ASSESSMENT | PLANNING | MANAGEMENT

Wagga Wagga Planning Study

Environmental / Biodiversity report for Bomen

(Project No. 069-052)

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

March 2008

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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 Bomen, 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 Bomen 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 Bomen 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 Bomen development site which will allow development of the site while avoiding impacts to native vegetation and threatened species habitats

Within the Bomen site, remnant native vegetation exists as small, isolated pockets of moderate quality roadside vegetation and as scattered paddock trees overlying improved pasture and cropping. Large and very large trees were scattered along road reserves across the site.

The native vegetation on the site was identified as Yellow Box Woodland which is consistent with the broader White Box, Yellow Box, Blakely's Redgum ecological community which is listed as endangered under Part 3, Schedule 1 of the TSC Act (1995). Due to the low diversity of native herbaceous plants in the groundcover, yellow box woodland is not considered part of the critically endangered box – gum woodland under the Commonwealth EPBC Act (1999). Yellow box (*Eucalyptus melliodora*) was the dominant tree species in patches of remnant vegetation and was the most common species of paddock tree encountered at the site.

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'Moderate to good' Yellow box woodland occupied an area of 35.97 ha within the site while scattered paddock trees and exotic grassland occupied an area of 40.33 ha. The remainder of vegetation at the site was identified as non-native vegetation.

Regionally, the site occurs within a landscape which has been heavily cleared of native vegetation, mostly for agricultural production. As such, native vegetation at the site, though degraded, is considered to be of high conservation value. The landscape value of the site was found to be low with patches of native vegetation typically highly isolated from each other.

One threatened fauna species, the grey crowned babbler, was observed at the site while a further 6 species; are considered likely, or with the potential to, occur. In addition, the site is considered to provide potential foraging habitat for two Commonwealth EPBC Act listed migratory bird species.

The development potential of the site is extensive with approximately 2785 ha of 'non-native vegetation' and 'scattered paddock trees and exotic grassland' within the site considered potentially developable. Areas identified as containing scattered paddock trees are potentially suitable for residential/industrial development provided that relevant offsets to the loss of paddock trees are achieved. Approximately 36 ha of the site is highly constrained as it contains remnant native vegetation in 'moderate to good' condition and provides potential habitat for a number of threatened fauna.

A structure plan has been produced which outlines the recommended location of potentially developable lands, lands to be retained and areas in which offsets may be located. In general, the location of retained lands and offset areas at the site aim to:

- Elevate patches of native vegetation from moderate to good condition
- Decrease edge effects currently experienced by native vegetation remnants
- Increase connectivity between currently isolated woodland patches within the site
- Increase connectivity of the site to areas of remnant vegetation outside the site boundaries

The loss of remnant trees within potentially developable lands of Bomen will require offsetting to a ratio of 10:1. Moreover, remnant trees retained within a residential zoning will also require offsetting. It is unlikely that appropriate offsets can be accommodated on site within 'moderate to good' condition vegetation therefore locations for offsets out side of the Bomen site may need to be explored. It is recommended that remnant trees within potentially developable lands be retained and incorporated into future Master Planning so as to maximise the retention of biodiversity values within any future urban 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 Bomen. 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 Bomen 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 Bomen 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 Bomen development site which will allow development of the site while avoiding impacts to native vegetation and threatened species habitats

1.3 Study Area

The Bomen site occurs to the north east of the city of Wagga Wagga. The site occupies an area of approximately 2821 ha and is bound by the Olympic Highway to the west, Mary Gilmore Road and Byrnes Road to the north, and Baven Road to the south (Map 1). The Main Southern Railway Line and Byrnes Road run in a north to south direction and dissect the site.

Current land use at the site is predominately rural with much of the site consisting of improved pasture sparsely grazed by sheep and cattle or cropping. Industrial development occurs in the south of the site as along with livestock sale yards and a sewerage treatment plant (STP).

The topography of the site is gently undulating with some steeper, hilly areas represented by two higher peaks (approximately 260 and 280 metres above sea level, ASL) in the east of the site. The elevation ranges from these high points to a low of approximately 180 metres ASL on the east of the site.

Drainage of the site is via two main creeks; Dukes Creek, which drains the majority of the land west of the Main Railway, and Schillers Creek which drains the area to the east of the Main Railway (Urban Concepts 1995). Both creeks drain south west towards the Murrumbidgee, approximately 2 km to the south of the site. Both creeks are ephemeral and lack defined channels (Urban Concepts 1995). Several smaller streams traverse the site and feed Dukes and Schillers Creeks.

Ponded surface water is provided on the site by numerous farm dams along with settlement and evaporation ponds associated with Riverina Wool Combing Pty Ltd and the stormwater treatment plant east of the Olympic Highway.

The site is predominately covered by the East Bomen soil group described by Chen and McKane (1997). This soil type is prone to erosion and occupies the undulating country and gentle slopes and hills across the site. Two small hill crests in the south east of the site are mapped as Glenmornon soils group. These soils are generally of low fertility and represent a high erosion hazard (Urban Concepts 1995).

The study site is mostly devoid of native vegetation with improved pasture and cropping (e.g. canola and barley) occupying most of the site (Map 1). Native vegetation is confined to isolated paddock trees and remnant roadside vegetation with the most notable stands of vegetation located along Byrnes and Trahairs Roads.

The site is located approximately 35 km north of Livingstone National Park and 30 km north east of the Rock Nature Reserve. Ulandra Nature Reserve is located approximately 40 km north east of the site while Elerslie Nature Reserve is approximately 40 km to the south east. The subject site is not well connected to these areas with much of the surrounding landscapes modified for similar land uses.

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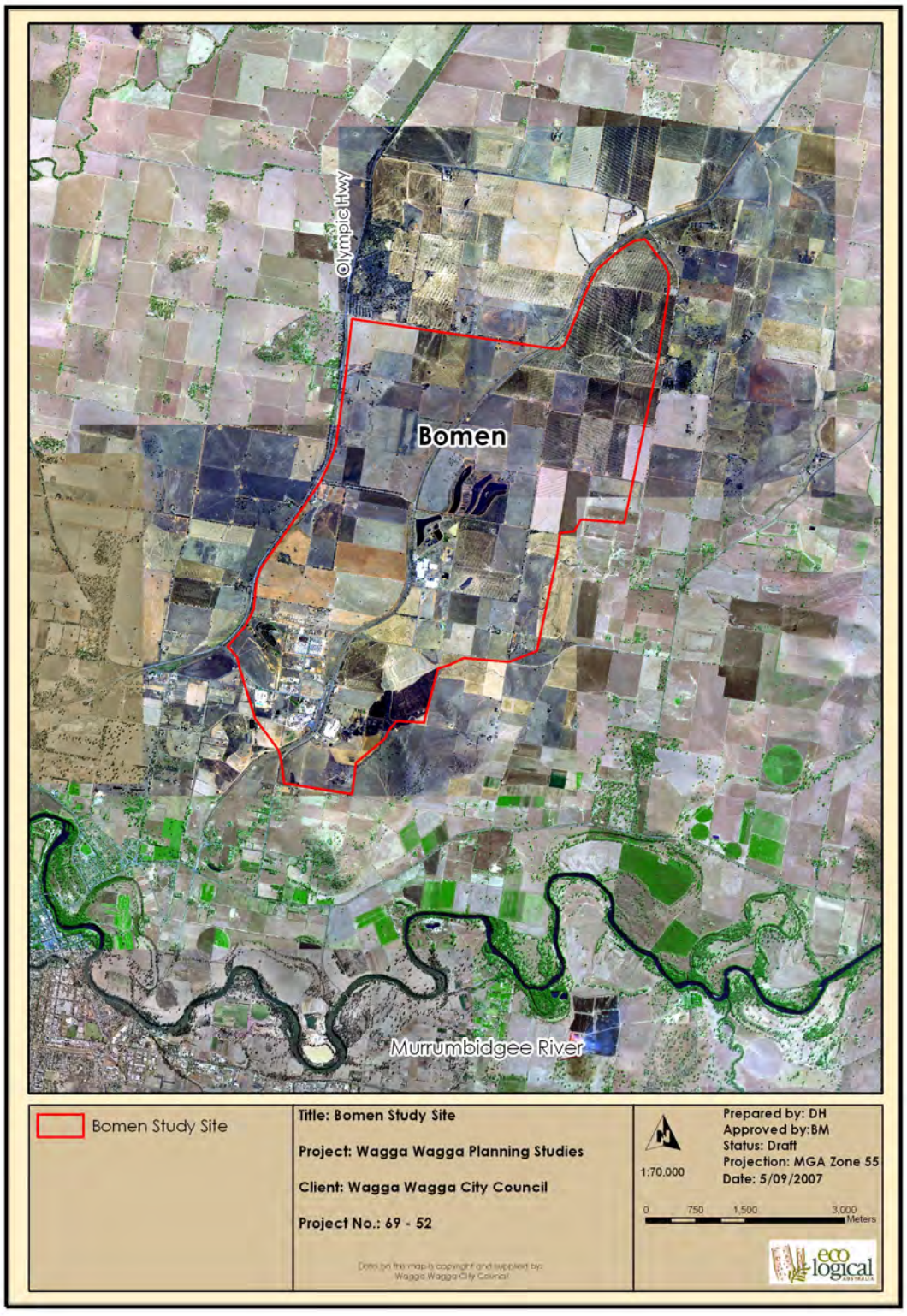

Map 1 – Location of proposed Bomen development site.

