gully Forest growing in small pockets of soil that have formed in depressions in sandstone rock shelves (NPWS 1997). Known from Georges River National Park, Ingleburn, Holsworthy, Peter Meadows Creek, St Marys Tower (NSW Scientific Committee 1999). | Unlikely |
| *Pultenaea glabra* | Smooth Bush-Pea | V | V | Grows in swamp margins, hillslopes, gullies and creekbanks and occurs within dry sclerophyll forest and tall damp heath on sandstone (DECC 2007). Flowers September to November, fruit matures October to December (*ibid.*). | No |
| *Pultenaea parviflora* | | E | V | May be locally abundant, particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays (DECC 2007). May also be common in ecotone between these communities and Castlereagh Scribbly Gum Woodland (*ibid.*). *Eucalyptus fibrosa* is usually the dominant canopy species (*ibid.*). *E. globoidea, E. longifolia, E. parramattensis, E. sclerophylla and E. sideroxylon* may also be present or co-dominant, with *Melaleuca decora* frequently forming a secondary canopy layer (*ibid.*). Associated species may include *Allocasuarina littoralis, Angophora bakeri, Aristida spp. Banksia spinulosa, Cryptandra spp., Daviesia ulicifolia, Entolasia stricta, Hakea sericea, Lissanthe strigosa, M. nodosa, Ozothamnus diosmifolius* and *Themeda australis* (*ibid.*). Often found in association with other threatened species such as *Dillwynia tenuifolia, Dodonaea falcata, Grevillea juniperina, Micromyrtus minutiflora, Persoonia nutans* and *Styphelia laeta* (*ibid.*). Flowering may occur between August and November (*ibid.*). | No |
| *Pultenaea pedunculata* | | E | - | Shale Gravel Transition Forest in the Wianamatta Shale - Tertiary alluvium intergrade areas (NPWS 1997). | No |
| *Syzygium paniculatum* | Magenta Lillypilly | V | V | This species occupies a narrow coastal area between Bulahdelah and Conjola State Forests in NSW. On the Central Coast, it occurs on Quaternary gravels, sands, silts and clays, in riparian gallery rainforests and remnant littoral rainforest communities (Payne 1997). In the Ourimbah Creek valley, *S. paniculatum* occurs within gallery rainforest with *Alphitonia excelsa, Acmena smithii, Cryptocarya glaucescens, Toona ciliata, Syzygium oleosum* with emergent *Eucalyptus saligna*. At Wyrrabalong NP, *S. paniculatum* occurs in littoral rainforest as a co-dominant *with Ficus fraseri, Syzygium oleosum, Acmena smithii, Cassine australe*, and *Endiandra sieberi*. Payne (1991) reports that the species appears absent from Terrigal formation shales, on which the gully rainforests occur. *S. paniculatum* is summer flowering (November-February), with the fruits maturing in May (DECC 2007). | No |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Tetratheca glandulosa* | | V | V | Associated with ridgetop woodland habits on yellow earths also in sandy or rocky heath and scrub (NPWS 1997). Often associated with sandstone / shale interface where soils have a stronger clay influence (NPWS 1997). Flowers July to November. | No |
| *Tetratheca juncea* | Black-eyed Susan | V | V | Occurs on predominantly low nutrient soils with a dense grassy understorey of grasses although it has been recorded in heathland and moist forest (DECC 2007). It is associated with dry open forest or woodland habitats dominated by Corymbia gummifera, E. capitellata, E. haemastoma and Angophora costata (Payne 1993). Themeda australis is generally the dominant ground cover (Payne 1993). T. juncea also displays a preference for southern aspect slopes, although is slopes with different aspects (DECC 2007). Flowers July to December. | No |
| *Thelymitra* sp. Kangaloon | Kangaloon Sun-orchid | - | CE | The Kangaloon Sun-orchid occurs in NSW and is known from three locations near Robertson in the Southern Highlands. This species occurs within the Southern Rivers Natural Resource Management Region.The species has an estimated extent of occurrence of 300 km². The Kangaloon Sun-orchid has an estimated area of occupancy of 10 km². The three localities are Butler's Swamp (0.125 km²), Stockyard Swamp (once known as Molly Morgan Swamp) (7 km²) and Wildes Meadow Swamp (3 km²), and are all located above what is known as the Kangaloon Aquifer | Unlikely |
| *Thesium australe* | Austral Toadflax | V | V | Occurs in grassland or grassy woodland. Often found in damp sites in association with Kangaroo Grass (Themeda australis) (DECC 2007). Flowers in spring–summer. Widespread but rare. NSW subdivisions: NC, CC, SC, NT, ST, NWS, CWS. Other Australian states: Qld, Tas. | No |
| *Triplarina imbricata* | Creek Triplarina | E | E | Found only in a few locations in the ranges south-west of Glenreagh and near Tabulam in north-east NSW. Along watercourses in low open forest with Water Gum *(Tristaniopsis laurina)* (DECC 2007). | No |
| *Wahlenbergia multicaulis* | | E2 | - | Found in disturbed sites and grows in a variety of habitats including forest, woodland, scrub, grassland and the edges of watercourses and wetlands. Typically occurs in damp, disturbed sites (with natural or human disturbance of various forms), typically amongst other herbs rather than in the open. In Western Sydney most sites are closely aligned with the Villawood Soil Series, which is a poorly drained, yellow podsolic extensively permeated with fine, concretionary ironstone (laterite). However, the sites in Hornsby LGA are on the 'Hawkesbury' soil landscape. | No |
| *Wilsonia backhousei* | | V | - | Grows in coastal saltmarshes in the Sydney Region and Jarvis Bay (Harden 1991) | No |
| **COMMUNITIES** | | | | | |

