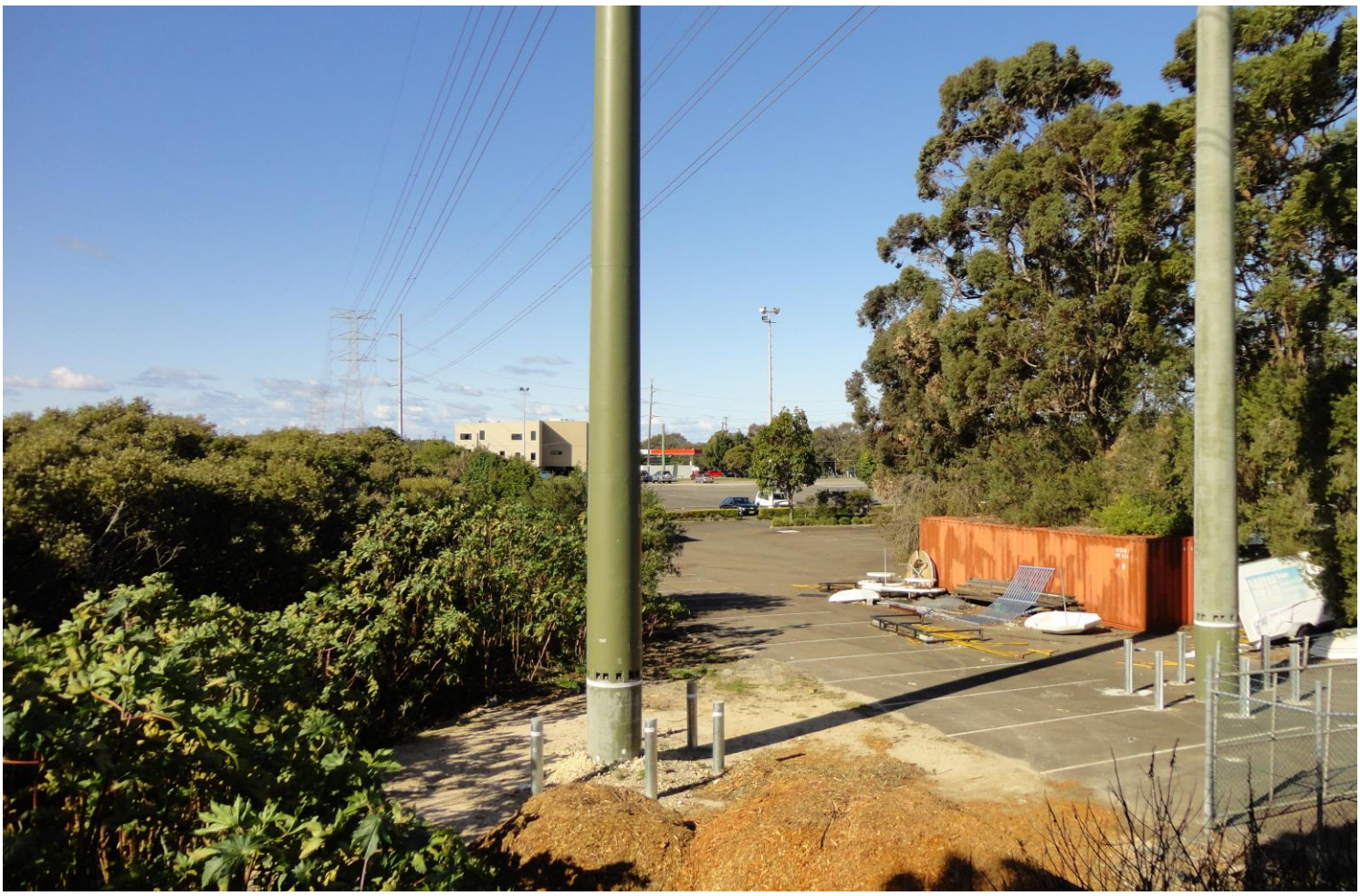
Review of Noise, Light and Bird Strike Potential

Woolooware Bay Town Centre Retail Project Application

Prepared for
Bluestone Property Solutions Pty Ltd

12 February 2016



DOCUMENT TRACKING

Item	Detail
Project Name	Woolooware Bay Town Centre Retail Project Application – Review of Noise, Light and Bird Strike Potential
Project Number	15SUT-2742
Project Manager	Beth Medway 02 8536 8612 PO Box 12 Sutherland NSW 1499
Prepared by	Rebecca Dwyer
Reviewed by	Beth Medway
Approved by	Beth Medway
Status	Final
Version Number	2
Last saved on	12 February 2016
Cover photo	View east over the existing carpark and edge of mangroves

This report should be cited as 'Eco Logical Australia 2016. *Woolooware Bay Town Centre Retail Project Application – Review of Noise, Light and Bird Strike Potential.* Prepared for Bluestone Property Solutions Pty Ltd.'

