



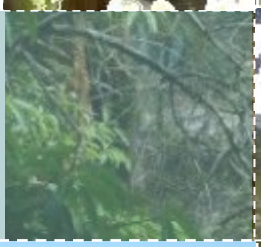


FLORA AND FAUNA ASSESSMENT REPORT

DECOMMISSIONING SITE 68 STORMWATER BASIN (SOPA)

Prepared for ALLUVIUM PTY LTD

By Applied Ecology Pty Ltd

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DISCLAIMER

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INTRODUCTION

PROJECT BACKGROUND

Alluvium P/L has commissioned a Flora and Fauna Assessment report for Site 68 Stormwater Wetland (part of SOPA lands) prior to decommissioning works for the purpose of identifying any environmental constraints that may affect the proposed activity.

The Flora and Fauna Assessment aims to provide a comprehensive snapshot of flora and fauna recorded on site during May 2014, underpinned by a review of available historic records.

SITE DESCRIPTION

The site is located on Sydney Olympic Park lands, at the corner of Australia Avenue and Bennelong Parkway (Figure 1, Figure 2).

Figure 1 Location of Site 68 at the corner of Australia Avenue and Bennelong Parkway, Sydney Olympic Park (Alluvium, 2014)

Figure 2 Site context for Site 68 at Homebush Bay

LITERATURE REVIEW

OEH correspondence (July, 2014)

As part of the development process, OEH planning officers have advised that "the subject site contains a large constructed wetland with fringing native vegetation and has been mapped on a Key Habitats Map of Sydney Olympic Park (undated). The constructed wetland protects water quality for the receiving waters leading into the Badu Mangroves wetland, Powells Creek and the Parramatta River. The parklands have extensive wetland areas and habitat for numerous migratory shorebirds, the Green and Golden Bell Frog, *Wilsonia backhousei* and other fauna and flora. It is possible the subject site also contains habitat for these and other threatened and migratory species."

Thus the ecological role of the wetland at Site 68 is best described as water quality management and protection of the downstream environment, with potential supplementary habitat for several threatened and listed migratory species.

Condition Assessment of the eastern and southern ponds (Cardno, 2012)

Water and sediment quality

Site 68 was referred to as the Southern Water Quality Control Pond (SWQCP) by Cardno (2012) in their recent condition assessment report. They described the SWQCP as having "a relatively small open water section and a proportionally larger fringing macrophyte zone which extends in a teardrop shape towards the northeast. Water enters from a culvert and flow dissipation structure on its western boundary and flows towards the east, through the macrophyte zone, to a glory hole outlet structure in the northeast section of the pond. From here water is conveyed by piped drainage to the culvert crossing located under Bennelong Parkway before being discharged into Bennelong Pond."

Cardno (2012) identified the key value of the SWQCP as stormwater quality improvement, with some minor alternative habitat for birds which utilise larger adjacent water bodies. The inlet was deemed to be in good condition, while the outlet water level control structure of the pond was assessed to be in poor condition, with woody debris and detritus that contributes to blockages during high flow events. The surcharge pit and outlet pipe on Bennelong Parkway were noted to contain large quantities of sediment which impedes water movement, and reflects the current levels of ineffective sediment control in the pond; this structure was also considered to be in poor condition.

Cardno (2012) assessed the levels of sediment in the SWQCP at Site 68, and reported that sediment was accumulating at a rate of 11.2% to 15.4% of total storage capacity. Analysis of the sediments showed high to very high levels of copper, lead, mercury, nickel and zinc in samples taken at various points in the SWQCP. The results obtained exceeded low level and/or high level trigger values from ANZECC/ARMCANZZ (2000) guidelines. While some hydrocarbons were detected in samples (generally Total Petroleum Hydrocarbons and Total Recoverable Hydrocarbons in the heavier range – C15-C35), these were typically more inert, and the more volatile harmful organic compounds (eg. BTEX, PAHs, PCBs, and pesticides) were not present at detectable levels.

Thus the assessment of water and sediment quality undertaken by Cardno (2012) supports the observation that the pond functions primarily for water quality improvement. Relatively rapid sediment accumulation such as that reported in this pond is not conducive to the establishment of a healthy macroinvertebrate community in the pond, and the elevated levels of heavy metals would have a detrimental effect on all but the most robust of aquatic species.

Macrophyte Asessment

Cardno (2012) compared the suite of wetland species present at the time of survey (Figure 3) with the suite of species that was planted as part of the initial design for the SWQCP and found that all but one species (*Phragmites australis*) were present in very low numbers, or were not located during the surveys. They noted that several other species were present at a moderate density, although some were senescent at the time of survey (assumed to be June, 2012). They also reported the

presence of *Azolla* sp, which is typically present in standing fresh or moderately fresh waters with elevated nutrient levels.

Figure 3 Location of macrophyte species in Site 68 SWQCP in June, 2012

From this assessment it is apparent that the SWQCP is functioning as a macrophyte wetland, and showing a fairly typical shift in species over the period of 13 years since the initial planting, or colonization. This suite of species is also typical of an urbanized wetland with higher levels of nutrients and heavy metals, with the more tolerant species, such as *Phragmites australis*, dominating the current configuration.

Frog Clearance of SWQCP (AM Consulting Ecology, 2014)

Australian Museum Consulting undertook a frog clearance of the SWQCP at Site 68 in July/August, 2014. Site 68 has been classified as potential Green and Golden Bell Frog habitat in SOPA's Biodiversity Management Plan (BMP). The purpose of the frog clearance was to remove frogs from the development site prior to works taking place, and was conducted as an approved activity under SOPA's licence from OEH. Surveys and clearance activities were restricted to the non-aquatic parts of the site, which typically comprised thick native grasses.

Vegetation in the terrestrial zones of Site 68 was slashed in a three stage process over a period of 4 days to allow frogs to migrate to more favourable habitats. This was created by the use of shelter boards which were positioned around the pond and the ground underneath wetted. The shelter boards and the remaining vegetation were searched over a period of 2 days immediately after the slashing period, and no frogs of any species were found. Two small skinks were found and relocated

off site. Since the frog clearance was performed the area has been kept slashed to minimize the opportunities for recolonization by frogs or other fauna.

SOPA bird surveys

As part of their Biodiversity Management Plan activities, SOPA have conducted regular bird surveys. These include the annual spring bird census (2004-2013), the Bird Census pre 2004 (2001-2003), the Lathams Snipe surveys (2013-2014) and incidental records. The following bird species were recorded during these surveys (Table 1), along with several species of frogs.

Table 1 Results of bird census surveys conducted by SOPA between 2001 and 2013 (pink highlight indicates introduced species, blue indicates protected migratory species, and green indicates threatened species)

COMMON NAME	SCIENTIFIC NAME	NUMBER OF SIGHTINGS FROM 2001 - 2014
AVES		
Australasian Figbird	*Sphecotheres vieilloti*	36
Australasian Grebe	*Tachybaptus novaehollandiae*	62
Australian Magpie	*Gymnorhina tibicen*	32
Australian Pelican	*Pelecanus conspicillatus*	11
Australian Raven	*Corvus coronoides*	50
Australian Reed-Warbler	*Acrocephalus australis*	80
Australian White Ibis	*Threskiornis molucca*	70
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	14
Black-shouldered Kite	*Elanus axillaris*	2
Black-winged Stilt	*Himantopus himantopus*	3
Brown Honeyeater	*Lichmera indistincta*	5
Buff-banded Rail	*Gallirallus philippensis*	6
Cattle Egret	*Bubulcus ibis*	63
Channel-billed Cuckoo	*Scythrops novaehollandiae*	3
Chestnut Teal	*Anas castanea*	186
Common Myna	*Acridotheres tristis*	267
Common Starling	*Sturnus vulgaris*	12
Crested Pigeon	*Ocyphaps lophotes*	22
Crimson Rosella	*Platycercus elegans*	1
Dusky Moorhen	*Gallinula tenebrosa*	310
Eastern Rosella	*Platycercus adscitus eximius*	2
Eurasian Coot	*Fulica atra*	4
Fairy Martin	*Petrochelidon ariel*	44
Grey Butcherbird	*Cracticus torquatus*	6
Grey Fantail	*Rhipidura albiscapa*	3
Grey Teal	*Anas gracilis*	3
Hardhead	*Aythya australis*	30
Latham's Snipe	*Gallinago hardwickii*	28
Laughing Kookaburra	*Dacelo novaeguineae*	7
Little Black Cormorant	*Phalacrocorax sulcirostris*	2
Little Grassbird	*Megalurus gramineus*	51