| Scientific Name | Common Name | TSC Act | EPBC Act | Habitat Associations | Likelihood of Occurrence |
|---|---|---|---|---|---|
| Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest | | - | CE | | No |
| Turpentine-Ironbark Forest in the Sydney Basin Bioregion | | - | CE | | No |
| Shale/Sandstone Transition Forest | | - | E | | No |

Disclaimer: Data extracted from the Atlas of NSW Wildlife and EPBC Protected Matters Report are only indicative and cannot be considered a comprehensive inventory. 'Migratory marine species' and 'listed marine species' listed on the EPBC Act (and listed on the DEW protected matters report) have not been included in this table, since they are considered unlikely to occur within the study area due to the absence of marine habitat.

*CE =Critically Endangered; E = Endangered; E2 = Endangered Population; V = Vulnerable; M = Migratory.*

# Appendix C: Part 3A Impact Assessment Criteria

**NSW Impact Assessment**

An assessment of the impacts of the proposal on species, populations and ecological communities listed under Schedules 1 and 2 of the TSC Act was undertaken. The proposal will be assessed under Part 3A of the EP&A Act and consequently this impact assessment was undertaken in accordance with the Draft *Guidelines for Threatened Species Assessment* (DECC and DPI Draft 2005).

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

The Green and Golden Bell Frog once ranged from Eastern Victoria to Northern NSW and westwards onto the southern tablelands. It was once a common and abundant species until the mid 1970's when a contraction in the species range was first noticed. The species has disappeared from 90% of its former range to occupy a fragmentary and primarily coastal distribution. Reasons for this range contraction are not conclusive and a number of threatening processes maybe working in conjunction. The amphibian chytrid fungus (*Batrachochytrium dendrobatidis)* and the predatory introduced fish *Gambusia holbrooki* have, however, been listed as threatening processes for the species.

A largely aquatic species, it has been reported from a wide variety of freshwater environments both natural and constructed. Characteristics that appear to be associated with *Litoria aurea* include shallow slow flowing or still waterbodies without heavy shading and with a high diversity of bank vegetation such as *J. kraussii, Schoenoplectus litoralis, Sporobolus virginicus* and *Typha orientalis* (Hamer *et al* 2002)

***How is the proposal likely to affect the lifecycle of a threatened species and/or population?***

The study area does not contain potential breeding habitat for the species and the proposal is unlikely to reduce foraging, shelter or movement habitat to a degree that would affect the species' lifecycle. The proposal is unlikely to affect the lifecycle of the key green and golden bell frog population at Greenacre.

**How is the proposal likely to affect the habitat of a threatened species, population or ecological community?**

The study area contains a relatively small amount of exotic grassland a considerable distance away from potential breeding sites and is surrounded by industrial and rail infrastructure. Potential shelter habitat in the form of an old railway sleepers and other human refuse occurs on site although this type of habitat is expected to occur widely amongst the railway corridors and industrial sites in the area. The proposal is unlikely to detrimentally affect the habitat of the key green and golden bell frog population at Greenacre.

Impacts on potential habitat occurring off-site via sediment run-off will be controlled via sediment fencing.

**Does the proposal affect any threatened species or populations that are at the limit of its known distribution?**

The species in question is not at the limit of its distribution. Green and golden bell frog populations occur from northern NSW to eastern Victoria.

**How is the proposal likely to affect current disturbance regimes?**

The study area has been subjected to ongoing disturbances such as clearing, industrial development and weed invasion, and the proposal could be considered a continuation of historic disturbances.

**How is the proposal likely to affect habitat connectivity?**

The proposal is unlikely to affect habitat connectivity as the study area is currently isolated from patches of potential breeding habitat by urban and industrial landuses.

