

Wagga Wagga Planning Study

Environmental / Biodiversity report for Edison Road

(Project No. 069-052)

Report prepared for:
Willana Associates
on behalf of Wagga Wagga City Council

March 2008

Document Tracking

Item	Detail	Signature
Project Name	Wagga Wagga Planning Study: Environmental/Biodiversity report for Edison Road	
Project Number	069-052	
Prepared by	EL	SL
Prepared by		
Approved by		
Status	FINAL	
Version Number	V1	
File location	G:\Current_Projects\Private Clients\Willana\Wagga Planning Studies\Reports	
Last saved on	11 March 2008	

Acknowledgements

This document has been prepared by Eco Logical Australia Pty Ltd with support from Willana Associates.

The study team would like to thank Wagga Wagga Council staff for their assistance in providing relevant information for this report.

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Executive Summary

Wagga Wagga City Council (WWCC) is in the process of preparing a draft Local Environment Plan (LEP) for the Wagga Wagga Local Government Area (WWLGA). The draft plan is intended to implement the strategic planning undertaken in the Wagga Wagga Spatial Plan 2007 (WWCC 2006) and will be prepared in accordance with the *Standard Instrument (Local Environmental Plans) Order 2006*.

Eco Logical Australia Pty Ltd was commissioned by Wagga Wagga City Council to prepare a study of the biodiversity values of a site at Edison Road, East Wagga Wagga, along with seven other sites (each subject to an individual report). The biodiversity studies will feed into the broader environmental study for each proposed development site. Each biodiversity report presents the ecological values of the subject lands and whether development of the site will "maintain or improve" biodiversity.

This biodiversity report seeks to present the ecological values of the Edison Road development site and to discuss the potential impacts on ecological values, including threatened species, endangered populations and endangered ecological communities, arising from development of the site. Moreover the report seeks to provide a framework for maintaining and improving biodiversity at the Edison Road site.

The specific objectives of the project are to:

- Describe the ecological values of the site
- Describe potential impacts of proposed development
- Recommend ways to minimise impacts on ecological values of the site
- Where impacts are unavoidable, to recommend offsets which ensure larger, viable areas of native vegetation and habitat are retained in such a way as to enhance landscape connectivity.

The report aims to provide a structure plan for the Edison Road development site which will allow development of the site while avoiding impacts to native vegetation and threatened species habitats

The site was primarily covered with exotic species and had evidence to indicate a history of cropping. Some Grey Box (*Eucalyptus microcarpa*) occurred on site with an exotic understorey and were classified as scattered paddock tree based on the projected foliage cover and floristic composition. While Inland Grey Box has been listed as an Endangered Ecological Community in NSW, and it is likely that the site once contained this community, the long term use of the site for agricultural purposes has degraded the vegetation such that it no longer represents the community.

No threatened species were recorded during the survey, however, there is habitat potential for three threatened fauna, little pied bat, yellow-bellied sheathtail Bat and superb parrot.

Consequently, the development potential of the site is extensive, however, the loss of remnant trees will require offsetting. It is recommended that remnant trees (11 of which are hollow bearing) be incorporated into future Master Planning to retain their values in the landscape.

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1. Introduction

1.1 Project Background

Wagga Wagga City Council (WWCC) is in the process of preparing a draft Local Environment Plan (LEP) for the Wagga Wagga Local Government Area (WWLGA). The draft plan is intended to implement the strategic planning undertaken in the Wagga Wagga Spatial Plan 2007 (WWCC 2006) and will be prepared in accordance with the *Standard Instrument (Local Environmental Plans) Order 2006*.

Preparation of the draft LEP requires that 8 environmental studies be undertaken at sites within the WWLGA that are proposed to be subject to significant zoning changes. These sites are:

- Boorooma East
- Estella West
- Lloyd
- Bomen
- Eastern Industrial – Copland Street South
- Eastern Industrial – Hammond Avenue North
- Edison Road
- Moorong Street

Eco Logical Australia Pty Ltd has been commissioned by Wagga Wagga City Council to prepare a study of the biodiversity values of each of the above sites. The biodiversity studies will feed into the broader environmental study for each proposed development site. Each biodiversity report will present the ecological values of the subject lands and whether development of the site will “maintain or improve” biodiversity.

The current document presents the biodiversity report for the proposed development site known as Edison Road. Biodiversity reports for each of the 7 additional development sites are presented as separate documents.

1.2 Project Objectives

This biodiversity report seeks to present the ecological values of the Edison Road development site and to discuss the potential impacts on ecological values, including threatened species, endangered populations and endangered ecological communities, arising from development of the site. Moreover the report seeks to provide a framework for maintaining and improving biodiversity at the Edison Road site.

The specific objectives of the project are to:

- Describe the ecological values of the site
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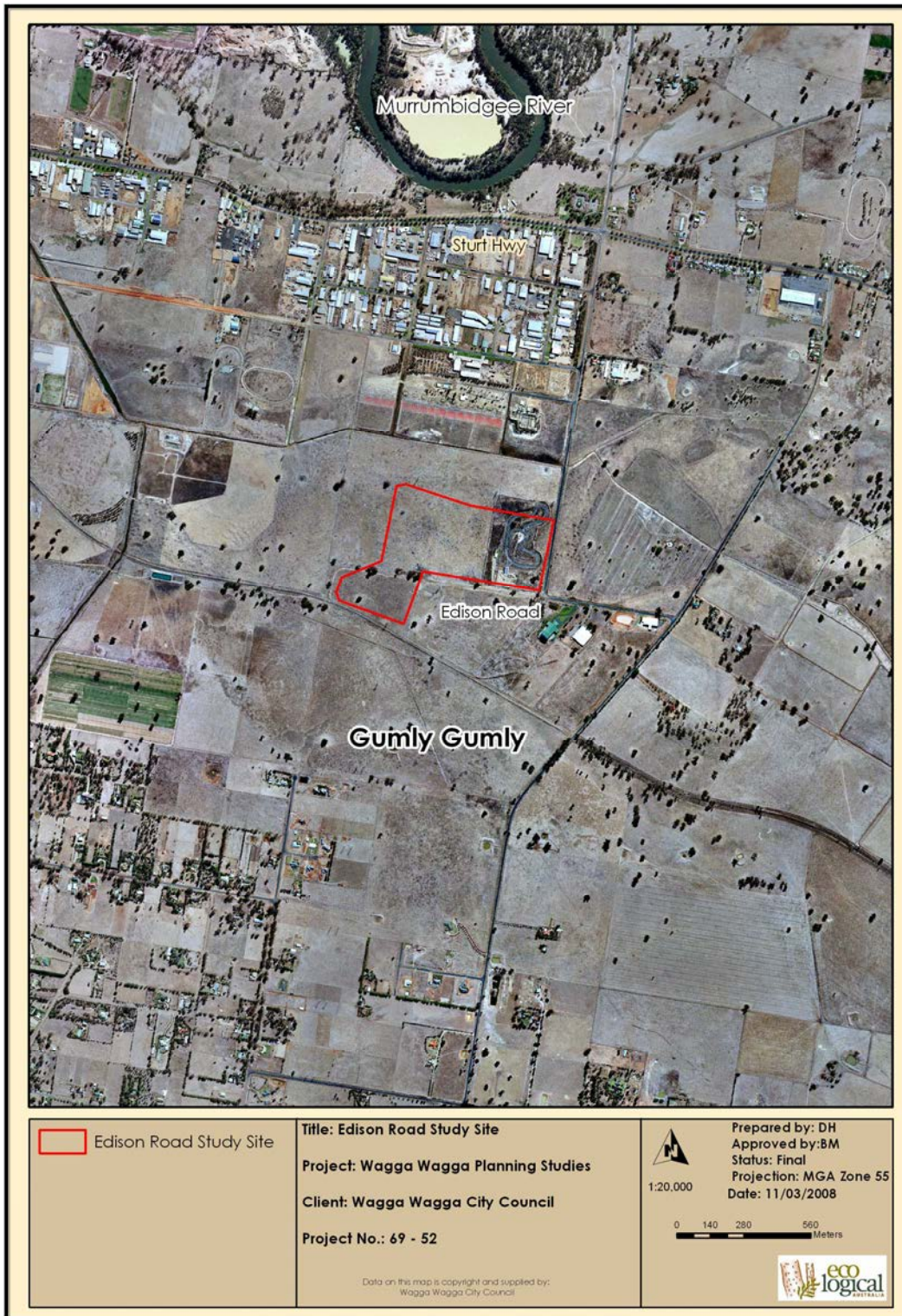
The report aims to provide a structure plan for the Edison Road development site which will allow development of the site while avoiding impacts to native vegetation and threatened species habitats

