FLORA AND FAUNA ASSESSMENT

CARPARK P5 (POD B), SYDNEY OLYMPIC PARKLANDS

CNR HILL ROAD & HOLKER ST, NEWINGTON

PREPARED FOR WAVEPARK GROUP 24/2/2017

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DOCUMENT VERIFICATION

Project Title	**URBNSURF SYDNEY**
Document Title	**FLORA AND FAUNA REPORT**
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Revision	Prepared by	Reviewed by	Date
Draft (D)	**M. Brainwood**	**A. Carey**	**24/1/2017**
D_2	**M. Brainwood**	**B. McCarthy**	**24/2/2017**
F-1	**M. Brainwood**	**B. McCarthy**	**1/4/2017**
F_2	**M. Brainwood**	**A. Ross**	**9/4/2017**
F_3	**Issued by:** 		**10/4/2017**

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ACKNOWLEDGMENTS

APPLIED ECOLOGY Pty Limited wishes to thank all representing organisations and individuals who assisted with fieldwork and contributed to the production or commented on the content of this report, including:

Ben McCarthy, Wave Park Group
Kerry Darcovich, Sydney Olympic Park Authority
Jenny O'Meara, Sydney Olympic Park Authority
Jonathan Salim, Wood & Grieve Engineers, St Leonards
Gerard Lighting, Padstow
Wood & Grieve, St Leonards
Urbaqua, Perth
McGregor Coxall, Manly

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EXECUTIVE SUMMARY

Applied Ecology P/L completed a flora and fauna survey and report for carpark P5 on Hill Rd in Sydney Olympic Park on behalf of URBNSURF/Wave Park Group P/L. Field surveys were completed on 12th January 2017, and the data from these surveys was considered in the context of flora and fauna records available on databases including NSW Wildlife Atlas (OEH) and the federal Protected Matters Search (DEE). This was further supplemented with fauna records provided by SOPA.

The proposed development is a wave park for recreational surfing, to be located in an area that is currently developed as a carpark, but with most of the site being used as a storage area for steel mesh and concrete fencing materials. Native vegetation on site is restricted to species used as landscape plantings from around 1999-2000, when the site was being prepared for use during the Sydney Olympic Games. Some immigration by native species from surrounding areas has occurred since then, but is mainly limited to damp area plants in the gabion lined swales, which were designed for stormwater treatment prior to discharge to nearby Narawang Wetlands, a series of constructed wetlands north/northwest of the subject site. Additional flora on the subject site included 43 weed species, with 5 species of noxious weeds.

Six species of birds were recorded on site during field surveys. These were all native, highly mobile, mostly larger species, and well adapted to living in a highly urbanised environment. Another avian species using the area was evidenced by a dropped primary feather. Three species of small lizards were also recorded during field surveys, and a fourth is reportedly often sighted around the bioswales. No threatened species, endangered ecological communities, endangered populations, or critical habitat was recorded on the subject site, although several were reported from nearby areas. Large populations of the Green and Golden Bell Frog (*Litoria aurea*) have been recorded regularly in the nearby Narawang Wetlands, and this area is also believed to provide habitat for the migratory Latham's Snipe (*Gallinago hardwickii*). To date, there is no evidence of these species using the subject site, other than a single event in 2010, when ten GGBF were reported from an unrecorded location in the P5 carpark, an occurrence presumably linked to high rainfall or similar population expansion event. Five threatened species of microbats have been recorded in the vicinity, with two of these frequenting the vicinity of the proposed development: Eastern Bentwing Bat (*Miniopteris schreibersii oceanensis*) and Southern Myotis (*Myotis macropus*).

South of the subject site is Haslam's Creek, which has a narrow band of Estuarine Saltmarsh, an Endangered Ecological Community, along lengthy sections of creek bank near the subject site. Within the EEC is a species of threatened flora: Narrow-leaved Wilsonia (*Wilsonia backhousei*), which has a limited distribution in intertidal habitats.

Each of these threatened species and the EEC could potentially be affected by the proposed development. The main factors likely to provide a potentially significant impact (direct or indirect) are clearing of vegetation, changes to water quantity or quality, increased noise levels or noise character, changes to light levels (daytime and night time), changes to availability of food and shelter resources (through a reduction in resources or reduced access to the resource), increased exposure

to predation, and reduction in breeding success, which may occur as a result of a proposed action or activity.

This report identifies and describes potential impacts, including individually significant impacts and other impacts that can contribute to a cumulative detrimental loading. We recommend a series of measures within a hierarchy of biodiversity impacts and appropriate offset requirements (OEH, 2017) to (i) avoid these impacts, and for instances where this is not practicable, (ii) mitigate the extent of impacts. With the current understanding of the project, we believe that these actions should be sufficient to effectively manage any potential impacts of the proposed development without the need for offsetting, which is the third option in the hierarchy of impact management. The loss of habitat on the subject site is minimal, of poor quality, and generally only used by highly mobile, common and/or pest species (Noisy Miners, for example).

Recommendations for managing potential impacts of the proposed development are provided for stormwater on site, wastewater discharge from the wave park facility (including quality and quantity), light and noise impacts. These impacts need to be considered during the construction and operational phases of the development.

INTRODUCTION

Project background

Applied Ecology P/L have been engaged by URBNSURF (in conjunction with Wave Park Group P/L) to prepare a Flora and Fauna Report for carpark P5 on Hill Rd in Sydney Olympic Park. This carpark is the site of a proposed recreational wave park that provides the opportunity for urban surfing in Sydney (Figure 1). On site work was completed under SOPA Work Permit ID 2584, issued 21 December 2016.

Figure 1 Artist's impression of the proposed wave park at P5 in Sydney Olympic Park (http://www.urbnsurf.co/sydney.html)

As part of preliminary studies for the project, Applied Ecology has undertaken:

- Review of technical information, scientific literature, and policy,
- Engagement with client and other stakeholders as required,
- Detailed survey of area as per map below including full species inventory, and
- Identify potential impacts for local flora and fauna on and near the subject site, and indicate mitigating actions to reduce these impacts.

In particular, the report has addressed and provides:

- Assessment of the potential direct (if any) and indirect biodiversity impacts of the development on flora and fauna, including threatened species such as the Green and Golden Bell Frog and Latham's Snipe, populations or communities or their habitats, including but not limited to impacts of light spill, noise and disturbance.
- Recommendation of appropriate avoidance, mitigation and management measures during construction and operation.

Study area location

The site is located in the Sydney Olympic park near the junction of Hill Road, Holker Busway and Holker Street and includes the existing carpark (P5) and any drainage swales and vegetated verges immediately associated with the site (Figure 2).

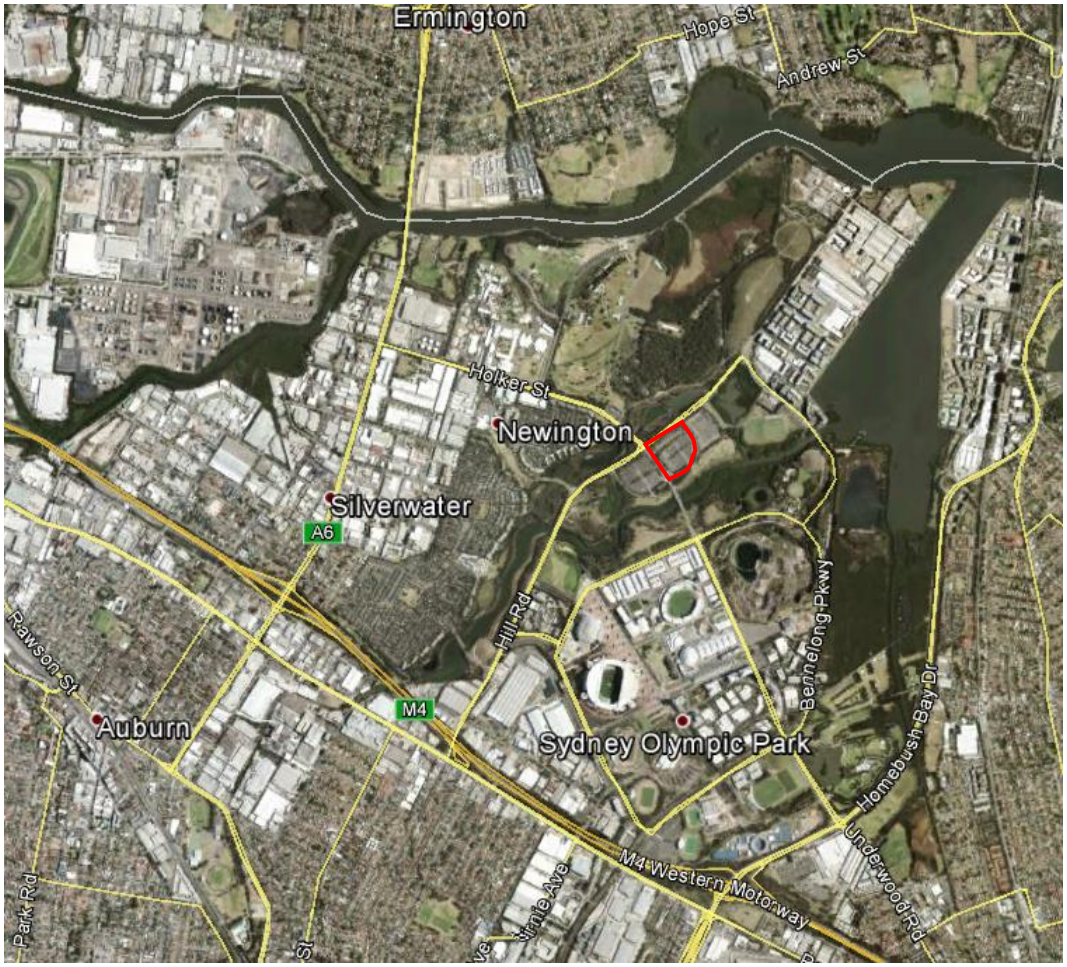


Figure 2 Location and context of proposed works

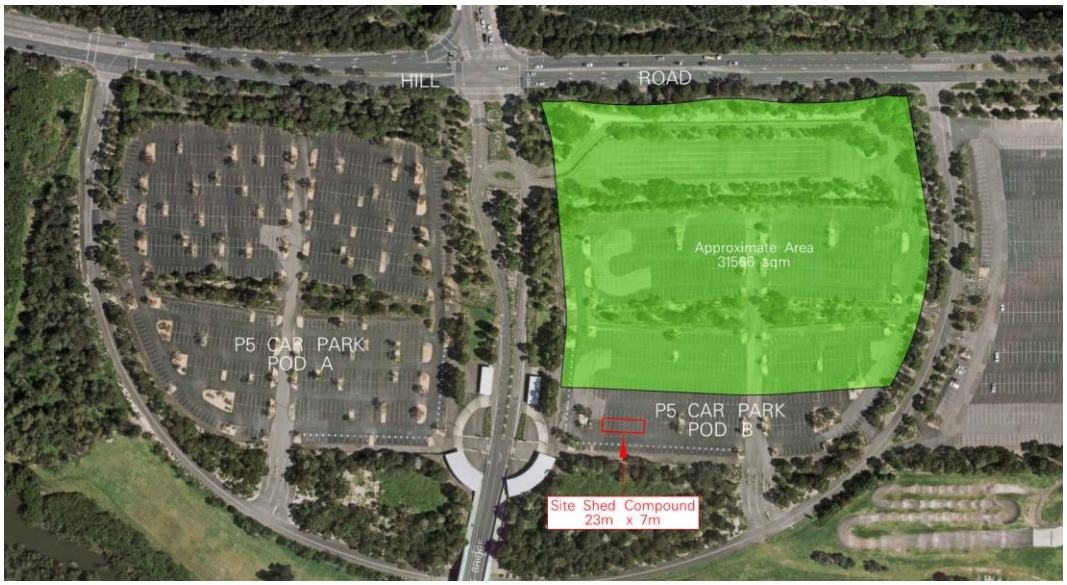


Figure 3 Proposed development footprint

The development footprint is approximately 31,500 m^2 with approximately twice this area assessed in the flora and fauna field survey (Figure 3).

Figure 4 Extent of study area

Site context (Sydney Olympic Park)

The subject site is located within the Sydney Olympic Park, and is covered by the Parklands Plan of Management 2010. This PoM is intended to manage the implementation of the objectives and functions of Sydney Olympic Park as outlined in the Sydney Olympic Park Authority Act 2001. The site is categorised under the Parklands PoM as land for Sport and Recreation (Figure 5). The PoM has a management framework that defines the management framework for each category of land, and specifically for Sport and Recreation Parks, which are "typically designed and built - or have the potential - to provide for a broad range of sports activities associated with organised sports, team training and sports competition activities on turf playing fields, custom tracks and surfaces and hard-courts. These places are all located on remediated lands; are adjacent to wetlands and waterways; Parklands Junction [which includes the subject site P5] is primarily a major events carpark." The proposed development falls within the stated purposes for the area, and meets the stated objectives for the land use category as described by the NSW Local Government Act 1993.

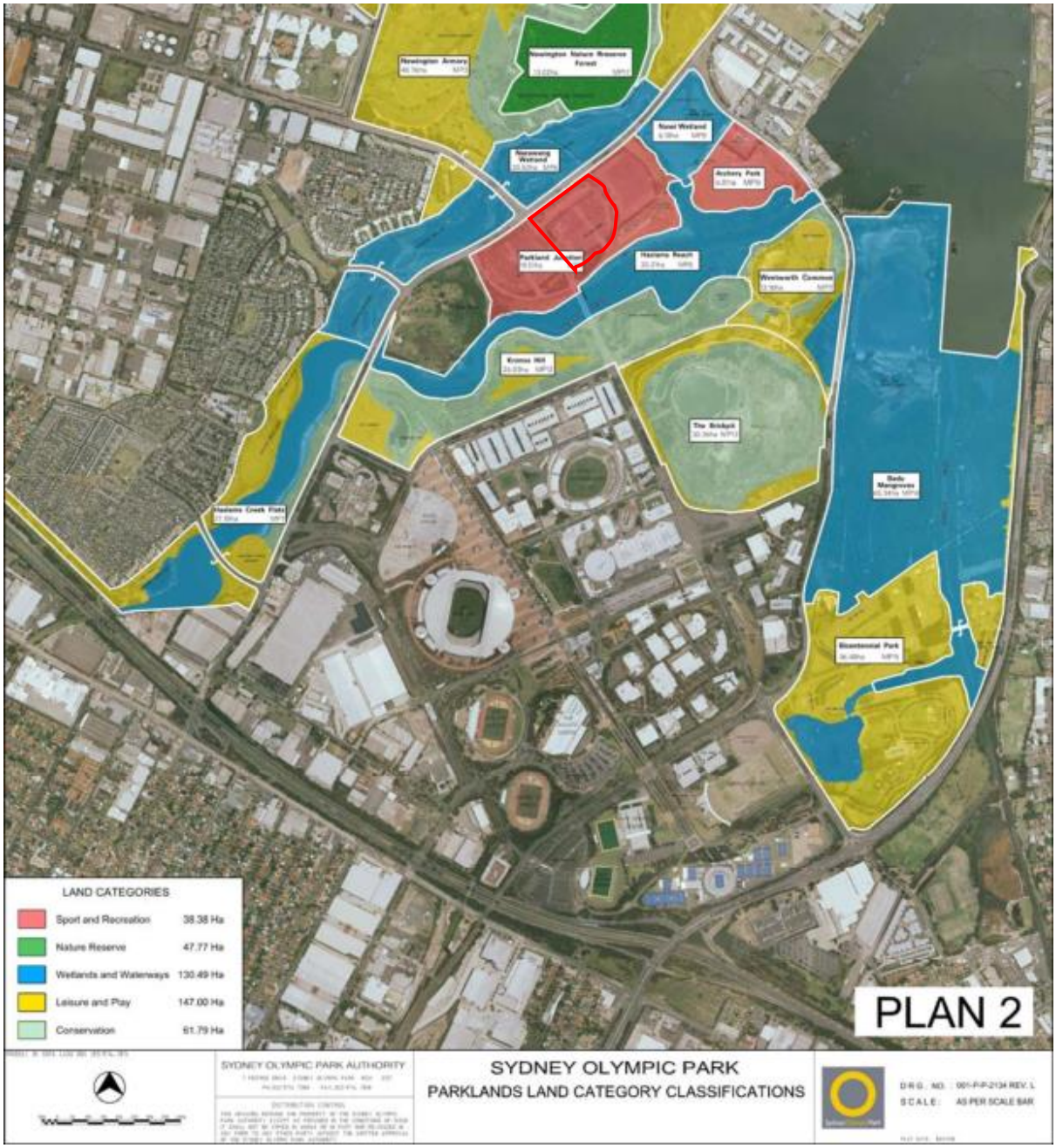


Figure 5 Sydney Olympic Parklands land use category classifications (Parklands PoM, 2010)

Under SEPP (Major Development) 2005, the subject site is zoned RE1 – Public Recreation (Figure 6). Part of the P5 carpark is classed as remediated lands (Figure 7), although this area is outside the immediate footprint of the proposed development. The area classed as remediated land is confined within a clay capped containment cell, and is wholly outside the project area.

The subject site is not considered a heritage precinct, nor is it threatened species habitat, although it is surrounded by Parklands Threatened Species Habitat (Figure 8). The subject site falls within land classed as Commercial and Operation Land, and is specifically described as a commercial carpark.

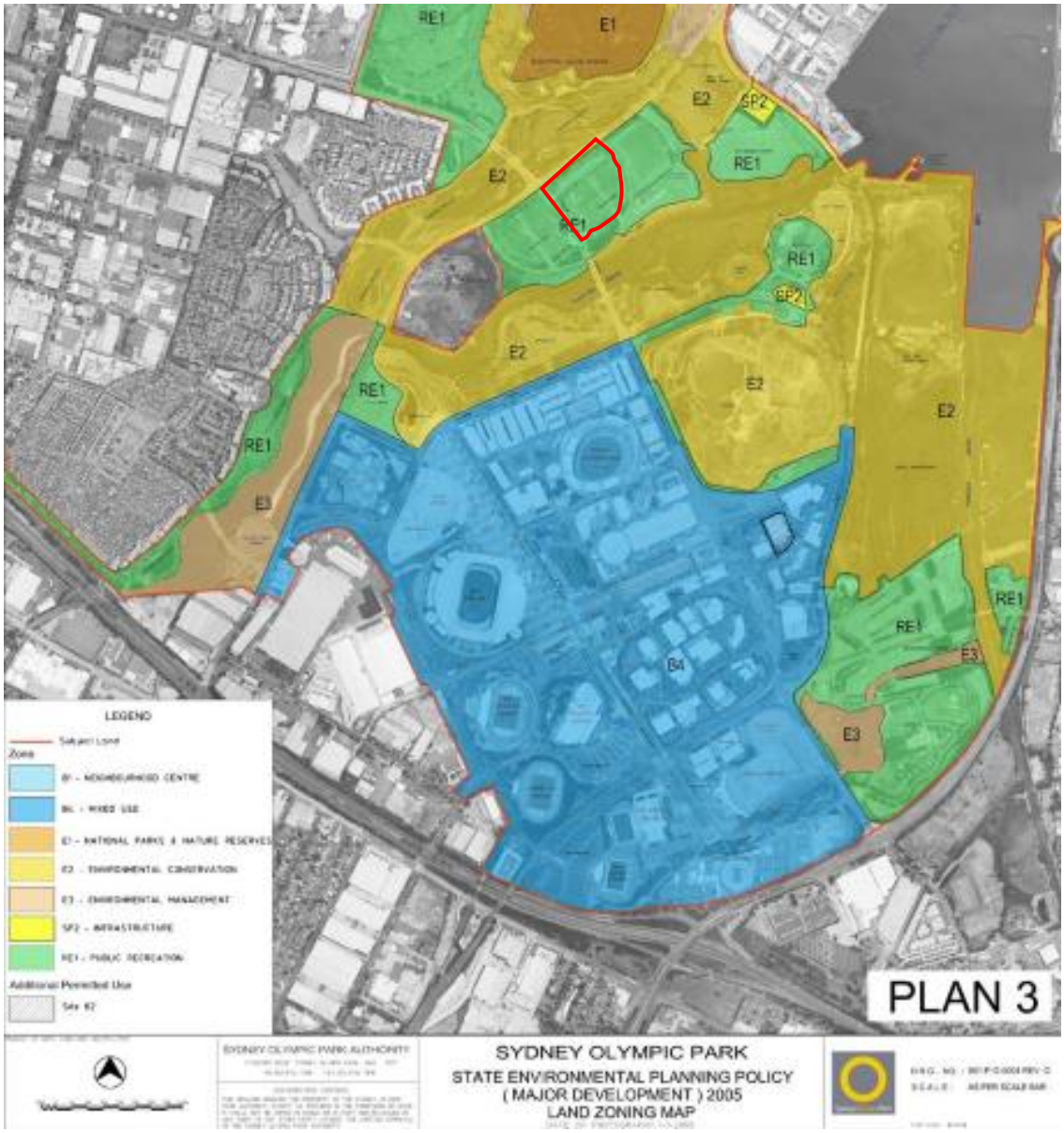


Figure 6 Sydney Olympic Park SEPP (Major Development) 2005 land zoning map (Parklands PoM, 2010)

Figure 7 Sydney Olympic Parklands remediated lands (shown in yellow; Parklands PoM, 2010)

Figure 8 Sydney Olympic Park Threatened Species Habitat (Parklands PoM 2010)

The Parklands PoM also outlines principles and guidelines for management of visitation, land occupation, access, safety and security, landscaping, water and energy, biodiversity, buildings and infrastructure, lighting and fire. These are underpinned by the Environmental Guidelines for Sydney Olympic Park 2008. Several other plans and policies are applicable for the proposed development, including:

- SOPA's Stormwater Management and Water Sensitive Urban Design Policy (updated 2016) provides specific requirements for controlling volume and frequency of stormwater

discharge from hardstand areas incluing carparks, water conservation through recycling, and riparian protection.

- Sydney Olympic Park Biodiversity Management Plan: Legal compliance & risk management (updated 2014), SOPA Biodiversity Conservation Strategy, and Standard Procedures for Biodiversity Management. The BMP did not identify any key ecological values for the Parklands Junction precinct, although surrounding precincts are noted to be habitat for a range of threatened flora and fauna species, and Endangered Ecological Communities (Figure 9), most notably Narawang Wetlands and Haslams Reach.

Figure 9 Site context within the Sydney Olympic Park natural areas (from O'Meara & Darcovich, 2014)

A number of priorities for management of Sports and Recreation Parks are identified in the Parklands PoM, including:

- Improve the quality and availability of playing fields for both community and other stakeholder sporting activities.
- Redesign and partially develop Parklands Junction (POD C) to accommodate additional sporting activities while preserving, to the extent required, the ability of Parklands Junction to function as a Transport Interchange, retain carparking capacity, and ensure effective major event public transport access through the Holker Street Busway.
- Develop a coordinated access, circulation and connectivity framework around Parklands Junction.
- Ensure Parkland Junction continues to provide adequate event-related car parking capacity, while taking opportunities to free up some areas for appropriate redevelopment to support additional sporting uses in due course.

Existing landuse

Most of the study site (approximately 5.6 ha) is asphalt with the remaining areas (approx. 35%) consisting of vegetated islands with or without drainage swales (Figure 4). A compound is currently utilizing the hardstand to store fencing materials and prefab concrete (Figure 10). Trucks regularly deliver and pick up materials from the compound, with heavy machinery used to load up (Figure 11).

Worksite lighting provides ample light for operations at night, with the associated light and noise pollution impacts on the surrounding areas (Figure 12). Immediately northeast of the P5 carpark, and container storage compound is also in operation day and night (Figure 13).

Figure 10 A compound containing prefab concrete and fencing materials covers approximately one third of the subject site

Figure 11 Trucks and other heavy machinery operate regularly on this part of the site

Figure 12 The compound is in operation day and night, with associated noise and light impacts on the surrounding area

Figure 13 Container storage area immediately east of the study site, also operating day and night

Description of works

URBNSURF Sydney will be arranged around a large open water surf sports lagoon (Figure 14) incorporating a Wavegarden surfing wave generator. The open water lagoon will comprise two zones with waves of different heights produced in each zone, allowing for beginners through to advanced surfers to be accommodated at the same time. The “Bay” zone will produce smooth white-water waves 0.6m high, and is ideal for beginner surfers, children and others with limited skills. The “Peak” zone will provide waves up to 2.0m high, with steep left and right pitching waves suitable for up to the highest level of performance surfing.

The maximum lagoon capacity is estimated at 84 participants per hour, with around half in each zone. Total attendance will include over 250,000 surfers annually, along with 75,000 other admissions, as well as numerous members of the general public who will be able to access food and beverage facilities in the Wave Park, as well as the upstairs viewing platform (Figure 16). Attendances are expected to peak early mornings, after work, and on weekends. Hours of operation are expected to be 6am to 10pm, 7 days a week throughout spring, summer and autumn, and 9am to 6pm for the three months of winter. Car parking for approximately 180 cars will be required to cater for guests and staff. Other parking will be available in the adjoining P5 carpark Pods A and C.

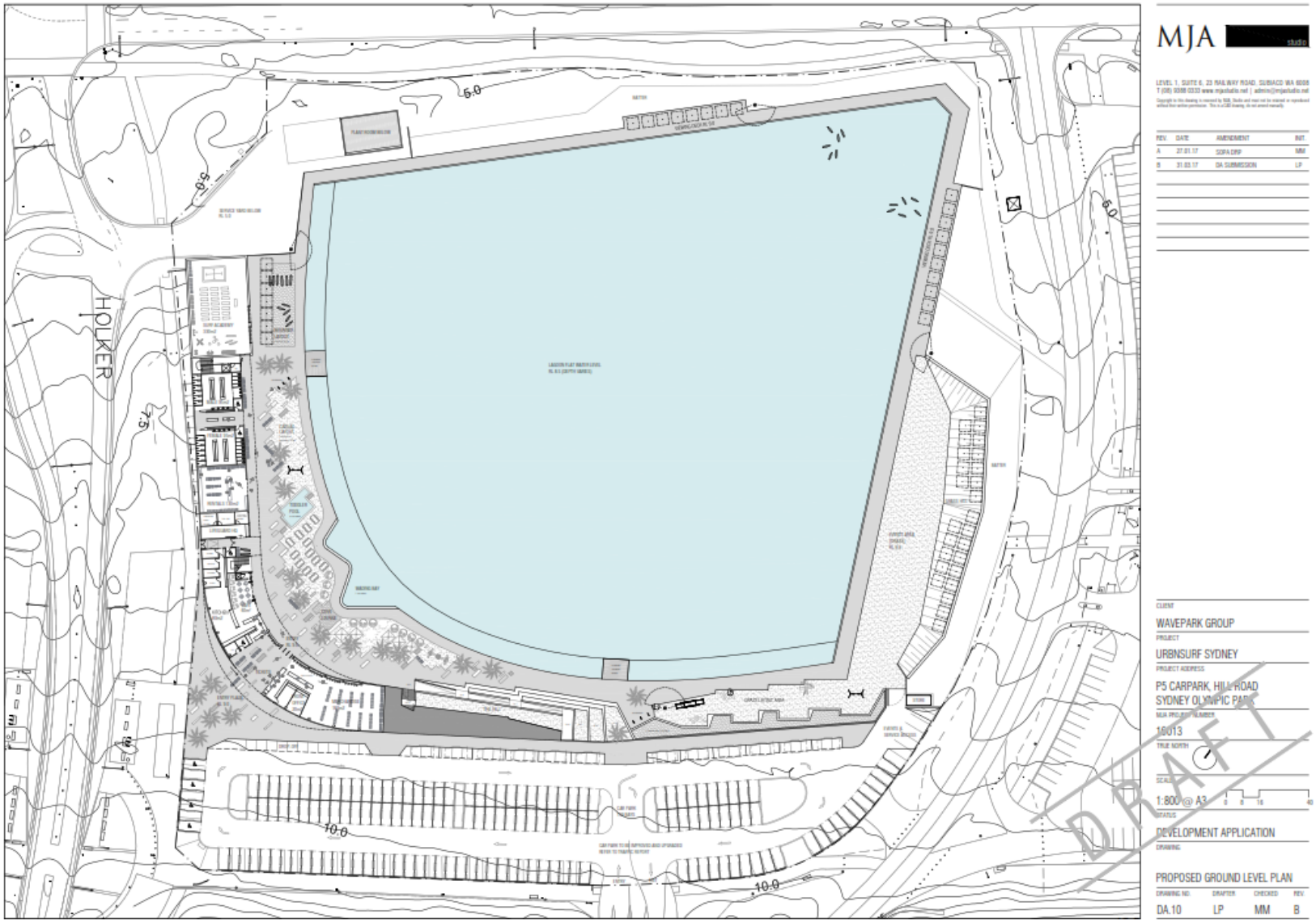


Figure 14 Overview of proposed wave park development at P5 carpark (Urbnsurf Sydney, 2016)

Water treatment facilities are currently proposed to be located near the intersection of Hill Rd and Holker St (Figure 15).