**How is the proposal likely to affect critical habitat?**

Not applicable - critical habitat has not been declared for this species.

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

The Grey-headed Flying Fox (*Pteropus poliocephalus*) is listed as vulnerable the TSC Act and EPBC Act. The species is endemic to the east coast of Australia with a distribution from Bundaberg in the north to Melbourne in the south, from the western slopes of the Great Dividing Range to the coast. The distribution of this species has recently suffered a southward contraction and a 30% population decline over the last ten years.

The Grey-headed Flying-fox is a highly mobile species whose migration patterns are determined by the availability of flowering food resources. The species is a canopy-feeding frugivore, blossom-eater and nectarivore, and occurs in rainforest, woodlands, paperbark swamps and Banksia woodlands. This species feeds in particular on the nectar and pollen of native trees, especially *Eucalyptus* spp., *Melaleuca* spp. and *Banksia* spp., and fruits of rainforest trees and vines. During times when native food resources are limited, Grey-Headed Flying-foxes forage on fruit crops and cultivated gardens. Grey-headed Flying-foxes congregate in large colonies of up to 200,000 individuals in the summer season. Camp sites are generally located next to rivers or creeks, and occur in a range of vegetation communities including rainforest, wet sclerophyll forest, *Melaleuca* woodland, *Casuarina* forest or mangroves. These sites have a dense canopy, providing them with the moist, humid microclimate they require. Campsites are critical for mating, birthing, rearing of young and as diurnal refuge from predators. Urban gardens, cultivated fruit crops and roadside verges may also provide temporary roosting habitat for this species.

This species is threatened by a number of processes including loss of foraging habitat, disturbance of roosting sites, unregulated shooting, and electrocution on powerlines.

Grey-headed Flying-fox was not recorded during the current field survey, but is known from records within 10 km radius of the study area. There is potential for the species to use the study area on occasion while foraging, although the study area does not contain current or historic campsites. Impacts are possible due to the clearing of foraging habitat.

***How is the proposal likely to affect the lifecycle of a threatened species and/or population?***

The proposal would involve the removal of canopy trees, however the species of tree (*Casuarina glauca*) is not considered foraging habitat for Grey-headed flying fox. .

The study area does not contain any current or historic campsites and the proposal would not disturb or impact on any campsites.

**How is the proposal likely to affect the habitat of a threatened species, population or ecological community?**

The proposal would involve the loss of nine (9) trees. This is considered a minor impact considering the highly mobile nature of this species and the distances they travel in search of food. Furthermore, similar habitat is present surrounding the study area including urban street trees.

**Does the proposal affect any threatened species or populations that are at the limit of its known distribution?**

The distribution of this species extends from Bundaberg in the north to Melbourne in the south, from the western slopes of the Great Dividing Range to the coast. The study area is not at the limit of the known distribution for the Grey-headed Fly-fox.

**How is the proposal likely to affect current disturbance regimes?**

The study area has been subjected to ongoing disturbances such as clearing and weed invasion and the proposal could be considered a continuation of the historic disturbances.

**How is the proposal likely to affect habitat connectivity?**

The study area is currently isolated from any areas of high quality habitat for this species. Further, given the highly mobile nature of this species and the large distances travelled in search of food, the removal of nine (9) trees within an area of 0.99 ha is considered a minor impact, particularly given the tree species (Casuarina glauca) is not considered as foraging habitat for this species.

**How is the proposal likely to affect critical habitat?**

Not applicable - critical habitat cannot be declared for a vulnerable species.

# Appendix D: EPBC Act Impact Assessments

The EPBC Act Administrative Guidelines on Significance set out 'Significant Impact Criteria' that are to be used to assist in determining whether a proposed action is likely to have a significant impact on matters of national environmental significance. Matters listed under the EPBC Act as being of national environmental significance include:

- Listed threatened species and ecological communities
- Listed migratory species
- Wetlands of International Importance
- The Commonwealth marine environment
- World heritage properties
- National heritage places
- Nuclear actions

Specific 'Significant Impact Criteria' are provided for each matter of national environmental significance except for threatened species and ecological communities in which case separate criteria are provided for species listed as endangered and vulnerable under the EPBC Act.

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

The Green and Golden Bell Frog is a relatively large and conspicuous frog that is listed as Endangered by the TSC Act and Vulnerable by the EPBC Act.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

**Criterion 1: lead to a long-term decrease in the size of an important population of a species**

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, key source populations either for breeding or dispersal populations that are necessary for maintaining genetic diversity, and/or populations that are near the limit of the species range.

The green and golden bell frog at Greenacre is identified as a 'key population' (DECC 2007), though the three identified breeding areas of this population occur to the east in proximity to the rail yards and other habitat elements in Greenacre.

