Appendix I – Specialist bird report (winter)

Transport Roads & Maritime Services

Species Impact Statement – Woodland Bird Component

REALIGNMENT OF THE OLYMPIC HIGHWAY AT KAPOOKA

WOODLAND BIRD SURVEYS - WINTER

SEPTEMBER 2013

ngh environmental

Document Verification

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EXECUTIVE SUMMARY

Roads and Maritime Services (Roads and Maritime) proposes to construct a four lane road and over-rail bridge on the Olympic Highway at Kapooka which will include realigning 2.7 kilometres of the Olympic Highway and upgrading the Olympic Highway/Camp Access Road intersection. It is expected that the project will take 18 months to construct (Roads and Maritime 2013).

The proposal requires the removal of 32.5 hectares of vegetation, 12.8 hectares of which comprises Box-Gum Woodland listed as an Endangered Ecological Community (EEC) under the *Threatened Species Conservations Act 1995* (TSC Act) and a Critically Endangered Ecological Community (CEEC) under the *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act). The removal of Box-Gum Woodland would result in the loss of 788 trees, 13 of which have been identified as hollow bearing trees.

An Ecological Assessment was prepared by GHD and submitted to Roads and Maritime in 2012. The Ecological Assessment concluded that a significant impact on the ecological community Box-Gum Woodland, listed under both the TSC Act and EPBC Act, was likely, based on impacts such as removal and fragmentation of habitat. Therefore a Referral to the Federal Minister for the Environment and a Species Impact Statement (SIS) would be required.

Director-General's Requirements (DGR's) for a Species Impact Statement were issued to Roads and Maritime on the 13 December 2012 and identified 27 fauna species (22 of which were birds), one flora species, one endangered fauna population, and two endangered ecological communities.

nghenvironmental was engaged by Roads and Maritime to undertake winter bird surveys specifically for subject species including the Regent Honeyeater, Swift Parrot, Little Lorikeet, and Glossy Black-cockatoo in accordance with the DGRs for the winter survey period. This survey report has been prepared to address issues in relation to winter woodland birds identified in the brief prepared by Roads and Maritime on 30 May 2013.

Amendments to the DGR's for the winter survey period were agreed/approved following discussions at a meeting held on the 27 June 2013 between Roads and Maritime, Office of Environment and Heritage (OEH), Mr Crane and nghenvironmental. Survey locations were discussed and decided upon during this meeting. Transects were located within the subject site, woodland areas within the study area, and at designated control sites including along the Kapooka access road, near the DPI Research Station and in Silvalite Reserve. All birds observed within 25 metres either side of each transect were recorded. Birds within 50 metres either side of each transect were also recorded.

Transect surveys were undertaken to target the Little Lorikeet, Swift Parrot and Regent Honeyeater. A total of 18 transects were surveyed within the study area/locality during the winter bird survey period (June and July/August). Transects were surveyed a total of four times, twice over two survey periods.

Glossy Black-cockatoo nest surveys were undertaken across the study area. All potential nest trees were recorded using a Garmin hand-held GPS. Surveys for this species were undertaken over two survey periods, one in June and the other around 30 days later in July/August, both coinciding with the breeding season for this species. Areas outside the study area were also surveyed including Pomingalarna Reserve, Silvalite Reserve and areas along the Holbrook Road. Pomingalarna Reserve was traversed in detail as this area supports suitable foraging habitat for this species and the Glossy Black-cockatoo has been recorded in this reserve previously.

A total of 68 bird species were recorded during the winter bird survey period. Of these, nine are threatened species listed under the TSC Act and/or EPBC Act. Two of the subject species listed in the

DGR's for the winter survey period (Little Lorikeet and Swift Parrot) were recorded within the study area. The Swift Parrot was recorded along three transects and was observed foraging on Golden Wattle (*Acacia pycnantha*) near WR-5. Approximately five - six individuals were observed during all three days. The Little Lorikeet was recorded along two transects (WR-3 and SA-3), and was also observed flying over the study area at another transect (WR-2).

The Glossy Black-cockatoo was not recorded during any of the transect surveys undertaken at Pomingalarna Reserve. Areas surrounding feed trees were surveyed for fresh orts (chewed remains of cones), however none were located.

A total of 64 potential nest trees were identified for the Glossy Black-cockatoo within the study area. The majority of trees were recorded within Silvalite Reserve and within paddock areas that still had large old hollow bearing trees and stags present. No Glossy Black-cockatoos were observed utilising these trees during either survey period.

The removal of Box Gum vegetation including hollow bearing trees and White Box along with Acacia species is likely to have some impact on the availability of foraging habitat for the Swift Parrot and Little Lorikeet. However, there are alternative habitat resources within the wider locality which these species can traverse to including areas along the Murrumbidgee River, Silvalite Reserve, Pomingalarna Reserve, the Kapooka Military Base, Livingstone National Park and The Rock Nature Reserve. The NSW Bionet Atlas and Birds Australia Birdata both show a number of records of the subject species are present at these areas within the wider locality

The Regent Honeyeater was not recorded during the winter bird surveys. This species has not been recorded within the Wagga Wagga LGA since 1980. The study area does not support suitable habitat for the Regent Honeyeater as vegetation structure supports little shrubby understorey and mistletoe is scarce. In the last ten years the Regent Honeyeater has been recorded within Albury (approximately 120 kilometres south of the study area) where woodland tree species such as Mugga Ironbark and Yellow Box were planted 20 years ago.

The Glossy Black-cockatoo is a highly mobile species and would be able to traverse to other areas of habitat within the locality. Higher quality stands of habitat are present outside the study area in Pomingalarna Reserve and the Rock Nature Reserve.

Additional mitigation measures that should be implemented for bird species include relocation of habitat features, providing wintering habitat for the Swift Parrot and nest box design.

PREFACE

This woodland bird survey report has been prepared by nghenvironmental Pty Ltd in accordance with the requirements of Sections 109 and 110 of the NSW *Threatened Species Conservation Act 1995* (TSC Act) (with the exception of matters identified in the Director Generals Requirements (DGR's) relating to Section 110) and with regard to the requirements as notified by the Director General of the Department of Premier and Cabinet, Office of Environment and Heritage.

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ACRONYMS AND ABBREVIATIONS

CEEC	Critically Endangered Ecological Community
CMA	Catchment Management Authority
DEWHA	Department of Environment, Water, Heritage and the Arts (Commonwealth – until late 2010)
DGRs	Director-General Requirements for this Species Impact Statement
DoE	Department of the Environment (formally Department of Sustainability, Environment, Water, Population and (DSEWPaC))
EEC	Endangered Ecological Community
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)
GPS	Global Positioning System
ha, m, km	Hectares, metres, kilometres
KTP	Key Threatening Process
LGA	Local Government Area
NR	Nature Reserve
NSW	New South Wales
MNES	Matters of National Environmental Significance
OEH	Office of Environment and Heritage (NSW – since April 2011)
REF	Review of Environmental Factors
RMS	Roads and Maritime Services (NSW – since early 2012) (now Roads and Maritime, since November 2013)
RTA	Roads and Traffic Authority (NSW – until early 2012)
SIS	Species Impact Statement
SPRAT	Species Profile and Threats Database, managed by DSEWPC
TSC Act	Threatened Species Conservation Act 1995 (NSW)
VMP	Vegetation management plan

DEFINITIONS

Development	Has the same meaning as in the Environment Planning and Assessment Act 1979 (EP&A Act).
Activity	Has the same meaning as in the EP&A Act.
Proposal	Is the development, activity or action proposed.
Subject site	Means the area directly affected by the proposal (footprint area).
Study Area	Means the subject site and any additional areas which are likely to be affected by the proposal, either directly or indirectly. The study area extends as far as is necessary to ensure all potential impacts are accounted for. At a minimum, the study area includes lands within 500-metres of the subject site as a minimum. This encompasses stockpile areas, crane pads, drainage etc.
Locality	The area within a 10km radius of the Subject site.
Known habitat	An area where a species has been recorded.
Subject Species, Populations or Ecological Communities	Means those threatened species, populations or ecological communities that are known or considered likely to occur in the study area. The SIS explicitly considers the impacts of the proposal on each of these entities.
Direct Impacts	Are those that directly affect habitat and individuals, usually within the footprint of the proposal. They include, but are not limited to, vegetation clearing and/or habitat removal. Consideration must be given to all of the likely direct impacts of the proposed activity or development.
Indirect Impacts	Occur when project related actions affect species, populations or ecological communities in a manner other than direct loss, usually beyond the footprint of the proposal. Indirect impacts can include loss of individuals though predation by domestic and / or feral animals, deleterious hydrological changes (including increased runoff and rising or falling of the water table) erosion, weed invasion, pollution, trampling or other impacts due to increased human activity within or directly adjacent to the sensitive habitat areas, altered fire regimes, habitat fragmentation and disruption of wildlife movement corridors. As with direct impacts, consideration must be given to all of the likely indirect impacts of the proposed activity or development.
Life Cycle	Is the series or stages of reproduction, growth, development, aging and death of an organism.
Viable	Means the capacity of a species to successfully complete each stage of its life cycle under normal conditions.
Risk of extinction	is the likelihood that the local population of the species or local occurrence of the endangered population or ecological community will become extinct either in the short, medium or long-term as a result of direct or indirect impacts on the viability of that population and includes changes to the ecological function of communities.

Local Population	Is the population that occurs in the study area. The assessment of the local population may be extended to include individuals beyond the study area if it can be clearly demonstrated that contiguous or interconnecting parts of the population continue beyond the study area, according to the following definitions: • The local population of resident fauna species comprises those individuals known or likely to occur in the study area, as well as individuals occurring in adjoining areas (contiguous or otherwise) that are known or likely to utilise habitats in the study area. • The local population of migratory or nomadic fauna species comprises those individuals that are likely to occur in the study area from time to time. • In cases where multiple populations occur in the study area, each population should be assessed separately.
Local Occurrence	Means the ecological community that occurs within the study area. However the local occurrences may include adjacent areas if this ecological community is part of a larger contiguous patch outside the study area and the movement of individuals and exchange of genetic material across the boundary of the study area can be clearly demonstrated.
Composition	Means both the plant and animal species present, and the physical structure of the ecological community. Note that while many ecological communities are identified primarily by their vascular plant composition, an ecological community as defined under the TSC Act consists of all plants and animals that occur in that community.
Assessments of Significance	Refers collectively to impact assessments made under the TSC Act's *Threatened Species Assessment Guidelines: The Assessments of Significance* (DECCW 2007) and the EPBC Act's *Significant Impact Guidelines 1.1 for Matters of National Environmental Significance* (DEWHA 2009) to characterise the significance of impacts on specific entities.
Key Threatening Processes	Listed under the TSC Act, Key Threatening Processes are defined as *"...the things that threaten - or could threaten - the survival or evolutionary development of species, populations or ecological communities*".

1 CONTEXTUAL INFORMATION

1.1 INTRODUCTION

This specialist woodland bird survey report has been prepared to address the Director General's Requirements (DGRs) for this proposal, issued to Roads and Maritime Services (RMS) (now Roads and Maritime) on 13 December 2012 (Appendix A).

1.1.1 The proposal

Roads and Maritime proposes to construct a four lane road and over-rail bridge on the Olympic Highway at Kapooka. The proposal involves the realignment of 2.7 kilometres of the Olympic Highway and upgrading the existing Olympic Highway/Camp Access Road intersection (subject site). It is expected that the project will take 18 months to construct (Roads and Maritime 2013). The proposal requires the removal of 32.5 hectares of vegetation, 12.8 hectares of this vegetation comprises Box Gum woodland, which is an Endangered Ecological Community (EEC) under the TSC Act and a Critically Endangered Ecological Community (CEEC) under the EPBC Act.

A portion of the proposed alignment (subject site) is located within the biodiversity offsets area as detailed in Wagga Wagga's biocertified Local Environmental Plan (LEP). The proposal would impact on 9.6 hectares of this offset area (GHD 2012).

1.1.2 Matters that have been limited or modified

Requirements for the content of the SIS are provided by Sections 109 and 110 of the TSC Act. The SIS does not need to address Sections 110(2)(g) and 110(3)(d) of the TSC Act, as these matters have been clarified by the requirements below. Table 1 summarises the points below that are relevant to woodland birds for this SIS.

The following Section 110 matters need only be addressed where relevant:

- All reference to threat abatement plans.
- All reference to recovery plans.
- All reference to key threatening processes
- All reference to critical habitat.

Table 1: Summary of matters from Section 110 relevant to woodland birds for this SIS.

Section 110 Matter	Requirement
Threat abatement plans	There are no threat abatement plans relevant to the Key Threatening Processes associated with the proposal.
Key Threatening Processes	The following Key Threatening Processes are relevant to this proposal: • Clearing of native vegetation. • Removal of dead wood and dead trees. • Loss of Hollow-bearing trees.

Section 110 Matter	Requirement
Recovery plans	There are two draft recovery plans relevant to bird species identified in Table 1 of the DGR's. These are detailed below: • Barking Owl – Draft Recovery plan February 2003. • Bush Stone Curlew – Draft Recovery plan February 2006. If other entities should be deemed as subject species, populations or ecological communities by analysis in accordance with the DGRs, then any relevant recovery plans pertaining to these entities will need to be addressed in the SIS.

1.1.3 The subject site, study area and locality

The proposal involves the realignment of 2.7 kilometres of the Olympic Highway and upgrading the existing Olympic Highway/Camp Access Road intersection (subject site).

The study area includes the subject site and additional areas likely to be affected by the proposed works. These may include compound areas, access roads, drainage, stockpile sites, and weather monitoring stations.

The majority of the study area is located to the east of the Olympic Highway and is on land bio-certified under the Wagga Wagga LEP. The proposed works are not in an area defined as Critical Habitat for any species or community (GHD 2012).

The locality includes an area of 10 kilometres surrounding the subject site. This includes control areas such as Pomingalarna Reserve, Silvalite Reserve and other patches of woodland habitat within this radius.

1.1.4 Tenure

The majority of the study area is located on public land and / or private land. Owners of the public land include the State of NSW, Soil Conservation Commission of NSW (SCS) and Wagga Wagga City Council (WWCC).

A number of private rural and industrial landholders are also located within the study area. Roads and Maritime is in the process of acquiring these lands for the proposal.

2 BACKGROUND INFORMATION AND IDENTIFICATION OF SUBJECT SPECIES

2.1 PREVIOUS STUDIES AND REPORTS ON THE SUBJECT SITE

In 2008, WWCC engaged Eco Logical Australia on behalf of Willana Associates to undertake a flora and fauna assessment of the study area (ELA 2007).

In April 2011 Roads and Maritime engaged nghenvironmental to undertake a constraints analysis for the proposal. The constraints analysis identified major constraints in the study area and the level of likely impact of the proposed route options that was assessed (nghenvironmental 2011).

In 2012, Roads and Maritime engaged GHD to prepare an Ecological Assessment. This assessment was undertaken to identify potential ecological constraints and opportunities, including known or likely presence of species, populations and ecological communities and their habitats listed under the TSC Act and the EPBC Act (GHD 2012).

These reports were considered during the process of identifying subject species.

A review of relevant ecological reports and other studies that incorporate the study locality was undertaken to assist us in determining if any of the subject species have previously been recorded. Reports reviewed include:

- Biannual Swift Parrot (*Lathamus discolor*) surveys as part of the National Recovery Program for the species (2001-present). Survey in May and August voluntarily conducted by GHD ecologists at various reserves in the Wagga Wagga LGA including Silvalite Reserve.
- Ecological assessment. Proposed Kapooka railway overbridge replacement and realignment of approaches of the Olympic Highway (CSU 2003). Report prepared by Johnstone Centre - Environmental Consulting, Charles Sturt University for NSW Roads and Traffic Authority.
- Research and monitoring stage 1, 2004/2005 (CSU 2005b). Superb Parrot and threatened woodland birds of the Kapooka Military Area. Report prepared by Johnstone Centre – Environmental Consulting, Charles Sturt University for Department of Defence.
- Research and monitoring stage 2, 2005/2006 (CSU 2006). Superb Parrot in the Kapooka Military Area and Wagga Wagga Local Government Area. Report prepared by Johnstone Centre - Environmental Consulting, Charles Sturt University for Department of Defence.
- Environmental Constraints Analysis: Kapooka Bridge Replacement (nghenvironmental 2011). Report prepared by nghenvironmental for NSW Roads and Traffic Authority.
- Kapooka Bridge replacement: Ecological Assessment (GHD 2012). Report prepared by GHD for Roads and Maritime Services.
- Realignment of the Olympic Highway at Kapooka – Microbat Survey Report: Director General's Requirements for a Species Impact Statement, draft version (WSP 2013). Report prepared by WSP Environmental for Roads and Maritime Services.

2.1.1 Database searches

nghenvironmental undertook a review of bird records within the Wagga Wagga Local Government Area (LGA) focusing on the NSW Bionet online database. The objective was to gain an understanding of landscape context of bird species occurring in the region. Species recorded, predicted or likely to occur within the LGA were recorded. A second search was also undertaken, focusing on birds recorded within a 10 kilometre radius of the subject site. Table 2 displays records from the NSW Bionet database. Species highlighted in grey were recorded outside the 10 kilometres radius and only within the Wagga Wagga LGA.

Table 2: Database Search results

Common Name	Scientific Name	NSW status (TSC Act)	Commonwth Status (EPBC Act)
Malleefowl	*Leipoa ocellata*	E1,P	V
Blue-billed Duck	*Oxyura australis*	V,P	
Freckled Duck	*Stictonetta naevosa*	V,P	
Australasian Bittern	*Botaurus poiciloptilus*	E1,P	E
Spotted Harrier	*Circus assimilis*	V,P	
Little Eagle	*Hieraaetus morphnoides*	V,P	
Square-tailed Kite	*Lophoictinia isura*	V,P	
Grey Falcon	*Falco hypoleucos*	E1,P	
Black Falcon	*Falco subniger*	V,P	
Brolga	*Grus rubicunda*	V,P	
Bush Stone-curlew	*Burhinus grallarius*	E1,P	
Plains-wanderer	*Pedionomus torquatus*	E1,P	V
Australian Painted Snipe	*Rostratula australis*	E1,P	E
Curlew Sandpiper	*Calidris ferruginea*	E1,P	C,J,K
Black-tailed Godwit	*Limosa limosa*	V,P	C,J,K
Gang-gang Cockatoo	*Callocephalon fimbriatum*	V,P	
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	V,P	
Major Mitchell's Cockatoo	*Lophochroa leadbeateri*	V,P	
Purple-crowned Lorikeet	*Glossopsitta porphyrocephala*	V,P	
Little Lorikeet	*Glossopsitta pusilla*	V,P	
Swift Parrot	*Lathamus discolor*	E1,P	E
Turquoise Parrot	*Neophema pulchella*	V,P	
Superb Parrot	*Polytelis swainsonii*	V,P	V
Barking Owl	*Ninox connivens*	V,P	
Powerful Owl	*Ninox strenua*	V,P	
Masked Owl	*Tyto novaehollandiae*	V,P	
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V,P	

Speckled Warbler	*Chthonicola sagittata*	V,P	
Shy Heathwren	*Hylacola cautus*	V,P	
Regent Honeyeater	*Anthochaera phrygia*	E4A,P	E
Pied Honeyeater	*Certhionyx variegatus*	V,P	
White-fronted Chat	*Epthianura albifrons*	V,P	
Painted Honeyeater	*Grantiella picta*	V,P	
Black-chinned Honeyeater (eastern subspecies)	*Melithreptus gularis gularis*	V,P	
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis temporalis*	V,P	
Chestnut Quail-thrush	*Cinclosoma castanotum*	V,P	
Varied Sittella	*Daphoenositta chrysoptera*	V,P	
Gilbert's Whistler	*Pachycephala inornata*	V,P	
Olive Whistler	*Pachycephala olivacea*	V,P	
Hooded Robin (south-eastern form)	*Melanodryas cucullata cucullata*	V,P	
Scarlet Robin	*Petroica boodang*	V,P	
Flame Robin	*Petroica phoenicea*	V,P	
Pink Robin	*Petroica rodinogaster*	V,P	
Diamond Firetail	*Stagonopleura guttata*	V,P	

Key

V = Vulnerable (TSC Act and EPBC Act)

P = Protected (NPW Act)

E1 = Endangered (TSC Act)

E4A = Critically Endangered (TSC Act)

V = Vulnerable (TSC Act and EPBC Act)

P = Protected (NPW Act)

E1 = Endangered (TSC Act)

E4A = Critically Endangered (TSC Act)

2.1.2 DGR Subject Species

As a result of previous studies undertaken within the study area, the DGRs have identified 22 bird species (subject species) to be considered in this SIS (Table 3). Bird species considered during the winter monitoring period (this report) are highlighted in grey and have been mapped as part of the background searches (Appendix B).

Table 3: Subject species identified in DGR's (birds only)

Bird Species		
Common Name	Scientific Name	Status
Regent Honeyeater	*Anthochaera phrygia*	CE TSC
Bush stone Curlew	*Burhinus grallarius*	E TSC
Swift Parrot	*Lathamus discolor*	E TSC
Painted Honeyeater	*Grantiella picta*	V TSC

Bird Species		
Common Name	Scientific Name	Status
Black-chinned Honeyeater (eastern subspecies)	*Melithreptus gularis*	V TSC
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V TSC
Diamond Firetail	*Stagonopleura guttata*	V TSC
Hooded Robin (South eastern form)	*Melanodryas cucullata cucullata*	V TSC
Speckled Warbler	*Pyrrholaemus saggitatus*	V TSC
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis*	V TSC
Scarlet Robin	*Petroica boodang*	V TSC
Flame Robin	*Petroica phoenicea*	V TSC
Varied Sittella	*Daphoenositta chrysoptera*	V TSC
White-fronted Chat	*Epthianura albifrons*	V TSC
Gilbert's Whistler	*Pachycephala inornata*	V TSC
Glossy black-cockatoo	*Calyptorhynchus lathami*	V TSC
Turquoise Parrot	*Neophema pulchella*	V TSC
Superb Parrot	*Polytelis swainsonii*	V TSC
Little Lorikeet	*Glossopsitta pusilla*	V TSC
Barking Owl	*Ninox connivens*	V TSC
Spotted Harrier	*Circus assimilis*	V TSC
Little Eagle	*Hieraaetus morphnoides*	V TSC

3 METHODOLOGY

3.1 SURVEY REQUIREMENTS

nghenvironmental was engaged by Roads and Maritime to undertake winter surveys of woodland birds and in particular the Regent Honeyeater, Swift Parrot, Little Lorikeet, and Glossy Black-cockatoo in accordance with the DGRs (Appendix A). Survey methodology requirements stated in the DGR's and Roads and Maritime brief are detailed in Table 4 below.

Table 4: Survey requirements

Subject Species	Survey requirements
Little Lorikeet Swift Parrot Regent Honeyeater	1. The study area must be surveyed systematically by walking parallel transects that cover all areas of potential habitat. 2. Transects should be 50 metres wide (i.e. 25 metres either side of transect midline). 3. Transects must be surveyed at a maximum rate of 100 metres per 10 minutes. 4. Each survey must be undertaken over two days, with transects on the second day located midway between those walked on the first day (i.e transects on a given day will be 100 metres apart). All birds seen or heard within the transect line or flying over must be recorded. 5. GPS co-ordinates of all survey points, transects, locations of potential habitat (e.g. nesting sites, foraging areas) and significant species would be recorded, and provided on maps. 6. Surveys must be conducted during winter and timed where possible to coincide with periods of peak food availability. Surveys must be undertaken in the early morning (sunrise to four hours after sunrise) on clear, still days to maximise detectability. Surveys should be undertaken when traffic noise is at a minimum.
Glossy Black-cockatoo	1. Glossy Black-cockatoo nest surveys should be undertaken within the study area, with all potential nest trees identified and monitored for evidence of use by nesting Glossy Black-cockatoos. Monitoring of potential nest sites should occur on at least two occasions (separated by approximately 30 days) during the breeding season (March to August). 2. *Optional (consultation with OEH)* *Targeted searches for Glossy Black-cockatoos must be undertaken throughout the locality (10 kms) outside the breeding season, with the objective of identifying foraging habitat, determining the use of foraging habitat and identifying flight paths.*

3.1.1 Desktop Review

A search of relevant databases was undertaken to obtain recorded of threatened and migratory bird species and populations within the Wagga Wagga LGA. The search included species listed only under the

TSC Act. Table 5 summarises the desktop results. Refer to Appendix B for maps of background search results.

Table 5: Desktop review summary

Database	Search Radius	Reference
NSW NPWS Wildlife Database Atlas	10 kms and Wagga Wagga LGA	NSW National Parks and Wildlife Service http://www.environment.nsw.gov.au/atlaspublicapp/UI_Modules/ATLAS_/AtlasSearch.aspx
Threatened Species, populations, and ecological communities of NSW, species profile database	N/A	NSW Office of Environment and Heritage (OEH) http://www.environment.nsw.gov.au/threatenedspecies/

3.1.2 Site reconnaissance

A brief reconnaissance of the study area and locality was undertaken on the 17 June 2013 by Roads and Maritime Representative Daniel Francis, Bird Ecologist Mr Mason Crane and nghenvironmental Senior Environmental Consultant, Amy Evans. Landscape aerial images and maps were used to identify potential habitat within the subject site, study area and study locality. The site reconnaissance involved traversing the site mostly in a 4WD to determine appropriate locations for transect surveys. Potential control sites within the study locality were also looked at during this time. A total of six person hours was spent on the site reconnaissance.

3.1.3 Description of existing vegetation

GHD (2012) undertook vegetation surveys using the Random Meander Method (Cropper 1993) in conjunction with transects and quadrats and an assessment of the quality of vegetation communities was undertaken using the Bio banking Assessment Method (DECC 2009) for the Ecological Assessment.

Four main vegetation communities were identified in the study area during the Ecological Assessment field surveys, these included:

1. *Grassy White Box Woodland* – Woodland dominated by White Box (*Eucalyptus albens*), which complies with the classification criteria for the NSW plant community type (PCT) White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (PCTID 266). All vegetation in this community is in moderate/good condition under the Biobanking methodology.
2. *Plantations* - Patches of planted non-endemic native vegetation are located within the road reserve along Camp Access Road. Commonly occurring planted species include Lemon-scented Gum (*Corymbia citriodora*) and Bloodwood species (*Corymbia spp.).* Groundcover vegetation in areas of planted vegetation is dominated by introduced species and is considered to be in low condition under the Biobanking methodology.
3. *Introduced grasslands* – Areas of introduced grasslands are located in the paddock areas to the south and north of the study area. These areas provide little foraging habitat with groundcover species being dominated by exotic and pasture plants. This area is considered low under the

Biobanking methodology. Some hollow bearing trees are present within this vegetation type, supporting roosting and breeding habitat for hollow dependant fauna.

4. *Deane's Wattle and introduced groundcover vegetation* – A small area of *Acacia deanei* is located near the proposed bridge site. Ground cover species comprise of introduced plants. This area is considered low under the Biobanking methodology.

GHD (2012) identified 120 species of plants consisting of 71 native species and 49 introduced species. Native over storey included White Box, Blakely's Red Gum, Long-leaved Box (*E. goniocalyx*), Red Stringybark (*E. macrorhyncha*) and Mugga Ironbark (*E. sideroxylon*). Five species of wattle were present including Cootamundra Wattle (*Acacia baileyana*), Silver Wattle (*A. dealbata*), Green Wattle *(A. deanei*), Kangaroo Thorn (*A. paradoxa)* and Golden Wattle (*A. pycnantha)*.

Native ground cover species included Red Grass (*Bothriochloa macra), Austrostipa spp., Dichelachne spp., Dianella spp*. and Golden Everlasting (*Xerochrysum bracteatum*). Six weeds classified as noxious species were recorded including Bathurst Burr (*Xanthium spinosum*), Blackberry (*Rubus fruticosus*), Broomrape (*Orobanche* sp.), Paterson's Curse (*Echium plantagineum*), St John's Wort (*Hypericum perforatum*), and White Horehound (*Marrubium vulgare*).

The above vegetation descriptions were used in conjunction with field observations by Mr Crane to define potential habitat areas of the subject species.

3.2 SURVEY EFFORT AND TECHNIQUE

3.2.1 Agreed Survey Methodology

The DGR survey requirements were amended after the first day of field surveys to reach an agreed position on survey effort between Roads and Maritime, OEH, Mr Crane and nghenvironmental.

Survey requirements in the DGR's were developed specifically for the spring survey period. After the first day of surveys it was evident that bird activity was still high well beyond four hours from sunrise. Bird species were also detected by Mr Crane at a faster rate than 100 metres per 10 minutes, therefore it was recommended that the rate of walking each survey be increased.

A meeting was held on the 27 June 2013 between Roads and Maritime, OEH, Mr Crane and nghenvironmental to discuss possible changes to survey requirements defined in the DGR's for the winter survey period. Changes were agreed upon by all parties and documented in the meeting minutes prepared by Daniel Francis (Roads and Maritime Representative). Refer to Appendix C for the minutes from this meeting. Table 6 highlights the changes to the survey methodology.

Table 6: Changes in survey methodology

Subject Species	DGR survey requirements	Changes made
Regent Honeyeater Swift Parrot Little Lorikeet	The study area must be surveyed systematically by walking parallel transects that cover all areas of potential habitat.	No changes.
	Transects should be 50 metres wide (i.e. 25 metres either side of transect midline).	No changes. However species were also recorded within 50 metres either side of the transect survey mid line.

	Transects must be surveyed at a maximum rate of 100 metres per 10 minutes.	Was agreed that survey rate could be increased.
	Each survey must be undertaken over two days, with transects on the second day located midway between those walked on the first day (i.e. transects on a given day will be 100 metres apart). All birds seen or heard within the transect line or flying over must be recorded.	No change in surveys undertaken over two days, however transects on second day were not located midway. It was discussed that species are detectable without having transects 25m apart. Was agreed that this survey effort was excessive for winter and the same results would be achieved without walking transects midway on the second day.
	GPS co-ordinates of all survey points, transects, locations of potential habitat (e.g. nesting sites, foraging areas) and significant species would be recorded, and provided on maps.	No changes.
	Surveys must be conducted during winter and timed where possible to coincide with periods of peak food availability. Surveys must be undertaken in the early morning (sunrise to four hours after sunrise) on clear, still days to maximise detectability. Surveys should be undertaken when traffic noise is at a minimum.	Was agreed that the four hour time restriction could be lifted until midday due to the cold weather and bird activity extending beyond four hours from sunrise.

3.2.2 GIS Mapping

Spatial data obtained during the survey used hand-held Garmin GPS units. Data was plotted over aerial imagery (sourced from Roads and Maritime) using ESRI's ArcGIS software for mapping, planning and presentation.

Vegetation and condition boundaries within the study area were determined from the Ecological Assessment (GHD 2012). Habitat types for each transect was determined during the survey period. All map references are based on the GDA 94 datum.

3.2.3 Survey Types

Transect Surveys

A total of 18 transects (including control sites) were walked within the study area/locality during the two winter bird survey periods (Period 1 -June and Period 2 - July/August). Transects were traversed a total of four times, twice on each of the two survey periods. The total length of transects equals 10.2 kilometres. During each survey period, each transect was walked twice, totalling 20.4 kilometres of transect surveys during each survey period. This equates to 40.8 kilometres of transects for the winter period.