Template 29/9/2015

Contents

List of figures

List of tables

1 Introduction

This report has been prepared by Eco Logical Australia (ELA) at the request of Bluestone Property Solutions Pty Ltd. It has been prepared in response to items raised under the Concept Plan Approval for the Woolooware Bay Town Centre. It focuses on management of noise and lighting to minimise impacts to sensitive ecosystems in the area. It also reviews the proposed architectural design for the project application in terms of potential 'bird strike'.

The proposed retail centre is situated adjacent to mangroves fringing Woolooware Bay. The position of the subject site relative to Towra Point Nature Reserve and Taren Point Shorebird Reserve is depicted in **Figure 1**. Woolooware Bay is an Aquatic Reserve. The mangroves and reserves provide habitat for threatened species such as *Myotis macropus* (Large-footed Myotis) and various migratory birds.

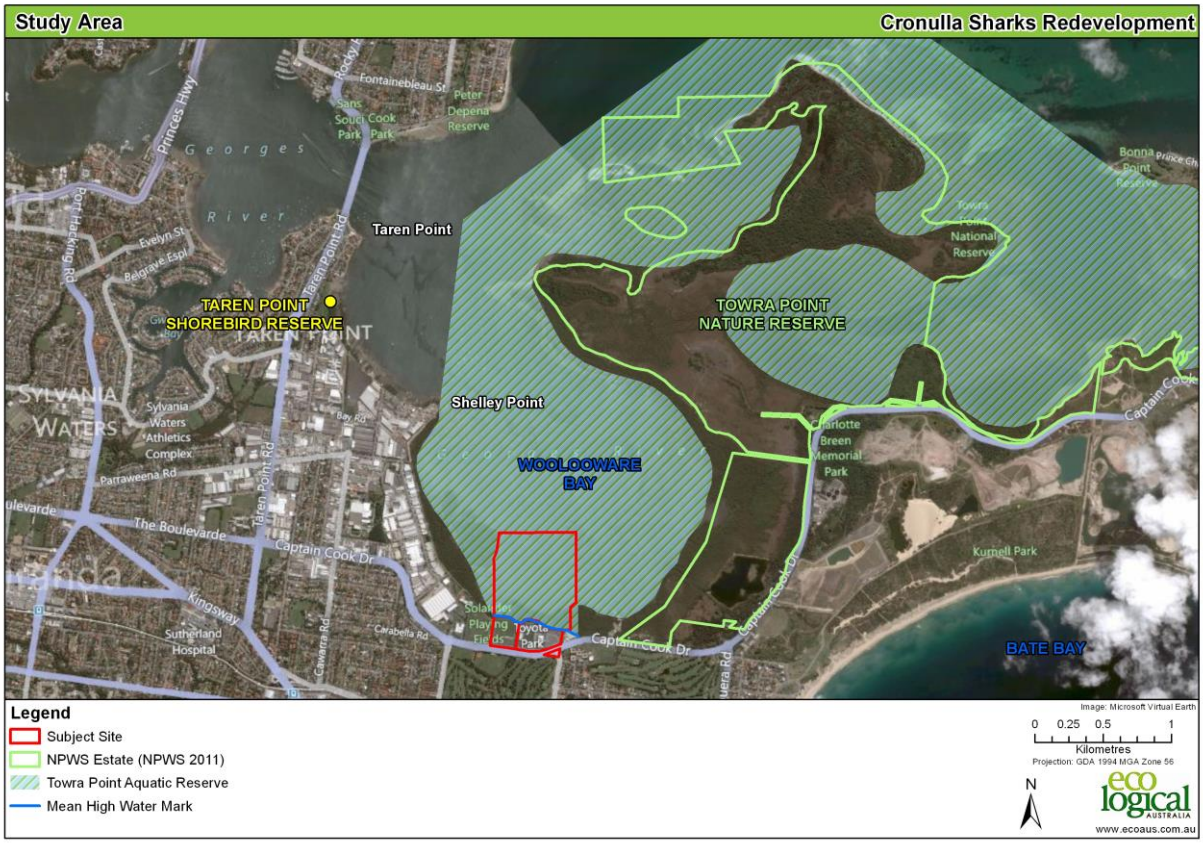


Figure 1: Regional context of Woolooware Bay Town Centre

2 Noise

The proposed retail complex is positioned at least 35 m from the edge of the mangroves. However, construction activity and recreational facilities (e.g. paths) will be closer to the mangroves than this distance.