1.3 Study Area

The Edison Road site occurs to the east of the existing urban area of the city of Wagga Wagga. The site occupies an area of approximately 28.1 ha and is bound by Tasman Road to the east. The remaining boundaries of the site are not clearly delineated, although the north and west property boundaries of Brown loosely delineate the site.

Current land use at the site is predominately rural, with cropping and improved pasture the predominant agricultural practices. The Wagga and District Kart Racing Club is located on the eastern side of the site and represents the most intensive land use at the site (Map 1). Land in areas surrounding the site is rural, although some land to the north is used for industrial purposes.

The site is flat with an elevation of 182 m AHD. Soils on the site are Kurrajong Plain soils described by Chen and McKane (1997). These soils are silty clays, quite fertile and have low erosion hazard.



Map 1 – Location of proposed Edison Road development site.

1.4 Legislative Summary

The following provides a brief summary of legislation relevant to biodiversity conservation within the study area.

NSW Native Vegetation Act 2003 (NV Act)

The objects of the *Native Vegetation Act 2003* (NV Act) are to manage native vegetation on a regional basis through bringing an end to broadscale clearing and seeking to protect and improve areas of existing native vegetation, particularly those areas of high conservation value. The NV Act also seeks to encourage the revegetation and rehabilitation of land in accordance with the principles of ecologically sustainable development.

Under the NV Act, clearing of native vegetation is not permitted unless the clearing is in accordance with a development consent granted in accordance with the NV Act or unless the clearing is in accordance with a property vegetation plan (PVP). Clearing of unprotected regrowth, of certain groundcover and clearing associated with routine agricultural management activities (RAMAs) does not constitute clearing of native vegetation under the Act and, therefore, does not require a consent approval or PVP.

Under the NV Act, clearing of native vegetation cannot be undertaken unless it **improves or maintains environment outcomes**. Mitigating actions or offsets which provide gains equal to, or exceeding, losses from clearing, may be required in order for clearing of native vegetation to improve or maintain biodiversity values under the Act. Under the Act, native vegetation which is in '**moderate to good**' condition and is of a type, or within a landscape that is highly cleared (>70%), can not be offset and is not permitted to be cleared.

Environmental Planning and Assessment Act 1979 (EP&A Act)

The *NSW Environmental Planning and Assessment Act 1979* (EP&A Act) is the principal planning legislation for the state, providing a framework for the overall environmental planning and assessment of development proposals. Various legislation and instruments, such as the *NSW Threatened Species Conservation Act 1995* (TSC Act), are integrated with the EP&A Act.

The LES is being prepared in accordance with section 57 of the EP&A Act. Issues to be addressed in the LES were raised during consultation with agencies (conducted in accordance with sections 34A and 62 of the EP&A Act).

NSW Threatened Species Conservation Act 1995 (TSC Act)

The TSC Act aims to protect and encourage the recovery of threatened species, populations and ecological communities listed under the Act. The integration of the TSC Act with the *NSW Environmental Planning and Assessment Act* (EP&A Act) requires consideration of the likelihood of a development (Part 4 of the EP&A Act) or an activity (Part 5 of the EP&A Act) significantly affecting threatened species, populations and ecological communities or their habitat. This is undertaken through the preparation of a '7-part test' (Section 5A).

Schedule 1 of the TSC Act lists threatened species, populations and ecological communities and species that are endangered or presumed extinct. Schedule 2 lists vulnerable species and Schedule 3 lists key threatening processes.

The TSC Act defines 'endangered' as a species, population or ecological community that is likely to become extinct or is in immediate danger of extinction. A species that is 'presumed extinct' has not been located in nature during the preceding fifty years despite the searching of known and likely habitats. A 'vulnerable' species is likely to become endangered unless the circumstances and factors threatening its survival or evolutionary development cease to operate.

The site is known or potential habitat for a number of threatened species, ecological communities and/or migratory species listed under the Act.

The TSC Act provides for the preparation of recovery plans and threat abatement plans, some of which apply to the site. Biodiversity certification of Local Environment Plans (LEPs) is also facilitated through this Act.

Commonwealth Environment Protection & Biodiversity Conservation Act 1999 (EPBC Act)

Approval from the Commonwealth Environment Minister is required under the EPBC Act if an action (can include a project, development, undertaking or activity) will, or is likely to, have a significant impact on matters considered to be of national environmental significance (NES matters). NES matters relevant to this study include threatened species, ecological communities and migratory (JAMBA/CAMBA) species that are listed under the Act.

The EPBC Act does not define significant impact but identifies matters that are necessary to take into consideration. If the matter is referred to the Minister a decision is generally required within 20 days in relation to whether an action requires Commonwealth approval.

The site is known or potential habitat for a number of threatened species, ecological communities and/or migratory species listed under the Act.

NSW Noxious Weeds Act 1993 (NW Act)

The objectives of the Noxious Weeds Act are to identify which noxious weeds require control measures, identify control measures suitable to those species and to specify the responsibilities of both public and private landholders for noxious weed control.