All surveys for the winter survey period were conducted by Mr Crane. Information recorded on each transect included:

- Bird species.
- Abundance.
- Habitat type for each transect.
- Observation activity of subject species recorded.
- Birds flying over transect.

Raw data sheets were sent to Daniel Francis via "Dropbox" on the 13 September 2013. Typed data sheets are provided in Appendix D. Refer to

Table 7 for a summary of transects, their length and the starting times for each transect.

Starting times for woodland bird transects ranged from 7.04am to 11.48am. Each transect was traversed at a relatively constant pace, except when stopping to observe birds. The mean walking pace along transects was 1.2 km/hr, however this increased slightly when walking transects in open areas. Care was taken not to count the same birds more than once in a single transect survey. All threatened birds that were observed were recorded using a Garmin hand-held GPS.

Transect locations were selected by nghenvironmental, Mr Crane, Roads and Maritime and OEH during the meeting held on 27 June 2013. Criteria used for selecting control sites for the subject species included:

- Proximity to subject site.
- Similar habitat type.
- Suitable habitat relevant to the subject species.
- Control sites used by other consultants for Squirrel Glider and Microchiropteran bats.

Pomingalarna Reserve was also chosen as a control site for the Glossy Black-cockatoo because this species has previously been recorded within the reserve. Suitable foraging habitat for this species is also abundant within the reserve. This reserve is located approximately five kilometres north of the subject site (refer to Appendix B).

Silvalite Reserve, located directly north of the subject site (and within the study area) supports similar habitat to that of the study area. The Swift Parrot and Little Lorikeet have been recorded previously within Silvalite Reserve.

Control sites were also chosen along Kapooka Drive because these strips of road reserve act as linkages between the Kapooka Military Base and the study area. Control sites within the Research Station were also chosen as this area supports a mix stand of revegetated eucalypt woodland. A mid storey of shrub species are present along these transects that may support some habitat for the Regent Honeyeater.

Transects chosen within the subject site and study area focused on areas of potential habitat where subject species would mostly utilise. Areas of vegetation along road reserves, within woodlands on the lower and higher slopes and areas parallel to the railway line were focused on.

Table 7: Transect Surveys

Transect Name	Locality	Transect Length (metres)	Survey Period 1 (June 2013)		Survey Period 2 (July/August2013)		Total person hours spent on each transect (expressed in minutes)
			Transect 1 Starting Time	Transect 2 Starting Time	Transect 1 Starting Time	Transect 2 Starting Time	
Transects in study areas but used as control areas (no impact)							
AR – 1	Section of road reserve along Kapooka Drive. Runs parallel to highway. Transect runs north to south.	541	9.01am	9.00am	9.48am	10.41am	108.2
AR - 2	Section of road reserve along Kapooka Drive. Transect runs east to west into Kapooka.	255	9.22am	9.27am	10.07am	11.08am	51
SL -1	Transect encompasses eastern side of Silvalite Reserve	1443	7.09am	11.09am	11.15am	7.23am	288.6
SL -2	Transect encompasses western side of Silvalite Reserve	2047	8.02am	11.41am	11.48am	7.59am	409.4
RC – 1	Located on DPI Research Station land, just west of proposed stockpile site. Transect runs east to west within revegetated woodland. Part of transect runs outside study area.	537	10.50am	9.51am	10.02am	10.04am	107.4
RC - 2	Located on DPI Research Station	542	11.20am	10.17am	10.23am	9.17am	108.4

	land. Transect runs north to south within revegetated woodland near study area boundary. Part of transect runs outside study area.						
Transects in study areas							
WR – 1	Woodland area that runs parallel to railway line (east side) just north of proposed piling pads. Silvalite Reserve is located on the western side of railway line.	375	9.14am	7.33am	8.27am	7.43am	75
WR – 2	Woodland area runs parallel to WR-1. Located 100m apart. Finishes just south of existing dam.	760	9.36am	7.46am	8.35am	7.57am	152
WR – 3	Woodland area located on hillside area, 330m east of proposed piling pads. Transect runs in a V shape.	682	8.44am	7.54am	9.01am	8.33am	136.4
WR – 4	Woodland area along hillside. Located 410m east of proposed alignment.	224	8.34am	8.12am	9.26am	8.57am	44.8
WR – 5	Woodland area directly behind decommissioned fuel depot. Located 50m west of proposed alignment	248	7.29am	8.30am	7.40am	9.20am	49.6
WR - 6	Woodland area that runs parallel to existing highway. Starts just north of Kapooka Bridge and ends, west of decommissioned fuel depot	431	7.11am	8.41am	7.22am	9.30am	86.2

Transects in subject site areas							
SA – 1	Woodland area along proposed alignment, east if decommissioned fuel depot.	333	7.04am	7.41am	7.51am	9.10am	66.6
SA - 2	Woodland area near gully that runs along proposed alignment. Just north of SA-1.	294	7.34am	7.53am	8.02am	8.21am	58.8
SA - 3	Long transect runs parallel to railway line. Starts just north of proposed piling pads and finishes north of decommissioned fuel depot.	865	7.55am	9.36am	8.12am	7.30am	173
SA - 4	Existing road reserve on western side of highway, near Kapooka turn off.	305	9.23am	9.40am	10.25am	11.25am	61
SA – 5	Existing road reserve west of highway. Located along proposed alignment.	181	9.49am	10.02am	10.44am	11.45am	36.2
SA - 6	Existing road reserve east of highway, near Silvalite entrance. Part of transect is located within proposed realignment.	175	10.06am	10.20am	11.03am	8.46am	35
						Total person hours spent doing transects =	34.1 hours

3.2.4 Survey Locations

Transects were located within the subject site, woodland areas within the study area, along the Kapooka access road (control site), near the DPI Research Station (control site) in Silvalite Reserve and Pomingalarna (control site). All birds observed within 25 metres either side of each transect were recorded. Birds within 50 metres either side of each transect were also recorded.

Refer to Figure 3-1 for a map of transect locations.

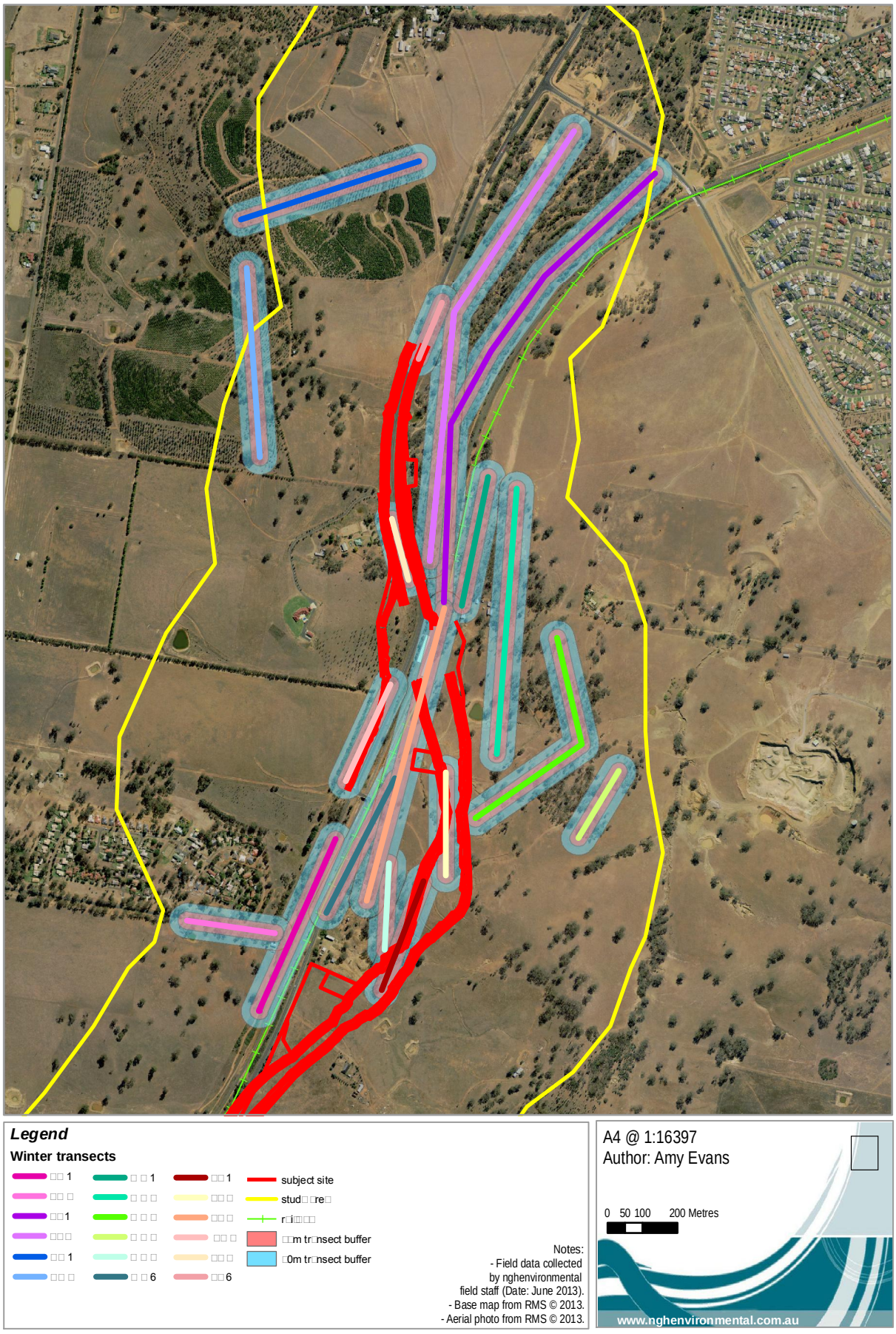

Figure 3-1: transect Locations

3.2.5 Glossy Black-cockatoo Nest Surveys

The Glossy Black- Cockatoo is known to nest in dead or live Eucalypt species at least 10 metres above the ground (Forshaw 2002). When traversing the study area for potential nest trees the following factors were taken into consideration (factors were taken from Cameron 2006):

- Nest site had to be > eight metres above the ground.
- Nests had to be located in the stem or branch of the tree and > 30cm in diameter.
- The angle of the branch / stem not more than 45˚ from vertical.

Surveys for Glossy Black-cockatoo nest sites were undertaken twice during the winter period. The first survey period (June) surveyed the study area/locality for potential nest trees and recorded them with a Garmin hand-held GPS. These trees were again monitored during the second survey period (July/August) to assess if the potential nest trees were being occupied. Refer to Figure 4-6 for a map of all potential nest trees recorded during the survey periods.

To identify areas of potential nesting habitat for the Glossy Black-cockatoo, aerial mapping was used to identify areas of hollow bearing trees within the study area. These areas were then traversed to determine if potential nesting sites were evident. All hollow bearing trees that met the above factors (Cameron 2006) were recorded.

Areas outside the study area were also surveyed including Pomingalarna Reserve and areas along the Holbrook Road. Pomingalarna Reserve was traversed in detailed as this area supports suitable foraging habitat for the Glossy Black-Cockatoo and has also been recorded in the reserve.

Consultation was undertaken with David Read from the WWCC regarding foraging signs located within Pomingalarna Reserve for the Glossy Black-cockatoo and any sightings within the study locality that haven't been registered on the NSW Bionet Atlas. Table 8 shows photos of foraging habitat and signage present within the Pomingalarna Reserve.

Areas of Pomingalarna Reserve were traversed on foot by Mr Crane to identify any presence of the Glossy Black-cockatoo. Search areas focused on Sheoak stands as this vegetation type supports foraging habitat for the Glossy Black-cockatoo. The area underneath Sheaok trees was assessed for any signs of fresh orts (chewed remains of cones) to determine if Glossy Black-cockatoos had been in the area feeding.

Table 8: Photos of foraging habitat and signage in Pomingalarna Reserve.

	
Photo 1: Foraging habitat present	Photo 2: Signage for the Glossy black-cockatoo

Photo 3: Casuarina trees located along eastern extent of Pomingalarna Reserve near tower site.

Photo 4: Signage for the Glossy black-cockatoo

Opportunistic Surveys

Opportunistic observations of bird species were recorded across the study area, outside the identified transects. Any threatened species observed was recorded using a Garmin hand-held GPS.

3.2.6 Survey conditions

Weather conditions during both survey periods are detailed in Table 9. Overall, conditions during the survey period were considered appropriate for detecting the targeted subject species for winter.

Table 9: Summary of weather conditions

Date	Min Temperature (°C)	Max Temperature (°C)	Rainfall (mm)	Wind	Fog
Survey Period 1					
26 June 2013	1.3	17.6	0.0	No Wind	No Fog
27 June 2013	2.3	16.0	0.0	Light	Light
28 June 2013	6.7	15.7	0.0	Light	No Fog
1 July 2013	4.2	11.9	0.2	No Wind	Moderate
Survey Period 2					
31 July 2013	0.6	16.3	0.0	No Wind	No Fog
1 August 2013	1.4	16.1	0.0	Light	No Fog
2 August 2013	8.3	15.2	0.0	Light	No Fog

Source: Weather zone, 2013, Wagga Wagga.

4 SURVEY RESULTS

A total of 68 bird species were recorded during the winter bird survey period. Of these, nine are threatened species listed under the TSC Act and/or EPBC Act. Refer to Figure 4-2 for the location of threatened species recorded within the study area during the winter period.

4.1 TRANSECT SURVEY RESULTS

Two of the subject species listed in the DGR's for the winter survey period were recorded during transect surveys of the study area; the Little Lorikeet and Swift Parrot. Table 10 summarises threatened species recorded during each survey period and their conservation status under the TSC and EPBC Acts.

Table 10: Threatened species recorded during winter survey period. (Subject species in bold)

Species Name	Listing	Survey Period 1	Survey Period 2
Little Eagle (*Hieraaetus morphnoides)*	Vulnerable – TSC Act	✓	
Swift Parrot (*Lathamus discolor)*	Endangered – TSC & EPBC Act		✓
Superb Parrot (*Polytelis swainsonii)*	Vulnerable – TSC & EPBC Act	✓	✓
Little Lorikeet (*Glossopsitta pusilla)*	Vulnerable – TSC Act		✓
Diamond Firetail (*Stagonopleura guttata)*	Vulnerable – TSC Act	✓	✓
Speckled Warbler (*Chthonicola sagittata)*	Vulnerable – TSC Act		✓
Flame Robin (*Petroica phoenicea)*	Vulnerable – TSC Act	✓	✓
Scarlet Robin (*Petroica boodang)*	Vulnerable – TSC Act		✓
Grey-crowned Babbler (*Pomatostomus temporalis)*	Vulnerable – TSC Act	✓	✓

4.1.1 Habitat along bird survey transects

The Ecological Assessment (GHD 2012) describes four vegetation types within the subject site:

- Grassy White Box Woodland.
- Non-native grassland.
- Deane's Wattle and introduced groundcover vegetation; and
- Plantation plantings.

Detailed descriptions of each of these four vegetation types are provided in the Ecological Assessment (GHD 2012) and Section 3.1.3 of this report.

Two endangered ecological communities have been recorded within or adjacent to the study area; Box – Gum Woodland and Inland Grey Box Woodland (DECC 2009; GHD 2012).

The majority of the land within and adjacent to the study area comprises of agricultural land. As a result, remnant vegetation varies substantially in quality. Although there are large tracts of remnant vegetation

supporting a continuous canopy, there is often little to no recruitment of over storey species occurring, and understorey and ground flora is limited in cover and diversity.

Vegetation along roadside areas and within Silvalite Reserve (control site) and Pomingalarna still retain a diversity of vegetation species and structure, providing suitable habitat for a range of bird species. These areas support habitat for hollow dependant fauna as a number of hollow bearing trees are present in these areas. Table 9 provides a brief habitat description and photo of each transect

Table 11: Transect Habitat Descriptions

Transect ID	Habitat Description	Photo
AR – 1	This roadside vegetation contains remnant box-gum woodlands (predominately *Eucalyptus albens*), and some urban woody weeds. Consistent with Grassy White Box Woodland as described in the Ecological Assessment (GHD 2012).	
AR - 2	This roadside vegetation contains remnant box-gum woodland (predominately *Eucalyptus albens*), and some urban woody weeds. The ground cover has been maintained and is mowed regularly. Vegetation along this transect was not defined the Ecological Assessment (GHD 2012).	
SL -1	This transect contains remnant box-gum woodlands (predominately *Eucalyptus albens*), together with plantation of an arboretum of non-indigenous Australian native plants. Vegetation along this transect was not defined in the Ecological Assessment (GHD 2012).	

Transect ID	Habitat Description	Photo
SL -2	This transect contains remnant box-gum woodland (predominately *Eucalyptus albens*), together with plantation of an arboretum of non-indigenous Australian native plants. Some Casuarina sp. are also sparsely located along this transect. Vegetation along this transect was not defined in the Ecological Assessment (GHD 2012).	
RC – 1	Revegetation site containing a few remnant box-gum (predominately *Eucalyptus albens*) trees and some grassland species. Vegetation along this transect was not defined in the Ecological Assessment (GHD 2012).	
RC - 2	Revegetation site containing a few remnant box-gum (predominately *Eucalyptus albens*) trees and some grassland species. Vegetation along this transect was not defined in the Ecological Assessment (GHD 2012).	
WR – 1	This transect contains remnant box-gum woodlands (predominately *Eucalyptus albens*). Consistent with Grassy White Box Woodland as described in the Ecological Assessment (GHD 2012).	

Transect ID	Habitat Description	Photo
WR – 2	This transect contains remnant box-gum woodlands (predominately *Eucalyptus albens*). Vegetation along this transect was not defined in the Ecological Assessment (GHD 2012).	
WR – 3	This transect contains remnant box-gum woodlands (predominately *Eucalyptus albens*). Vegetation along this transect was not defined in the Ecological Assessment (GHD 2012).	
WR – 4	This transect contains remnant box-gum woodlands (predominately *Eucalyptus albens*). Vegetation along this transect was not defined in the Ecological Assessment (GHD 2012).	
WR – 5	This transect contains remnant box-gum woodlands (predominately *Eucalyptus albens*), adjacent to an area containing some planted non-indigenous Australian native species and thickets of *Acacia pycnantha.* Vegetation along this transect was described as Plantation – Eucalypts in the Ecological Assessment (GHD 2012).	

Transect ID	Habitat Description	Photo
WR - 6	This transect contains remnant box-gum woodlands (predominately *Eucalyptus albens),* adjacent to an area containing some planted non-indigenous Australian native species and thickets of *Acacia pycnantha*. Vegetation along this transect was not defined in the Ecological Assessment (GHD 2012).	
SA – 1	The site contains remnant box-gum woodlands (predominately *Eucalyptus albens*). Consistent with Grassy White Box Woodland as described in the Ecological Assessment (GHD 2012).	
SA - 2	The site contains remnant box-gum woodlands (predominately *Eucalyptus albens*). Minor gully erosion present near this transect line. Consistent with Grassy White Box Woodland as described in the Ecological Assessment (GHD 2012).	
SA - 3	The site contains remnant box-gum woodlands (predominately *Eucalyptus albens*). Some gully erosion evident near this transect line. Consistent with Grassy White Box Woodland as described in the Ecological Assessment (GHD 2012).	

Transect ID	Habitat Description	Photo
SA - 4	This roadside vegetation contains remnant box-gum woodlands (predominately *Eucalyptus albens*), also contains a thicket of *Calytrix tetragona*. Consistent with two vegetation communities as described in the Ecological Assessment (GHD 2012). White Box Woodland regrowth (TSC Act only) and White Box woodland regrowth with dense *Calytrix tetragona* (Not Box Gum woodland).	
SA – 5	This transect comprises vegetation consisting of remnant box-gum woodlands (predominately *Eucalyptus albens*), and some urban woody weeds. Consistent with two vegetation communities identified in as described in the Ecological Assessment (GHD 2012). Grassy White Box Woodland and introduced grassland.	
SA - 6	This transect area contains vegetation consistent with remnant box-gum woodlands (predominately *Eucalyptus albens*). Consistent with Grassy White Box Woodland as described in the Ecological Assessment (GHD 2012).	

4.1.2 Observations of Subject Species

No subject species were recorded during the first survey period (June). The Little Lorikeet and Swift Parrot were recorded during the second survey period (July/August). This may be due to areas of Golden Wattle flowering, attracting these species to forage within the study area.

The Swift Parrot was recorded along three transects including WR-5, SA-1 and SA-2. The Swift Parrot was observed foraging on Golden Wattle (*Acacia pycnantha*) near WR-5. Approximately five - six individuals were observed during all three days.

The Little Lorikeet was recorded along two transects (WR-3 and SA-3), and was also observed flying over the study area at another other transect (WR-2).

Table 12 summarises transects in which these two subject species were recorded at.

Table 12: Subject Species records

Subject Species	Transect Locations		
	Control Area	Study Area	Subject Site
Swift Parrot	Not recorded.	*WR-5* - Woodland area directly behind decommissioned fuel depot. Located 50m west of proposed alignment.	*SA-1* – Woodland area along proposed alignment, east if decommissioned fuel depot. *SA-2* - Woodland area near gully that runs along proposed alignment. Just north of SA-1.
Little Lorikeet	Not recorded	*WR-2* – Woodland area runs parallel to WR-1. Located 100m apart. Finishes just south of existing dam. *WR-3* - Woodland area located on hillside area, 330m east of proposed piling pads. Transect runs in a V shape.	*SA-3* - Long transect runs parallel to railway line. Starts just north of proposed piling pads and finishes north of decommissioned fuel depot.

No subject species were recorded within control site areas.

The Swift Parrot was recorded at two transects within the subject site. These two transects would be directly impacted upon by the proposed works. At transect SA-1, two individual Swift Parrots were observed within 50 metres of the transect mid line on the first day and one individual on the second day. Within 100 metres of the transect mid line a total of two individuals were recorded on the first day and three individuals on the second day. Swift Parrots recorded at SA-1 were observed foraging on Golden Wattle.

Along SA-2 the Swift Parrot was not recorded within 50 or 100 metres of the transect mid line. The Swift Parrot was observed flying over the study area at this transect site.

The Swift Parrot was also recorded along transect WR-5 within the study area. This transect is located parallel to transect SA-1 and is outside the construction footprint (subject site). It also comprises Golden Wattle in which the Swift Parrot was observed feeding on. Three individual Swift Parrots were observed within 50 metres and 100 metres of the transect mid line on the first day, while only one individual was observed within 100 metres of the transect mid line on the second day.

The Little Lorikeet was observed at one transect that traverses the subject site. WR-3 is the longest transect within the study area (excluding the control sites) that runs for 865 metres. Parts of this transect cross the subject site and would be directly impacted upon by the proposed works. The Little Lorikeet was recorded along this transect on the first day of surveys within 100 metres of the transect mid line.

Within the study area, the Little Lorikeet was observed flying over transect WR-2 during the survey period. Along WR-3, the Little Lorikeet was observed within 50 metres of the transect mid line on the first day of surveys. These two transects would not be impacted upon by the proposed works.

4.1.3 Species Diversity

The highest diversity of birds was recorded in transect WR-1, during both survey periods. This transect is approximately 375 metres long and located adjacent the railway line, directly north of where the proposed crane and piling pads will be located. This transect lies just outside the subject site.

Transect SA-5 recorded the lowest diversity of bird species during both survey periods. This transect is smaller than other transects with a length of approximately 181 metres. This transect is located within the subject site along the existing Olympic Highway within a narrow road reserve area that is quite close to existing traffic and noise.

Transects SA-1, SA-2 and SA-5 would be directly impacted by the proposed works. All three transects are located within the subject site. Species diversity was lowest at SA-5, with SA-1 and SA-2 also recording less than 12 species at these sites. Figure 4-1 shows a similar comparison of species diversity at each of the transects during each survey period. Although the lengths of each transects were not considered when determining diversity across all transects (longer transects will record higher diversity), Figure 4-1 does reveal that diversity was very similar during each survey period. Areas outside the subject site (RC-1, RC-2, AR-1, AR-2 etc) showed the highest diversity of birds recorded.

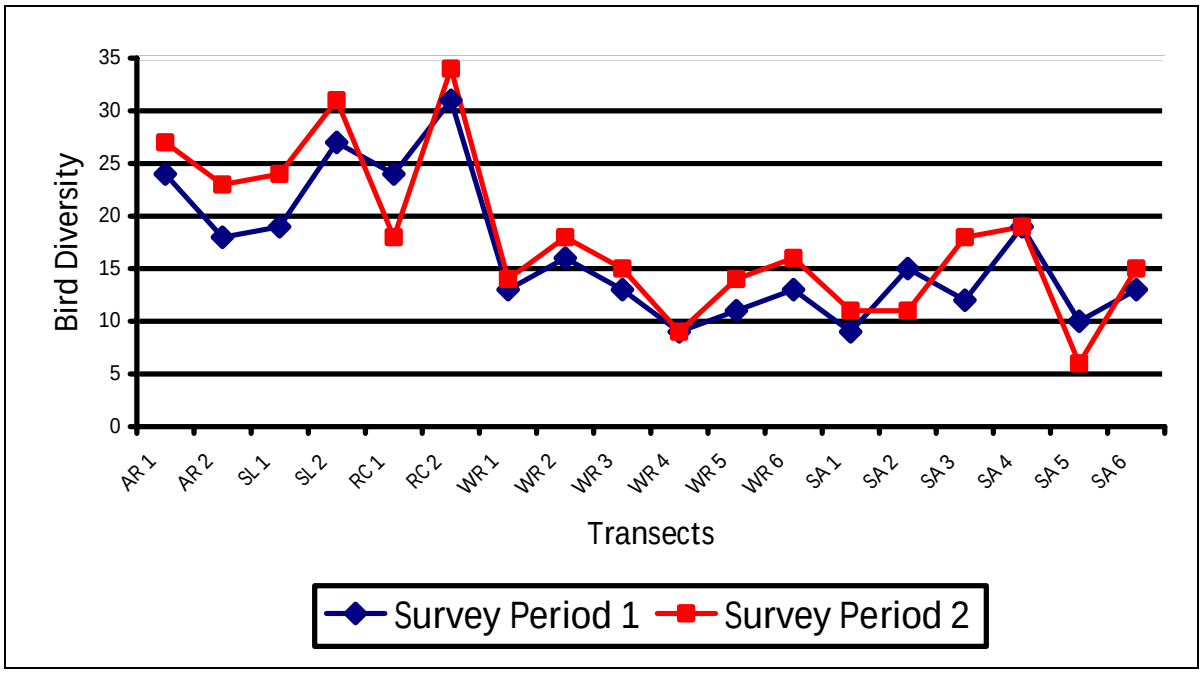

Figure 4-1: Comparison of Species Diversity at each transect across survey periods.

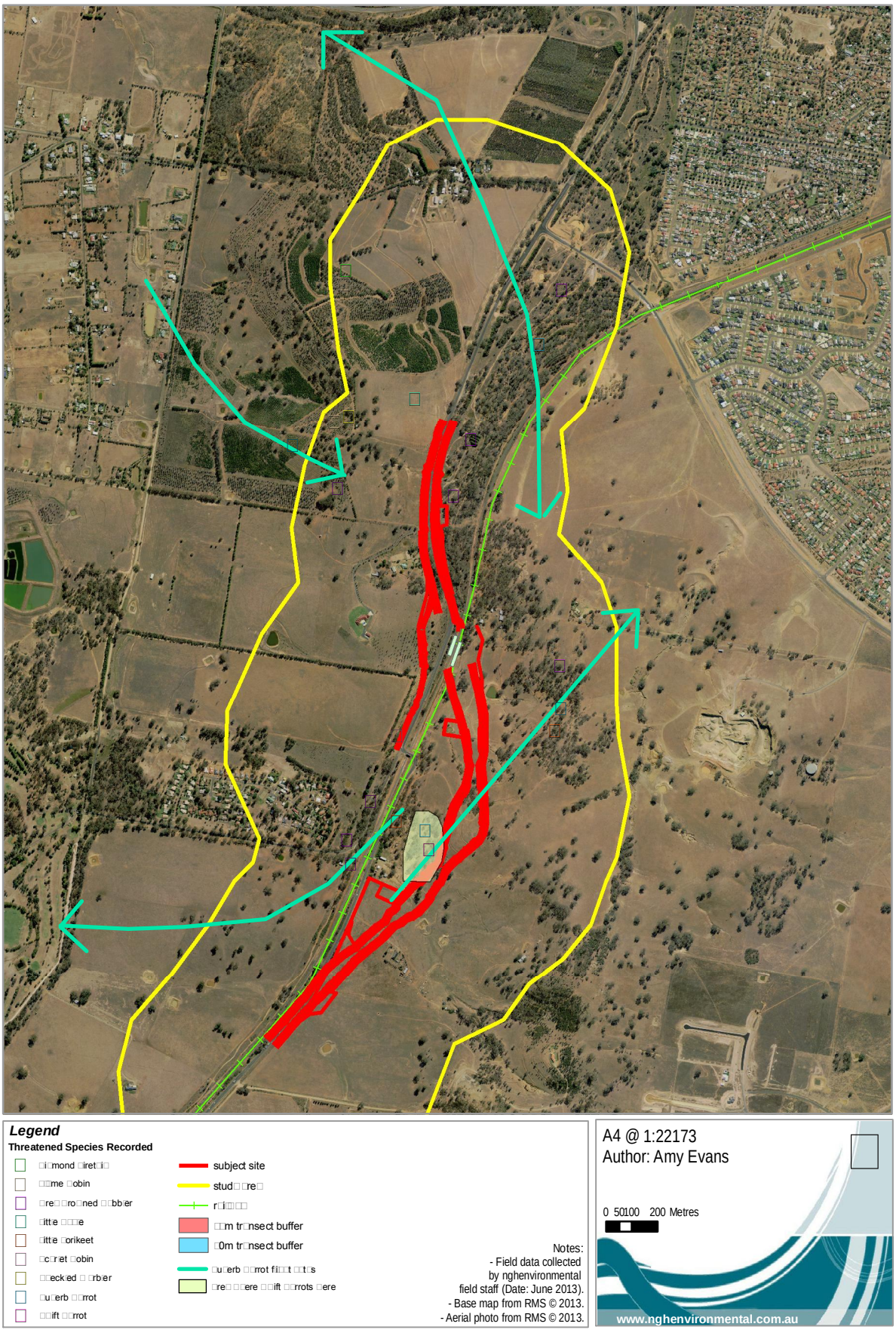

Figure 4-2: Location of Threatened Species recorded

4.1.4 Bird Abundance

Bird abundance was also recorded along all 18 transect sites (Figure 4-3). Abundance was low at all of the SA transect sites (subject sites), as well as WR-1, AR-2, and RC-1. Abundances were the highest in control sites along AR-1 which is located along Access Road to Kapooka and transects within Silvalite Reserve (SL-1 and SL-2) and near the DPI Research Centre (RC-2).

Although species diversity was high at RC-1, the number of individual birds recorded was quite low. This may be due to a number of factors including lack of hollow resources, species territories, foraging habitat, time of year and patch sizes. .