COMMON NAME	SCIENTIFIC NAME	NUMBER OF SIGHTINGS FROM 2001 - 2014
Little Pied Cormorant	*Phalacrocorax melanoleucos*	5
Little Wattlebird	*Anthochaera chrysoptera*	14
Magpie-lark	*Grallina cyanoleuca*	154
Nankeen Night Heron	*Nycticorax caledonicus*	2
New Holland Honeyeater	*Phylidonyris novaehollandiae*	4
Noisy Miner	*Manorina melanocephala*	263
Nutmeg Mannikin	*Lonchura punctulata*	48
Olive-backed Oriole	*Oriolus sagittatus*	20
Pacific Black Duck	*Anas superciliosa*	184
Pacific Koel	*Eudynamys orientalis*	8
Pied Currawong	*Strepera graculina*	120
Purple Swamphen	*Porphyrio porphyrio*	221
Rainbow Lorikeet	*Trichoglossus haematodus*	182
Red Wattlebird	*Anthochaera carunculata*	152
Red-browed Finch	*Neochmia temporalis*	1
Red-rumped Parrot	*Psephotus haematonotus*	12
Red-whiskered Bulbul	*Pycnonotus jocosus*	4
Rock Dove	*Columba livia*	3
Sacred Kingfisher	*Todiramphus sanctus*	1
Silvereye	*Zosterops lateralis*	4
Spotted Pardalote	*Pardalotus punctatus*	2
Spotted Turtle-Dove	*Streptopelia chinensis*	37
Sulphur-crested Cockatoo	*Cacatua galerita*	13
Superb Fairy-wren	*Malurus cyaneus*	434
Tawny Grassbird	*Megalurus timoriensis*	1
Welcome Swallow	*Hirundo neoxena*	56
White-plumed Honeyeater	*Lichenostomus penicillatus*	19
White-winged Triller	*Lalage tricolor*	1
Willie Wagtail	*Rhipidura leucophrys*	77
AMPHIBIA		
Common Eastern Froglet	*Crinia signifera*	3
Striped Marsh Frog	*Limnodynastes peronii*	1
Green and Golden Bell Frog	*Litoria aurea*	4
Peron's Tree Frog	*Litoria peronii*	10
MAMMALIA		
Grey-headed Flying-fox	*Pteropus poliocephalus*	1

A total of 60 species of birds were recorded, including 5 introduced species, 2 protected migratory species (Cattle Egret and Latham's Snipe), and 10 species which were sighted once or twice only. The most commonly reported species was the Superb Fairy Wren, followed by the Dusky Moorhen. The Cattle Egret was recorded 63 times between 2003 and 2012, while the Latham's Snipe was recorded 28 times between 2007 and 2014, with the bulk of observations in the 12 months (16/9/2013 to 18/2/2014).

Four species of frogs were recorded as incidental sightings, including one threatened species (Green and Golden Bell Frog), and one threatened mammal species (Grey-headed Flying Fox) was also recorded as an incidental sighting.

FLORA SURVEYS

METHODS

Database Searches

Searches of several databases were made to identify threatened species that may potentially be found on the subject site. Endangered Ecological Communities were also identified in the area. Databases were accessed on 5th September, 2014. These included:

- NSW Wildlife Atlas (www.bionet.nsw.gov.au/),
- PlantNet (www.rbgsyd.nsw.gov.au), and
- EPBC Act database (www.environment.gov.au/erin/ert/epbc/index.html).

Field Surveys

Areas of different vegetation communities were delineated prior to field work from aerial photos, and these were traversed and inspected using the random meander method described by Cropper (1993). Community boundaries were recorded with a hand held GPS unit at appropriate intervals determined on site and downloaded into Applied Ecology's GIS system. Flora and fungi species present, vegetation type and quality, and special features and values were identified and recorded. Additional patch characteristics recorded during the survey included clearing, encroachment, observable fire history, weed invasion, proximity to housing or other developments, and connectivity.

From this, Applied Ecology's staff has built an inventory of plant species recorded on site by ground truthing the extent of each vegetation community. Threatened, rare and regionally significant species were targeted. Surveys were conducted on 28th August, 2014, totaling 2 person hours.

The following information was recorded for each vegetation community type identified:

- dominant vascular plant species in each stratum (layer);
- typical range in the height of the tree or upper canopy layer and stem count;
- typical range in the projective foliage cover of the tree or upper canopy layer;
- typical % cover for dominant species in each stratum;
- topography;
- soil type;
- general condition of the community including evidence of fire, disturbance, presence and abundance of weeds; and
- any other factor relevant to the vegetation community.

A description of vegetation communities was prepared according to the structure of the plant community, as is outlined in Specht et al (1995). Structural classes were then further divided into plant communities on the basis of data collected during general traverses of the study area.

DESKTOP SURVEY RESULTS

Searches of NSW Wildlife Atlas (www.bionet.nsw.gov.au/), PlantNet (www.rbgsyd.nsw.gov.au), and EPBC Act database (www.environment.gov.au/erin/ert/epbc/index.html) revealed the following rare plants recorded on or near the study site.

The NSW Wildlife Atlas search covered an area within a 10km2 cell centred on the study site. A total of 12 species of flora were reported for this area in the NSW Wildlife Atlas (**Error! Reference source not found.**).

Table 2. Threatened flora species recorded within 10km of the study site (NSW Wildlife Atlas).

FAMILY	SCIENTIFIC NAME	COMMON NAME	NSW STATUS	COMM. STATUS	RECORDS
Campanulaceae	*Wahlenbergia multicaulis*	Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield	E2		55
Convolvulaceae	*Wilsonia backhousei*	Narrow-leafed Wilsonia	V,P		85
Ericaceae	*Epacris purpurascens var. purpurascens*		V,P		23
Fabaceae (Faboideae)	*Dillwynia tenuifolia*		V,P		1
Fabaceae (Mimosoideae)	*Acacia pubescens*	Downy Wattle	V,P	V	69
Myrtaceae	*Darwinia biflora*		V,P	V	2
Myrtaceae	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	V,P	V	2
Myrtaceae	*Eucalyptus scoparia*	Wallangarra White Gum	E1,P	V	1
Myrtaceae	*Syzygium paniculatum*	Magenta Lilly Pilly	E1,P	V	1
Rhamnaceae	*Pomaderris prunifolia*	P. prunifolia in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas	E2		13
Thymelaeaceae	*Pimelea curviflora var. curviflora*		V,P	V	1
Zannichelliaceae	*Zannichellia palustris*		E1,P		4

Additional species recorded in the Protected Matters Search are detailed below. Species known to occur in or near the proposed works area are highlighted.

Table 3 Threatened flora species listed in the protected matters search (additional to the NSW Wildlife Atlas) within a 5km buffer of the study site

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	TYPE OF PRESENCE
Acacia pubescens	Downy Wattle	vulnerable	Species or species habitat likely occur within area
Allocasuarina glareicola		Endangered	Species or species habitat may occur within area
Caladenia tessellata	Thick-lipped Spider-orchid, Daddy Long-legs	Vulnerable	Species or species habitat likely occur within area
Cryptostylis hunteriana	Leafless Tongue-orchid	Vulnerable	Species or species habitat may occur within area
Genoplesium baueri	Yellow Gnat-orchid	Endangered	Species or species habitat likely occur within area
Melaleuca biconvexa	Biconvex Paperbark	Vulnerable	Species or species habitat may occur within area
Pelargonium sp. Striatellum	Omeo Stork's-bill	Endangered	Species or species habitat may occur within area
Pimelea curviflora var curviflora		Vulnerable	Species or species habitat may occur within area
Pimelea spicata	Spiked Rice-flower	Endangered	Species or species habitat likely occur within area
Pterostylis saxicola	Sydney Plains Greenhood	Endangered	Species or species habitat known to occur within area
Streblus pendulinus	Siah's Backbone, Sia's Backbone, Isaac Wood	Endangered	Species or species habitat likely to occur within area
Syzygium paniculatum	Magenta Lilly Pilly, Brush Cherry, and others	Vulnerable	Species or species habitat may occur within area

FIELD SURVEY RESULTS

The site was surveyed using a random meander through all of the terrestrial area surrounding the SWQCP. Additional species were recorded in the wetland area if they were able to be identified from the banks using high powered binoculars.

Figure 4 Vegetation zones surveyed at Site 68

Native flora species

A total of 24 native plant species were recorded on the subject site. This included 14 species in the terrestrial zone and 13 species in the wetland zone (Table 4). No threatened species were reported during this survey.

Table 4 Native flora species recorded on the study site on 28th August, 2014

SPECIES NAME	COMMON NAME	TERRESTRIAL	WETLAND
Acacia longifolia	Sydney Golden Wattle	y	
Baumea articulata	Jointed Twig Rush		y
Bolboschoenus fluviatilis	Marsh Club-Rush		y
Callistemon citrinus	Crimson Bottlebrush	y	y
Callistemon salignus	Willow Bottlebrush	y	
Carex appressa	Tall Sedge	y	y
Carex inversa	A sedge	y	
Casuarina glauca	Swamp Oak	y	y
Chorizandra cymbaria	Bristle-sedge		y
Damasonium minus	Starfruit		y
Dianella caerulea	Blue Flax Lily	y	
Einadia hastata	Berry Saltbush	y	
Epilobium billardierianum	Willow Herb	y	
Glycine microphylla	Lesser Love Creeper	y	
Hibbertia scandens	Climbing Guinea Flower	y	
Juncus kraussii	Sea Rush		y
Juncus usitatus	Common Rush	y	
Lomandra longifolia	Spiny Mat-rush	y	
Persicaria decipiens	Slender Knotweed		y
Phragmites australis	Common Reed		y
Potamogeton crispus	Curly Pondweed		y
Pteridium esculentum	Harsh Bracken		y
Typha orientalis	Broad-leaf Cumbungi		y
Wahlenbergia gracilis	Sprawling Bluebell	y	

Introduced flora species

A further 30 species of introduced plants were recorded on the subject site (Table 5), with 28 species in the terrestrial zone and 2 species in the wetland zone. Some species may have been missed in the wetland zone due to survey limitations.