The Noxious Weeds Act allows for the declaration of weeds as noxious within a Local Control Area (LCA) and assigns a weed control class to each declared noxious weeds. The Edison Road site is located within the Wagga Wagga City Council LCA. Currently 106 species or groups of species are listed as noxious weeds within the Wagga Wagga City Council LCA. Three noxious weeds are known to occur on the site.

Water Management Act 2000 (WM Act)

The *Water Management Act 2000* and *Water Act 1912* control the extraction of water, the use of water, the construction of works such as dams and weirs and the carrying out of activities in or near water sources in New South Wales. 'Water sources' include any river, lake, estuary, place where water occurs naturally on or below the surface of the ground and New South Wales coastal waters.

Approval is required under the *Water Management Act* for carrying out of a 'controlled activity' on 'waterfront land' (s91). Controlled activities' include:

- the construction of buildings or carrying out of works;
- the removal of material or vegetation from land by excavation or any other means;
- the deposition of material on land by landfill or otherwise; or
- any activity that affects the quantity or flow of water in a water source.

'Waterfront land' is defined as the bed of any river or lake, and any land lying between any permanent or intermittent waterbody or lake and a line drawn parallel to and forty metres inland from either the highest bank or shore (in relation to non-tidal waters) or the mean high water mark (in relation to tidal waters). The distance of forty metres can be reduced by the regulations. Depending upon the regulations, land adjoining coastal waters may also be waterfront land.

It is an offence to carry out a controlled activity on waterfront land except in accordance with an approval.

Remnant native vegetation on site does not occur on waterfront land as defined under the WM Act and as such, approval under the WM Act to remove native vegetation from the site is unlikely to be required.

2. Description of Methods

2.1 Review of existing information

A review of the Atlas of NSW Wildlife was undertaken for the site and determined that while there are many records of threatened species in the Wagga LGA, most of these are associated with patches of remnant vegetation.

Aerial photography was supplied by Wagga Wagga City Council and reviewed prior to field survey.

2.2 Desktop Assessment

The NSW National Parks and Wildlife Atlas of NSW Wildlife and Commonwealth Environmental Protection and Biodiversity Conservation Act (1999) Protected Matters Search Tool were used to supplement surveys undertaken in this site in order to compile a comprehensive list of flora and fauna likely or with the potential to occur at the site. The searches were performed on 4/09/2007 for the Wagga Wagga LGA. Likelihood of occurrences for threatened species, populations and communities for the Edison Road site were then made based on the habitat characteristics of the site, results of the field survey and professional judgement (Appendix 1). Five terms for the likelihood of occurrence of species were used and are defined below:

- “yes” = the species was or has been observed on the site
- “likely” = a medium to high probability that a species uses the site
- “potential” = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur
- “unlikely” = a very low to low probability that a species uses the site
- “no” = habitat on site and in the vicinity is unsuitable for the species.

2.3 Field Survey

The proposal site was inspected on 15th August 2007 by Sam Luccitti and Bruce Mullins of Eco Logical Australia.

A random traverse was undertaken across the paddock north of Edison Road (Map 2). The traverses extended for more than 100 m and all visible vascular flora were recorded. Incidental sightings of fauna were also noted. The survey extended for approximately 2 person hours.

Tree counts were undertaken at the site with the location of each tree marked on a high resolution map. For each tree an estimation of height, diameter at breast height and number of small, medium and large hollows was made.

2.4 Desktop review results

The species, populations and communities considered to have the potential to occur on the site based on the habitat present are outlined in Table 1.

Table 1: Species, populations and communities listed under the TSC Act and EPBC Act for which the site represents habitat

Scientific Name	Common Name	Status		Habitat
		TSC Act	EPBC Act	
<i>Ardea ibis</i>	Cattle Egret		M	Stock paddocks, pastures, croplands, garbage tips, wetlands, tidal mudflats
<i>Hirundapus caudacutus</i>	White-throated Needletail		M	Open space above canopy. Forages over large areas
<i>Merops ornatus</i>	Rainbow Bee-eater		M	Open woodlands with sandy, loamy soils, dunes, cliffs, mangroves golf courses
<i>Polytelis swainsonii</i>	Superb Parrot	V	V	Breeds along inland rivers in river red gum, feeding in box woodland with 10km of nest tree. West of dividing range.
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail Bat	V	-	Forages in most habitats across its very wide range, with and without trees. Roosts and breeds in living or dead hollow bearing trees.
<i>Chalinolobus picatus</i>	Little Pied bat	V	-	Dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine forest, malle and bramble box. Roosts and breeds in tree hollows, fissures or cracks, buildings, power poles, fence posts, caves, cliff crevices, mineshafths and tunnels.

2.5 Field Survey Results

2.5.1 Flora

The survey identified 19 species, twelve of which were native (Appendix 2).

Common species recorded on the site during the current survey included capeweed (*Arctotheca calendula*), *Romulea rosea*, ryegrass (*Lolium rigidum*), great brome (*Bromus diandrus*), and common crowfoot (*Erodium cicutarium*), all exotic species.

Twelve remnant trees were recorded on the site. These trees were generally located in the vicinity of unformed section of Edison Road in the west of the site. Many of the

trees were large to very large and contained hollow bearing limbs. Table 2 provides a summary of the trees within the study site.

Table 2: Trees located on the study site.

Species	Height (m)	Diameter at breast height (cm)	Presence of hollows
Grey Box <i>Eucalyptus microcarpa</i>	25	100	A few small, medium and large hollows
Grey Box <i>Eucalyptus microcarpa</i>	14	60-80	A few small and large hollows
Grey Box <i>Eucalyptus microcarpa</i>	18	110	A few small and large hollows
Blakely's Redgum <i>Eucalyptus blakelyi</i>	15	60	None
Grey Box <i>Eucalyptus microcarpa</i>	18	160	A few small, medium and large hollows
Grey Box <i>Eucalyptus microcarpa</i>	18	160	A few small, medium and large hollows
Grey Box <i>Eucalyptus microcarpa</i>	20	80-110	A few small, medium and large hollows
Grey Box <i>Eucalyptus microcarpa</i>	20	80-110	A few small, medium and large hollows
Grey Box <i>Eucalyptus microcarpa</i>	20	80-110	A few small, medium and large hollows
Grey Box <i>Eucalyptus microcarpa</i>	20	120	Large and medium hollows common
Grey Box <i>Eucalyptus microcarpa</i>	18	100	A few small and medium hollows
Grey Box <i>Eucalyptus microcarpa</i>	20	100	A few small and medium hollows

Two noxious weeds were recorded on site; Paterson's curse (*Echium plantagineum*) and Bathurst burr (*Xanthium spinosum*). Both species are categorised as Class 4 noxious weeds within the Wagga Wagga LGA (NSW DPI 2007).