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1.4 Legislative Summary

The following provides a brief summary of the main pieces 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).

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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 Bomen 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. 3 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

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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.

The removal of vegetation or material from within 40 m of waterbodies within the site would require approval under the Act.

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2. Description of Methods

2.1 Review of existing information

A number of environmental reports have been prepared for the Bomen area. A description of each report and their major findings is provided below:

- **Urban Bushland Management Consultants (2006). *Desktop Flora and Fauna Assessment for Lot 4, DP849385, Web Street, Bomen*. Unpublished report for Pioneer Road Services**

  This document was a desktop survey and analysis of impacts from industrial development on the site. The document reported that two threatened flora species, the Yass daisy (*Ammobium craspedioides*) and the small purple-pea (*Swainsona recta*) had the potential to occur within the study area. Further, it reported that 8 threatened fauna species potentially occurred on the study site. These species included 6 avian species: Major Mitchell's cockatoo (*Cacatua leadbeateri*), diamond firetail (*Stagonopleura guttata*), brolga (*Grus rubicundus*), turquoise parrot (*Neophema pulchella*), superb parrot (*Poly swainsonii*), and the barking owl (*Ninox connivens*), and 2 mammal species: the bilby (*Macrotis lagotis*) and the spotted-tailed quoll (*Dasyurus maculatus*). However, the report concluded that the threatened species were unlikely to be adversely impacted from industrial development on the site (7-part tests were used in impact assessments).

- **Charles Sturt University (1999). *Soil and Landscape Survey Bomen, NSW*. Unpublished report for Pacific Power.**

  This document provided detailed information on the soils of Bomen (type, conductivity, texture) and identified areas in Bomen with low, moderate, high and severe hazard and erosion potential. It recommended sediment and erosion control measures for the site to minimise the impacts of development on the site.

- **Urban Concepts (1995). WISDOM Study – Section 5 Environmental Audit. An unpublished report prepared for the NSW Dept. of Business and Regional Development and Wagga Wagga City Council.**

  Section 5 – Environmental Audit, of the WISDOM Report provided a review of the aspects of the local environment within the Bomen area that were considered significant for industrial proposals. Aspects of the local environment covered under Section 5 of the report included; geology, soils, drainage, vegetation and fauna habitat, air and noise quality, social and economic factors, and overall amenity.

  The report found that native vegetation is sparse within the Bomen area with only few areas of particularly high conservation value. Further, the area was not considered likely to provide unique habitat for threatened flora or fauna species.

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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 Bomen 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.

Aerial photographs of the site and surrounding area were provided by Wagga Wagga City Council and were used to investigate the extent of vegetation cover, landscape features and land use in the area.

2.3 Field Survey

Survey of the site was conducted during the period between 15th and 24th August, 2007. Weather conditions ranged from fine and sunny to cold and rainy during the survey period. Weather conditions for the period are summarised in (Table 1).

Table 1: Weather conditions for the survey period 15th – 24th August, 2007.

Date	Day	Temps (°C)		Rain (mm)
		Min	Max	
15	We	1.5	16	0
16	Th	2.3	16.6	0
17	Fr	5	12.2	14.2
18	Sa	5.5	14.4	1.8
19	Su	3.2	15.8	0.2
20	Mo	4.1	17.7	0.2
21	Tu	1.4	16.8	0
22	We	3.4	15.2	0
23	Th	2.8	16.6	0
24	Fr	7.3	17.2	0

Source: Bureau of Meteorology [Online]. http://www.bom.gov.au

Prior to field survey, aerial photography of the site was assessed and vegetation zones requiring survey where identified. Vegetation Zones were mapped according to the methods described in the *BioMetric Tool* v1.8 (Ayers et al. 2005).

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The aim of the field survey was to accurately and quantitatively record the type, condition and extent of vegetation at the site. Field survey also aimed to record the various types of fauna habitat present within the site and the types and degree of disturbance acting on ecological values at the site.

Targeted fauna surveys were not conducted in the current study, rather incidental fauna sightings were recorded. Limited access to the site at the time of survey meant that most of the site could only be inspected from the road reserve. The review of aerial photography revealed that parts of the site were cropped, and the entire site was largely cleared of native vegetation.

Vegetation within the study area was assessed using two methods:

- Systematic Vegetation survey (vegetation plots)
- Tree Counts

Systematic vegetation surveys were conducted using the methods described in Appendix 3 of the BioMetric Tool v1.8 Operation Manual (Ayers *et al.* 2005). Due to the paucity of native vegetation at the site, only 1 vegetation plot was surveyed. The location of the vegetation plot was biased towards an area of remnant tree cover along Trahairs Road (Map 2).

Tree counts were made by identifying all large trees at the site (i.e. > 40 cm diameter at breast height (DBH)). Their location was then recorded either via a handheld GPS unit or by marking their location on a high resolution aerial photograph. Large trees were assigned to a size class (Large - > 40 cm and < 80 cm DBH and Very Large - > 80 cm DBH) and the species of each tree recorded as either large or very large was recorded.

Following completion of the field survey, data collected was used to run the BioMetric Tool v1.8 (AYERS ET AL. 2005). BioMetric is a tool for assessing terrestrial biodiversity at the scale of patch, paddock or property (Ayers et al. 2005). Readers should consult the BioMetric Tool Operational Manual (Ayers et al. 2005) for a detailed discussion of the assessment process under the BioMetric Tool v1.8.

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 2.

Table 2: 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	
Threatened species				
Ardea ibis	Cattle Egret		M	Stock paddocks, pastures, croplands, garbage tips, wetlands, tidal mudflats

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Scientific Name	Common Name	Status		Habitat
		TSC Act	EPBC Act	
Hirundapus caudacutus	White-throated Needletail		M	Open space above canopy. Forages over large areas
Polytelis swainsonii	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.
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V		Inhabits open Box-gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains
Climacteris picumnus victoriae	Eastern subspecies of Brown Treecreeper	V		Drier forests / woodlands / scrubs with fallen branches
Stagonopleura guttata	Diamond Firetail	V		Open eucalypt forests, woodlands.
Saccolaimus flaviventris	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.
Chalinolobus picatus	Little Pied bat	V	-	Dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine forest, mallee and bramble box. Roosts and breeds in tree hollows, fissures or cracks, buildings, power poles, fence posts, caves, cliff crevices, mineshafts and tunnels.
Threatened Ecological Communities				
	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	E	CE	Western slopes and plains

2.5 Field Survey Results

2.5.1 Flora

A total of 26 flora species were recorded by the systematic survey along Trahairs Road. Of the 26 species recorded, 15 were native species while the remaining 11 species were exotic. Common native species along Trahairs Road included yellow box (*Eucalyptus melliodora*), *Austrostipa scabra*, *Lomandra multiflora* and *Dianella revoluta*. Exotic species typically dominated the groundcover with species such as Patterson's curse (*Echium plantagineum*), capeweed (*Arctotheca calendula*) and

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onion grass (*Romulea rosea*). A list of flora species recorded during the survey is presented below (Table 3).

Visual assessment from the road reserve confirmed that much of the site was devoid of native vegetation and consisted of improved pasture and cropping.

No threatened flora were recorded during the surveys nor are any considered likely to occur on site as outlined in section 2.4. Urban Bushland Management Consultants (2006) considered two species; Yass daisy (*Ammobium craspedioides*) and small purple-pea (*Swainsona recta*), as possibly occurring at the site, however this is considered unlikely given the level and nature of historic and ongoing disturbance at the site combined with the predominately exotic vegetation cover.