Table 5 Exotic flora species recorded on the study site on 28th August, 2014.

SPECIES NAME	COMMON NAME	TERRESTRIAL	WETLAND
Acacia baileyana	Cootamundra Wattle	y	
Ageratina adenophora	Crofton Weed		y
Ailanthus altissima	Tree of Heaven	y	
Anagalis arvensis	Scarlet Pimpernel	y	
Araujia sericifera	Moth Vine	y	
Asparagus aethiopicus	Asparagus Fern	y	
Bidens pilosa	Cobblers Pegs	y	
Cardiospermum grandiflorum	Balloon Vine	y	
Chloris gayana	Rhodes Grass	y	

SPECIES NAME	COMMON NAME	TERRESTRIAL	WETLAND
Cinnamomum camphora	Camphor Laurel (juv)	y	
Cirsium vulgare	Spear Thistle	y	
Conyza sp	Fleabane	y	
Cynodon dactylon	Common Couch	y	
Ehrharta erecta	Panic Veldt Grass	y	
Euphorbia peplus	Petty Spurge	y	
Galium murale	Small Bedstraw	y	
Hydrocotyle bonariensis	Kurnell's Curse	y	
Modiola caroliniana	Red-flowered Mallow	y	
Nothoscordum borbonicum	Onion Weed	y	
Oxalis incarnata	Pink Oxalis	y	
Oxalis pes-caprae	Soursob	y	
Pennisetum setaceum	Fountain Grass	y	
Phoenix canariensis	Canary Island Palm	y	
Plantago lanceolata	Plantain	y	
Rumex obtusifolia	Broad-leaf Dock		y
Senecio madagascariensis	Fireweed	y	
Sida rhombifolia	Paddy's Lucerne	y	
Solanum nigrum	Blackberry Nightshade	y	
Vicia tetrasperma	Slender Vetch	y	
Yucca aloifolia	Spanish Bayonet, Dagger Plant	y	

Three species of noxious weeds were recorded on site at Site 68 SWQCP. These included the following weeds declared noxious in Auburn City Council area:

Class 4 weeds:

- *Asparagus aethiopicus* Asparagus Fern
- *Cardiospermum grandiflorum* Balloon vine
- *Senecio madagascariensis* Fireweed

Noxious weed control classes have different control requirements, summarised in Table 6 below. These vary between different local government areas or county councils, so that one weed may be a Class 4 weed for one LGA and a Class 5 weed for another. Weed classifications and control requirements can be checked on the DPI website at http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/noxweed/noxious-app-application?sq_content_src=%2BdXJsPWh0dHAlM0ElMkYlMkZ3ZWVkcy5kcGkubnN3Lmdvdi5hdSUyRndlZWRzUHVibGljJmFsbD0x

Table 6 Noxious weed class control requirements (DPI, 2014)

CONTROL CLASS	WEED PROBLEM	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	The plant must be fully and continuously suppressed and destroyed. In some cases the plant

CONTROL CLASS	WEED PROBLEM	CONTROL REQUIREMENTS
	distributed in the area and are likely to spread in the area or to another area.	may not be sold, propagated or knowingly distributed.
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 of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its reproduction*
Class 5	Plants that are likely, by their sale or the sale of their seeds or movement within the State or an area of the State, to spread in the State or outside the State.	There are no requirements to control existing plants of Class 5 weeds. However, the weeds are "notifiable" and a range of restrictions on their sale and movement exists.

Overall conditions for the vegetation communities recorded on the study site are discussed in a later section, along with an assessment of their conservation value. Threats to these conservation values are identified and measures to mitigate these threats are proposed.

Figure 5 Site 68 SWQCP on 28th August, 2014, showing the wetland area and surrounding terrestrial area, most of which has been cleared of canopy and regularly slashed since the frog clearance in July, 2014. Note the cut stumps from Swamp Oaks in the foreground.

FAUNA AND HABITAT

METHODS

Database Searches

Searches of several databases were made to identify threatened species that may potentially be found on the subject site. Databases were accessed on the 5th September, 2014. These included:

- NSW Wildlife Atlas (www.bionet.nsw.gov.au/),
- EPBC Act database (www.environment.gov.au/erin/ert/epbc/index.html).

Field Surveys

Field surveys were conducted on the 28th August, 2014. Weather was cool and cloudy, with light rainfall and a slight breeze.

- Bird surveys were opportunistic. Any birds sighted or heard calling during other survey activities were recorded.
- Reptiles and amphibians were surveyed opportunistically whilst undertaking the site assessment.

DESKTOP SURVEY RESULTS

Threatened fauna

Searches of NSW Wildlife Atlas, and EPBC Act database revealed the following threatened animal species recorded in the Sydney Olympic Park area. NSW Wildlife Atlas searches covered an area 10km2 centred on the study site. A total of 21 species of threatened fauna were reported since 2000 for this area in the NSW Wildlife Atlas.

Table 7 Threatened fauna species listed recorded within 10km2 cell centred on the study site (NSW Wildlife Atlas).

FAMILY	SCIENTIFIC NAME	COMMON NAME	NSW STATUS	COMM. STATUS	RECORDS
Myobatrachidae	*Pseudophryne australis*	Red-crowned Toadlet	V,P		2
Hylidae	*Litoria aurea*	Green and Golden Bell Frog	E1,P	V	2
Ardeidae	*Ixobrychus flavicollis*	Black Bittern	V,P		1
Accipitridae	*Circus assimilis*	Spotted Harrier	V,P		2
Accipitridae	*Hieraaetus morphnoides*	Little Eagle	V,P		1
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew	E1,P		1
Rostratulidae	*Rostratula australis*	Australian Painted Snipe	E1,P	E	2
Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	E1,P	C,J,K	283
Scolopacidae	*Limosa limosa*	Black-tailed Godwit	V,P	C,J,K	6

FAMILY	SCIENTIFIC NAME	COMMON NAME	NSW STATUS	COMM. STATUS	RECORDS
Scolopacidae	*Xenus cinereus*	Terek Sandpiper	V,P	C,J,K	1
Laridae	*Sternula albifrons*	Little Tern	E1,P	C,J,K	3
Psittacidae	*Glossopsitta pusilla*	Little Lorikeet	V,P		3
Strigidae	*Ninox strenua*	Powerful Owl	V,P,3		19
Tytonidae	*Tyto tenebricosa*	Sooty Owl	V,P,3		1
Meliphagidae	*Epthianura albifrons*	White-fronted Chat	V,P		195
Meliphagidae	*Epthianura albifrons*	White-fronted Chat population in the Sydney Metropolitan Catchment Management Area	E2,V,P		195
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	V,P		1
Peramelidae	*Perameles nasuta*	Long-nosed Bandicoot population in inner western Sydney	E2,P		3
Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox	V,P	V	32
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V,P		2
Molossidae	*Mormopterus norfolkensis*	Eastern Freetail-bat	V,P		2
Vespertilionidae	*Miniopterus schreibersii oceanensis*	Eastern Bentwing-bat	V,P		5

Protected Matters Search: threatened fauna

A slightly different suite of threatened fauna species (Table 8) is reported to occur or are likely to occur within a 2km radius in the Protected Matters Search. These include a range of wetland and migratory species.

Table 8 Threatened fauna species listed in the protected matters search (additional to the NSW Wildlife Atlas) within a 2km buffer of the study site.