2.5.2 Fauna

Incidental sightings of fauna were recorded whilst on site (Table 3). Consequently, only 11 fauna species were observed, all of which were birds. Of the species observed, the common starling (*Sternus vulgaris*) is introduced, with the remaining species native to the area. Commonly encountered birds included the galah (*Eolophus roseicapillus*), common starling (*Sturnus vulgaris*) and Australian raven (*Corvus coronoides*).

Table 3: Fauna species recorded during the field survey of the Edison Road site.

Species Name	Common Name
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo
<i>Cacatua sanguinea</i>	Little Corella
<i>Corvus coronoides</i>	Australian Raven
<i>Eolophus roseicapillus</i>	Galah
<i>Grallina cyanoleuca</i>	Magpie-lark
<i>Gymnorhina tibicen</i>	Australian Magpie
<i>Pardalotus striatus</i>	Striated Pardalote
<i>Psephotus haematonotus</i>	Red-rumped Parrot
<i>Rhipidura leucophrys</i>	Willie Wagtail
<i>Sturnus vulgaris</i>	Common Starling

Fauna habitat was limited on site and included:

- Isolated trees
- Small, medium and large hollows
- Grassland
- Large woody debris

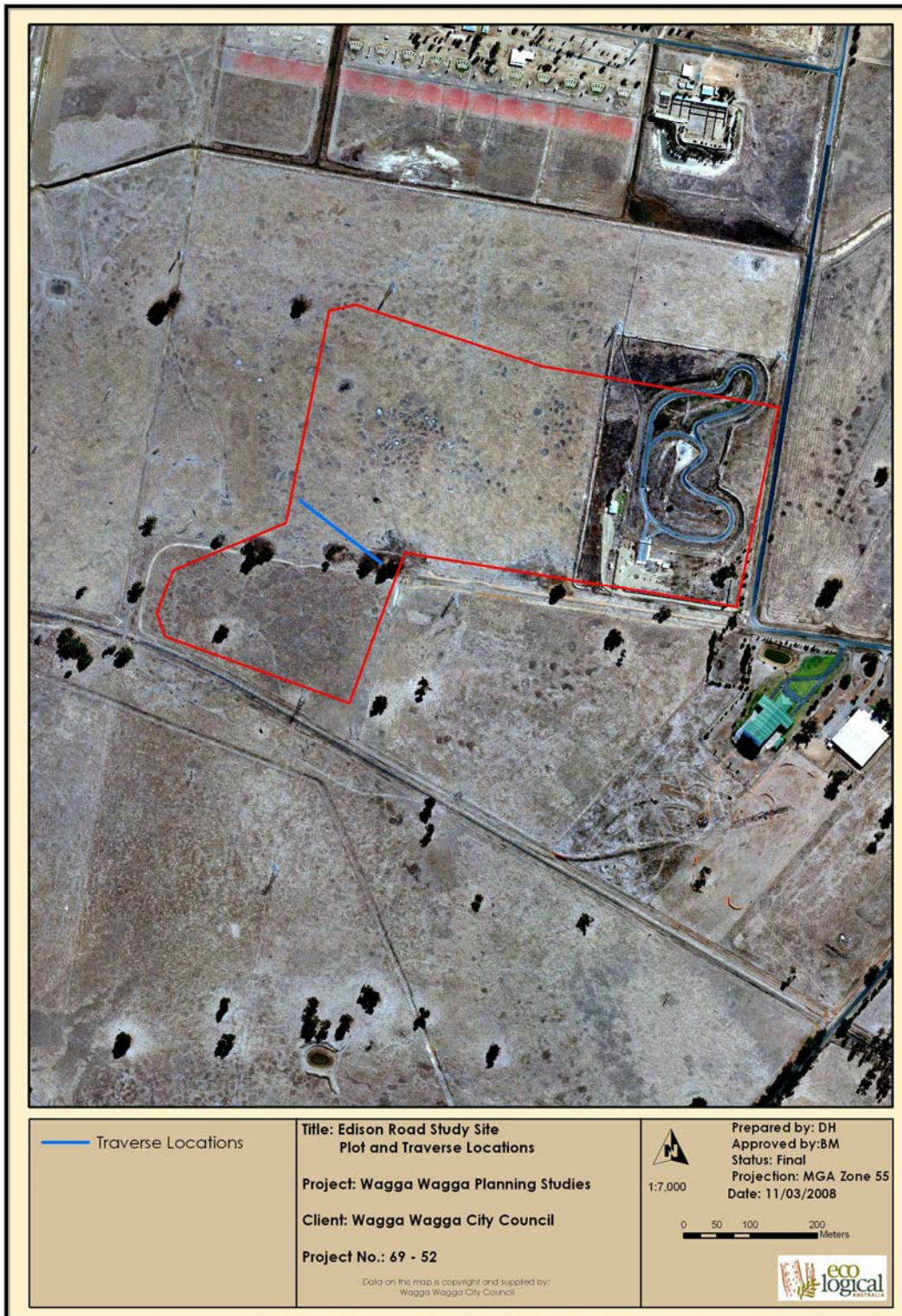
The isolated, hollow bearing trees likely provides breeding and roosting habitat for some birds and reptiles, while the grassland likely provides foraging and refuge habitat for a variety of birds and some common frogs (such as *Limnodynastes tasmaniensis*).

2.6 Special Considerations

Vegetation surveys were undertaken during late winter and are, therefore, likely to underestimate native groundcover due to the many non-native annuals that grow in the region at that time. The region is currently experiencing average rainfall after an extended period of drought which may also favour the dominance of exotic species during the time of survey.

2.7 Consultation

Eco Logical Australia discussed their approach to the project, and in particular field survey, with Mark Sheahan (DECC), Dr David Read, and David Walker (Wagga Wagga City Council), Darren Walleth (DWE), and Rachel Short, Vicki Shirlaw and Stuart Harding (Willana Associates).



Map 2 – Location of vegetation traverses.

3. Assessment of Vegetation

3.1 Areas of Native Vegetation

The study site is devoid of native vegetation communities and comprises improved pasture and cropped areas with isolated remnant paddock trees, as well as non-native grassland (Map 3). The traverse was conducted in previously improved pasture that has remained apparently unmanaged and grazed for many years. Consequently, the vegetation comprised predominantly exotic species with occasional native elements.