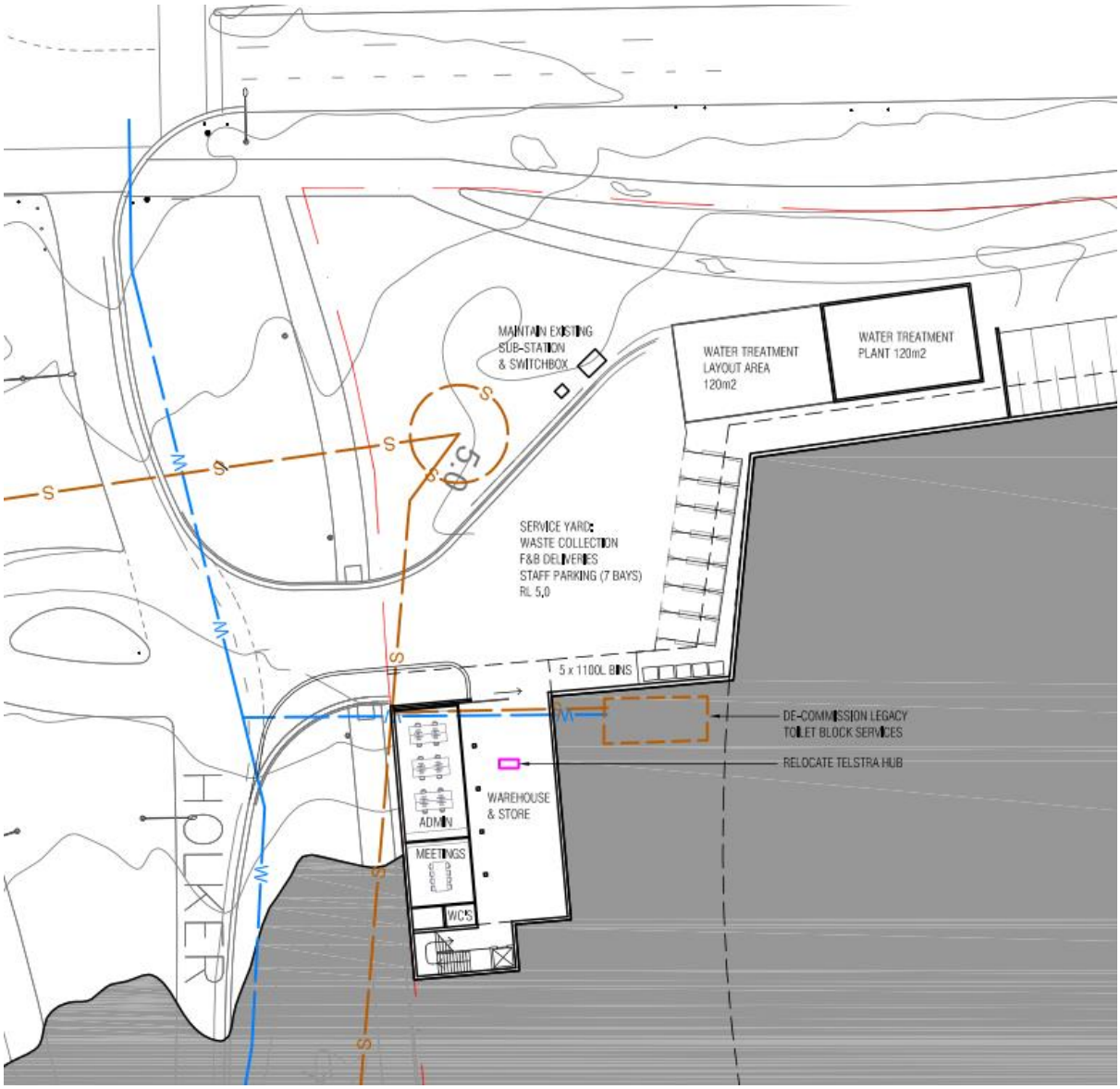


Figure 15 Location of water treatment and waste collection areas near Hill Rd and Holker St intersection (URBNSURF 2016)

Figure 16 Artist's impression of the facility (URBNSURF Sydney SEARS 2016)

FLORA SURVEYS

Database Searches

Searches of several databases were made to identify threatened species and Endangered Ecological Communities (EECs) that may potentially be found on the subject site. Databases were accessed on 9th January 2017. These included:

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

Field survey methods

Areas of different vegetation communities were delineated prior to field work based on aerial photography. The area was traversed and inspected using the random meander method described by Cropper (1993). Flora and 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 staff have 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 the 12th January 2017.

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 based on data collected during general traverses of the study area.

Field survey results

The site was divided into three zones:

- car park, footpaths, amenities and open space
- swales
- the hill (behind the facilities building)

The following sections list the native and introduced flora species present on site during the current study.

Native flora

A total of 40 species of native flora were recorded on site at P5 at Sydney Olympic Park (Table 1). Of these, most were trees and shrubs planted as part of the SOPA landscaping plan.

Table 1 Native flora species recorded on site at P5 at Sydney Olympic Park on 12th January 2017

SPECIES NAME	COMMON NAME	CAR PARK	SWALES	HILLTOP	PLANTED?
Acacia buxifolia	Box-leaved Wattle			y	Y
Acacia falcata	Hickory Wattle	y		y	Y
Acacia linifolia	White Wattle			y	Y
Acacia longifolia	Sydney Golden Wattle	y		y	Y
Acacia parramattensis	Sydney Green Wattle	y		y	Y
Blechnum ambiguum	Water Fern		y		?
Calochlaena dubia	Soft Bracken		y		?
Carex appressa	Tall Sedge	y			Y
Cenchrus purpurascens [=Pennisetum alopecuroides]	Swamp Foxtail	y	y	y	Y
Chrysocephalum apiculatum	Yellow Buttons, Common Everlastings	y		y	
Commelina cyanea	Scurvy Weed			y	
Corymbia maculata	Spotted Gum	y			Y
Cupaniopsis anacardioides	Tuckeroo	y			Y
Dianella sp	Flax Lily	y		y	Y
Einadia polygonoides	Fishbones			y	Y
Epilobium hirtigerum	Willow Herb		y		Y
Eucalyptus amplifolia	Cabbage Gum	y			Y
Eucalyptus baueriana	Blue Box	y			Y
Eucalyptus botryoides	Southern Mahogany	y			Y
Eucalyptus fibrosa	Red Ironbark	y		y	Y
Eucalyptus paniculata	Grey Ironbark	y		y	Y
Eucalyptus punctata	Grey Gum	y		y	Y
Eucalyptus racemosa	Scribbly Gum	y		y	Y
Eucalyptus resinifera	Red Mahogany	y		y	Y
Eucalyptus robusta	Swamp Mahogany	y			Y
Eucalyptus tereticornis	Forest Red Gum	y			Y
Gahnia sieberiana	Red-fruit Saw-sedge		y		?
Hakea salicifolia	Willow-leaved Hakea	y		y	Y
Histopteris incisa	Batswing Fern		y		?
Juncus continuus			y		?
Lachnagrostis filiformis	Blown Grass	y			
Lomandra longifolia	Spiny Matrush	y	y	y	Y
Melaleuca quinquenervia	Broad-leaved Paperbark	y			Y
Melaleuca sieberi			y		Y
Melaleuca styphelioides	Prickly-leaved Paperbark	y		y	Y
Pittosporum undulatum	Swet Pittosporum			y	Y

SPECIES NAME	COMMON NAME	CAR PARK	SWALES	HILLTOP	PLANTED?
Poa labillardieri	Tussocky Grass	y		y	Y
Typha orientalis	Cumbungi		y		Y
Viola hederacea	Native Violet	y		y	
Wahlenbergia gracilis	Australian Bluebell	y			

Introduced flora

A total of 43 species of introduced flora were recorded on site at P5 at Sydney Olympic Park (Table 2). Of these, many are common weeds of disturbed areas.

Table 2 Introduced flora species recorded on site at P5 at Sydney Olympic Park on 12th January 2017

SPECIES NAME	COMMON NAME	CAR PARK	SWALES	HILL TOP	NOXI-OUS?
Ageratina adenophora	Crofton Weed		y		
Araujia sericifera	Moth Vine		y	y	4
Bidens pilosa	Cobblers Pegs	y		y	
Bromus catharticus	Prairie Grass	y		y	
Cenchrus clandestinus [=Pennisetum clandestinum]	Kikuyu	y			
Centaurium erythraea	Common Centaury		y	y	
Chloris gayana	Rhodes Grass	y		y	
Cinnamomum camphora	Camphor Laurel	y			4
Cirsium vulgare	Spear Thistle	y			
Conyza sp	Fleabane		y	y	
Cyclospermum leptophyllum	Slender Celery	y			
Cynodon dactylon	Common Couch	y		y	
Cyperus brevifolius	Mullumbimby Couch		y		
Cyperus eragrostis	Umbrella Sedge		y		
Echinochloa crus-galli	Barnyard Grass	y			
Ehrharta erecta	Panic Veldt Grass			y	
Eragrostis curvula	African Lovegrass	y		y	
Erigeron karvinskianus	Seaside Daisy		y		
Gamochaeta calviceps	Cudweed	y			
Hypocaeris radicata	Flatweed	y		y	
Juncus acutus	Sharp Rush	y	y		
Lactuca serriola	Prickly Lettuce	y		y	
Lantana camara	Lantana			y	4
Ligustrum lucidum	Large-leaved Privet			y	4
Melinis repens	Red Natal Grass	y	y		
Modiola caroliniana	Red-flowered Mallow			y	
Nephrolepis cordifolia	Fishbone Fern		y		
Oxalis pes-caprae	Oxalis	y			

SPECIES NAME	COMMON NAME	CAR PARK	SWALES	HILL TOP	NOXIOUS?
Paspalum dilatatum	Paspalum	y			
Paspalum urvillei	Vasey Grass		y		
Phoenix canariensis	Phoenix Palm			y	
Phyllanthus amarus	Phyllanthus			y	
Plantago lanceolata	Plantain	y		y	
Senecio madagascariensis	Fireweed		y		4
Senna pendula var glabrata	Smooth Senna	y			
Setaria viridis	Redlegs, Pigeon Grass	y		y	
Sida rhombifolia	Paddys Lucerne		y	y	
Solanum lycopersicum	Tomato Plant	y			
Solanum nigrum	Blackberry Nightshade		y	y	
Sonchus oleraceus	Milk Thistle	y		y	
Sporobolus africanus	Parramatta Grass			y	
Verbena bonariensis	Purple Top		y		
Verbena officinalis	Vervain, Common Verbena			y	

Threatened species and noxious weeds

No threatened flora species were recorded on site at P5 at Sydney Olympic Park during the current survey. Five species of noxious weeds were recorded on site, including:

- Moth Vine (*Araujia sericifera*)
- Camphor Laurel (*Cinnamomum camphora*)
- Lantana (*Lantana camara*)
- Large-leaved Privet (*Ligustrum lucidum*)
- Fireweed (*Senecio madagascariensis*)

All of these species are Class 4 noxious weeds. These are 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 control requirements for Class 4 noxious weeds are that the growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread. For some Class 4 there is an additional control requirement that the plant may not be sold, propagated or knowingly distributed.

FLORA AND VEGETATION

Vegetation mapping

In 2014 OEH updated the draft Native Vegetation Mapping for the Sydney Metropolitan Catchment Management Area based on extensive consultation and feedback. The area known as P5 carpark on Hill Rd in Sydney Olympic Park has no vegetation mapped on site (Figure 17). Adjoining lands have a mixture of retained native vegetation communities, including Estuarine Saltmarsh (an Endangered Ecological Community) and Estuarine Mangrove Forest. These are located south and southeast of the site. North and northwest of P5 carpark are artificial and recreated habitat areas, including

artificial wetlands, surrounded by “plantations”, or areas that were previously unvegetated but now have comprehensive revegetation plantings established, and small areas of “urban native and exotic cover”, otherwise known as highly degraded patches of weeds.

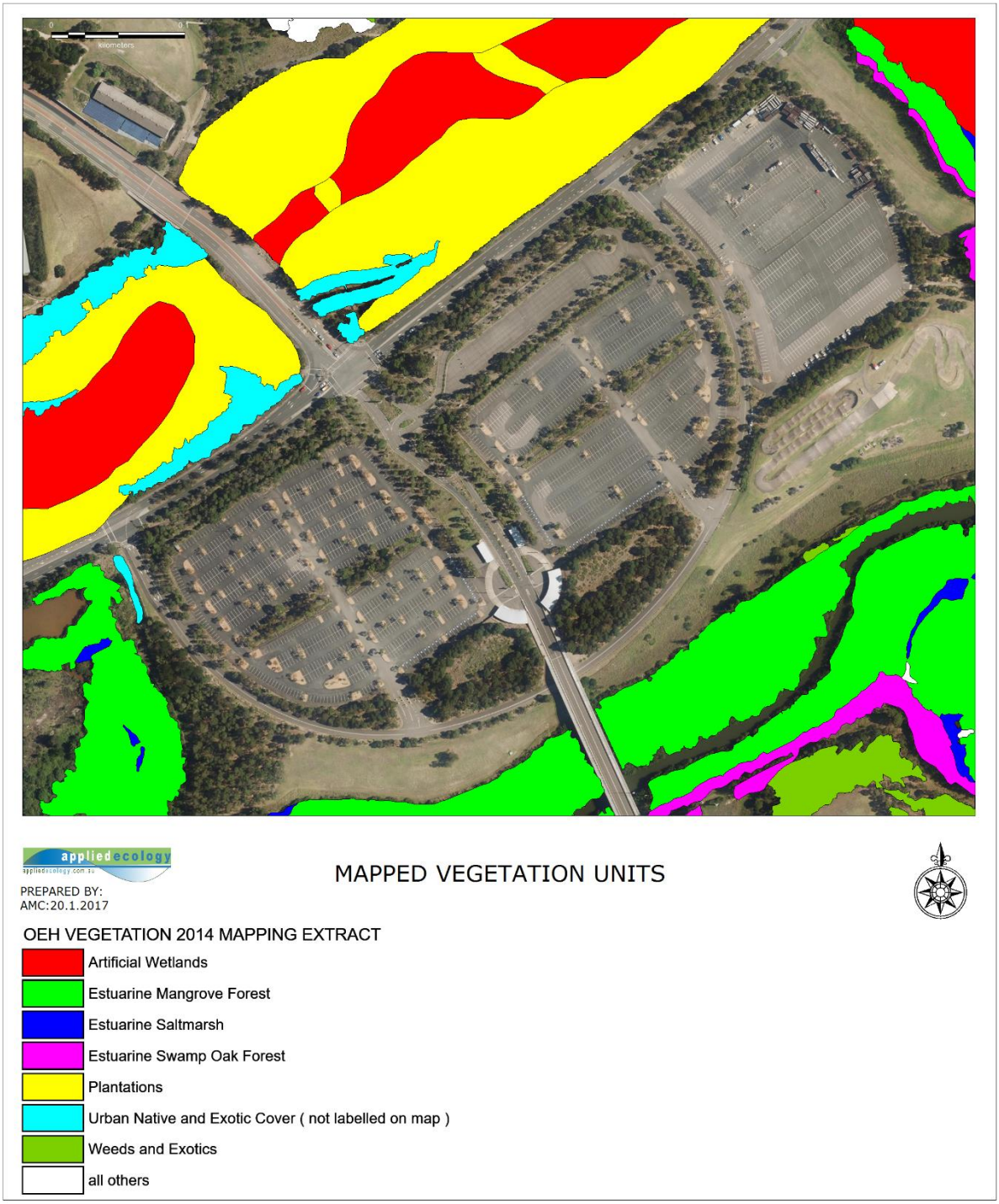


Figure 17 Vegetation mapping for the area surrounding P5 carpark at Sydney Olympic Park

Areas of remnant native vegetation can provide habitat for a number of threatened species, including flora and fauna. Narrow-leaved Wilsonia (*Wilsonia backhousei*) has been reported in recent years from a number of locations just upstream of the Holker Busway bridge (Figure 18), which is the closest discharge point for stormwater and wastewater directly to the harbour. The presence of this

threatened flora species provides a factor that needs to be considered during the design of maintenance procedures for the proposed wave park.

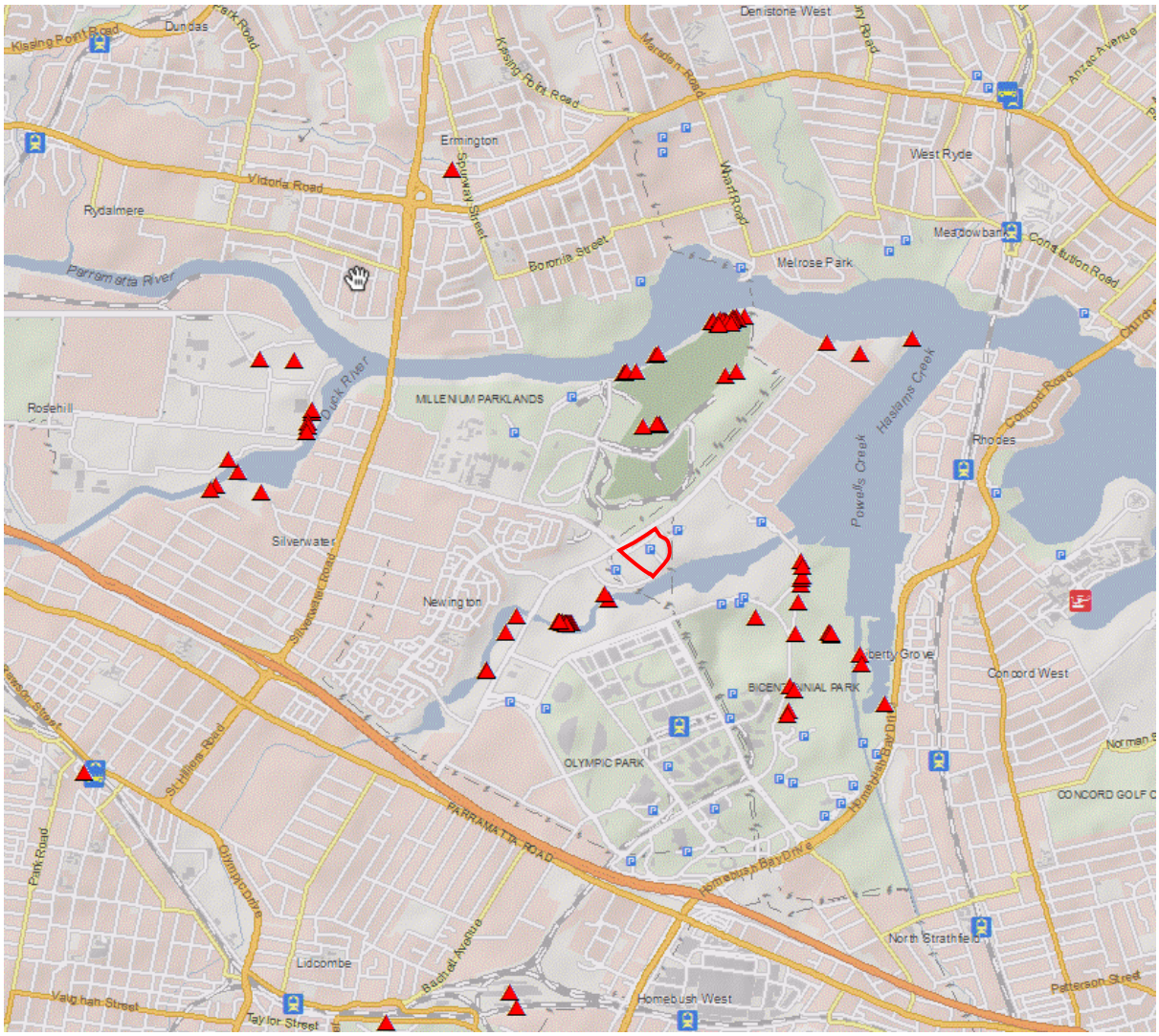


*Figure 18 Narrow-leaved Wilsonia (*Wilsonia backhouseil, *shown as red triangles) is located upstream of P5 carpark (Bionet, accessed 8 January 2017)*

Vegetation on the study site

Comparison with vegetation mapping

Vegetation mapping indicates that there are no extant vegetation communities on site in the vicinity of P5 carpark. This fits with observations on site which are that most, if not all, of the canopy and shrub species have been planted as part of the Sydney Olympics revegetation planting program, with minor localised immigration of native forbs from surrounding areas. O'Meara and Darcovich (2014) describe the lengthy history of disturbance and industrial landuse in the area, and detail some of the activities undertaken as a process of rehabilitation and management of the whole of the parklands, post Olympic games in 2000.

Description of vegetation zones

Car park, footpaths, amenities etc

Vegetation surrounding the carpark consists of planted trees with the remnants of planted grasses and Lomandras (Figure 19). Banks of car spaces are separated by narrow planted strips which consist of trees and groundcover plantings including Lomandras and Swamp Foxtail grasses (Figure 19).

Figure 19 (left) car park perimeter with canopy trees; (right) interior planting areas with groundcover species and trees

In some places the narrow planted strip is combined with a footpath and information signage, and the trees in these areas are often in better health for many of the trees (Figure 20). Several rows of closely spaced planting of Spotted Gums create shade along the edge of the busway, and are surrounded by a mown grassed area (Figure 20).

Figure 20 (left) some areas are in better condition than others; (right) canopy planting in a mown grass area near amenities

Swales

A number of vegetated swales collect runoff from the hardstand areas of the carpark. These were constructed with gabion walls and a gabion base and were possibly planted with native wetland species at the time (although exactly how is not clear), or they have become introduced over the last two decades (Figure 21). Elsewhere, there is no vegetation at all in the base of the swales (Figure 21). All of the swales were completely dry, and showed no evidence of having permanent standing water. All of the wetland species present are capable of surviving lengthy periods without standing water, and some have deep penetrating roots that would access subsurface water (Figure 22). The storage compound in the middle of the carpark makes full use of the available space, with the perimeter fencing positioned right on the edge of the vegetated strip (Figure 22).

Figure 21 (left) some swales have wetland vegetation; (right) in some areas, gabion lined swales have no vegetation

Figure 22 (left) internal swale with surrounding canopy and damp area species; (right) the compound extends to the edge of the swale and associated plantings

The hill

Like everywhere else on site, the hill is the result of complete remodelling of the landform surface. In reality, it is a mound that separates the carpark from the perimeter road to the east, and the harbour inlet beyond that (Figure 23). The slightly elevated location, in conjunction with some clearing, has increased the exposure of the remaining trees to the elements, resulting in some wind damage and limb loss (Figure 23).

There is very limited understorey vegetation, and what is present is predominantly weed species. The spread of these weeds has been somewhat limited by the thick leaf litter layer generated by the canopy plants (Figure 24). The western end of the hill abuts the Holker busway and bridge, and overlooks the intertidal area where Haslam's Creek discharges to Homebush Bay.

Figure 23 (left) the hill is really a vegetated mound next to the carpark; (right) limb damage on exposed trees was noted

Figure 24 (left) limited understorey is present under canopy revegetation; (right) the Holker busway and bridge adjoin the western end of the hill

Condition assessment

Ecologically, the vegetation throughout the study site is in poor condition, lacking the normal structural components such as a shrub layer and a comprehensive understorey layer. This is not surprising given the history of the site. As well, many of the trees on site show signs of stress that probably result from their location in the middle of a hot, dry, windy, sealed carpark. Signs include cracking along trunks, deformities in development resulting in leaning trunks, stunted growth, etc (Figure 25). In areas where there is understorey vegetation present it is often partially or predominantly weedy, unless it consists of some of the hardiest native species commonly used in landscape planting, such as Lomandras, Tussocky Grass, and Swamp Foxtail grass. The shrub layer is almost completely absent from most of the site, except for localised plantings of hardy Acacias, and Melaleucas along some of the larger gabion swales on the lower end of the site (Figure 26).

Figure 25 Many trees show deformities in trunk development, significant leaning, reduced growth, and other signs of poor health

Figure 26 The shrub layer is generally limited to hardy Acacia species and Melaleucas along the larger swales at the lower end of the site

FAUNA SURVEYS

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 9th January 2017. These included:

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

Field survey methods

Fauna habitat assessment was undertaken on the 12th of January 2017 between 11.30am and 4pm (Figure 27). Weather was hot and clear. All areas of the site were traversed and inspected for fauna and habitat resources assessed. A series of photo points were established and used for detailing habitat resources on site in the following sections (Figure 28).

Figure 27 Every effort was made to identify and photograph any wildlife seen on site

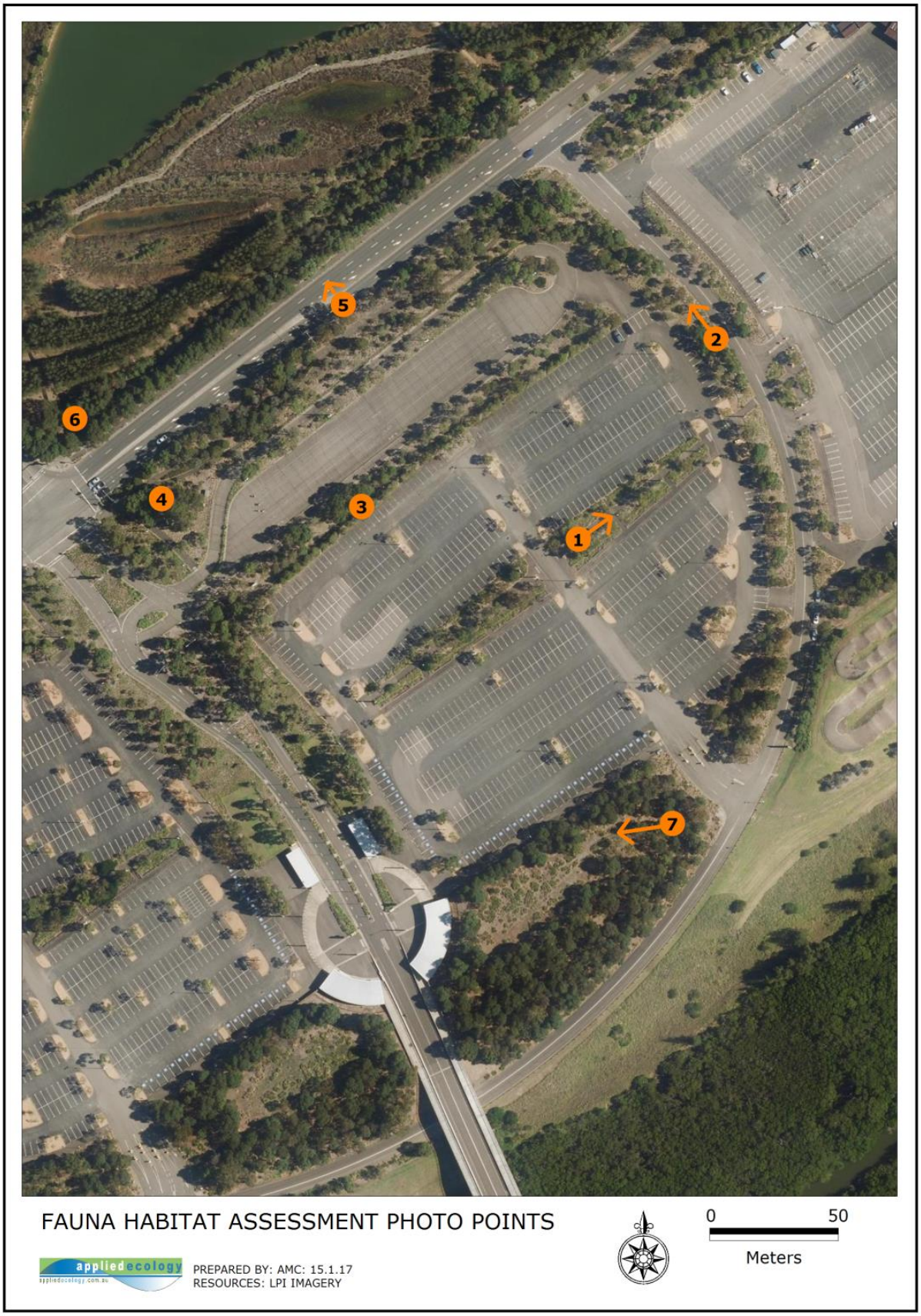


Figure 28 Photo points

FIELD SURVEY RESULTS

Amphibian habitat

Very little amphibian habitat occurs on the subject site. Foraging habitat is marginal, fragmented and disjunct from better frog habitat in the general locale. There is no breeding habitat present on site. Drainage swales (see photo point 1 & 2 for location) are constructed of gabions and there is no opportunity for water to pond. No frogs were recorded on site during the current surveys.