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	TYPE OF PRESENCE
LISTED THREATENED SPECIES - AVES			
Anthochaera phrygia	Regent Honeyeater	Endangered	Foraging, feeding or related behaviour likely to occur within area
Botaurus poiciloptilus	Australasian Bittern	Endangered	Species or species habitat known to occur within area

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	TYPE OF PRESENCE
Dasyornis brachypterus	Eastern Bristlebird	Endangered	Species or species habitat may occur within area
Diomedea epomophora sanfordi	Northern Royal Albatross	Endangered	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora epomophora	Southern Royal Albatross	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Lathamus discolor	Swift Parrot	Endangered	Species or species habitat likely to occur within area
Rostratula australis	Australian Painted Snipe	Endangered	Species or species habitat likely to occur within area
Thalassarche cauta cauta	Shy Albatross, Tasmanian Shy Albatross	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta salvini	Salvin's Albatross	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi	White-capped Albatross	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita	Chatham Albatross	Endangered	Foraging, feeding or related behaviour likely to occur within area
AMPHIBIANS			
Heleioporus australiacus	Giant Burrowing Frog	Vulnerable	Species or species habitat likely to occur within area
Litoria aurea	Green and Golden Bell Frog	Vulnerable	Species or species habitat likely to occur within area
MAMMALS			
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	Species or species habitat may occur within area
Dasyurus maculatus maculatus	Spotted-tailed Quoll	Endangered	Species or species habitat known to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)	Koala (combined populations)	Vulnerable	Species or species habitat may occur within area
Pseudomys novaehollandiae	New Holland Mouse, Pookila	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus	Grey-headed Flying Fox	Vulnerable	Foraging, feeding or related behaviour known to occur within area
REPTILES			
Hoplocephalus bungaroides	Broad-headed Snake	Vulnerable	Species or species habitat likely to occur within area

Protected Matters Search: Migratory Species

Migratory species listed under the EPBC ACT excluding pelagics and marine turtles occurring within a 5km radius of the study site are listed in below:

Table 9 Migratory Species listed in the EPBC ACT within a 5km buffer of the study site.

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	TYPE OF PRESENCE
MIGRATORY MARINE BIRDS			
Apus pacificus	Fork-tailed Swift		Species or species habitat likely to occur within area
Diomedea epomophora (sensu stricto)	Southern Royal Albatross	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora sanfordi	Northern Royal Albatross	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta cauta	Shy Albatross, Tasmanian Shy Albatross	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta salvini	Salvin's Albatross	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi	White-capped Albatross	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita	Chatham Albatross	Endangered	Foraging, feeding or related behaviour likely to occur within area
MIGRATORY TERRESTRIAL SPECIES			
Haliaeetus leucogaster	White-bellied Sea-Eagle		Species or species habitat known to occur within area
Hirundapus caudacutus	White-throated Needletail		Species or species habitat known to occur within area
Merops ornatus	Rainbow Bee-eater		Species or species habitat likely to occur within area
Monarcha melanopsis	Black-faced Monarch		Species or species habitat known to occur within area
Monarcha trivirgatus	Spectacled Monarch		Species or species habitat may occur within area
Myiagra cyanoleuca	Satin Flycatcher		Species or species habitat known to occur within area
Rhipidura rufifrons	Rufous Fantail		Species or species habitat known to occur within area
MIGRATORY WETLAND SPECIES			
Ardea alba	Great Egret, White Egret		Species or species habitat known to occur within area
Ardea ibis	Cattle Egret		Species or species habitat likely to occur within area
Gallinago hardwickii	Latham's Snipe, Japanese Snipe		Species or species habitat may occur within area

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	TYPE OF PRESENCE
Numenius minutus	Little Curlew, Little Whimbrel		Foraging, feeding or related behaviour likely to occur within area
Rostratula benghalensis (sensu lato)	Painted Snipe	Endangered	Species or species habitat likely to occur within area
LISTED MARINE SPECIES			
Apus pacificus	Fork-tailed Swift		Species or species habitat likely to occur within area
Ardea alba	Great Egret, White Egret		Species or species habitat known to occur within area
Ardea ibis	Cattle Egret		Species or species habitat likely to occur within area
Diomedea epomophora (sensu stricto)	Southern Royal Albatross	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora sanfordi	Northern Royal Albatross	Endangered	Foraging, feeding or related behaviour likely to occur within area
Gallinago hardwickii	Latham's Snipe, Japanese Snipe		Species or species habitat may occur within area
Gallinago megala	Swinhoe's Snipe		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura	Pin-tailed Snipe		Foraging, feeding or related behaviour likely to occur within area
Haliaeetus leucogaster	White-bellied Sea-Eagle		Species or species habitat known to occur within area
Hirundapus caudacutus	White-throated Needletail		Species or species habitat known to occur within area
Lathamus discolor	Swift Parrot	Endangered	Species or species habitat likely to occur within area
Merops ornatus	Rainbow Bee-eater		Species or species habitat likely to occur within area
Monarcha melanopsis	Black-faced Monarch		Species or species habitat known to occur within area
Monarcha trivirgatus	Spectacled Monarch		Species or species habitat may occur within area
Myiagra cyanoleuca	Satin Flycatcher		Species or species habitat known to occur within area
Numenius minutus	Little Curlew, Little Whimbrel		Foraging, feeding or related behaviour likely to occur within area
Pandion haliaetus	Osprey		Species or species habitat likely to occur within area
Rhipidura rufifrons	Rufous Fantail		Species or species habitat known to occur within area
Rostratula	Painted Snipe	Endangered	Species or species habitat likely

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	TYPE OF PRESENCE
benghalensis (sensu lato)			to occur within area
Thalassarche cauta cauta	Shy Albatross, Tasmanian Shy Albatross	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta salvini	Salvin's Albatross	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi	White-capped Albatross	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita	Chatham Albatross	Endangered	Foraging, feeding or related behaviour likely to occur within area

Mapped distribution of threatened species

The NSW Wildlife Atlas records sightings of threatened and other species and these are available through BioNet http://www.environment.nsw.gov.au/atlaspublicapp/UI_Modules/ATLAS_/AtlasSearch.aspx. Records for an area within 1km of the subject site (Figure 6) are shown in Table 10 . These records include NSW Wildlife Atlas records, BirdLife Australia Records and NSW Bird Atlas records.

Table 10 lists 7 species of frogs, 207 species of birds in 55 families, 9 species of mammals, and 14 species of reptiles sighted near the subject site since 2000.

Table 10 Species list for fauna records within 1km of Site 68

Class Name	Family Name	Scientific Name	Common Name	NSW Status	Comm Status	Count
AMPHIBIA	Hylidae	*Litoria aurea*	Green and Golden Bell Frog	E1,P	V	298
AMPHIBIA	Hylidae	*Litoria dentata*	Bleating Tree Frog	P		1
AMPHIBIA	Hylidae	*Litoria fallax*	Eastern Dwarf Tree Frog	P		29
AMPHIBIA	Hylidae	*Litoria peronii*	Peron's Tree Frog	P		240
AMPHIBIA	Myobatrachidae	*Crinia signifera*	Common Eastern Froglet	P		197
AMPHIBIA	Myobatrachidae	*Limnodynastes peronii*	Brown-striped Frog	P		271
AMPHIBIA	Myobatrachidae	*Limnodynastes tasmaniensis*	Spotted Grass Frog	P		54
AVES	Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill	P		28
AVES	Acanthizidae	*Acanthiza lineata*	Striated Thornbill	P		1
AVES	Acanthizidae	*Acanthiza nana*	Yellow Thornbill	P		263

Class Name	Family Name	Scientific Name	Common Name	NSW Status	Comm Status	Count
AVES	Acanthizidae	*Acanthiza pusilla*	Brown Thornbill	P		3
AVES	Acanthizidae	*Gerygone albogularis*	White-throated Gerygone	P		2
AVES	Acanthizidae	*Gerygone levigaster*	Mangrove Gerygone	P		12
AVES	Acanthizidae	*Gerygone mouki*	Brown Gerygone	P		1
AVES	Acanthizidae	*Sericornis frontalis*	White-browed Scrubwren	P		55
AVES	Acanthizidae	*Smicrornis brevirostris*	Weebill	P		3
AVES	Accipitridae	*Accipiter cirrocephalus*	Collared Sparrowhawk	P		7
AVES	Accipitridae	*Accipiter fasciatus*	Brown Goshawk	P		19
AVES	Accipitridae	*Accipiter novaehollandiae*	Grey Goshawk	P		1
AVES	Accipitridae	*Aviceda subcristata*	Pacific Baza	P		1
AVES	Accipitridae	*Circus approximans*	Swamp Harrier	P		4
AVES	Accipitridae	*Circus assimilis*	Spotted Harrier	P		10
AVES	Accipitridae	*Elanus axillaris*	Black-shouldered Kite	P		67
AVES	Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	P		33
AVES	Accipitridae	*Haliastur sphenurus*	Whistling Kite	P		1
AVES	Accipitridae	*Hieraaetus morphnoides*	Little Eagle	V,P		2
AVES	Accipitridae	*Milvus migrans*	Black Kite	P		2
AVES	Accipitridae	*Pandion cristatus*	Eastern Osprey	VU		1
AVES	Acrocephalidae	*Acrocephalus australis*	Australian Reed-Warbler	P		224
AVES	Aegothelidae	*Aegotheles cristatus*	Australian Owlet-Nightjar	P		1
AVES	Alaudidae	*Mirafra javanica*	Horsfield's Bushlark	P		2
AVES	Alcedinidae	*Ceyx azureus*	Azure Kingfisher	P		1
AVES	Alcedinidae	*Dacelo novaeguineae*	Laughing Kookaburra	P		49
AVES	Alcedinidae	*Todiramphus sanctus*	Sacred Kingfisher	P		28