3.2 Regional Scale Assessment

3.2.1 Mitchell Landscapes

A review of the Mitchell Landscapes mapping within the Wagga Wagga area found that one Mitchell Landscape occurs within the Edison Road site. This landscape is the Murrumbidgee – Tarcutta Channels and Floodplains Ecosystem in the NSW South West Slopes Bioregion (Mitchell 2002) (Map 4). The landscape is characterised by channels, floodplain and terraces of Murrumbidgee tributaries on Quaternary alluvium, generally lies at an elevation of between 200 to 400m, and has undifferentiated organic sand and loam on the floodplain, brown gradational loam and yellow texture-contrast soils on higher terraces. River red gum gallery woodland generally occurs on banks in this landscape, and yellow box and grey box open woodland occur on floodplain and terraces (Mitchell 2002). The Murrumbidgee – Tarcutta Channels and Floodplain landscape has been heavily cleared for agricultural production (Table 4)

Table 4 – Mitchell landscapes within the study area

Mitchell Landscape	Degree of Clearance	Area within Study Area	% of Study Area
Murrumbidgee – Tarcutta Channels and Floodplains Ecosystem	91 %	28.1 ha	100 %



Map 3 – Areas of native vegetation at the site.



Map 4 – Mitchell landscapes on the site

3.2.2 Vegetation Types

The site contains remnant isolated trees, but these do not comprise a native vegetation community (Table 5). The site is rural and modified by agricultural activities (Map 5).

Table 5 – vegetation types on site, their area within the site and the degree to which this landscape type has been cleared from its previous extent

Vegetation Type	Degree of Clearance	Area within Study Area	% of Study Area
Scattered Paddock Trees and Exotic Grassland	N/A	0.98 ha	3.5 %

3.3 Landscape Scale Assessment

3.3.1 Landscape Value

The landscape value of the site is defined by Ayers *et al.* (2005) as the extent of vegetation cover, the connectivity of vegetation within the site to patches of native vegetation outside the site and the overall size of remnant vegetation patches connected to the site. In determining the landscape value of the site, the extent of vegetation cover is estimated for three scales (within 10, 100 and 1000 ha areas) to recognise the different ranges of various biota and scale of impacts of activities on biota in the area.

The study site is located within a rural environment, with some industrial development to the north. The site is surrounded by similar rural land. Only isolated paddock trees are present in the site. Little to no connectivity exists between native vegetation within or outside the site boundaries. The site does not play an important role as a corridor or provide key habitat for threatened and non-threatened species

A summary of the outcomes of the landscape scale assessment as described in Ayers *et al.* (2005) is provided in Table 6 below.

Table 6 – Landscape Value of Vegetation.

Landscape Attribute	Current Score
% Cover within 1.75 km radius (1000 ha)	< 10 %
% Cover within 0.55 km radius (100 ha)	< 10 %
% Cover within 0.2 km radius (10 ha)	< 10 %
Connectivity value	Nil
Total adjacent remnant area	Small
Calculated Landscape Value	0



Map 5 – Vegetation types on site

3.4 Site Scale Assessment

3.4.1 Assessment Zone Delineation

Vegetation within the site was broken up into 2 discrete zones based on the type, condition and quality of the native vegetation. These zones were:

- Zone 1 - Scattered Paddock Trees and Exotic Grassland
- Non-native Vegetation

The resulting assessment zones are presented in Map 6 below.

3.4.2 Condition and Quality of Vegetation

Condition of the vegetation within Zone 1 was determined to be 'paddock trees' (Map 7) as the projected foliage cover of the overstorey was below stated threshold for grassy woodland vegetation in 'moderate to good' condition and was found to have a groundcover consisting of perennial and annual exotic pasture Ayers *et al.* (2005).

The remainder of the site consisted of non-native vegetation and was not assigned a condition.

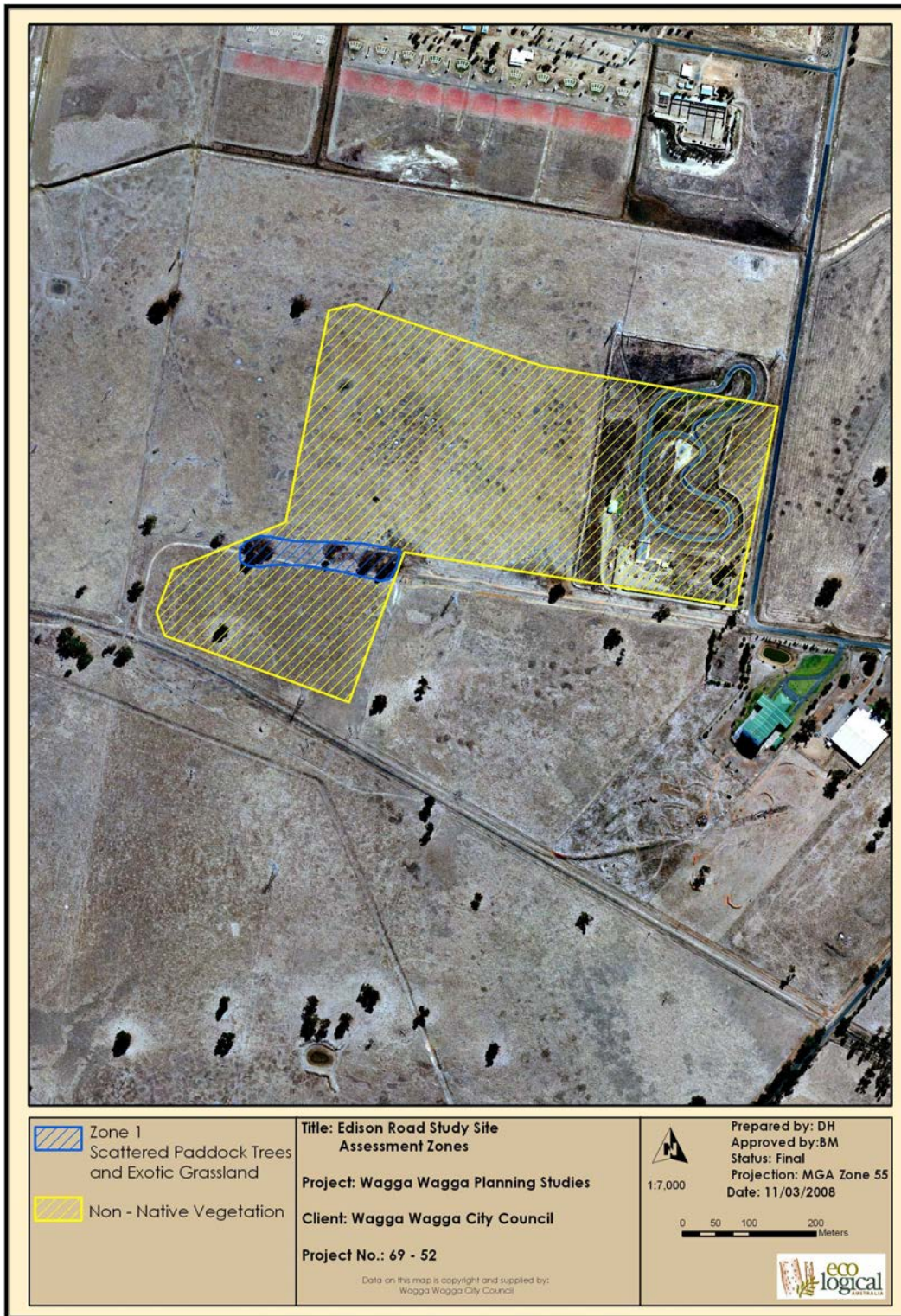
3.4.3 Summary of Assessment Zone Information

Vegetation at the site was found to be in poor condition, with the majority of the site devoid of native vegetation. The condition of the native vegetation was found to be scattered paddock trees due to the sparse overstorey cover and exotic dominated groundcover (Table 7).