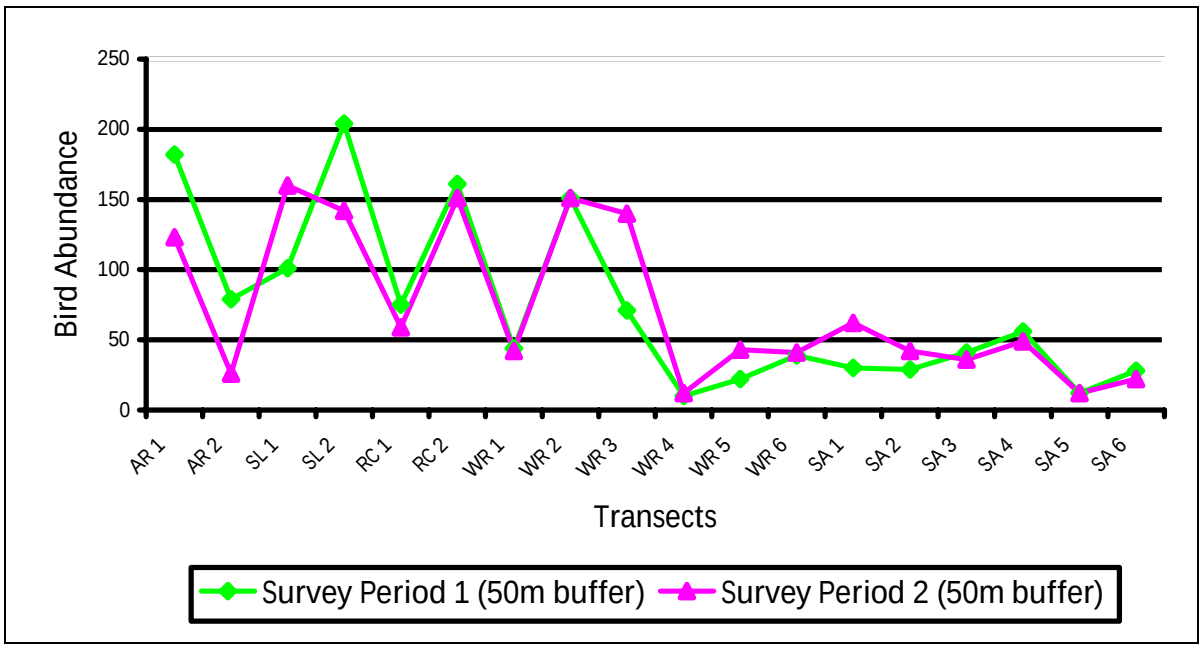

Figure 4-3: Bird abundances along transects

During the meeting held on the 27 June 2013, it was agreed that species observed within a 50 metre buffer of each transect mid line would be recorded as well as a 25 metre buffer. As a comparison, Mr Crane also recorded species abundances within a 100 metre buffer of each transect mid line.

Figure 4-4 and Figure 4-5 compares detection of species within a 50 metre buffer and a 100 metre buffer. Along some transects, the abundance of birds recorded doubles (SL-2) while along other transects it remains similar (SA-5). This may be due to woodland patch sizes as SL-2 is located in Silvalite Reserve which has an average woodland width of 200 metres, while SA-5 only has an average woodland width of 20 metres.

It is evident that a higher number of individuals can be observed and recorded if the buffer width is higher. However this is more evident in larger vegetation patches. There was little difference in the number of bird species detected when comparing buffer width along transects in small patch areas such as SA-5.

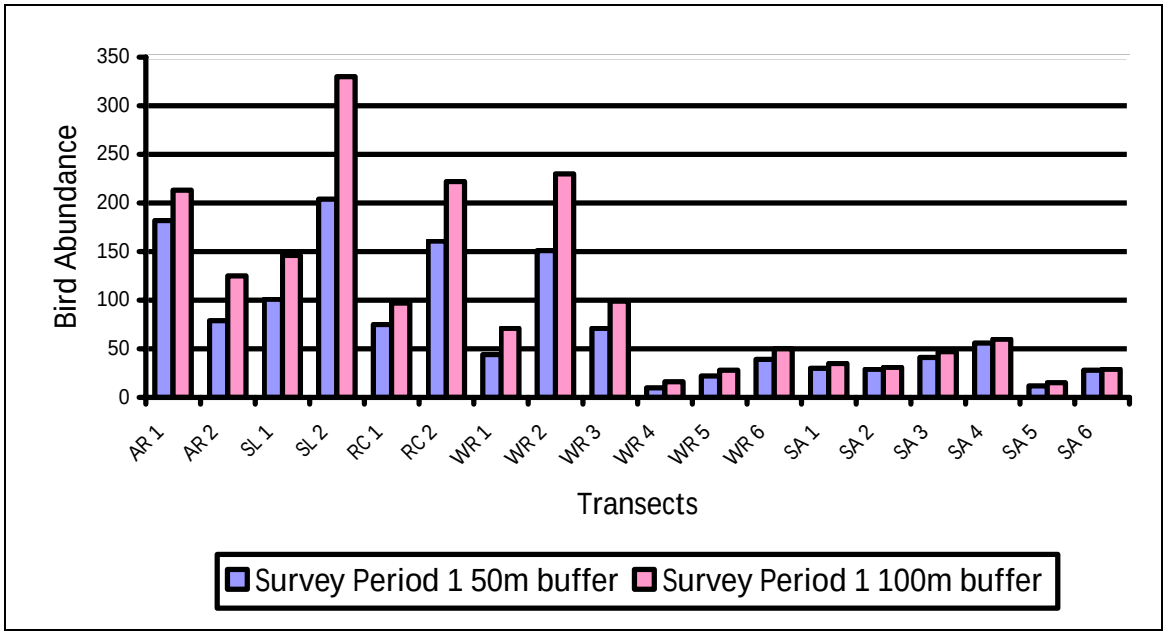

Figure 4-4: Survey Period 1 – Comparison of Buffer Areas

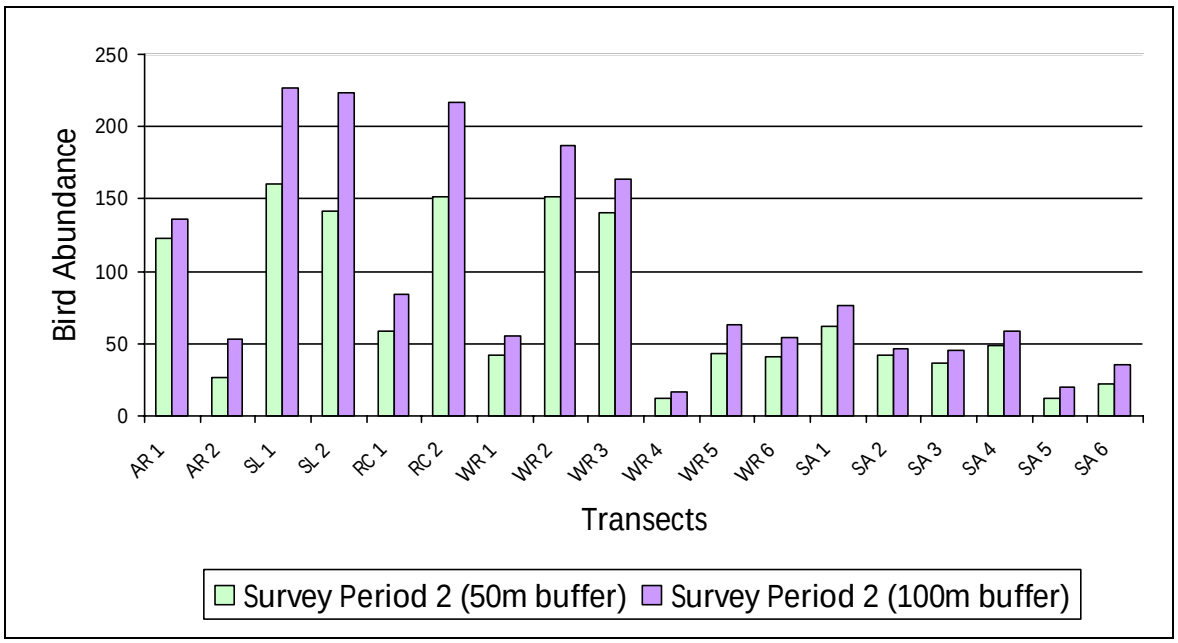

Figure 4-5: Survey Period 2 – Comparison of Buffer Areas

The most dominant species recorded during the winter survey period included the Red Wattle Bird (*Anthochaera carunculata*) and Noisy Miner (*Manorina melanocephala*). These two species were recorded in the majority of all transects during both survey periods. Other species recorded with high abundances were the Common Starling (*Sturnus vulgaris*) and Silvereye (*Zosterops lateralis*) with flocks of 60 individuals observed along some transects.

The Galah (*Eolophus roseicapillus*), Rainbow Lorikeet (*Trichoglossus haematodus*), White Plumed Honeyeater (*Lichenostomus penicillatus*) and Eastern Rosella (*Platycercus eximius*) were also recorded in high numbers.

The threatened species Superb Parrot (*Polytelis swainsonii*) and Grey-crowned Babbler (*Pomatostomus temporalis*) were also recorded during both survey periods along a number of transects. A total of 22 and 53 individual Superb Parrots were recorded during the June and July survey period respectively. This species was recorded along transects SL-2, RC-2, WR-2, WR-3, WR-4, WR-5, SA-1, SA-2, and SA-3. A total of 28 and 37 individual Grey-crowned Babblers were recorded during the June and July survey period respectively. This species was recorded along transects RC-2, WR-2, WR-3, WR-4, SA-3, and SA-5.

4.2 GLOSSY BLACK-COCKATOO SURVEYS

4.2.1 Foraging and Flight Paths

The Glossy Black-Cockatoo is rarely found away from *Allocasuarina* or *Casuarina* trees except when they are on the move (Crowley and Garnett 2001). This species usually avoids open sites where predation risk is greater and is known to forage at sites with high abundances of Allocasuarina cover (Cameron and Cunningham 2006).

Within the Riverina and South West Slopes, the Glossy Black-Cockatoo is known to associate with hills and rocky rises that support Allocasuarina or Casuarina species. The study area is quite open with small pockets of Box Gum vegetation present. There are no rocky areas evident and hillside areas comprise of scattered Box Gum woodland and/or open grassland areas. Within Silvalite Reserve there are some scattered pockets of *Allocasuarina*, however more suitable habitat is found within Pomingalarna Reserve.

Pomingalarna Reserve is a bushland reserve and forms an important part of Wagga Wagga's landscape. Its highest point is 298 metres above sea level. It is considered to have high conservation value given the extensive loss of natural landscapes on the south west slopes (Priday and Mulvaney 2005). It contains approximately 165 plant species including 53 introduced species, 91 species of birds, five species of native mammals and an extensive number of amphibians and reptiles (Murphy 1999).

Consultation was undertaken with David Read from the WWCC regarding the foraging signs located within Pomingalarna Reserve and any sightings within the study locality that haven't been registered on the NSW Bionet Atlas. Mr Read stated that Glossy Black-cockatoos have not been recorded recently within the reserve, however there have been some opportunistic sightings of this species flying over the suburb of Glenfield Park in 2011-2012, approximately two kilometres north east of the study area.

In 2011, the WWCC received $23,192 over two years to restore the habitat of the Glossy Black-cockatoo at Pomingalarna Reserve. Outcomes of the project included restoring eight hectares of known habitat for the Glossy Black-cockatoo by planting 2,000 Drooping Sheoak (*Allocasuarina verticillata*) seedlings as a food source. Six nest boxes were also installed throughout the reserve.

Pomingalarna Reserve may serve as a significant habitat link to the endangered population of Glossy Black-cockatoos further west at Narrandera Hills.

Within Pomingalarna Reserve, areas of foraging habitat are abundant across the majority of the reserve. The WWCC has set up a number of Glossy Black-Cockatoo habitat areas within the reserve, however there have not been any recent sightings of the species (pers. com David Read). The Glossy Black-Cockatoo was not detected during transect undertaken within Pomingalarna during either survey period.

Areas surrounding feed trees were surveyed for fresh orts (chewed remains of cones), however none were located.

Because no Glossy Black-Cockatoos were observed during either survey period, we were unable to determine "known" flight paths. Past records for the Glossy Black-cockatoo have been recorded within the Wagga Wagga LGA at Pomingalarna Reserve approximately five kilometres north of the subject site and at the Rock Nature Reserve, approximately 23 kilometres south of the subject site. The most recent records were in 2007.

The Glossy Black-Cockatoo is known to fly at considerable heights when moving between feeding areas, averaging over 45 kilometres / hour in sustained flight (Garnett *et al*. 2000). During the breeding season (between March and August) they are known to make round trip flights of up to 30 kilometres to forage (Garnett *et al.* 2000).

The new realignment of this section of road would result in some cut and fill batters to construct the road. The majority of the alignment would be between 50 metres and 180 metres wide with a maximum cutting depth of 18 metres and a maximum fill height of 14 metres (GHD 2012).

It is possible that the Glossy Black-Cockatoo may fly over the study area to access foraging habitat located at both Pomingalarna Reserve and the Rock Nature Reserve where existing records occur. The cut and fill ratios for the proposed works are unlikely to impact on flight paths for the Glossy Black-cockatoo. This species flies quite high and generally over rocky and open areas. It unlikely that the proposal would hinder potential flight paths for this species.

No Glossy Black-cockatoos were observed during the winter survey period.

4.2.2 Glossy Black- Cockatoo Nest Surveys

A total of 64 potential Glossy Black-cockatoo nest trees were identified within the study area. All trees were recorded using a Garmin hand-held GPS. Two potential Glossy Black-cockatoo nest trees are located directly within the subject site and would be impacted upon. An additional four potential Glossy Black-cockatoo nest trees are located in close proximity to the proposed footprint that may be impacted by the proposal. It is recommended that these trees be avoided if possible. Co-ordinates for these six trees are provided in Table 13.

Table 13: GPS Co-ordinates for potential nest trees in subject site.

Tree	Location	GPS Co-ordinates
Tree 1 – Grey Box (*E. microcarpa*) *Direct impact*	Located in road reserve area along Access Road to Kapooka.	528096 E 6110374 N
Tree 2 – Grey Box (*E. microcarpa*) *Direct impact*	Located in road reserve area along Access Road to Kapooka.	528155 E 6110495 N
Tree 3 – Grey Box (*E. microcarpa*) *Potential to retain*	Located in between southbound and northbound lanes. Approximately 155m east of the decommissioned fuel depot.	528227 E 6109851 N
Tree 4 – Grey Box (*E. microcarpa*) *Potential to retain*	Located just north of potential piling pads. Is located between road batter and drainage line.	528365 E 6110782 N

Tree 5 - Grey Box (*E. microcarpa*) *Potential to retain*	Located just north of potential piling pads. Is located between road batter and drainage line.	528365 E 6110786 N
Tree 6 – Grey Box (*E. microcarpa*) *Potential to retain*	Located at northern end of works within Silvalite Reserve.	52873 E 6111278 N

No Glossy Black-cockatoos were observed utilising any of the potential nest trees during either survey period. Signs of wearing or chew marks or breeding activity were not observed surrounding the hollow entrances. Shape files for all potential nest trees recorded for the Glossy Black-cockatoo were provided to Roads and Maritime on the 24 September 2013.

Table 14 shows four examples of potential Glossy Black-cockatoo nest trees that were recorded. The majority of trees were recorded within Silvalite Reserve and within paddock areas that still had large old hollow bearing trees and stags present.

Table 14: Example of potential nest trees recorded.

	
Photo 1: Located in subject site, east of railway line.	Photo 2: On highway at Kapooka entrance.
	
Photo 3: In road reserve, near Silvalite entrance.	Photo 4: Located within Silvalite.

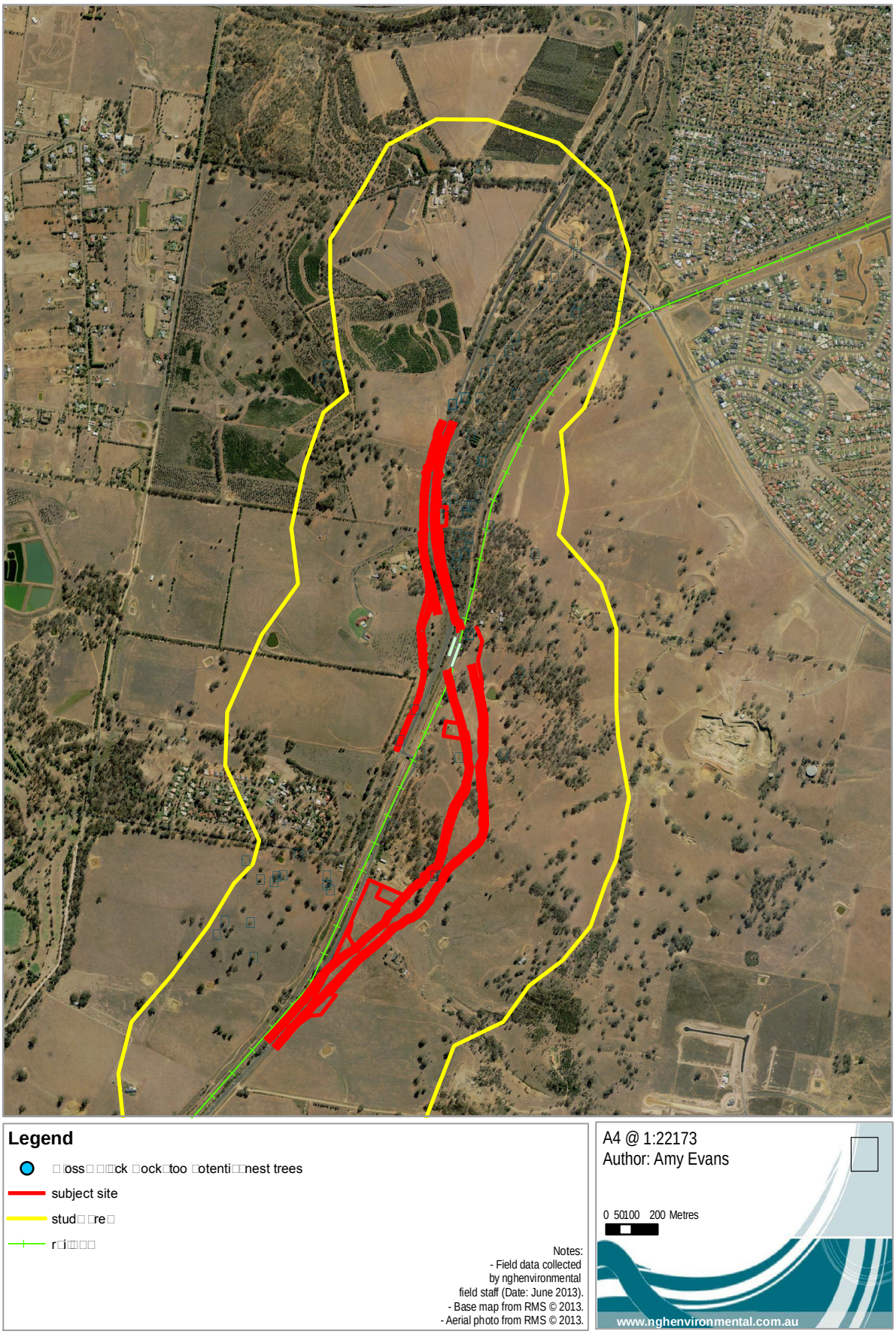

Figure 4-6: Glossy black-cockatoo potential nest trees

5 ASSESSMENT

5.1 HABITAT AVAILABILITY FOR SUBJECT SPECIES

The study area does not support breeding habitat for two of the four subject species (Swift Parrot and Regent Honeyeater) as the Swift Parrot only breeds in Tasmania and there are only three known breeding areas within NSW and Victoria for the Regent Honeyeater. As all four subject species are flight mobile and known to fly large distances, there are challenges for recording the abundances of these species at a regional level.

Threatened bird species, although hard to detect, can be readily seen and recorded if the conditions are right. For example, if foraging resources are in low numbers due to drought then it is likely that species such as the Swift Parrot and Little Lorikeet would inhabit other areas along the coast for food sources. If there is an abundance of food resources and nesting / roosting habitat then threatened species can become abundant at the local level. During the winter survey period, White Box trees were flowering and flowering Golden Wattle was abundant, attracting the Swift Parrot and Little Lorikeet to the area.

Because the study area does not support a shrubby understorey or a large variety of food resources, it is unlikely that the Regent Honeyeater would occupy such an area. The lack of suitable foraging habitat within the study area is a limiting factor for the Regent Honeyeater to be present at the local and regional level.

Photo: Birdlife Australia, 2013

Although there was potential roosting and breeding habitat present for the Glossy Black-cockatoo, foraging resources within the study area were scarce. Although no foraging resources were present within the study area during field surveys, foraging resources may become available in the future. The WWCC have undertaken a program to restore foraging habitat for the Glossy Black-cockatoo within Pomingalarna Reserve, only five kilometres away. The Glossy Black-cockatoo could use the study area for nesting habitat and fly to nearby Pomingalarna Reserve to forage. Therefore it is important to retain potential nesting trees for this species.

5.2 ASSESSMENT OF LIKELY IMPACTS ON THREATENED SPECIES, POPULATIONS AND ECOLOGICAL COMMUNITIES

The Ecological Assessment (GHD 2012) addressed potential direct, indirect and cumulative impacts of the proposal on a range of fauna groups and undertook an assessment of significance of impacts on threatened bird species including the Swift Parrot and Little Lorikeet. nghenvironmental agree with the conclusions of GHD on the potential impacts on bird species identified in the Ecological Assessment (GHD 2012), however the Regent Honeyeater and Glossy Black-cockatoo were not assessed due to unlikely presence of habitat (GHD 2012). The four subject species identified in the DGRs for winter surveys have been further addressed below.

5.2.1 Little Lorikeet

The Little Lorikeet is a small bright green parrot, with a red face, forehead and throat that surrounds its black bill and extends to the eye. They also have an orange-yellow eye. The under tail is olive-yellow with a partly concealed red base, and the underwing coverts are bright green.

This species call in flight is quite different from other lorikeets, comprising of a shrill and rolling screech. Their flight is swift and direct, with rapid shallow wing-beats. If this species is flushed from a tree they will weave through the treetops but flocks travelling long distances usually fly high on a direct course. In flight, they appear small and compact, with short angular wings and a short pointed tail.

Distribution and Habitat

The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability, although some areas retain residents for much of the year and 'locally nomadic' movements are suspected of breeding pairs.

This species mainly inhabits dry, open sclerophyll forests and woodlands, usually dominated by tall eucalypts, especially box–ironbark species including White Box and Yellow Box, where they forage in the canopy of flowering trees.

Diet and Foraging

The Little Lorikeet forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in *Angophora, Melaleuca* and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. This species is also known to feed on isolated flowering trees in paddocks and roadside remnants. It feeds mostly on nectar and pollen and occasionally on native fruits such as mistletoe (*Notothixos spp.*).

Breeding

This species relies on hollows for breeding, nesting in close proximity to feeding areas if possible. The Little Lorikeet will select hollows in the limb or trunk of smooth-barked Eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m). These nest sites are often used repeatedly for decades, suggesting that preferred sites are limited. Riparian trees often chosen, including species like Allocasuarina.

Nesting season extends from May to September foe the Little Lorikeet. In years when flowering is prolific, this species can breed twice, producing three to four young per attempt. However, the survival rate of fledglings is unknown.

Likelihood of presence

The Little Lorikeet was recorded during the second survey period (July/August) flying over the study area. About three to four individuals were recorded flying over the study area. This species has also been recorded nearby within Silvalite Reserve in 2004 and 2008 by GHD Senior Ecologist Leigh Maloney (Biannual Swift Parrot Surveys 2001-current).

Assessment of likely impacts

nghenvironmental agrees with the conclusion of GHD's significance assessment (GHD 2012) that the removal of mature and juvenile trees, particularly White Box, from the study area may impact foraging and roosting habitat for the species. The removal of hollow-bearing trees may also reduce the availability of breeding habitat for the Little Lorikeet.

The amount of habitat proposed to be removed is a relatively small proportion of the potential habitat for the Little Lorikeet. High quality habitat for this species is present in other parts of the study area and

within the study locality. The removal of vegetation would also increase fragmentation within the study area. However, given the mobility of this species, it is unlikely that the proposal would have an adverse impact on the Little Lorikeet.

5.2.2 Swift Parrot

The Swift Parrot is medium sized, slim parrot about 25 cm long. It is bright green with red around the bill, throat and forehead, with the red on its throat edged with yellow. Its crown is blue-purple. There are bright red patches under its wings. One of most distinctive features about the Swift Parrot is its long (12 cm), thin red tail from a distance. The female is slightly duller, with a creamy underwing bar. They are noisy, active and showy, with a very fast, direct flight.

Photo: Birdlife Australia, 2013

This species was recorded during field surveys.

Distribution and Habitat

The Swift Parrot is endemic to south-eastern Australia, breeding in Tasmania during spring and summer and migrating in autumn and winter to southern and central Victoria and eastern New South Wales. In NSW, the Swift Parrot mostly occurs on the coast and south west slopes.

Each year the Swift Parrot Recovery Team relies on the involvement of volunteers to identify areas the birds are visiting and what resources they are using. This information directly helps the recovery effort for this species. Surveys are conducted twice a year and aim to cover the migratory winter range of this species. Mainland surveys are held on the third weekend in May and the first weekend in August every year.

Swift Parrots are found in dry sclerophyll forests and woodlands, suburban parks and gardens and flowering fruit trees. In Tasmania, they are often among Tasmanian Blue Gum (*Eucalyptus globulus).* They roost communally, often in the same tree each night. They are almost always in trees, only coming to ground to drink.

Following winter they return to Tasmania where they breed from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum.

Diet and Foraging

Swift Parrots feed in the outer canopy of flowering eucalypts, eating mainly nectar, as well as some psyllids and lerps, seeds and flowers. They are active and agile when feeding, often hanging upside down.

On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp infestations. Favoured feed trees within the South West Slopes include winter flowering species such as Mugga Ironbark (*E. sideroxylon*) and White Box (*E. albens*). Commonly used lerp infested trees include Inland Grey Box (*E. microcarpa*).

Breeding

Breeding habitat would not be impacted by the proposed works as the Swift Parrots only breed in Tasmania during spring and summer with timing varying with the flowering of the Tasmanian Blue Gum. The nest is in a hollow in the trunk, a branch or spout of a living or dead gum. Pairs may return to the same nest site each year.

Likelihood of presence

The Swift Parrot was recorded during the second survey period (July/August) flying over the study area and feeding on Golden Wattle near the decommissioned fuel depot area. This area is located within woodland that is located between the existing highway and proposed realignment, south-east of the Kapooka Bridge. This species has also been recorded in previous surveys near the study area within Silvalite Reserve. A flock of Swift Parrots (roughly 40 individuals) were recorded near the Kapooka Military Base in 2012 (*pers. comm.,* Leigh Maloney 3 September 2012).

Assessment of likely impacts

nghenvironmental agrees with the conclusion of GHD's significance assessment (2012) that the removal of mature and juvenile trees, particularly White Box, from the study area may impact foraging and roosting habitat for the species. White Box trees within the study area provide a foraging resource for the Swift Parrot during winter before it migrates back to Tasmania. This species was also observed foraging on Golden Wattle within the study area.

The removal of vegetation as a result of the proposed works would reduce the amount of roosting and foraging habitat for the Swift Parrot in the study area. The proposal would remove 14.2 hectares of woodland (8.7 per cent of the woodland in the study area and 1.7 per cent in the locality).

High quality habitat for this species is present in other parts of the study area and outside the study area. Due to the mobility and relatively large ranges of the Swift Parrot, it is unlikely that the proposal would remove a substantial amount of habitat for this species. It is unlikely that the proposal would have an adverse impact on the Swift Parrot.

5.2.3 Regent Honeyeater

Photo: Birdlife Australia, 2013

The Regent Honeyeater is medium-sized, black and yellow honeyeater with a sturdy, curved bill. Its head, neck, throat, upper breast and bill are black and the back and lower breast are pale lemon in colour with a black scalloped pattern. Its flight and tail feathers are edged with bright yellow. In males, the dark eye is surrounded by yellowish warty bare skin. Females are smaller, with a bare yellowish patch under the eye only, and have less black on the throat. Young birds resemble females, but are browner and have a paler bill. The Regent Honeyeaters call is a soft metallic bell-like song and bobs its head when calling. Birds are most vocal in non-breeding season.

Distribution and Habitat

The Regent Honeyeater used to be widely distributed in south-eastern mainland Australia from Rockhampton in Queensland to Adelaide in South Australia. Its range has contracted dramatically in the last 30 years and the Regent Honeyeater is now confined to between north-eastern Victoria and south-eastern Queensland.

There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands.

The Regent Honeyeater is found in eucalypt forests and woodlands, particularly in blossoming trees and mistletoe. It is also seen in orchards and urban gardens. In the last 10 years Regent Honeyeaters have been recorded in urban areas around Albury where woodlands tree species such as Mugga Ironbark and Yellow Box were planted 20 years ago.

Diet and Foraging

The Regent Honeyeater is a generalist forager feeding mainly on nectar and other plant sugars. It can also feed on insects and spiders, as well as native and cultivated fruits. It forages in flowers or foliage, but sometimes comes down to the ground to bathe in puddles or pools. It is also known to hawk for insects on the wing. Key eucalypt species within the South West Slopes that provide foraging habitat for the Regent Honeyeater include Mugga Ironbark, Yellow Box, Blakely's Red Gum, and White Box. The Regent Honeyeater also utilises Grey Box, Red Box and Red Stringybark.

This species will also eat nectar and fruit from the mistletoes during the breeding season. When nectar is scarce, lerp and honeydew comprise a large proportion of the diet. Insects make up about 15% of the total diet and are important components of the diet of nestlings. A shrubby understorey is an important source of insects and nesting material.

Breeding

There are three known key breeding areas, two in NSW including Capertee Valley and Bundarra-Barraba regions and the other in Victoria at Chiltern-Albury. The species breeds between July and January in Box-Ironbark and other temperate woodlands and riparian gallery forest dominated by River Sheoak. Regent Honeyeaters usually nest in horizontal branches or forks in tall mature eucalypts and Sheoaks. Also nest in *mistletoe haustoria*. An open cup-shaped nest is constructed of bark, grass, twigs and wool by the female. Two or three eggs are laid and incubated by the female for 14 days. Nestlings are brooded and fed by both parents.

Likelihood of presence

The Regent Honeyeater was not recorded during the winter bird surveys. It was not recorded during the Ecological Assessment surveys (GHD 2012) nor are there any records of this species within the study area from previous studies undertaken (Refer to reference list). This species has not been recorded within the Wagga Wagga LGA since 1980. The study area does not support suitable habitat for the Regent Honeyeater as vegetation structure supports little shrubby understorey and mistletoe is scarce.

Assessment of likely impacts

According to the Ecological Assessment (GHD 2012), the Regent Honeyeater was unlikely to inhabit the study area, therefore an assessment of significance was not warranted. The Regent Honeyeater was not recorded within the study area during the winter bird survey period.

The Regent Honeyeater prefers areas of dry open forests and woodland, particularly Box-Ironbark woodland and riparian areas of River Sheoak. The Regent Honeyeater has not been recorded within the Wagga Wagga LGA for over twenty years. It is a highly nomadic species and is often a vagrant to areas. There are only three known key breeding regions remaining, with the closest being Albury-Chiltern area. The study area does not support suitable habitat for this species. The study area is dominated by open woodland with Box Gum species. Vegetation structure is not adequate to support this species and foraging resources are not varied enough.