Class Name	Family Name	Scientific Name	Common Name	NSW Status	Comm Status	Count
AVES	Anatidae	*Anas castanea*	Chestnut Teal	P		601
AVES	Anatidae	*Anas gracilis*	Grey Teal	P		351
AVES	Anatidae	*Anas platyrhynchos*	Mallard	P		23
AVES	Anatidae	*Anas rhynchotis*	Australasian Shoveler	P		17
AVES	Anatidae	*Anas superciliosa*	Pacific Black Duck	P		445
AVES	Anatidae	*Aythya australis*	Hardhead	P		115
AVES	Anatidae	*Biziura lobata*	Musk Duck	P		4
AVES	Anatidae	*Chenonetta jubata*	Australian Wood Duck	P		91
AVES	Anatidae	*Cygnus atratus*	Black Swan	P		133
AVES	Anatidae	*Malacorhynchus membranaceus*	Pink-eared Duck	P		27
AVES	Anatidae	*Stictonetta naevosa*	Freckled Duck	V,P		1
AVES	Anatidae	*Tadorna tadornoides*	Australian Shelduck	P		5
AVES	Anhingidae	*Anhinga novaehollandiae*	Australasian Darter	P		198
AVES	Anhingidae	*Botaurus poiciloptilus*	Australasian Bittern	P		1
AVES	Apodidae	*Apus pacificus*	Fork-tailed Swift	P		1
AVES	Apodidae	*Hirundapus caudacutus*	White-throated Needletail	P		3
AVES	Ardeidae	*Ardea ibis*	Cattle Egret	P		78
AVES	Ardeidae	*Ardea intermedia*	Intermediate Egret	P		25
AVES	Ardeidae	*Ardea modesta*	Eastern Great Egret	P		140
AVES	Ardeidae	*Ardea pacifica*	White-necked Heron	P		5
AVES	Ardeidae	*Butorides striatus*	Striated Heron	P		42
AVES	Ardeidae	*Egretta garzetta*	Little Egret	P		12
AVES	Ardeidae	*Egretta novaehollandiae*	White-faced Heron	P		306
AVES	Ardeidae	*Egretta sacra*	Eastern Reef Egret	P		1
AVES	Ardeidae	*Nycticorax caledonicus*	Nankeen Night Heron	P		41
AVES	Artamidae	*Cracticus tibicen*	Australian Magpie	P		333
AVES	Artamidae	*Cracticus torquatus*	Grey Butcherbird	P		118
AVES	Artamidae	*Strepera graculina*	Pied Currawong	P		371
AVES	Cacatuidae	*Cacatua galerita*	Sulphur-crested Cockatoo	P		55
AVES	Cacatuidae	*Cacatua sanguinea*	Little Corella	P		20
AVES	Cacatuidae	*Cacatua tenuirostris*	Long-billed	P		3

Class Name	Family Name	Scientific Name	Common Name	NSW Status	Comm Status	Count
			Corella			
AVES	Cacatuidae	*Calyptorhynchus funereus*	Yellow-tailed Black-Cockatoo	P		14
AVES	Cacatuidae	*Eolophus roseicapillus*	Galah	P		59
AVES	Cacatuidae	*Nymphicus hollandicus*	Cockatiel	P		2
AVES	Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike	P		224
AVES	Campephagidae	*Coracina tenuirostris*	Cicadabird	P		3
AVES	Campephagidae	*Lalage sueurii*	White-winged Triller	P		11
AVES	Caprimulgidae	*Eurostopodus mystacalis*	White-throated Nightjar	P		1
AVES	Charadriidae	*Charadrius bicinctus*	Double-banded Plover	P		1
AVES	Charadriidae	*Charadrius ruficapillus*	Red-capped Plover	P		43
AVES	Charadriidae	*Elseyornis melanops*	Black-fronted Dotterel	P		388
AVES	Charadriidae	*Erythrogonys cinctus*	Red-kneed Dotterel	P		113
AVES	Charadriidae	*Pluvialis fulva*	Pacific Golden Plover	P	C,J,K	48
AVES	Charadriidae	*Pluvialis squatarola*	Grey Plover	P	C,J,K	1
AVES	Charadriidae	*Vanellus miles*	Masked Lapwing	P		441
AVES	Charadriidae	*Vanellus miles novaehollandiae*	Masked Lapwing	P		1
AVES	Charadriidae	*Vanellus tricolor*	Banded Lapwing	P		2
AVES	Cisticolidae	*Cisticola exilis*	Golden-headed Cisticola	P		86
AVES	Climacteridae	*Cormobates leucophaea*	White-throated Treecreeper	P		1
AVES	Columbidae	*Geopelia striata*	Peaceful Dove	P		1
AVES	Columbidae	*Lopholaimus antarcticus*	Topknot Pigeon	P		5
AVES	Columbidae	*Ocyphaps lophotes*	Crested Pigeon	P		199
AVES	Columbidae	*Phaps elegans*	Brush Bronzewing	P		2
AVES	Coraciidae	*Eurystomus orientalis*	Dollarbird	P		10
AVES	Corcoracid	*Corcorax*	White-winged	P		1

Class Name	Family Name	Scientific Name	Common Name	NSW Status	Comm Status	Count
	ae	*melanorhamphos*	Chough			
AVES	Corvidae	*Corvus coronoides*	Australian Raven	P		535
AVES	Corvidae	*Corvus orru*	Torresian Crow	P		3
AVES	Cuculidae	*Cacomantis flabelliformis*	Fan-tailed Cuckoo	P		11
AVES	Cuculidae	*Cacomantis variolosus*	Brush Cuckoo	P		2
AVES	Cuculidae	*Chalcites basalis*	Horsfield's Bronze-Cuckoo	P		58
AVES	Cuculidae	*Chalcites lucidus*	Shining Bronze-Cuckoo	P		1
AVES	Cuculidae	*Eudynamys orientalis*	Eastern Koel	P		88
AVES	Cuculidae	*Scythrops novaehollandiae*	Channel-billed Cuckoo	P		43
AVES	Dicruridae	*Dicrurus bracteatus*	Spangled Drongo	P		8
AVES	Estrildidae	*Lonchura castaneothorax*	Chestnut-breasted Mannikin	P		1
AVES	Estrildidae	*Neochmia modesta*	Plum-headed Finch	P		2
AVES	Estrildidae	*Neochmia temporalis*	Red-browed Finch	P		197
AVES	Estrildidae	*Taeniopygia bichenovii*	Double-barred Finch	P		37
AVES	Estrildidae	*Taeniopygia guttata*	Zebra Finch	P		10
AVES	Falconidae	*Falco berigora*	Brown Falcon	P		2
AVES	Falconidae	*Falco cenchroides*	Nankeen Kestrel	P		22
AVES	Falconidae	*Falco longipennis*	Australian Hobby	P		4
AVES	Falconidae	*Falco peregrinus*	Peregrine Falcon	P		17
AVES	Falconidae	*Falco subniger*	Black Falcon	P		1
AVES	Hirundinidae	*Hirundo neoxena*	Welcome Swallow	P		511
AVES	Hirundinidae	*Petrochelidon ariel*	Fairy Martin	P		263
AVES	Hirundinidae	*Petrochelidon nigricans*	Tree Martin	P		13
AVES	Laridae	*Chlidonias hybrida*	Whiskered Tern	P		8
AVES	Laridae	*Chroicocephalus novaehollandiae*	Silver Gull	P		477
AVES	Laridae	*Gelochelidon nilotica*	Gull-billed Tern	P		5
AVES	Laridae	*Hydroprogne caspia*	Caspian Tern	P	C,J	16
AVES	Laridae	*Sterna hirundo*	Common Tern	P	C,J,K	1
AVES	Laridae	*Thalasseus bergii*	Crested Tern	P		9
AVES	Maluridae	*Malurus cyaneus*	Superb Fairy-wren	P		688
AVES	Maluridae	*Malurus lamberti*	Variegated Fairy-	P		2