Little to no connectivity exists between native vegetation within or outside the site boundaries. The site does not appear to play an important role as a corridor or provide key habitat for threatened and non-threatened species

Table 7 – Summary Information on Vegetation Assessment

Assessment Zone No.	Area (ha)	Vegetation Type	Vegetation Condition	Landscape Value	Biometric Score	No. Large trees.
1	1.0	Scattered Paddock Trees and Exotic Grassland	Paddock Trees	0	N/A	Approx. 7



Map 6 – Assessment Zones at the site



Map 7 – Vegetation condition at the site

4. Threatened Species

4.1 Threatened Species

No threatened species have been recorded on the site. The study area is devoid of native vegetation communities and comprises paddock trees. These trees may represent habitat for some species, but use is likely to be infrequent to non-existent. Species identified as having the potential to occur at the site include superb parrot (*Polytelis swainsonii*), yellow bellied sheathtail bat (*Saccolaimus flaviventris*) and little pied bat (*Chalinolobus picatus*).

Three species listed as migratory under the EPBC Act may also occur at the site. The species are: white-throated needletail (*Hirundapus caudacutus*), cattle egret (*Ardea ibis*) and rainbow bee-eater (*Merops ornatus*). As with threatened species above, the use of the site by these species is likely to be infrequent to non-existent.

The extent of habitat available for threatened species known, or with the potential, to occur at the site is presented in Table 8 below. Available habitat for threatened species is generally low across the site.

Table 8 – Habitat available for Threatened species considered likely, or with the potential to occur at the site.

Species	Breeding Habitat		Foraging Habitat		Roosting/Shelter Habitat	
	Description	Habitat on Site (ha or No. trees)	Description	Habitat on Site (ha or No. trees)	Description	Habitat on Site (ha or No. trees)
Little Pied Bat	Tree hollows, fissures or cracks, buildings, power poles, fence posts, caves, cliff crevices, mineshafts, tunnels.	Yes – 11 hollow bearing trees	Dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress-pine forest, mallee, Bimbil box.	Yes, 28.1 ha.	Tree hollows, fissures or cracks, buildings, power poles, fence posts, caves, cliff crevices, mineshafts, tunnels for roosting.	Yes – 11 hollow bearing trees
Superb Parrot	Living or dead trees with hollows > 5 cm diameter.	None	Feeds in box woodland with 10km of nest tree. West of dividing	Yes but dependence on the site likely to be low. Site is poorly connected to remnants off site.	Living or dead trees with hollows > 5 cm diameter.	Yes, but dependence on the site likely to be low. Site

Species	Breeding Habitat		Foraging Habitat		Roosting/Shelter Habitat	
	Description	Habitat on Site (ha or No. trees)	Description	Habitat on Site (ha or No. trees)	Description	Habitat on Site (ha or No. trees)
			range.			is poorly connected to remnants off site.
Yellow-bellied Sheathtail Bat	Live or dead hollow bearing trees	Yes – 11 hollow bearing trees	Forages in most habitats across its very wide range, with and without trees.	Yes, 28.1 ha.	Live or dead hollow bearing trees, under exfoliating bark, in burrows of terrestrial mammals in treeless areas, bird nests or sugar glider nests.	Yes – 11 hollow bearing trees

Proposed development of the study site may result in the loss of 12 paddock trees. For threatened species identified as potentially occurring at the site, the loss of this habitat is not likely to result in a significant impact. The extent of habitat with the potential to be removed under the current proposal is summarised in Table 9 below together with an assessment of whether this loss would be acceptable and whether the loss would require offsetting.

Table 9 – Standards for maintaining threatened species habitats.

Species	Ability to sustain a temporary reduction in the population / habitat on this property	Loss of habitat by proposal	Acceptability of loss/ Offset
Little Pied bat	Yes	12 possible foraging and/or roosting trees	Yes
Superb Parrot	Upper and lower slopes of Murrumbidgee: no loss of <i>Eucalyptus camaldulensis</i> with hollows > 5cm (ECH) and < 100 m from the Murrumbidgee River, 100m – 200m from the river up to 7 % loss ECH, > 200m from the river up to 10 % loss ECH. 10 % loss of foraging habitat.	12 possible foraging and/or roosting trees.	Yes, with offsetting.
Yellow bellied Sheathtail bat	Up to 10 % loss of foraging habitat. Up to 10 % loss of hollow bearing trees.	11 breeding and roosting trees	Yes, with offsetting.

4.2 Threatened Populations

The Wagga Wagga population of squirrel glider (*Petaurus norfolcensis*) is listed as an endangered population. However, there is no habitat for this species on site.

4.3 Endangered Ecological Communities

Remnant trees of the endangered ecological community Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penneplain, Nandewar and Brigalow Belt South Bioregions occurred on site; however, a history of agricultural practices on the site has reduced the native vegetation to scattered trees over cropping and improved pasture. Native vegetation at the site, therefore, does not constitute the community.

5. Structure Plan

The study site contains 12 paddock trees overlying cropped and pasture improved paddocks. The paddock trees are considered to have limited conservation value within the landscape as the long-term viability of the vegetation is considered low however, the paddock trees are thought to provide potential habitat for a number of species. The site is, therefore, potentially suitable for residential/industrial development provided that relevant offsets to the loss of native vegetation are achieved.

An offset ratio of 10:1 is required for scattered paddock trees at the Edison Road site (DEC 2005).. This means that for every large tree (i.e. > 40 cm diameter at breast height DBH) removed, 10 large trees of the same species must be retained at the site. Furthermore, the removal of a small tree (i.e. < 40 cm DBH) must be offset through the planting of 10 trees of the same species.

Offset areas are required to be reserved and managed for conservation. This means that 'open space' zoning is not sufficient for offset areas, rather zoning must reflect the conservation objectives of the offset area and a conservation management plan for offset areas must be prepared and implemented. In addition to the above, any scattered paddock trees not located within 'open space' or 'conservation' area must be considered as cleared and their loss offset using the above ratios.

The total loss of paddock trees, assuming full development of the site, is presented in Table 10 below. Also shown is the number of trees required to be retained, for each species, in order to achieve the offset ratio of 10:1.

Table 10: Proposed loss and required offset of paddock trees at the proposed Edison Road development site.