An assessment of significance was undertaken for this species to determine the potential impact on foraging and roosting habitat as result of the proposed works. It concluded that it is unlikely that the proposal would have a significant effect on the Regent Honeyeater. Refer to Section 7 for an assessment of significance on the Regent Honeyeater.

5.2.4 Glossy Black-cockatoo

The Glossy Black-Cockatoo is the smallest of the five black-cockatoos in Australia. It is a brown-black cockatoo with a large, bulbous bill and a short crest. Males have a prominent red tail panel, while females have a yellow to orange-red tail. The coloured tail panel is barred black in juvenile birds, with the extent of barring decreasing with age. The female usually has irregular pale-yellow markings on the head and neck, and may have yellow flecks on the underparts and underwing. Some adult males have a few yellow feathers on the head and the males' tail panels tend to be bright red. Young birds resemble adult males but have yellow spotted or streaked breasts, bellies and flanks, with some yellow spots on the cheeks and sides of head.

Photo: Birdlife Australia, 2013

Distribution and Habitat

The Glossy Black-Cockatoo is an uncommon species, although is widespread in eastern Australia from Eungella, Queensland south to east Gippland in Victoria. It also extends inland from southern central Queensland through the central west of New South Wales with a small population in the Riverina to north-eastern Victoria. There is also an isolated population on Kangaroo Island, South Australia.

The Glossy Black-Cockatoo is highly dependent on the distribution of *Allocasuarina* species on which it feeds and is found in woodland dominated by *Allocasuarina*, often confined to remnant *Allocasuarina* patches surrounded by cleared farmlands. The Glossy black-cockatoo is reliant upon tree hollows for breeding.

Diet and Foraging

Inland populations feed on a wide range of sheoaks, such as Drooping Sheoak (*Allocasuaraina diminuta*). Belah (*Casuarina cristata*) is also utilised and may be a critical food source for some populations. In the Riverina, birds are associated with hills and rocky rises supporting Drooping Sheoak, but also recorded in open woodlands dominated by Belah. The Glossy Black-cockatoo feeds almost exclusively on the seeds of several species of she-oak (*Casuarina* and *Allocasuarina* species), shredding the cones with its massive bill. Occasionally the Glossy Black-cockatoo also eats wood-boring larvae.

The species is known to feed in threes, less commonly in pairs or small groups or in large flocks of up to 60 birds. The Glossy black-cockatoo is quite tame and easily approached when feeding, they can be detected by the clicking of their bills and the falling debris of casuarina cones and twigs.

Breeding

The Glossy Black-Cockatoo mates for life, with pairs maintaining their bond all year round. The female prepares the nest hollow and incubates the eggs, only leaving the nest to feed herself after the newly hatched nestling is a week old. Males feed the female and nestling throughout the incubation and brooding period. Once fledged, the young bird is fed by both parents for up to four months and remains with them until the next breeding season.

Likelihood of presence

The Glossy Black-cockatoo was not recorded during the winter bird surveys. It was not recorded during the Ecological Assessment (GHD 2012) nor are there any records of this species within the study area. The nearest record of this species is located within Pomingalarna Nature Reserve, approximately five kilometres north of the study area in 2007. Other sightings of this species have been recorded at the Rock Nature Reserve, about 27 kilometres south of the study area. David Read from WWCC stated that opportunistic sightings for this species have been observed flying over Glenfield Park, approximately two kilometres from the subject site.

Assessment of likely impacts

According to the Ecological Assessment (GHD 2012), the Glossy Black-cockatoo was unlikely to inhabit the study area, therefore an assessment of significance was not warranted. The Glossy Black-cockatoo was not recorded within the study area/locality during the winter bird survey period.

Potential nesting trees were identified and recorded within the study area for this species. Results revealed a total of 64 potential nest trees. Two potential nest trees are located directly within the subject site and would be impacted upon. An additional four potential nest trees are located in close proximity to the subject site that may be impacted by the proposal. It is recommended that these trees be avoided if possible. The Glossy Black-cockatoo is a highly flight mobile and is known to travel distances of up to 30 kilometres per day to forage. There was no foraging habitat located within the subject site. Minimal foraging habitat was present within Silvalite Reserve, however an abundance of sheoak was present at Pomingalarna Reserve. It is possible that the Glossy Black-Cockatoo may fly over the study area to access foraging habitat located at both Pomingalarna Reserve and the Rock Nature Reserve where existing records occur. The cut and fill ratios for the proposed works are unlikely to impact on flight paths for the Glossy Black-cockatoo. This species flies quite high and generally over rocky and open areas. It unlikely that the proposal would hinder potential flight paths for this species.

An assessment of significance was undertaken for this species to determine the potential impact on foraging and breeding habitat as result of the proposed works. It concluded that it is unlikely that the proposal would have a significant effect on the Glossy Black-cockatoo. Refer to Section 7 for an assessment of significance on the Glossy Black-cockatoo.

5.3 DISCUSSION OF LOCAL AND REGIONAL ABUNDANCE

Background searches revealed that all four species are relatively scattered in abundance across the Wagga Wagga LGA (Refer to Appendix B for background searches).

There is only one record for the Regent Honeyeater, dating back to 1980 in the Wagga Wagga town area. Due to its nomadic movements in the order of hundreds of kilometres and the species not being recorded within the region for over twenty years, it is unlikely that the Regent Honeyeater is likely to occur regularly within the region.

There are a total of seven records for the Glossy black-Cockatoo with the most recent being 2007 on the NSW Bionet Atlas. These records are confined to the Rock Nature Reserve and Pomingalarna Reserve. According to WWCC's David Read, sightings of this species flying over Glenfield Park were recorded in 2011-2012.

Two records exist on the NSW Bionet Atlas for the Little Lorikeet near Pomingalarna Reserve, although sightings for this species have been recorded by GHD within Silvalite Reserve in 2004 and 2008. This

species was also recorded during the winter survey. Due to its nomadic movements which are influenced by seasonal food availability, it is unlikely that the Little Lorikeet would be reliant on resources within the study area. Food resources would be available for this species across the region.

There are 21 records for the Swift Parrot within the Wagga Wagga LGA with the most recent record being 2002 on the NSW Bionet Atlas. These records are scattered between road reserves near the study area, Pomingalarna Reserve, Livingstone National Park and Charles Sturt University at Estella. A flock of Swift Parrots were recorded within the Kapooka Military base in 2012 (*pers. comm.* Leigh Maloney). The Swift Parrot only breeds in Tasmania, therefore is an opportunistic winter visitor to the region. This species was also recorded during the winter survey.

5.3.1 Discussion of habitat utilisation

The winter bird surveys focused on areas of woodland habitat and hollow bearing trees within open cleared areas. The four subject species have specific habitat types relating to breeding, roosting and foraging. Key habitat components generally include:

- Vegetation type and structure.
- Presence of hollow bearing trees – roosting and breeding habitat.
- Vegetation patch size – territory ranges, edge effects.

The seasons and climatic conditions are also important factors when assessing the presence of a threatened species within an area. Specific habitat components identified in relation to the sightings of the subject species included the presence of flowering Golden Wattle and flowering Box Gum for the Swift Parrot and Little Lorikeet

The Regent Honeyeater and Glossy Black-cockatoo were not observed within the study area during the winter survey period.

The Little Lorikeet was recorded flying over the study area along transect WR-2. This species was also recorded within woodland areas along transects WR-3 and SA-3. WR-3 is located higher within the landscape along a hill, dominated by Box Gum woodland. SA-3 was also located within Box Gum woodland however parallel to the existing road reserve where Golden Wattle is present.

The Swift Parrot was recorded along three transects and was observed foraging on Golden Wattle near WR-5. Approximately five - six individuals were observed during all three days of the second survey period (July/August). Transect WR-5 is located behind the existing fuel depot where the woodland area is more dense and comprises large areas of Golden Wattle compared to other woodland patches across the study area.

Habitat utilisation was expected to be contained to areas of woodland habitat, although large hollow bearing trees were assessed within the study area for potential nesting habitat for the Glossy Black-cockatoo. None of the subject species were observed utilising these hollow bearing trees. The Little Lorikeet and Swift Parrot were only observed foraging within or flying over the subject site/study area.

According to Saunders and Heinsohn (2008), studies have shown that the Little Lorikeet is the only competitive species that has a significant positive association with the Swift Parrot in the Western Slopes habitats. Although both these species have similar foraging attributes, they don't tend to compete with one another and will often forage in harmony together. However, other species such as the Noisy Miner are known to have a negative effect on the Swift Parrot due to interference competition, dominating areas with rich food sources and aggressively excluding passive species such as the Swift Parrot.

5.3.2 Discussion of corridors

An assessment of vegetation connectivity and corridors was undertaken by GHD (2012) using the method prescribed by DEC (2009).

A review of the extent of native vegetation clearance in the Murrumbidgee Catchment Management Authority region concluded that the clearing of the Wonga Hills and Ranges landscape constituted 85% clearance of native vegetation. As per DEC (2005), vegetation is considered over-cleared if 70% or more of the pre-European distribution has been removed.

At a local scale, vegetation clearing is estimated to be 80-90% of original cover within a two kilometre radius of the subject site. Notwithstanding the extent of loss of vegetation, the landscape value was estimated as 'high' using the DEC (2009) landscape value criteria.

All four subject species are highly mobile birds that travel long distances between areas of suitable foraging habitat. The Little Lorikeet, Swift Parrot and Glossy Black-cockatoo fly at heights above the canopy and are able to cover vast distances while the Regent Honeyeater is a highly nomadic species.

Substantial areas of high quality habitat occur within reserves in the locality including Pomingalarna Reserve, approximately five kilometres north of the study area, Silvalite Reserve only 200 metres north of the study area, the Rock Nature Reserve, approximately 27 kilometres south of the study area and the Kapooka Military Base which is only 500 metres west of the study area. Road Reserves and smaller vegetated areas such as Gregadoo Hills and Plum Pudding Hills provide important linkages and stepping stones to larger intact areas of vegetation such as Livingstone National Park to the south of the study area.

Foraging habitat located within the subject site and study area is fragmented and of lower quality value compared to other areas of woodland within the study locality for the four winter subject species. There is no foraging habitat for the Glossy Black-cockatoo within the subject site or study area. The Regent Honeyeater relies heavily on mistletoe as a foraging resource, however it is quite scarce within the study area. The Swift Parrot was observed foraging on areas of Golden Wattle which are sparsely scattered across the study area. However the subject site and study area provides a foraging haven for the Superb Parrot which was observed along a number of transect areas foraging on grasses and capeweed.

Although a large number of hollow bearing trees are located within the study area, the wider locality supports an abundance of hollow resources within Pomingalarna Reserve, Livingstone National Park and along the Murrumbidgee River. The Swift Parrot, Little Lorikeet and Glossy Black-cockatoo have all been recorded in these larger, higher quality woodland areas.

5.4 ASSESSMENT OF HABITAT

Transect surveys concentrated on woodland areas within the study area with only opportunistic sightings recorded for open paddock areas. These open paddock areas were also assessed for potential Glossy Black-cockatoo nest trees.

Refer to Table 9 for a description of the vegetation and habitat within each transect area. Bird species diversity was greatest along transects located within Silvalite Reserve (SL-1 and SL-2) as vegetation located within this area comprised greater vegetation structure and patch size.

Road reserve areas that were in close proximity to the existing Olympic Highway with low patch sizes recorded the lowest diversity of species. However WR-4, located to the east of the study site on the hillier areas also recorded low diversity. This area consisted of larger scattered Eucalypt trees with no mid storey species present and ground cover species comprising mostly of weeds.

Larger patch sizes with a diverse vegetation structure including some mid storey species such as Acacia and larger hollow bearing trees, attracts species such as the Swift Parrot and Little Lorikeet. These species preferred areas with denser vegetation and were found only in Box Gum woodland with Golden Wattle present.

5.4.1 Distribution and condition of regional habitats

Within the wider locality there are numerous reserves and vegetated woodland areas that would support suitable habitat for the Little Lorikeet, Swift Parrot, Regent Honeyeater, Glossy Black-cockatoo and other threatened woodland bird species.

Areas that support woodland vegetation and potential habitat located within the study locality (10 kilometre radius) include Silvalite Reserve (60 hectares), Pomingalarna Reserve (225 hectares), DPI Research Station area (22 hectares), Willans Hill (53 hectares) and the Kapooka Military area (200 hectares).

Smaller pockets of woodland just outside the study locality that provide habitat and act as linkages or stepping stones for species include Gregadoo Hills (100 hectares), Plum Pudding Hills (62 hectares), Big Springs including Mount Flakney and the Murrumbidgee River and its tributaries. These areas are located south of the subject site and link up to Livingstone National Park, while the Murrumbidgee River is located five kilometres to the north of the study area.

Within the wider locality, the Rock Nature Reserve (347 hectares) and Livingstone National Park (1919 hectares) provide a variety of suitable habitat for the identified subject species. Both these reserves are protected under the *National Parks and Wildlife Act 1974*. Vegetation structure is more prominent in these reserves and roosting and breeding habitat for hollow dependant fauna is abundant.

5.5 DESCRIPTION OF FEASIBLE ALTERNATIVES

Roads and Maritime have had a number of ecological studies undertaken to determine the most appropriate route based on ecological impacts, design options and safety. As part of the constraints analysis prepared by nghenvironmental in 2011, a number of route options were considered to identify the route that would have the least ecological impact, but also ensuring that Roads and Maritime safety and design requirements were still met.

The consideration of the two route options was put forward to various stakeholders including: Wagga Wagga City Council, community members and the transport industry (RMS 2011). After extensive consultation with stakeholders and acknowledgment of the regional importance of the proposed road infrastructure, it was deemed that there was no other feasible alternative.

6 IMPACT AMELIORATION

6.1 KEY THREATENING PROCESSES

Section 1.1.2 of this report briefly discusses key threatening processes (KTP's) listed on the TSC Act and EPBC Act related to the proposal. KTP's applicable to this proposal include clearing of native vegetation, removal of dead wood and dead trees, and loss of hollow-bearing trees. The Ecological Assessment (GHD 2012) further identified the impacts of these three KTP's relevant to the study area:

- Clearing of native vegetation – approximately 14.2 hectares.
- Loss of hollow-bearing trees – 13 hollow-bearing trees and up to 72 tree hollows.
- Removal of deadwood, stags and coarse woody debris (CWD). Six stags have been identified for potential relocation.

The above listed KTP's are relevant to the species identified for winter bird surveys. There are also other specific threats that have been identified on the NSW Threatened Species website (accessed August 2013) that are relevant to the four subject species. Table 4 provides an overview of these threats.

Table 15: List of other threats relating to winter bird subject species relevant to the proposal.

Winter Listed Birds	threats relevant to this species
Little Lorikeet	• Given that large old Eucalyptus trees on fertile soils produce more nectar, the extensive clearing of woodlands for agriculture has significantly decreased food for the lorikeet, thus reducing survival and reproduction. • Small scale clearing, such as during road works and fence construction, continues to destroy habitat and it will be decades before revegetated areas supply adequate forage sites. • The loss of old hollow bearing trees has reduced nest sites, and increased competition with other native and exotic species that need large hollows with small entrances to avoid predation. • Felling of hollow trees for firewood collection or other human demands increases this competition. • Competition with the introduced Honeybee for both nectar and hollows exacerbates these resource limitations.
Swift Parrot	• On the mainland the main threat is loss of foraging and roosting habitat through clearing for agriculture, and urban and industrial development. • Collisions with wire netting fences, windows and cars, during the breeding season and winter migration (especially where such obstacles are in close proximity to suitable habitat).
Regent Honeyeater	• Fragmentation and degradation of habitat from clearing for agricultural and residential development, particularly fertile Yellow Box-White Box-Blakely's Red Gum woodlands. • Continuing loss of key habitat tree species and remnant woodlands from strategic agricultural developments, timber gathering and residential developments. • Suppression of natural regeneration of over storey tree species and shrub species from overgrazing. • Firewood harvesting in Box-Ironbark woodlands can also remove important habitat

	components. • Competition from larger aggressive honeyeaters, particularly Noisy Miners, Noisy Friarbirds and Red Wattlebirds. • The small population size and restricted habitat availability make the species highly vulnerable to extinction via stochastic processes. • Egg and nest predation by native birds.
Glossy Black-Cockatoo	• Reduction of suitable habitat through clearing for development. • Decline of hollow bearing trees over time due to land management activities. • Firewood collection resulting in loss of hollow bearing trees, reduced recruitment of hollow bearing trees, and disturbance of breeding attempts. • Decline in extent and productivity of sheoak foraging habitat due to feral herbivores. • Limited information on the location of nesting aggregations and the distribution of high quality breeding habitat. • Grazing can degrade foraging habitat and limit the capacity of sheoak stands to regenerate following fire or drought.

6.1.1 Clearing of native vegetation

Native vegetation is made up of plant communities, comprising primarily indigenous species and includes canopy trees (where present), understorey, ground cover and below ground biomass (roots, bulbs and the seed bank). Clearing, as defined by the determination, refers to the destruction of a sufficient proportion of one or more strata (layers) within a stand or stands of native vegetation.

The clearing of native vegetation can result in a number of issues including fragmentation of the landscape, increase habitat for invasive species, loss and/or disruption of ecological function and loss of the leaf litter layer resulting in a major loss of biological diversity.

There has been extensive clearing of native vegetation within the study area and greater locality. This is a result of past and present agricultural practices, urbanisation and infrastructure and construction. The proposal will further reduce the extent of native vegetation within the study area.

6.2 DESCRIPTION OF AMELIORATIVE MEASURES

Potential impacts on biodiversity are assessed and mitigation measures are proposed as part of environmental assessment required under the EP&A Act. A number of route options were assessed for the realignment of Kapooka Bridge. The preferred route option was based on findings from the constraints analysis (nghenvironmental 2011) and the Ecological Assessment (GHD 2012) that involved minimising the ecological impacts of the proposal. Roads and Maritime consulted with OEH to ensure that the preferred route option met the following ecological requirements:

- Avoid and minimise impacts first.
- Mitigate impacts where avoidance is not possible.
- Offset where residual impacts cannot be avoided.

6.2.1 Long-term management, compensatory strategies and on-going monitoring

Roads and Maritime has a set of Biodiversity Guidelines (2011) for protecting and managing biodiversity on Roads and Maritime projects which document best practice for pre-clearing and fauna management. These guidelines would be implemented during the proposed works. Guidelines relevant to the proposal include:

- Guide 1 – Pre-clearing process.
- Guide 2 – Exclusion zones.
- Guide 3 – Re-establishment of native vegetation.
- Guide 4 – Clearing of vegetation.
- Guide 5 – Re-use of woody debris.
- Guide 6 – Weed management.
- Guide 8 – Nest boxes.
- Guide 9: Fauna handling.

The following management strategies and mitigation measures were recommended in the Ecological Assessment by GHD (2012):

- Tree and shrub plantings undertaken under bridge and on batter slopes to assist in revegetation and woodland bird movement.
- Tree and shrub plantings to be undertaken at designated squirrel glider crossing zones.
- Box Gum woodland species to be used for revegetation works.
- Roads and Maritime to investigate planting of trees and shrubs in the land zoned E2 on the agricultural research station north-west of the proposal.
- Tree and shrubs to be planted on the western side of the new Camp Access Road.
- Placement of fallen logs would not exceed 50 metres per 1000m².
- In accordance with Roads and Maritime Biodiversity Guidelines, nest boxes would be installed in the subject site and study area at a ratio of 1:1 for loss of hollows greater than five centimetres. Seventy per cent of nest boxes required, would be installed prior to the commencement of clearing activities.
- Final construction would aim to retain hollow bearing trees wherever possible while still meeting operational objectives for road safety, design and sediment basin operation. This includes hollow-bearing trees that are on the margins of the concept design.
- Felled limbs with hollows greater than five centimetres in diameter would be retained on the ground as woody debris.

For additional, detailed mitigation measures refer to Table 15 of the Ecological Assessment by GHD (2012).

The following mitigation measures in regards to woodland birds are also recommended. These mitigation measures have also been stated in the Realignment of the Olympic Highway at Kapooka including new road over rail bridge Review of Environmental Factors (REF):

- In consultation with Wagga Wagga City Council, some of the large woody debris generated by the proposal will be relocated outside the limits of the proposal and retained as habitat on the ground. The woody debris retained will be spread in a fashion that replicates the natural occurrence of woody debris in the environment and will not be stacked.
- Placement of woody debris on the ground will not exceed the upper benchmark for total length of fallen logs for Western Slopes Grassy Woodland in the Murrumbidgee catchment (50 metres per 1000 square metres) (DECC 2008).
- Woody debris will be re-used as detailed in RTA (2011a) - Biodiversity Guidelines Guide 5: Re-use of woody debris and bushrock.
- Relocation of woody debris will be done in a manner that discourages removal for firewood (eg inside fences rather than outside fences).
- Where practicable, vegetation removal will occur outside the main fauna breeding season (August to January) to avoid potential breeding disturbance to fauna, particularly the Squirrel Glider and woodland birds.
- The existing road adjacent to Silvalite Reserve will be ripped and restored (bitumen pavement removed and revegetated with local native species) to minimise fragmentation of fauna habitat. These works will commence as soon as the road is no longer required for traffic access.
- Shrubs will be planted under the bridge and on batter slopes to assist in revegetation and to aid fauna passage and woodland bird movement.
- Locally native species will be used for revegetation. Species will be consistent with those for the Commonwealth scientific committee determination of Box-Gum Woodland.
- Removal of mature trees, including hollow-bearing trees, will be minimised wherever possible while still meeting operational objectives for road safety, design and sediment basin operation.
- Hollow-bearing trees to be retained will be protected by a physical barrier or fence.
- Pruning or lopping of limbs will be conducted in preference to tree removal wherever possible.
- Hollow-bearing trees to be retained will be defined by survey before clearing.
- Nest boxes will be installed at a minimum 1:1 ratio for the loss of hollows greater than five centimetres in diameter, as detailed in RTA (2011a) - Biodiversity Guidelines Guide 8: nest boxes. Seventy per cent of nest boxes will be installed in the six months prior to and 30 per cent will be installed during construction.
- Placement of nest boxes will aim to reach the benchmark for trees with hollows for Western Slopes Grassy Woodland in the Murrumbidgee catchment (five per 1000 square metres) (DECC 2008).
- The types and ratios of nest boxes will be incorporated into the nest box strategy to be prepared as part of the Wildlife Crossing Management Plan.

On- going monitoring for the proposal is not required for the following reasons:

- There would be no significant impact on any threatened fauna species as a result of the proposal.
- To minimise the impacts on fauna species in the study area, Roads and Maritime will develop a Wildlife Crossing Management Plan in consultation with the OEH.

- Mitigation measures (eg glider rope bridges, nest boxes and strategic revegetation) are proposed to minimise the effect of fragmentation on threatened fauna species.
- Compared to other projects in the region (eg Hume Highway Duplication and Bypasses) the potential impacts of the proposal are of a smaller scale.
- The only significant impact as a result of the project is to Box-Gum Woodland. The impacts of this have been offset in accordance with State and Federal Offset Policies.
- The proposed offset site has been assessed using the BBAM (DECC 2009) and DoE offsets assessment guide (DSEWPaC 2012) and covers above and beyond what is required to offset the residual impacts of the project on Box-Gum Woodland, as well as State and/or Commonwealth listed fauna species.
- Monitoring would be undertaken at the offset site in accordance with the Management Plan for the site.

7 ADDITIONAL INFORMATION

7.1 LICENCES

Surveys for this assessment were undertaken under the authority of the Office of Environmental and Heritage (OEH) Scientific Licence Number SL100682 and, the Animal Care and Ethics Committee of the Director General of NSW Department of Primary Industries Approval No: 11/5138. Refer to Appendix F for copies of nghenvironmental's licences.

7.2 QUALIFICATIONS AND EXPERIENCE

Name: Amy Evans

Qualifications:

B.App.Sc Parks, Recreation and Heritage, majoring in wildlife ecology and management.

B.App.Sc in Ecotourism

Grad. Cert. Ornithology

Experience

Amy has worked in the environmental industry since 2006. Amy graduated from Charles Sturt University with a double degree in B.App.Sc (Parks, Recreation and Heritage) and (Ecotourism) majoring in wildlife ecology and management. She has also obtained a Graduate Certificate in Ornithology.

Amy has a strong background in terrestrial ecology, particularly bird ecology. In her career, she has been involved in the development of management plans for the Cullerin Range Wind Farm and the Tarcutta, Woomargama and Holbrook Bypasses. Over the past three years Amy has assisted in managing the implementation of the biodiversity commitments for the Hume Highway Upgrade project for NSW RMS. Amy has experience in tendering, report writing, environmental management and planning, review of Environmental Factors (REF's), 7 Part Tests, EIS, Flora and Fauna surveys and assessments, Anabat analysis, threatened species habitat assessments, erosion and sedimentation control, on site environmental advice, environmental compliance, project reporting and management, implementation of monitoring programs, and reviewing reports.

Amy is a highly determined, reliable and efficient person with developed organisational skills. She is able to work effectively in teams or autonomously, with experience providing support and service to internal and external stakeholders including government bodies. Amy is able to make complex decisions and demonstrates a good understanding of environmental legislation.

Name: Mason Crane

Qualifications:

B.App.Sc Parks, Recreation and Heritage

PhD Candidate. Australian National University, Canberra.

Experience

Mr Crane is a senior research officer for the Australian National University (ANU). He is a highly experienced field ecologist with over 13 years of extensive experience in wildlife research. A large percentage of Mason's time is dedicated to carrying out wildlife surveys across numerous wildlife monitoring project throughout Victoria, NSW and Queensland. He is currently a PhD candidate at ANU researching the conservation of arboreal marsupials in agricultural landscapes. Mr Crane has authored numerous publications on this subject and other wildlife conservation research. His extensive and intensive work in this field has meant he has been able to develop specialised skills in the bird, reptile and mammal surveying.

Mr Crane is actively involved in conservation in his local area with the Gundagai Bushcare Group, Riverina

Highlands Landcare network. He has been involved in a number of vegetation restoration projects including restoration work in degraded grassy white-box remnants.

Publications that Mr Crane has assisted in include:

- Lindenmayer, D.B., Claridge, A.W., Hazell, D., Michael, D.R., Crane, M., MacGregor, C.I., and Cunningham, R.B. (2003). Wildlife on farms. How to conserve native animals. CSIRO Publishing. Melbourne.
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- Lindenmayer, D.B., Crane, M., and Michael D.R., with illustrations by Beaton E. (2005) Woodlands: A Disappearing Landscape. CSIRO Publishing. Collingwood, Melbourne.

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APPENDIX A DGR REQUIREMENTS

Director-General's Requirements for a Species Impact Statement

NSW GOVERNMENT | Office of Environment & Heritage

Your reference : SF2011/10011903
Our reference : ED12/900
Contact : Matt Cameron 02 6022 0605

Applicant(s):

ROADS & MARITIME SERVICES,
ABN 76 236 371 088,
484,
WAGGA WAGGA NSW 2650
STANDARD POST

Dear Sir/Madam

DIRECTOR-GENERAL'S REQUIREMENTS FOR A SPECIES IMPACT STATEMENT FOR THE REALIGNMENT OF THE OLYMPIC HIGHWAY AT KAPOOKA

Issued pursuant to s. 111 Threatened Species Conservation Act 1995

Thank you for your letter dated 14 November 2012 and received by the Department of Premier and Cabinet, Office of Environment and Heritage (OEH) on 19 November 2012 requesting Director-General's (DGRs) requirements for a species impact statement (SIS) for the proposal cited above. Please find enclosed a copy of the DGRs (Attachment A) issued on behalf of the Director General.

The purpose of an SIS is to:

- allow the applicant or proponent to identify threatened species issues and provide appropriate amelioration for adverse impacts resulting from the proposal;
- assist consent and determining authorities in the assessment of a development application under Part 4 or request for Part 5 approval under the Environment Planning and Assessment Act 1979 (EP&A Act);
- assist the Director-General of the Department of Premier and Cabinet, OEH in deciding whether or not concurrence should be granted for the purposes of Parts 4 or 5 of the EP&A Act;
- assist the Director-General of the Department of Premier and Cabinet, OEH or the Minister for the Environment when consulted for the purposes of Parts 4 or 5 of the EP&A Act;
- assist the Director-General of the Department of Premier and Cabinet, OEH in the assessment of Section 91 Licence applications lodged under the TSC Act.

OEH understands that Roads and Maritime Services (RMS) is, or will in the future be, considering a proposal under Part 5 of the Environmental Planning and Assessment Act for this activity. To assist RMS with the approval process, OEH provides the following information.

Referrals

Whilst OEH is unable to provide comment on draft Species Impact Statements (SISs) in their entirety, OEH will provide comment to proponents and their consultants on key issues arising in the drafting process. The ability of OEH to provide such advice is dependent on the availability of OEH resources and on other statutory priorities.

Please note that it is the determining or consent authority's responsibility to ensure that a draft or final SIS complies with the requirements issued by the Director-General. OEH is not available to perform this function on the determining authority's behalf.

Concurrence

If RMS, as determining authority, decides to approve the proposal following a review of the environmental impact assessment and final SIS, then the concurrence of the Director-General of OEH is required in accordance with s112C of the Environmental Planning and Assessment Act 1979, before approval can be granted. A concurrence application is not required should RMS decide to refuse the proposal.

Concurrence applications to OEH should be accompanied by:

1. Two copies of the SIS;
2. A copy of any preliminary flora and fauna assessment undertaken (i.e. the report addressing the assessment of significance that triggered the requirement for the SIS);
3. A copy of the Review of Environmental Factors;
4. A copy of the determination notice and the conditions of the proposed approval;
5. A copy of any submissions or objections received by RMS concerning the proposal;
6. A copy of any other supporting information lodged in support of the development application including social and economic impact assessments; and
7. A cheque for $320 in accordance with s.252A of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) (as amended).

Public Notification

RMS is required to give public notification of the Species Impact Statement in accordance with s113 of the *Environmental Planning and Assessment Act 1979.*

Other Information

If OEH grants concurrence to RMS's determination notice, then OEH would appreciate a copy of the determination notice issued by RMS to the proponent. OEH would use this information to monitor the type and number of consents and approvals being issued which affect threatened species, populations or ecological communities.

OEH would also like to mention the requirements of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The EPBC Act requires the approval of the Federal Minister for the Environment (in addition to any State or Local Government approval or determination) for an action that will have, or is likely to have, a significant impact on a matter of national environmental significance. Threatened species and communities listed by the EPBC Act are considered to be a matter of national environmental significance. OEH recommends discussing this proposal with the Department of Sustainability Environment Water Population and Communities (DSEWPaC) to establish if the proposal may be determined as a controlled action. If DSEWPaC call the proposal in as a controlled action it would be beneficial to have all areas of this assessment included in the assessment undertaken for the SIS.

Many of the species and ecological communities listed in the *Threatened Species Conservation Act 1995* (NSW) are also listed in the Commonwealth EPBC Act. Further information regarding the operation of the EPBC Act (including Federally listed threatened species and communities) may be obtained from the website of the Commonwealth Department of Environment and Water Resources www.dewr.gov.au or by contacting the department on 1800 803 772.

Should you require any additional information please contact Matt Cameron, Regional Biodiversity Conservation Officer, on (02) 6022 0605.

.....