Class Name	Family Name	Scientific Name	Common Name	NSW Status	Comm Status	Count
			wren			
AVES	Maluridae	*Stipiturus malachurus*	Southern Emu-wren	P		1
AVES	Megaluridae	*Cincloramphus cruralis*	Brown Songlark	P		3
AVES	Megaluridae	*Cincloramphus mathewsi*	Rufous Songlark	P		3
AVES	Megaluridae	*Megalurus gramineus*	Little Grassbird	P		185
AVES	Megaluridae	*Megalurus timoriensis*	Tawny Grassbird	P		6
AVES	Meliphagidae	*Acanthorhynchus tenuirostris*	Eastern Spinebill	P		7
AVES	Meliphagidae	*Anthochaera carunculata*	Red Wattlebird	P		332
AVES	Meliphagidae	*Anthochaera chrysoptera*	Little Wattlebird	P		42
AVES	Meliphagidae	*Epthianura albifrons*	White-fronted Chat	VU		2
AVES	Meliphagidae	*Lichenostomus chrysops*	Yellow-faced Honeyeater	P		21
AVES	Meliphagidae	*Lichenostomus fuscus*	Fuscous Honeyeater	P		2
AVES	Meliphagidae	*Lichenostomus penicillatus*	White-plumed Honeyeater	P		311
AVES	Meliphagidae	*Lichmera indistincta*	Brown Honeyeater	P		154
AVES	Meliphagidae	*Manorina melanocephala*	Noisy Miner	P		297
AVES	Meliphagidae	*Manorina melanophrys*	Bell Miner	P		1
AVES	Meliphagidae	*Meliphaga lewinii*	Lewin's Honeyeater	P		2
AVES	Meliphagidae	*Melithreptus lunatus*	White-naped Honeyeater	P		3
AVES	Meliphagidae	*Myzomela sanguinolenta*	Scarlet Honeyeater	P		9
AVES	Meliphagidae	*Philemon corniculatus*	Noisy Friarbird	P		2
AVES	Meliphagidae	*Phylidonyris niger*	White-cheeked Honeyeater	P		2
AVES	Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater	P		167
AVES	Monarchidae	*Grallina cyanoleuca*	Magpie-lark	P		393
AVES	Monarchidae	*Monarcha melanopsis*	Black-faced Monarch	P		4
AVES	Monarchid	*Myiagra cyanoleuca*	Satin Flycatcher	P		5

Class Name	Family Name	Scientific Name	Common Name	NSW Status	Comm Status	Count
	ae					
AVES	Monarchidae	*Myiagra inquieta*	Restless Flycatcher	P		1
AVES	Monarchidae	*Myiagra rubecula*	Leaden Flycatcher	P		9
AVES	Motacillidae	*Anthus novaeseelandiae*	Australian Pipit	P		6
AVES	Motacillidae	*Motacilla tschutschensis*	Eastern Yellow Wagtail	P		1
AVES	Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird	P		1
AVES	Oriolidae	*Oriolus sagittatus*	Olive-backed Oriole	P		71
AVES	Oriolidae	*Sphecotheres vieilloti*	Australasian Figbird	P		56
AVES	Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush	P		3
AVES	Pachycephalidae	*Falcunculus frontatus frontatus*	Crested Shrike-tit	P		1
AVES	Pachycephalidae	*Pachycephala pectoralis*	Golden Whistler	P		15
AVES	Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler	P		26
AVES	Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote	P		125
AVES	Pardalotidae	*Pardalotus striatus*	Striated Pardalote	P		4
AVES	Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican	P		330
AVES	Petroicidae	*Eopsaltria australis*	Eastern Yellow Robin	P		1
AVES	Petroicidae	*Petroica rosea*	Rose Robin	P		3
AVES	Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant	P		339
AVES	Phalacrocoracidae	*Phalacrocorax carbo*	Great Cormorant	P		154
AVES	Phalacrocoracidae	*Phalacrocorax sulcirostris*	Little Black Cormorant	P		324
AVES	Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant	P		144
AVES	Phasianidae	*Coturnix ypsilophora*	Brown Quail	P		31
AVES	Podargidae	*Podargus strigoides*	Tawny Frogmouth	P		2
AVES	Podicipedidae	*Podiceps cristatus*	Great Crested Grebe	P		6
AVES	Podicipedi	*Poliocephalus*	Hoary-headed	P		55

Class Name	Family Name	Scientific Name	Common Name	NSW Status	Comm Status	Count
	dae	*poliocephalus*	Grebe			
AVES	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe	P		292
AVES	Psittacidae	*Glossopsitta concinna*	Musk Lorikeet	P		7
AVES	Psittacidae	*Platycercus elegans*	Crimson Rosella	P		11
AVES	Psittacidae	*Platycercus eximius*	Eastern Rosella	P		57
AVES	Psittacidae	*Psephotus haematonotus*	Red-rumped Parrot	P		136
AVES	Psittacidae	*Trichoglossus haematodus*	Rainbow Lorikeet	P		243
AVES	Rallidae	*Fulica atra*	Eurasian Coot	P		415
AVES	Rallidae	*Gallinula tenebrosa*	Dusky Moorhen	P		499
AVES	Rallidae	*Gallirallus philippensis*	Buff-banded Rail	P		30
AVES	Rallidae	*Lewinia pectoralis*	Lewin's Rail	P		15
AVES	Rallidae	*Porphyrio porphyrio*	Purple Swamphen	P		452
AVES	Rallidae	*Porzana fluminea*	Australian Spotted Crake	P		19
AVES	Rallidae	*Porzana pusilla*	Baillon's Crake	P		15
AVES	Rallidae	*Porzana tabuensis*	Spotless Crake	P		19
AVES	Rallidae	*Tribonyx ventralis*	Black-tailed Native-hen	P		4
AVES	Recurvirostridae	*Cladorhynchus leucocephalus*	Banded Stilt	P		1
AVES	Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt	P		567
AVES	Recurvirostridae	*Recurvirostra novaehollandiae*	Red-necked Avocet	P		269
AVES	Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail	P		60
AVES	Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail	P		441
AVES	Rhipiduridae	*Rhipidura rufifrons*	Rufous Fantail	P		4
AVES	Rostratulidae	*Rostratula australis*	Australian Painted Snipe	E1,P	E	5
AVES	Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	P		18
AVES	Scolopacidae	*Arenaria interpres*	Ruddy Turnstone	P		3
AVES	Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper	P	C,J,K	207
AVES	Scolopacidae	*Calidris canutus*	Red Knot	P	C,J,K	2
AVES	Scolopacid	*Calidris ferruginea*	Curlew Sandpiper	E1,P	C,J,K	70

Class Name	Family Name	Scientific Name	Common Name	NSW Status	Comm Status	Count
	ae					
AVES	Scolopacidae	*Calidris melanotos*	Pectoral Sandpiper	P	J,K	9
AVES	Scolopacidae	*Calidris ruficollis*	Red-necked Stint	P	C,J,K	11
AVES	Scolopacidae	*Gallinago hardwickii*	Latham's Snipe	P	C,J,K	74
AVES	Scolopacidae	*Limosa lapponica*	Bar-tailed Godwit	P	C,J,K	129
AVES	Scolopacidae	*Numenius madagascariensis*	Eastern Curlew	P		5
AVES	Scolopacidae	*Philomachus pugnax*	Ruff	P		4
AVES	Scolopacidae	*Tringa glareola*	Wood Sandpiper	P	C,J,K	1
AVES	Scolopacidae	*Tringa nebularia*	Common Greenshank	P	C,J,K	14
AVES	Scolopacidae	*Tringa stagnatilis*	Marsh Sandpiper	P	C,J,K	17
AVES	Scolopacidae	*Xenus cinereus*	Terek Sandpiper	P		3
AVES	Strigidae	*Ninox novaeseelandiae*	Southern Boobook	P		5
AVES	Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill	P		1
AVES	Threskiornithidae	*Platalea regia*	Royal Spoonbill	P		228
AVES	Threskiornithidae	*Plegadis falcinellus*	Glossy Ibis	P	C	54
AVES	Threskiornithidae	*Threskiornis molucca*	Australian White Ibis	P		513
AVES	Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis	P		4
AVES	Timaliidae	*Zosterops lateralis*	Silvereye	P		289
AVES	Turdidae	*Zoothera lunulata*	Bassian Thrush	P		1
AVES	Turnicidae	*Turnix varius*	Painted Button-quail	P	V	2
AVES	Tytonidae	*Tyto javanica*	Eastern Barn Owl	P		6
MAMMALIA	Molossidae	*Mormopterus planiceps*	Little Mastiff-bat	P		7
MAMMALIA	Molossidae	*Tadarida australis*	White-striped Freetail-bat	P		6
MAMMALIA	Muridae	*Hydromys chrysogaster*	Water-rat	P		1
MAMMALIA	Phalangeridae	*Trichosurus vulpecula*	Common Brushtail Possum	P		2
MAMMALIA	Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox	V,P	V	2

Class Name	Family Name	Scientific Name	Common Name	NSW Status	Comm Status	Count
MAMMALIA	Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat	P		6
MAMMALIA	Vespertilionidae	*Miniopterus schreibersii oceanensis*	Eastern Bentwing-bat	P		2
MAMMALIA	Vespertilionidae	*Nyctophilus geoffroyi*	Lesser Long-eared Bat	P		3
MAMMALIA	Vespertilionidae	*Vespadelus darlingtoni*	Large Forest Bat	P		3
REPTILIA	Agamidae	*Pogona barbata*	Bearded Dragon	P		1
REPTILIA	Chelidae	*Chelodina (Chelodina) longicollis*	Eastern Snake-necked Turtle	P		4
REPTILIA	Elapidae	*Pseudonaja textilis*	Eastern Brown Snake	P		1
REPTILIA	Scincidae	*Cryptoblepharus virgatus*	Cream-striped Shinning-skink	P		8
REPTILIA	Scincidae	*Ctenotus robustus*	Robust Ctenotus	P		8
REPTILIA	Scincidae	*Ctenotus taeniolatus*	Copper-tailed Skink	P		1
REPTILIA	Scincidae	*Eulamprus heatwolei*	Yellow-bellied Water-skink	P		1
REPTILIA	Scincidae	*Eulamprus quoyii*	Eastern Water-skink	P		21
REPTILIA	Scincidae	*Eulamprus tenuis*	Barred-sided Skink	P		4
REPTILIA	Scincidae	*Lampropholis delicata*	Dark-flecked Garden Sunskink	P		13
REPTILIA	Scincidae	*Lampropholis guichenoti*	Pale-flecked Garden Sunskink	P		14
REPTILIA	Scincidae	*Saiphos equalis*	Three-toed Skink	P		1
REPTILIA	Scincidae	*Saproscincus mustelinus*	Weasel Skink	P		1
REPTILIA	Scincidae	*Tiliqua scincoides*	Eastern Blue-tongue	P		21