Species Name	Common Name	No. of trees		Required Offset		Total Offset
		Large	Very Large	Large	Very Large	
<i>Eucalyptus microcarpa</i>	Grey Box	1	10	10	100	110
<i>Eucalyptus blakelyi</i>	Blakely's Redgum	1		10		10
Overall Total						150

Sufficient offsets for the loss of paddock trees are not available within retained lands at the site and so offsets in other areas would be required. The precise extent of retained areas relative to potentially developable areas will need to be determined in the context of other constraints to development (i.e. geotechnical, flooding, bushfire, etc), the impacts on threatened species and the potential to provide offsets to the losses associated with the potentially developable areas. The determination of the appropriate mix of retained areas and potentially developable areas is an iterative process that will require further liaison between DECC and WWCC. As part of this process, the quantum of offsets associated with each potential mix of retained

areas and potentially developable areas will need to be calculated. The data that has been collected for this report provides a basis for these calculations.

While paddock trees positioned within residential zoned land (or similar) are required to be offset, it is recommended that paddock trees –particularly those containing hollows – be retained where possible at the site. Future master planning should aim to incorporate existing paddock trees into the urban/industrial landscape and so retain their values as fauna habitat.

The areas proposed for development, as determined on the basis of current investigation at the site, are presented in Map 8 below.



Map 8: Structure Plan for the site

6. References

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7. Appendices

Appendix 1: Likelihood of occurrence for threatened species, populations and communities on the Edison Road site.

Scientific Name	Common Name	Status		Likelihood	Habitat
		TSC Act	EPBC Act		
Threatened species - Fish					
<i>Maccullochella peelii peelii</i>	Murray Cod		V	Unlikely	Waterways of the Murray–Darling Basin in a wide range of warm water habitats that range from clear, rocky streams to slow flowing turbid rivers and billabongs. The upper reaches of the Murray and Murrumbidgee Rivers are considered too cold to contain suitable habitat.
<i>Macquarie australasica</i>	Macquarie Perch		E	No	Occurs widely in riverine and lake habitats. In Sydney basin only known from Cataract and Cordeaux River catchments. Upland streams and migrates upstream to gravel beds to spawn.
Threatened species - Frogs					
<i>Litoria booroolongensis</i>	Booroolong Frog	E		Unlikely	Restricted to NSW and north-eastern Victoria, predominantly along the western-flowing streams of the Great Dividing Range. Live along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses
<i>Litoria raniformis</i>	Southern Bell Frog	E	V	No	Usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. They are

Scientific Name	Common Name	Status		Likelihood	Habitat
		TSC Act	EPBC Act		
					also found in irrigated rice crops, particularly where there is no available natural habitat
Threatened species - Snakes					
<i>Aprasia parapulchella</i>	Pink-tailed Worm-lizard	V	V	Unlikely	In general, lizards occur in open grassland habitats that have a substantial cover of small rocks
<i>Delma impar</i>	Striped Legless Lizard	V	V	Unlikely	Lowland native grasslands
Threatened species - Birds					
<i>Ardea alba</i>	Great Egret, White Egret		M	Unlikely	Shallows of rivers, estuaries, tidal mudflats, freshwater wetlands, larger dams
<i>Ardea ibis</i>	Cattle Egret		M	Potential	Stock paddocks, pastures, croplands, garbage tips, wetlands, tidal mudflats
<i>Burhinus grallarius</i>	Bush Stone-curlew	E		No	Well wooded floodplain forests, amongst fallen timber
<i>Cacatua leadbeateri</i>	Major Mitchell's Cockatoo	V		Unlikely	Near water on timbered watercourses
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V		No	Wetter forests, and woodlands, from sea level to 2000m on divide. From timbered foothills and valleys to suburban gardens.
<i>Climacteris picumnus victoriae</i>	Eastern subspecies of Brown Treecreeper	V		Potential	Drier forests / woodlands / scrubs with fallen branches.
<i>Gallinago hardwickii</i>	Latham's Snipe, Japanese Snipe		M	No	Soft wet ground or shallow water with tussocks and other green and dead growth. Wet drainage areas
<i>Grus rubicundis</i>	Brolga	V		Potential	Though Brolgas often feed in dry grassland or ploughed paddocks or even desert claypans, they are dependent on wetlands too, especially shallow swamps, where

Scientific Name	Common Name	Status		Likelihood	Habitat
		TSC Act	EPBC Act		
					they will forage with their head entirely submerged
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle		M	No	Rivers, large dams. Roost and nest on large platforms built in large Eucalypts
<i>Hirundapus caudacutus</i>	White-throated Needletail		M	Potential	Open space above canopy. Forages over large areas
<i>Lathamus discolor</i>	Swift Parrot	E	E, M	Unlikely	Forests, woodlands, plantations, banksias, street trees and gardens on the mainland
<i>Leipoa ocellata</i>	Malleefowl	E	V, M	No	Predominantly inhabit mallee communities, preferring the tall, dense and floristically-rich mallee found in higher rainfall (300-450 mm mean annual rainfall) areas. Less frequently found in other eucalypt woodlands
<i>Melanodryas cucullata</i>	Hooded Robin	V		Potential	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	V		Unlikely	Ironbark woodlands, extensively wooded areas
<i>Merops ornatus</i>	Rainbow Bee-eater		M	Potential	Open woodlands with sandy, loamy soils, dunes, cliffs, mangroves golf courses
<i>Myiagra cyanoleuca</i>	Satin Flycatcher		M	Unlikely	Heavily vegetated gullies in forests, and taller woodlands of coastal south-east Australia. Also occurs in various sites during migration including farms and parks
<i>Neophema pulchella</i>	Turquoise Parrot	V		Unlikely	Open grassy woodland, with dead trees, near permanent water and forested hills.
<i>Ninox connivens</i>	Barking Owl	V		Unlikely	Open forests, woodlands, dense

Scientific Name	Common Name	Status		Likelihood	Habitat
		TSC Act	EPBC Act		
					scrubs, other large trees near watercourses. Nest in tree hollow.
<i>Pachycephala inornata</i>	Gilbert's Whistler	V		Potential	The Gilbert's Whistler occurs in ranges, plains and foothills in arid and semi-arid timbered habitats. In NSW it occurs mostly in mallee shrubland, but also in box-ironbark woodlands, Cypress Pine and Belah woodlands and River Red Gum forests.
<i>Pedionomus torquatus</i>	Plains Wanderer	E	V	No	Most of the vegetation is <5 cm high but some vegetation up to a maximum of 30 cm is important for concealment, grass tussocks are spaced 10-20 cm apart
<i>Polytelis swainsonii</i>	Superb Parrot	V	V	Potential	Breeds along inland rivers in river red gum, feeding in box woodland with 10km of nest tree. West of dividing range.
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V		Potential	Inhabits open Box-gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains
<i>Pyrholaemus sagittatus</i>	Speckled Warbler	V		Unlikely	Well vegetated woodlands, diverse structure
<i>Rostratula australis</i>	Australian Painted Snipe		V	Unlikely	Well vegetated margins of wetlands
<i>Rostratula benghalensis australis</i>	Painted Snipe (Australian subspecies)	E	V, M	Unlikely	Well vegetated margins of wetlands
<i>Stagonopleura guttata</i>	Diamond Firetail	V		Unlikely	Open eucalypt forests, woodlands.
<i>Stictonetta naevosa</i>	Freckled Duck	V		Potential	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to