Mr Michael Saxon **Mr Michael Saxon**

Regional Co-ordination Officer

SouthRegional Co-ordination Officer South

(by Delegation)

Dated: 13-Dec-2012

ATTACHMENT A

DIRECTOR GENERAL'S REQUIREMENTS FOR A SPECIES IMPACT STATEMENT FOR THE REALIGNMENT OF THE OLYMPIC HIGHWAY AT KAPOOKA

INTRODUCTION

The purpose of a Species Impact Statement (SIS) in the development assessment process as it relates to your application is:

- to allow you, as applicant, to identify the issues pertaining to threatened species, populations, ecological communities or their habitats, and provide appropriate amelioration for adverse impacts resulting from the action; and
- to assist the consent or approval authorities in the assessment of your proposal pursuant to the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Section 111(1) of the *Threatened Species Conservation Act 1995* (TSC Act) requires that it must be either the applicant for the development consent or the proponent of the activity who makes the request for Director-General's Requirements (DGRs). The Office of Environment and Heritage (OEH) notes that in this instance Erica Adamson, (General Manager, Environment Branch), made the request for the DGRs. Please advise the OEH contact officer, Matt Cameron (Regional Biodiversity Conservation Officer) on (02) 6022 06505 if it is not intended that Erica Adamson will be the applicant or proponent, whatever the case may be.

It is also essential to note that Section 111(1) requires that the applicant must, in preparing the SIS, comply with the requirements of the Director-General. As any consent or approval granted where the Director-General's requirements are not met may be invalid, it is strongly recommended that the Roads and Maritime Services ensure that all of the requirements detailed below are complied with.

DEFINITIONS

The definitions given below are relevant to these requirements:

- **Development** has the same meaning as in the EP&A Act.
- **Activity** has the same meaning as in the EP&A Act
- **Proposal** is the development, activity or action proposed
- **Subject Site** means the area directly affected by the proposal.
- **Study Area** means the subject site and any additional areas which are likely to be affected by the proposal, either directly or indirectly. The study area should extend as far as is necessary to take all potential impacts into account. As a minimum, the study area must include all lands within 500-m of the subject site (as shown in the Kapooka Bridge Replacement Ecological Assessment, November 2012).

- **Subject Species, Populations or Ecological Communities** means those threatened species, populations or ecological communities that are known or considered likely to occur in the study area. The SIS is to explicitly consider the impacts of the proposal on each of these entities.

- **Direct Impacts** are those that directly affect habitat and individuals, usually within the footprint of the proposal. They include, but are not limited to, clearing and habitat removal. Consideration must be given to all of the likely direct impacts of the proposed activity or development.

- **Indirect Impacts** occur when project-related actions affect species, populations or ecological communities in a manner other than direct loss, usually beyond the footprint of the proposal. Indirect impacts can include loss of individuals through predation by domestic and/or feral animals, deleterious hydrological changes (including increased runoff and raising or lowering of the water table), erosion, weed invasion, pollution, trampling or other impacts due to increased human activity within or directly adjacent to sensitive habitat areas, altered fire regimes, habitat fragmentation and disruption of wildlife movement corridors. As with direct impacts, consideration must be given to all of the likely indirect impacts of the proposed activity or development.

- **Life Cycle** is the series or stages of reproduction, growth, development, aging and death of an organism.

- **Viable** means the capacity to successfully complete each stage of the life cycle under normal conditions.

- **Risk of Extinction** is the likelihood that the local population of the species or local occurrence of the endangered population or ecological community will become extinct either in the short, medium or long-term as a result of direct or indirect impacts on the viability of that population and includes changes to the ecological function of communities.

- **Local Population** is the population that occurs in the study area. The assessment of the local population may be extended to include individuals beyond the study area if it can be clearly demonstrated that contiguous or interconnecting parts of the population continue beyond the study area, according to the following definitions.

  - The local population of a threatened plant species comprises those individuals occurring in the study area or the cluster of individuals that extend into habitat adjoining and contiguous with the study area that could reasonably be expected to be cross-pollinating with those in the study area.
  - The local population of resident fauna species comprises those individuals known or likely to occur in the study area, as well as any individuals occurring in adjoining areas (contiguous or otherwise) that are known or likely to utilise habitats in the study area.
  - The local population of migratory or nomadic fauna species comprises those individuals that are likely to occur in the study area from time to time.

  In cases where multiple populations occur in the study area, each population should be assessed separately.

- **Local Occurrence** means the ecological community that occurs within the study area. However the local occurrence may include adjacent areas if the ecological community on the study area forms part of a larger contiguous area of that ecological community and the movement of individuals and exchange of genetic material across the boundary of the study area can be clearly demonstrated.
- **Composition** means both the plant and animal species present, and the physical structure of the ecological community. Note that while many ecological communities are identified primarily by their vascular plant composition, an ecological community consists of all plants and animals as defined under the TSC Act that occur in that ecological community.

All other definitions are the same as those contained in the TSC Act.

MATTERS WHICH HAVE BEEN LIMITED OR MODIFIED

The following Section 110 matters of the TSC Act need not be addressed by the subject SIS:

- Section 110(2)(g) and 110(3)(d).

The matters raised in these sections of the TSC Act have been clarified by the requirements below.

The following Section 110 matters need only be addressed where relevant:

- All reference to threat abatement plans
- All reference to recovery plans
- All reference to key threatening processes
- All reference to critical habitat. At the time of printing, the areas of declared critical habitat are not relevant to this proposal.

The proponent should be aware that recovery plans may be approved, critical habitat may be declared and key threatening processes may be listed between the issue of these requirements and the granting of approval. If this occurs, these additional matters will need to be addressed in the SIS and considered by the consent, determining or concurrence authority.

MATTERS TO BE ADDRESSED

The TSC Act provides that the SIS must meet all the matters specified in Sections 109 and 110 of the Act with the exception of those matters limited above. Some of the requirements outlined in Sections 109 and 110 (excluding the matters limited above) have been repeated below (italics) along with the specific Director-General's Requirements for your proposal.

Previous surveys and assessments may be used to assist in addressing these requirements. All references used throughout the SIS must be cited and detailed in a reference list.

1 FORM OF THE SPECIES IMPACT STATEMENT

A species impact statement must be in writing [Section 109 (1)]

A species impact statement must be signed by the principal author of the statement and by:

(a) the applicant for the licence, or

(b) if the species impact statement is prepared for the purposes of the Environmental Planning and Assessment Act 1979, the applicant for development consent or the proponent of the activity proposed to be carried out (as the case requires) [Section 109(2)].

The SIS must include the following declaration signed by the applicant or proponent:

"I...[insert name], of ..[address], being the applicant for the [choose one of the following development consent for/proponent of] the action proposed...[insert DA number, Lot & DP numbers, street, suburb and LGA names] have read and understood this species impact statement. I understand the implications of the recommendations made in the statement and accept that they may be imposed as conditions of consent or concurrence for the action proposed."

2 CONTEXTUAL INFORMATION

2.1 Description of proposal, subject site and study area

A species impact statement must include a full description of the action proposed, including its nature, extent, location, timing and layout [Section 110 (1)]

A full description of the action proposed includes a description of all associated actions. These actions may occur on or off the *subject site*. In describing the action proposed, the proportion of the *subject site* and the *study area* that will be affected is to be provided, including details of the location of any auxiliary infrastructure and all component parts of the *proposal* including, but not restricted to, (i) roadworks and temporary access and egress routes, (ii) cycleways, walkways, drainage and settling ponds, stockpile areas, diversion banks, vehicle parking areas and temporary buildings, (iii) changes in surface water flows (iv) location of stormwater and drainage infrastructure (v) location of power and data easements.

The type of action proposed shall be detailed, including the timetable for the construction of the *proposal*. If a staged construction approach is adopted then the timetable shall clearly indicate this.

If subsequent development of adjacent land is proposed by the proponent in the future, including any additional road construction then this shall be identified to the extent that it is known at the time of preparing the SIS. If existing structures, such as pipelines and transmission lines, are to be relocated, this should also be described and assessed.

Where the proposed road passes through endangered ecological communities, the habitat of endangered populations, or the habitat of threatened species, the construction methods used shall be described in detail and the feasibility of construction of the road without adversely impacting on these entities and their habitats shall be demonstrated.

The vegetation within the study that is to be retained is to be fully documented, and shown on the relevant plans and maps. The proposed management regimes for such areas are also to be documented.

2.2 Provision of relevant plans and maps

A detailed plan of the *study area* shall be provided at a preferred scale of 1:4,000 or finer. This plan shall show the *proposal*, the location and type of vegetation communities present within the *study area*, the full extent of vegetation clearing anticipated, and the scale of the plan. This plan shall also show the location of any key habitat resources for threatened species (e.g., hollow-bearing trees, large old trees, identified feed trees, potential breeding sites, rock outcrops, concentrations of fallen timber, areas supporting mistletoes). Where the general habitat of each *subject species, population or ecological community* within the *study area* can be clearly delineated, this habitat shall be represented on the plan.

Colour aerial photography of the locality (or a reproduction of such a photograph) shall be provided. This aerial photograph shall clearly show the subject site and the scale of the photograph.

The locations of the *subject species populations or ecological communities* recorded in any survey conducted for the purposes of the SIS or relied upon in this SIS shall be represented on a map of the *study area* that shows the *proposal* (preferred scale 1:4,000 or finer).

A topographic map of the general *locality* at a scale of 1:25,000 is to be provided. This map is to detail the location of the action proposed, landscape features including rivers, swamps, wetlands, any locally significant sites of *subject species, populations or ecological communities*, and areas of high human activity such as townships, railways, and roads. This map shall incorporate the area within a radius of 10km from the subject site. All available historical records are to be included of *subject species, populations of ecological communities* sourced from various databases and other sources are to be included on this map.

2.3 Land tenure information

The land tenure across the *study area* is to be described and any limitations to sampling across the *study area* resulting from this tenure (e.g., denied access to private land) shall be noted.

3 INITIAL ASSESSMENT

A general description of the threatened species or populations known or likely to be present in the area that is the subject of the action and in any area that is likely to be affected by the action [Section 110 (2)(a)].

3.1 Identifying subject species and populations

For the purposes of this SIS, the species listed in Table 1 are to be addressed as *subject species*:

Table 1. List of *subject species*.

SPECIES	SCIENTIFIC NAME	STATUS
FAUNA		
Birds		
Regent Honeyeater	*Anthochaera phrygia*	Critically Endangered
Bush-stone Curlew	*Burhinus grallarius*	Endangered
Swift Parrot	*Lathamus discolor*	Endangered
Painted Honeyeater	*Grantiella picta*	Vulnerable
Black-chinned Honeyeater (eastern subspecies)	*Melithreptus gularis gularis*	Vulnerable
Brown Treecreeper	*Climacteris picumnus victoriae*	Vulnerable
Diamond Firetail	*Stagonopleura guttata*	Vulnerable
Hooded Robin	*Melanodryas cucullata cucullata*	Vulnerable
Speckled Warbler	*Pyrrholaemus sagittatus*	Vulnerable
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis temporalis*	Vulnerable
Scarlet Robin	*Petroica boodang*	Vulnerable
Flame Robin	*Petroica phonecea*	Vulnerable
Varied Sittella	*Daphoenositta chrysoptera*	Vulnerable
White-fronted Chat	*Epthianura albifrons*	Vulnerable
Gilbert's Whistler	*Pachycephala inomata*	Vulnerable
Glossy Black Cockatoo	*Calyptorhynchus lathami*	Vulnerable
Turquoise Parrot	*Neophema pulchella*	Vulnerable
Superb Parrot	*Polytelis swainsonii*	Vulnerable
Little Lorikeet	*Glossopsitta pusilla*	Vulnerable
Barking Owl	*Ninox connivens*	Vulnerable
Spotted Harrier	*Circus assimilis*	Vulnerable
Little Eagle	*Hieraaetus morphnoides*	Vulnerable

SPECIES	SCIENTIFIC NAME	STATUS
Mammals		
Eastern Bentwing-bat	*Miniopterus schreibersii oceanensis*	Vulnerable
Corben's Long-eared Bat	*Nyctophilus corbeni*	Vulnerable
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	Vulnerable
Southern Myotis	*Myotis macropus*	Vulnerable
Squirrel Glider	*Petaurus norfolcensis*	Vulnerable
FLORA		
Woolly Ragwort	*Senecioo garlandi*	Vulnerable
ENDANGERED POPULATIONS		
Squirrel Glider in the Wagga Wagga Local Government Area		
ENDANGERED ECOLOGICAL COMMUNITIES		
White Box, Yellow Box, Blakely's Red Gum Woodland		
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions		

One of the roles of a SIS is to determine which species, populations or ecological communities may be utilising, or present, on a development site. This list is not exhaustive and other entities may also need to be included for assessment in this SIS on the basis of desktop and habitat analyses and the outcomes of fieldwork.

In determining whether other entities, should also be addressed as *subject species, populations and ecological communities*, consideration shall be given to the habitat types present within the *study area*, recent records of threatened species, populations or ecological communities in the *locality* and the known distributions of threatened species, populations and ecological communities. This analysis and its conclusion are to be documented in the SIS.

Databases such as the OEH Atlas of NSW Wildlife and BioNet, as well as databases held by the Australian Museum and Royal Botanic Gardens, should be consulted to assist in compiling the list of possible entities to be analysed. It should be noted that if the OEH Atlas is the only database that is referred to, due to data exchange agreements, the data provided by OEH will only include that for which OEH is a custodian. In many cases, this may only be a small subset of the data available. Other databases must also be consulted to create a comprehensive list of entities for consideration as *subject species, populations or ecological communities*.

3.2 Identifying habitats

In describing the *study area*, consideration shall be given to the previous land uses and the effect of these land uses on the *study area*. Relevant historical events may include fire, clearing, logging, slashing, recreational use and agricultural activities including grazing and cropping.

A description of habitats including such components as the abundance of tree hollows, the presence of wetlands, the density of understorey vegetation, the floristic composition and cover of ground cover plants species, the soil type and the presence of heath and permanent or ephemeral swamps shall be given. The condition of these habitats within the *study area* shall be discussed, including the prevalence of introduced species. A description of the habitat requirements of threatened species, populations or ecological communities likely to occur in the *study area* shall be provided.

Any areas which may provide habitat connectivity between the *study area* and adjacent areas of likely habitat for *subject species, populations or ecological communities* shall be identified and described.

In defining the *study area*, consideration shall be given to possible *indirect impacts* of the proposed action on species/habitats in and surrounding the *subject site*. These could include impacts arising from altered fire and hydrology regimes, soil erosion or pollution, fencing, habitat fragmentation and disruption of wildlife movement corridors, edge effects, altered light and noise regimes, disturbance of roosting areas or other impacts due to increased use of the area by humans, and the impacts of increased levels of domestic and feral predators. As a minimum, the *study area* must include all lands within 500-m of the subject site (as shown in the Kapooka Bridge Replacement Ecological Assessment, November 2012).

4 SURVEY

4.1 Requirement to survey

A flora and fauna survey is to be conducted in the *study area*. Survey may be required beyond the *study area* to clarify the conservation significance of the *subject site* and *study area* to the *subject species, populations and ecological communities*. Targeted surveys shall be conducted for all *subject species, populations and ecological communities* determined in accordance with Section 3. Previous surveys and assessments may be used to assist in addressing this requirement. However, the efficacy of such previous surveys and assessments in meeting this requirement must be described in full. These previous surveys do not negate the need for the additional targeted survey work set out in Appendix 1 of these DGRs.

Particular attention shall be paid to the timing and climatic conditions for conducting fauna surveys including invertebrates, as many of the *subject species* will only be present or detectable for a few months each year or during certain climatic conditions. The Olympic Highway represents a significant noise source that has the potential to reduce the efficacy of surveys relying on the detection of calls. Surveys relying on call detection should be undertaken when the impact of traffic noise is minimal. Additional advice on these matters should be sought from the OEH contact officer.

Identification of all species is essential. Identification to genus only is not acceptable. Species of taxonomic uncertainty shall be confirmed by a recognised authority such as the Australian Museum or National Herbarium at the Royal Botanic Gardens, Sydney.

4.2 Documentation of survey effort and technique

Survey technique(s) shall be described and a reference given, where available, outlining the survey technique employed.

Survey site(s) shall be identified on a map with a clear legend. The size, orientation and dimensions of quadrat or length of transect shall be clearly noted for each type of survey technique undertaken. Full AMG grid references for the survey site(s) shall be provided. Completed data sheets are to be included as an appendix to the SIS.

The time invested in each survey technique shall be summarised in the SIS, based on completed survey forms, e.g. number of person hours / transect, duration of call playback, number of nights that traps are set and total area surveyed in hectares.

It is not sufficient to aggregate all time spent on all survey techniques. Effort must be expressed separately for each survey technique that is applied.

Personnel details including name of surveyor(s), contact phone number, qualifications and experience must be included. The person who identified records (e.g. Anabat, hair tubes, scat analysis) shall also be identified in this manner.

Environmental conditions during the survey shall be noted from the commencement of each survey technique until its completion. These conditions must be documented in the SIS.

An assessment of the efficacy of each survey regime in detecting each species under the intensity utilised by the study is to be provided. The effect of the season, weather and any other factors likely to influence survey results (including traffic noise) at the time of the field survey shall be considered with respect to the adequacy of survey results. An assessment will also be made of the adequacy of the survey and background information used to assess the likely area of use (home range) for each *subject species, population or ecological community*, and the areas providing habitat connectivity.

A full list of all flora and fauna species recorded during the course of surveys shall be included (such information is indicative of the habitat quality of the site). Completed Atlas of NSW Wildlife cards are to be provided for each threatened species record in any survey conducted for the purposes of the SIS. For confidentiality, these cards are not to be included in the SIS but rather shall accompany the SIS when supplied to the OEH.

4.3 Specific survey requirements

Appendix 1 details the specific survey requirements for the *subject species, populations or ecological communities* identified in Table 1 of these DGRs. These survey requirements can determine the presence of *subject species, populations or ecological communities* known or likely to be in the *study area* and/or can provide contextual information on habitats to allow appropriate

assessment of impacts at a broader scale. The flora and fauna survey of the *study area* must include the use of these survey methods.

You are advised that discussions between the consultant(s) engaged to prepare the SIS and OEH may be necessary in order to derive an appropriate survey regime for some of these requirements, and to confirm the survey regimes proposed for any additional *subject species, populations and ecological communities* derived by analysis as part of this SIS.

5 ASSESSMENT OF LIKELY IMPACTS ON THREATENED SPECIES, POPULATIONS AND ECOLOGICAL COMMUNITIES

For all *subject species, populations and ecological communities*, the SIS shall describe the following:

a. the location, nature and extent of habitat removal or modification which will result from the action proposed;

b. the likely and potential direct and indirect impacts of the removal of habitat. Particular attention shall be given to the loss of:

   i. White Box, Yellow Box, Blakely's Red Gum Woodland

   ii. habitat for threatened woodland birds, Superb Parrots, and Squirrel Gliders

   iii. fragmentation of habitat for threatened woodland birds, Superb Parrots, and Squirrel Gliders

   iv. the likelihood of and extent of loss of hollow-bearing trees

   v. the likelihood of and extent of loss of large old trees

   vi. the likelihood of and extent of loss of native grasslands.

   Similarly, attention is to be given to the likelihood of and extent of loss of food resources and the impact this may have on the *subject species, populations or ecological communities*.

c. any indirect impacts of the proposal including:

   i. the fragmentation or isolation of *local populations* and/or *local occurrences*, and the increased distance required for the movement of individuals/genetic material between habitat patches,

   ii. change in vegetation floristics and structure resulting from edge effects,

   iii. altered hydrology regimes (including increased runoff and raising or lowering of the water table),

   iv. soil erosion and pollution,

   v. disturbance to foraging or nesting/breeding habitat of species,

vi. trampling or other impacts due to increased use of the area by humans, particularly on White Box, Yellow Box, Blakely's Red Gum Woodland,

vii. increased mortality rates due to road deaths,

viii. habitat fragmentation and disruption of wildlife movement corridors and pollination mechanisms,

ix. altered light and noise regimes,

x. the likely contribution of the action proposed to the threatening processes already acting on populations of those *subject species or populations* and occurrences of *subject ecological communities* in the *locality.*

All of the above contextual information (which can be incorporated into Sections 5.1 - 5.5 below) will assist with the assessment of cumulative impacts on the *subject species, populations and ecological communities.*

5.1 Assessment of species likely to be affected

An assessment of which threatened species or populations known or likely to be present in the area are likely to be affected by the action [Section 110(2)(b)].

This requirement allows refinement of the list of *subject species or populations* (given the outcome of survey and analysis of likely impacts) in order to identify which threatened species or populations may be affected, and the nature of the impact.

The remaining requirements in this section (5.2 – 5.5) need only be addressed for those threatened species or populations that are likely to be affected by the proposal.

5.2 Discussion of local and regional abundance

An estimate for the local and regional abundance of those species or populations [Section 110 (2)(d)]

5.2.1 Discussion of other known local populations

A discussion of other known *local populations* in the *locality* shall be provided. The long-term security of other habitats shall be examined as part of this discussion. The relative significance of the *subject site* for the *subject species, populations and ecological communities* in the *locality* shall be discussed. It is essential that the SIS includes some surveys conducted beyond the *study area* to clarify the conservation significance of the *subject site* to the *subject species and populations.*

The need for off-site surveys to provide context to the anticipated impacts of the *proposal* may also be required for other threatened species recorded during the surveys of the *study area.*

5.2.2 Discussion of habitat utilisation

An estimate of the number of individuals of each *subject species* utilising the *study area* shall be provided as well as a description of how these individuals use the *study area* (e.g. residents, transients, adults, juveniles, nesting, foraging). A discussion of the significance of these individuals to the viability of the *subject species* in the *locality* shall be provided.

5.2.3 Description of vegetation
The vegetation present within the *study area* and the surface area covered by each vegetation community shall be mapped and described. Reference to the vegetation classification system used (e.g. Specht, Benson, Keith) and to the ecological communities determined as endangered by the NSW Scientific Committee shall be provided. Classification must have regard to both structural and floristic elements.

5.2.4 Discussion of corridors
Particular attention shall be given to identifying movement corridors for *subject species* within the *study area*. The impact of the proposal on these corridors and the resulting impact on the resident *subject species* shall be discussed.

5.3 Assessment of habitat

A full description of the type, location, size and condition of the habitat (including critical habitat) of those species, populations and ecological communities and details of the distribution and condition of similar habitats in the region [Section 110 (2)(f) and Section 110 (3)(c)]

5.3.1 Description of habitat values
Specific habitat features in the *study area* shall be described and quantified (e.g. frequency and location of stags, hollow bearing trees, culverts, rock shelters, rock outcrops, crevices, caves, drainage lines, soaks, area of ecological communities etc.), as well as the density of understorey vegetation and groundcover.

The condition of the habitat within the *study area* shall be discussed, including the prevalence of introduced species, species of weeds present and an estimate of the total weed cover as a percentage of each vegetation community, whether trampling or grazing is apparent, effects of erosion, prevalence of rubbish dumping, history of resource extraction or logging and proximity to roads. Details of the *study area's* fire history (e.g. frequency, time since last fire, intensity) and the source of fire history (e.g. observation, local records), shall be provided.

5.3.2 Distribution and condition of regional habitats
For the habitats of *subject species and populations* found in the study area, the SIS shall discuss the distribution and condition of similar habitats in the region. For the *subject ecological communities* found in the study area, the SIS shall discuss the distribution and condition of these ecological communities in the region. Regional information may be obtained from existing datasets and from other sources.

5.4 Discussion of conservation status

For each species or population likely to be affected, and for each ecological community present, details of its local, regional and State-wide conservation status,...[and]... its habitat requirements ... [Section 110(2)(c) and Section 110(3)(b)]

Assessment shall include reference to the threatening processes that are generally accepted by the scientific community as affecting the *subject species, population or ecological community* and which are likely to be caused or exacerbated by the *proposal*. Assessment shall also include reference to any approved or draft recovery plans which may be relevant to the *proposal*. Up-to-

date lists and copies of approved and draft recovery plans are available on the OEH website www.environment.nsw.gov.au by following the links to threatened species.

5.5 Description of feasible alternatives

A description of any feasible alternatives to the action that are likely to be of lesser effect and the reasons justifying the carrying out of the action in the manner proposed, having regard to the biophysical, economic and social considerations and the principles of ecologically sustainable development [Section 110(2)(h) and Section 110(3)(e)].

In this instance, the reasons for the selection of the proposed alignment over other options that potentially had less impact on biodiversity must be fully detailed and justified.

6 IMPACT AMELIORATION

6.1 Description of ameliorative measures

A full description and justification of the measures proposed to mitigate any adverse effect of the action on the species, populations and ecological communities including a compilation (in a single section of the statement) of those measures [Section 110 (2)(i) and Section 110 (3)(f)].

6.1.1 Long term management strategies
Consideration shall be given to the information contained in approved and draft recovery plans or threat abatement plans for existing taxa, known or likely to occur in the *study area*, and whether any recommendation is applicable to the *proposal*.

The development of long-term management strategies shall be considered to protect areas within the *study area* which are of particular importance for the *subject species, populations or ecological communities* likely to be affected by the *proposal*. This may include proposals to restore or improve habitat on site where possible. If mitigation is to include rehabilitation of the site, then the rehabilitation strategy shall be detailed.

Any measures proposed to mitigate the effect of the proposal on *local populations* of threatened species and populations and/or *local occurrences* of ecological communities shall be described. The potential effectiveness of any such amelioration in maintaining a viable *local population* and/or *local occurrence* in the short, medium and long term shall be discussed (e.g. wildlife crossing structures, fauna underpasses, vegetation management).

6.1.2 Compensatory strategies
If significant modification of the *proposal* to minimise impacts on *subject species, populations or ecological communities* is not possible, then compensatory strategies shall be considered. These may include other off-site or local area proposals that contribute to long term conservation of the *subject species, populations or ecological communities*. These areas should be assessed in accordance with the Principles for the use of biodiversity offsets in NSW, which can be found on the following link on the OEH website http://www.environment.nsw.gov.au/biocertification/offsets.htm.

The areas proposed to be used for compensatory strategies must be described in full including a detailed description of their biodiversity. A complete description of how the area will be managed for conservation in perpetuity must also be provided.

Where such proposals involve other lands, or where involvement of community groups is envisaged in such proposals, landholders, land managers and/or community groups are to be consulted and *proposals* shall contain evidence of support from these stakeholders and relevant land managers.

Compensatory benefits likely to result from such measures proposed for alternative sites are to be discussed and evaluated along with a discussion of the mechanisms through which they might best occur.

The proposal will impact on land that is currently being used to offset the loss of Box-Gum Woodland elsewhere in the Wagga Wagga Local Government Area. An offset ratio of 10:1 was applied through this arrangement, which resulted in the Wagga Wagga Local Environment Plan 2010 being biodiversity certified under the *Threatened Species Conservation Act 1995*. When considering strategies for offsetting the loss of this habitat, there is a need to offset the original loss (which the lands are currently offsetting) and also the proposed loss of the offset site. This would require an offset ratio of 11:1 for both the area of native vegetation impacted, and also for the number of hollow-bearing trees lost as a consequence of the project. For these lands, the offset ratios applied as part of the Biodiversity Certification of the Wagga Wagga Local Environment Plan represent a minimum.

6.1.3 Ongoing monitoring

Any proposed pre-construction monitoring plans or on-going monitoring of the effectiveness of the mitigation measures shall be outlined in detail, including the objectives of the monitoring program, method of monitoring, reporting framework, duration and frequency. Generally, ameliorative strategies that have not been proved effective should be undertaken under experimental design conditions and appropriately monitored.

6.1.4 Translocation

OEH does not consider that translocation of threatened species, populations and ecological communities is an appropriate ameliorative strategy for the purposes of considering impacts of a particular development/activity. It strongly supports the view that development proposals which may impact on significant local populations of *subject species and populations* or significant local occurrences of *subject ecological communities* as determined by the SIS should aim to:

i. minimise the impacts by considering all possible alternatives to the *proposal*, such that a significant impact is not likely; and

ii. manage the remaining habitat (if any) to ensure that the *local population* and/or *local occurrence* continues to exist in the long term.

The translocation of *subject species, populations and ecological communities* is only supported by OEH in specific conservation programs (e.g. recovery planning).

7. ASSESSMENT OF SIGNIFICANCE OF LIKELY EFFECT OF PROPOSED ACTION

An assessment of significance (s5A EP&A Act) is to be provided for each *subject species, population or ecological community* identified in the SIS, incorporating relevant information from sections 5.1 to 7 of the SIS. On the basis of these assessments, a conclusion is to be provided concerning whether, based on more detailed assessment through the SIS process and consideration of alternatives and/or ameliorative measures proposed in the SIS, the proposal is considered likely to have a significant effect on threatened species, populations or ecological communities or their habitats.

8 ADDITIONAL INFORMATION

8.1 Qualifications and experience

A species impact statement must include details of the qualifications and experience in threatened species conservation of the person preparing the statement and of any other person who has conducted research or investigations relied on in preparing the statement [Section 110(4)]

8.2 Other approvals required for the development or activity

A list of any approvals that must be obtained under any other Act or law before the action may be lawfully carried out, including details of the conditions of any existing approvals that are relevant to the species or population or ecological community [Sections 110(2)(j) and 110(3)(g)]

In providing a list of other approvals the following shall be included:

- Where consent is required under Part 4 of the *Environmental Planning and Assessment Act 1979*, the name of the consent authority and the timing of the development application shall be included; or
- Where approval is required under Part 5 of the *Environmental Planning and Assessment Act 1979*, the name of the determining authority, the basis for the approval and when the approval is proposed to be obtained shall be included.
- Where consent or approval is required under any other Act, the name of the consent or determining authority and the timing of the development application, basis for the approval and when the approval is proposed to be obtained shall be included

8.3 Licensing matters relating to flora and fauna surveys

Persons conducting flora and fauna surveys must have appropriate licences or approvals under relevant legislation. The relevant legislation and associated licences and approvals that may be required are listed below:

National Parks and Wildlife Act 1974:

- General Licence (Section 120) to harm or obtain protected fauna (this may include threatened fauna).
- Licence to pick protected native plants (Section 131).

- Scientific Licence (Section 132C) to authorise the carrying out of actions for scientific, educational or conservation purposes.

Threatened Species Conservation Act 1995:

- Licence to harm threatened animal species, and/or pick threatened plants and/or damage the habitat of a threatened species (Section 91).

Animal Research Act 1985:

- Animal Research Authority to undertake fauna surveys.

8.4 Reports of State-wide conservation status

Section 110(5) of the *Threatened Species Conservation Act 1995* has the effect of requiring OEH to provide available information regarding the State-wide conservation status of the subject species, populations or ecological communities, in order to satisfy ss.110(2)&(3) of the Act.

OEH has also produced a set of profiles for a number of threatened species, populations and ecological communities that are available on the OEH threatened species website (www.threatenedspecies.environment.nsw.gov.au). Some of these are relevant to the list of *subject species, populations and ecological communities* for this *proposal*.

Proponents and consultants should note that OEH has no further published information available to satisfy s.110(5) of the Act and that receipt and use of the above profiles can be taken to have satisfied the requirements of ss.110(2)&(3) in relation to the State-wide conservation status of the listed species, populations and ecological communities.