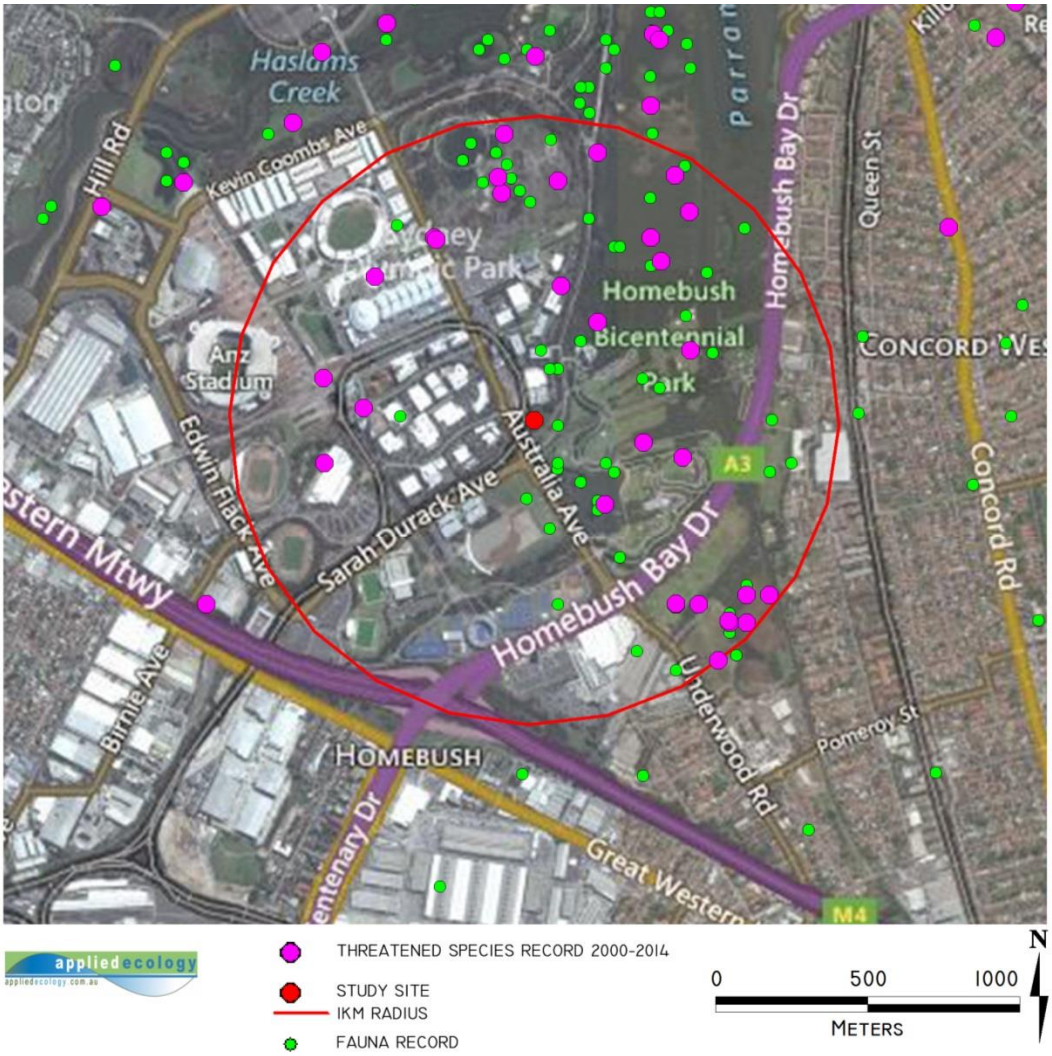

Figure 6 Distribution of threatened species and other fauna species within 1km radius of Site 68

FIELD SURVEY RESULTS

A total of 12 bird species were recorded in fauna surveys at the subject site, none of which were introduced and none of which are listed under the NSW Threatened Species Conservation Act or the EP&BC Act (Table 11). As well, several frogs were identified by call, and one medium sized skink was observed on site. Surrounding walking tracks were used almost continuously by walkers, usually without dogs.

Table 11 Fauna species recorded during surveys in May, 2014

COMMON NAME	SPECIES NAME
AVES	
Dusky Moorhen	*Gallinula tenebrosa*
Laughing Kookaburra	*Dacelo novaeguineae*
Magpie-lark	*Grallina cyanoleuca*
Masked Lapwing	*Vanellus miles*
Noisy Miner	*Manorina melanocephala*
Pacific Black Duck	*Anas superciliosa*
Pied Currawong	*Strepera graculina*

Purple Swamphen	*Porphyrio porphyrio*
Superb Fairy-wren	*Malurus cyaneus*
Welcome Swallow	*Hirundo neoxena*
Willie Wagtail	*Rhipidura leucophrys*
AMPHIBIANS AND REPTILES	
Common Eastern Froglet	*Crinia signifera*
Peron's Tree Frog	*Litoria peronii*
Water Skink	*Eulamprus quoyii*

Fauna surveys were restricted to a single visit, and cannot be guaranteed to capture all the species that use the site on a regular or irregular basis. Surveys were conducted in the first week of spring, around midday, and during or immediately after rain, and with moderate to strong winds. These conditions are not highly conducive for bird watching, although they are somewhat favourable for frogs.

From the suite of fauna recorded on 28th August, 2014 the site tends to support a range of more common water birds and larger generalist bird species. The two species of frogs persist on the site despite ongoing maintenance to ensure that frogs are discouraged from utilizing the area.

Figure 7 Purple Swamphens were beginning to nest in the dense ferns and reeds at Site 68

Figure 8 Pacific Black Ducks were shy, but unaffected by rainfall during surveys

Figure 9 Willy Wagtails foraged over the water, using fallen branches as stable perches for hunting

Figure 10 Eastern Water Skinks were making use of erosion holes in the steep western bank at Site 68

HABITAT ASSESSMENT AND CONSERVATION VALUE

IDENTIFICATION OF COMMUNITIES PRESENT

Like most of the Sydney Olympic Park sites, Site 68 went through major modification as part of the development process for building sporting facilities and supporting accommodation for the 2000 Olympic Games (Figure 11). As a result, Site 68 bears no resemblance to a natural environment. Modifications include major earthworks to form the basin and surrounding 3m high berm or wall, diversion of all natural drainage in this part of the SOPA site, and complete revegetation of the basin following completion of earthworks (Figure 12).

Figure 11 Site 68 and surrounds in 1996, prior to construction of the stormwater basin

Figure 12 Site 68 and surrounds in 1999 following construction of the stormwater basin

The basin itself has gone through a number of “evolutionary” stages, with the original plantings from the basin’s stormwater quality management design being largely replaced by immigrant species. The most likely vector for the transference of these species into the pond is via water birds, either as seed or as vegetative propagules. The surrounding banks have shown significant growth in Swamp Oaks and *Lomandra longifolia*, most of which has been cleared in more recent times, so that the terrestrial embankments are largely devoid of much more than a mown surface. Thus the original vegetation community has no relevance for this site.

The area immediately downstream and east of the site has been retained as open space. Southeast is Bicentennial Park, a highly modified environment with several artificial water bodies, a modified

creekline, and most of its area is covered by mown turf grass. Directly downstream and northeast of Site 68 is Badu Mangroves, a wetland and saltmarsh reserve. Like other parts of the harbour and foreshore, the area around Sydney Olympic Park has been greatly modified. There has been historic construction of seawalls and bunds, alteration to creeklines, and sediment deposition, and consequent significant change to the original vegetation. Many of these changes have promoted mangrove growth at the expense of other estuarine habitats.

ASSESSMENT OF FLORA AND VEGETATION CONDITION

Terrestrial Zone

The terrestrial zone is characterised by a steeply sloping embankment around the SWQCP. Originally this had several dense stands of *Casuarina glauca*, with dense plantings of *Lomandra longifolia* in between. As part of recent changes to vegetation management in the area, many of the Casuarinas have been cleared, leaving only low cut stumps, and the Lomandras have been slashed to the level of mown grass (Figure 13). While this is clearly designed to keep frogs from recolonizing the area, it has been ineffective, and has not addressed the habitat requirements and current level of use by Latham's Snipe.