2.1 Ecological considerations

Animals rely on meaningful sounds for communication, navigation, avoiding danger and finding food against a background of noise. The effects of noise on most species are poorly understood and fauna will perceive noise impacts differently (AMEC Americas Ltd 2005; Office of Planning, Environment & Realty; Eco Logical Australia 2006). Some fauna become stressed by noise, which can affect foraging or breeding, or they may leave an area, whereas other species or populations do not seem to be affected or may adjust to noise over time.

As far as determining impacts to fauna, the nature of the noise (e.g. high or low pitch; sudden or continuous) needs to be considered as well as the 'loudness' (measured in dB(A)) because animals perceive noise differently to humans. For example, microbats such as the Large-footed Myotis are more attuned to the high frequency band (e.g. metal on metal sounds), so may not be concerned by steady low pitch traffic noise (e.g. microbats often inhabit road culverts). However, loud ongoing noise may make it difficult for microbats to hear prey, which can adversely affect foraging (Siemers & Schaub 2011). As another example, many bird species are more sensitive to sudden loud noises (e.g. dogs barking) rather than continuous noise or noise that builds and fades away (e.g. aircraft).

For the purposes of this discussion, sensitive ecological areas are identified as:

- the mangroves on the northern side of the proposed development
- Towra Point Nature Reserve, which is located more than 0.5 km away (**Figure 1**).

2.2 Existing noise

The site of the proposed development is currently an open carpark on asphalt. The carpark is used on a daily basis, with cars regularly parking on the edge of the mangroves. Noise levels have not been measured at this location.

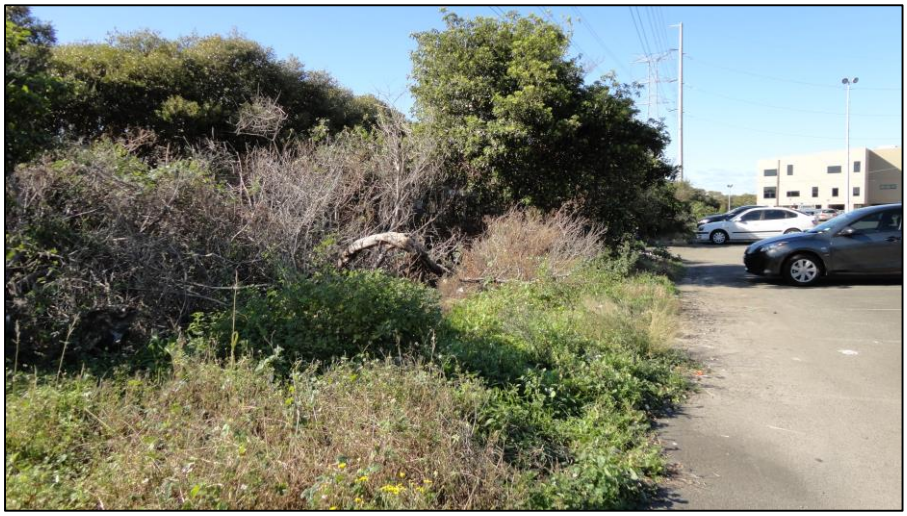


Figure 2: Cars parked on the edge of mangroves

2.3 Predicted noise

2.3.1 During construction

Noise levels predicted to occur at sensitive ecological sites during construction have been estimated by Acoustic Logic (refer to **Table 1**). Acoustic Logic states that calculated levels represent a maximum noise level and as such will not be accumulative. All calculated noise levels assume no screening and will reduce by 5-8 dB(A) with screening from other structures.