Table 3: Flora species recorded within the proposed Bomen development site.

Species Name	Common Name
Eucalyptus melliodora	Yellow Box
Callitris glaucophylla	White Cypress Pine
Olea europaea #	Common Olive
Echium plantagineum#	Patterson's Curse
Austrostipa bigeniculata	
Avena fatua#	Wild Oats
Arctotheca calendula#	Capeweed
Bromus spp.#	
Romulea rosea#	
Dianella revoluta	
Austrodanthonia spp.	
Arthropodium spp.	
Lomandra multiflora	
Trifolium arvense#	Haresfoot Clover
Medicago spp.#	
Dianella longifolia	
Maireana enchylaenoides	
Salvia verbenaca#	Wild Sage
Stipa scabra	
Sida corrugata	
Oxalis perennans	
Rumex brownii	Swamp Dock
Maireana excavata	
Lomandra filiformis	
Convolvulus erubescens	
Hordeum leporinum#	Barley Grass

#Exotic species

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One exotic species recorded within the Bomen site, Patterson's curse, is a declared noxious weed within the Wagga Wagga LGA. Patterson's curse is listed as a class 4 noxious weed and therefore the "growth and spread of the plant must be controlled according to measures specified in a management plan published by the local control authority" (NSW DPI 2007).

2.5.2 Fauna

A total of 11 species of avifauna were observed during field survey including the threatened grey-crowned babbler (*Pomatostomus temporalis*) (Table 4). One amphibian species, spotted marsh frog (*Limnodynastes tasmaniensis*) was recorded sheltering under a piece of corrugated iron on the side of Trahairs Road. No other fauna groups were observed during the survey.

A review of the NSW Wildlife Atlas and EPBC Act Protected Matters Search Tool indicated a total of 54 threatened or migratory species, an endangered population and an endangered ecological community have been previously recorded within the Wagga Wagga LGA. Of these, 2 migratory species listed under the EPBC Act; white-throated needletail (*Hirundapus caudacutus*) and cattle egret (*Ardea ibis*) and 6 threatened species listed under the TSC Act and/or EPBC Act; superb parrot (*Polytelis swainsonii*), swift parrot (*Lathamus discolor*), diamond firetail (*Stagonopleura guttata*), brown treecreeper (*Climacteris picumnus victoriae*), little pied bat (*Chalinolobus picatus*) and yellow-bellied sheathtail bat (*Saccolaimus flaviventris*) have the potential to occur at the site. This assessment is shown in full in Appendix 1.

One threatened species; the grey-crowned babbler, and an endangered ecological community, White box, Yellow box, Blakely's Redgum Woodland were observed at the site. White Box, Yellow Box, Blakely's Redgum Woodland, commonly referred to as Box-gum Woodland, is listed as an EEC under the TSC Act and as a critically endangered ecological community under the Commonwealth EPBC Act.

Urban Bushland Management Consultants (2006), in addition to species listed above, considered the major Mitchell's cockatoo (*Cacatua leadbeateri*), brolga (*Grus rubicundus*), turquoise parrot (*Neophema pulchella*), barking owl (*Ninox connivens*), bilby (*Macrotis lagotis*) and spotted-tailed quoll (*Dasyurus maculates*) as possibly occurring in the south west of the site. These species are currently considered unlikely to occur at the site.

Table 4: Fauna species recorded during field survey of the proposed Bomen development site.

Species Name	Common Name	Status
Birds		
Corvus coronoides	Australian Raven	-
Cracticus nigrogularis	Pied Butcherbird	-
Eolophus roseicapillus	Galah	-
Gymnorhina tibicen	Australian Magpie	-
Manorina melanocephala	Noisy Miner	-
Ocyphaps lophotes	Crested Pigeon	-

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Species Name	Common Name	Status
Pardalotus striatus	Striated Pardalote	-
Platycercus adscitus eximius	Eastern Rosella	-
Pomatostomus temporalis	Grey-crowned Babbler	Vulnerable
Falco berigora	Brown Falcon	-
Sturnus vulgaris	Common Starling	Introduced
Amphibia		-
Limnodynastes tasmaniensis	Spotted Marsh Frog	-

The majority of the site is highly degraded with little native vegetation and subsequently is likely to provide little habitat for threatened native fauna (WISDOM 1995, UBMC 2006). Highly mobile species such as several species of birds and microchiropteran bats have the potential to utilise the site for foraging and/or roosting.

Threatened fauna habitat is generally confined to small patches of remnant roadside vegetation along Byrnes Road and Trahairs Road. The threatened grey-crowned babbler was only recorded within remnant woodland along Trahairs Road.

Fauna habitat varied in condition from moderate quality woodland containing large, hollow bearing trees and native understorey vegetation (Trahairs Road only), to improved pasture and crops offering limited foraging habitat for common species such as Australian magpie and galah. Surface rock and outcropping granite occurred at high points in the south of the site and may provide limited reptile habitat. UBMC documented (2006) how the majority of the site is likely to consist of highly disturbed and simplified grassland habitat and as such offer minimal habitat for threatened flora and fauna. This is an assessment that we concur with (following from our field inspection).

Fauna habitat observed at the site included:

- Woodland vegetation (restricted to Trahairs Road and to a lesser extent, Byrnes Road)
- Large hollow bearing trees
- Large paddock trees
- Surface rock
- Woody debris (restricted to Trahairs Road and to a lesser extent, Byrnes Road)

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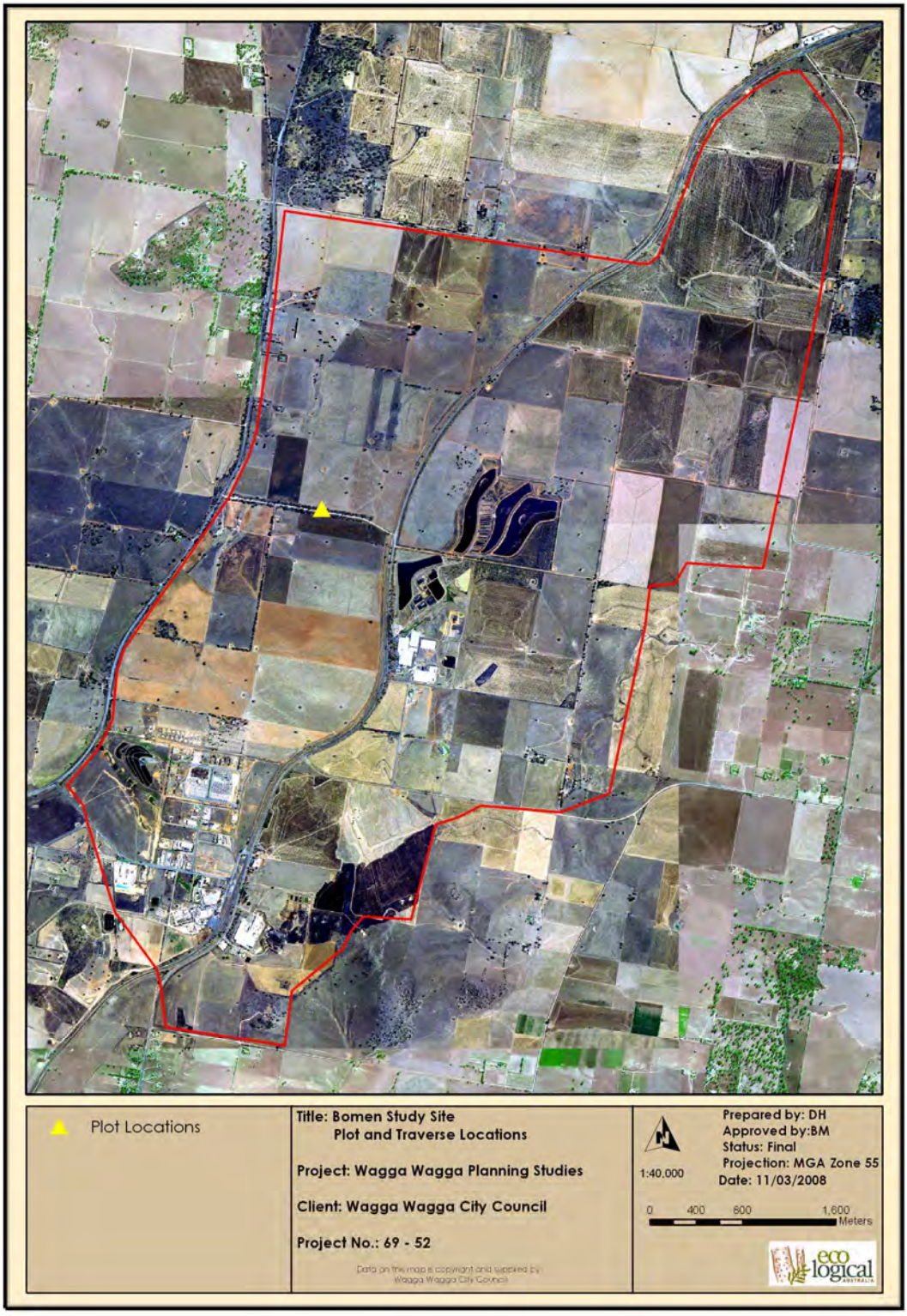

Map 2 Location of vegetation plots.