Figure 29 (LEFT) PHOTO POINT 1 - VEGETATED GABION SWALE, (RIGHT) PHOTO POINT 2 - UNVEGETATED GABION SWALE

Figure 30 PHOTO POINT 3 – PARTIALLY VEGETATED GABION SWALE

There is one small area of ponding water (see photo point 4) near a leaking overflow (potentially a sewer leak – evidenced by odour and tomato plant growth) near Hill Road.

Figure 31 PHOTO POINT 4 – PONDED WATER AT OVERFLOW, LEAK

The subject site is separated from the wetland to the northwest by the busy Hill Road near the junction of Holker Road. Hill Road is a four lane road + median strip + hard stand verges at this location (see photo point 5). Frog fences have been erected along the perimeter of the wetland to prevent frogs, and other fauna, from dispersing from the wetland across Hill Road and Holker Road were fauna fatalities are highly likely (see photo point 6).

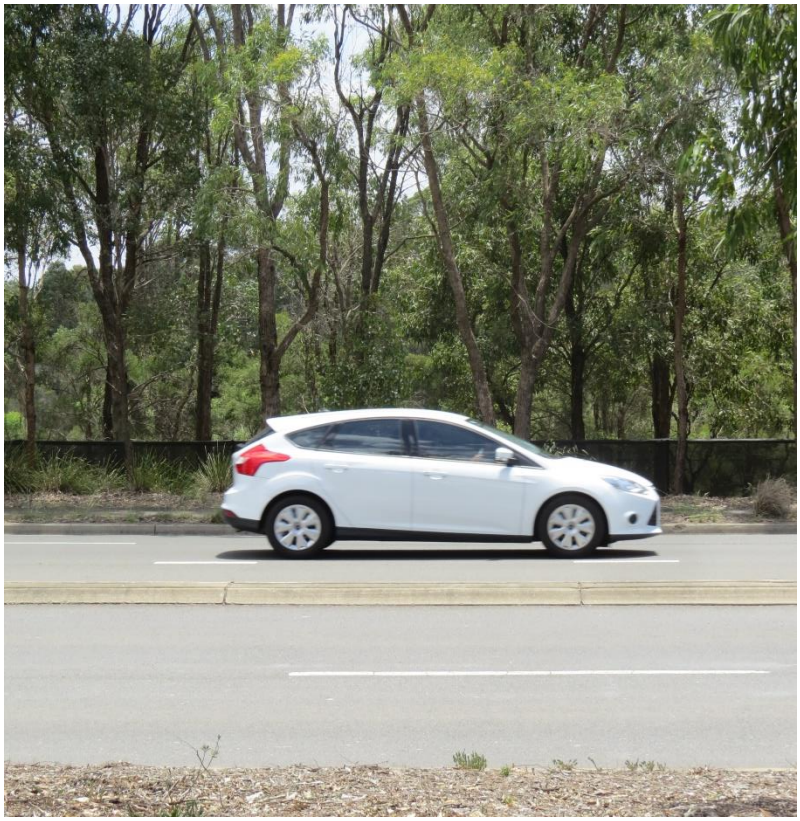


Figure 32 PHOTO POINT 5 - HILL ROAD WITH FROG EXCLUSION FENCE IN BACKGROUND

Figure 33 PHOTO POINT 6 - FROG EXCLUSION FENCING

Birds and bird habitat

Six species of birds were observed on site.

Table 3 Birds observed

COMMON NAME	SPECIES NAME	COUNT
Australian Magpie	*Cracticus tibicen*	1
Australian Raven	*Corvus coronoides*	4
Australian White Ibis	*Threskiornis moluccus*	1
Laughing Kookaburra	*Dacelo novaeguineae*	1
Noisy Miner	*Manorina melanocephala*	10+
Red Wattlebird	*Anthochaera carunculata*	3

In addition to these species a Tawny Frogmouth (*Podargus strigoides*) feather was found in the woodland patch (see photo point 7).

This suite of species is not atypical of hardened urban areas near suitable foraging habitat. The woodland patch is approximately 6000m^2 in area and is the best bird habitat on site. It is excellent habitat for Noisy Miners providing woodland trees with a grassy understorey adjacent to open areas. Noisy Miners were observed actively harassing the Laughing Kookaburra and Red Wattlebirds during the survey.

Figure 34 PHOTO POINT 7- WOODLAND PATCH PROVIDES EXCELLENT NOISY MINER HABITAT

Figure 35 RED WATTLEBIRDS WERE OBSERVED ACTIVELY GLEANING LEAVES ON TREES IN THE ISLANDS IN THE HARDSTAND AREA

Figure 36 LAUGHING KOOKABURRA AND NOISY MINERS

Trees within the study area are too young to provide breeding habitat in the form of hollows, however, they do provide potential nesting sites for Noisy Miners. This species is likely to preclude most other species from using the site except temporarily. This, combined with the high ambient noise (vehicles and industry), small size and the exposed nature of the site make the bird habitat on

site to be generally of poor quality. However, trees on site may act as a “stepping stone” between good quality bird habitat north and south of the site.

Figure 37 Tawny Frogmouth feather.

Reptiles and reptile habitat

Three species of reptile were observed on site.

Table 4 Reptiles observed on site

COMMON NAME	SPECIES NAME	COUNT
Delicate/Garden Skink	*Lampropholis delicata*	2
Eastern Water Skink	*Eulamprus quoyii*	3
Eastern Striped Skink (deceased)	*Ctenotus robustus*	1

Suitable habitat is present for the species observed and several others. It is likely that the Common Garden Skink or Pale-flecked Garden Sunskink (*Lampropholis guichenoti)* and the Eastern Blue-tongued Lizard *(Tiliqua scincoides scincoides)* are also present on site or use the site on occasion. Eastern Water Skinks were observed along the drainage swales while the other two species were observed in the woodland patch (photo point 7). In this location logs (from trees that have been felled or imported) combine with bark debris and thick patches of Lomandras to create excellent small reptile refugia.

Figure 38 Lomandras, bark and logs provide refugia suitable for small reptiles

Figure 39 Ctenotus robustus body found under log pile in woodland patch

Mammal and other habitat resources

There are very few resources for native mammals on site. On occasion Grey-headed Flying-foxes may feed on flowering eucalypts. Common Brushtail Possums may also visit or use the site to move between better patches of habitat. It is likely that exotic species, such as the Red Fox (*Vulpes vulpes*) and the Black Rat (*Rattus rattus*), occur on site.

Other habitat resources noted on site were a series of termite mounds at the base of several trees along Hill Road (Figure 40). The interesting thing about these mounds is that they were not seen elsewhere on site, or in adjoining areas.

Figure 40 Multiple termite mounds were observed along the vegetated verge of Hill Road. they were not observed in other parts of the site.

TARGETED SEARCHES

Targeted searches were conducted on site for threatened species, in particular, for Green and Golden Bell Frogs. Large areas of frog habitat are directly adjoining the subject site (Figure 41). SOPA hold records for over 3180 sightings of this species in the vicinity of carpark P5 between 1/1/2000 and 28/2/2017. Of these, 12 were in the carpark precinct, and all of these were heard calling during a single survey in December 2010.

There was very little potential habitat for the species and no frogs were recorded on site during the current survey. There are records of this species from the surrounding area, reported during the last 17 years (Figure 42). Nearly all of these records are from one locality, an artificial wetland immediately west of the intersection of Hill Rd and Holker St. This is the lowest point for the carpark, and runoff from this area would tend to drain to this wetland. The presence of this species in the wetland is a factor that should be taken into consideration during the design of management procedures for the proposed wave park, particularly in relation to dewatering of the pool for maintenance or emergency lagoon discharge.

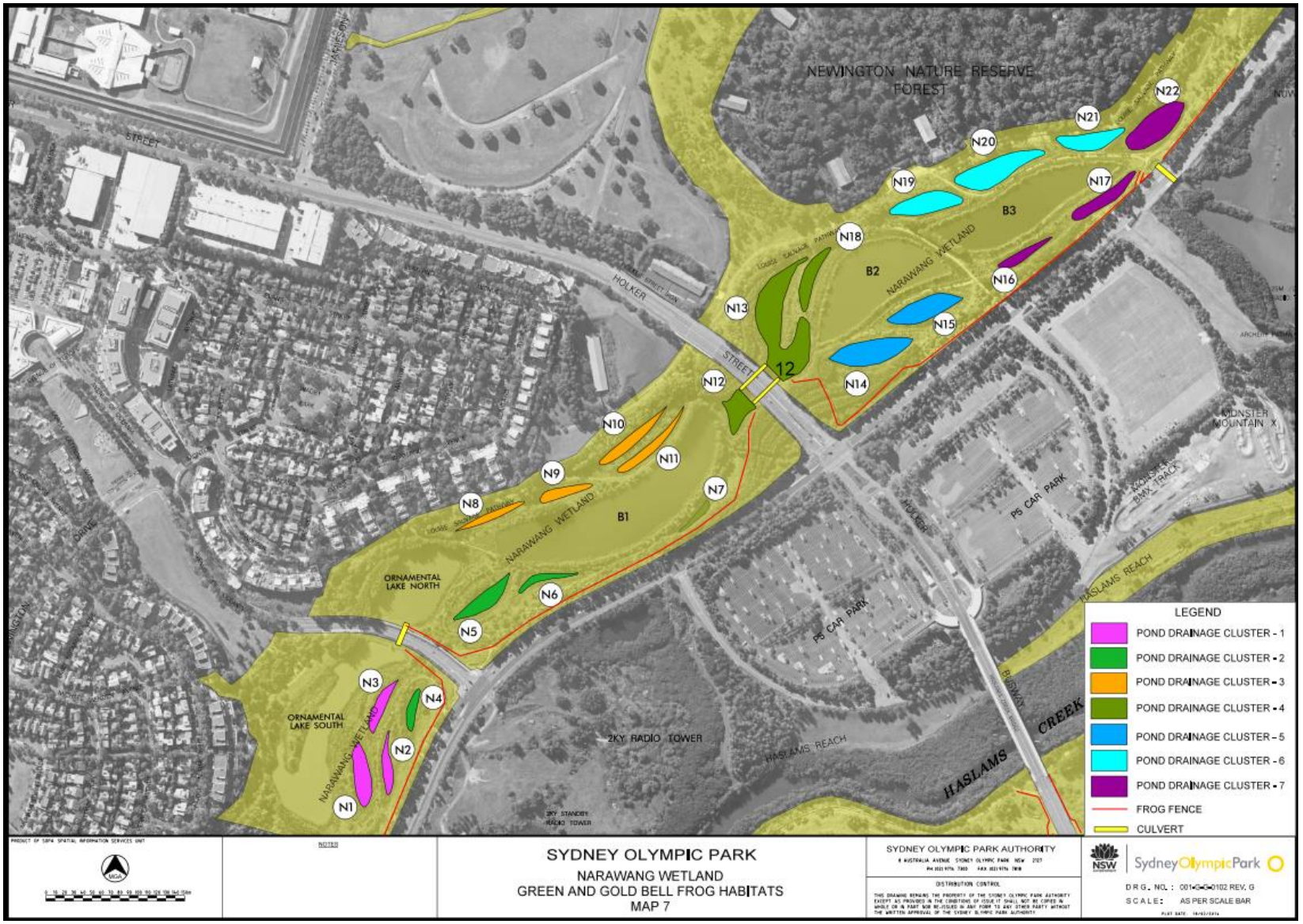


Figure 41 Location of ponds in Narawang Wetland that form Green and Golden Bell Frog habitat (note the frog fence)

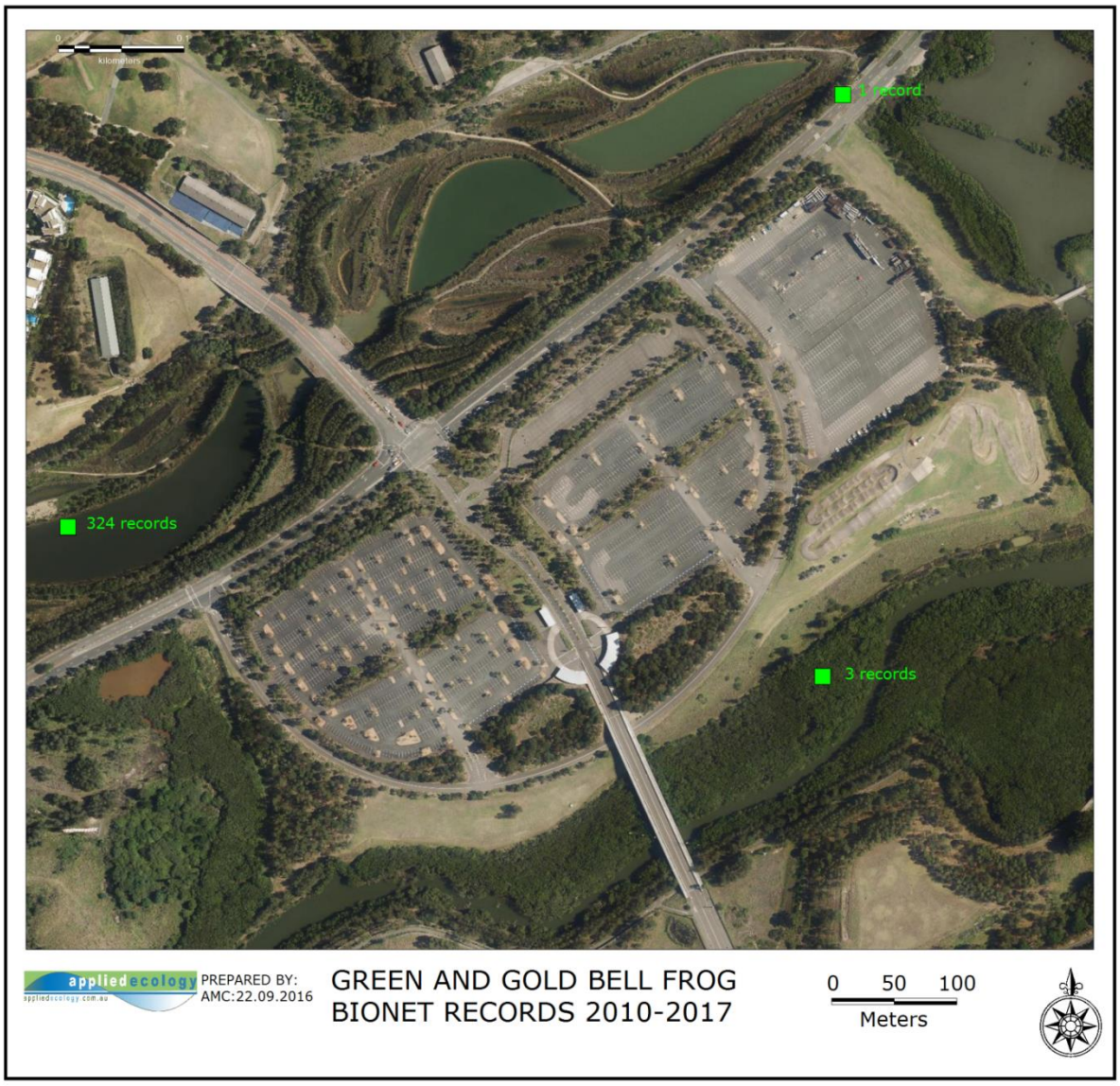


Figure 42 GGBF RECORDS NSW WILDLIFE ATLAS JANUARY 2010- JANUARY 2017

OTHER FAUNA SURVEYS

Threatened species and migratory bird records 1990- 2017

Because of the nature of the Sydney Olympic Parklands, numerous threatened species and migratory birds have been recorded in the area. Reducing the Wildlife Atlas search area to within 1km of the subject site still produced records of 13 threatened bird species, 5 threatened mammal species, 2 species of threatened flora, and 18 protected migratory birds (Table 5).

Table 5 Threatened species and migratory bird records within 1 kilometre of the subject site 1990-2017 from the NSW Wildlife Atlas (E = endangered, V = vulnerable, P = protected; C = China, J = Japan, K = Korea migratory bird agreements)

CLASS NAME	SCIENTIFIC NAME	COMMON NAME	NSW STATUS	COMM STATUS	RECORDS
Amphibia	*Litoria aurea*	Green and Golden Bell Frog	E1,P	V	11586
Aves	*Hirundapus caudacutus*	White-throated Needletail	P	C,J,K	3
Aves	*Ardea ibis*	Cattle Egret	P	C,J	22
Aves	*Botaurus poiciloptilus*	Australasian Bittern	E1,P	E	5

CLASS NAME	SCIENTIFIC NAME	COMMON NAME	NSW STATUS	COMM STATUS	RECORDS
Aves	*Ixobrychus flavicollis*	Black Bittern	V,P		2
Aves	*Plegadis falcinellus*	Glossy Ibis	P	C	26
Aves	*Circus assimilis*	Spotted Harrier	V,P		2
Aves	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	V,P	C	154
Aves	*Hieraaetus morphnoides*	Little Eagle	V,P		1
Aves	*Pluvialis fulva*	Pacific Golden Plover	P	C,J,K	268
Aves	*Rostratula australis*	Australian Painted Snipe	E1,P	E	2
Aves	*Actitis hypoleucos*	Common Sandpiper	P	C,J,K	12
Aves	*Arenaria interpres*	Ruddy Turnstone	P	C,J,K	3
Aves	*Calidris acuminata*	Sharp-tailed Sandpiper	P	C,J,K	282
Aves	*Calidris canutus*	Red Knot	P	E,C,J,K	12
Aves	*Calidris ferruginea*	Curlew Sandpiper	E1,P	CE,C,J,K	233
Aves	*Calidris melanotos*	Pectoral Sandpiper	P	J,K	27
Aves	*Calidris ruficollis*	Red-necked Stint	P	C,J,K	6
Aves	*Gallinago hardwickii*	Latham's Snipe	P	C,J,K	513
Aves	*Limosa lapponica*	Bar-tailed Godwit	P	C,J,K	596
Aves	*Limosa limosa*	Black-tailed Godwit	V,P	C,J,K	1
Aves	*Numenius madagascariensis*	Eastern Curlew	P	CE,C,J,K	1
Aves	*Tringa nebularia*	Common Greenshank	P	C,J,K	12
Aves	*Tringa stagnatilis*	Marsh Sandpiper	P	C,J,K	11
Aves	*Xenus cinereus*	Terek Sandpiper	V,P	C,J,K	1
Aves	*Gelochelidon nilotica*	Gull-billed Tern	P	C	4
Aves	*Hydroprogne caspia*	Caspian Tern	P	C,J	1
Aves	*Sterna hirundo*	Common Tern	P	C,J,K	5
Aves	*Glossopsitta pusilla*	Little Lorikeet	V,P		1
Aves	*Epthianura albifrons*	White-fronted Chat	V,P		54
Aves	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	V,P		14
Mammalia	*Pteropus poliocephalus*	Grey-headed Flying-fox	V,P	V	6
Mammalia	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V,P		2
Mammalia	*Mormopterus norfolkensis*	Eastern Freetail-bat	V,P		2
Mammalia	*Miniopterus schreibersii oceanensis*	Eastern Bentwing-bat	V,P		36
Mammalia	*Myotis macropus*	Southern Myotis	V,P		9
Flora	*Wilsonia backhousei*	Narrow-leafed Wilsonia	V,P		33
Flora	*Dillwynia tenuifolia*		V,P		1

SOPA surveys

SOPA conduct regular surveys of precincts in the Sydney Olympic Park. Results are tabulated for each precinct, including MP05 Parklands Junction, which includes the area around carpark P5. Fauna records for this precinct include species sightings between 1 January 2000 and 28 February 2017. A total of 972 sightings were recorded for 70 species (Table 6). This included 4 species of amphibians (1 threatened species: Green and Golden Bell Frog), 4 species of mammals (1 threatened species:

Grey-headed Flying Fox, and 3 introduced species), 3 species of reptiles (2 lizards, 1 turtle), and 59 species of birds (6 migratory species, 4 introduced species). Many of these are potentially sporadic visitors to the site.

These survey records represent the results of an average of 8 surveys per year (Table 7; during September to November), plus incidental sightings. Numbers of bird species sighted per survey ranged from 5.4 (in 2009) to 12.1 (in 2008), but typically around 8 species of birds were recorded during each survey. This is comparable to the 6 species (with evidence of a 7th) recorded during the current study. For a full list of sightings, see Appendix A.

Table 6 Fauna sightings recorded during surveys conducted on behalf of SOPA in the MP05 Parklands Junction precinct between 1/1/2000 and 28/2/2017 (data provided by J. O'Meara on behalf of SOPA)

COMMON NAME	# SIGHTINGS	SCIENTIFIC NAME	FAUNA TYPE	TSC ACT	EPBC ACT	JAMBA / CAMBA / ROKAMBA LISTING	INTRO-DUCED
Eastern Dwarf Tree Frog	28	*Litoria fallax*	Amphibian				
Green and Golden Bell Frog	12	*Litoria aurea*	Amphibian	E	V		
Peron's Tree Frog	20	*Litoria peronii*	Amphibian				
Striped Marsh Frog	10	*Limnodynastes peronii*	Amphibian				
Australasian Figbird	1	*Sphecotheres vieilloti*	Bird				
Australian Magpie	81	*Gymnorhina tibicen*	Bird				
Australian Pelican	5	*Pelecanus conspicillatus*	Bird				
Australian Raven	68	*Corvus coronoides*	Bird				
Australian White Ibis	38	*Threskiornis molucca*	Bird				
Black-faced Cuckoo-Shrike	20	*Coracina novaehollandiae*	Bird				
Black-fronted Dotterel	3	*Elseyornis melanops*	Bird		M		
Black-shouldered Kite	3	*Elanus axillaris*	Bird		M		
Brown Goshawk	1	*Accipiter fasciatus*	Bird		M		
Channel-billed Cuckoo	1	*Scythrops novaehollandiae*	Bird				
Chestnut Teal	1	*Anas castanea*	Bird		M		
Common Myna	3	*Acridotheres tristis*	Bird				Y
Common Starling	8	*Sturnus vulgaris*	Bird				Y
Crested Pigeon	13	*Ocyphaps lophotes*	Bird				
Crimson Rosella	2	*Platycercus elegans*	Bird				

COMMON NAME	# SIGHTINGS	SCIENTIFIC NAME	FAUNA TYPE	TSC ACT	EPBC ACT	JAMBA / CAMBA / ROKAMBA LISTING	INTRO-DUCED
Darter	1	*Anhinga melanogaster*	Bird				
Dusky Moorhen	1	*Gallinula tenebrosa*	Bird				
Fairy Martin	2	*Petrochelidon ariel*	Bird				
Galah	4	*Eolophus roseicapillus*	Bird				
Golden-headed Cisticola	3	*Cisticola exilis*	Bird				
Great Cormorant	6	*Phalacrocorax carbo*	Bird				
Great Egret	1	*Ardea alba*	Bird				
Grey Butcherbird	9	*Cracticus torquatus*	Bird				
House Sparrow	1	*Passer domesticus*	Bird				Y
Laughing Kookaburra	15	*Dacelo novaeguineae*	Bird				
Little Black Cormorant	5	*Phalacrocorax sulcirostris*	Bird				
Little Corella	1	*Cacatua sanguinea*	Bird				
Little Wattlebird	2	*Anthochaera chrysoptera*	Bird				
Magpie-lark	48	*Grallina cyanoleuca*	Bird				
Masked Lapwing	20	*Vanellus miles*	Bird		M		
Nankeen Kestrel	4	*Falco cenchroides*	Bird		M		
Noisy Miner	48	*Manorina melanocephala*	Bird				
Olive-backed Oriole	4	*Oriolus sagittatus*	Bird				
Pacific Black Duck	5	*Anas superciliosa*	Bird		M		
Pacific Koel	9	*Eudynamys orientalis*	Bird				
Pied Cormorant	3	*Phalacrocorax varius*	Bird				
Pied Currawong	43	*Strepera graculina*	Bird				
Purple Swamphen	1	*Porphyrio porphyrio*	Bird				
Rainbow Lorikeet	43	*Trichoglossus haematodus*	Bird				
Red Wattlebird	67	*Anthochaera carunculata*	Bird				
Red-browed Finch	2	*Neochmia temporalis*	Bird				

COMMON NAME	# SIGHTINGS	SCIENTIFIC NAME	FAUNA TYPE	TSC ACT	EPBC ACT	JAMBA / CAMBA / ROKAMBA LISTING	INTRO-DUCED
Red-rumped Parrot	9	*Psephotus haematonotus*	Bird				
Red-whiskered Bulbul	1	*Pycnonotus jocosus*	Bird				Y
Rock Dove	15	*Columba livia*	Bird				Y
Silver Gull	38	*Larus novaehollandiae*	Bird				
Silvereye	2	*Zosterops lateralis*	Bird				
Spotted Pardalote	20	*Pardalotus punctatus*	Bird				
Spotted Turtle-Dove	4	*Streptopelia chinensis*	Bird				Y
Striated Heron	1	*Butorides striatus*	Bird				
Sulphur-crested Cockatoo	8	*Cacatua galerita*	Bird				
Superb Fairy-wren	77	*Malurus cyaneus*	Bird				
Welcome Swallow	41	*Hirundo neoxena*	Bird				
White-breasted Woodswallow	1	*Artamus leucorynchus*	Bird				
White-faced Heron	8	*Egretta novaehollandiae*	Bird				
White-plumed Honeyeater	44	*Lichenostomus penicillatus*	Bird				
Willie Wagtail	26	*Rhipidura leucophrys*	Bird				
Yellow Thornbill	1	*Acanthiza nana*	Bird				
Yellow-faced Honeyeater	1	*Lichenostomus chrysops*	Bird				
Zebra Finch	1	*Taeniopygia guttata*	Bird				
Brown Hare	2	*Lepus capensis*	Mammal				Y
Cat	1	*Felis catus*	Mammal				Y
Fox	1	*Vulpes vulpes*	Mammal				Y
Grey-headed Flying-fox	1	*Pteropus poliocephalus*	Mammal	V	V		
Dark-flecked Garden Sunskink	1	*Lampropholis delicata*	Reptile				
Eastern Snake-necked Turtle	1	*Chelodina longicollis*	Reptile				
Pale-flecked Garden Sunskink	1	*Lampropholis guichenoti*	Reptile				

Table 7 Summary of number of sightings, and sightings per survey days at carpark P5 over the last 10 years (SOPA, 2017)

YEAR	TOTAL SIGHTINGS	# SURVEY DAYS	AVERAGE SIGHTINGS/DAY
2007	75	8	9.4
2008	98	8	12.1
2009	43	8	5.4
2010	76	9	8.3
2011	57	8	7.1
2012	68	8	8.5
2013	48	8	6
2014	70	8	8.8
2015	58	8	7.3
2016	74	8	9.1

ANALYSIS OF SURVEY RESULTS

The total of 40 species of native flora on site recorded in the current study is misleading as the majority of the species are planted canopy species, with a number of planted shrub and groundcover species. Together they do not constitute a vegetation community, but are merely an ad hoc selection of species for landscaping purposes. This is hardly surprising as the subject site is a car park, and has been landscaped accordingly. As a result, the area has been mapped as having no native vegetation, and the current survey supports this classification.

The swales provide a similar level of ecological integrity – they are gabion-lined box drains approximately 0.5m deep and varying from 0.3 to 1.0m wide. The design promotes infiltration to the surrounding soil, and does not support retention of water in ponds that could provide habitat to the Green and Golden Bell Frog, among other species. Most of the non-planted native species have become established in or close to the swales.

In a similar manner, the planted 'woodland' on the hilltop, or mound, has little in the way of vegetation community structure. Most of the five species of noxious weeds are located in association with the swales or the hilltop. Despite this, there is potential for this area to achieve some ecological value as habitat for native fauna, although this would require supplementing the existing suite of species with a mix of shrub and groundcover species. The area is developing some habitat resources, largely through the felling of trees or limb loss from subsequent exposure of the remaining trees. In reality, however, the site will always be subject to ongoing high levels of impacts, and would require consequent high levels of maintenance activities to make this work.

Fauna resources on site reflect the poor condition of the vegetation. Six species of birds were recorded on site, all of them larger generalist species that are typically common in disturbed and urbanised environments. One species, the kookaburra, is becoming less common in urban woodlands over recent years. Three species of lizards were also recorded on site, one in the drainage swales and the others in the woodland area on top of the hill. These are also typically more common species in disturbed areas. Several other species are potentially typically present but were not recorded during the current survey.