Figure 13 Purple Swamphens forage in the slashed area on the steep embankment – in comparative safety from disturbance

Records provided by SOPA from their annual spring bird census show increasing levels of use of the SWQCP by Lathams Snipe over the last few years. It is quite possible that this is the result of increasing pressures on other areas of habitat available, causing them to use the pond as roosting habitat with greater frequency. It also provides potential foraging habitat for Latham's Snipe and the Cattle Egret. Results of SOPA's surveys show that a diverse suite of bird species use the pond on a regular basis, and the abundance and diversity of bird species recorded in the middle of a wet, windy day in late winter supports this observation.

Wetland Zone

The wetland zone reflects the length of colonization time for the pond, which has resulted in a comparatively stable vegetation cover over the shallow areas of the pond. Deeper areas retain open water, including the area immediately in front of the inflow point and the area surrounding the glory hole (the outlet control point; Figure 14). There is a shallow berm that has formed between these two open water areas as a result of sediment deposition and collection around reeds and sedges (Figure 15).

While it is apparent that the pond is no longer able to adequately treat the stormwater flows (see review of Cardno, 2012 earlier in this report), the pond still retains a moderately high level of habitat quality. Numerous water birds use the pond and surrounding reeds for roosting, foraging and nesting, and many more birds feed on emergent insects. At the time of survey more birds were observed foraging over the water than on it. It is quite probable that microbats would also use this food resource but these have not been surveyed in this area to date.

Figure 14 Deeper water is generally free of reeds and sedges, leaving a mosaic with open water patches among the reeds

Debris has collected around the sedges and is reported to periodically collect in and block the outlet control structures (Figure 16). SOPA have conducted regular monitoring of the growth of Azolla sp, a native water fern that proliferates in freshwater ponds with high levels of nutrients. Monitoring was conducted using a number of white quadrats, scattered around the edge between reeds and open water.

Figure 15 Dense reeds have colonized the collecting sediment opposite the inflow point, creating a stable berm in the pond

Figure 16 Plant debris and litter also collects at the edge of the reeds, including at this Azolla sp monitoring point

HABITAT REQUIREMENTS FOR AFFECTED THREATENED AND MIGRATORY SPECIES

The information provided in the following sections is intended as a guide for the selection of suitable areas to function as habitat offsets that will compensate for the loss of habitat associated with the decommissioning of Site 68's SWQCP. Each of these species is protected under environmental legislation in New South Wales, including the Commonwealth's EPBC Act and NSW Threatened Species Conservation Act.

Latham's Snipe (*Gallinago hardwickii*)

Latham's Snipe is a non-breeding migratory visitor to south-eastern Australia, and breed in Japan and far eastern Russia (SPRAT profile, DoE, 2004). They spend the northern winter (our summer) in Australia, travelling singly or in small groups. In Australia the Latham's Snipe usually inhabits open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). They can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity. They generally occupy flooded meadows, seasonal or semi-permanent swamps, or open waters, but various other freshwater habitats can be used including bogs, waterholes, billabongs, lagoons, lakes, creek or river margins, river pools and floodplains.

The structure and composition of the vegetation that occurs around these wetlands is not important in determining the suitability of habitat. As such, snipe may be found in a variety of vegetation types or communities including tussock grasslands with rushes, reeds and sedges, coastal and alpine heathlands, lignum or tea-tree scrub, button-grass plains, alpine herbfields and open forest. The foraging habitats of Latham's Snipe are characterized by areas of mud (either exposed or beneath a very shallow covering of water) and some form of cover (e.g. low, dense vegetation). The snipe roost on the ground near (or sometimes in) their foraging areas, usually in sites that provide some degree of shelter, e.g. beside or under clumps of vegetation, among dense tea-tree, in forests, in drainage ditches or plough marks, among boulders, or in shallow water if cover is unavailable.

This species was recorded 28 times in Site 68's SWQCP.

Cattle Egret (*Ardea ibis*)

The Cattle Egret was originally native to Africa, south-west Europe, and Asia. It is a relatively recent colonist of Australia from Asia following a massive range expansion since 1877 (SPRAT profile, DoE, 2014). In Australia the principal breeding sites are the central east coast from about Newcastle to Bundaberg. It also breeds in major inland wetlands in north NSW (notably the Macquarie Marshes).

The Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. High numbers have been observed in moist, low-lying poorly drained pastures with an abundance of high grass; it avoids low grass pastures. It uses predominately shallow, open and fresh wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora. They have sometimes been observed in swamps with tall emergent vegetation.

The Cattle Egret often forages away from water on low lying grasslands, improved pastures and croplands. It is commonly found in cattle fields and other farm areas that contain livestock. The Cattle Egret has also been observed foraging in rubbish tips. It is becoming more frequent in drier regions; consuming the ticks of livestock in the absence of other food sources. This inland spread is

believed to be due to the construction of artificial waterways. The Cattle Egret roosts in trees, or amongst ground vegetation in or near lakes and swamps. It has also been recorded roosting near human settlement and industrial areas on the North Coast of NSW.

This species was recorded 63 times in Site 68's SWQCP.

Green and Golden Bell Frog (*Litoria aurea*)

The Green and Golden Bell Frog occurs mainly along coastal lowland areas of eastern NSW and Victoria (SPRAT profile, DoE, 2014). In NSW, the species commonly occupies disturbed habitats, and breeds largely in ephemeral ponds. In Victoria, the Green and Golden Bell Frog occupies habitats with little human disturbance and commonly breeds in permanent ponds, as well as ephemeral ponds. Green and Golden Bell Frogs need various habitats for different aspects of their life cycle including foraging, breeding, over-wintering and dispersal. They will also use different habitats or habitat components on a temporal or seasonal basis.

In NSW, the Green and Golden Bell Frog has been found in a wide range of water bodies except fast flowing streams. It inhabits many disturbed sites, including abandoned mines and quarries. Breeding habitat in NSW includes water bodies that are still, shallow, ephemeral, unpolluted (but the frog can be found in polluted habitats), unshaded, with aquatic plants and free of Mosquito Fish (*Gambusia holbrooki*) and other predatory fish, with terrestrial habitats that consisted of grassy areas and vegetation no higher than woodlands, and a range of diurnal shelter sites. Breeding occurred in a significantly higher proportion of sites with ephemeral (temporary) ponds, rather than sites with fluctuating or permanent ponds, and where predatory fish were absent.

This species was recorded as incidental sightings/call records 10 times in Site 68's SWQCP. The importance of Site 68 as habitat for the GGBF is that predatory fish are absent, and can continue to be excluded, making it important habitat to ensure the ongoing breeding success of the species in the area.

RECOMMENDATIONS

- Conduct surveys of aquatic zone to ensure that Zannichellia palustris is not present
- Conduct additional surveys of the SWQCP in spring and summer to gain a more clear understanding of the species that use the pond, and the level of usage to ensure that offsets are able to more accurately compensate for the loss of habitat; include microbat surveys in subsequent surveys
- Locate and improve habitat areas nearby for Green and Golden Bell Frog
- Locate and improve habitat areas nearby for Latham's Snipe and Cattle Egret
- Include dog and cat proof fencing around offset areas designated as substitute habitat for threatened and migratory species affected by the loss of habitat at Site 68's SWQCP
- Ensure all offsets meet all the statutory requirements detailed in the BioBanking Assessment Methodology and Credit Calculator Operational Manual (DECCW, 2008), as outlined in "Attachment 1: Biodiversity offsetting for Major Projects – Interim Arrangements for assessing and offsetting impacts" included in OEH's letter dated 30/7/14

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Appendix A Project Senior Staff

Project Manager– Dr. Meredith Brainwood

Dr. Meredith Brainwood carried out field work and report writing. Meredith holds a Bachelor of Applied Science (Environmental Science), a Master of Science (Honours) and completed a PhD in Ecohydromorphology.

Meredith has extensive experience in preparing plans of management, aquatic and terrestrial flora and fauna surveys, and the development of rigorous scientific methodologies. She held contract roles with companies such as A&S Bushcare Services, National Trust Bushland Management Services, Good Bush People and NSW National Parks and Wildlife Service. Meredith worked as a senior environmental scientist with Australian Wetlands before joining Applied Ecology Pty Ltd.

Senior Consultant- Anne Carey

Anne undertook the mapping for the project and assisted with report writing and refinement. Anne has a Degree in Science (Conservation Biology) and a Masters Degree in Wildlife Management and has over 20 years industry experience. Prior to Applied Ecology, Anne worked as the Operations Manager at Australian Wetlands (Sydney Design group), as an Environmental Manager for PSP- an alliance of private companies delivering infrastructure projects for Sydney water, as field ecologist, undertaking fauna and flora assessments and vegetation mapping, for various companies including NSW National Parks and Wildlife Service.