Scientific Name	Common Name	Status		Likelihood	Habitat
		TSC Act	EPBC Act		
					more permanent waters such as lakes, reservoirs, farm dams and sewage ponds
<i>Grantiella picta</i>	Painted Honeyeater	V	-	Unlikely	Boree, Brigalow and Box-gum woodlands and box-ironbark forests. Inhabits vegetation with 5 or more mistletoe per hectare.
<i>Xanthomyza phrygia</i>	Regent Honeyeater	E	E, M	Unlikely	Dry open forests, woodlands, especially red ironbark, yellow box, yellow gum
Threatened species - Mammals					
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	No	Occurs in wide variety of habitats in large remnants. Dens in tree hollows, hollow log or rock crevice
<i>Macrotis lagotis</i>	Bilby	Ex	V	No	Sandy desert areas in spinifex (<i>Triodia</i> species) grasslands
<i>Myotis adversus</i>	Large-footed Myotis	V		Potential	Known from a range of habitats close to water from lakes, small creeks to large lakes and mangrove lined estuaries
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail Bat	V	-	Potential	Forages in most habitats across its very wide range, with and without trees. Roosts and breeds in living or dead hollow bearing trees.
<i>Chalinobolus picatus</i>	Little Pied bat	V	-	Potential	Dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine forest, malle and bramble box. Roosts and breeds in tree hollows, fissures or cracks, buildings, power poles, fence posts, caves, cliff crevices, mineshafts and tunnels.
<i>Nyctophilus timoriensis</i> (south eastern form)	Eastern Long-eared Bat	V	V	Potential	Inhabits a variety of vegetation types, including mallee, bullock

Scientific Name	Common Name	Status		Likelihood	Habitat
		TSC Act	EPBC Act		
					Allocasuarina leuhmanni and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland
<i>Petaurus norfolcensis</i>	Squirrel Glider	V		Unlikely	In the region occurs in Box-gum woodlands, box-ironbark woodlands and river red gum woodland.
<i>Phascolarctos cinereus</i>	Koala	V		No	Inhabit eucalypt woodlands and forests
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	V	-	No	Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. Also inhabit heath, swamps, rainforest and wet sclerophyll forest.
Threatened species - Plants					
<i>Ammobium craspedioides</i>	Yass Daisy	V	V	No	Known from natural temperate grassland sites.
<i>Amphibromus fluitans</i>	River Swamp Wallaby-grass	V	V	No	Swamps or low-lying areas which become periodically water-logged, usually on clayey soils.
<i>Austrostipa wakoolica</i>		E	E	No	Grows on floodplains of the Murray River tributaries, in open woodland on grey, silty clay or sandy loam soils; habitats include the edges of a lignum swamp with box and mallee; creek banks in grey, silty clay; mallee and lignum sandy-loam flat; open Cypress Pine forest on low sandy range; and a low, rocky rise

Scientific Name	Common Name	Status		Likelihood	Habitat
		TSC Act	EPBC Act		
<i>Brachycome muelleriodes</i>	Claypan Daisy	V	V	No	Grows in damp areas on the margins of claypans in moist grassland with <i>Pycnosorus globosus</i> , <i>Agrostis avenacea</i> and <i>Austrodanthonia duttoniana</i>
<i>Brachycome papillosa</i>	Mossigiel Daisy	V	V	No	Recorded primarily in clay soils on Bladder Saltbush (<i>Atriplex vesicaria</i>) and <i>Maireana aphylla</i> plains, but also in grassland and in Grey Box (<i>Eucalyptus microcarpa</i>) - Cypress Pine (<i>Callitris spp.</i>) woodland
<i>Diuris sheaffiana</i>	Tricolour Diuris	V	V	No	Sporadically distributed on the western slopes of NSW. Associated species include <i>Callitris glaucophylla</i> , <i>Eucalyptus populnea</i> , <i>Eucalyptus intertexta</i> , Ironbark and Acacia shrubland. The understorey is often grassy with herbaceous plants such as Bulbine species
<i>Senecio garlandii</i>	Woolly Ragwort	V	V	No	Woolly Ragwort occurs on sheltered slopes of rocky outcrops
<i>Swainsona murrayana</i>	Slender Darling-pea	V	V	No	Grows in a variety of vegetation types including bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with <i>Maireana</i> species. Plants have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated.
<i>Swainsona recta</i>	Small Purple-pea	E	E	No	Before European settlement Mountain Swainson-pea occurred in the grassy understorey

Scientific Name	Common Name	Status		Likelihood	Habitat
		TSC Act	EPBC Act		
					of woodlands and open-forests dominated by Blakely's Red Gum <i>Eucalyptus blakelyi</i> , Yellow Box <i>E. melliodora</i> , Candlebark Gum <i>E. rubida</i> and Long-leaf Box <i>E. gonicalyx</i>
<i>Thesium australe</i>	Austral Toadflax	V	V	No	Often found in damp sites in association with Kangaroo Grass (<i>Themeda australis</i>)
Threatened Ecological Populations					
<i>Petaurus norfolcensis</i> – endangered population Wagga Wagga	Squirrel Glider population in the Wagga Wagga LGA	E		Unlikely	Inhabits a wide range of open forest, woodland and riverine forest habitats. Utilise remnants of various sizes, including small remnants and even small stands of trees within Travelling Stock Reserves, roadside reserves or private land. Often utilise linear remnant vegetation along roadsides or rivers and streams
Threatened Ecological Communities					
	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	E	CE	Yes	Western slopes and plains

Appendix 2: Flora species recorded on the Edison Road site.

Species Name	Common Name
Arcotrocha calendula#	Capeweed
Bromus diandrus#	Great Brome
Bromus spp.#	
Echium plantagineum#	Patterson's Curse
Erodium botrys#	Long Storksbill
Erodium cicutarium#	Common Crowfoot
Eucalyptus blakelyi	Balkely's Redgum
Eucalyptus microcarpa	Inland Grey Box
Hordeum leporinum#	Barley Grass
Juncus spp.	
Lolium rigidum#	Wimmera Ryegrass
Malva parviflora#	Small-flowered Mallow
Oxalis spp.	
Romulea rosea#	
Rumex brownii	Swamp Dock
Rumex crispus#	Curled Dock
Vulpia spp.	
Xanthium spinosum#	Bathurst Burr

#Exotic species