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2.6 Special Considerations

Vegetation survey was undertaken during late winter and therefore is 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.

Properties across much of the Bomen site were not accessible and so assessment was undertaken from road reserves and inferences using aerial photography. Visual assessment indicated that vegetation across much of the site, excluding road reserves, was typically highly modified. Vegetation within these areas consisted of cropped or pasture-improved paddocks and was thus identified as exotic vegetation not requiring assessment using the *BioMetric* methodology.

2.7 Consultation

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

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3. Assessment of Vegetation

3.1 Areas of Native Vegetation

Remnant native vegetation exists as small, isolated pockets of moderate quality roadside vegetation (e.g. Roadsides along Trahairs Road and Byrne's Road) and as scattered paddock trees overlying improved pasture and cropping (Map 3). Large and very large trees were scattered along road reserves across the site.

Overall, native vegetation occupied an area of 76.3 ha of the Bomen site. About 35.97 ha (1.3 %) of this was considered to be vegetation in 'moderate to good' condition while 40.33 ha (1.4 %) consisted of scattered paddock trees.

The majority of the area was devoid of native vegetation (2745 ha or 97.3 %), having been extensively cleared for agricultural activities such as grazing and cropping over the past 150 years. The site also contained some small, isolated areas of non-native, woody vegetation cover. These areas were generally associated with agriculture such as olive groves and windbreaks or with landscape plantings around homesteads and industrial developments.

3.2 Regional Scale Assessment

3.2.1 Mitchell Landscapes

A review of the Mitchell Landscapes mapping (Mitchell 2002) within the Wagga Wagga area found that the site occurs within the Junee Hills and Slopes (Map 4).

The degree of clearance of the Mitchell Landscape (as a whole) and the area and proportion of the study area covered by the Mitchell Landscape is shown in Table 5. The Junee Hills and Slopes landscape has been extensive cleared in the past for agricultural production and this is reflected in the high degree of clearance (98%) (Table 5).

Table 5 –Mitchell landscapes within the study area

Mitchell Landscape	Degree of Clearance	Area within Study Area	% of Study Area
Junee Hills and Slopes	98 %	2821.3 ha	100 %

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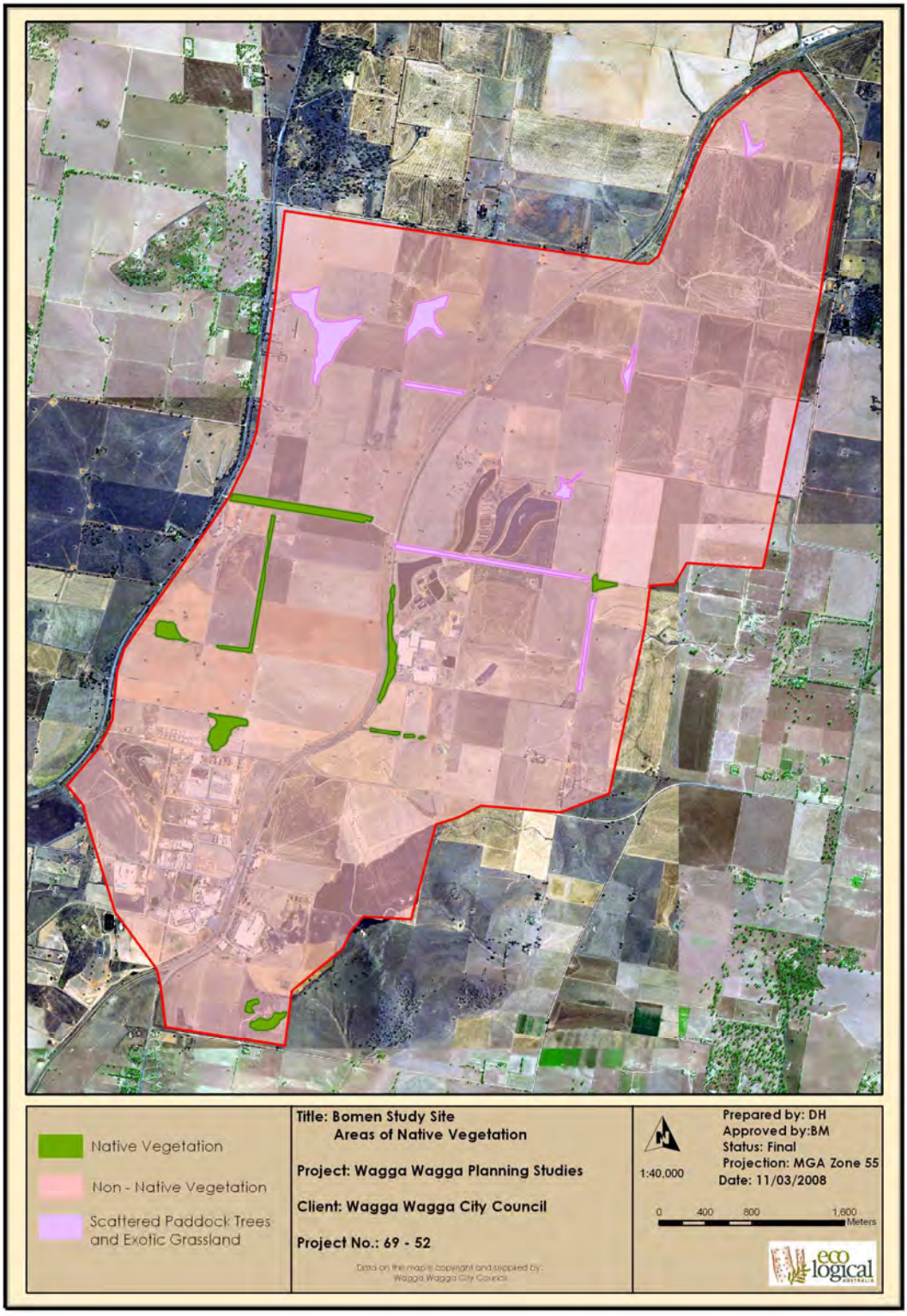

Map 3 – Areas of native vegetation at the site.