Appendix 1. Survey requirements

SPECIES	SURVEY REQUIREMENTS
Birds	
Woodland birds	Surveys must be undertaken during September to October. Surveys must be undertaken in the early morning (sunrise to four hours after sunrise) on clear, still days. Surveys should be undertaken when traffic noise is at a minimum. The *study area* must be surveyed systematically by walking parallel transects that cover all areas of potential habitat. Transects should be 50-m wide (i.e. 25-m either side of the transect mid-line). Transects must be surveyed at a maximum rate of 100-m per 10 minutes. Each survey must be undertaken over two days, with transects on the second day located midway between those walked on the first day (i.e.. transects on a given day will be 100-m apart). All birds seen or heard within the transect or flying over must be recorded. Two surveys must be undertaken, separated by a period of at least one week.
Regent Honeyeater, Swift Parrot, Little Lorikeet	Surveys must be undertaken during Winter, timed where possible to coincide with periods of peak food availability. Surveys must be undertaken in the early morning (sunrise to four hours after sunrise) on clear, still days. Surveys should be undertaken when traffic noise is at a minimum. The *study area* must be surveyed systematically by walking parallel transects that cover all areas of potential habitat. Transects should be 50-m wide (i.e. 25-m either side of the transect mid-line). Transects must be surveyed at a maximum rate of 100-m per 10 minutes. Each survey must be undertaken over two days, with transects on the second day located midway between those walked on the first day (i.e.. transects on a given day will be 100-m apart). All birds seen or heard within the transect or flying over must be recorded.
Little Eagle, Spotted Harrier	Surveys for these species can be conducted during the diurnal bird censuses for the smaller woodland bird species, but in addition, traverses of the *study area* must be undertaken during daylight hours to locate these species and to search for potential nests trees with large stick nests. These traverses can be done as part of other habitat and vegetation community surveys and mapping.
Barking Owl	Barking Owl nest surveys should be undertaken within the *study area*, with all potential nest trees identified and monitored for evidence of use by nesting Barking Owls. Monitoring of potential nest sites should occur on at least two occasions (separated by approximately 30-days) during the period September to October. The area within 20-m of potential nest trees should be searched for the presence of roosting male Barking Owls, or signs of their presence (e.g., whitewash on the ground). If signs of their presence are found, additional follow up surveys should be undertaken to confirm the presence of nesting birds.

SPECIES	SURVEY REQUIREMENTS
Glossy Black Cockatoo	Glossy Black-cockatoo nest surveys should be undertaken within the *study area*, with all potential nest trees identified and monitored for evidence of use by nesting Glossy Black-cockatoos. Monitoring of potential nest sites should occur on at least two occasions (separated by approximately 30-days) during the breeding season. Targeted searches for Glossy Black-cockatoos must be undertaken throughout the *locality* outside the breeding season, with the objectives of identifying foraging habitat, determining the use of foraging habitat, and identifying flight paths.
Superb Parrot	Superb Parrot nest surveys should be undertaken within the *study area*, with all potential nest trees monitored for evidence of use by nesting Superb Parrots. Monitoring of potential nest sites should occur on at least two occasions (separated by approximately 30-days) during the breeding season (September – November), with known nests used to get the timing right. Nest surveys should also be undertaken in the wider local area in order to assist in the possible identification of flight paths and allow for the relative importance of nests impacted by the development to be determined. Targeted searches for Superb Parrots must be undertaken throughout the *locality* during the breeding season, with the objective of identifying foraging areas and flight paths. These surveys should be timed to coincide with periods when birds are undertaking these activities. A focus of these surveys should be identifying foraging habitat or flight paths that may be negatively impacted by the development, or which may bring birds into contact with proposed infrastructure. These targeted searches should be undertaken at least twice during the breeding season (separated by approximately 30-days) to allow for changes in the use of habitat over time. Foraging areas and flight paths are likely to vary between years, depending on the availability and spatial distribution of food resources (natural and exotic). Superb Parrot habitat in the *locality,* including potential habitat (e.g., paddocks that may be cropped in subsequent years), must be mapped. This will allow for a more complete assessment of the impacts, particularly with regard to potential movement pathways.
Mammals	
Microchiropteran bats	Surveys using Anabat recorders and stag watching should aim to identify the number and location of roost sites for the subject bats and identify important foraging habitat in the study area and the locality. If required, the OEH can provide further advice on bat survey techniques to acquire this information.

SPECIES	SURVEY REQUIREMENTS
	Surveys of the *subject site*, *study area* and *locality* shall be undertaken for hollow-bearing trees. This shall involve intensive searches for hollow-bearing trees in the *subject site* and *study area*. Representative sampling of the *locality* for hollow-bearing trees shall involve the use of transects in selected locations and the gathering of data in conjunction with ground-truthing for endangered ecological communities. The number of hollow-bearing trees recorded shall be used to provide context to the potential breeding habitat affected by the action proposed. Surveys can be undertaken at any time of the year under varied seasonal conditions.
Squirrel Gliders	Surveys of the *study area* must be undertaken during Autumn. Survey sites should be located to sample remnants on both sides of the existing Olympic Highway, and on both sides of the proposed new alignment. Appropriately sized cage traps (200 x 170 x 500-mm) must be used. Traps must be baited with a mixture of peanut butter, rolled oats and honey. A diluted honey and water mixture must be sprayed on the tree trunk leading to the trap as an attractant. Traps should be set at approximately 100-m intervals. Traps must be located so that potential den sites, foraging habitat, and movement pathways are targeted. The number of traps set per site will depend on the size and configuration of the remnant being sampled. Each site should be trapped for a minimum of seven consecutive nights. As a guide, survey effort per site should approximate 100 trap nights.
Flora	
Woolly Ragwort.	The *study area* should be systematically surveyed using evenly spaced transects located about 20 m apart through all areas of woodland habitat.
White Box, Yellow Box, Blakely's Red Gum Woodland	Surveys shall identify and map the extent and condition of this ecological community in the *subject site*, *study area* and *locality*. This shall involve the use of vegetation surveys in the *subject site* and the *study area*. The use of existing datasets held by OEH in combination with ground-truthing of selected sites within areas mapped by OEH as the ecological community is recommended for surveys of the *locality*. The sites sampled shall be used to provide context to the ecological community affected by the action proposed. Surveys can be undertaken at any time of the year under varied seasonal conditions.

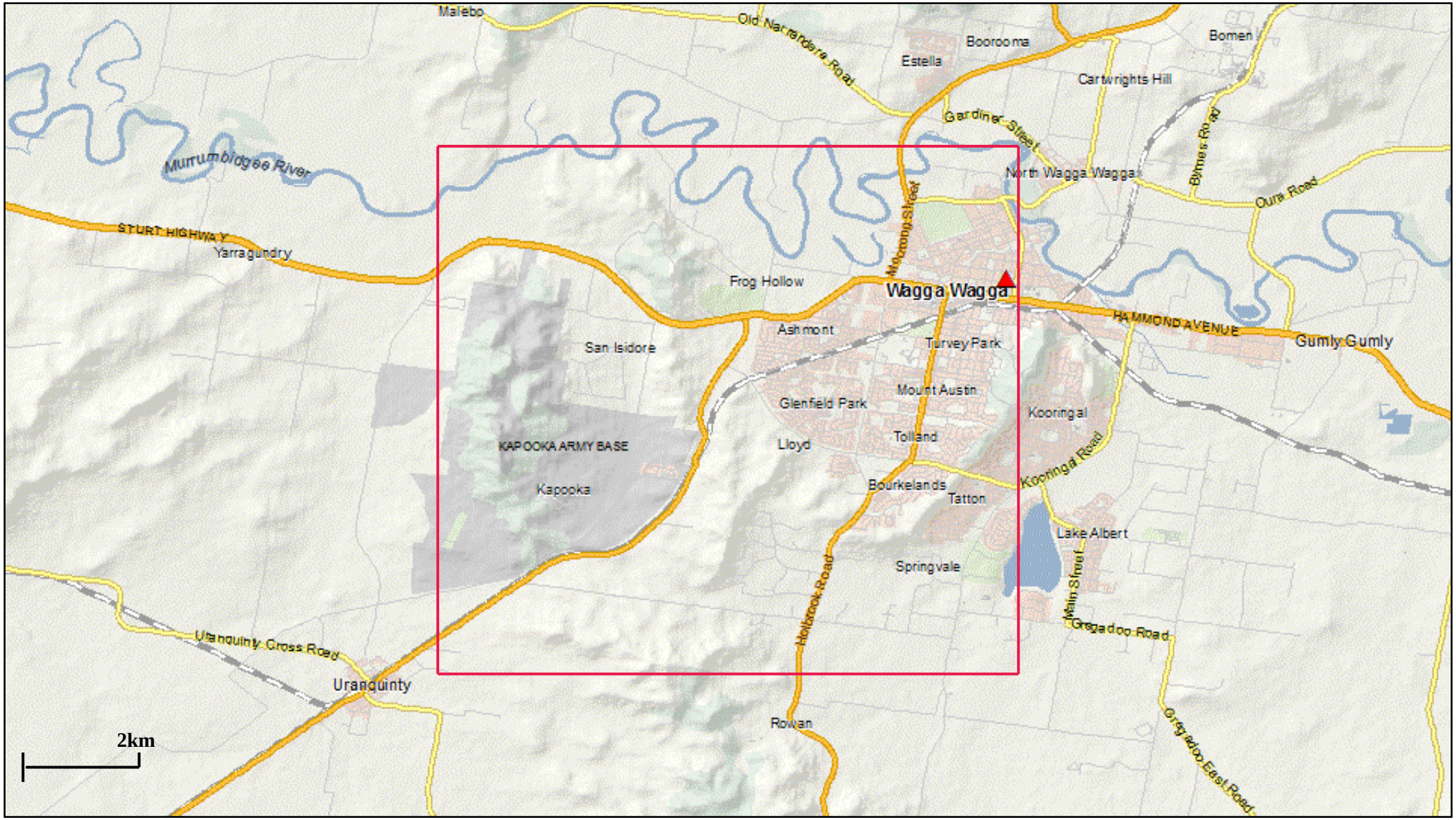
APPENDIX B BACKGROUND SEARCH RESULTS

Wagga Wagga Local Government Area (LGA)

Common Name	Scientific Name	NSW status	Comm. status	Records
Malleefowl	*Leipoa ocellata*	E1,P	V	K
Blue-billed Duck	*Oxyura australis*	V,P		K
Freckled Duck	*Stictonetta naevosa*	V,P		1
Australasian Bittern	*Botaurus poiciloptilus*	E1,P	E	K
Spotted Harrier	*Circus assimilis*	V,P		6
Little Eagle	*Hieraaetus morphnoides*	V,P		47
Square-tailed Kite	*^^Lophoictinia isura*	V,P,3		K
Grey Falcon	*^Falco hypoleucos*	E1,P,2		K
Black Falcon	*Falco subniger*	V,P		12
Brolga	*Grus rubicunda*	V,P		7
Bush Stone-curlew	*Burhinus grallarius*	E1,P		6
Plains-wanderer	*Pedionomus torquatus*	E1,P	V	K
Australian Painted Snipe	*Rostratula australis*	E1,P	E	K
Curlew Sandpiper	*Calidris ferruginea*	E1,P	C,J,K	3
Black-tailed Godwit	*Limosa limosa*	V,P	C,J,K	K
Gang-gang Cockatoo	*^^Callocephalon fimbriatum*	V,P,3		12
Glossy Black-Cockatoo	*^Calyptorhynchus lathami*	V,P,2		4
Major Mitchell's Cockatoo	*^Lophochroa leadbeateri*	V,P,2		2
Purple-crowned Lorikeet	*^^Glossopsitta porphyrocephala*	V,P,3		K
Little Lorikeet	*Glossopsitta pusilla*	V,P		13
Swift Parrot	*^^Lathamus discolor*	E1,P,3	E	40
Turquoise Parrot	*^^Neophema pulchella*	V,P,3		27
Superb Parrot	*^^Polytelis swainsonii*	V,P,3	V	91
Barking Owl	*^^Ninox connivens*	V,P,3		8
Powerful Owl	*^^Ninox strenua*	V,P,3		K
Masked Owl	*^^Tyto novaehollandiae*	V,P,3		K
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V,P		1034
Speckled Warbler	*Chthonicola sagittata*	V,P		29
Shy Heathwren	*Hylacola cautus*	V,P		K
Regent Honeyeater	*Anthochaera phrygia*	E4A,P	E	2
Pied Honeyeater	*Certhionyx variegatus*	V,P		K
White-fronted Chat	*Epthianura albifrons*	V,P		11
Painted Honeyeater	*Grantiella picta*	V,P		K
Black-chinned Honeyeater (eastern subspecies)	*Melithreptus gularis gularis*	V,P		20
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis*	V,P		8
Chestnut Quail-thrush	*Cinclosoma castanotum*	V,P		P
Varied Sittella	*Daphoenositta chrysoptera*	V,P		15
Gilbert's Whistler	*Pachycephala inornata*	V,P		5
Olive Whistler	*Pachycephala olivacea*	V,P		K
Hooded Robin (south-eastern form)	*Melanodryas cucullata cucullata*	V,P		13
Scarlet Robin	*Petroica boodang*	V,P		33
Flame Robin	*Petroica phoenicea*	V,P		14
Pink Robin	*Petroica rodinogaster*	V,P		P
Diamond Firetail	*Stagonopleura guttata*	V,P		26

10km radius of subject site

Common Name	Scientific Name	Comm. status	Records
Australian Painted Snipe	*Rostratula australis*	E	P
Barking Owl	*^^Ninox connivens*		4
Black-chinned Honeyeater (eastern subspecies)	*Melithreptus gularis gularis*		2
Black-tailed Godwit	*Limosa limosa*	C,J,K	K
Blue-billed Duck	*Oxyura australis*		K
Brolga	*Grus rubicunda*		K
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*		9
Bush Stone-curlew	*Burhinus grallarius*		K
Chestnut Quail-thrush	*Cinclosoma castanotum*		P
Curlew Sandpiper	*Calidris ferruginea*	C,J,K	K
Diamond Firetail	*Stagonopleura guttata*		5
Flame Robin	*Petroica phoenicea*		1
Freckled Duck	*Stictonetta naevosa*		K
Gang-gang Cockatoo	*^^Callocephalon fimbriatum*		K
Gilbert's Whistler	*Pachycephala inornata*		5
Glossy Black-Cockatoo	*^Calyptorhynchus lathami*		4
Grey Falcon	*^Falco hypoleucos*		P
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis temporalis*		K
Hooded Robin (south-eastern form)	*Melanodryas cucullata cucullata*		5
Little Eagle	*Hieraaetus morphnoides*		4
Little Lorikeet	*Glossopsitta pusilla*		3
Major Mitchell's Cockatoo	*^Lophochroa leadbeateri*		K
Malleefowl	*Leipoa ocellata*	V	K
Painted Honeyeater	*Grantiella picta*		K
Pied Honeyeater	*Certhionyx variegatus*		K
Plains-wanderer	*Pedionomus torquatus*	V	K
Purple-crowned Lorikeet	*^^Glossopsitta porphyrocephala*		P
Regent Honeyeater	*Anthochaera phrygia*	E	K
Scarlet Robin	*Petroica boodang*		3
Shy Heathwren	*Hylacola cautus*		K
Speckled Warbler	*Chthonicola sagittata*		K
Spotted Harrier	*Circus assimilis*		K
Square-tailed Kite	*^^Lophoictinia isura*		K
Superb Parrot	*^^Polytelis swainsonii*	V	11
Swift Parrot	*^^Lathamus discolor*	E	5
Turquoise Parrot	*^^Neophema pulchella*		K
Varied Sittella	*Daphoenositta chrysoptera*		1
White-fronted Chat	*Epthianura albifrons*		K



Legend

Species records mapped as held

10km extent from subject site

Atlas of NSW Wildlife records

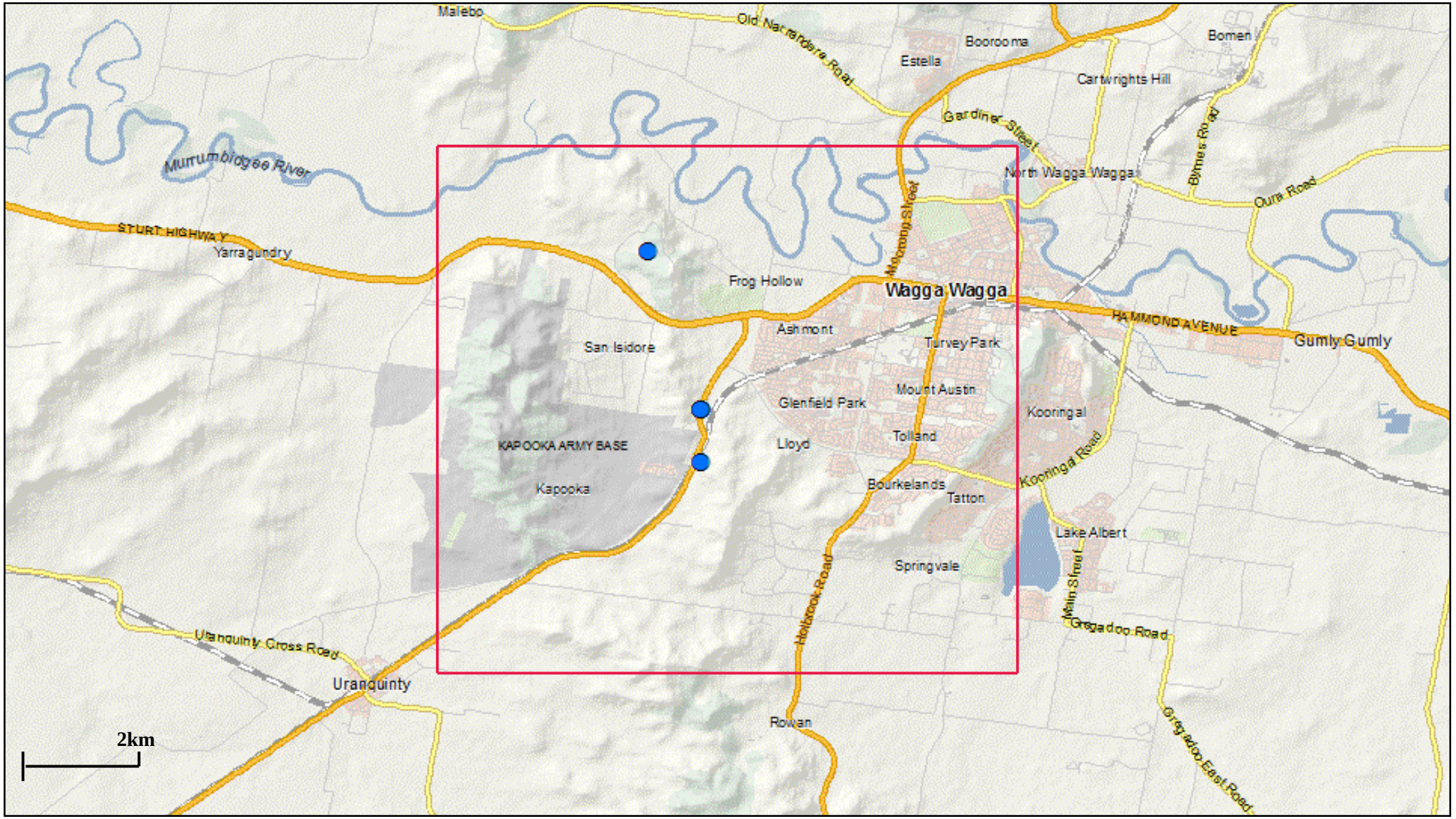
Regent Honeyeater

N

Data from the BioNet Atlas of NSW Wildlife website, which holds records from a number of custodians. Location accuracy varies. Maps from the website are interactive: map displays can be modified from the original extent and a maximum of 5 species can be selected to display. Map may contain errors and omissions. Neither the Office of Environment and Heritage nor any other data custodian will accept liability for any loss, damage, cost or expenses incurred as a result of the use of, or reliance upon, the information in the map. Map copyright the State of NSW through the Office of Environment and Heritage.

Your Selection: Public Report of all Valid Records of Regent Honeyeater (Species: Anthochaera phrygia) in selected area [North: -35.09 West: 147.26 East: 147.37 South: -35.19] returned a total of 1 records of 1 species.

Report generated on 30/06/2013 9:55 AM



Legend

Category 3 sensitive spp. 0.01°(~1km) rounded

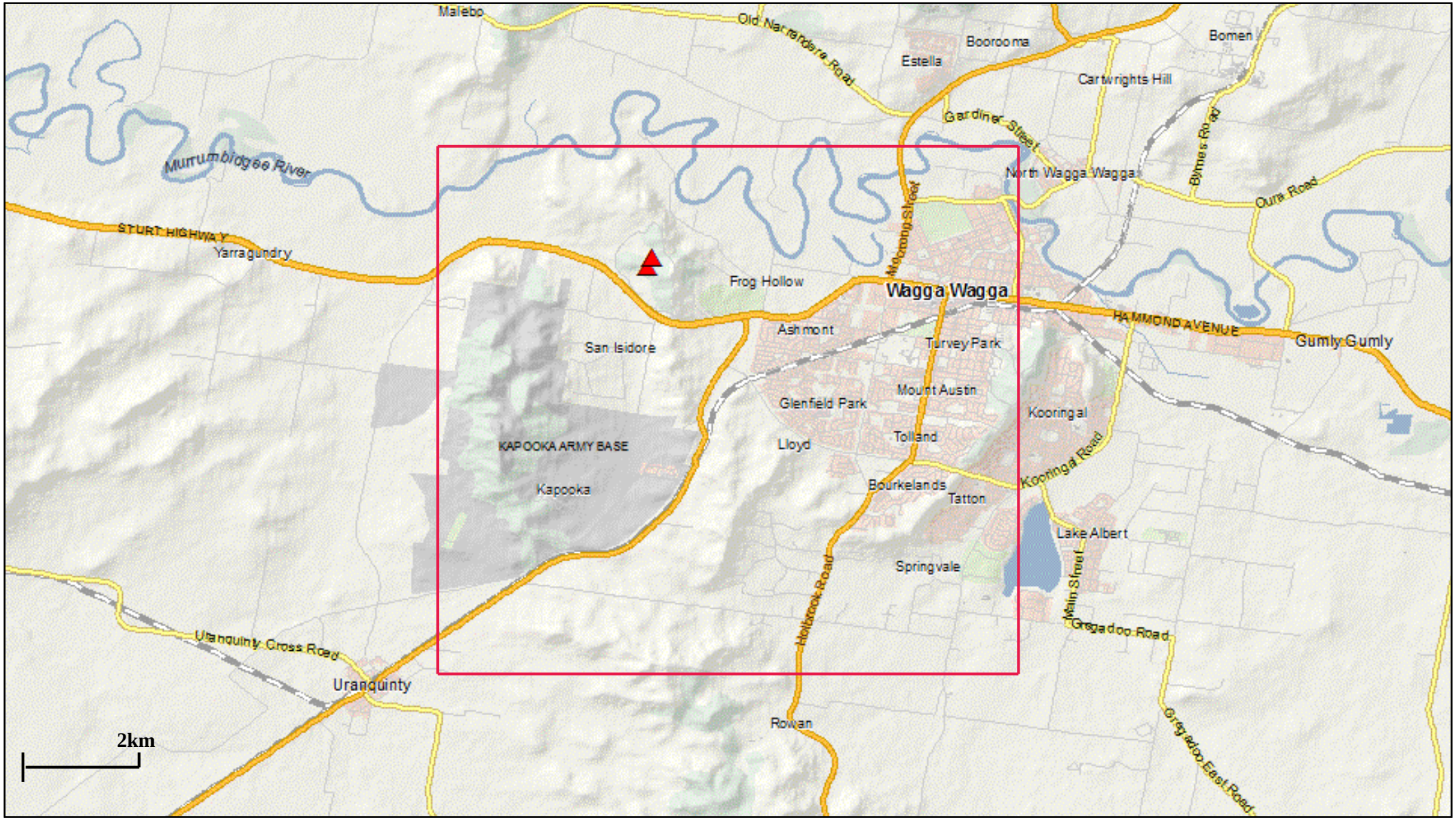
10km extent from subject site

Atlas of NSW Wildlife records

Swift Parrot

Your Selection: Public Report of all Valid Records of Swift Parrot (Species: Lathamus discolor) in selected area [North: -35.09 West: 147.26 East: 147.37 South: -35.19] returned a total of 5 records of 1 species.

Report generated on 30/06/2013 9:59 AM



Legend

Species records mapped as held

10km extent from subject site

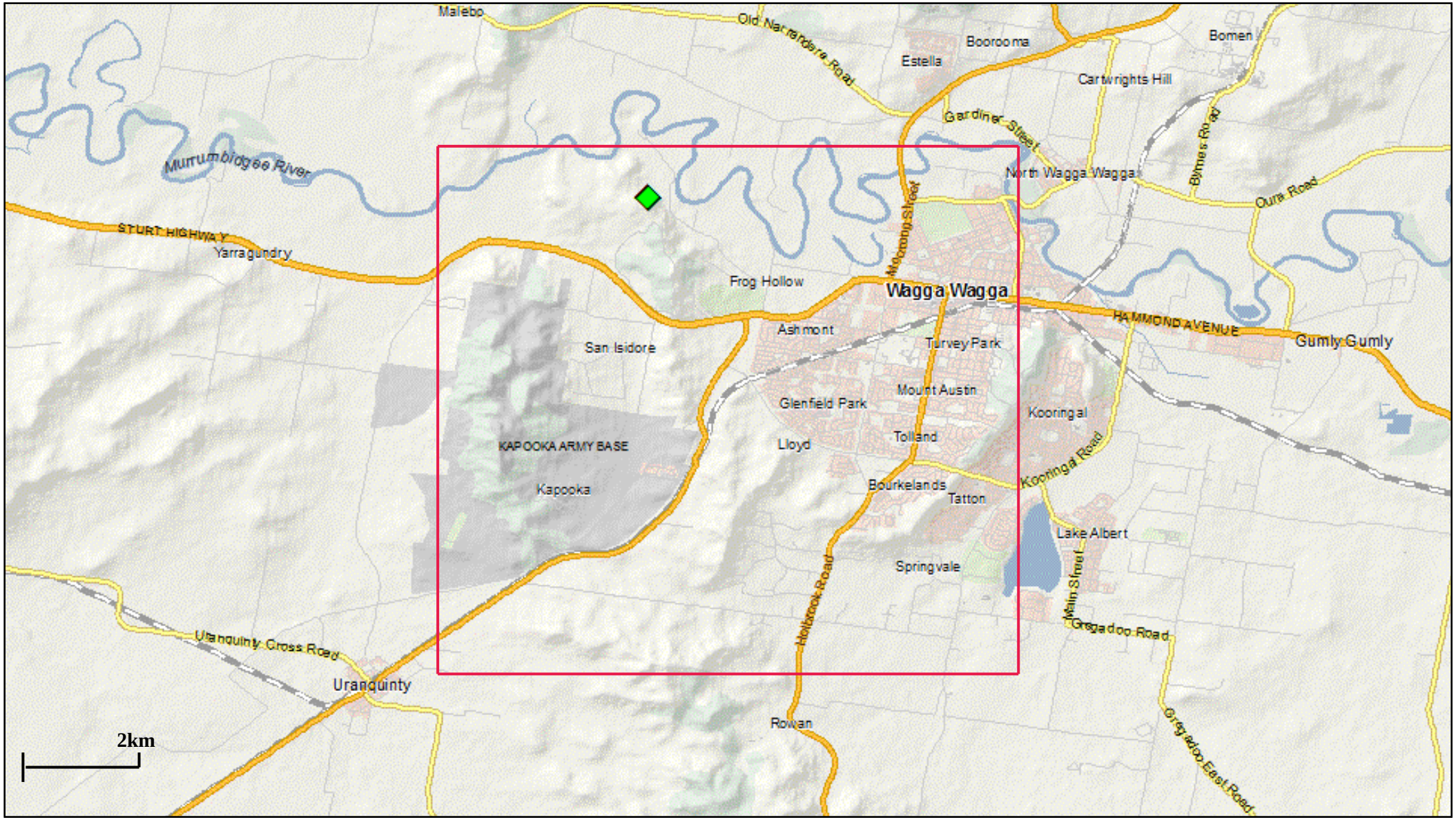
Atlas of NSW Wildlife records

Little Lorikeet

N

Your Selection: Public Report of all Valid Records of Little Lorikeet (Species: Glossopsitta pusilla) in selected area [North: -35.09 West: 147.26 East: 147.37 South: -35.19] returned a total of 3 records of 1 species.

Report generated on 30/06/2013 9:57 AM



Legend

Category 2 sensitive spp.0.1°(~10km) rounded

10km extent from subject site

Atlas of NSW Wildlife records

Glossy Black Cockatoo

N

Your Selection: Public Report of all Valid Records of Glossy Black-Cockatoo (Species: Calyptorhynchus lathami) in selected area [North: -35.09 West: 147.26 East: 147.37 South: -35.19] returned a total of 4 records of 1 species.

Report generated on 30/06/2013 10:00 AM

APPENDIX C MEETING MINUTES

Kapooka Bridge realignment phone hook-up with OEH – DGRs winter bird survey methodology.

Meeting Minutes

Date:	Thursday 27 June 2013
Time and location:	10:30am – 11.30am - Phone hook-up
Minutes by:	Dan Francis
Attendees:	Matt Cameron (MCam, OEH), Mason Crane (MC, Ecologist), Amy Evans (AE nghenvironmental), Daniel Francis (DF, KMH), Andrew Cook (AC, RMS environment branch), Paul Weedon (PW, RMS)
Apologies:	Michial Sutherland (MS, RMS)

OEH – Office of Environment and Heritage.
SIS – Species Impact Statement separate and additional to the AoS and REF.
DGR's – Director General for OEH's SIS requirements.