Overall, the subject site has very little ecological value. Its best potential would be as a buffer to better habitat nearby, but in reality this is unlikely since the area is a carpark and therefore exposed to a constant high level of impacts in its current configuration. A small section of Pod B (the northern half of the carpark) is used by buses for parking and repairing buses, or simply for parking off street before commencing routes from the Holker Busway terminal.

The larger half of Pod B has been cordoned off for a fencing storage compound. The compound has 'daylight' lights for night work, and was observed to have semi-trailers and other large trucks arrive, load, and leave. Loading is completed using a heavy-duty forklift. Thus, there is potential for constant noise and light pollution as a minimum impact for the surrounding area. The same can be said for the site immediately adjoining Pod B in P5 carpark. This area is currently being used for container storage, with containers stacked five high. The storage area is currently in regular use, evidenced by additional containers being added to the stacks at the time of the current study.

POTENTIAL IMPACTS FOR FAUNA (LITERATURE REVIEW)

Effects of artificial lighting on native fauna

Anthropogenic environmental impacts can disrupt the sensory environment of animals and affect important processes from mate choice to predator avoidance. Currently, these effects are best understood for auditory and chemosensory modalities, and recent reviews highlight their importance for conservation (Delhey & Peters, 2017). The conservation importance of impaired visual communication is less documented; however, anthropogenic effects on the visual environment may be of similar importance relative to conservation as anthropogenic effects on other sensory modalities.

Amphibians

Effects of artificial lighting for frogs can range from changing their ability to hunt successfully, to affecting their behaviour during mating, and predator avoidance. Frogs generally have good night vision, which is the main sense used while hunting. Frogs have good depth and movement perception. Also because of their wide vision range they can look about without moving, so don't scare off prey. They have a mirror layer in the back of the eye providing 'eye shine', which acts as a kind of search light for hunting, and giving them a significant advantage over prey. Different species have different sensitivity to light depending on their habitat and habits (http://thefrog.org).

Artificial light may also influence frog behaviour. Frogs tend to move towards blue light (<500nm) and some respond to both blue (<475nm) and red (>600nm) light depending on whether the frog is dark adapted (Buchanan, 2006). Frogs are capable of foraging in an environment where the illumination is 10-6 to 10-5 lux at which point a frog can still discern light against dark or dark against light and prey movement. Frogs can also feed in much brighter environments.

Male frogs adjust mate calling to avoid predation by frog eating microbats (Buchanan, 2006). In more brightly lit environments they call from exposed locations, to be able to see predators, but from low illuminance environments they remain concealed. Frogs have been found in concentration around street lights due to the concentration of prey in these locations but frogs are also more vulnerable to predation at those locations and to death by automobile (Buchanan, 2006).

Shorebirds

In bird visual systems, bird cones contain a coloured oil droplet in the first inner segment before the visual pigment. The oil droplet acts as a filter for electromagnetic radiation altering the characteristics of the electromagnetic radiation before it interacts with the visual pigment (Varela et al, 1993). There are several different avian cone oil droplet types, each type filters different wavelengths. The combination of up to 6 different types of oil droplet filter that may be associated with any one cone colour pigment in avian cone arrangements provides for a large diversity of colour discrimination. Migratory birds have very large rods (Beason, 1999). The rods lack oil droplets and only have visual pigments which make them more sensitive to the presence of electromagnetic radiation compared to cones.

Migratory waders are adapted to natural changes associated with the day and night cycle as well as the night-time phase of the moon. Artificial lighting has the potential to displace migratory birds from preferred roosts, or may create a constant level of light at night that can affect behaviour (including attraction) and migration related orientation (Van De Laar, 2007). Migratory waders may also use lighting from natural sources to orient themselves during migration (Poot et al. 2008).

Artificial lighting can lead to increased circling of an area – but not necessarily the target destination – resulting in wasted energy for the bird, which is especially important at the end of a long migration. Disorientation may also result in birds crashing into structures, or landing in unsuitable locations, which may ultimately result in death through inadequate supplies in drinking water or food. As well, there may be increased risk of predation due to navigation issues and increasing exhaustion for birds (Hansen et al, 2015).

Increased periods of artificial lighting have direct effects on wetlands, resulting in flow on effects for animals dependent on these ecosystems. Extended photoperiods can lead to increased growth of green algae, which can alter nutrient cycling pathways, smother smaller wetland fauna, such as microinvertebrates and macroinvertebrates, thus reducing the availability of food resources for larger organisms, including waders.

Use of vegetation for screening of wetlands in areas with high levels of artificial lighting will reduce the photoperiod improves the health of the wetland, with consequent improvements of the area as habitat for waders. Planting stands of vegetation between disturbances and wetland habitats improves the suitability of available roost sites by providing shelter from wind (Peters & Otis, 2007). Wind was found to be one of the most significant factors in roost selection for overwintering habitat, although there was evidence of variation in species-specific roost site selection.

Vegetative screening may also reduce flight initiation distances (FID), so that disturbances within a range that would normally result in flushing may not disrupt feeding and other behaviours (Koch & Paton, 2014). Younger birds and smaller species of shorebirds generally have the shortest FID, while larger species such as plovers and oystercatchers have FID greater than 50m. Using this to develop species-specific buffer requirements, Koch and Paton (2014) found results ranging from 61m for sandpipers to 186m for a species of American plover.

Microbats

Under moonlight, for mammals, there may be fewer but more successful prey encounters. Some species show a noticeable response to artificial light in the wild, while others show no response at all (Beier, 2006). Fast flying bats exploit insect attraction to city lighting and road lighting. Slow flying gleaner and flutter detector bats avoid street lighting (Rydell, 2006). This has led to competitive exclusion of species in some areas, when two species both hunt the same prey but one species hunts in the lit zone and the other avoids the lit zone but the prey is attracted to the lit zone.

Artificial lighting has an effect on both microbats and their prey species. Artificial lighting attracts and repels animals in taxon-specific ways and affects physiological processes. Being nocturnal, bats are likely to be strongly affected by artificial lighting. Many species of bats are insectivorous, and insects are also strongly influenced by lighting (Rowse et al, 2016).

Impacts on bats and their prey depend on the light spectra produced by street lights; ultraviolet (UV) wavelengths attract more insects and consequently insectivorous bats (Rowse et al, 2016). Bat responses to lighting are species-specific and reflect differences in flight morphology and performance; fast-flying aerial hawking species frequently feed around street lights, whereas relatively slow flying bats that forage in more confined spaces are often light-averse. Increasing light

levels have a negative influence on microbat species that are tolerant of 'clutter' in the environment, such as *Myotis* species, regardless of the type of artificial lighting.

Lighting technologies are changing rapidly, with the use of light-emitting diode (LED) lamps increasing. Rapid changes in street lighting offer the potential to explore mitigation methods such as part-night lighting (PNL), dimming, directed lighting, and motion-sensitive lighting that may have more beneficial consequences for light-averse bat species.

Insectivorous bats that hunt in open spaces above the canopy (open-space foragers) or along vegetation edges such as forest edges, tree lines or hedgerows (edge foragers) are the most tolerant of artificial lighting (Jung and Threlfall 2016). When foraging at street lights, open-space foragers typically fly above the lamps, diving into the light cone to catch insects (Jung and Kalko 2010). Edge foragers tend to be more manoeuvrable than open-space foragers (Kalko et al. 2008), and some conduct circuits inside the light cone when hunting insects at street lights (Jung and Kalko 2010). Though a relatively high proportion of aerial insectivorous bats may forage in suburban habitats, bat activity and the number of bat species decrease significantly in highly urbanised areas. This is probably because roosts and insect habitats are both lacking, and those insects which are present might not aggregate at street lamps because the pervasive artificial lighting in city centres causes a dilution effect, rendering the lights less attractive for bats (Jung & Kalko 2011; Jung & Threlfall 2016).

For forest dwelling bats, their morphology only allows slow flight speeds, which might render them more vulnerable to predators when flying in a sphere of light away from protective vegetation cover (Rydell et al. 1996). Most forest-dwelling bat species emerge from their roosts relatively late in the evening, presumably to minimise predation risk from diurnal birds of prey (Jones and Rydell 1994) and so may be 'hard-wired' to be light-averse. Furthermore, slow-hawking bats use echolocation calls that are adapted for short-range prey detection among clutter (Norberg and Rayner 1987), and so these may not be suitable for orientation in semi-open habitats where most street lights are positioned. For example, the chocolate wattled bat *Chalinolobus morio* avoided parks when lights were switched on (Scanlon and Petit 2008). In contrast, eastern horseshoe bats Rhinolophus megaphyllus were repeatedly observed traversing 200 m of open grassland to forage extensively around artificial lights (Pavey, 1999). Extinction risk is highest in bat species with low aspect ratios (Jones et al. 2003; Safi and Kerth 2004), which are the species that show aversion to artificial lighting. Thus, species that may suffer most from light pollution are likely to be already threatened taxa.

Effects of noise for microbats

Ambient noise influences the availability and use of acoustic information in animals in many ways. For example, *Myotis* species are part of an especially vulnerable group of gleaning bats that rely on listening for prey rustling sounds to find food. This strategy of 'passive listening' is adopted by bat species specialized to glean arthropods from vegetation or the ground where prey echoes are masked by overlapping, strong background echoes. For such 'passive listening' bats, it is conceivable that environmental noise interferes with the detection of prey. As these bats use echolocation for spatial orientation, the reception of relevant echoes could potentially be impaired by noise as well (Gillam and McCracken, 2007).

In an assessment of feeding behaviours for the greater mouse-eared bat (*Myotis myotis*), Schaub et al (2008) found a clear effect of the type of noise on the allocation of foraging effort and on the distribution of prey capture events. The degree to which the background noise deterred bats from the compartment increased from traffic noise to vegetation movement noise to broadband computer generated noise. Vegetation noise, set 12dB below the traffic noise amplitude, had a

larger repellent effect; presumably because of its acoustic similarity with prey sounds. As bats roost in noisy places, it appears likely that a specific noise-impairment on perception of prey sounds (Goerlitz et al., 2008), on echolocation (Gillam and McCracken, 2007), or both, and possibly specific characteristics of the noise, are reasons for avoidance of noisy places.

Potential impacts from the Wave Park

The main potential impacts identified as a result of construction of the proposed wave park are summarised below (Table 8)

Table 8 Summary of potential impacts from the proposed development, identified in consultation with SOPA staff

POTENTIAL IMPACT	CONSTRUCTION PHASE IMPACTS	OPERATIONAL PHASE IMPACTS
Stormwater runoff	Removal of bioswale and subsequent loss of filtration before runoff reaches Narawang wetlands • Untreated stormwater runoff delivered to GGBF habitat • Need to protect GGBF habitat from changed hydrology	Reduced hardstand surface area will reduce volume of runoff delivered to Narawang wetlands • Need to consider changed hydrology in the wetlands • Need to provide filtration or other treatment of runoff before delivery to GGBF habitat wetland
Diverting stormwater to Nuwi Wetlands (Haslams Outreach)	Temporary impacts • Untreated stormwater runoff delivered to natural waterway • Loss of water supply for Narawang wetlands • Potential impacts for *Wilsonia backhousei* and Estuarine Saltmarsh EEC • Potential impacts for fisheries habitat	Ongoing potential impacts • Untreated stormwater runoff delivered to natural waterway • Loss of water supply for Narawang wetlands • Potential impacts for *Wilsonia backhousei* and Estuarine Saltmarsh EEC • Potential impacts for fisheries habitat
Excess lagoon water disposal (routine)	Onsite management needs to accommodate treatment of quantity and quality of any potential lagoon water discharge (see potential impacts from stormwater discharge above)	Onsite management needs to accommodate treatment of quantity and quality of any potential lagoon water discharge (see potential impacts from stormwater discharge above)
Lagoon Water disposal (emergency)	Onsite management needs to accommodate treatment of quantity and quality of any potential lagoon water discharge (see potential impacts from stormwater discharge above)	Onsite management needs to accommodate treatment of quantity and quality of any potential lagoon water discharge (see potential impacts from stormwater discharge above)
Light spill	Increased lighting at night during construction. Animals likely to be affected include: • Microbats • GGBF	Increased lighting at night during normal operations (to 10pm in summer and 9pm in winter). Animals likely to be affected include: • Microbats

POTENTIAL IMPACT	CONSTRUCTION PHASE IMPACTS	OPERATIONAL PHASE IMPACTS
	• Migratory waders (see below)	• GGBF Migratory waders (see below)
Increased noise, altered character of noise	Increased noise levels at night during construction (see below)	Increased noise levels at night during normal operations (to 10pm in summer and 9pm in winter; see below)
Loss of habitat	Direct mortality of animals (such as blue tongue lizards) during removal of gabions from the work site Minor loss of feeding and roosting resources	Minor loss of feeding and roosting resources, mainly for birds and small lizards
Pest plant establishment (weeds)	Potential for weeds to invade and establish on site and in downstream environments	Potential for weeds to invade and establish on site and in downstream environments
Landscape planting	Removal of existing plantings may result in a minor reduction in habitat quality and extent	Introducing the wrong plant species through landscaping will change the character of vegetation, and the availability and nature of food resources, and may result in the introduction of plants with the potential to become weedy

The NSW Scientific Committee has identified noise and light impacts as being direct threats for a few of the threatened and/or migratory species recorded on or near the subject site. These are:

- ***Litoria aurea*** **Green and Golden Bell Frog**
  Major threats identified for the Green and Golden Bell Frog include (DEWHA 2009) habitat degradation (which includes siltation, changes to water quality, aquatic vegetation diversity or structure reducing shelter, **increased light and noise**, grazing, mowing, fire).
- ***Calidris canutus*** **Red Knot,** and
- ***Calidris ferruginea*** **Curlew Sandpiper,** and
- ***Limosa limosa*** **Black-tailed Godwit,** and
- ***Numenius madagascariensis*** **Eastern Curlew,** and
- ***Numenius madagascariensis*** **Eastern Curlew**

  Disturbance can result from residential and recreational activities including; fishing, power boating, four wheel driving, walking dogs**, noise and night lighting**. While some disturbances may have only a low impact it is important to consider the combined effect of disturbances with other threats. Roosting and foraging birds are sensitive to discrete, unpredictable disturbances such as **loud noises (i.e. construction sites)** and approaching objects (i.e. boats). **Sustained disturbances can prevent shorebirds from using parts of the habitat** (DEWHA 2009).

FLORA, FAUNA AND THE LEGISLATIVE CONTEXT

PROTECTED MATTERS SEARCH (EPBC ACT)

The databases summarise the matters of national environmental significance that may occur in, or may relate to, the area nominated. The following results were obtained for a 5km buffer of the site (Table 9)

Table 9. Summary of Protected Matters searches.

PROTECTED MATTERS	PRESENT AT OR NEAR THE STUDY SITE
World Heritage Properties	NONE
National Heritage Places	NONE
Wetlands of International Significance (Ramsar Sites)	NONE
Commonwealth Marine Areas	NONE
Threatened Ecological Communities	7
Threatened Species	62
Migratory Species	57

Assessment of Impacts for Migratory Species

A number of faunal groups, including migratory terrestrial birds and migratory wetland birds, are identified as having potential presence near the subject site. These were assessed for likely presence on or in the immediate vicinity of the proposed works hence pelagic birds and marine turtles listed on the protected matters search have not been included (Table 10). The NSW Wildlife Atlas was used to determine if the listed species had been recorded on or within a 10km^2 cell centred on the site [North: -33.76 West: 151.01 East: 151.12 South: -33.86] from 1 January 2000 to 20 January 2017.

Table 10. Migratory species protected under EP&BC Act.

SPECIES NAME	COMMON NAME	TYPE OF PRESENCE IN WENTWORTH FALLS	PRESENT	RECORDS WITHIN 10km^2 CELL	Impact likely
MIGRATORY TERRESTRIAL BIRD SPECIES					
Cuculus optatus	Oriental Cuckoo, Horsfields Cuckoo	Species or species habitat may occur within area	Not suitable habitat – presence very unlikely		No
Hirundapus caudacutus	White-throated Needletail	Species or species habitat known to occur within area	Not suitable habitat – presence very unlikely	6	No

SPECIES NAME	COMMON NAME	TYPE OF PRESENCE IN WENTWORTH FALLS	PRESENT	RECORDS WITHIN 10km^2 CELL	Impact likely
Monarcha melanopsis	Black-faced Monarch	Species or species habitat known to occur within area	Not suitable habitat – presence very unlikely		No
Monarcha trivirgatus	Spectacled Monarch	Species or species habitat known to occur within area	Not suitable habitat – presence very unlikely		No
Motacilla flava	Yellow Wagtail	Species or species habitat likely to occur within area	Not suitable habitat – presence very unlikely		No
Myiagra cyanoleuca	Satin Flycatcher	Species or species habitat known to occur within area	Not suitable habitat – presence very unlikely		No
Rhipidura rufifrons	Rufous Fantail	Species or species habitat known to occur within area	Not suitable habitat – presence very unlikely		No
MIGRATORY WETLAND BIRD SPECIES					
Arenaria interpres	Ruddy Turnstone	Foraging, feeding or related behaviour known to occur within area	Not suitable habitat – presence very unlikely	2	No
Calidris acuminata	Sharp-tailed Sandpiper	Foraging, feeding or related behaviour known to occur within area	Not suitable habitat – presence very unlikely	572	No
Calidris canutus	Red Knot	Foraging, feeding or related behaviour known to occur within area	Not suitable habitat – presence very unlikely	13	No
Calidris ferruginea	Curlew Sandpiper	Foraging, feeding or related behaviour known to occur within area	Not suitable habitat – presence very unlikely	275	No
Calidris melanotos	Pectoral Sandpiper	Foraging, feeding or related behaviour known to occur within area	Not suitable habitat – presence very unlikely	31	No

SPECIES NAME	COMMON NAME	TYPE OF PRESENCE IN WENTWORTH FALLS	PRESENT	RECORDS WITHIN 10km^2 CELL	Impact likely
Calidris ruficollis	Red-necked Stint	Foraging, feeding or related behaviour known to occur within area	Not suitable habitat – presence very unlikely	27	No
Calidris tenuirostris	Great Knot	Foraging, feeding or related behaviour known to occur within area	Not suitable habitat – presence very unlikely		No
Charadrius bicinctus	Double-banded Plover	Foraging, feeding or related behaviour known to occur within area	Not suitable habitat – presence very unlikely		No
Charadrius leschenaultii	Greater Sand Plover, Large Sand Plover	Foraging, feeding or related behaviour known to occur within area	Not suitable habitat – presence very unlikely		No
Charadrius mongolus	Lesser Sand Plover, Mongolian Plover	Foraging, feeding or related behaviour known to occur within area	Not suitable habitat – presence very unlikely		No
Gallinago hardwickii	Latham's Snipe, Japanese Snipe	Species or species habitat may occur within area	Not suitable habitat – presence very unlikely	606	No
Gallinago megala	Swinhoe's Snipe	Foraging, feeding or related behaviour likely to occur within area	Not suitable habitat – presence very unlikely		No
Gallinago stenura	Pin-tailed Snipe	Foraging, feeding or related behaviour likely to occur within area	Not suitable habitat – presence very unlikely		No
Heteroscelus brevipes	Grey-tailed Tattler	Foraging, feeding or related behaviour known to occur within area	Not suitable habitat – presence very unlikely	1	No
Limosa lapponica	Bar-tailed Godwit	Species or species habitat known to occur within area	Not suitable habitat – presence very unlikely	772	No

SPECIES NAME	COMMON NAME	TYPE OF PRESENCE IN WENTWORTH FALLS	PRESENT	RECORDS WITHIN 10km^2 CELL	Impact likely
Limosa limosa	Black-tailed Godwit	Foraging, feeding or related behaviour known to occur within area	Not suitable habitat – presence very unlikely	6	No
Numenius madagascariensis	Eastern Curlew	Species or species habitat known to occur within area	Not suitable habitat – presence very unlikely	18	No
Numenius minutus	Little Curlew, Little Whimbrel	Foraging, feeding or related behaviour likely to occur within area	Not suitable habitat – presence very unlikely		No
Numenius phaeopus	Whimbrel	Foraging, feeding or related behaviour known to occur within area	Not suitable habitat – presence very unlikely		No
Pandion haliaetus	Osprey	Species or species habitat known to occur within area	Not suitable habitat – presence very unlikely		No
Philomachus pugnax	Ruff	Foraging, feeding or related behaviour known to occur within area	Not suitable habitat – presence very unlikely		No
Pluvialis fulva	Pacific Golden Plover	Foraging, feeding or related behaviour known to occur within area	Not suitable habitat – presence very unlikely	282	No
Tringa nebularia	Common Greenshank	Species or species habitat known to occur within area	Not suitable habitat – presence very unlikely	154	No
Tringa stagnatilis	Marsh Sandpiper, Little Greenshank	Foraging, feeding or related behaviour known to occur within area	Not suitable habitat – presence very unlikely	25	No

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the nominated area. The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the

heritage values of a place on the Register of the National Estate. None of the listed places or matters will be affected by the proposed works at Archers Park. Results of this search are listed in Table 11.

Table 11. Other matters protected under the EPBC Act and related instruments.

OTHER PROTECTED MATTERS	OCCURRING IN 5 KM RADIUS OF SUBJECT SITE
Commonwealth Lands	2
Commonwealth Heritage Places	None
Places on the Register of the National Estate (RNE)	None
Listed Marine Species	64
Whales and Other Cetaceans	None
Critical Habitats	None
Commonwealth Reserves	None
Nationally Important Wetlands	2

Extra information

Additional information provided through a search of Protected Matters databases includes the following (Table 7):

Table 12. Additional Protected Matters information.

OTHER PROTECTED MATTERS	**OCCURRING IN 5 KM RADIUS OF SUBJECT SITE**
State and Territory Reserves	1
Other Commonwealth Reserves	None
Regional Forest Agreements	None

IMPACT ON THREATENED SPECIES (NSW TSC ACT)

A search was undertaken of the NSW Wildlife Atlas for all valid records of Threatened (listed on TSC Act 1995) or Commonwealth listed Entities within a 10km cell centred on the subject site [North: -33.78, West: 151.01, East: 151.12, South: -33.88] recorded since the 1st January 1997 until 20th of January 2017. The search returned a total of 13,662 records of 50 species and are listed in Table 13.

Table 13 Threatened Species

KINGDOM	CLASS	SCIENTIFIC NAME	COMMON NAME	NSW STATUS	COMM. STATUS	RECORDS
Animalia	Amphibia	*Litoria aurea*	Green and Golden Bell Frog	E1,P	V	12331
Animalia	Aves	*Botaurus poiciloptilus*	Australasian Bittern	E1,P	E	6
Animalia	Aves	*Ixobrychus flavicollis*	Black Bittern	V,P		2
Animalia	Aves	*Circus assimilis*	Spotted Harrier	V,P		2
Animalia	Aves	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	V,P	C	211
Animalia	Aves	*Hieraaetus morphnoides*	Little Eagle	V,P		3
Animalia	Aves	*Rostratula australis*	Australian Painted Snipe	E1,P	E	2
Animalia	Aves	*Calidris canutus*	Red Knot	P	E,C,J,K	13
Animalia	Aves	*Calidris ferruginea*	Curlew Sandpiper	E1,P	CE,C,J,K	275
Animalia	Aves	*Limosa limosa*	Black-tailed Godwit	V,P	C,J,K	6
Animalia	Aves	*Numenius madagascariensis*	Eastern Curlew	P	CE,C,J,K	18
Animalia	Aves	*Xenus cinereus*	Terek Sandpiper	V,P	C,J,K	1
Animalia	Aves	*Sternula albifrons*	Little Tern	E1,P	C,J,K	3
Animalia	Aves	*Glossopsitta pusilla*	Little Lorikeet	V,P		3
Animalia	Aves	*Ninox strenua*	Powerful Owl	V,P,3		34
Animalia	Aves	*Epthianura albifrons*	White-fronted Chat	V,P		192
Animalia	Aves	*Epthianura albifrons*	White-fronted Chat population in the Sydney Metropolitan Catchment Management Area	E2,V,P		192
Animalia	Aves	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	V,P		14
Animalia	Mammalia	*Pteropus poliocephalus*	Grey-headed Flying-fox	V,P	V	60
Animalia	Mammalia	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V,P		2
Animalia	Mammalia	*Mormopterus norfolkensis*	Eastern Freetail-bat	V,P		3
Animalia	Mammalia	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V,P		1
Animalia	Mammalia	*Miniopterus schreibersii oceanensis*	Eastern Bentwing-bat	V,P		63
Animalia	Mammalia	*Myotis macropus*	Southern Myotis	V,P		14

KINGDOM	CLASS	SCIENTIFIC NAME	COMMON NAME	NSW STATUS	COMM. STATUS	RECORDS
Animalia	Mammalia	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V,P		1
Animalia	Gastropoda	*Meridolum corneovirens*	Cumberland Plain Land Snail	E1		2
Plantae	Flora	*Wahlenbergia multicaulis*	Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield	E2		9
Plantae	Flora	*Wilsonia backhousei*	Narrow-leafed Wilsonia	V,P		89
Plantae	Flora	*Tetratheca glandulosa*		V,P		1
Plantae	Flora	*Epacris purpurascens var. purpurascens*		V,P		13
Plantae	Flora	*Dillwynia tenuifolia*		V,P		2
Plantae	Flora	*Acacia bynoeana*	Bynoe's Wattle	E1,P	V	1
Plantae	Flora	*Acacia clunies-rossiae*	Kanangra Wattle	V,P		1
Plantae	Flora	*Acacia pubescens*	Downy Wattle	V,P	V	56
Plantae	Flora	*^^Hypsela sessiliflora*		P,3	X	1
Plantae	Flora	*^^Callistemon linearifolius*	Netted Bottle Brush	V,P,3		3
Plantae	Flora	*Darwinia biflora*		V,P	V	2
Plantae	Flora	*Eucalyptus camfieldii*	Camfield's Stringybark	V,P	V	1
Plantae	Flora	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	V,P	V	1
Plantae	Flora	*Eucalyptus scoparia*	Wallangarra White Gum	E1,P	V	1
Plantae	Flora	*Melaleuca deanei*	Deane's Paperbark	V,P	V	1
Plantae	Flora	*Syzygium paniculatum*	Magenta Lilly Pilly	E1,P	V	1
Plantae	Flora	*Caladenia tessellata*	Thick Lip Spider Orchid	E1,P,2	V	1
Plantae	Flora	*Genoplesium baueri*	Bauer's Midge Orchid	E1,P,2	E	1
Plantae	Flora	*Pterostylis saxicola*	Sydney Plains Greenhood	E1,P,2	E	1
Plantae	Flora	*Grevillea beadleana*	Beadle's Grevillea	E1,P,3	E	1
Plantae	Flora	*Persoonia hirsuta*	Hairy Geebung	E1,P,3	E	1

KINGDOM	CLASS	SCIENTIFIC NAME	COMMON NAME	NSW STATUS	COMM. STATUS	RECORDS
Plantae	Flora	*Pomaderris prunifolia*	P. prunifolia in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas	E2		15
Plantae	Flora	*Pimelea curviflora var. curviflora*		V,P	V	1
Plantae	Flora	*Zannichellia palustris*		E1,P		4

As identified in Section 5(A) of the EP&A Act, 1979 the following matters need to be addressed to determine whether or not a significant effect on threatened species, populations or ecological communities or their habitats is likely to result from the proposed development:

ASSESSMENT OF SIGNIFICANCE (7 PART TEST)

Matter [1]

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

Flora

It is considered that there is very marginal habitat present for a number of species listed under the Threatened Species Conservation Act, 1995, or under the EP&BC Act. Endangered Ecological Communities recorded in the Parramatta City LGA were also assessed for potential impacts from the proposed works.

Wilsonia backhousei **Narrow-leafed Wilsonia**

Wilsonia backhousei is a mat forming prostrate subshrub. It is salt tolerant and is found in intertidal saltmarshes and, more rarely, on seacliffs. In the Sydney region there has been a considerable decline in the abundance of the species this century, largely as a result of loss of habitat.

The species has been recorded numerous times at the Newington Nature Reserve on the southern bank of the Parramatta River and along the shoreline in saltmarsh and mangroves at the downstream end of Haslams Creek; however, this species was not observed during surveys of the proposed development site. It is considered that the proposed activity will not have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Epacris purpurascens var. purpurascens

The species can occur in riparian zones draining into Sydney Sandstone Gully Forest, shale lenses within sandstone habitats and colluvial areas overlying or adjoining sandstone or tertiary alluvium.