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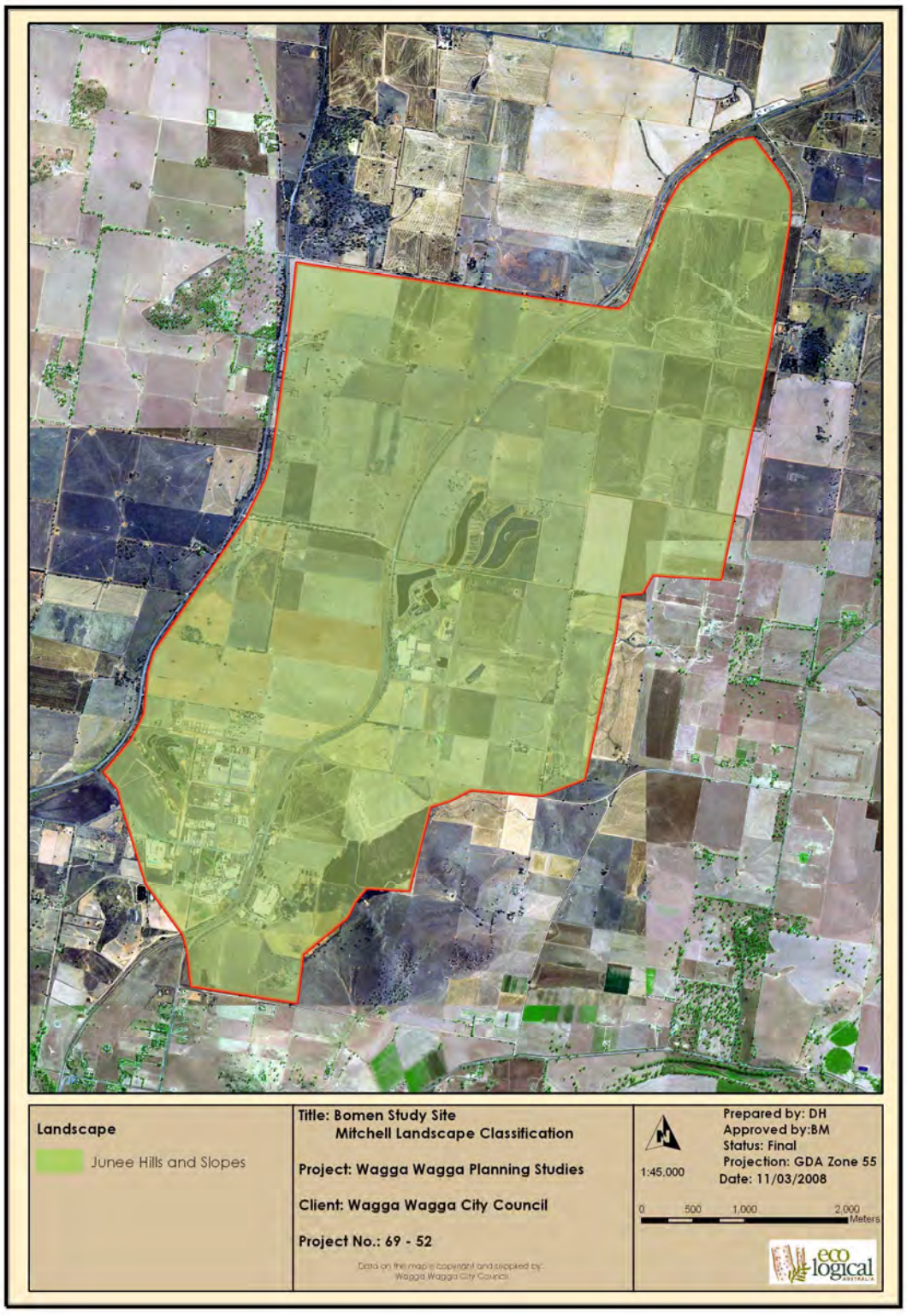

Map 4 – Mitchell landscapes at the site

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3.2.2 Vegetation Types

The native vegetation observed on the site was consistent with the Yellow Box Woodland vegetation community described in Priday and Mulvaney (1995). This community, as the name suggests, is dominated by *Eucalyptus melliodora* (yellow box) with white box (*Eucalyptus albens*) and Blakely's Redgum (*Eucalyptus blakelyi*) occurring less frequently. Yellow box was the dominant tree species in patches of remnant vegetation along Trahairs Road and Byrne's Road. Yellow box was also the most common species of paddock tree encountered at the site. Yellow box woodland occupied an area of 35.97 ha within the site (Table 6).

The Yellow Box Woodland vegetation community present at the site is consistent with the broader White Box, Yellow Box, Blakely's Redgum ecological community which is listed as endangered under Part 3, Schedule 1 of the TSC Act (1995). Due to the low diversity of native herbaceous plants in the groundcover, yellow box woodland is not considered part of the critically endangered box – gum woodland under the Commonwealth EPBC Act (1999). Map 5 shows the vegetation types present at the subject site.

Table 6 – 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	Proportion of Study Area (%)
Box-gum Woodland	95 %	35.97 ha	1.3 %

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Map 5 – Vegetation types on site

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3.3 Landscape Scale Assessment

3.3.1 Landscape Value

The landscape value of the site is defined by 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 (Ayers *et al.* 2005).

Native vegetation cover at the site is sparse with patches of remnant vegetation isolated and generally in low condition. Little to no connectivity exists between native vegetation within and outside the site boundaries and patches of native vegetation within the site are also generally isolated.

The study site is located within a rural environment, with some residential and industrial development to the north and south, respectively. The Murrumbidgee River occurs approximately 2 km to the south of the site and provides a major east – west corridor for fauna movement (e.g. superb parrot, swift parrot). No connectivity exists between vegetation on site and vegetation along the river.

A summary of the outcomes of the landscape scale assessment (following the methodology described in Ayers *et al.* 2005) is provided in Table 7 below. Overall the site was found to have no landscape value.

Table 7 – Landscape Value Assessment.

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	Moderate
Total adjacent remnant area	Small
Calculated Landscape Value	**0**

3.4 Site Scale Assessment

3.4.1 Assessment Zone Delineation

Vegetation within the Bomen site was broken up into 2 discrete assessment zones based on the type, condition and quality of the vegetation following examination of recent aerial photography of the site.

Vegetation Zones determined from aerial photography were:

- Zone 1 – Yellow Box Woodland – 'moderate to good' condition
- Zone 2 –Scattered Paddock Trees and Exotic Grassland

The resulting assessment zones are presented in Map 6 below.

As stated in Section 2.3, due to the dearth of native vegetation at the site and limitations regarding access to properties, vegetation survey at the site was limited to a single vegetation plot along the road reserve adjacent to Trahairs Road.

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Therefore, only Assessment Zone 1 was assessed in accordance with Ayers *et al.* (2005).

The vast majority of the site was considered to be non-native vegetation and as such has been excluded from any Assessment Zones as shown in map 6.

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Map 6 – Assessment Zones at the site

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Condition and Quality of Vegetation

Analysis of the results of the survey indicated that the vegetation within Zone 1 was in 'moderate to good' condition with a well developed canopy cover and mixed native and exotic groundcover (Table 8). Exotic species generally dominated the groundcover within Zone 1.

Table 8 – Site Assessment for Zone 1 using the *BioMetric Tool* (see Ayers et al. 2005). The table shows the benchmark values for the relevant vegetation community and the assessed values generated from plots within each assessment zone.

Variables	Benchmarks			Vegetation Plots within Assessment Zone 1
Native plant species		≥	19	19
Native over-storey cover	8	to	15	18
Native mid-storey cover	1	to	5	0
Native ground cover (grasses)	16	to	50	12
Native ground cover (shrubs)	0	to	4	0
Native ground cover (other)	1	to	5	12
Exotic plant cover				76
Number of trees with hollows		≥	5	1
Overstorey regeneration			1	100
Total length of fallen logs		≥	50	0

3.4.2 Vegetation Condition Categories

The condition of native vegetation at the site varied from 'moderate to good' condition yellow box woodland along Trahairs and Byrne's Roads (Zone 1) to scattered paddock trees above cropped and pasture improved paddocks (Zone 2) (Map 7).

The understorey of 'moderate to good' condition vegetation was predominately exotic grasses and herbs however a greater proportion of native groundcover species were observed along Trahairs Road. Common native groundcover species encountered along Trahairs Road included *Dianella revoluta*, *Austrostipa scabra*, *Lomandra filiformis* and *L. multiflora* as well as *Austrodanthonia* spp.

Woody understorey vegetation was generally absent from vegetation within the assessment zones. Again, Trahairs Road was an exception with understorey species such as native blackthorn (*Bursaria spinosa*) and kurrajong (*Brachychiton populneus*) occurring sporadically and predominately at the base of large or very large eucalypts.

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Map 7 – Vegetation condition at the site

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3.4.3 Summary of Assessment Zone Information

The Bomen site contains small, isolated patches of 'moderate to good' condition remnant woodland consistent with the Box – gum woodland EEC as well as patches of scattered paddock trees (Table 9). The majority of the site contains non-native vegetation, predominately improved pasture and crops such as canola and lucerne (Table 9).

Regionally, the site occurs within a landscape which has been heavily cleared of native vegetation, mostly for agricultural production. As such, native vegetation at the site, though degraded, is considered to be of high conservation value. The landscape value of the site was found to be low (according assessment using Ayers *et al.* 2005) with patches of native vegetation typically highly isolated from each other.