Item No	Item	Comments	Action By	When
1.	Purpose of the meeting	1. Purpose of the meeting and introductions. 2. Background and clarification of the survey methodology. 3. Alternate methodology justification. 4. Glossy-black Cockatoo survey methodology. 5. Agreed methodology and outcomes. 6. Next steps and meeting close-out.	DF	27/06/2013
2.	Background and clarification of the survey methodology	Background to survey methodology from MCam: • Methodology developed from spring bird survey methodology and National Survey guideline for the Swift Parrot and Regent Honeyeater. • Estimated 14km transects total. • 24hr effort total. • Acknowledge that there are other ways to survey for the Swift Parrot and Regent Honeyeater. • OEH is more focused on the survey effort and being able to make a statement about the use of the site. • Any discussed methodology would apply to winter bird surveys. No change would be made to the spring bird survey methodology.	MCam	27/06/2013
3.	Alternate	Background and justification of methodology (shown	MC	27/06/2013

	methodology justification.	in attachment B) by MC: • Species are detectable without having transects at 25m. • Not a sharp drop off in calls/activity 4hr after dawn as would be experienced in spring/summer. • Open habitat can be surveyed at greater that 100m/10min. • Surveys would include targeted, off-transect surveys of flowering trees or flocks of birds etc. as required. • One survey effort would be about 6 to 7km over 5hr repeated on the second day. • Survey effort would be replicated in late July. • Total effort would be about 20hr and 28km.		
4.	Glossy-black Cockatoo survey methodology	Potential nest trees on Kapooka Army Base land may be surveyed from the boundary with adequate visibility of birds roosting.	MCam	27/06/2013
5.	Agreed methodology and outcomes	Agreed methodology and outcomes: • Survey transects to be carried out as shown in Attachment B. • Surveys may extend past 4hr from dawn if there is no drop-off in activity and is supported by data in the report. • Targeted and opportunistic surveys are to be carried-out (i.e. flowering trees, flocks of birds) whilst doing transects. • The survey rate may be increased from 100m/10min in more open habitat. • Survey would be replicated in late July to ensure an appropriate effort in terms of hours. • Access to Kapooka Army Base and land south west of the proposal for winter bird survey work would be sought by RMS. • If access is not granted to Glossy-black Cockatoo potential nest trees on Kapooka Army Base land may be surveyed from the boundary if visibility is adequate. • Spring surveys for woodland birds would not be carried out prior to consultation with OEH and methodology is agreed. • Any modification to the winter bird survey methodology would not apply to the spring bird survey methodology.	MCam	27/06/2013
6.	Next steps and meeting close out	Minutes to be circulated as draft for comment.	DF	27/06/2013

LEGEND

- Railway line
- Existing drainage
- Subject site
- Study area
- Silvalite Reserve
- Area within which glider crossing structures would be erected
- Tree planting

5.9 km of transects
@ 10 min / 100 m = 9.8 hrs

4 days with repeats
if 5 hrs in morning = 2 days

1:10,000 @ A3

0 100 200 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

CLIENTS | PEOPLE | PERFORMANCE

Roads and Maritime Services
Kapooka bridge replacement ecological assessment

Job Number	23-14107
Revision	0
Date	03 Oct 2012

Proposed locations for Squirrel Glider crossings and tree plantings

Figure 6

G:\23\14107\GIS\Maps\Ecology_maps\Kapooka_ecology_Fig6.mxd

Suite 3, Level 1, 161-169 Baylis Street Wagga Wagga NSW 2650 Australia T 61 2 6923 7400 F 61 2 6971 9565 E wgamail@ghd.com W www.ghd.com

Data source: NSW LPI: Railway lines and Silvalite Reserve boundary - 2005; NSW Roads and Maritime Services: Road design and proposal features - 2011, aerial photography - 2011 & 2006. Created by:rtrobinson

APPENDIX D TRANSECT SURVEY RESULTS

SITE	AR-1
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	28/06/2013	1/07/2013
START TIME	9:01:00 AM	9:00:00 AM
FINISH TIME	9:27:00 AM	9:26:00 AM

	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
SPECIES	T1	T2	T1	T2	T1	T2
AUSTRALIAN WOOD DUCK	0	2	0	2		✓
AUSTRALIAN HOBBY	0	0	0	0	✓	
GALAH	6	0	6	2	✓	✓
RAINBOW LORIKEET	0	4	0	4		✓
YELLOW ROSELLA	2	0	2	0	✓	
EASTERN ROSELLA	0	1	0	2		✓
SUPERB FAIRY-WREN	0	0	0	0	✓	
STRIATED PARDALOTE	1	3	1	3	✓	✓
YELLOW THORNBILL	3	3	3	3	✓	✓
WEEBILL	4	3	4	7	✓	✓
RED WATTLEBIRD	26	17	28	27	✓	✓
LITTLE FRIARBIRD	0	1	1	1	✓	✓
NOISY FRIARBIRD	9	12	11	13	✓	✓
BLUE-FACED HONEYEATER	0	4	0	4		✓
NOISY MINER	20	25	24	29	✓	✓
WHITE-PLUMED HONEYEATER	4	10	4	10	✓	✓
GREY SHRIKE-THRUSH	1	0	1	0	✓	
WILLIE WAGTAIL	2	0	2	0	✓	
AUSTRALIAN MAGPIE	0	1	0	1	✓	✓
PIED CURRAWONG	0	2	0	2		✓

WHITE-WINGED CHOUGH	0	5	0	5	✓	✓
HOUSE SPARROW	2	2	2	2	✓	✓
COMMON BLACKBIRD	1	1	1	1	✓	✓
COMMON STARLING	0	5	0	5	✓	✓

SITE	AR-2
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	28/06/2013	1/07/2013
START TIME	9:22:00 AM	9:27:00 AM
FINISH TIME	9:44:00 AM	9:40:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
AUSTRALIAN WOOD DUCK	0	15	10	19	✓	✓
LITTLE BLACK CORMORANT	1	0	1	0	✓	
YELLOW-BILLED SPOONBILL	0	0	1	0	✓	
BROWN GOSHAWK	0	0	0	0	✓	
GALAH	0	0	3	1	✓	✓
RAINBOW LORIKEET	0	0	0	0		✓
EASTERN ROSELLA	0	0	2	0	✓	
RED WATTLEBIRD	1	5	1	9	✓	✓
LITTLE FRIARBIRD	3	0	3	0	✓	
NOISY FRIARBIRD	9	7	10	10	✓	✓
BLUE-FACED HONEYEATER	6	1	8	1	✓	✓
NOISY MINER	13	4	20	8	✓	✓
MAGPIE-LARK	0	0	0	0		✓
AUSTRALIAN MAGPIE	1	0	1	0	✓	✓
PIED CURRAWONG	0	2	0	2		✓
WHITE-WINGED CHOUGH	0	8	0	8		✓
HOUSE SPARROW	0	3	0	5	✓	✓
COMMON STARLING	0	0	0	2	✓	✓

SITE	SL-1
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	27/06/2013	1/07/2013
START TIME	7:09:00 AM	11:09:00 AM
FINISH TIME	8:02:00 AM	11:41:00 AM

	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
SPECIES	T1	T2	T1	T2	T1	T2
AUSTRALIAN WOOD DUCK	0	0	0	3		✓
CRESTED PIGEON	2	0	2	0	✓	
GALAH	2	4	2	4	✓	✓
RAINBOW LORIKEET	6	11	9	13	✓	✓
YELLOW ROSELLA	2	2	2	2	✓	✓
EASTERN ROSELLA	5	4	8	6	✓	✓
STRIATED PARDALOTE	0	0	0	0	✓	✓
YELLOW THORNBILL	0	0	0	0	✓	
WEEBILL	0	0	0	0	✓	
RED WATTLEBIRD	8	20	14	28	✓	✓
BLUE-FACED HONEYEATER	0	0	1	0	✓	
NOISY MINER	18	12	21	21	✓	✓
GREY BUTCHERBIRD	0	0	1	0	✓	
MAGPIE-LARK	0	0	0	0	✓	
AUSTRALIAN MAGPIE	3	0	3	0	✓	✓
PIED CURRAWONG	1	0	1	4	✓	✓
WELCOME SWALLOW	0	0	0	0		✓
COMMON BLACKBIRD	0	1	0	1		✓
COMMON STARLING	0	0	0	0		✓

SITE	SL-2
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	27/06/2013	1/07/2013
START TIME	8:02:00 AM	11:41:00 AM
FINISH TIME	9:00:00 AM	12:30:00 PM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
AUSTRALIAN WOOD DUCK	2	5	10	5	✓	✓
CRESTED PIGEON	0	1	0	1		✓
GALAH	0	2	3	6	✓	✓
SULFUR-CRESTED COCKATOO	1	0	1	0	✓	✓
RAINBOW LORIKEET	0	0	2	4	✓	✓
SUPERB PARROT	0	0	0	0	✓	
YELLOW ROSELLA	5	6	5	6	✓	✓
EASTERN ROSELLA	0	4	0	8		✓
SUPERB FAIRY-WREN	0	0	0	4		✓
SPOTTED PARDALOTE	0	4	0	4		✓
STRIATED PARDALOTE	2	0	5	0	✓	✓
YELLOW THORNBILL	3	5	7	10	✓	✓
WEEBILL	13	0	23	3	✓	✓
RED WATTLEBIRD	14	28	28	50	✓	✓
NOISY FRIARBIRD	1	0	1	0	✓	
BLUE-FACED HONEYEATER	2	1	3	6	✓	✓
NOISY MINER	5	16	17	24	✓	✓
WHITE-PLUMED HONEYEATER	4	1	6	3	✓	✓
WILLIE WAGTAIL	1	2	1	2	✓	✓
GREY FANTAIL	1	1	1	2	✓	✓

OLIVE-BACKED ORIOLE	0	1	1	1	✓	✓
GREY BUTCHERBIRD	0	1	0	1		✓
MAGPIE-LARK	2	3	2	3	✓	✓
AUSTRALIAN MAGPIE	5	1	8	1	✓	✓
PIED CURRAWONG	0	0	1	0	✓	
AUSTRALIAN RAVEN	1	0	1	0	✓	✓
COMMON STARLING	0	60	0	60	✓	✓

SITE	RC-1
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	28/06/2013	1/07/2013
START TIME	10:50:00 AM	9:51:00 AM
FINISH TIME	11:17:00 AM	10:16:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
LITTLE EAGLE	0	0	0	0	✓	
GALAH	0	0	0	0	✓	✓
YELLOW ROSELLA	3	0	3	0	✓	
SUPERB FAIRY-WREN	0	0	3	0	✓	
STRIATED PARDALOTE	1	0	1	0	✓	
RED WATTLEBIRD	3	1	4	1	✓	✓
NOISY MINER	0	0	0	0	✓	✓
WHITE-PLUMED HONEYEATER	14	10	18	13	✓	✓
FLAME ROBIN	0	0	0	0	✓	
EASTERN YELLOW ROBIN	0	0	0	1	✓	✓
WHITE-BROWED BABBLER	8	12	9	12	✓	✓
GREY SHRIKE-THRUSH	1	2	2	2	✓	✓
WILLIE WAGTAIL	3	2	3	2	✓	✓
GREY FANTAIL	0	0	0	0	✓	
DUSKY WOODSWALLOW	9	0	9	0	✓	
PIED BUTCHERBIRD	0	0	0	1		✓
AUSTRALIAN MAGPIE	2	0	4	0	✓	✓
AUSTRALIAN RAVEN	0	4	0	4	✓	✓
DIAMOND FIRETAIL	0	0	0	0	✓	
WELCOME SWALLOW	0	0	0	0		✓

TREE MARTIN	0	0	0	0		✓
SILVEREYE	0	0	4	0	✓	✓
COMMON BLACKBIRD	0	0	0	1	✓	✓
COMMON STARLING	0	0	0	0		✓

SITE	RC-2
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	28/06/2013	1/07/2013
START TIME	11:20:00 AM	10:17:00 AM
FINISH TIME	12:00:00 PM	10:52:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
COMMON BRONZEWING	1	0	1	7	✓	✓
CRESTED PIGEON	1	0	1	0	✓	
GALAH	0	2	1	2	✓	✓
SULFUR-CRESTED COCKATOO	0	0	0	0		✓
RAINBOW LORIKEET	0	2	0	2	✓	✓
SUPERB PARROT	0	2	0	2		✓
SUPERB FAIRY-WREN	6	7	10	7	✓	✓
SPOTTED PARDALOTE	0	0	0	0	✓	
STRIATED PARDALOTE	0	3	1	2	✓	✓
YELLOW-RUMPED THORNBILL	2	4	4	4	✓	✓
YELLOW THORNBILL	9	3	13	3	✓	✓
WEEBILL	4	4	8	4	✓	✓
RED WATTLEBIRD	3	3	7	5	✓	✓
NOISY FRIARBIRD	0	1	0	2		✓
BLUE-FACED HONEYEATER	0	0	1	0	✓	
NOISY MINER	4	2	8	3	✓	✓
YELLOW-FACED HONEYEATER	1	1	1	1	✓	✓
WHITE-PLUMED HONEYEATER	2	0	5	3	✓	✓
BROWN-HEADED HONEYEATER	0	2	0	2		✓
RED-CAPPED ROBIN	1	0	1	2	✓	✓

GREY-CROWNED BABBLER	2	0	2	0	✓	
RUFOUS WHISTLER	0	0	1	0	✓	
GREY SHRIKE-THRUSH	0	0	0	0	✓	
WILLIE WAGTAIL	0	0	0	1		✓
GREY FANTAIL	1	6	3	6		
GREY BUTCHERBIRD	0	0	1	0	✓	
AUSTRALIAN MAGPIE	4	3	4	4	✓	✓
AUSTRALIAN RAVEN	0	2	0	3		✓
WHITE-WINGED CHOUGH	7	3	7	7	✓	✓
SILVEREYE	3	60	10	60	✓	✓
COMMON STARLING	0	0	0	0		✓

SITE	WR-1
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	27/06/2013	1/07/2013
START TIME	9:14:00 AM	7:33:00 AM
FINISH TIME	9:35:00 AM	7:45:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
GALAH	0	0	0	0		✓
RAINBOW LORIKEET	1	10	3	10	✓	✓
YELLOW ROSELLA	0	3	0	3		✓
EASTERN ROSELLA	0	3	4	3	✓	✓
RED WATTLEBIRD	9	4	17	6	✓	✓
BLUE-FACED HONEYEATER	0	0	0	0	✓	
NOISY MINER	8	4	11	8	✓	✓
GREY SHRIKE-THRUSH	0	0	0	0		✓
GREY BUTCHERBIRD	0	1	0	2		✓
MAGPIE-LARK	0	0	0	0		✓
AUSTRALIAN MAGPIE	1	0	2	0	✓	✓
AUSTRALIAN RAVEN	0	0	0	0	✓	
COMMON STARLING	0	0	2	0	✓	

SITE	WR-2
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	27/06/2013	1/07/2013
START TIME	9:36:00 AM	7:46:00 AM
FINISH TIME	10:00:00 AM	8:09:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
AUSTRALIAN WOOD DUCK	0	0	0	7		✓
HARDHEAD	0	0	1	0		✓
AUSTRALASIAN GREBE	0	0	0	1		✓
WHITE-FACED HERON	0	0	1	0	✓	
GALAH	0	0	0	0	✓	✓
RAINBOW LORIKEET	13	6	19	6	✓	✓
SUPERB PARROT	2	0	4	0	✓	✓
YELLOW ROSELLA	0	2	0	5		✓
EASTERN ROSELLA	5	6	8	6	✓	✓
RED WATTLEBIRD	28	28	53	36	✓	✓
LITTLE FRIARBIRD	1	0	2	0	✓	
NOISY MINER	18	34	24	46	✓	✓
GREY-CROWNED BABBLER	0	3	0	5		✓
MAGPIE-LARK	0	0	0	0	✓	✓
AUSTRALIAN MAGPIE	1	4	1	5	✓	✓
COMMON STARLING	0	0	0	0		✓

SITE	WR-3
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	26/06/2013	28/06/2013
START TIME	8:44:00 AM	7:54:00 AM
FINISH TIME	9:04:00 AM	8:26:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
AUSTRALIAN WOOD DUCK	0	0	0	0	✓	
GALAH	0	0	0	0	✓	
RAINBOW LORIKEET	3	4	6	4	✓	✓
SUPERB PARROT	1	0	1	0	✓	
EASTERN ROSELLA	6	2	7	5	✓	✓
LAUGHING KOOKABURRA	0	0	0	0	✓	
RED WATTLEBIRD	22	4	30	7	✓	✓
NOISY FRIARBIRD	2	0	2	0	✓	
BLUE-FACED HONEYEATER	1	0	1	0	✓	✓
NOISY MINER	4	9	4	15	✓	✓
GREY-CROWNED BABBLER	8	4	8	8	✓	✓
AUSTRALIAN MAGPIE	0	1	0	1	✓	✓
COMMON STARLING	0	0	0	0		✓

SITE	WR-4
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	28/06/2013	1/07/2013
START TIME	8:34:00 AM	8:12:00 AM
FINISH TIME	8:43:00 AM	8:22:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
AUSTRALIAN WOOD DUCK	0	1	0	1		✓
RAINBOW LORIKEET	0	0	0	2		✓
SUPERB PARROT	2	0	2	0	✓	✓
EASTERN ROSELLA	0	0	0	0		✓
LAUGHING KOOKABURRA	0	0	0	0	✓	
RED WATTLEBIRD	0	0	0	0		✓
NOISY MINER	4	3	6	4	✓	✓
AUSTRALIAN MAGPIE	0	0	1	0	✓	✓
AUSTRALIAN RAVEN	0	0	0	0		✓

SITE	WR-5
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	28/06/2013	1/07/2013
START TIME	7:29:00 AM	8:30:00 AM
FINISH TIME	7:40:00 AM	8:40:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
GALAH	0	0	0	0		✓
RAINBOW LORIKEET	0	0	0	0		✓
SUPERB PARROT	2	0	2	0	✓	
EASTERN ROSELLA	0	5	1	7	✓	✓
RED WATTLEBIRD	0	4	0	4	✓	✓
NOISY FRIARBIRD	0	0	0	0		✓
BLUE-FACED HONEYEATER	0	0	0	0		✓
NOISY MINER	5	6	7	6	✓	✓
PIED BUTCHERBIRD	0	0	0	0		✓
AUSTRALIAN MAGPIE	0	0	1	0	✓	✓
AUSTRALIAN RAVEN	0	0	0	0	✓	✓

SITE	WR-6
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	28/06/2013	1/07/2013
START TIME	7:11:00 AM	8:41:00 AM
FINISH TIME	7:28:00 AM	8:58:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
GALAH	0	0	0	0	✓	
RAINBOW LORIKEET	3	6	3	6	✓	✓
EASTERN ROSELLA	3	0	3	0	✓	✓
STRIATED PARDALOTE	2	0	3	0	✓	
RED WATTLEBIRD	0	0	0	1		✓
NOISY FRIARBIRD	3	3	5	6	✓	✓
BLUE-FACED HONEYEATER	0	3	0	3		✓
NOISY MINER	9	6	13	6	✓	✓
MAGPIE-LARK	0	0	0	0	✓	
AUSTRALIAN MAGPIE	0	0	0	0	✓	✓
PIED CURRAWONG	0	0	0	0	✓	
AUSTRALIAN RAVEN	0	1	0	1	✓	✓
COMMON STARLING	0	0	0	0	✓	

SITE	SA-1
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	26/06/2013	28/06/2013
START TIME	7:04:00 AM	7:41:00 AM
FINISH TIME	7:26:00 AM	7:52:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
GALAH	0	0	0	0	✓	
EASTERN ROSELLA	0	0	0	0		✓
SUPERB PARROT	1	0	2	0	✓	✓
STRIATED PARDALOTE	0	0	0	0		✓
RED WATTLEBIRD	0	0	0	0	✓	✓
NOISY MINER	10	9	10	9	✓	✓
PIED BUTCHERBIRD	1	0	1	0	✓	
AUSTRALIAN MAGPIE	7	2	10	3	✓	✓
COMMON STARLING	0	0	0	0		✓

SITE	SA-2
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	26/06/2013	28/06/2013
START TIME	7:34:00 AM	7:53:00 AM
FINISH TIME	7:54:00 AM	8:03:00 AM

	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
SPECIES	T1	T2	T1	T2	T1	T2
AUSTRALIAN WOOD DUCK	0	3	0	3		✓
GALAH	0	0	0	0		✓
EASTERN ROSELLA	1	2	1	2	✓	✓
YELLOW ROSELLA	2	0	2	0	✓	
RAINBOW LORIKEET	4	0	4	0	✓	
SUPERB PARROT	0	0	0	0	✓	✓
STRIATED PARDALOTE	0	0	0	1		✓
RED WATTLEBIRD	0	0	0	0	✓	✓
NOISY MINER	7	4	7	4	✓	✓
MAGPIE-LARK	0	0	0	0	✓	✓
AUSTRALIAN MAGPIE	0	0	0	1	✓	✓
PIED CURRAWONG	0	0	0	0	✓	
AUSTRALIAN RAVEN	1	0	0	0	✓	
WELCOME SWALLOW	1	0	1	0	✓	
COMMON STARLING	0	4	0	0		✓

SITE	SA-3
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	26/06/2013	27/06/2013
START TIME	7:55:00 AM	9:36:00 AM
FINISH TIME	8:09:00 AM	9:50:00 AM

	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
SPECIES	T1	T2	T1	T2	T1	T2
AUSTRALIAN WOOD DUCK	2	0	2	0	✓	
GALAH	0	0	0	0	✓	
EASTERN ROSELLA	1	0	1	0	✓	
RAINBOW LORIKEET	7	2	7	2	✓	✓
SUPERB PARROT	4	0	4	0	✓	
RED WATTLEBIRD	1	2	1	6	✓	✓
BLUE-FACED HONEYEATER	8	0	8	0	✓	
NOISY MINER	7	4	7	5	✓	✓
GREY-CROWNED BABBLER	0	0	0	0		✓
MAGPIE-LARK	0	0	0	0	✓	✓
AUSTRALIAN MAGPIE	2	1	2	2	✓	✓
AUSTRALIAN RAVEN	0	0	0	0	✓	

SITE	SA-4
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	26/06/2013	28/06/2013
START TIME	9:23:00 AM	9:40:00 AM
FINISH TIME	9:43:00 AM	9:58:00 AM

	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
SPECIES	T1	T2	T1	T2	T1	T2
NANKEEN KESTREL	0	1	0	1		✓
AUSTRALIAN HOBBY	0	1	0	1		✓
RAINBOW LORIKEET	0	2	0	2	✓	✓
SUPERB FAIRYWREN	3	4	3	4	✓	✓
STRIATED PARDALOTE	3	1	4	1	✓	✓
YELLOW THORNBILL	5	0	5	0	✓	
WEEBILL	5	6	5	6	✓	✓
RED WATTLEBIRD	2	0	2	3	✓	✓
NOISY FRIARBIRD	0	0	0	0	✓	✓
BLUE-FACED HONEYEATER	2	4	2	4	✓	✓
NOISY MINER	2	1	2	1	✓	✓
WHITE-PLUMED HONEYEATER	2	2	2	2	✓	✓
WILLIE WAGTAIL	1	0	1	0	✓	
GREY FANTAIL	1	0	1	0	✓	
PIED BUTCHERBIRD	0	1	0	1	✓	✓
MAGPIE-LARK	0	0	0	0		✓
AUSTRALIAN MAGPIE	2	0	2	0	✓	✓
AUSTRALIAN RAVEN	0	0	0	0	✓	
WHITE-WINGED CHOUGH	5	0	5	0	✓	

SITE	SA-5
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	26/06/2013	28/06/2013
START TIME	9:49:00 AM	10:02:00 AM
FINISH TIME	10:00:00 AM	10:14:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
GALAH	0	0	0	1		✓
EASTERN ROSELLA	0	0	0	0		✓
YELLOW ROSELLA	0	0	0	0	✓	
RAINBOW LORIKEET	0	0	0	0	✓	✓
RED WATTLEBIRD	0	1	0	1	✓	✓
BLUE-FACED HONEYEATER	3	2	3	3	✓	✓
NOISY MINER	1	3	1	4	✓	✓
GREY-CROWNED BABBLER	1	0	1	0	✓	
AUSTRALIAN MAGPIE	0	1	0	1	✓	✓
COMMON BLACKBIRD	0	0	0	0		✓

SITE	SA-6
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	26/06/2013	28/06/2013
START TIME	10:06:00 AM	10:20:00 AM
FINISH TIME	10:16:00 AM	10:30:00 AM

	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
SPECIES	T1	T2	T1	T2	T1	T2
AUSTRALIAN WOOD DUCK	0	0	0	0	✓	
CRESTED PIGEON	0	5	0	5		✓
GALAH	2	0	2	0	✓	
RAINBOW LORIKEET	0	0	0	0	✓	✓
RED-RUMPED PARROT	0	2	0	2		✓
RED WATTLEBIRD	4	2	4	3	✓	✓
LITTLE FRIARBIRD	0	0	0	0		✓
NOISY MINER	0	0	0	0		✓
WHITE-PLUMED HONEYEATER	1	3	1	3	✓	✓
WILLIE WAGTAIL	0	1	0	1		✓
OLIVE-BACKED ORIOLE	2	0	2	0	✓	
PIED BUTCHERBIRD	1	0	1	0	✓	
COMMON STARLING	3	2	3	2	✓	✓

SITE	AR-1
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	31/07/2013	2/08/2013
START TIME	9:48:00 AM	10:41:00 AM
FINISH TIME	10:17:00 AM	11:08:00 AM

	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONS INC. OUTSIDE TRANSECT	
SPECIES	T1	T2	T1	T2	T1	T2
AUSTRALIAN WOOD DUCK	1	1	1	1	✓	✓
NANKEEN KESTREL	0	1	0	1		✓
GALAH	0	0	1	0	✓	
SULFUR-CRESTED COCKATOO	0	0	0	0	✓	
RAINBOW LORIKEET	0	2	0	2	✓	✓
YELLOW ROSELLA	0	2	0	2		✓
EASTERN ROSELLA	3	2	3	2	✓	✓
RED-RUMPED PARROT	8	3	8	3	✓	✓
STRIATED PARDALOTE	3	2	3	2	✓	✓
YELLOW THORNBILL	0	0	0	0		✓
WEEBILL	3	2	5	2	✓	✓
RED WATTLEBIRD	9	3	9	3	✓	✓
LITTLE FRIARBIRD	0	1	0	1		✓
NOISY FRIARBIRD	4	2	5	4	✓	✓
BLUE-FACED HONEYEATER	1	0	1	0	✓	
NOISY MINER	18	7	22	8	✓	✓
WHITE-PLUMED HONEYEATER	1	5	1	5	✓	✓
GREY-CROWNED BABBLER	0	7	0	7		✓
WILLIE WAGTAIL	1	0	1	0	✓	✓
BLACK-FACED CUCKOO-SHRIKE	2	0	2	0	✓	

PIED BUTCHERBIRD	0	0	0	0		✓
AUSTRALIAN MAGPIE	0	2	0	2	✓	✓
PIED CURRAWONG	2	8	2	8	✓	✓
AUSTRALIAN RAVEN	0	0	0	0	✓	
WHITE-WINGED CHOUGH	0	6	0	6		✓
WELCOME SWALLOW	2	0	2	0	✓	
COMMON STARLING	3	6	5	6	✓	✓

SITE	AR-2
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	31/07/2013	2/08/2013
START TIME	10:07:00 AM	11:08:00 AM
FINISH TIME	10:18:00 AM	11:20:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
AUSTRALIAN WOOD DUCK	0	2	2	11	✓	✓
NANKEEN KESTREL	1	0	1	0	✓	
GALAH	2	0	2	0	✓	✓
SULFUR-CRESTED COCKATOO	0	0	0	0	✓	
RAINBOW LORIKEET	0	0	0	0		✓
SUPERB PARROT	2	0	2	0	✓	
YELLOW ROSELLA	0	2	0	2		✓
EASTERN ROSELLA	0	0	0	0	✓	
RED-RUMPED PARROT	0	0	0	0	✓	
STRIATED PARDALOTE	0	1	0	3		✓
WEEBILL	0	0	0	0		✓
RED WATTLEBIRD	3	0	5	0	✓	✓
LITTLE FRIARBIRD	0	0	0	0	✓	
NOISY FRIARBIRD	4	0	5	0	✓	✓
NOISY MINER	1	3	4	4	✓	✓
WHITE-PLUMED HONEYEATER	0	2	2	2	✓	✓
WILLIE WAGTAIL	0	1	0	1	✓	✓
PIED BUTCHERBIRD	0	0	0	0		✓
MAGPIE-LARK	1	0	1	0	✓	✓
AUSTRALIAN MAGPIE	1	0	1	1	✓	✓

PIED CURRAWONG	0	0	0	0		✓
AUSTRALIAN RAVEN	0	0	0	0	✓	
COMMON STARLING	0	0	0	4	✓	✓

SITE	SL-1
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	31/07/2013	2/08/2013
START TIME	11:15:00 AM	7:23:00 AM
FINISH TIME	11:48:00 AM	7:59:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
AUSTRALIAN WOOD DUCK	0	2	0	2		✓
GALAH	2	1	2	3	✓	✓
SULFUR-CRESTED COCKATOO	0	0	0	0	✓	
RAINBOW LORIKEET	15	2	18	6	✓	✓
SUPERB PARROT	0	1	0	1		✓
EASTERN ROSELLA	7	4	9	4	✓	✓
LAUGHING KOOKABURRA	0	0	0	0	✓	
SUPERB FAIRYWREN	0	0	0	0	✓	
SPOTTED PARDALOTE	2	0	5	0	✓	✓
STRIATED PARDALOTE	1	1	2	3	✓	✓
WEEBILL	0	0	2	3	✓	✓
RED WATTLEBIRD	20	23	35	18	✓	✓
BLUE-FACED HONEYEATER	0	0	0	0	✓	✓
NOISY MINER	26	23	40	26	✓	✓
WHITE-PLUMED HONEYEATER	0	0	0	0	✓	✓
GREY-CROWNED BABBLER	0	0	7	0	✓	✓
WILLIE WAGTAIL	0	0	0	0		✓
GREY BUTCHERBIRD	1	1	3	3	✓	✓
MAGPIE-LARK	0	0	0	0		✓
AUSTRALIAN MAGPIE	0	3	0	4		✓

PIED CURRAWONG	20	0	25	0	✓	
AUSTRALIAN RAVEN	0	1	0	1	✓	✓
WHITE-WINGED CHOUGH	4	0	4	0	✓	
COMMON STARLING	0	0	1	0	✓	✓

SITE	SL-2
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	31/07/2013	2/08/2013
START TIME	11:48:00 AM	7:59:00 AM
FINISH TIME	12:20:00 PM	8:34:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
AUSTRALIAN WOOD DUCK	1	0	1	2	✓	✓
CRESTED PIGEON	2	3	2	3	✓	✓
GALAH	0	0	0	2	✓	✓
SULFUR-CRESTED COCKATOO	0	1	0	3		✓
RAINBOW LORIKEET	0	0	0	0	✓	✓
SUPERB PARROT	0	13	0	13		✓
YELLOW ROSELLA	3	5	3	7	✓	✓
EASTERN ROSELLA	5	2	6	2	✓	✓
RED-RUMPED PARROT	0	0	0	2	✓	✓
SUPERB FAIRY-WREN	2	5	4	5	✓	✓
SPOTTED PARDALOTE	3	5	5	9	✓	✓
STRIATED PARDALOTE	2	1	5	3	✓	✓
YELLOW THORNBILL	8	5	11	8	✓	✓
WEEBILL	8	5	13	7	✓	✓
RED WATTLEBIRD	8	7	11	11	✓	✓
NOISY FRIARBIRD	0	0	0	0		✓
BLUE-FACED HONEYEATER	0	0	0	1	✓	✓
NOISY MINER	18	11	32	16	✓	✓
WHITE-PLUMED HONEYEATER	0	0	1	4	✓	✓
GREY-CROWNED BABBLER	0	0	5	0	✓	

GREY SHRIKE-THRUSH	2	1	4	2	✓	✓
WILLIE WAGTAIL	0	0	0	0		✓
GREY FANTAIL	0	0	0	0		✓
GREY BUTCHERBIRD	0	0	0	0		✓
MAGPIE-LARK	0	0	0	0	✓	
AUSTRALIAN MAGPIE	1	1	1	1	✓	✓
PIED CURRAWONG	4	2	4	3	✓	✓
AUSTRALIAN RAVEN	0	1	0	1		✓
WHITE-WINGED CHOUGH	5	0	5	0	✓	
MISTLETOEBIRD	0	1	0	2		✓
COMMON STARLING	0	1	2	1	✓	✓