This species was not observed during surveys of the proposed development site. It is considered that the proposed activity will not have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Acacia pubescens **Downy Wattle**

Acacia pubescens occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravelly soils, often with ironstone. The species occurs in open woodland and forest, in a variety of plant communities, including Cooks River/ Castlereagh Ironbark Forest, Shale/ Gravel Transition Forest and Cumberland Plain Woodland (NSW NPWS 2003).

This species was not observed during surveys of the proposed development site. It is considered that the proposed activity will not have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Zannichellia palustris

Zannichellia palustrisis a submerged aquatic plant with leaves 2-7 cm long by less than 1 mm wide. In NSW, known from the lower Hunter and in Sydney Olympic Park. It grows in fresh or slightly saline stationary or slowly flowing water and flowers during warmer months. NSW populations behave as annuals, dying back completely every summer.

This species was not observed during surveys of the proposed development site. As well, there was no suitable habitat for the species, which may have been difficult to spot due to summer dieback. It is considered that the proposed activity will not have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Fauna

There is very little habitat on the subject site thus in relation to threatened species recorded in the NSW Wldlife Atlas in the 10km cell only species with more than two records since 1st January 2000 have been considered in the following assessments:

Fauna: Amphibia

Litoria aurea **Green and Golden Bell Frog**

The green and golden bell frog is mostly green in colour, with patches of brown, a gold stripe running along the side and blue colour on the inside of the thighs. The frogs are usually located in and around water bodies such as wetlands, lakes and dams, and often on sites which humans have disturbed such as abandoned quarries. Their preferred habitats always contain plenty of vegetation in and around water.

Near the subject site there are significant areas of known habitat for this species, however it has not been recorded directly on the study site. It is considered that the proposed activity is not likely to have an adverse effect on the life cycle of the species to the extent that a viable local population of the species is likely to be placed at risk of extinction, provided that due consideration is given to the species for the dewatering process.

Fauna: Aves

Botaurus poiciloptilus **Australasian Bittern**

Australasian Bitterns are widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (Typha spp.) and spikerushes (Eleocharis spp.). Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains.

Near the subject site there is some marginal foraging habitat for this species. The species is fairly commonly recorded at the Newington Nature Reserve and it is considered that the proposed activity will not have an adverse effect on the life cycle of the species to the extent that a viable local population of the species is likely to be placed at risk of extinction.

Haliaeetus leucogaster **White-bellied Sea-Eagle**

Despite its name, the sea-eagle is not confined to coastal areas, and the species is regularly recorded at terrestrial wetlands far from the sea, especially along larger inland rivers and at freshwater swamps and lakes. White-bellied Sea-Eagles are normally seen perched high in a tree, or soaring over waterways and adjacent land. Birds form permanent pairs that inhabit territories throughout the year. They feed mainly off aquatic animals, such as fish, turtles and sea snakes, but it takes birds and mammals as well. It is a skilled hunter, and will attack prey up to the size of a swan. Sea-Eagles also feed on carrion (dead prey) such as sheep and fish along the waterline.

The species has been recorded numerous times at the Newington Nature Reserve on the southern bank of the Parramatta River, not far from the subject site. Near the subject site there is some marginal foraging habitat for this species. It is considered that the proposed activity will not have an adverse effect on the life cycle of the species to the extent that a viable local population of the species is likely to be placed at risk of extinction.

Calidris canutus **Red Knot**

The red knot is a medium-sized shorebird which breeds in tundra and the Arctic Cordillera in the far north of Canada, Europe, and Russia. It is a large member of the *Calidris* sandpipers, second only to the great knot. Their diet varies according to season; arthropods and larvae are the preferred food items at the breeding grounds, while various hard-shelled molluscs are consumed at other feeding sites at other times. North American breeders migrate to coastal areas in Europe and South America, while the Eurasian populations winter in Africa, Papua New Guinea, Australia, and New Zealand. This species forms enormous flocks when not breeding.

Near the subject site there is some marginal foraging habitat for this species. The species is fairly commonly recorded at the Newington Nature Reserve and it is considered that the proposed activity will not have an adverse effect on the life cycle of the species to the extent that a viable local population of the species is likely to be placed at risk of extinction.

Calidris ferruginea **Curlew Sandpiper**

The Curlew Sandpiper is a small (18-23 cm), highly-gregarious, migratory shorebird with a medium-length, down-curved bill and longish black legs. The Curlew Sandpiper breeds in Siberia and migrates

to Australia (as well as Africa and Asia) for the non-breeding period, arriving in Australia between August and November, and departing between March and mid-April. It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts.

The species has been recorded numerous times at the Newington Nature Reserve on the southern bank of the Parramatta River, not far from the subject site. Near the subject site there is some marginal foraging habitat for this species. It is considered that the proposed activity will not have an adverse effect on the life cycle of the species to the extent that a viable local population of the species is likely to be placed at risk of extinction.

Limosa limosa **Black-tailed Godwit**

The Black-tailed Godwit is a migratory wading bird that breeds in Mongolia and Eastern Siberia and flies to Australia for the southern summer, arriving in August and leaving in March. In NSW, it is most frequently recorded at Kooragang Island (Hunter River estuary), with occasional records elsewhere along the coast, and inland. Usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats.

Near the subject site there is some marginal foraging habitat for this species. The species is fairly commonly recorded at the Newington Nature Reserve and it is considered that the proposed activity will not have an adverse effect on the life cycle of the species to the extent that a viable local population of the species is likely to be placed at risk of extinction.

Numenius madagascariensis **Eastern Curlew**

Within Australia, the Eastern Curlew has a primarily coastal distribution. The Eastern Curlew breeds in Russia and north-eastern China but its distribution is poorly known. During the non-breeding season a few birds occur in southern Korea and China, but most spend the non-breeding season in north, east and south-east Australia. It generally occupies coastal lakes, inlets, bays and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts.

Near the subject site there is some marginal foraging habitat for this species. The species is fairly commonly recorded at the Newington Nature Reserve and it is considered that the proposed activity will not have an adverse effect on the life cycle of the species to the extent that a viable local population of the species is likely to be placed at risk of extinction.

Ninox strenua **Powerful owl**

This species breeds in open or closed, wet or dry sclerophyll forests and woodlands. It nests in hollows in large old trees, usually living eucalypts within or below the canopy. Powerful Owls are sedentary with a home range around 1000 hectares where they feed mainly on medium sized species of arboreal marsupials that are most readily available (Reid et al, 2004).

Near the subject site there is some marginal foraging habitat for this species. The species is commonly recorded in the LGA however it is considered that the proposed activity will not have an adverse effect on the life cycle of the species to the extent that a viable local population of the species is likely to be placed at risk of extinction.

Epthianura albifrons **White-fronted Chat**

The White-fronted Chat is an endemic Australian passerine bird, 12 cm in length and weighing approximately 13 g. It has a short slender bill, long spindly legs, a short square-tipped tail and rounded wings. Along the coastline, it is found predominantly in saltmarsh vegetation but also in open grasslands and sometimes in low shrubs bordering wetland areas. 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. 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. Nests are usually built about 23 cm above the ground (but have been found up to 2.5 m above the ground).

The species has been recorded numerous times at the Newington Nature Reserve on the southern bank of the Parramatta River within the vicinity of the subject site. The estuarine communities near the subject site provide minimal foraging & roosting habitat for this species. It is considered that the proposed activity will not have an adverse effect on the life cycle of the species to the extent that a viable local population of the species is likely to be placed at risk of extinction.

Artamus cyanopterus cyanopterus **Dusky Woodswallow**

The Dusky Woodswallow is often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests. At sites where Dusky Woodswallows are recorded the understorey is typically open with sparse eucalypt saplings, acacias and other shrubs, including heath. The ground cover may consist of grasses, sedges or open ground, often with coarse woody debris.

Near the subject site there is some marginal foraging habitat for this species. The species is rarely recorded in the LGA and it is considered that the proposed activity will not have an adverse effect on the life cycle of the species to the extent that a viable local population of the species is likely to be placed at risk of extinction.

Fauna: Mammalia

Pteropus poliocephalus **Grey headed flying fox**

This species inhabits a wide range of habitats including rainforest, mangroves, paperbark swamps, wet and dry sclerophyll forests and cultivated areas. Several species that form the diet of this flying fox were present nearby to the site, including eucalypts and angophoras.

Nearby vegetation provides some suitable foraging habitat for this species and it is often recorded within the LGA including at several “camps”. Suitable and extensive habitat is located nearby, and would provide the majority of the local habitat and food sources for this species. It is considered that the proposed activity would not have an adverse effect on the life cycle of the species to the extent that a viable local population of the species is likely to be placed at risk of extinction.

Miniopterus schreibersii oceanensis **Eastern bentwing bat**

This species forages above and below the canopy within open forests and woodlands, feeding on small insects. It roosts in caves, old mines, old buildings, stormwater drains and under bridges. Breeding

centres around maternity caves which must have suitable temperature, humidity and size to permit breeding (Churchill, 1998).

There is some suitable foraging habitat for this species and it has been recently recorded in the LGA (Applied Ecology 2010-2012). It is considered that the proposed activity is not likely to have an adverse effect on the life cycle of the species to the extent that a viable local population of the species is likely to be placed at risk of extinction.

Myotis macropus **Southern Myotis**

now most often referred to as Myotis macropus or the Southern Myotis, but has previously been called the Large-footed Myotis (M. adversus). It has disproportionately large feet; more than 8 mm long, with widely-spaced toes which are distinctly hairy and with long, curved claws. The Southern 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.

There is some suitable foraging habitat for this species and it has been recently recorded in the LGA (Applied Ecology 2010-2012). It is considered that the proposed activity is not likely to have an adverse effect on the life cycle of the species to the extent that a viable local population of the species is likely to be placed at risk of extinction.

Matter [2]

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

No endangered populations were recorded on or near the proposed works site. It is considered that the proposed action is not likely to have an adverse effect on the life cycle of the species that constitutes any endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

Matter [3]

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

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

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

There are no critically endangered ecological communities present on or near the proposed works site**. There is one endangered ecological community present- Coastal saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions-** near the boundary of the proposed work site. It is considered that the proposed action is not likely to substantially and adversely modify the

composition of this EEC (if mitigation measures identified in this REF are implemented) and as such that its local occurrence is not likely to be placed at risk of extinction.

Matter [4]

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

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

There will be minimal disturbance during the construction phase, with potential for ongoing disturbance during the management of the site. Provided recommended mitigation actions (or similar) are incorporated into the design of the project, these should be kept to a minimum

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

No additional fragmentation or isolation is anticipated by the proposed works.

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

The habitat value of the carpark area to be disturbed is considered to be very limited as it has already highly degraded.

Matter [5]

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

No direct or indirect impact is likely for critical habitat from the proposed works.

Matter [6]

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

No existing applicable recovery or threat abatement plan is relevant for the proposed works.

Matter [7]

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

Key threatening processes

Of the thirty eight key threatening processes described in Schedule 3 of the Threatened Species Conservation Act 1995, four are potentially applicable to the proposed works. These are threats associated with the accidental transfer of seed propagules and pathogens from affected areas to unaffected areas in mud carried on cars and trucks, and boots of workers and visitors and include:

- Infection of frogs by amphibian chytrid fungus causing the disease chytridiomycosis
- Infection of native plants by Phytophthora cinnamomi;

- Introduction and Establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae
- Invasion of native plant communities by exotic perennial grasses

Table 14. Threatened Species Conservation Act 1995 Schedule 3- Key Threatening Processes Assessment.

Threatened Species Conservation Act 1995 **Schedule 3 Key threatening processes**	**Applicable to proposed works**
Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners, Manorina melanocephala (Latham, 1802)	No
Alteration of habitat following subsidence due to longwall mining	No
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands (as described in the final determination of the Scientific Committee to list the threatening process)	No
Anthropogenic Climate Change	No
Bushrock removal (as described in the final determination of the Scientific Committee to list the threatening process)	No
Clearing of native vegetation (as defined and described in the final determination of the Scientific Committee to list the key threatening process)	No
Competition and grazing by the feral European Rabbit, *Oryctolagus cuniculus (L.)*	No
Competition and habitat degradation by Feral Goats, *Capra hircus* Linnaeus 1758	No
Competition from feral honey bees, *Apis mellifera* L.	No
Death or injury to marine species following capture in shark control programs on ocean beaches (as described in the final determination of the Scientific Committee to list the key threatening process)	No
Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments (as described in the final determination of the Scientific Committee to list the key threatening process)	No
Forest Eucalypt dieback associated with over-abundant psyllids and bell miners	No
Herbivory and environmental degradation caused by feral deer	No
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	No
Importation of Red Imported Fire Ants *Solenopsis invicta* Buren 1972	No
Infection by Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species and populations	No
Infection of frogs by amphibian chytrid fungus causing the disease chytridiomycosis	Potential
Infection of native plants by *Phytophthora cinnamomi*	Potential
Introduction and Establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae	Potential
Introduction of the Large Earth Bumblebee *Bombus terrestris* (L.)	No
Invasion and establishment of exotic vines and scramblers	No
Invasion and establishment of Scotch Broom (*Cytisus scoparius*)	No
Invasion and establishment of the Cane Toad (*Bufo marinus*)	No
Invasion of native plant communities by African Olive *Olea europaea* subsp. *cuspidata* (Wall. ex G. Don) Cif.	No
Invasion, establishment and spread of Lantana (*Lantana camara* L. *sens. lat*)	No
Invasion of native plant communities by *Chrysanthemoides monilifera*	No
Invasion of native plant communities by exotic perennial grasses	Potential

Threatened Species Conservation Act 1995 **Schedule 3 Key threatening processes**	**Applicable to proposed works**
Invasion of the Yellow Crazy Ant, *Anoplolepis gracilipes* (Fr. Smith) into NSW	No
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	No
Loss of hollow-bearing trees	No
Loss or degradation (or both) of sites used for hill-topping by butterflies	No
Predation and hybridisation of feral dogs (*Canis lupus familiaris*)	No
Predation by *Gambusia holbrooki* Girard, 1859 (Plague Minnow or Mosquito Fish) (as described in the final determination of the Scientific Committee to list the threatening process)	No
Predation by the European Red Fox *Vulpes Vulpes* (Linnaeus, 1758)	No
Predation by the Feral Cat *Felis catus* (Linnaeus, 1758)	No
Predation by the Ship Rat *Rattus rattus* on Lord Howe Island	No
Predation, habitat degradation, competition and disease transmission by Feral Pigs, *Sus scrofa* Linnaeus 1758	No
Removal of dead wood and dead trees	No

SUMMARY OF 7 PART TEST

No threatened species were recorded on the subject site. Several threatened species were recorded within a 10km2 cell centred on the subject site, however, it is considered that the proposed activity is not likely to have an adverse effect on the life cycle of these species to the extent that a viable local population of any of these species is likely to be placed at risk of extinction.

Populations of Green and Golden Bell Frogs exist in the adjoining area, west of the subject site, and located in an area described in recent vegetation mapping as “artificial wetlands”. A saltmarsh species, *Wilsonia backhousei*, is located on the foreshores of Haslams Creek and areas around its confluence with Homebush Bay. Consideration needs to be given to both these species in the design of aspects of construction and management of the proposed wave park.

No threatened populations were recorded on or near the subject site. One endangered ecological community is located in the vicinity of the subject site. Areas of Estuarine Saltmarsh EEC has been recorded along the lower extent of Haslams Creek, within the tidal limit, and on foreshore areas of Homebush Bay. These saltmarsh patches may also be affected by some activities associated with the operation of the wave park, although it is unlikely that this would put the community at risk of local extinction. No key habitat was recorded within the vicinity of the subject site.

DISCUSSION AND RECOMMENDATIONS

Assessing impacts

The Threatened Species Assessment Guidelines (DECCW, 2007) outlines the requirements for considering a species in an Assessment of Significance. A species does not have to be considered as part of the assessment of significance if adequate surveys or studies have been carried out that clearly show that the species:

- does not occur in the study area, or
- will not use on-site habitats on occasion, or
- will not be influenced by off-site impacts of the proposal.

Otherwise all species likely to occur in the study area (based on general species distribution information), and known to use that type of habitat, should be considered in the rationale that determines the list of threatened species, populations and ecological communities for the assessment of significance.

Under the NSW Threatened Species Conservation Act, impacts may be considered to be direct impacts or indirect impacts. **Direct impacts** are those that directly affect the habitat and individuals. They include, but are not limited to, death through predation, trampling, poisoning of the animal/plant itself and the removal of suitable habitat. When applying each factor, consideration must be given to all of the likely direct impacts of the proposed activity or development. **Indirect impacts** occur when project-related activities affect species, populations or ecological communities in a manner other than direct loss. Indirect impacts can include loss of individuals through starvation, exposure, predation by domestic and/or feral animals, loss of breeding opportunities, loss of shade/shelter, deleterious hydrological changes, increased soil salinity, erosion, inhibition of nitrogen fixation, weed invasion, fertiliser drift, or increased human activity within or directly adjacent to sensitive habitat areas. As with direct impacts, consideration must be given, when applying each factor, to all of the likely indirect impacts of the proposed activity or development.

The threatened species assessment of significance should not be considered a 'pass or fail' test. Instead, consideration of the factors will inform the decision-making process of the likelihood of significant effect. Where necessary, the process will trigger further assessment in the form of a species impact statement. In determining the nature and magnitude of an impact, the following matters were considered:

- pre-construction, construction and occupation/maintenance phases
- all on-site and off-site impacts, including location, installation, operation and maintenance of auxiliary infrastructure and fire management zones
- all direct and indirect impacts
- the frequency and duration of each known or likely impact/action
- the total impact which can be attributed to that action over the entire geographic area affected, and over time
- the sensitivity of the receiving environment
- the degree of confidence with which the impacts of the action are known and understood.

Recovery and threat abatement plans, priorities action statements, threatened species profiles and other fact sheets prepared for threatened species and endangered communities in NSW provide further guidance on whether an action or activity is likely to be significant. Due to the cumulative nature of impacts within a community or for a species, it is important to reduce the overall severity of the impact. Biodiversity offsets are measures that benefit biodiversity by compensating for the adverse impacts elsewhere of an action. Determining the correct measure for reducing the net exent of impacts for a species or community is identified through the mitigation hierarchy (OEH, 2016).

The mitigation hierarchy

The mitigation hierarchy serves to meet the environmental policy principle of "No Net Loss" of biodiversity alongside development (Gardner et al, 2013). Offsetting is generally considered the final stage in a mitigation hierarchy, whereby predicted biodiversity impacts must first be avoided, minimised and reversed by developers, before any remaining impacts are offset. In NSW, OEH has developed a framework for considering biodiversity impacts and appropriate offset requirements. The first, and most relevant of these, is:

1. **Impacts must be avoided first by using prevention and mitigation measures.** Offsets are then used to address the remaining impacts. This may include modifying the proposal to avoid an area of biodiversity value or putting in place measures to prevent offsite impacts.

The following section provides a list of prevention and mitigation measures that are recommended for this project. Any residual impacts should be identified through the preparation of an Environmental Impact Statement (EIS), at which stage it may become relevant to consider offsetting.

Prevention and mitigation measures

Recommended mitigation measures for the above impacts are outlined in the following table.

POTENTIAL IMPACT	MITIGATION MEASURES
Emergency lagoon discharge (wastewater disposal)	Water quality of discharge needs to consider the existing environment. While there is no expectation of wastewater discharge, this needs to be considered as a potential impact from accidental or catastrophic discharge, or for maintenance overhaul. Lagoon water will be maintained at a level of compliance with ANZECC (2000) guidelines for primary contact. This will ensure that the impacts on the local ecology are kept to a minimum in the event of discharge. ⇨ Integrated Water Management Plan prepared (Urbaqua, 2017) ⇨ Compliance with SOPA's Stormwater Management and Water Sensitive Urban Design Policy indicated in IWMP ⇨ NSW EPA advise that the proposal does not constitute a Scheduled Activity under Schedule 1 of the Protection of the Environment Operations Act 1997.
Stormwater runoff	The volume of stormwater likely to be generated from the proposed wave park site will be reduced to about half the existing level, including from the carpark and other hardstand areas. This will continue to be discharged to the Narawang wetland following appropriate treatment based on MUSIC modelling. An Integrated Water Management Plan has been developed for the project, and the proposed stormwater drainage will mimic existing flow paths, so that no adverse water quality impacts are expected for Narawang wetland. ⇨ Integrated Water Management Plan prepared (Urbaqua, 2017) ⇨ Compliance with SOPA's Stormwater Management and Water Sensitive Urban Design Policy indicated in IWMP
Light pollution	Light pollution issues include light trespass and over-illumination. If the site is properly designed and managed these impacts can be kept to a minimum. The proposal will need to consider lighting luminaire design and orientation so that light spill in minimised. See below for more information. ⇨ Detailed design to acknowledge the measures taken to manage potential impacts from lighting
Noise pollution	The main noise sources associated with the development were identified as follows: • Waves • Wave generating plants

	• General building services (eg. Air conditioning, etc) • Patron noise • Ambient music noise • Vehicle movement noise The Noise Impact Assessment (Wood & Grieve Engineers, 2017) used night time criterion as the noise target at the boundary for the nearest sensitive receivers to identify a number of noise mitigation measures. ⇨ Ensure the noise mitigation measures proposed in the Noise Impact Assessment are implemented through detailed design and operation Wood and Grieve (2017) found that no significant impacts would be expected for nearby sensitive receivers.
Fauna using swales on site	These include blue-tongues and other lizards. A suitably licenced and experienced ecologist should be on site to ensure that these animals are rescued and relocated prior to construction works. Timing of works is essential – rescue and relocation may need to be undertaken during decommissioning of the swales. Removal of gabions will need to accommodate ⇨ Ecologist on site before/during removal of gabions
GGBF entering the site during construction	GGBF have been recorded on the subject site during regular surveys conducted by SOPA. These may be encouraged by extended wet periods to venture beyond the Narawang wetland. Monitor for calls on site during and immediately after extended rain events. Project CEMP to include monitoring after high rainfall and an emergency plan to exclude GGBF from the works site during construction. Suitable responses would be temporary frog exclusion fencing (such as sediment fencing), for example, after high rainfall during mating season. ⇨ Project CEMP to address excluding GGBF from works areas
Landscape planting	Landscaping species should be drawn primarily from the mapped vegetation nearest to the subject site, and that is most suitable to the developed environment. For example, to supplement Sydney Turpentine Ironbark Forest EEC nearby, canopy species would include Turpentines and Ironbarks, and understorey species would include Acacias common to this forest community, etc. This will create a useful ecological buffer, and would provide additional habitat resources to the area as well as the normal landscaping outcomes. ⇨ Prepare a site PLANTING PLAN using appropriate landscaping species from the Sydney Turpentine Ironbark Forest vegetation community

Integrated Water Management Plan (IWMP)

An IWMP was prepared for the proposed development by Urbaqua (2017), based on the SOPA Stormwater Management and Water Sensitive Urban Design Policy to reflect site specific characteristics and requirements of the site and proposal. These included:

- Maximise harvest and reuse of roof water
- Minimise volume and frequency of stormwater discharge from hardstand areas and maximise quality of stormwater discharged
- Water conservation
- Riparian protection

Urbaqua noted that there are no creeks, rivers, lakes or estuaries within 40 m of the site. However, the site currently drains to the Narawang Wetlands approximately 80m to the north of the site via culverts beneath Hill Road. The environmental importance of the wetlands and strategies for their protection were considered in the preparation of the IWMP. Key environmental assets considered included Narawang Wetland, Haslams Creek, Nuwi Wetland and Newington Nature Reserve.

The IWMP notes the potential environmental impacts outlined in this Flora and Fauna report, and provides a series of management strategies that address these impacts. These include:

1) Wastewater discharge – no wastewater discharge to the environment, all domestic and lagoon wastewater to be discharged via the sewer
2) Lagoon water discharge – via the existing drainage system to the Nuwi wetland. Quantity of discharge will be managed at less than 130L/s so that it is comparable to a 1 year ARI rainfall event and will not exceed the capacity of the existing drainage system, and the quality of the lagoon water will comply with ANZECC guidelines for primary contact.
3) Stormwater runoff – peak discharge rates will be reduced from current levels, currently discharging to Narawang Wetland. The modelled stormwater flow rates show a reduction to nearly half the existing rates for 1, 20 and 100-year ARI rainfall events. The net environmental impact of this reduction in stormwater input for the Narawang Wetland is expected to be negligible. Quality of stormwater will be managed using best practice WSUD based on MUSIC modelling for the site.
4) Habitat loss – minor loss of habitat through decommissioning of some of the existing stormwater bioswales (gabion lined channels). Impacts to be managed through application of methodology developed by ecologist.
5) Weed incursion – landscaping to include weed control throughout the impacted area, and revegetation with appropriate species that are sympathetic to the ecology of the surrounding natural areas.

These measures will ensure that there is no net impact expected from stormwater or wastewater for the natural environment as a result of the proposed works.

Emergency lagoon discharge point

Recommended location for a stabilised wastewater discharge point needs to minimise impacts on Estuarine Saltmarsh EEC and *Wilsonia backhousei*, a threatened species. The preferred route and discharge location are shown in Figure 43. The discharge point will be via an existing stormwater outlet to Nuwi Wetland, near the Hill Rd bridge crossing, and was selected in consultation with K. Darcovich and S. Hamilton from SOPA. We recommended the application of relevant water sensitive urban design elements to manage the quality of water discharged from the wave park and surrounds. These elements are included in the Integrated Water Management Plan. In conjunction with proposed limitations on discharge rates, this is expected to minimise any potential environmental impacts for the wetland.

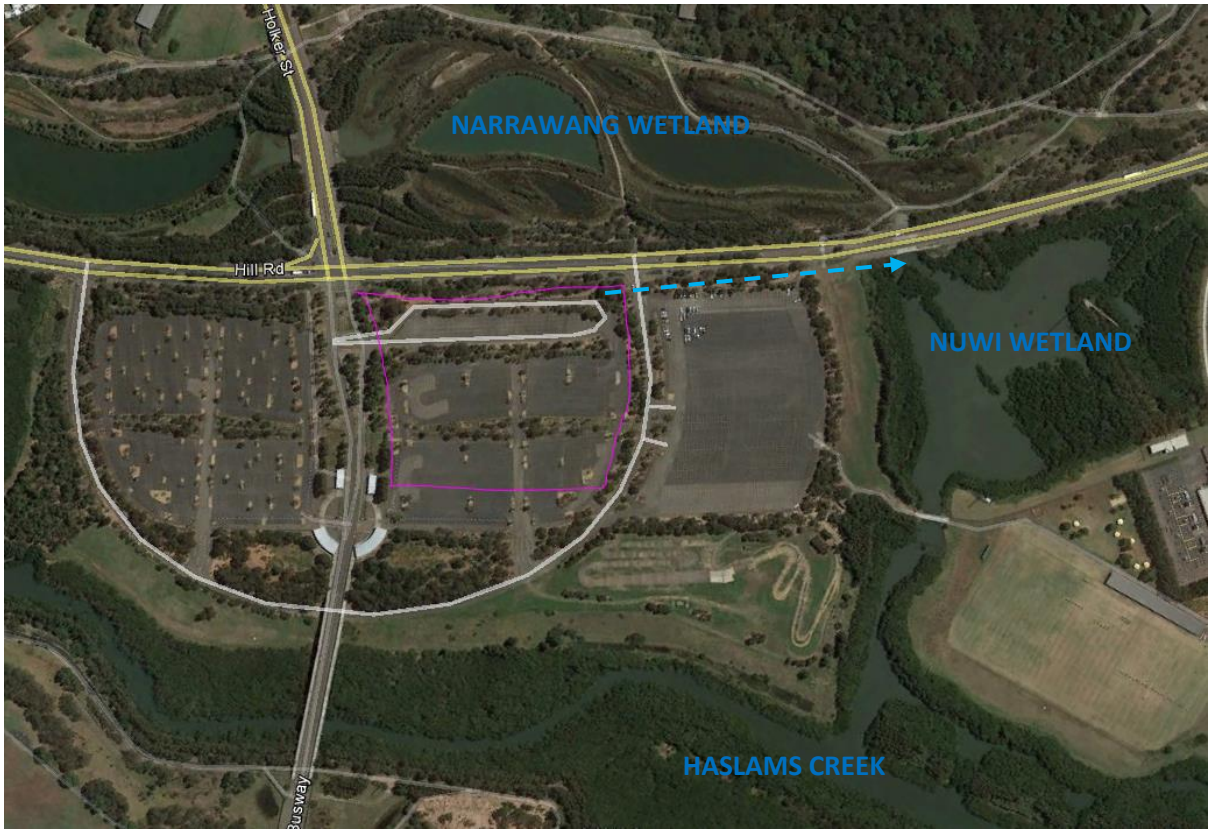


Figure 43 Preferred route and discharge location for emergency lagoon discharge point

Light pollution management

We recommend using full-cutoff fixtures (all light directed downward — no light emitted upward) and fitted with energy efficient lamps. Sign-lighting should preferably be aimed down on signs—not upwards. Outdoor security, and display lighting should be fitted with quality shielded flood lights and fitted with efficient lamps directing light at the target area only. All public lighting installations need to comply with:

- Australian Standard AS 4282: 1997 Control of the Obtrusive Effects of Outdoor Lighting
- Australian Standard AS/NZS1158 Road Lighting (Parts 1,2 and 3)

Gerard Lighting (2017) have identified the following points with respect to lighting management for the Wave Park:

- The venue is intended to operate up to 10pm (changing seasonally). The design anticipates the inclusion of five 25m high sports lighting poles (designed to address safety requirements).
- Best practice measures described in "AS4282 1997 – Control of obtrusive effects of outdoor lighting" have been applied in the design and will be adhered to in construction and operation. Modern HD LED technology allows temperature control (to reduce attraction of insects), dimmable, reduces glare, is dimmable, and is focused by baffles.
- The proposal site itself is zoned for Sport and Recreation use. The existing carpark is already illuminated at night with parking flood lights. There are no known onsite sensitive receptors.
- The nearest sensitive receptor is the fauna that inhabits Narrawang Wetlands to the north of Hill Road.
- Three scenarios have been modelled to determine the potential offsite impacts of the proposed sports lighting at the edge of Hill Road's road reserve at the interface of the

Narrawang Wetlands. Note Hill Road's road reserve is planted and occupied by relatively dense eucalypts at an approximate average height of 10m shielding light with foliage conservatively assumed at 50% density (although observed to be denser). The effect of this verge side vegetation has been emulated through the creation of a 10m high vertical mesh.