Table 1: Maximum construction noise at surrounding locations (Acoustic Logic)

Equipment Type	Sound Power Level (SWL)	Location					Discussion
		Mangroves directly adjacent to the site	20m from the site	40m from the site	60m From the Site	Towra Point 500m from the site	
Hydraulic Hammers	115	87 dB(A)	81 dB(A)	75 dB(A)	71 dB(A)	50 dB(A)	Intermittent noise level as equipment cannot run continuously
Concrete Saw Cutting	114	86 dB(A)	80 dB(A)	74 dB(A)	70 dB(A)	49 dB(A)	Only when in operation
Excavator (without hammer)	98	70 dB(A)	64 dB(A)	58 dB(A)	54 dB(A)	33 dB(A)	Detailed noise levels based on worst case levels (ie operating at boundary of the site with the wetlands)
Drill Pilling equipment	105	77 dB(A)	71 dB(A)	65 dB(A)	61 dB(A)	40 dB(A)	Detailed noise levels based on worst case levels (ie operating at boundary of the site with the wetlands)

2.3.2 During operation

Noise associated with the proposed loading dock and various plant and equipment located along the northern end of the retail facility are likely to have ongoing impacts on fauna inhabiting the nearby

mangroves. However, there is considerable uncertainty about the degree of impact because fauna inhabiting mangroves near the stadium and car park may already be accustomed to elevated noise levels compared to fauna inhabiting Towra Point.

2.4 Predicted impact on fauna and mitigation measures

Fauna at Towra Point are unlikely to be affected by the construction or operational noise from the proposed retail centre because of noise attenuation over distance. Significantly higher levels of noise are likely to be experienced in the nearby mangroves and this may result in fauna avoiding these areas, at least temporarily during construction in close proximity to the mangroves.

The following measures will mitigate some of these impacts:

- Where possible, select quieter types of machinery and equipment, or use construction techniques that are quieter.
- Limit construction noise to daylight hours so that peak fauna foraging periods at dawn, dusk and night-time are avoided, particularly when construction activity is in close proximity to the mangroves.
- Avoid noisy construction activities within 50 m of habitat areas during October to January, as this is an important period in the life-cycle for many species inhabiting this area.
- Establish a dense vegetated buffer between the retail facility (particularly near the loading dock) and the mangroves to mitigate some of the operational noise at the level of the mangrove habitat.

3 Lighting

3.1 Background

Excessive lighting not only causes light pollution and wastes energy but also impacts on the natural environment by affecting the activity rhythms of both plants and animals (Outen 1998). The mangroves adjacent the proposed retail centre provide habitat for nocturnal species such as microbats, including the *Myotis macropus* (Large-footed Myotis) which is listed as vulnerable under the NSW *Threatened Species Conservation Act 1995*.

Microbats are affected by artificial lighting because of the following reasons (Fure 2006, Jones 2000):

- Many species of bats are known to sample the light levels before emerging from their roost; only emerging for their night's hunting when the light intensity outside reaches a critical level after sunset (Swift 1980).
- Artificial lighting disrupts the normal 24-hour pattern of light and dark which is likely to affect the natural behaviour of bats. Light near a roost access point will delay bats from emerging and shorten the amount of time available to them for foraging.
- Bright light may reduce social flight activity and cause bats to move away from the light area to an alternative dark area.
- Illuminating a bat roost creates disturbance and may cause the bats to desert the roost.
- Artificial lighting can also affect the feeding behaviour of bats. In most bat species there is an evening period of activity followed by another at dawn. These two flights correlate with the peak flight times of nocturnal insect prey. Insects are attracted to light particularly if it is a single light source in a dark area.
- Artificial lighting can increase the chances of predation. It is believed that *Myotis* species shun bright light as a predator avoidance strategy.

3.2 Mitigation measures

The main mitigation measure regarding light is to ensure that the mangroves are not illuminated during construction or as part of the building and path design. Lighting should not be directed toward or in the mangroves.

4 Bird strike potential

The site is located near important migratory bird habitat at Towra Point and Taren Point.

4.1 Background

A significant numbers of birds are killed or injured due to impact with windows on buildings, particularly when buildings are situated within migratory flight paths. Birds hit windows for three reasons:

- they don't see them as a barrier and attempt to fly through them
- they see habitat reflected in them and attempt to navigate to some point in the reflection
- they are attracted to lights on buildings at night and fly near to them.

Complete or faceted reflective facades appear to be especially problematic.

The majority of bird strike studies reviewed have been done in North America and Europe where there are populations of migratory birds that have died after colliding with plain mirrored glass building facades (see example below). There are no comparable Australian studies that were identified and this remains an area of potential future research.