SITE	RC-1
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	1/08/2013	2/08/2013
START TIME	10:02:00 AM	10:04:00 AM
FINISH TIME	10:22:00 AM	10:29:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
SULFUR-CRESTED COCKATOO	0	0	0	0		✓
RAINBOW LORIKEET	0	0	0	0	✓	✓
YELLOW ROSELLA	1	0	1	0	✓	
SUPERB FAIRY-WREN	0	0	0	0		✓
SPOTTED PARDALOTE	0	0	0	0		✓
STRIATED PARDALOTE	0	0	1	2	✓	✓
RED WATTLEBIRD	4	5	5	11	✓	✓
NOISY MINER	0	0	0	0	✓	✓
WHITE-PLUMED HONEYEATER	7	17	9	21	✓	✓
WHITE-BROWED BABBLER	10	7	10	10	✓	✓
GREY SHRIKE-THRUSH	1	1	1	2	✓	✓
WILLIE WAGTAIL	2	4	2	5	✓	✓
GREY BUTCHERBIRD	0	0	0	1		✓
AUSTRALIAN MAGPIE	0	0	1	0	✓	
PIED CURRAWONG	0	0	0	0	✓	
WHITE-WINGED CHOUGH	0	0	0	0		✓
MISTLETOEBIRD	0	0	0	1		✓
WELCOME SWALLOW	0	0	1	0	✓	

SITE	RC-2
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	1/08/2013	2/08/2013
START TIME	10:23:00 AM	9:17:00 AM
FINISH TIME	11:03:00 AM	9:58:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
AUSTRALIAN WOOD DUCK	1	0	1	0	✓	
COMMON BRONZEWING	3	0	3	0	✓	✓
CRESTED PIGEON	0	0	0	1		✓
GALAH	0	0	2	0	✓	
LONG-BILLED CORELLA	0	0	0	0	✓	✓
RAINBOW LORIKEET	0	0	0	0	✓	
YELLOW ROSELLA	2	7	2	7	✓	✓
SUPERB FAIRY-WREN	0	5	4	7	✓	✓
SPOTTED PARDALOTE	3	0	3	4	✓	✓
STRIATED PARDALOTE	1	5	3	10	✓	✓
SPECKLED WARBLER	1	0	1	0	✓	
YELLOW-RUMPED THORNBILL	2	0	2	2	✓	✓
YELLOW THORNBILL	10	5	14	8	✓	✓
WEEBILL	9	7	13	10	✓	✓
RED WATTLEBIRD	5	4	5	6	✓	✓
NOISY MINER	12	7	14	9	✓	✓
YELLOW-FACED HONEYEATER	1	1	2	2	✓	✓
WHITE-PLUMED HONEYEATER	1	5	1	7	✓	✓
BROWN-HEADED HONEYEATER	1	2	1	2	✓	✓
WHITE-NAPED HONEYEATER	4	8	4	8	✓	✓

FLAME ROBIN	4	3	9	3	✓	✓
RED-CAPPED ROBIN	3	1	3	1	✓	✓
EASTERN YELLOW ROBIN	0	0	0	0	✓	
GREY-CROWNED BABBLER	0	4	0	4		✓
RUFOUS WHISTLER	0	0	1	0	✓	
GREY SHRIKE-THRUSH	0	0	0	0	✓	✓
GREY FANTAIL	4	1	4	1	✓	✓
GREY BUTCHERBIRD	0	0	0	1		✓
AUSTRALIAN MAGPIE	1	3	1	6	✓	✓
AUSTRALIAN RAVEN	0	0	0	0	✓	
WHITE-WINGED CHOUGH	4	4	4	9	✓	✓
DIAMOND FIRETAIL	0	0	0	0		✓
SILVEREYE	0	7	0	10	✓	✓
COMMON BLACKBIRD	0	0	1	1	✓	✓

SITE	WR-1
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	31/07/2013	1/08/2013
START TIME	8:27:00 AM	7:43:00 AM
FINISH TIME	8:37:00 AM	7:55:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
CRESTED PIGEON	0	1	0	1	✓	✓
GALAH	0	0	0	0	✓	
RAINBOW LORIKEET	0	0	0	0		✓
SUPERB PARROT	2	0	2	0	✓	✓
YELLOW ROSELLA	0	1	0	1		✓
EASTERN ROSELLA	11	1	11	4	✓	✓
LAUGHING KOOKABURRA	0	0	0	0	✓	
RED WATTLEBIRD	4	8	9	10	✓	✓
NOISY MINER	4	2	6	2	✓	✓
GREY-CROWNED BABBLER	0	0	0	0		✓
GREY BUTCHERBIRD	0	0	0	0		✓
AUSTRALIAN MAGPIE	1	1	1	2	✓	✓
AUSTRALIAN RAVEN	0	1	0	1	✓	✓
WHITE-WINGED CHOUGH	5	0	5	0	✓	

SITE	WR-2
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	31/07/2013	1/08/2013
START TIME	8:35:00 AM	7:57:00 AM
FINISH TIME	9:00:00 AM	8:21:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
AUSTRALIAN WOOD DUCK	3	0	3	0	✓	✓
HARDHEAD	0	0	0	0	✓	✓
AUSTRALASIAN GREBE	0	0	1	0	✓	✓
GALAH	5	4	5	4	✓	✓
RAINBOW LORIKEET	2	4	2	4	✓	✓
LITTLE LORIKEET	0	0	0	0	✓	
SUPERB PARROT	0	3	0	3	✓	✓
EASTERN ROSELLA	9	10	9	11	✓	✓
STRIATED PARDALOTE	0	3	0	3		✓
RED WATTLEBIRD	16	27	21	34	✓	✓
LITTLE FRIARBIRD	2	2	3	3	✓	✓
NOISY FRIABIRD	1	0	1	0	✓	
BLUE-FACED HONEYEATER	0	6	0	9		✓
NOISY MINER	16	23	20	28	✓	✓
GREY-CROWNED BABBLER	0	0	0	0		✓
AUSTRALIAN MAGPIE	4	2	5	6	✓	✓
AUSTRALIAN RAVEN	4	5	4	5	✓	✓
COMMON STARLING	0	0	0	3	✓	✓

SITE	WR-3
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	31/07/2013	1/08/2013
START TIME	9:01:00 AM	8:33:00 AM
FINISH TIME	9:22:00 AM	8:50:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
AUSTRALIAN WOOD DUCK	0	0	0	0	✓	
CRESTED PIGEON	0	0	0	1		✓
GALAH	0	11	0	11	✓	✓
SULFUR-CRESTED COCKATOO	0	2	0	2		✓
RAINBOW LORIKEET	0	2	0	2	✓	✓
LITTLE LORIKEET	2	0	2	0	✓	
EASTERN ROSELLA	3	9	4	9	✓	✓
SUPERB PARROT	3	5	3	5	✓	✓
RED WATTLEBIRD	25	9	37	14	✓	✓
LITTLE FRIABIRD	2	2	2	2	✓	✓
NOISY MINER	24	30	26	30	✓	✓
PIED BUTCHERBIRD	0	0	0	0	✓	
AUSTRALIAN MAGPIE	1	1	2	3	✓	✓
AUSTRALIAN RAVEN	2	6	2	6	✓	✓
COMMON STARLING	0	1	0	1	✓	✓

SITE	WR-4
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	31/07/2013	1/08/2013
START TIME	9:26:00 AM	8:57:00 AM
FINISH TIME	9:34:00 AM	9:06:00 AM

	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONS INC. OUTSIDE TRANSECT	
SPECIES	T1	T2	T1	T2	T1	T2
GREAT CORMORANT	0	0	0	0		✓
GALAH	0	0	0	0	✓	
RAINBOW LORIKEET	0	0	0	0	✓	✓
EASTERN ROSELLA	2	0	2	3	✓	✓
SUPERB PARROT	0	0	0	0	✓	✓
RED WATTLEBIRD	0	0	0	0		✓
NOISY MINER	2	3	3	3	✓	✓
GREY BUTCHERBIRD	0	1	0	2		✓
AUSTRALIAN MAGPIE	2	2	2	2	✓	✓

SITE	WR-5
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	31/07/2013	1/08/2013
START TIME	7:40:00 AM	9:20:00 AM
FINISH TIME	7:50:00 AM	9:30:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
AUSTRALIAN WOOD DUCK	1	0	1	0	✓	
RAINBOW LORIKEET	2	0	2	0	✓	
SWIFT PARROT	1	1	2	1	✓	✓
SUPERB PARROT	4	0	6	0	✓	✓
EASTERN ROSELLA	2	0	5	3	✓	✓
STRIATED PARDALOTE	2	2	2	2	✓	✓
RED WATTLEBIRD	1	0	6	0	✓	✓
NOISY MINER	10	10	13	10	✓	✓
GREY-CROWNED BABBLER	0	4	0	4		✓
PIED BUTCHERBIRD	0	0	0	1	✓	✓
AUSTRALIAN MAGPIE	2	0	2	0	✓	
PIED CURRAWONG	0	0	0	0	✓	✓
AUSTRALIAN RAVEN	1	0	1	1	✓	✓
WELCOME SWALLOW	0	0	0	1		✓

SITE	WR-6
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	31/07/2013	1/08/2013
START TIME	7:22:00 AM	9:30:00 AM
FINISH TIME	7:39:00 AM	9:46:00 AM

	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONS INC. OUTSIDE TRANSECT	
SPECIES	T1	T2	T1	T2	T1	T2
RAINBOW LORIKEET	7	1	7	1	✓	✓
SUPERB PARROT	0	0	0	0	✓	
YELLOW ROSELLA	2	3	2	3	✓	✓
EASTERN ROSELLA	5	3	6	5	✓	✓
SPOTTED PARDALOTE	0	0	0	1	✓	✓
STRIATED PARDALOTE	1	2	1	2	✓	✓
WEEBILL	0	0	0	0	✓	✓
RED WATTLEBIRD	0	0	0	0	✓	✓
NOISY FRIARBIRD	0	0	0	0		✓
NOISY MINER	5	7	9	10	✓	✓
GREY-CROWNED BABBLER	0	0	0	1		✓
PIED BUTCHERBIRD	0	0	0	0	✓	
AUSTRALIAN MAGPIE	2	1	2	1	✓	✓
AUSTRALIAN RAVEN	0	0	0	0	✓	
WHITE-WINGED CHOUGH	0	0	0	0		✓
WELCOME SWALLOW	0	2	1	2	✓	✓

SITE	SA-1
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	31/07/2013	1/08/2013
START TIME	7:51:00 AM	9:10:00 AM
FINISH TIME	8:01:00 AM	9:20:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
AUSTRALIAN WOOD DUCK	2	0	2	0	✓	
RAINBOW LORIKEET	0	3	0	3		✓
SWIFT PARROT	2	1	2	3	✓	✓
SUPERB PARROT	2	2	2	2	✓	✓
EASTERN ROSELLA	11	0	13	0	✓	✓
RED WATTLEBIRD	3	5	3	7	✓	✓
NOISY FRIARBIRD	0	1	1	1	✓	✓
NOISY MINER	15	10	19	13	✓	✓
GREY-CROWNED BABBLER	0	0	0	0	✓	✓
PIED BUTCHERBIRD	2	2	2	2	✓	✓
AUSTRALIAN MAGPIE	0	1	0	1		✓

SITE	SA-2
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	31/07/2013	1/08/2013
START TIME	8:02:00 AM	8:21:00 AM
FINISH TIME	8:10:00 AM	8:31:00 AM

	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
SPECIES	T1	T2	T1	T2	T1	T2
SULFUR-CRESTED COCKATOO	0	0	0	1		✓
EASTERN ROSELLA	4	1	4	3	✓	✓
SWIFT PARROT	0	0	0	0	✓	
SUPERB PARROT	8	5	8	5	✓	✓
STRIATED PARDALOTE	0	0	0	1		✓
RED WATTLEBIRD	0	5	0	5	✓	✓
NOISY FRIARBIRD					✓	✓
NOISY MINER	4	4	5	4	✓	✓
AUSTRALIAN MAGPIE	1	0	1	0	✓	✓
AUSTRALIAN RAVEN	0	3	0	3		✓
COMMON STARLING	3	4	3	4	✓	✓

SITE	SA-3
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	31/07/2013	1/08/2013
START TIME	8:12:00 AM	7:30:00 AM
FINISH TIME	8:24:00 AM	7:42:00 AM

	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
SPECIES	T1	T2	T1	T2	T1	T2
CRESTED PIGEON	0	0	0	2		✓
GALAH	0	2	0	2	✓	✓
EASTERN ROSELLA	0	4	0	4		✓
RAINBOW LORIKEET	0	0	1	0	✓	✓
LITTLE LORIKEET	2	0	2	0	✓	
SPOTTED PARDALOTE	0	0	0	0	✓	
STRIATED PARDALOTE	0	0	0	0		✓
RED WATTLEBIRD	7	6	8	6	✓	✓
BLUE-FACED HONEYEATER	5	0	5	0	✓	✓
NOISY MINER	3	2	7	2	✓	✓
GREY-CROWNED BABBLER	0	0	0	1		✓
PIED BUTCHERBIRD	0	0	0	0	✓	
MAGPIE-LARK	0	0	0	0		✓
AUSTRALIAN MAGPIE	3	0	3	0	✓	✓
PIED CURRAWONG	1	0	1	0	✓	
AUSTRALIAN RAVEN	0	0	0	0	✓	✓
COMMON BLACKBIRD	0	0	0	0	✓	
COMMON STARLING	1	0	1	0	✓	✓

SITE	SA-4
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	31/07/2013	2/08/2013
START TIME	10:25:00 AM	11:25:00 AM
FINISH TIME	10:41:00 AM	11:40:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
AUSTRALIAN WOOD DUCK	0	0	2	0	✓	
GALAH	2	0	2	0	✓	✓
YELLOW ROSELLA	0	1	0	1		✓
CRIMSON ROSELLA	2	0	2	0	✓	
EASTERN ROSELLA	0	0	0	0	✓	
RAINBOW LORIKEET	3	6	3	6	✓	✓
SUPERB FAIRYWREN	4	3	4	3	✓	✓
SPOTTED PARDALOTE	0	0	0	0	✓	
STRIATED PARDALOTE	1	2	1	4	✓	✓
WEEBILL	6	0	6	0	✓	
RED WATTLEBIRD	5	1	8	1	✓	✓
NOISY MINER	3	2	3	3	✓	✓
WHITE-PLUMED HONEYEATER	1	0	1	1	✓	✓
SCARLET ROBIN	2	0	2	0	✓	
WILLIE WAGTAIL	0	1	0	1	✓	
AUSTRALIAN MAGPIE	3	0	3	1	✓	✓
PIED CURRAWONG	0	0	0	0	✓	
AUSTRALIAN RAVEN	0	0	0	0	✓	
COMMON STARLING	0	1	0	1	✓	✓

SITE	SA-5
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	31/07/2013	2/08/2013
START TIME	10:44:00 AM	11:45:00 AM
FINISH TIME	10:52:00 AM	11:55:00 AM

	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
SPECIES	T1	T2	T1	T2	T1	T2
RAINBOW LORIKEET	5	2	11	2	✓	✓
SPOTTED PARDALOTE	0	0	0	0		✓
RED WATTLEBIRD	0	0	0	0	✓	✓
NOISY MINER	2	3	2	3	✓	✓
GREY-CROWNED BABBLER	0	0	2	0	✓	
AUSTRALIAN MAGPIE	0	0	0	0	✓	

SITE	SA-6
OBSERVER	Mason Crane

	TRANSECT 1	TRANSECT 2
DATE	31/07/2013	2/08/2013
START TIME	11:03:00 AM	8:46:00 AM
FINISH TIME	11:10:00 AM	8:54:00 AM

SPECIES	WITHIN 50m TRANSECT		WITHIN 100M TRANSECT		ALL OBSERVATIONAS INC. OUTSIDE TRANSECT	
	T1	T2	T1	T2	T1	T2
GALAH	0	4	0	4		✓
RAINBOW LORIKEET	0	0	0	0	✓	
YELLOW ROSELLA	1	0	1	0	✓	
LAUGHING KOOKABURRA	0	0	0	0		✓
SPOTTED PARDALOTE	0	0	0	0		✓
RED WATTLEBIRD	1	2	4	4	✓	✓
NOISY MINER	1	0	1	0	✓	
WHITE-PLUMED HONEYEATER	3	1	5	1	✓	✓
GREY-CROWNED BABBLER	0	0	0	3		✓
GREY SHRIKE-THRUSH	0	1	0	1		✓
WILLIE WAGTAIL	0	0	1	1	✓	✓
MAGPIELARK	0	0	0	0	✓	
AUSTRALIAN MAGPIE	2	1	2	1	✓	✓
PIED CURRAWONG	0	0	0	1		✓
COMMON STARLING	1	4	1	4	✓	✓

APPENDIX E BIRD SPECIES RECORDED

COMMON NAME	SCIENTIFIC NAME	SURVEY PERIOD 1	SURVEY PERIOD 2
AUSTRALIAN WOOD DUCK	*Chenonetta jubata*	✓	✓
HARDHEAD	*Aythya australis*	✓	✓
AUSTRALASIAN GREBE	*Tachybaptus novaehollandiae*	✓	✓
WHITE-FACED HERON	*Egretta novaehollandiae*	✓	
LITTLE BLACK CORMORANT	*Phalacrocorax sulcirostris*	✓	
GREAT CORMORANT	*Phalacrocorax carbo*		✓
YELLOW-BILLED SPOONBILL	*Platalea flavipes*	✓	
LITTLE EAGLE	*Hieraaetus morphnoides*	✓	
BROWN GOSHAWK	*Accipiter fasciatus*	✓	
AUSTRALIAN HOBBY	*Falco longipennis*	✓	
NANKEEN KESTREL	*Falco cenchroides*	✓	✓
COMMON BRONZEWING	*Phaps chalcoptera*	✓	✓
CRESTED PIGEON	*Ocyphaps lophotes*	✓	✓
LONG BILLED CORELLA	*Cacatua tenuirostris*		✓
SULFUR-CRESTED COCKATOO	*Cacatua galerita*	✓	✓
GALAH	*Eolophus roseicapillus*	✓	✓
SWIFT PARROT	*Lathamus discolor*		✓
SUPERB PARROT	*Polytelis swainsonii*	✓	✓
RED-RUMPED PARROT	*Psephotus haematonotus*	✓	✓
LITTLE LORIKEET	*Glossopsitta pusilla*		✓
RAINBOW LORIKEET	*Trichoglossus haematodus*	✓	✓
YELLOW ROSELLA	*Platycercus flaveolus*	✓	✓
EASTERN ROSELLA	*Platycercus eximius*	✓	✓
SUPERB FAIRY-WREN	*Malurus cyaneus*	✓	✓
DIAMOND FIRETAIL	*Stagonopleura guttata*	✓	✓
SPOTTED PARDALOTE	*Pardalotus punctatus*	✓	✓
STRIATED PARDALOTE	*Pardalotus striatus*	✓	✓
SPECKLED WARBLER	*Chthonicola sagittata*		✓
YELLOW THORNBILL	*Acanthiza nana*	✓	✓
YELLOW-RUMPED THORNBILL	*Acanthiza chrysorrhoa*	✓	✓
WEEBILL	*Smicrornis brevirostris*	✓	✓
LAUGHING KOOKABURRA	*Dacelo novaeguineae*	✓	✓
RED WATTLEBIRD	*Anthochaera carunculata*	✓	✓
LITTLE FRIARBIRD	*Philemon citreogularis*	✓	✓
NOISY FRIARBIRD	*Philemon corniculatus*	✓	✓

BLUE-FACED HONEYEATER	*Entomyzon cyanotis*	✓	✓
YELLOW-FACED HONEYEATER	*Lichenostomus chrysops*	✓	✓
NOISY MINER	*Manorina melanocephala*	✓	✓
WHITE-PLUMED HONEYEATER	*Lichenostomus penicillatus*	✓	✓
BROWN-HEADED HONEYEATER	*Lichmera indistincta*	✓	✓
WHITE-NAPED HONEYEATER	*Melithreptus lunatus*		✓
SCARLET ROBIN	*Petroica boodang*		✓
RED-CAPPED ROBIN	*Petroica goodenovii*	✓	✓
FLAME ROBIN	*Petroica phoenicea*	✓	✓
EASTERN YELLOW ROBIN	*Eopsaltria australis*	✓	✓
GREY-CROWNED BABBLER	*Pomatostomus temporalis*	✓	✓
WHITE-BROWED BABBLER	*Pomatostomus superciliosus*	✓	✓
RUFOUS WHISTLER	*Pachycephala rufiventris*	✓	✓
GREY SHRIKE-THRUSH	*Colluricincla harmonica*	✓	✓
WILLIE WAGTAIL	*Rhipidura leucophrys*	✓	✓
GREY FANTAIL	*Rhipidura albiscapa*	✓	✓
BLACK FACED CUCKOO-SHRIKE	*Coracina novaehollandiae*		✓
DUSKY WOODSWALLOW	*Artamus cyanopterus*	✓	
OLIVE-BACKED ORIOLE	*Oriolus sagittatus*	✓	
GREY BUTCHERBIRD	*Cracticus torquatus*	✓	✓
PIED BUTCHERBIRD	*Cracticus nigrogularis*	✓	✓
MAGPIE-LARK	*Grallina cyanoleuca*	✓	✓
AUSTRALIAN MAGPIE	*Cracticus tibicen*	✓	✓
PIED CURRAWONG	*Strepera graculina*	✓	✓
AUSTRALIAN RAVEN	*Corvus coronoides*	✓	✓
WHITE-WINGED CHOUGH	*Corcorax melanorhamphos*	✓	✓
MISTLETOEBIRD	*Dicaeum hirundinaceum*		✓
WELCOME SWALLOW	*Hirundo neoxena*	✓	✓
TREE MARTIN	*Petrochelidon nigricans*	✓	
SILVEREYE	*Zosterops lateralis*	✓	✓
HOUSE SPARROW	*Passer domesticus*	✓	
COMMON BLACKBIRD	*Turdus merula*	✓	✓
COMMON STARLING	*Sturnus vulgaris*	✓	✓

APPENDIX F LICENCES

TRIM File No. 11/5138
DG ACEC Meeting 143, 10 October 2011

ANIMAL CARE AND ETHICS COMMITTEE OF THE DIRECTOR-GENERAL OF DEPARTMENT OF PRIMARY INDUSTRIES

CERTIFICATE OF APPROVAL

Mr Nicholas Graham-Higgs
Nghenvironmental
18 / 21 Mary Street
SURRY HILLS NSW 2010

is approved
to conduct the following research

FAUNA SURVEYS

as approved by and in accordance with the

ANIMAL CARE AND ETHICS COMMITTEE OF THE DIRECTOR-GENERAL OF DEPARTMENT OF PRIMARY INDUSTRIES

being animal research carried out in accordance with the Code of Practice, for a recognised research purpose and in connection with animals (other than exempt animals) that have been obtained from the holder of an animal suppliers licence

Approval with the following conditions that:-

1. The Director-General's Animal Care and Ethics Committee is to be informed of the specific location of each study and the procedures to be undertaken prior to work being commenced.
2. Trapping is limited to a maximum of four consecutive nights at any one site.
3. Traps are to be cleared within two hours of sunrise.

This approval remains in force until **11 October 2014** unless suspended, cancelled or surrendered

(*Signature of authorised person*)
AMANDA PAUL
EXECUTIVE OFFICER
1 November 2011

Office of Environment & Heritage
NSW National Parks & Wildlife Service

SCIENTIFIC LICENCE

NATIONAL PARKS & WILDLIFE ACT, 1974
Section 132c

Name and postal address of principal licensee

Mr Nick Graham-Higgs
NGH Environmental
PO Box 470
BEGA NSW 2550

Nominated premises (where appropriate)

Your licence number is: SL100682

This licence is valid from: 01 March 2013

This licence will expire on: 28 February 2015

Additional authorisations:

Project Title: General Fauna and Flora Surveys

This licence authorises the following activities: Pick protected flora for identification purposes. Harm, trap, release fauna.

This licence authorises the principal licensee and any associates named in **Attachment A** to conduct those activities authorised above, to those species, communities or materials listed in **Attachment B**, at the locations specified in **Attachment C** of this licence.

This licence also authorises the principal licensee to import or export those species, or materials listed in **Attachment B** interstate as provided under s126 of the *National Parks and Wildlife Act 1974* (NPW Act) and to conduct research on park under clause 23 of the *National Parks and Wildlife Regulation 2009 (*NPW Reg*),* where this forms part of a project approved by a delegated officer of OEH.

This licence is issued subject to the provisions of NPW Act, NPW Reg, the general conditions listed below, any special conditions as may be notified in writing to the licensee by the Chief Executive of OEH ("the Chief Executive") or a 'delegated officer' of OEH ("delegated officer") and the OEH "Scientific Licensing" policy.

Julie M Innes ....

Signature of Delegated Officer

Date: 02 April 2013

Signature of Principal Licensee*

Date: 02 April 2013

* This licence is not valid unless it is signed by the principal licensee. By signing this licence the licensee agrees that they have read, understood and agree to comply with all of the conditions listed on the licence.

LICENCE CONDITIONS

Specific

a) Work on NPWS estate may only be conducted under a NPWS contract or with the prior written consent of the relevant area manager.
b) Fauna is to be managed in accordance with a current Animal Care and Ethics Committee approval.
c) The NPWS Frog hygiene protocol is to be followed when working in habitat likely to contain frogs.
d) Clean, sharp secateurs are to be used to sample plants.
e) The principal licensee may authorise other people to work under this licence. The licensee must maintain a signed and dated register of all people authorised, and provide each person with a copy of this licence.
f) Volunteers may assist under direct supervision.

General

1. Only the person/s named on the licence, or authorised to operate under the terms and conditions of the licence, may undertake the work. This licence is not transferable except with written confirmation from Wildlife Licensing & Management Unit ("WLMU").
2. The principal licensee may vary the associated parties authorised during the term of the licence only by maintaining a signed and dated register of the associates. A copy of the register must be provided to WLMU at renewal or on request by an authorised officer.
3. The licensee must carry this licence at all times whilst work is being undertaken in the field. Where multiple parties are listed, photocopies will suffice provided some other proof of identity can be provided e.g. Driver's licence.
4. The licensee must provide other parties authorised to conduct the specified activities with a copy of this licence.
5. The licensee must obtain the permission of the owner, manager or occupier of lands upon which research is conducted **(for persons working on NPWS lands see also conditions 16-18).**
6. Specimens or samples taken under this licence must not be sold, bartered, given, lent or promised to others without the prior written approval of the Chief Executive or delegate.
7. Collections or research shall, as far as is possible, be carried out away from the view of the public.
8. The licensee shall indemnify and keep indemnified, so far as the law allows, Her Majesty Queen Elizabeth II, the Minister administering the National Parks and Wildlife Act 1974, the Government of New South Wales, the Chief Executive of the Office of Environment and Heritage, and the National Parks and Wildlife Service and its servants, agents or contractors (herein jointly and severally referred to as "OEH"), FROM AND AGAINST all lawful suits, claims, demands, proceedings, costs, (including solicitor - client costs) and expenses of any nature whatsoever which the OEH may suffer or incur in connection with loss of life, personal injury or damage to property from an occurrence in connection with any land, premises, vehicle or other mode of conveyance or other item under the care, control or management of the OEH, and arising either directly or indirectly from any negligent or wrongful act or omission of the licensee in the course of an operation or activities pursuant to the licence or otherwise.

Reporting requirements

9. The licensee undertaking survey, research or other biodiversity assessment works must provide a full report of the work carried out under this licence in the standard OEH excel format available at http://www.environment.nsw.gov.au/resources/nature/scientificLicenceDatasheet.xls
10. The licensee must ensure that data submitted to OEH in the above format is accurate to **not less than 100m** (without suitable justification).
11. The licensee must submit reports online using a secure login acquired from OEH Wildlife Data Unit. Contact atlas@environment.nsw.gov.au for account details and guidelines.
12. Licensees undertaking work that cannot be supplied in the above format must provide a report to the OEH specifying:
    a. Title of the project
    b. A precise description of the locality including geographic coordinates where practical
    c. Results of the project
13. The licensee may also be required to complete a metadata proforma for works on NPWS estate.
14. Licensees undertaking permanent/semi-permanent marking, banding or tagging must provide marking details (e.g. tag number, date, location, species) to OEH with any renewal application.
15. The licensee must provide a copy of any final report and/or any scientific papers relating to this work to the Chief Executive (marked "attention Wildlife Licensing & Management Unit") when the study is completed.

Additional reporting requirements for consultants

16. Licences issued to consultants and consulting companies for survey and assessment purposes are required to provide a list of the sites where work was conducted and a list of the reports produced. A copy of these reports may be requested.
17. Reports in accordance with licence conditions 9. to 16. must be provided annually, from the "valid from" date of the licence.

Projects undertaken on NPWS managed land

18. The licensee may only undertake works in NPWS managed lands with the prior written approval of the relevant Area Manager and comply with any imposed restrictions or conditions.
19. The licensee must maintain regular contact with the NPWS Area office throughout the project as park management activities and other events may affect access to research locations. Access to reserves may be restricted during management activities or other while the reserve is closed for other reasons.
20. The licensee must only use vehicles on public roads unless otherwise approved by an authorised officer.

It is an offence under the *National Parks & Wildlife Regulation 2009* to breach any of the conditions of this licence, issue any false receipt, make a false entry in any record, or otherwise keep a false record or provide false or misleading records or information (Maximum Penalty $3300).

Records, notifications and inquiries should be directed to:

Wildlife Licensing and Management Unit
Office of Environment and Heritage
PO Box 1967
Hurstville NSW 1481

Phone: 02 9585 6406
Fax: 02 9585 6401
Email: wildlife.licensing@environment.nsw.gov.au

Additional Information for licence holders

It is the licence holder's responsibility to ensure they are familiar with any other relevant statutory or regulatory provisions relevant to this licence such as the ***National Parks and Wildlife Regulation 2009*** particularly with respect to activities undertaken on NPWS managed lands, the ***Firearms Act 1999,*** any local council, building and health requirements and codes of practice under the ***Prevention of Cruelty to Animals Act 1979*** as well as specific requirements under the ***Animal Research Act 1985***. On the expiration of your permit the onus is on you to renew. While OEH forwards renewal notices to permit holders, it will not be responsible for the non-receipt of such a notice.

It is the licensee's responsibility to inform themselves of any likely hazards and ensure that appropriate risk management and emergency procedures are developed and in place for works undertaken on NPWS managed lands. The risk management and emergency procedures will also extend to cover OEH staff and any other third parties which may be impacted by the licensee's works. OEH accepts no responsibility for any event which results in the licensee suffering any loss. The licensee will be held liable for any damages resulting from their works which have impacted on OEH staff or any other third party.

Attachment A

Other parties

In addition to the principal licensee identified above, the following parties are also authorised under this licence:

NIL

Attachment B

Licence Class

Class Name	Class Start Date
Ecological survey/consultancy	14/02/2012

Focus of work

This project authorises the licensee to Harm, Pick, collect or otherwise interact with the following species, communities or materials as described on this licence in the listed quantities:

Species Type	Family	Genus	Species	Subspecies	Species Code	Common Name	Target Parts	Units	Qty
FA FL	ALL FAUNA ALL FLORA					ALL FAUNA ALL FLORA	Individuals Individuals		

Attachment C

Project location

This project is authorised in the following areas:

NPWS Estate

Tenure Type	Branch	Region	Area	Park	Karst Area
NPWS Estate				Only under NPWS contract or with area manager consent	

Other

Tenure Type	State Forests	CMA Region	LGA	Lot Sec DP	Marine Park	Other Location
Other						Non-NPWS estate