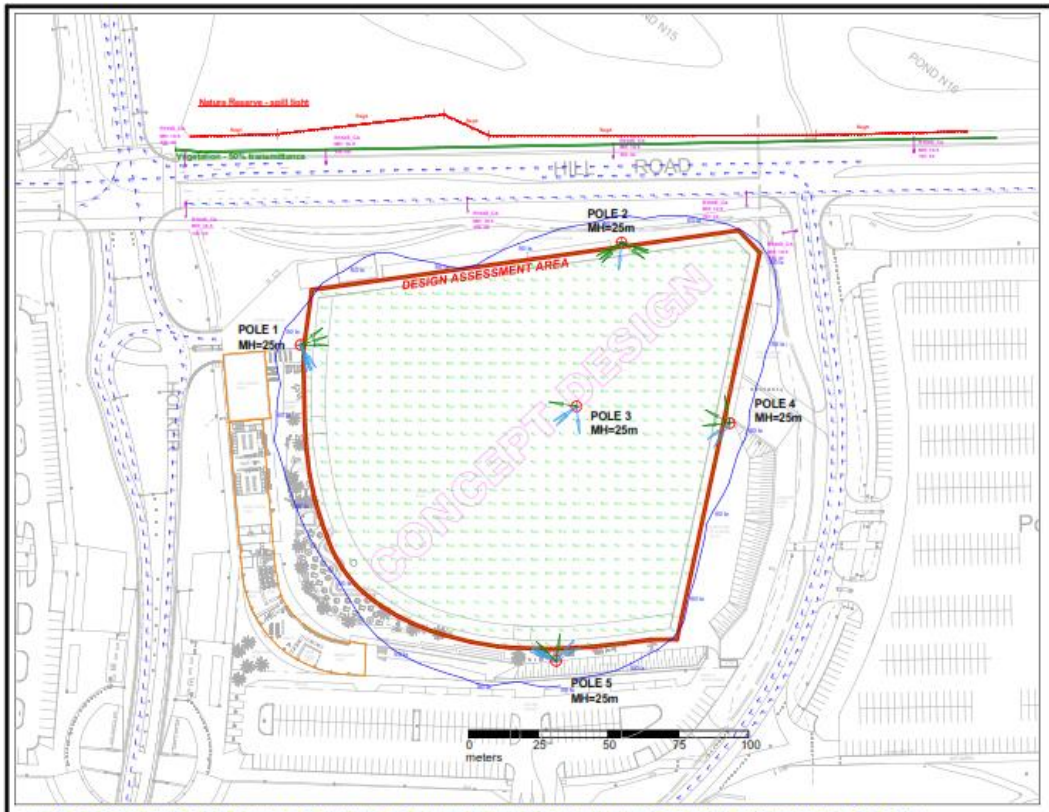
1. PLAN 1: EXISTING light modelled to be generated from street lights on Hill Road. This excludes additional light generated by car headlights and other potential sources. Assumptions on the specifications of the street lights are contained on the plan within. The light generated by street lights on Hill Road itself are modelled to be up to 6.2 lux.
2. PLAN 2: PROPOSED sports lighting (only). Best practice measures have been included in the design, specifically for lighting of sensitive environments (described above).
3. PLAN 3: COMBINES the existing and the proposed sports lighting.

The Narrawang Wetland interface is divided into 5 segments (Figure 44), and the three lighting plans described above were assessed. Of most interest in Plan 3, which incorporates the existing light levels with the modelled light levels expected during operation of the wave park (Figure 45). The modelled Lux levels for the existing, proposed sports lights (only) and combined (to measure the significance of the potential impact) is shown in the table below.

Table 15 Modelled lux levels for proposed Wave Park development

	Plan 1	Plan 2	Plan 3
	EXISTING (Max Lux)	**PROPOSED (Max Lux)**	**COMBINED (Max Lux)**
SEGMENT 1	0.6	0.2	0.8
SEGMENT 2	0.4	0.3	0.5
SEGMENT 3	0.6	0.2	0.9
SEGMENT 4	0.6	0.5	1.1
SEGMENT 5	0.4	0.1	0.4

Based on the above, potential impacts to the habitat within the Narrawang Wetlands are considered to be insignificant when considered in the context of existing street lighting.



THIS DESIGN HAS NOT BEEN ACHIEVED TO MEET THE REQUIREMENTS OF ANY AUSTRALIAN SPORT LIGHTING STANDARD.

THIS DESIGN HAS BEEN PRODUCED AS PER THE REQUESTS OF THE CLIENT. THE CLIENT REQUESTED A MINIMUM HORIZONTAL POINT ILLUMINANCE AT GROUND LEVEL OF Eph=50lx (surf lagoon only).

Luminaire Schedule

Project: Floods

Symbol	Qty	Label	Arrangement	LLF	Description	Total Watts	Lum. Lumens	Arm	CIE Type	IES Class
	15	Ra3	SINGLE	0.800	SR4H840A2 4000K CRI80 Flat Glass	19200	113956	0	Direct	Type III
	15	Ra3b	SINGLE	0.800	SR4H840A2 with Baffle	19186.5	107018	0	Direct	Type III

Design Notes

For further calculations or details please consult your GPS representative.

A maintenance factor of 0.8 has been applied to all IP6x luminaires. A maintenance policy should be adopted to support the maintenance factor of 0.80.

Mounting height MH - refers to the height above the pool surface from the luminaire.

Obstructions such as fences HAVE NOT BEEN INCLUDED in this lighting calculation.

AS4282 1997 - "Control of the obtrusive effects of outdoor lighting"
LIGHT TECHNICAL PARAMETERS - Pre-curfew hours
-> Ev Residential Areas - 10 lux maximum
-> Luminous Intensity Emitted - Level 2 control
-> Threshold Increment - 20% maximum

DESIGN ASSESSMENT - Street lights & floods SWITCHED ON
Vertical spill illuminance has been calculated on the boundaries as shown from 0m to 25m above ground level (1 x 1m increment grid). The maximum calculated vertical illuminance with floods switched on is 1.1lux maintained (1.375lux initial).

The maximum luminous intensity emitted per luminaire has been assessed using a large controlling dimension of >75 metres. The maximum elevation used in the design results in a maximum luminous intensity within Level 2 control limits.

Threshold increment has been calculated on the roadways. The maximum TI calculated is 11.6% based on an assumed roadway adaptation luminance of 1.0 cd/m2.

This represents a CONCEPT DESIGN ONLY; site and pole locations must be confirmed prior to installation.

ASSUMPTIONS:
We haven't received any clear indication regarding pole and luminaire types on Hill Rd; these have been assumed to be Sylvania Roadster 150W HPS Aeroscreen (located as per supplied CAD file).

Vegetation on Hill Rd (North boundary) has been included in the lighting design using a 50% transmittance factor.

Rev:	Date:	Comment:	By:	Chkd:	Appd:
Rev3	08.03.2017	Revised design based on clients request.	AP		
Rev2	07.03.2017	Revised design based on clients request.	AP		
Rev1	02.02.2017	Changed pole height, location & lux level	AP		

GERARD LIGHTING
N-112 Gow Street, Padstow NSW 2211
Ph: 1300-799-300

Project: URBNSURF Sydney		Rev: 3	Scale: 1:1500 / A3
Title: 50lux min MH=25m	Designer: AP	Date: 3/9/2017	Page No: Page 1 of 2
Client: WAVEPARK Group	Document No: 01-49771Rev3 - URBNSURF Sydney - concept lighting des		

Figure 44 Design assessment area and concept design notes for lighting plan for proposed Wave Park

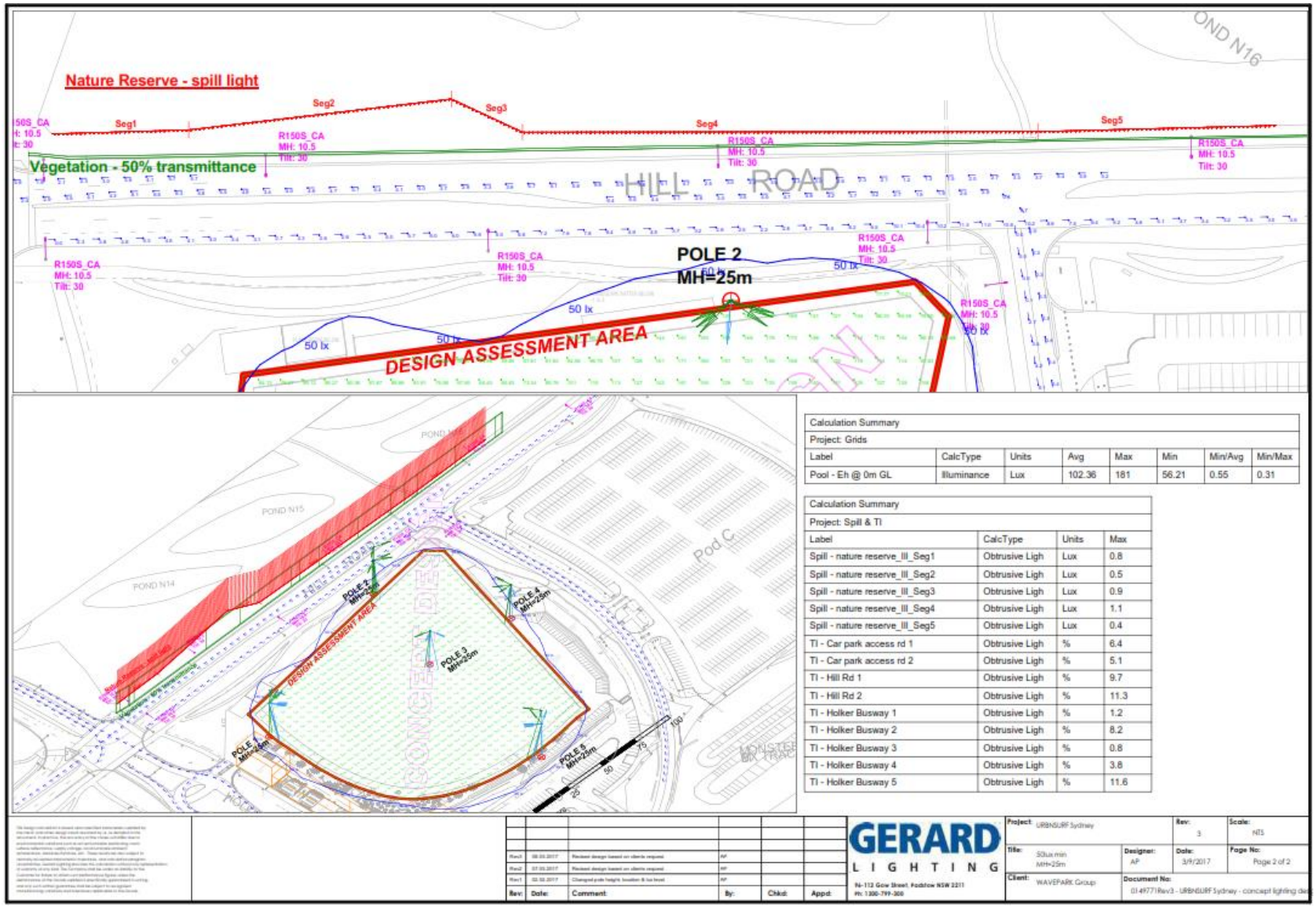


Figure 45 Design assessment area and summary of light spill calculations

Noise impact management

Noise impacts associated with the proposed development generally fall into three categories:

1. Construction
2. Operation
3. Traffic

Construction noise

Duration of allowed construction hours are summarised by Wood & Grieve (2017) from NSW Planning, and note that construction is limited to 7am to 7pm Monday to Friday, and 8am to 4pm on Saturday. This includes delivery of materials, and prohibits work on Sundays and public holidays, or outside these hours without written approval, unless at the direction of the police or in an emergency.

Construction noise impacts include increased noise levels, and continuous and impulsive vibrations. Vibrations can affect human comfort and have structural impacts on surrounding structures. Disturbance caused by vibration will depend on its duration and its magnitude. Vibration impact levels for human comfort are lower than those for structures. Vibration limits for structures are defined to minimise the risk of cosmetic surface cracks and are set below the levels that have the potential to cause damage to the main structure. A site specific CEMP needs to ensure that construction noise generation complies with these limits.

Operational noise

Operational noise levels are typically lower than construction noise levels. Operational noise is expected to include:

- Waves
- Wave generating plant
- General building plant and services (eg air conditioning units)
- Patron noise
- Ambient music noise

Night time criterion were used as the noise targets at the boundary of the nearest residential receivers. Predicted noise levels (44dB(A)) are within permissible limits.

Road traffic noise

Based on the predicted increase in traffic movement along Holker St and Hill Rd, the estimated increase in road traffic noise ranged from 0.0 to 0.3dB, with increases in noise levels peaking on weekends. This was found to be well within the maximum permissible increase level of 2db, therefore the proposed development complies with the requirements of NSW Road Noise Policy.

Potential ecological impacts of noise

Wood & Grieve (2017) made the following comment about the potential impacts from noise for fauna in Narrawang Wetland (p.20):

“In accordance with the model, the predicted noise emission from the operation of the Wave Park shows the compliances with the evening noise limit (i.e. between 6pm – 10pm). Therefore, it is in our opinion that the operation of the Wave Park will not cause a significant impact on the surrounding community and sensitive faunas located within the Narrawang Wetlands (located north of Hill Road).”

Landscape planting

The landscape design and planting plan is being prepared for the subject site by McGregor Coxall (2017). This includes a plant list for the planting plan (Table 16). *Livistona australis* and *Pandanus pedunculatus* are Australian palms or palm-like species but not endemic to the area, but will help to create the beach-like atmosphere through vegetation. *Carpobrotus glaucescens* is a succulent commonly found on back sand dunes and nearby areas, and will fulfil the same role. Most of the remaining species are drawn from the Sydney Turpentine Ironbark Forest (STIF) vegetation community. These are described in Table 16 as important **diagnostic** species for the community, **uninformative** – meaning they are often present but are generally widespread in Sydney's vegetation communities, or **other** – meaning they are not generally found in this community. For some of these 'other' species, a closely related alternative has been suggested that is a diagnostic species for STIF.

Table 16 Plant list for landscape design for wave park (McGregor Coxall, 2017)

TREE SPECIES	**STIF**	**COMMENTS**
Eucalyptus paniculata	diagnostic	
Livistona australis	other	
Pandanus pedunculatus	other	
Syncarpia glomulifera	diagnostic	
UNDERSTOREY/GROUNDCOVER		
Acacia longifolia	uninformative	consider using *Acacia floribunda*
Billardiera scandens	diagnostic	
Breynia oblongifolia	diagnostic	
Brunoniella australis	other	
Bursaria spinosa	diagnostic	
Carpobrotus glaucescens	other	
Cyperus gracilis	other	
Danthonia linkii	other	consider using *Rytidosperma tenuius*
Daviesia ulicifolia	diagnostic	
Dianella caerulea	diagnostic	
Dichelachne rara	other	consider using *Dichelachne micrantha*
Dodonaea triquetra	diagnostic	
Exocarpus cupressiformis	diagnostic	
Goodenia hederacea	uninformative	
Hardenbergia violacea	diagnostic	
Notelaea longifolia	diagnostic	
Pandorea pandorana	diagnostic	
Themeda australis	diagnostic	
Wahlenbergia gracilis	other	

CONCLUSION

The subject site is currently used as a car park, and is in an ecologically degraded condition. The main potential environmental impacts relate to the surrounding areas, which have threatened flora and fauna species, protected migratory species, and endangered ecological communities present. A series of recommendations have been made to minimise or mitigate impacts on these key ecological

assets, outlined in this report. These have been addressed through the preparation of an Integrated Water Management Plan (Urbaqua, 2017), a Lighting Plan (Gerard Lighting, 2017), a Noise Impact Management Plan (Wood & Grieve, 2017), and a Landscape Plan (McGregor Coxall, 2017).

Key points from each of these management plan designs and reports have been summarised in the previous section of this report. This clearly demonstrates that all reasonable efforts have been made to minimise any impacts on the surrounding natural environment.

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APPENDIX A

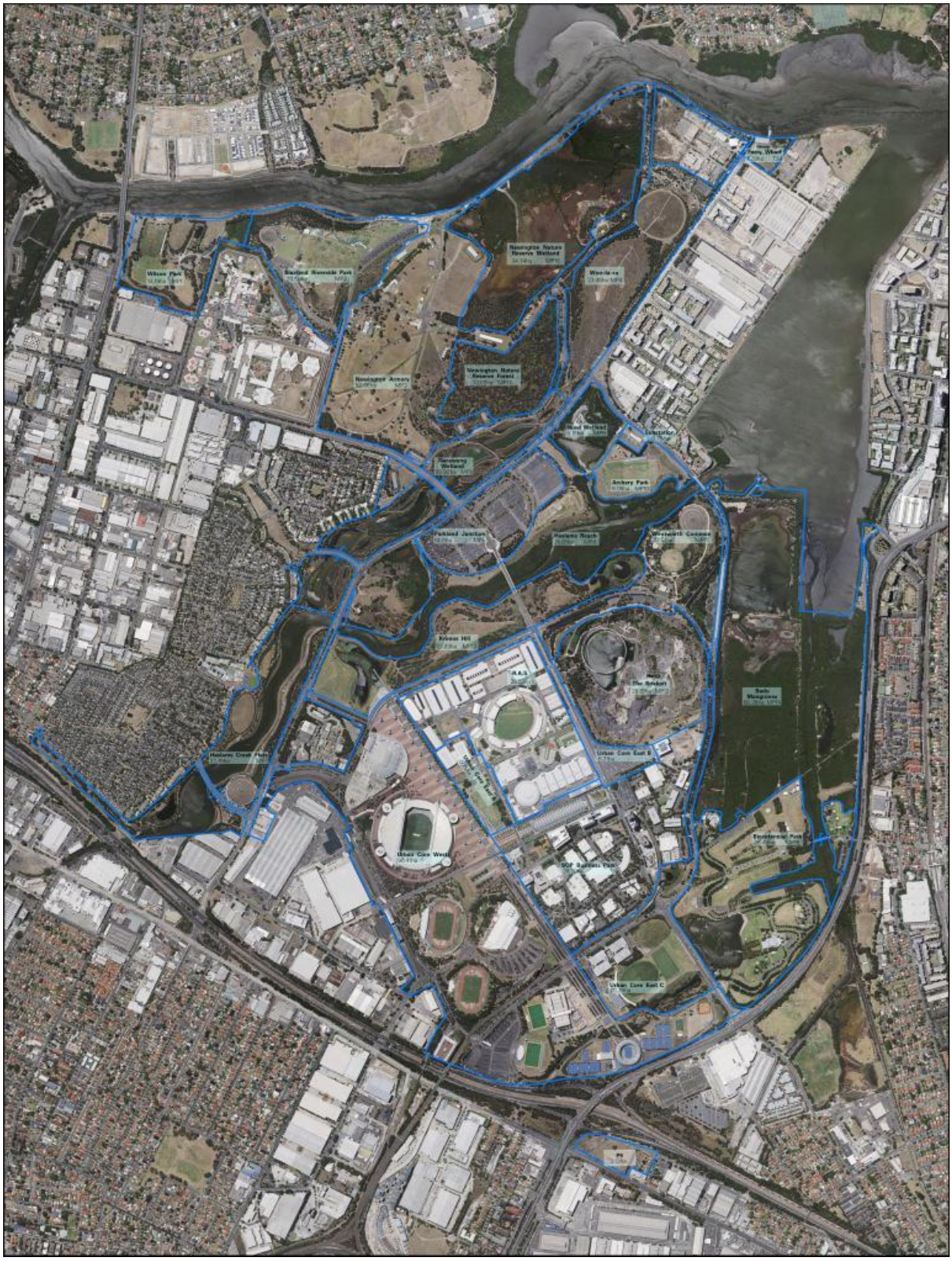

Figure 46 Location of precincts in Sydney Olympic Park

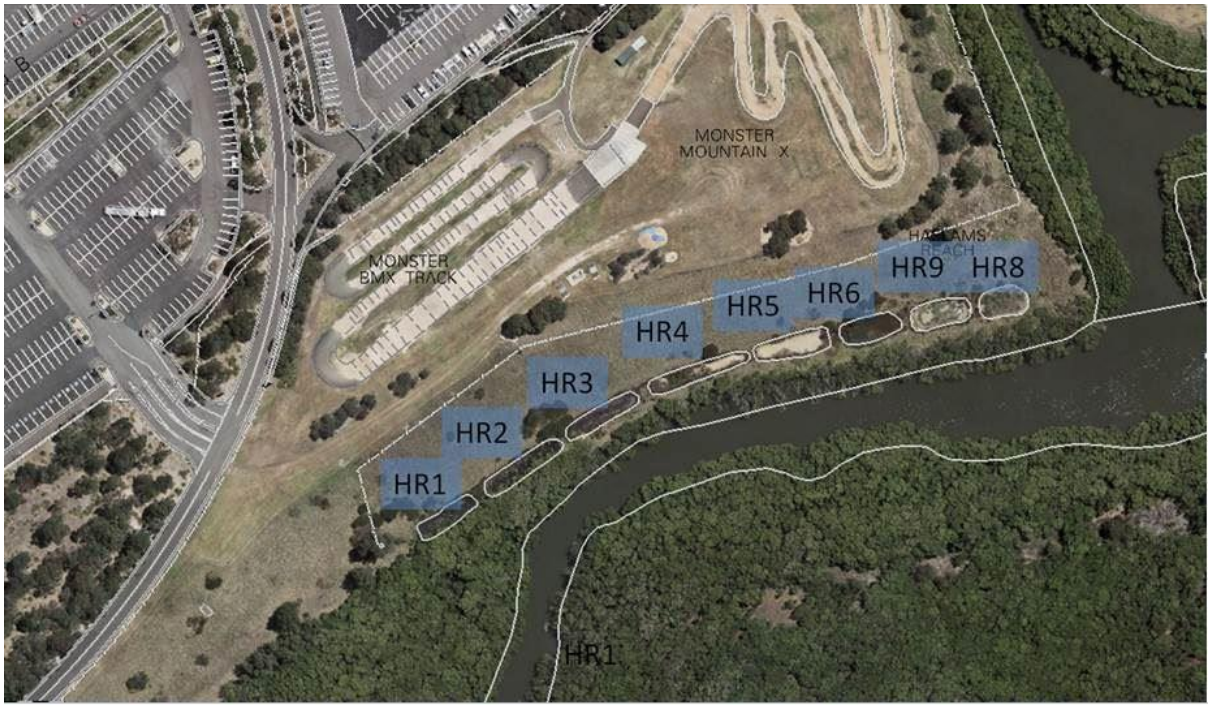

Figure 47 Location of ponds along Haslams Creek

Table 17 Fauna sighting records for MP05 Parklands Junction precinct, Sydney Olympic Park

RECORD_ID	SURVEY_DATE	COMMON_NAME	SCIENTIFIC_NAME	METHOD	WEATHER	WIND
11518	6/02/2002	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Calm
11521	6/02/2002	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Calm
11522	6/02/2002	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Calm
11687	6/02/2002	Australian Pelican	*Pelecanus conspicillatus*	Seen	Overcast	Calm
11828	6/02/2002	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
11830	6/02/2002	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
12213	6/02/2002	Australian White Ibis	*Threskiornis molucca*	Seen	Overcast	Calm
12469	6/02/2002	Black-faced Cuckoo-Shrike	*Coracina novaehollandiae*	Seen	Overcast	Calm
35482	6/02/2002	Great Cormorant	*Phalacrocorax carbo*	Seen	Overcast	Calm
41974	7/02/2002	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Raining	Calm
42131	7/02/2002	Willie Wagtail	*Rhipidura leucophrys*	Seen	Raining	Calm
51773	7/02/2002	Silver Gull	*Larus novaehollandiae*	Seen	Raining	Calm
52856	7/02/2002	Welcome Swallow	*Hirundo neoxena*	Seen	Raining	Calm
11519	14/04/2002	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
11520	14/04/2002	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm

11686	14/04/2002	Australian Pelican	*Pelecanus conspicillatus*	Seen	Clear	Calm
11825	14/04/2002	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
11826	14/04/2002	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
11827	14/04/2002	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
11829	14/04/2002	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
12212	14/04/2002	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Calm
12214	14/04/2002	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Calm
12215	14/04/2002	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Calm
12216	14/04/2002	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Calm
12217	14/04/2002	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Calm
12218	14/04/2002	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Calm
12468	14/04/2002	Black-faced Cuckoo-Shrike	*Coracina novaehollandiae*	Seen	Clear	Calm
27847	14/04/2002	Common Starling	*Sturnus vulgaris*	Seen	Clear	Calm
36010	14/04/2002	Little Black Cormorant	*Phalacrocorax sulcirostris*	Seen	Clear	Calm
42130	14/04/2002	Willie Wagtail	*Rhipidura leucophrys*	Seen	Clear	Calm
51772	14/04/2002	Silver Gull	*Larus novaehollandiae*	Seen	Clear	Calm
88155	14/04/2002	Pied Currawong	*Strepera graculina*	Seen	Clear	Calm
88156	14/04/2002	Pied Currawong	*Strepera graculina*	Seen	Clear	Calm
20819	27/07/2002	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Light
49029	27/07/2002	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
17420	29/07/2002	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Light
21161	29/07/2002	Australian Raven	*Corvus coronoides*	Seen	Overcast	Light
13661	2/08/2002	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Light
21018	2/08/2002	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Light
49026	2/08/2002	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Light
21162	29/01/2003	Australian Raven	*Corvus coronoides*	Seen	Overcast	Light
20821	30/01/2003	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
20886	30/01/2003	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
21016	30/01/2003	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Calm
35485	30/01/2003	Great Cormorant	*Phalacrocorax carbo*	Seen	Clear	Calm
20887	24/04/2003	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
20820	30/07/2003	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Light