Figure 3: Example of a mirrored glass façade that can cause bird strike (from Sheppard 2011)

4.2 Proposed facades

The proposed north and south facing facades of the retail complex are illustrated in **Figure 4** and **Figure** 5. The proposed design seeks to reduce potential for bird strike by featuring a variety of window and external wall treatments and styles, rather than a uniform reflective facade as shown in **Figure 3**. Windows on the northern façade, which would look out over the mangroves to Botany Bay and Towra Point, are set back and screened with horizontal lattice. Windows on the southern side of the building are slightly set back and some windows are partly screened by trees.

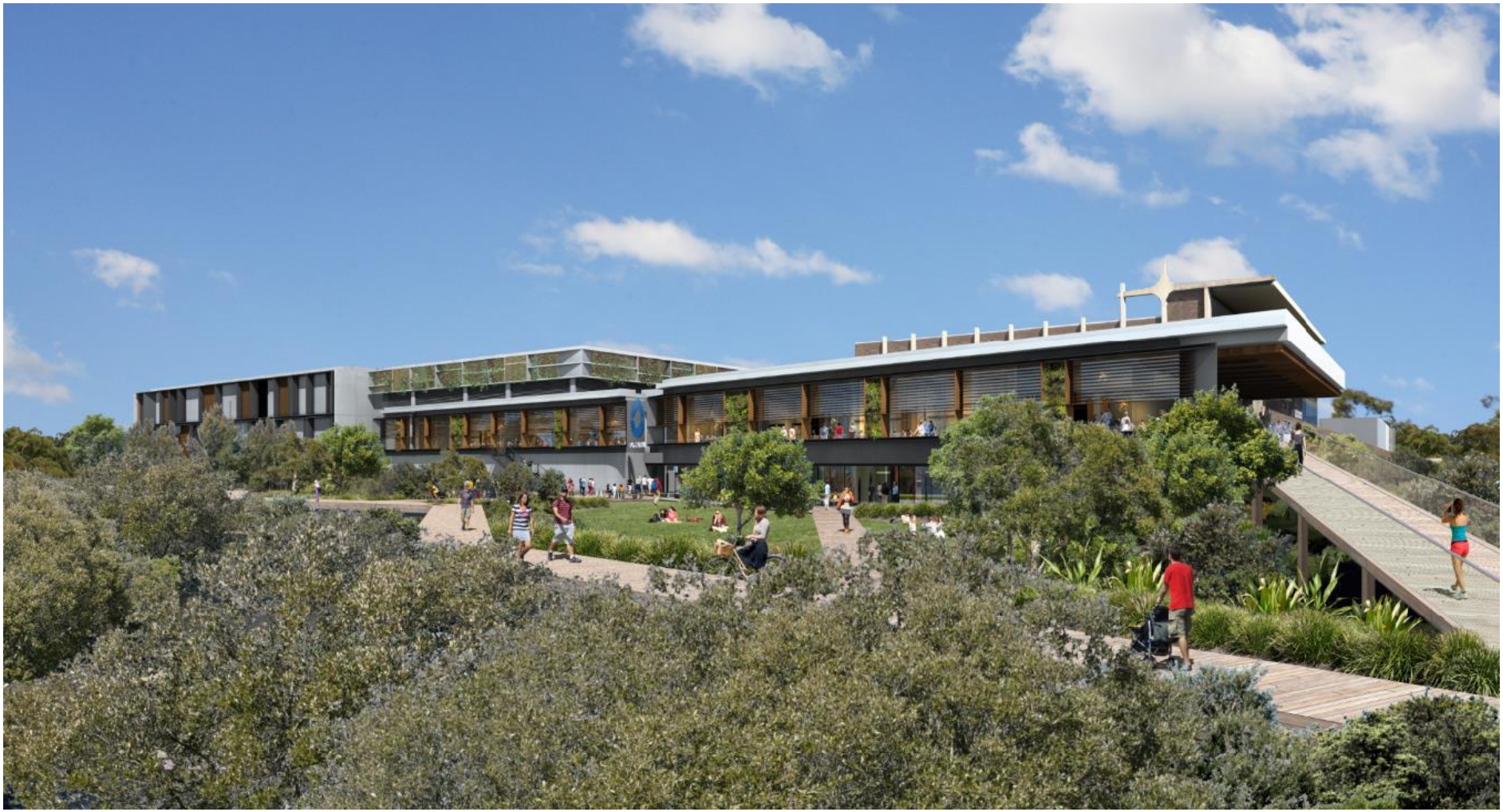


Figure 4: Proposed northern façade (Source: HDR Rice Daubney 2016)

Figure 5: Proposed southern façade (Source: HDR Rice Daubney 2016)

References

Acoustic Logic 2014. *Woolooware Bay Town Centre Residential Stage 2 – Residential Development Noise Impact Assessment*. Prepared for Bluestone Property Solutions Pty Ltd.