Table 9 – Summary Information on Vegetation Assessment

Assessment Zone No.	Area (ha)	Vegetation Type	Vegetation Condition	Landscape Value	Biometric Score	No. Large trees.
1	35.97	Box – Gum Woodland	'Moderate to good'	0	38	315
2	40.33	Scattered Paddock Trees and Exotic Grassland	Paddock Trees		N/A	69
Non-native Vegetation	2745.0	N/A	N/A		N/A	168

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4. Threatened Species

4.1 Threatened Species

One threatened fauna species, the grey crowned babbler, was observed at the site during the current study while a review of state and federal threatened species databases identified a further 6 species; diamond firetail, brown treecreeper, yellow-bellied sheathtail bat, little pied bat (*Chalinolobus picatus*) swift parrot (*Lathamus discolour*) and superb parrot as likely, or with the potential to, occur at the site (see Appendix 1). The site is considered to provide potential foraging habitat for two Commonwealth EPBC Act listed migratory bird species; cattle egret and white-throated needletail .

No threatened flora were considered likely or with the potential to occur at the site.

The extent of habitat available for threatened species known, or with the potential, to occur at the site is presented in Table 10 below. Available habitat for threatened species is generally low across the site.

Table 10 – Extent of habitat available at the site for threatened species known, likely or with the potential to utilise 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)
Diamond Firetail	Open eucalypt forests, woodlands, either in the shrubby understorey, or higher up, especially under hawk's or raven's nests.	No	As per breeding habitat.	Yes – approx. 36 ha	As per breeding habitat.	No
Grey Crowned Babbler	Nests in shrubs and eucalypt saplings or outermost leaves of low branches of mature eucalypts.	Yes – approx. 36 ha	Inhabits open Box-gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands	Yes – approx. 36 ha	Inhabits open Box-gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands	Yes – approx. 36 ha
Brown Treecreeper	Nests in tree hollows within grassy woodland	Yes – approx. 36 ha	Open grassy woodlands with fallen logs including	Yes – approx. 36 ha	As per breeding and foraging habitat.	Yes – approx. 36 ha

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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)
	vegetation. patches of remnant woodland greater than 5ha that contain hollow bearing trees.		remnants with a very sparse shrub and small tree layer.			
Little Pied bat	Tree hollows, fissures or cracks, buildings, power poles, fence posts, caves, cliff crevices, mineshafts, tunnels.	Yes, numerous hollow bearing trees	Dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress-pine forest, mallee, Bimbil box.	Yes – approx. 76.3 ha	Tree hollows, fissures or cracks, buildings, power poles, fence posts, caves, cliff crevices, mineshafts, tunnels for roosting.	Yes, numerous hollow bearing trees
Swift parrot	Does not breed in mainland Australia	No	Forests, woodlands, plantations, banksias, street trees and gardens on the mainland	Yes – approx. 36 ha	As per foraging habitat.	Yes – approx. 36 ha
Superb Parrot	Breeds along inland rivers in river red gum. Living or dead trees with hollows > 5 cm diameter.	No	Feeds in box woodland with 10km of nest tree. West of dividing range.	Yes – approx. 36 ha	As per foraging type.	Yes – approx. 36 ha
Yellow bellied Sheathtail bat	Live or dead hollow bearing trees	Yes, numerous hollow bearing trees	Forages in most habitats across its very wide range, with and without trees.	Yes – approx. 76.3 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, numerous hollow bearing trees

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Proposed development of the study site may result in the loss of 237 paddock trees. For the majority of 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 11 below together with an assessment of whether this loss would be acceptable and whether the loss would require offsetting.

Table 11 – Standards for maintaining threatened species habitats (show whether these species are able to sustain losses of habitat and quantifies the degree of habitat loss)

Species	Ability to sustain a temporary reduction in the population / habitat on this property	Loss of habitat by proposal	Acceptability of loss/ Offset
Diamond Firetail	Yes – up to 10 % loss but no loss of riparian habitats	Nil	Yes
Grey Crowned Babbler	Yes – up to 10 % loss of habitat, but no loss of connectivity.	Nil	Yes
Brown Treecreeper	No loss of breeding habitat	Nil	Yes
Little Pied bat	Yes	Loss of 237 paddock trees	Yes, with offsets
Superb Parrot	Upper and lower slopes of Murrumbidgee: no loss of *Eucalyptus camaldulensis* 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.	Nil	Yes, with offsets
Swift parrot	Yes – 5 % loss of foraging habitat except for mature *Eucalyptus albens* and *E. sideroxylon*.	Nil	Yes, with offsets
Yellow bellied Sheathtail bat	Up to 10 % loss of foraging habitat. Up to 10 % loss of hollow bearing trees.	Loss of 237 paddock trees	Yes, with offsets

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4.2 Threatened Populations

No threatened populations are considered likely to occur within the Bomen site. An endangered squirrel glider population occurs within the Wagga Wagga LGA however due to the highly fragmented nature of vegetation at the site, squirrel gliders are unlikely to utilise the site.

4.3 Endangered Ecological Communities

The Yellow Box Woodland vegetation type recorded at the site is consistent with the White box, Yellow box, Blakely's Redgum ecological community which is listed as endangered under Part 3, Schedule 1 of the TSC Act. Yellow box woodland at the site is not consistent with the critically endangered box – gum woodland ecological community listed under the Commonwealth EPBC Act..

White Box, Yellow Box, Blakely's Red Gum woodland (box – gum woodland) occurs in the study area as several degraded remnants generally associated with road reserves (Map 8). This community is generally highly modified with respect to species composition. At most sites where the community occurs, native understorey and ground layer vegetation has been replaced by improved pasture, cropping or weeds. The community has been depleted to such an extent throughout its range that all remnants are of conservation significance (Priday and Mulvaney 2005).

'Moderate to good' condition box – gum woodland occupies an area of approximately 35.97 ha across the site (Table 12).

Table 12 – Area of EECs at the site.

EEC	Area of EEC		
	Moderate to good condition	**Low condition**	**Total**
Box – Gum Woodland	35.97 ha	-	35.97 ha

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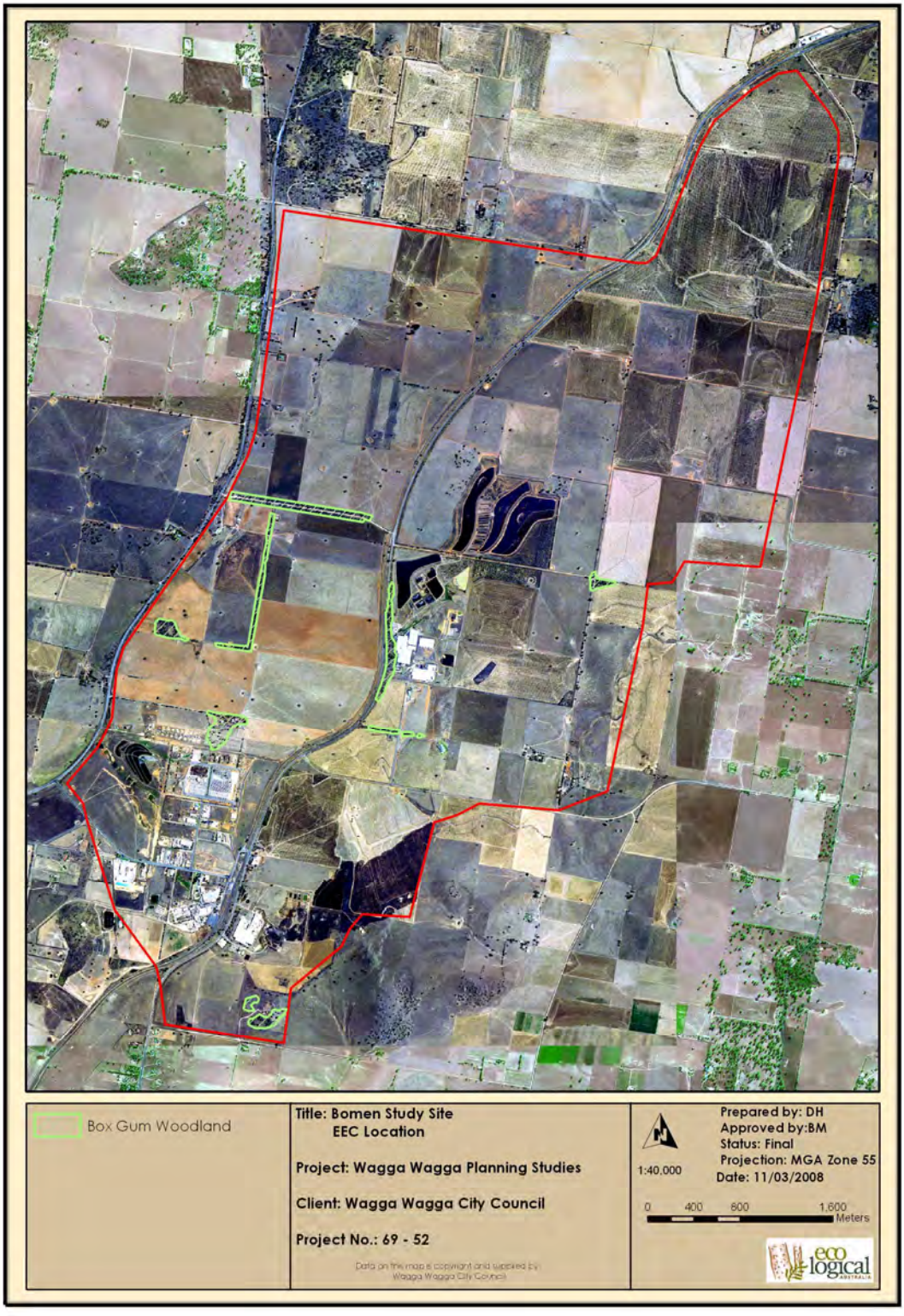