20884	30/07/2003	Australian Raven	*Corvus coronoides*	Seen	Clear	Light
20888	2/08/2003	Australian Raven	*Corvus coronoides*	Seen	Clear	Light
21017	2/08/2003	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Light
17383	27/01/2004	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Light
20885	27/01/2004	Australian Raven	*Corvus coronoides*	Seen	Clear	Light
21015	27/01/2004	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Light
49027	27/01/2004	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Light
17419	2/02/2004	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Light
17701	2/02/2004	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Calm
21163	2/02/2004	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
21164	2/02/2004	Australian Raven	*Corvus coronoides*	Seen	Overcast	Light
21245	2/02/2004	Australian White Ibis	*Threskiornis molucca*	Seen	Overcast	Calm
21246	2/02/2004	Australian White Ibis	*Threskiornis molucca*	Seen	Overcast	Light
33614	2/02/2004	House Sparrow	*Passer domesticus*	Seen	Overcast	Light
49028	2/02/2004	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Calm
12727	19/03/2004	Black-shouldered Kite	*Elanus axillaris*	Seen		
42903	22/04/2004	Zebra Finch	*Taeniopygia guttata*	Seen		
12726	18/05/2004	Black-shouldered Kite	*Elanus axillaris*	Seen		
19909	21/09/2004	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
35940	21/09/2004	Laughing Kookaburra	*Dacelo novaeguineae*	Seen	Clear	Calm
43149	21/09/2004	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Calm
27157	28/09/2004	Chestnut Teal	*Anas castanea*	Seen	Raining	Calm
46273	28/09/2004	Silver Gull	*Larus novaehollandiae*	Seen	Raining	Calm
46274	12/10/2004	Silver Gull	*Larus novaehollandiae*	Seen	Clear	Calm
54127	12/10/2004	Masked Lapwing	*Vanellus miles*	Seen	Clear	Calm
32942	19/10/2004	Golden-headed Cisticola	*Cisticola exilis*	Seen	Overcast	Calm
39332	19/10/2004	Galah	*Eolophus roseicapillus*	Seen	Overcast	Calm
39731	19/10/2004	Little Black Cormorant	*Phalacrocorax sulcirostris*	Seen	Overcast	Calm
94119	19/10/2004	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Overcast	Calm
20152	26/10/2004	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Calm
20206	26/10/2004	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
36728	26/10/2004	Masked Lapwing	*Vanellus miles*	Seen	Overcast	Calm

51774	26/10/2004	Silver Gull	*Larus novaehollandiae*	Seen	Overcast	Calm
94120	26/10/2004	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Overcast	Calm
20281	9/11/2004	Australian White Ibis	*Threskiornis molucca*	Seen	Overcast	Calm
46272	9/11/2004	Silver Gull	*Larus novaehollandiae*	Seen	Overcast	Calm
54233	9/11/2004	Little Black Cormorant	*Phalacrocorax sulcirostris*	Seen	Overcast	Calm
92286	9/11/2004	Pied Currawong	*Strepera graculina*	Seen	Overcast	Calm
16227	20/09/2005	Australian Raven	*Corvus coronoides*	Seen	Clear	Light
16872	20/09/2005	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Light
28339	20/09/2005	Darter	*Anhinga melanogaster*	Seen	Clear	Light
40698	20/09/2005	Willie Wagtail	*Rhipidura leucophrys*	Seen	Clear	Light
42864	20/09/2005	Yellow Thornbill	*Acanthiza nana*	Seen	Clear	Light
43150	20/09/2005	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Light
51775	20/09/2005	Silver Gull	*Larus novaehollandiae*	Seen	Clear	Light
53522	20/09/2005	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Light
20409	27/09/2005	Australian Raven	*Corvus coronoides*	Seen	Raining	Calm
41978	27/09/2005	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Raining	Calm
51782	27/09/2005	Silver Gull	*Larus novaehollandiae*	Seen	Raining	Calm
55535	27/09/2005	Little Wattlebird	*Anthochaera chrysoptera*	Seen	Raining	Calm
91772	27/09/2005	Pied Cormorant	*Phalacrocorax varius*	Seen	Raining	Calm
94828	27/09/2005	Red Wattlebird	*Anthochaera carunculata*	Seen	Raining	Calm
20186	3/10/2005	Australian Pelican	*Pelecanus conspicillatus*	Seen	Overcast	Moderate
20208	3/10/2005	Australian Raven	*Corvus coronoides*	Seen	Overcast	Moderate
20321	3/10/2005	Black-faced Cuckoo-Shrike	*Coracina novaehollandiae*	Seen	Overcast	Moderate
34804	3/10/2005	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Moderate
38004	3/10/2005	Masked Lapwing	*Vanellus miles*	Seen	Overcast	Moderate
41976	3/10/2005	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Overcast	Moderate
42682	3/10/2005	Willie Wagtail	*Rhipidura leucophrys*	Seen	Overcast	Moderate
50998	3/10/2005	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Moderate
51778	3/10/2005	Silver Gull	*Larus novaehollandiae*	Seen	Overcast	Moderate
52580	3/10/2005	Sulphur-crested Cockatoo	*Cacatua galerita*	Seen	Overcast	Moderate

95994	3/10/2005	Red-rumped Parrot	*Psephotus haematonotus*	Seen	Overcast	Moderate
14043	11/10/2005	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
19911	11/10/2005	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
20000	11/10/2005	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Calm
38003	11/10/2005	Masked Lapwing	*Vanellus miles*	Seen	Clear	Calm
41090	11/10/2005	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Calm
42309	11/10/2005	Yellow-faced Honeyeater	*Lichenostomus chrysops*	Seen	Clear	Calm
50997	11/10/2005	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
51777	11/10/2005	Silver Gull	*Larus novaehollandiae*	Seen	Clear	Calm
92287	11/10/2005	Pied Currawong	*Strepera graculina*	Seen	Clear	Calm
94124	11/10/2005	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Calm
17841	18/10/2005	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Moderate
20001	18/10/2005	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Moderate
41975	18/10/2005	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Moderate
51781	18/10/2005	Silver Gull	*Larus novaehollandiae*	Seen	Clear	Moderate
52667	18/10/2005	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Moderate
52857	18/10/2005	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Moderate
94123	18/10/2005	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Moderate
17682	25/10/2005	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
19910	25/10/2005	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
20060	25/10/2005	Black-faced Cuckoo-Shrike	*Coracina novaehollandiae*	Seen	Clear	Calm
34417	25/10/2005	Golden-headed Cisticola	*Cisticola exilis*	Seen	Clear	Calm
34864	25/10/2005	Masked Lapwing	*Vanellus miles*	Seen	Clear	Calm
41770	25/10/2005	White-breasted Woodswallow	*Artamus leucorynchus*	Seen	Clear	Calm
51776	25/10/2005	Silver Gull	*Larus novaehollandiae*	Seen	Clear	Calm
52668	25/10/2005	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
18609	1/11/2005	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Light
20207	1/11/2005	Australian Raven	*Corvus coronoides*	Seen	Overcast	Light
20282	1/11/2005	Australian White Ibis	*Threskiornis molucca*	Seen	Overcast	Light
20322	1/11/2005	Black-faced Cuckoo-Shrike	*Coracina novaehollandiae*	Seen	Overcast	Light

35483	1/11/2005	Great Cormorant	*Phalacrocorax carbo*	Seen	Overcast	Light
41977	1/11/2005	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Overcast	Light
51779	1/11/2005	Silver Gull	*Larus novaehollandiae*	Seen	Overcast	Light
53523	1/11/2005	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Light
90103	1/11/2005	Noisy Miner	*Manorina melanocephala*	Seen	Overcast	Light
94122	1/11/2005	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Overcast	Light
94827	1/11/2005	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Light
20408	8/11/2005	Australian Raven	*Corvus coronoides*	Seen	Raining	Light
35484	8/11/2005	Great Cormorant	*Phalacrocorax carbo*	Seen	Raining	Light
41089	8/11/2005	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Raining	Light
41795	8/11/2005	White-faced Heron	*Egretta novaehollandiae*	Seen	Raining	Light
51780	8/11/2005	Silver Gull	*Larus novaehollandiae*	Seen	Raining	Light
52666	8/11/2005	Superb Fairy-wren	*Malurus cyaneus*	Seen	Raining	Light
94121	8/11/2005	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Raining	Light
16176	19/09/2006	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
20111	19/09/2006	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
33111	19/09/2006	Masked Lapwing	*Vanellus miles*	Seen	Clear	Calm
40504	19/09/2006	Willie Wagtail	*Rhipidura leucophrys*	Seen	Clear	Calm
47700	19/09/2006	Silver Gull	*Larus novaehollandiae*	Seen	Clear	Calm
47774	19/09/2006	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Calm
47835	19/09/2006	Spotted Pardalote	*Pardalotus punctatus*	Seen	Clear	Calm
48018	19/09/2006	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
56106	19/09/2006	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Calm
89697	19/09/2006	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
91968	19/09/2006	Pied Currawong	*Strepera graculina*	Seen	Clear	Calm
93813	19/09/2006	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Calm
15872	26/09/2006	Black-shouldered Kite	*Elanus axillaris*	Seen	Overcast	Calm
19554	26/09/2006	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
19645	26/09/2006	Australian White Ibis	*Threskiornis molucca*	Seen	Overcast	Calm
34367	26/09/2006	Masked Lapwing	*Vanellus miles*	Seen	Overcast	Calm

41069	26/09/2006	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Overcast	Calm
48812	26/09/2006	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Calm
50285	26/09/2006	Silver Gull	*Larus novaehollandiae*	Seen	Overcast	Calm
50413	26/09/2006	Welcome Swallow	*Hirundo neoxena*	Seen	Overcast	Calm
91970	26/09/2006	Pied Currawong	*Strepera graculina*	Seen	Overcast	Calm
93814	26/09/2006	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Overcast	Calm
94468	26/09/2006	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Calm
15829	3/10/2006	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Calm
18083	3/10/2006	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Seen	Overcast	Calm
19553	3/10/2006	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
34294	3/10/2006	Great Cormorant	*Phalacrocorax carbo*	Seen	Overcast	Calm
50286	3/10/2006	Silver Gull	*Larus novaehollandiae*	Seen	Overcast	Calm
52638	3/10/2006	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Calm
91967	3/10/2006	Pied Currawong	*Strepera graculina*	Seen	Overcast	Calm
93812	3/10/2006	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Overcast	Calm
94469	3/10/2006	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Calm
15083	10/10/2006	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Calm
19643	10/10/2006	Australian White Ibis	*Threskiornis molucca*	Seen	Overcast	Calm
32610	10/10/2006	Little Black Cormorant	*Phalacrocorax sulcirostris*	Seen	Overcast	Calm
38471	10/10/2006	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Calm
40397	10/10/2006	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Overcast	Calm
40400	10/10/2006	Willie Wagtail	*Rhipidura leucophrys*	Seen	Overcast	Calm
46703	10/10/2006	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Calm
46894	10/10/2006	Silver Gull	*Larus novaehollandiae*	Seen	Overcast	Calm
94471	10/10/2006	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Calm
19552	17/10/2006	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
36699	17/10/2006	Masked Lapwing	*Vanellus miles*	Seen	Overcast	Calm
41962	17/10/2006	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Overcast	Calm
50282	17/10/2006	Silver Gull	*Larus novaehollandiae*	Seen	Overcast	Calm

52637	17/10/2006	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Calm
56323	17/10/2006	Willie Wagtail	*Rhipidura leucophrys*	Seen	Overcast	Calm
93815	17/10/2006	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Overcast	Calm
94470	17/10/2006	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Calm
34101	24/10/2006	Masked Lapwing	*Vanellus miles*	Seen	Clear	Calm
34293	24/10/2006	Great Cormorant	*Phalacrocorax carbo*	Seen	Clear	Calm
41670	24/10/2006	Willie Wagtail	*Rhipidura leucophrys*	Seen	Clear	Calm
50412	24/10/2006	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Calm
50945	24/10/2006	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
94465	24/10/2006	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
96236	24/10/2006	Red-whiskered Bulbul	*Pycnonotus jocosus*	Seen	Clear	Calm
19508	31/10/2006	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Seen	Clear	Calm
20112	31/10/2006	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
41068	31/10/2006	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Calm
50284	31/10/2006	Silver Gull	*Larus novaehollandiae*	Seen	Clear	Calm
50947	31/10/2006	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
94466	31/10/2006	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
95830	31/10/2006	Red-rumped Parrot	*Psephotus haematonotus*	Seen	Clear	Calm
19555	7/11/2006	Australian Raven	*Corvus coronoides*	Seen	Overcast	Light
19646	7/11/2006	Australian White Ibis	*Threskiornis molucca*	Seen	Overcast	Light
19730	7/11/2006	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Seen	Overcast	Light
41665	7/11/2006	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Overcast	Light
50281	7/11/2006	Silver Gull	*Larus novaehollandiae*	Seen	Overcast	Light
50604	7/11/2006	Silvereye	*Zosterops lateralis*	Seen	Overcast	Light
50946	7/11/2006	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Light
55110	7/11/2006	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Light
91969	7/11/2006	Pied Currawong	*Strepera graculina*	Seen	Overcast	Light
93811	7/11/2006	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Overcast	Light
94467	7/11/2006	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Light

13574	18/09/2007	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Calm
16235	18/09/2007	Australasian Figbird	*Sphecotheres vieilloti*	Seen	Overcast	Calm
28114	18/09/2007	Crested Pigeon	*Ocyphaps lophotes*	Seen	Overcast	Calm
39715	18/09/2007	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Calm
40327	18/09/2007	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Overcast	Calm
46892	18/09/2007	Silver Gull	*Larus novaehollandiae*	Seen	Overcast	Calm
47303	18/09/2007	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Calm
56074	18/09/2007	Willie Wagtail	*Rhipidura leucophrys*	Seen	Overcast	Calm
90667	18/09/2007	Pacific Black Duck	*Anas superciliosa*	Seen	Overcast	Calm
91958	18/09/2007	Pied Currawong	*Strepera graculina*	Seen	Overcast	Calm
94455	18/09/2007	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Calm
16175	25/09/2007	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
19423	25/09/2007	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Calm
20110	25/09/2007	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
28115	25/09/2007	Crested Pigeon	*Ocyphaps lophotes*	Seen	Clear	Calm
31948	25/09/2007	Galah	*Eolophus roseicapillus*	Seen	Clear	Calm
39974	25/09/2007	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Calm
45052	25/09/2007	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
45246	25/09/2007	Rock Dove	*Columba livia*	Seen	Clear	Calm
45260	25/09/2007	Silver Gull	*Larus novaehollandiae*	Seen	Clear	Calm
54008	25/09/2007	Laughing Kookaburra	*Dacelo novaeguineae*	Seen	Clear	Calm
94461	25/09/2007	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
20109	2/10/2007	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
38361	2/10/2007	Galah	*Eolophus roseicapillus*	Seen	Clear	Calm
39294	2/10/2007	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Calm
45992	2/10/2007	Spotted Turtle-Dove	*Streptopelia chinensis*	Seen	Clear	Calm
46004	2/10/2007	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
46105	2/10/2007	Silver Gull	*Larus novaehollandiae*	Seen	Clear	Calm
55904	2/10/2007	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Calm

90668	2/10/2007	Pacific Black Duck	*Anas superciliosa*	Seen	Clear	Calm
91963	2/10/2007	Pied Currawong	*Strepera graculina*	Seen	Clear	Calm
93806	2/10/2007	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Calm
94457	2/10/2007	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
15080	9/10/2007	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Light
32343	9/10/2007	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Light
32364	9/10/2007	Masked Lapwing	*Vanellus miles*	Seen	Overcast	Light
40115	9/10/2007	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Overcast	Light
42916	9/10/2007	Willie Wagtail	*Rhipidura leucophrys*	Seen	Overcast	Light
45258	9/10/2007	Silver Gull	*Larus novaehollandiae*	Seen	Overcast	Light
91959	9/10/2007	Pied Currawong	*Strepera graculina*	Seen	Overcast	Light
94454	9/10/2007	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Light
16530	16/10/2007	Black-fronted Dotterel	*Elseyornis melanops*	Seen	Clear	Moderate
19422	16/10/2007	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Moderate
40116	16/10/2007	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Moderate
45247	16/10/2007	Rock Dove	*Columba livia*	Seen	Clear	Moderate
45259	16/10/2007	Silver Gull	*Larus novaehollandiae*	Seen	Clear	Moderate
45846	16/10/2007	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Moderate
91965	16/10/2007	Pied Currawong	*Strepera graculina*	Seen	Clear	Moderate
93805	16/10/2007	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Moderate
94458	16/10/2007	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Moderate
17634	23/10/2007	Australian Pelican	*Pelecanus conspicillatus*	Seen	Clear	Calm
19425	23/10/2007	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Calm
40498	23/10/2007	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Calm
48017	23/10/2007	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
94460	23/10/2007	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
19428	30/10/2007	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Calm
19510	30/10/2007	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Seen	Clear	Calm
20113	30/10/2007	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
25291	30/10/2007	Channel-billed Cuckoo	*Scythrops novaehollandiae*	Seen	Clear	Calm

32624	30/10/2007	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Calm
40328	30/10/2007	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Calm
46895	30/10/2007	Silver Gull	*Larus novaehollandiae*	Seen	Clear	Calm
47304	30/10/2007	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
56075	30/10/2007	Willie Wagtail	*Rhipidura leucophrys*	Seen	Clear	Calm
89698	30/10/2007	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
91972	30/10/2007	Pied Currawong	*Strepera graculina*	Seen	Clear	Calm
93818	30/10/2007	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Calm
94474	30/10/2007	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
15095	6/11/2007	Black-fronted Dotterel	*Elseyornis melanops*	Seen	Overcast	Light
32023	6/11/2007	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Light
40044	6/11/2007	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Overcast	Light
45053	6/11/2007	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Light
55704	6/11/2007	Willie Wagtail	*Rhipidura leucophrys*	Seen	Overcast	Light
89695	6/11/2007	Noisy Miner	*Manorina melanocephala*	Seen	Overcast	Light
93804	6/11/2007	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Overcast	Light
13575	16/09/2008	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Strong
19427	16/09/2008	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Strong
19509	16/09/2008	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Seen	Clear	Strong
46106	16/09/2008	Silver Gull	*Larus novaehollandiae*	Seen	Clear	Strong
46340	16/09/2008	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Strong
54273	16/09/2008	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Strong
91698	16/09/2008	Pied Cormorant	*Phalacrocorax varius*	Seen	Clear	Strong
93816	16/09/2008	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Strong
94472	16/09/2008	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Strong
95217	16/09/2008	Red-browed Finch	*Neochmia temporalis*	Seen	Clear	Strong
13377	23/09/2008	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
19647	23/09/2008	Australian White Ibis	*Threskiornis molucca*	Seen	Overcast	Calm

41070	23/09/2008	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Overcast	Calm
50287	23/09/2008	Silver Gull	*Larus novaehollandiae*	Seen	Overcast	Calm
50351	23/09/2008	Sulphur-crested Cockatoo	*Cacatua galerita*	Seen	Overcast	Calm
50948	23/09/2008	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Calm
55111	23/09/2008	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Calm
56324	23/09/2008	Willie Wagtail	*Rhipidura leucophrys*	Seen	Overcast	Calm
90670	23/09/2008	Pacific Black Duck	*Anas superciliosa*	Seen	Overcast	Calm
91971	23/09/2008	Pied Currawong	*Strepera graculina*	Seen	Overcast	Calm
93817	23/09/2008	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Overcast	Calm
94473	23/09/2008	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Calm
17559	30/09/2008	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
17635	30/09/2008	Australian Pelican	*Pelecanus conspicillatus*	Seen	Clear	Calm
17903	30/09/2008	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
19426	30/09/2008	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Calm
26190	30/09/2008	Dusky Moorhen	*Gallinula tenebrosa*	Seen	Clear	Calm
31972	30/09/2008	Grey Butcherbird	*Cracticus torquatus*	Seen	Clear	Calm
34324	30/09/2008	Little Black Cormorant	*Phalacrocorax sulcirostris*	Seen	Clear	Calm
39535	30/09/2008	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Calm
41641	30/09/2008	White-faced Heron	*Egretta novaehollandiae*	Seen	Clear	Calm
41664	30/09/2008	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Calm
45261	30/09/2008	Silver Gull	*Larus novaehollandiae*	Seen	Clear	Calm
45340	30/09/2008	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
45362	30/09/2008	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Calm
50350	30/09/2008	Sulphur-crested Cockatoo	*Cacatua galerita*	Seen	Clear	Calm
50944	30/09/2008	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
52802	30/09/2008	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Calm
53990	30/09/2008	Golden-headed Cisticola	*Cisticola exilis*	Seen	Clear	Calm
56322	30/09/2008	Willie Wagtail	*Rhipidura leucophrys*	Seen	Clear	Calm
89308	30/09/2008	Nankeen Kestrel	*Falco cenchroides*	Seen	Clear	Calm

90669	30/09/2008	Pacific Black Duck	*Anas superciliosa*	Seen	Clear	Calm
91966	30/09/2008	Pied Currawong	*Strepera graculina*	Seen	Clear	Calm
93809	30/09/2008	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Calm
94464	30/09/2008	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
17902	7/10/2008	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
19330	7/10/2008	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
19424	7/10/2008	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Calm
28116	7/10/2008	Crested Pigeon	*Ocyphaps lophotes*	Seen	Clear	Calm
47699	7/10/2008	Silver Gull	*Larus novaehollandiae*	Seen	Clear	Calm
47773	7/10/2008	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Calm
47849	7/10/2008	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
54643	7/10/2008	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Calm
56262	7/10/2008	Willie Wagtail	*Rhipidura leucophrys*	Seen	Clear	Calm
91697	7/10/2008	Pied Cormorant	*Phalacrocorax varius*	Seen	Clear	Calm
93808	7/10/2008	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Calm
94462	7/10/2008	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
13376	14/10/2008	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
18527	14/10/2008	Australian White Ibis	*Threskiornis molucca*	Seen	Overcast	Calm
20357	14/10/2008	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Calm
34258	14/10/2008	Fairy Martin	*Petrochelidon ariel*	Seen	Overcast	Calm
34301	14/10/2008	Great Egret	*Ardea alba*	Seen	Overcast	Calm
35650	14/10/2008	Grey Butcherbird	*Cracticus torquatus*	Seen	Overcast	Calm
35918	14/10/2008	Laughing Kookaburra	*Dacelo novaeguineae*	Seen	Overcast	Calm
39534	14/10/2008	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Calm
48463	14/10/2008	Silvereye	*Zosterops lateralis*	Seen	Overcast	Calm
50279	14/10/2008	Silver Gull	*Larus novaehollandiae*	Seen	Overcast	Calm
50943	14/10/2008	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Calm
52341	14/10/2008	Spotted Turtle-Dove	*Streptopelia chinensis*	Seen	Overcast	Calm
91960	14/10/2008	Pied Currawong	*Strepera graculina*	Seen	Overcast	Calm
93802	14/10/2008	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Overcast	Calm

15082	21/10/2008	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Light
25685	21/10/2008	Crested Pigeon	*Ocyphaps lophotes*	Seen	Overcast	Light
39355	21/10/2008	Little Wattlebird	*Anthochaera chrysoptera*	Seen	Overcast	Light
47552	21/10/2008	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Light
47698	21/10/2008	Silver Gull	*Larus novaehollandiae*	Seen	Overcast	Light
47742	21/10/2008	Sulphur-crested Cockatoo	*Cacatua galerita*	Seen	Overcast	Light
47834	21/10/2008	Spotted Pardalote	*Pardalotus punctatus*	Seen	Overcast	Light
91613	21/10/2008	Pacific Koel	*Eudynamys orientalis*	Seen	Overcast	Light
91962	21/10/2008	Pied Currawong	*Strepera graculina*	Seen	Overcast	Light
93803	21/10/2008	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Overcast	Light
94456	21/10/2008	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Light
15827	28/10/2008	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Calm
18041	28/10/2008	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
19642	28/10/2008	Australian White Ibis	*Threskiornis molucca*	Seen	Overcast	Calm
39973	28/10/2008	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Overcast	Calm
45491	28/10/2008	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Calm
89696	28/10/2008	Noisy Miner	*Manorina melanocephala*	Seen	Overcast	Calm
91964	28/10/2008	Pied Currawong	*Strepera graculina*	Seen	Overcast	Calm
93807	28/10/2008	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Overcast	Calm
94459	28/10/2008	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Calm
15081	4/11/2008	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Calm
19641	4/11/2008	Australian White Ibis	*Threskiornis molucca*	Seen	Overcast	Calm
32623	4/11/2008	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Calm
46893	4/11/2008	Silver Gull	*Larus novaehollandiae*	Seen	Overcast	Calm
46957	4/11/2008	Welcome Swallow	*Hirundo neoxena*	Seen	Overcast	Calm
89694	4/11/2008	Noisy Miner	*Manorina melanocephala*	Seen	Overcast	Calm
91961	4/11/2008	Pied Currawong	*Strepera graculina*	Seen	Overcast	Calm
10069	22/09/2009	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Light
10070	22/09/2009	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Light

10071	22/09/2009	Pacific Black Duck	*Anas superciliosa*	Seen	Clear	Light
10072	22/09/2009	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Light
10073	22/09/2009	Purple Swamphen	*Porphyrio porphyrio*	Seen	Clear	Light
10074	22/09/2009	Pied Currawong	*Strepera graculina*	Seen	Clear	Light
10075	22/09/2009	Common Starling	*Sturnus vulgaris*	Seen	Clear	Light
10076	22/09/2009	Masked Lapwing	*Vanellus miles*	Seen	Clear	Light
10355	29/09/2009	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
10356	29/09/2009	Rock Dove	*Columba livia*	Seen	Clear	Calm
10357	29/09/2009	Black-fronted Dotterel	*Elseyornis melanops*	Seen	Clear	Calm
10358	29/09/2009	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Calm
10359	29/09/2009	Masked Lapwing	*Vanellus miles*	Seen	Clear	Calm
11176	6/10/2009	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Calm
11177	6/10/2009	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
11178	6/10/2009	Willie Wagtail	*Rhipidura leucophrys*	Seen	Clear	Calm
11179	6/10/2009	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
11180	6/10/2009	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
11181	6/10/2009	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Calm
12865	13/10/2009	Willie Wagtail	*Rhipidura leucophrys*	Seen	Clear	Calm
12866	13/10/2009	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Calm
12867	13/10/2009	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Calm
12868	13/10/2009	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
12869	13/10/2009	Pied Currawong	*Strepera graculina*	Seen	Clear	Calm
57460	20/10/2009	Laughing Kookaburra	*Dacelo novaeguineae*	Seen	Clear	Calm
57461	20/10/2009	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
57462	20/10/2009	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Calm
57463	20/10/2009	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Calm
57464	20/10/2009	Nankeen Kestrel	*Falco cenchroides*	Seen	Clear	Calm
57465	20/10/2009	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
57466	20/10/2009	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
58127	27/10/2009	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Calm
58128	27/10/2009	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Seen	Overcast	Calm

58129	27/10/2009	Sulphur-crested Cockatoo	*Cacatua galerita*	Seen	Overcast	Calm
58815	3/11/2009	Olive-backed Oriole	*Oriolus sagittatus*	Seen	Clear	Calm
58816	3/11/2009	Crested Pigeon	*Ocyphaps lophotes*	Seen	Clear	Calm
58817	3/11/2009	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
58818	3/11/2009	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
58819	3/11/2009	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Calm
58820	3/11/2009	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Calm
59147	10/11/2009	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
59148	10/11/2009	Nankeen Kestrel	*Falco cenchroides*	Seen	Clear	Calm
59149	10/11/2009	Sulphur-crested Cockatoo	*Cacatua galerita*	Seen	Clear	Calm
105010	20/09/2010	Crimson Rosella	*Platycercus elegans*	Seen	Overcast	Calm
105011	20/09/2010	Noisy Miner	*Manorina melanocephala*	Seen	Overcast	Calm
105012	20/09/2010	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Overcast	Calm
105013	20/09/2010	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Calm
105014	20/09/2010	Welcome Swallow	*Hirundo neoxena*	Seen	Overcast	Calm
105015	20/09/2010	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
105016	20/09/2010	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Overcast	Calm
105017	20/09/2010	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Calm
105018	20/09/2010	Pied Currawong	*Strepera graculina*	Seen	Overcast	Calm
105457	28/09/2010	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
105458	28/09/2010	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Calm
105459	28/09/2010	Masked Lapwing	*Vanellus miles*	Seen	Clear	Calm
105460	28/09/2010	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
105461	28/09/2010	Crested Pigeon	*Ocyphaps lophotes*	Seen	Clear	Calm
105462	28/09/2010	Grey Butcherbird	*Cracticus torquatus*	Seen	Clear	Calm
105463	28/09/2010	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
105464	28/09/2010	Pied Currawong	*Strepera graculina*	Seen	Clear	Calm
105465	28/09/2010	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
106291	5/10/2010	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm

106292	5/10/2010	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
106293	5/10/2010	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Calm
106294	5/10/2010	Spotted Pardalote	*Pardalotus punctatus*	Seen	Clear	Calm
106295	5/10/2010	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
106296	5/10/2010	Pacific Koel	*Eudynamys orientalis*	Seen	Clear	Calm
106297	5/10/2010	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
106298	5/10/2010	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
106299	5/10/2010	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Calm
106719	12/10/2010	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Seen	Overcast	Calm
106720	12/10/2010	Willie Wagtail	*Rhipidura leucophrys*	Seen	Overcast	Calm
106721	12/10/2010	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Calm
106722	12/10/2010	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Overcast	Calm
106723	12/10/2010	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Calm
106724	12/10/2010	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Calm
107249	21/09/2010	Crimson Rosella	*Platycercus elegans*	Seen	Clear	Calm
107250	21/09/2010	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
107251	21/09/2010	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Calm
107252	21/09/2010	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
107253	21/09/2010	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Calm
107254	21/09/2010	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
107255	21/09/2010	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Calm
107256	21/09/2010	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
107257	21/09/2010	Pied Currawong	*Strepera graculina*	Seen	Clear	Calm
107458	19/10/2010	Superb Fairy-wren	*Malurus cyaneus*	Seen	Raining	Calm
107459	19/10/2010	Pacific Koel	*Eudynamys orientalis*	Seen	Raining	Calm
107460	19/10/2010	Noisy Miner	*Manorina melanocephala*	Seen	Raining	Calm
107461	19/10/2010	Red Wattlebird	*Anthochaera carunculata*	Seen	Raining	Calm
107462	19/10/2010	Magpie-lark	*Grallina cyanoleuca*	Seen	Raining	Calm
107463	19/10/2010	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Raining	Calm

107464	19/10/2010	Australian Raven	*Corvus coronoides*	Seen	Raining	Calm
107868	15/11/2010	Rock Dove	*Columba livia*	Seen	Clear	Calm
107869	15/11/2010	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
107870	15/11/2010	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Seen	Clear	Calm
107871	15/11/2010	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Calm
107872	15/11/2010	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
107873	15/11/2010	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Calm
107874	15/11/2010	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
107875	15/11/2010	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Calm
107876	26/10/2010	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Calm
108366	2/11/2010	Australian Raven	*Corvus coronoides*	Seen	Overcast	Moderate
108367	2/11/2010	Noisy Miner	*Manorina melanocephala*	Seen	Overcast	Moderate
108368	2/11/2010	Rock Dove	*Columba livia*	Seen	Overcast	Moderate
108369	2/11/2010	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Moderate
108370	2/11/2010	Silver Gull	*Larus novaehollandiae*	Seen	Overcast	Moderate
108371	2/11/2010	White-faced Heron	*Egretta novaehollandiae*	Seen	Overcast	Moderate
108372	2/11/2010	Pied Currawong	*Strepera graculina*	Seen	Overcast	Moderate
108373	2/11/2010	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Moderate
108374	2/11/2010	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Seen	Overcast	Moderate
108375	2/11/2010	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Moderate
108376	2/11/2010	Welcome Swallow	*Hirundo neoxena*	Seen	Overcast	Moderate
108377	2/11/2010	Welcome Swallow	*Hirundo neoxena*	Seen	Overcast	Moderate
108919	9/11/2010	Noisy Miner	*Manorina melanocephala*	Seen	Overcast	Light
108920	9/11/2010	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Light
108921	9/11/2010	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Light
108922	9/11/2010	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Seen	Overcast	Light
108923	9/11/2010	Pacific Koel	*Eudynamys orientalis*	Seen	Overcast	Light
108924	9/11/2010	Welcome Swallow	*Hirundo neoxena*	Seen	Overcast	Light
127605	20/09/2011	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Light
127606	20/09/2011	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Light

127607	20/09/2011	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Light
127608	20/09/2011	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Light
127609	20/09/2011	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Light
127610	20/09/2011	Pied Currawong	*Strepera graculina*	Seen	Clear	Light
127611	20/09/2011	Sulphur-crested Cockatoo	*Cacatua galerita*	Seen	Clear	Light
127612	20/09/2011	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Light
128035	27/09/2011	Crested Pigeon	*Ocyphaps lophotes*	Seen	Overcast	Calm
128036	27/09/2011	Noisy Miner	*Manorina melanocephala*	Seen	Overcast	Calm
128037	27/09/2011	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
128038	27/09/2011	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Calm
128039	27/09/2011	Rock Dove	*Columba livia*	Seen	Overcast	Calm
128040	27/09/2011	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Calm
128041	27/09/2011	Australian White Ibis	*Threskiornis molucca*	Seen	Overcast	Calm
129751	4/10/2011	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Calm
129752	4/10/2011	Noisy Miner	*Manorina melanocephala*	Seen	Overcast	Calm
129753	4/10/2011	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Overcast	Calm
129754	4/10/2011	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Calm
129755	4/10/2011	White-faced Heron	*Egretta novaehollandiae*	Seen	Overcast	Calm
129756	4/10/2011	Welcome Swallow	*Hirundo neoxena*	Seen	Overcast	Calm
130208	11/10/2011	Australian Raven	*Corvus coronoides*	Seen	Clear	Moderate
130209	11/10/2011	Rock Dove	*Columba livia*	Seen	Clear	Moderate
130210	11/10/2011	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Moderate
130211	11/10/2011	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Moderate
130212	11/10/2011	Grey Butcherbird	*Cracticus torquatus*	Seen	Clear	Moderate
130213	11/10/2011	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Moderate
130842	18/10/2011	Rock Dove	*Columba livia*	Seen	Overcast	Calm
130843	18/10/2011	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Calm
130844	18/10/2011	Grey Butcherbird	*Cracticus torquatus*	Seen	Overcast	Calm
130845	18/10/2011	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Calm
130846	18/10/2011	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
130847	18/10/2011	Pied Currawong	*Strepera graculina*	Seen	Overcast	Calm

131477	25/10/2011	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Overcast	Light
131478	25/10/2011	Laughing Kookaburra	*Dacelo novaeguineae*	Seen	Overcast	Light
131479	25/10/2011	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Light
131480	25/10/2011	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Light
131481	25/10/2011	Australian Raven	*Corvus coronoides*	Seen	Overcast	Light
131482	25/10/2011	Rock Dove	*Columba livia*	Seen	Overcast	Light
131483	25/10/2011	Pied Currawong	*Strepera graculina*	Seen	Overcast	Light
131484	25/10/2011	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Light
132057	1/11/2011	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Overcast	Calm
132058	1/11/2011	Noisy Miner	*Manorina melanocephala*	Seen	Overcast	Calm
132059	1/11/2011	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Calm
132060	1/11/2011	Crested Pigeon	*Ocyphaps lophotes*	Seen	Overcast	Calm
132061	1/11/2011	Pied Currawong	*Strepera graculina*	Seen	Overcast	Calm
132062	1/11/2011	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Overcast	Calm
132063	1/11/2011	Fairy Martin	*Petrochelidon ariel*	Seen	Overcast	Calm
132064	1/11/2011	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Calm
132856	8/11/2011	Laughing Kookaburra	*Dacelo novaeguineae*	Seen	Overcast	Calm
132857	8/11/2011	Pied Currawong	*Strepera graculina*	Seen	Overcast	Calm
132858	8/11/2011	Rock Dove	*Columba livia*	Seen	Overcast	Calm
132859	8/11/2011	Welcome Swallow	*Hirundo neoxena*	Seen	Overcast	Calm
132860	8/11/2011	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
132861	8/11/2011	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Calm
132862	8/11/2011	Crested Pigeon	*Ocyphaps lophotes*	Seen	Overcast	Calm
132863	8/11/2011	Willie Wagtail	*Rhipidura leucophrys*	Seen	Overcast	Calm
134670	25/09/2012	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Calm
134671	25/09/2012	Rock Dove	*Columba livia*	Seen	Clear	Calm
134672	25/09/2012	Masked Lapwing	*Vanellus miles*	Seen	Clear	Calm
134673	25/09/2012	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
134674	25/09/2012	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
134675	25/09/2012	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
134676	25/09/2012	Crested Pigeon	*Ocyphaps lophotes*	Seen	Clear	Calm

135581	2/10/2012	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
135582	2/10/2012	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
135583	2/10/2012	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
135584	2/10/2012	Spotted Pardalote	*Pardalotus punctatus*	Seen	Clear	Calm
135585	2/10/2012	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
135586	2/10/2012	Common Myna	*Acridotheres tristis*	Seen	Clear	Calm
135587	2/10/2012	Common Starling	*Sturnus vulgaris*	Seen	Clear	Calm
135588	2/10/2012	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Calm
135589	2/10/2012	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Calm
135885	18/09/2012	Rock Dove	*Columba livia*	Seen	Clear	Calm
135886	18/09/2012	Crested Pigeon	*Ocyphaps lophotes*	Seen	Clear	Calm
135887	18/09/2012	Masked Lapwing	*Vanellus miles*	Seen	Clear	Calm
135888	18/09/2012	Pied Currawong	*Strepera graculina*	Seen	Clear	Calm
135889	18/09/2012	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
135890	18/09/2012	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Calm
135891	18/09/2012	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Calm
135892	18/09/2012	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Calm
136091	9/10/2012	Rock Dove	*Columba livia*	Seen	Overcast	Calm
136092	9/10/2012	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Calm
136093	9/10/2012	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Calm
136094	9/10/2012	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Calm
136095	9/10/2012	Sulphur-crested Cockatoo	*Cacatua galerita*	Seen	Overcast	Calm
136096	9/10/2012	Noisy Miner	*Manorina melanocephala*	Seen	Overcast	Calm
136097	9/10/2012	Spotted Pardalote	*Pardalotus punctatus*	Seen	Overcast	Calm
136098	9/10/2012	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Calm
136099	9/10/2012	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
136100	9/10/2012	Common Starling	*Sturnus vulgaris*	Seen	Overcast	Calm
136807	16/10/2012	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Calm
136808	16/10/2012	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Calm
136809	16/10/2012	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
136810	16/10/2012	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Calm

136811	16/10/2012	Laughing Kookaburra	*Dacelo novaeguineae*	Seen	Overcast	Calm
136812	16/10/2012	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Seen	Overcast	Calm
136813	16/10/2012	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Overcast	Calm
136814	16/10/2012	Welcome Swallow	*Hirundo neoxena*	Seen	Overcast	Calm
137474	23/10/2012	Noisy Miner	*Manorina melanocephala*	Seen	Overcast	Light
137475	23/10/2012	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Light
137476	23/10/2012	Common Starling	*Sturnus vulgaris*	Seen	Overcast	Light
137477	23/10/2012	Common Myna	*Acridotheres tristis*	Seen	Overcast	Light
137478	23/10/2012	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Light
137479	23/10/2012	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Light
137480	23/10/2012	Australian Raven	*Corvus coronoides*	Seen	Overcast	Light
137481	23/10/2012	Spotted Pardalote	*Pardalotus punctatus*	Seen	Overcast	Light
138200	30/10/2012	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Calm
138201	30/10/2012	Masked Lapwing	*Vanellus miles*	Seen	Clear	Calm
138202	30/10/2012	Common Starling	*Sturnus vulgaris*	Seen	Clear	Calm
138203	30/10/2012	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Calm
138204	30/10/2012	Spotted Pardalote	*Pardalotus punctatus*	Seen	Clear	Calm
138205	30/10/2012	Pacific Koel	*Eudynamys orientalis*	Seen	Clear	Calm
138206	30/10/2012	Pied Currawong	*Strepera graculina*	Seen	Clear	Calm
138207	30/10/2012	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
138208	30/10/2012	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Calm
138667	6/11/2012	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Calm
138668	6/11/2012	Masked Lapwing	*Vanellus miles*	Seen	Overcast	Calm
138669	6/11/2012	Common Starling	*Sturnus vulgaris*	Seen	Overcast	Calm
138670	6/11/2012	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
138671	6/11/2012	Rock Dove	*Columba livia*	Seen	Overcast	Calm
138672	6/11/2012	Spotted Pardalote	*Pardalotus punctatus*	Seen	Overcast	Calm
138673	6/11/2012	Welcome Swallow	*Hirundo neoxena*	Seen	Overcast	Calm
138674	6/11/2012	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Calm
138675	6/11/2012	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Calm
141199	17/09/2013	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Light

141200	17/09/2013	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Light
141201	17/09/2013	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Light
141202	17/09/2013	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Light
141203	17/09/2013	Pied Currawong	*Strepera graculina*	Seen	Overcast	Light
141204	17/09/2013	Noisy Miner	*Manorina melanocephala*	Seen	Overcast	Light
141205	17/09/2013	Australian Raven	*Corvus coronoides*	Seen	Overcast	Light
141603	24/09/2013	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Seen	Overcast	Calm
141604	24/09/2013	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Calm
141605	24/09/2013	Pied Currawong	*Strepera graculina*	Seen	Overcast	Calm
141606	24/09/2013	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Calm
141607	24/09/2013	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Calm
141608	24/09/2013	Red-rumped Parrot	*Psephotus haematonotus*	Seen	Overcast	Calm
141609	24/09/2013	Red-browed Finch	*Neochmia temporalis*	Seen	Overcast	Calm
141610	24/09/2013	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
141611	24/09/2013	Welcome Swallow	*Hirundo neoxena*	Seen	Overcast	Calm
142114	1/10/2013	Australian Raven	*Corvus coronoides*	Seen	Overcast	Light
142115	1/10/2013	Pied Currawong	*Strepera graculina*	Seen	Overcast	Light
142116	1/10/2013	Brown Goshawk	*Accipiter fasciatus*	Seen	Overcast	Light
142117	1/10/2013	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Light
142118	1/10/2013	Noisy Miner	*Manorina melanocephala*	Seen	Overcast	Light
142836	8/10/2013	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Calm
142837	8/10/2013	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
142838	8/10/2013	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
142839	8/10/2013	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
142840	8/10/2013	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Calm
143247	15/10/2013	Laughing Kookaburra	*Dacelo novaeguineae*	Seen	Clear	Calm
143248	15/10/2013	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
143249	15/10/2013	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
143250	15/10/2013	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Calm
143251	15/10/2013	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Clear	Calm
143252	15/10/2013	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm

143253	15/10/2013	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
143254	15/10/2013	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
143994	22/10/2013	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Calm
143995	22/10/2013	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
143996	22/10/2013	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Calm
143997	22/10/2013	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Overcast	Calm
143998	22/10/2013	Pied Currawong	*Strepera graculina*	Seen	Overcast	Calm
144503	29/10/2013	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
144504	29/10/2013	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
144505	29/10/2013	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
144506	29/10/2013	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
144507	29/10/2013	Spotted Pardalote	*Pardalotus punctatus*	Seen	Clear	Calm
144508	29/10/2013	Common Starling	*Sturnus vulgaris*	Seen	Clear	Calm
144509	29/10/2013	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
145561	5/11/2013	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Light
145562	5/11/2013	Pied Currawong	*Strepera graculina*	Seen	Overcast	Light
166483	23/09/2014	Masked Lapwing	*Vanellus miles*	Seen	Clear	Calm
166484	23/09/2014	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
166485	23/09/2014	Nankeen Kestrel	*Falco cenchroides*	Seen	Clear	Calm
166486	23/09/2014	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
166487	23/09/2014	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
166488	23/09/2014	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
166489	23/09/2014	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Calm
166490	23/09/2014	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Calm
167096	7/10/2014	Australian Raven	*Corvus coronoides*	Seen	Overcast	Moderate
167097	7/10/2014	Noisy Miner	*Manorina melanocephala*	Seen	Overcast	Moderate
167098	7/10/2014	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Moderate
167099	7/10/2014	Laughing Kookaburra	*Dacelo novaeguineae*	Seen	Overcast	Moderate
167100	7/10/2014	Pied Currawong	*Strepera graculina*	Seen	Overcast	Moderate
167101	7/10/2014	Red-rumped Parrot	*Psephotus haematonotus*	Seen	Overcast	Moderate
167102	7/10/2014	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Moderate

167103	7/10/2014	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Moderate
167104	7/10/2014	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Overcast	Moderate
167627	16/09/2014	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Calm
167628	16/09/2014	Noisy Miner	*Manorina melanocephala*	Seen	Overcast	Calm
167629	16/09/2014	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Calm
167630	16/09/2014	Spotted Pardalote	*Pardalotus punctatus*	Seen	Overcast	Calm
167631	16/09/2014	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Calm
167632	16/09/2014	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Calm
167633	16/09/2014	Welcome Swallow	*Hirundo neoxena*	Seen	Overcast	Calm
167634	16/09/2014	Rock Dove	*Columba livia*	Seen	Overcast	Calm
167635	16/09/2014	Red-rumped Parrot	*Psephotus haematonotus*	Seen	Overcast	Calm
168327	21/10/2014	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
168328	21/10/2014	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Calm
168329	21/10/2014	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Calm
168330	21/10/2014	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Calm
168331	21/10/2014	Magpie-lark	*Grallina cyanoleuca*	Seen	Overcast	Calm
168332	21/10/2014	Laughing Kookaburra	*Dacelo novaeguineae*	Seen	Overcast	Calm
168333	21/10/2014	Spotted Pardalote	*Pardalotus punctatus*	Seen	Overcast	Calm
168334	21/10/2014	Welcome Swallow	*Hirundo neoxena*	Seen	Overcast	Calm
168687	28/10/2014	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Calm
168688	28/10/2014	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
168689	28/10/2014	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
168690	28/10/2014	Pacific Koel	*Eudynamys orientalis*	Seen	Clear	Calm
168691	28/10/2014	Spotted Pardalote	*Pardalotus punctatus*	Seen	Clear	Calm
168692	28/10/2014	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
168693	28/10/2014	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Calm
168694	28/10/2014	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Calm
168695	28/10/2014	Willie Wagtail	*Rhipidura leucophrys*	Seen	Clear	Calm

169262	4/11/2014	Noisy Miner	*Manorina melanocephala*	Seen	Overcast	Calm
169263	4/11/2014	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Seen	Overcast	Calm
169264	4/11/2014	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Calm
169265	4/11/2014	Masked Lapwing	*Vanellus miles*	Seen	Overcast	Calm
169266	4/11/2014	Laughing Kookaburra	*Dacelo novaeguineae*	Seen	Overcast	Calm
169267	4/11/2014	Spotted Pardalote	*Pardalotus punctatus*	Seen	Overcast	Calm
169268	4/11/2014	Welcome Swallow	*Hirundo neoxena*	Seen	Overcast	Calm
169269	4/11/2014	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Calm
169270	4/11/2014	White-plumed Honeyeater	*Lichenostomus penicillatus*	Seen	Overcast	Calm
169271	4/11/2014	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Calm
169272	4/11/2014	Red-rumped Parrot	*Psephotus haematonotus*	Seen	Overcast	Calm
170228	14/10/2014	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
170229	14/10/2014	Spotted Pardalote	*Pardalotus punctatus*	Seen	Clear	Calm
170230	14/10/2014	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
170231	14/10/2014	Pied Currawong	*Strepera graculina*	Seen	Clear	Calm
170232	14/10/2014	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
170233	14/10/2014	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Calm
170234	14/10/2014	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Calm
170235	14/10/2014	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
170236	14/10/2014	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
170600	30/09/2014	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
170601	30/09/2014	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Calm
170602	30/09/2014	Spotted Pardalote	*Pardalotus punctatus*	Seen	Clear	Calm
170603	30/09/2014	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
170604	30/09/2014	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Calm
170605	30/09/2014	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
170606	30/09/2014	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
173775	15/09/2015	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Light
173776	15/09/2015	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Light

173777	15/09/2015	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Light
173778	15/09/2015	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Light
173779	15/09/2015	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Light
173780	15/09/2015	Willie Wagtail	*Rhipidura leucophrys*	Seen	Clear	Light
174347	20/10/2015	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
174348	20/10/2015	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Calm
174349	20/10/2015	Crested Pigeon	*Ocyphaps lophotes*	Seen	Clear	Calm
174350	20/10/2015	Olive-backed Oriole	*Oriolus sagittatus*	Seen	Clear	Calm
174351	20/10/2015	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Calm
174352	20/10/2015	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
174353	20/10/2015	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Calm
174825	20/10/2015	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
174826	20/10/2015	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
174949	13/10/2015	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Light
174950	13/10/2015	Australian Raven	*Corvus coronoides*	Seen	Overcast	Light
174951	13/10/2015	Crested Pigeon	*Ocyphaps lophotes*	Seen	Overcast	Light
174952	13/10/2015	Masked Lapwing	*Vanellus miles*	Seen	Overcast	Light
174953	13/10/2015	Noisy Miner	*Manorina melanocephala*	Seen	Overcast	Light
174954	13/10/2015	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Overcast	Light
174955	13/10/2015	Welcome Swallow	*Hirundo neoxena*	Seen	Overcast	Light
175395	13/10/2015	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Light
175474	6/10/2015	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Light
175653	6/10/2015	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Light
175725	6/10/2015	Australian Raven	*Corvus coronoides*	Seen	Clear	Light
175840	6/10/2015	Olive-backed Oriole	*Oriolus sagittatus*	Seen	Clear	Light
175998	29/09/2015	Laughing Kookaburra	*Dacelo novaeguineae*	Seen	Clear	Calm
175999	29/09/2015	Pied Currawong	*Strepera graculina*	Seen	Clear	Calm
176072	29/09/2015	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
176264	29/09/2015	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm

176265	29/09/2015	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Calm
176266	29/09/2015	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
176343	29/09/2015	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Calm
176344	29/09/2015	Red-rumped Parrot	*Psephotus haematonotus*	Seen	Clear	Calm
176345	29/09/2015	Spotted Pardalote	*Pardalotus punctatus*	Seen	Clear	Calm
176346	29/09/2015	Superb Fairy-wren	*Malurus cyaneus*	Seen	Clear	Calm
176347	29/09/2015	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Calm
176607	22/09/2015	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Light
176765	22/09/2015	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Light
176830	22/09/2015	Australian Raven	*Corvus coronoides*	Seen	Clear	Light
176831	22/09/2015	Olive-backed Oriole	*Oriolus sagittatus*	Seen	Clear	Light
177153	27/10/2015	Noisy Miner	*Manorina melanocephala*	Seen	Overcast	Moderate
177154	27/10/2015	Spotted Turtle-Dove	*Streptopelia chinensis*	Seen	Overcast	Moderate
177155	27/10/2015	Superb Fairy-wren	*Malurus cyaneus*	Seen	Overcast	Moderate
177156	27/10/2015	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Moderate
177157	27/10/2015	Australian White Ibis	*Threskiornis molucca*	Seen	Overcast	Moderate
177158	27/10/2015	Australian Raven	*Corvus coronoides*	Seen	Overcast	Moderate
177159	27/10/2015	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Overcast	Moderate
177160	27/10/2015	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Moderate
177161	27/10/2015	Welcome Swallow	*Hirundo neoxena*	Seen	Overcast	Moderate
177685	3/11/2015	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Calm
177686	3/11/2015	Australian Raven	*Corvus coronoides*	Seen	Overcast	Calm
177954	3/11/2015	Pacific Koel	*Eudynamys orientalis*	Seen	Overcast	Calm
177955	3/11/2015	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Calm
177956	3/11/2015	Noisy Miner	*Manorina melanocephala*	Seen	Overcast	Calm
177957	3/11/2015	Willie Wagtail	*Rhipidura leucophrys*	Seen	Overcast	Calm
178143	3/11/2015	Superb Fairy-wren	*Malurus cyaneus*	Heard	Overcast	Calm
178605	12/04/2016	Striated Heron	*Butorides striatus*	Seen	Overcast	Calm
179867	13/09/2016	Australian Magpie	*Gymnorhina tibicen*	Seen	Overcast	Light

179938	13/09/2016	Common Myna	*Acridotheres tristis*	Seen	Overcast	Light
180006	13/09/2016	Laughing Kookaburra	*Dacelo novaeguineae*	Seen	Overcast	Light
180111	13/09/2016	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Overcast	Light
180126	13/09/2016	Red Wattlebird	*Anthochaera carunculata*	Seen	Overcast	Light
180203	13/09/2016	Welcome Swallow	*Hirundo neoxena*	Seen	Overcast	Light
180224	13/09/2016	White-faced Heron	*Egretta novaehollandiae*	Seen	Overcast	Light
180408	20/09/2016	Laughing Kookaburra	*Dacelo novaeguineae*	Seen	Clear	Calm
180409	20/09/2016	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
180410	20/09/2016	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
180411	20/09/2016	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
180412	20/09/2016	Grey Butcherbird	*Cracticus torquatus*	Seen	Clear	Calm
180413	20/09/2016	Red-rumped Parrot	*Psephotus haematonotus*	Seen	Clear	Calm
180414	20/09/2016	White-faced Heron	*Egretta novaehollandiae*	Seen	Clear	Calm
181448	27/09/2016	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
181450	27/09/2016	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Heard	Clear	Calm
181456	27/09/2016	Laughing Kookaburra	*Dacelo novaeguineae*	Seen	Clear	Calm
181459	27/09/2016	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Calm
181460	27/09/2016	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
181465	27/09/2016	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
181470	27/09/2016	Spotted Pardalote	*Pardalotus punctatus*	Heard	Clear	Calm
181473	27/09/2016	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Calm
181476	27/09/2016	Willie Wagtail	*Rhipidura leucophrys*	Heard	Clear	Calm
181726	4/10/2016	Spotted Turtle-Dove	*Streptopelia chinensis*	Seen	Clear	Calm
181727	4/10/2016	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
181728	4/10/2016	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Calm
181729	4/10/2016	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
181730	4/10/2016	Spotted Pardalote	*Pardalotus punctatus*	Heard	Clear	Calm

181731	4/10/2016	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
181732	4/10/2016	Grey Butcherbird	*Cracticus torquatus*	Seen	Clear	Calm
181733	4/10/2016	Silver Gull	*Larus novaehollandiae*	Seen	Clear	Calm
181734	4/10/2016	White-faced Heron	*Egretta novaehollandiae*	Seen	Clear	Calm
181735	4/10/2016	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Heard	Clear	Calm
182196	11/10/2016	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Moderate
182386	11/10/2016	Little Corella	*Cacatua sanguinea*	Seen	Clear	Moderate
182401	11/10/2016	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Moderate
182437	11/10/2016	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Moderate
182653	11/10/2016	White-faced Heron	*Egretta novaehollandiae*	Seen	Clear	Moderate
182665	11/10/2016	Willie Wagtail	*Rhipidura leucophrys*	Seen	Clear	Moderate
182753	18/10/2016	Pied Currawong	*Strepera graculina*	Seen	Clear	Calm
182754	18/10/2016	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Calm
182755	18/10/2016	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
182756	18/10/2016	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Calm
182757	18/10/2016	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
182758	18/10/2016	Spotted Pardalote	*Pardalotus punctatus*	Heard	Clear	Calm
182759	18/10/2016	Red-rumped Parrot	*Psephotus haematonotus*	Seen	Clear	Calm
182760	18/10/2016	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
182761	18/10/2016	Pacific Koel	*Eudynamys orientalis*	Heard	Clear	Calm
182762	18/10/2016	Silver Gull	*Larus novaehollandiae*	Seen	Clear	Calm
182763	18/10/2016	Grey Butcherbird	*Cracticus torquatus*	Seen	Clear	Calm
182764	18/10/2016	Willie Wagtail	*Rhipidura leucophrys*	Seen	Clear	Calm
183269	25/10/2016	Pied Currawong	*Strepera graculina*	Seen	Clear	Calm
183270	25/10/2016	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Calm
183271	25/10/2016	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
183272	25/10/2016	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Calm
183273	25/10/2016	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
183274	25/10/2016	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm

183275	25/10/2016	Willie Wagtail	*Rhipidura leucophrys*	Seen	Clear	Calm
183276	25/10/2016	Red Wattlebird	*Anthochaera carunculata*	Seen	Clear	Calm
183277	25/10/2016	Pacific Koel	*Eudynamys orientalis*	Heard	Clear	Calm
183278	25/10/2016	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Calm
183777	1/11/2016	Pied Currawong	*Strepera graculina*	Seen	Clear	Calm
183778	1/11/2016	Australian White Ibis	*Threskiornis molucca*	Seen	Clear	Calm
183779	1/11/2016	Rainbow Lorikeet	*Trichoglossus haematodus*	Seen	Clear	Calm
183780	1/11/2016	Australian Magpie	*Gymnorhina tibicen*	Seen	Clear	Calm
183781	1/11/2016	Magpie-lark	*Grallina cyanoleuca*	Seen	Clear	Calm
183782	1/11/2016	Noisy Miner	*Manorina melanocephala*	Seen	Clear	Calm
183783	1/11/2016	Spotted Pardalote	*Pardalotus punctatus*	Heard	Clear	Calm
183784	1/11/2016	Australian Raven	*Corvus coronoides*	Seen	Clear	Calm
183785	1/11/2016	Welcome Swallow	*Hirundo neoxena*	Seen	Clear	Calm
183786	1/11/2016	Silver Gull	*Larus novaehollandiae*	Seen	Clear	Calm
183787	1/11/2016	Galah	*Eolophus roseicapillus*	Seen	Clear	Calm
183788	1/11/2016	Grey Butcherbird	*Cracticus torquatus*	Seen	Clear	Calm