AMEC Americas Ltd 2005. *Mackenzie Gas Project – Effects of Noise on Wildlife*. Prepared for Imperial Oil Resources Ventures Ltd.

Eco Logical Australia 2006. *Noise Impact Assessment Playground Relocation – Kukuni Wildlife Shelter, Lane Cove National Park*. Prepared for Environmental Partnerships

Eco Logical Australia 2011. *Cronulla Sharks Redevelopment – ecological assessment of the concept plan*. Prepared for Bluestone Capital Ventures No. 1 Pty Ltd.

Fure, A. 2006. 'Bats and lighting'. *The London Naturalist* No.85, 2006.

Jones, J. 2000. *Guidelines – Impact of Lighting on Bats*. Unpublished report by Dr Jenny Jones.

Office of Planning, Environment & Realty. *Noise effect on Wildlife – Highway Traffic Noise*. U.S. Department of Transportation. Website accessed 11/2/13: http://www.fhwa.dot.gov/environment/noise/noise_effect_on_wildlife/effects/wild00.cfm

Outen, A.R. 1998. *The possible ecological implications of artificial lighting*. Hertfordshire Biological Records Centre.

Rydell, J. 'Bats and Their Insect Prey at Streetlights'. *Mammals – Chapter 3*.

Sheppard C. 2011. *Bird-friendly Building Design*. American Bird Conservancy.

Siemers, B.M. and Schaub, A. 2011. 'Hunting at the highway: traffic noise reduces foraging efficiency in acoustic predators'. *Proceedings of the Royal Society B*. 278, 1646-1652.

Zurcher, A.A., Sparks, D.W. and Bennett, V.J. 2010. 'Why the bat did not cross the road?' *Acta Chiropterologica*.

HEAD OFFICE
Suite 2, Level 3
668-672 Old Princes Highway
Sutherland NSW 2232
T 02 8536 8600
F 02 9542 5622

CANBERRA
Level 2
11 London Circuit
Canberra ACT 2601
T 02 6103 0145
F 02 6103 0148

COFFS HARBOUR
35 Orlando Street
Coffs Harbour Jetty NSW 2450
T 02 6651 5484
F 02 6651 6890

PERTH
Suite 1 & 2
49 Ord Street
West Perth WA 6005
T 08 9227 1070
F 08 9322 1358

DARWIN
16/56 Marina Boulevard
Cullen Bay NT 0820
T 08 8989 5601
F 08 8941 1220

SYDNEY
Level 6
299 Sussex Street
Sydney NSW 2000
T 02 8536 8650
F 02 9264 0717

NEWCASTLE
Suites 28 & 29, Level 7
19 Bolton Street
Newcastle NSW 2300
T 02 4910 0125
F 02 4910 0126

ARMIDALE
92 Taylor Street
Armidale NSW 2350
T 02 8081 2681
F 02 6772 1279

WOLLONGONG
Suite 204, Level 2
62 Moore Street
Austinmer NSW 2515
T 02 4201 2200
F 02 4268 4361

BRISBANE
Suite 1 Level 3
471 Adelaide Street
Brisbane QLD 4000
T 07 3503 7191
F 07 3854 0310

HUSKISSON
Unit 1 51 Owen Street
Huskisson NSW 2540
T 02 4201 2264
F 02 4443 6655

NAROOMA
5/20 Canty Street
Narooma NSW 2546
T 02 4476 1151
F 02 4476 1161

MUDGEE
Unit 1, Level 1
79 Market Street
Mudgee NSW 2850
T 02 4302 1230
F 02 6372 9230

GOSFORD
Suite 5, Baker One
1-5 Baker Street
Gosford NSW 2250
T 02 4302 1220
F 02 4322 2897

1300 646 131
www.ecoaus.com.au