Map 8 – Extent of EECs at the site.

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5. Structure Plan

The study site contains several areas of box – gum woodland in 'moderate to good' condition, the most notable of which occurs along the Trahairs Road reserve west of Byrne's Road (Map 9). Under the Native Vegetation Act (2003), 'moderate to good' condition box-gum woodland at the site is not permitted to be cleared, regardless of available offsets or management actions because:

- It is in 'moderate to good' condition
- Is listed as an endangered ecological community under the TSC Act (1995).
- Is of a vegetation type that is greater than 70% cleared across its range (see Section 3.2.2)
- It occurs within 2 Mitchell landscapes which are greater than 70% cleared (see Section 3.2.1

'Moderate to good' condition box – gum woodland within the site is of high conservation value and should be retained for conservation (Map 9). This area is of high biodiversity value and occurs within a landscape which has been heavily cleared of native vegetation. 'Moderate to good' condition box – gum woodland within the site is therefore considered highly constrained and unavailable for development (Map 9).

The site contains several patches of scattered paddock trees, which due to their isolated location amid improved pasture and cropping, are considered to have limited conservation value within the landscape (Map 9). Areas identified as containing scattered paddock trees are therefore potentially suitable for residential/industrial development provided that relevant offsets to the loss of paddock trees are achieved (Map 9).

The majority of the site consists of non-native vegetation which does not contain any significant biodiversity value. These areas are potentially suitable for residential/industrial development.

An offset ratio of 10:1 is required for scattered paddock trees at the Bomen 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. thein addition to the above, any low condition vegetation or 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 that all native vegetation not mapped as 'moderate to good' condition box-gum woodland is removed under the current proposal, is presented in Table 13 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.

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Table 13: Proposed loss and required offset of paddock trees at the proposed Bomen development site.

		No. of trees		Required Offset		
Species Name	**Common Name**	**Large**	**Very Large**	**Large**	**Very Large**	**Total Offset**
Eucalyptus albens	White Box	8	-	80	-	**80**
Eucalyptus melliodora	Yellow Box	265	27	2650	270	**2920**
Eucalyptus blakelyi	Blakely's Redgum	14	1	140	10	**150**
Callitris glaucophylla	White Cypress	13	-	130	-	**130**
Brachychiton populneus	Kurrajong	11	-	110	-	**110**
	Stag	5	-	5	-	**5**
				Overall Total		**3390**

Sufficient offsets for the loss of paddock trees are unlikely to be available within retained lands at the site. However, 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 retention, development and offsets at Bomen, as determined on the basis of current investigation at the site, are presented in Map 9 below. In general, the location of offsets at the site should aim to:

- Elevate patches of native vegetation from moderate to good condition
- Decrease edge effects currently experienced by native vegetation remnants
- Increase connectivity between currently isolated woodland patches within the site
- Increase connectivity of the site to areas of remnant vegetation outside the site boundaries

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Management actions within retained vegetation at the site will further help to offset loss of scattered paddock trees across the site. Woodland vegetation at the site is resilient and likely to regenerate over time provided that factors currently preventing regeneration are managed. Management actions could include:

- Fencing and protection of the site
- Grazing exclusion (initial 3 years) and grazing control
- Control of feral pests
- Erosion control
- Retention of dead timber
- Control of weeds
- Retention of all native regrowth
- Fire management / ecological burning
- Replanting of shrub and understorey species in treed areas
- Revegetation

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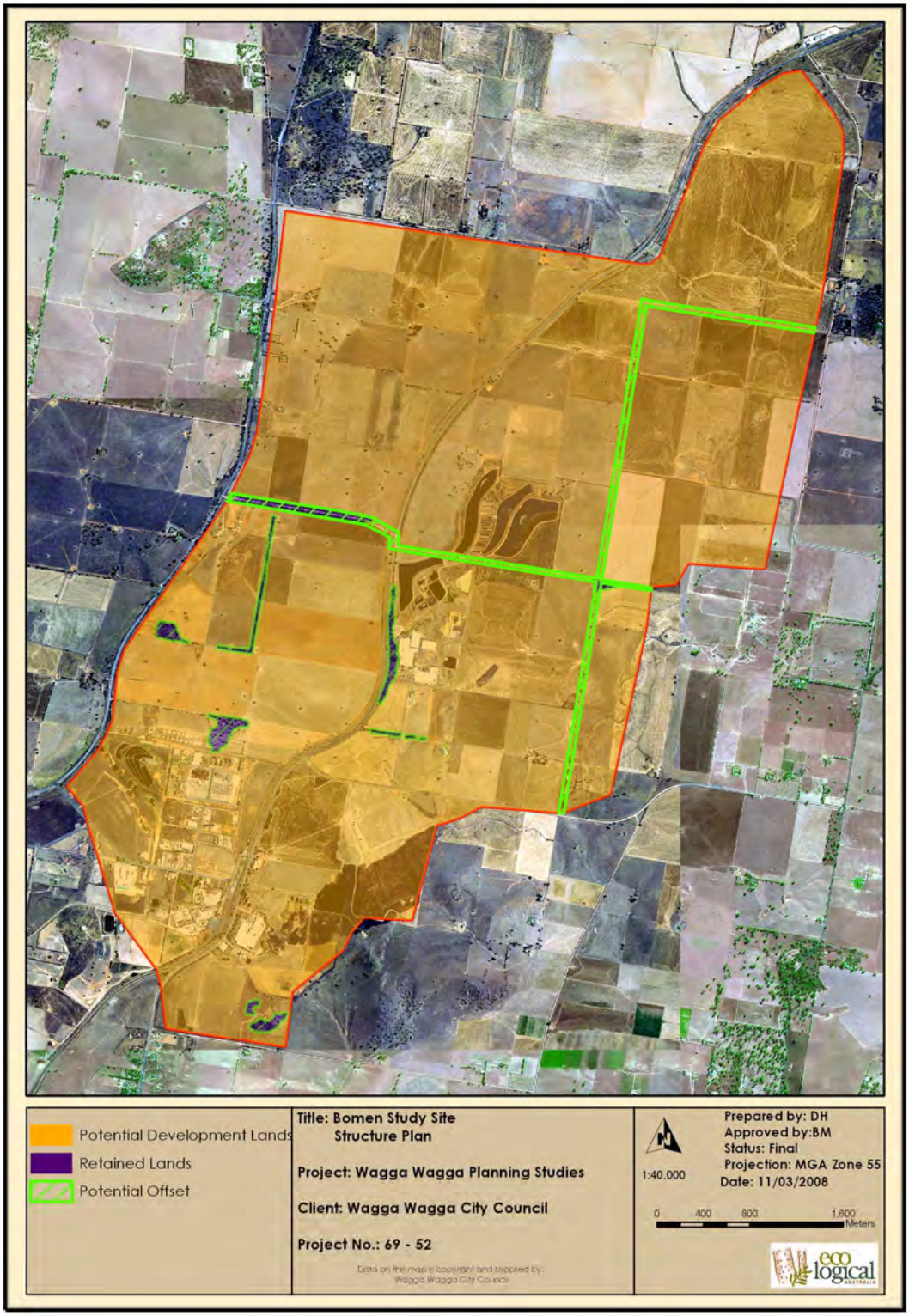

Map 9 – Bomen Structure Plan

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7. Appendices

Appendix 1: Likelihood of occurrence table for threatened species, endangered populations and endangered ecological communities recorded within the Wagga Wagga LGA.