The proposed works would involve the loss of a minor amount of degraded potential foraging and shelter habitat for this species. It is unlikely that a population of this species is dependent upon the potential habitat within the study area to the extent that their removal would cause the population to decline.

**Criterion 2: reduce the area of occupancy of an important population**

It is unlikely that a population of this species is dependent upon the exotic grassland within the study area to the extent that removal would reduce the area of occupancy of the population.

**Criterion 3: fragment an existing important population into two or more populations**

The proposal is unlikely to inhibit dispersal of green and golden bell frog to such a degree that it would fragment a population present in the area into two or more populations.

**Criterion 4: adversely affect habitat critical to the survival of a species**

The study area represents only a minor area of potential foraging and shelter habitat which is not considered habitat critical to the survival of the species.

**Criterion 5: disrupt the breeding cycle of an important population**

The study area represents only potential foraging habitat for the species with no potential breeding habitat located within the study area. As such the proposal to removal less than one (1) hectare of exotic dominated vegetation is unlikely to impact upon the breeding cycle of an important population of the species.

**Criterion 6: modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

The study area represents only a minor area of potential foraging and shelter habitat. The proposal is unlikely to cause the species to decline, especially considering the areas of similar habitat in the surrounding area.

**Criterion 7: result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat**

The study area is currently dominated by exotic vegetation, and it is unlikely that the proposed works would lead to invasive species becoming more established within the study area.

**Criterion 8: introduce disease that may cause the species to decline, or**

Although green and golden bell frog is threatened by chytrid fungus (*Batrachochytrium dendrobatidis),* the proposed works are highly unlikely to introduce disease that will cause the species to decline because the study area contains only highly degraded marginal foraging and sheltered habitat for this species.

**Criterion 9: interfere substantially with the recovery of the species.**

The proposed works would involve the removal of less than one (1) hectare of exotic dominated vegetation, representing a minor area of potential foraging habitat for this species. The loss of this small area of potential foraging habitat is unlikely to substantially interfere with the recovery of the species.

**Conclusion**

Based on the above assessment it is concluded that the proposal is unlikely to have a significant impact on green and golden bell frog. As such, no referral to the SEWPAC for assessment and approval by the Environment Minister is necessary.

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

The Grey-headed Flying Fox (*Pteropus poliocephalus*) is listed as vulnerable the TSC Act and EPBC Act. Background information on this species is provided in **Appendix C**.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

**Criterion 1: lead to a long-term decrease in the size of an important population of a species**

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, key source populations either for breeding or dispersal populations that are necessary for maintaining genetic diversity, and/or populations that are near the limit of the species range.

The proposed works would involve the loss of nine *Casuarina glauca* trees. These species do not offer foraging habitat for the Grey-headed Flying Fox. It is unlikely that an important population of this species is dependent upon the trees within the study area to the extent that their removal would cause the important population to decline.

**Criterion 2: reduce the area of occupancy of an important population**

It is unlikely that an important population of this species is dependent upon the trees within the study area to the extent that their removal would reduce the area of occupancy of the population.

**Criterion 3: fragment an existing important population into two or more populations**

The trees within the study area represent only a very minor area of potential foraging habitat, such that the removal of the trees within the study area would not fragment an important population of the species.

**Criterion 4: adversely affect habitat critical to the survival of a species**

The study area represents only a minor area of potential foraging habitat which is not habitat critical to the survival of the species.

**Criterion 5: disrupt the breeding cycle of an important population**

The study area represents only potential foraging habitat for the species with no current or historic campsites located within the study area. As such the removal of nine (9) trees from the study area is unlikely to impact upon the breeding cycle of an important population of the species.

**Criterion 6: modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

The study area represents only a minor area of potential foraging habitat. The removal of nine (9) trees from this area is unlikely to cause the species to decline, especially considering the areas of similar habitat in the surrounding area.

**Criterion 7: result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat**

The study area is currently dominated by exotic, and it is unlikely that the proposed works would lead to invasive species becoming more established within the study area.

**Criterion 8: introduce disease that may cause the species to decline, or**

Disease is not currently recognised as a threat to the Grey-headed Flying Fox and it is considered unlikely the proposed works will introduce disease that may cause this species to decline.

**Criterion 9: interfere substantially with the recovery of the species.**

The proposed works would involve the removal of a total of nine (9) trees, none of which represent forage habitat. The loss of these trees is unlikely to substantially interfere with the recovery of the species.

**Conclusion**

Based on the above assessment it is concluded that the proposal is unlikely to have a significant impact on the Grey-headed Flying-fox. As such, no referral to the SEWPAC for assessment and approval by the Environment Minister is necessary.

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