Scientific Name	Common Name	Status		Likelihood	Habitat
		TSC Act	EPBC Act		
Threatened species - Fish					
Maccullochella peelii peelii	Murray Cod		V	No	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.
Macquarie australasica	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					
Litoria booroolongensis	Booroolong Frog	E		No	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
Litoria raniformis	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 also found in irrigated rice crops, particularly where there is no available natural habitat
Threatened species - Snakes					

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Scientific Name	Common Name	Status		Likelihood	Habitat
		TSC Act	EPBC Act		
Aprasia parapulchella	Pink-tailed Worm-lizard	V	V	Unlikely	In general, lizards occur in open grassland habitats that have a substantial cover of small rocks
Delma impar	Striped Legless Lizard	V	V	Unlikely	Lowland native grasslands
Threatened species - Birds					
Ardea alba	Great Egret, White Egret		M	No	Shallows of rivers, estuaries, tidal mudflats, freshwater wetlands, larger dams
Ardea ibis	Cattle Egret		M	Potential	Stock paddocks, pastures, croplands, garbage tips, wetlands, tidal mudflats
Burhinus grallarius	Bush Stone-curlew	E		No	Well wooded floodplain forests, amongst fallen timber
Cacatua leadbeateri	Major Mitchell's Cockatoo	V		Unlikely	Near water on timbered watercourses
Callocephalon fimbriatum	Gang-gang Cockatoo	V		No	Wetter forests, and woodlands, from sea level to 2000m on divide. From timbered foothills and valleys to suburban gardens.
Climacteris picumnus victoriae	Eastern subspecies of Brown Treecreeper	V		Yes	Drier forests / woodlands / scrubs with fallen branches.
Gallinago hardwickii	Latham's Snipe, Japanese Snipe		M	No	Soft wet ground or shallow water with tussocks and other green and dead growth. Wet drainage areas
Grus rubicundis	Brolga	V		No	Though Brolgas often feed in dry grassland or ploughed paddocks or even desert claypans, they are dependent on wetlands too, especially shallow swamps, where they will forage with their head entirely submerged
Haliaeetus leucogaster	White-bellied Sea-Eagle		M	No	Rivers, large dams. Roost and nest on large platforms built in large Eucalypts
Hirundapus caudacutus	White-throated Needletail		M	Potential	Open space above canopy. Forages over large areas
Lathamus discolor	Swift Parrot	E	E, M	Yes	Forests, woodlands, plantations, banksias, street trees and gardens on the mainland

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Scientific Name	Common Name	Status		Likelihood	Habitat
		TSC Act	EPBC Act		
Leipoa ocellata	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
Melanodryas cucullata	Hooded Robin	V		Unlikely	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V		Unlikely	Ironbark woodlands, extensively wooded areas
Merops ornatus	Rainbow Bee-eater		M	Unlikely	Open woodlands with sandy, loamy soils, dunes, cliffs, mangroves golf courses
Myiagra cyanoleuca	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
Neophema pulchella	Turquoise Parrot	V		Unlikely	Open grassy woodland, with dead trees, near permanent water and forested hills.
Ninox connivens	Barking Owl	V		Unlikely	Open forests, woodlands, dense scrubs, other large trees near watercourses. Nest in tree hollow.
Pachycephala inornata	Gilbert's Whistler	V		No	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.
Pedionomus torquatus	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

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Scientific Name	Common Name	Status		Likelihood	Habitat
		TSC Act	EPBC Act		
Polytelis swainsonii	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.
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V		Yes	Inhabits open Box-gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains
Pyrrholaemus sagittatus	Speckled Warbler	V		Unlikely	Well vegetated woodlands, diverse structure
Rostratula australis	Australian Painted Snipe		V	No	Well vegetated margins of wetlands
Rostratula benghalensis australis	Painted Snipe (Australian subspecies)	E	V, M	No	Well vegetated margins of wetlands
Stagonopleura guttata	Diamond Firetail	V		Potential	Open eucalypt forests, woodlands.
Stictonetta naevosa	Freckled Duck	V		No	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 more permanent waters such as lakes, reservoirs, farm dams and sewage ponds
Grantiella picta	Painted Honeyeater	V	-	Unlikely	Boree, Brigalow and Box-gum woodlands and box – ironbark forests. Inhabits vegetation with 5 or more mistletoe per hectare.
Xanthomyza phrygia	Regent Honeyeater	E	E, M	No	Dry open forests, woodlands, especially red ironbark, yellow box, yellow gum
Threatened species - Mammals					
Dasyurus maculatus	Spotted-tailed Quoll	V	E	No	Occurs in wide variety of habitats in large remnants. Dens in tree hollows, hollow log or rock crevice
Macrotis lagotis	Bilby	Ex	V	No	Sandy desert areas in spinifex (*Triodia* species) grasslands
Myotis adversus	Large-footed Myotis	V		Unlikely	Known from a range of habitats close to water from lakes, small creeks to large lakes and mangrove lined estuaries

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Scientific Name	Common Name	Status		Likelihood	Habitat
		TSC Act	EPBC Act		
Saccolaimus flaviventris	Yellow-bellied Sheathtail 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.
Chalinolobus picatus	Little Pied bat	V	-	Potential	Dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine forest, mallee and bramble box. Roosts and breeds in tree hollows, fissures or cracks, buildings, power poles, fence posts, caves, cliff crevices, mineshafts and tunnels.
Nyctophilus timoriensis (south eastern form)	Eastern Long-eared Bat	V	V	No	Inhabits a variety of vegetation types, including mallee, bulloak Allocasuarina luehmannii 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
Petaurus norfolcensis	Squirrel Glider	V		Unlikely	In the region occurs in Box-gum woodlands, box-ironbark woodlands and river red gum woodland.
Phascolarctos cinereus	Koala	V		No	Inhabit eucalypt woodlands and forests
Phascogale tapoatafa	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					
Ammobium craspedioides	Yass Daisy	V	V	No	Known from natural temperate grassland sites.
Amphibromus fluitans	River Swamp Wallaby-grass	V	V	No	Swamps or low-lying areas which become periodically water-logged, usually on clayey soils.

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Scientific Name	Common Name	Status		Likelihood	Habitat
		TSC Act	EPBC Act		
Austrostipa wakoolica		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
Brachycome muelleroides	Claypan Daisy	V	V	No	Grows in damp areas on the margins of claypans in moist grassland with *Pycnosorus globosus*, *Agrostis avenacea* and *Austrodanthonia duttoniana*
Brachycome papillosa	Mossigiel Daisy	V	V	No	Recorded primarily in clay soils on Bladder Saltbush (*Atriplex vesicaria*) and *Maireana aphylla* plains, but also in grassland and in Grey Box (*Eucalyptus microcarpa*) - Cypress Pine (*Callitris spp*.) woodland
Diuris sheaffiana	Tricolour Diuris	V	V	No	Sporadically distributed on the western slopes of NSW. Associated species include Callitris glaucophylla, Eucalyptus populnea, Eucalyptus intertexta, Ironbark and Acacia shrubland. The understorey is often grassy with herbaceous plants such as Bulbine species
Senecio garlandii	Wooly Ragwort	V	V	No	Woolly Ragwort occurs on sheltered slopes of rocky outcrops
Swainsona murrayana	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 *Maireana* species. Plants have been found in remnant native grasslands or grassy woodlands that have been

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Scientific Name	Common Name	Status		Likelihood	Habitat
		TSC Act	EPBC Act		
					intermittently grazed or cultivated.
Swainsona recta	Small Purple-pea	E	E	No	Before European settlement Mountain Swainson-pea occurred in the grassy understorey of woodlands and open-forests dominated by Blakely's Red Gum *Eucalyptus blakelyi*, Yellow Box *E. melliodora*, Candlebark Gum *E. rubida* and Long-leaf Box *E. goniocalyx*
Thesium australe	Austral Toadflax	V	V	No	Often found in damp sites in association with Kangaroo Grass (*Themeda australis*)
Threatened Ecological Populations					
Petaurus norfolcensis – endangered population Wagga Wagga	Squirrel Glider population in the Wagga Wagga LGA	E		No	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

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