

WEST BELCONNEN PROJECT ACT AND NSW LAND FLORA AND FAUNA STUDIES



prepared by

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Cover Photograph:

Remnant Box-Gum Woodland trees in the far south of the study area.

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1 Introduction

The study area is a large parcel of land straddling the border of New South Wales and the Australian Capital Territory to the west of the new suburb of West Macgregor in the north-western corner of the ACT; see **Figure 1**.

The brief for this study was to identify the likely significant flora and fauna issues present in the study area and undertake a survey program to address these issues; particular note was to be taken of the likelihood of the presence of threatened and other significant species and communities, as listed in New South Wales and/or the Australian Capital Territory.

This report covers the following key matters:

- i. a description of the vegetation patterns and plant communities in the study area;
- ii. a description of the fauna habitats in the study area;
- iii. lists of the flora and fauna species observed in/near the study area;
- iii. based upon targeted field surveys and previous records an assessment of the potential for species, populations and ecological communities listed under the following Acts to occur on the study area
 - New South Wales *Threatened Species Conservation Act 1995* (TSC Act) and *Fisheries Management Act 1994* (FM Act);
 - Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
 - ACT *Nature Conservation Act 1980*.
- vi. a discussion of implications of the above findings to development in the study area.

2 The Study Area

2.1 Location of the Study Area

The study area is located adjacent to West Macgregor, the landfill and recycling site, the Belconnen Golf Course and Central Molonglo. The total area is 1,010 hectares, with about 332 hectares in NSW (33%) and 678 hectares in the ACT (67%). The Murrumbidgee River is the western boundary of the study area. Within the ACT the Murrumbidgee River Corridor extends along the eastern side of the river and is about 700 metres wide within the study area. This corridor primarily covers the steep land falling down to the river. No such corridor is identified in NSW. The northern boundary of the study area is Ginninderra Creek. The other watercourses in the area are small side streams, several of which cross the study area emptying into the Molonglo River valley. The Murrumbidgee River itself is not within the subject property but was included in the study area as it is on the very edge of the property.

2.2 Character of the Study Area

The vast majority of the study area is cleared and highly modified land. The original woodland has largely been cleared, with only relatively small stands of trees now remaining. The paddocks are mostly sown with pasture species, such as Oats *Avena* sp., Barley Grass *Hordeum* sp., and Rye Grass *Lolium* sp. Native grassland, mostly originally an understorey to the Yellow Box – Red Gum Woodland, is almost nonexistent. Scattered patches of *Austrostipa* spp. occur through the area, but native species diversity is very low. On the gentler topography in the far south, there are remnant Yellow Box *Eucalyptus melliodora* and Blakeley's Red Gum *Eucalyptus blakelyi* trees with an understorey ranging from exotic pasture to quite good quality native grassland.

Woodland of Inland Scribbly Gum *Eucalyptus rossii*, Broad-leaved Peppermint *Eucalyptus dives*, Red Stringybark *Eucalyptus macrorhyncha* and Snow Gum *Eucalyptus pauciflora* occurs on the steeper land, with a few remnants on the more level land above, particularly in the far south.

Along the river, there are stands of large River Oak *Casuarina cunninghamiana* trees, and there is an understorey of mainly weeds.

Rock outcrops, primarily of rhyolite type rocks, occur along the western part of the study area, including the slopes to the river and the nearby ridges to the east. These outcrops are mostly in or close to the river corridor.

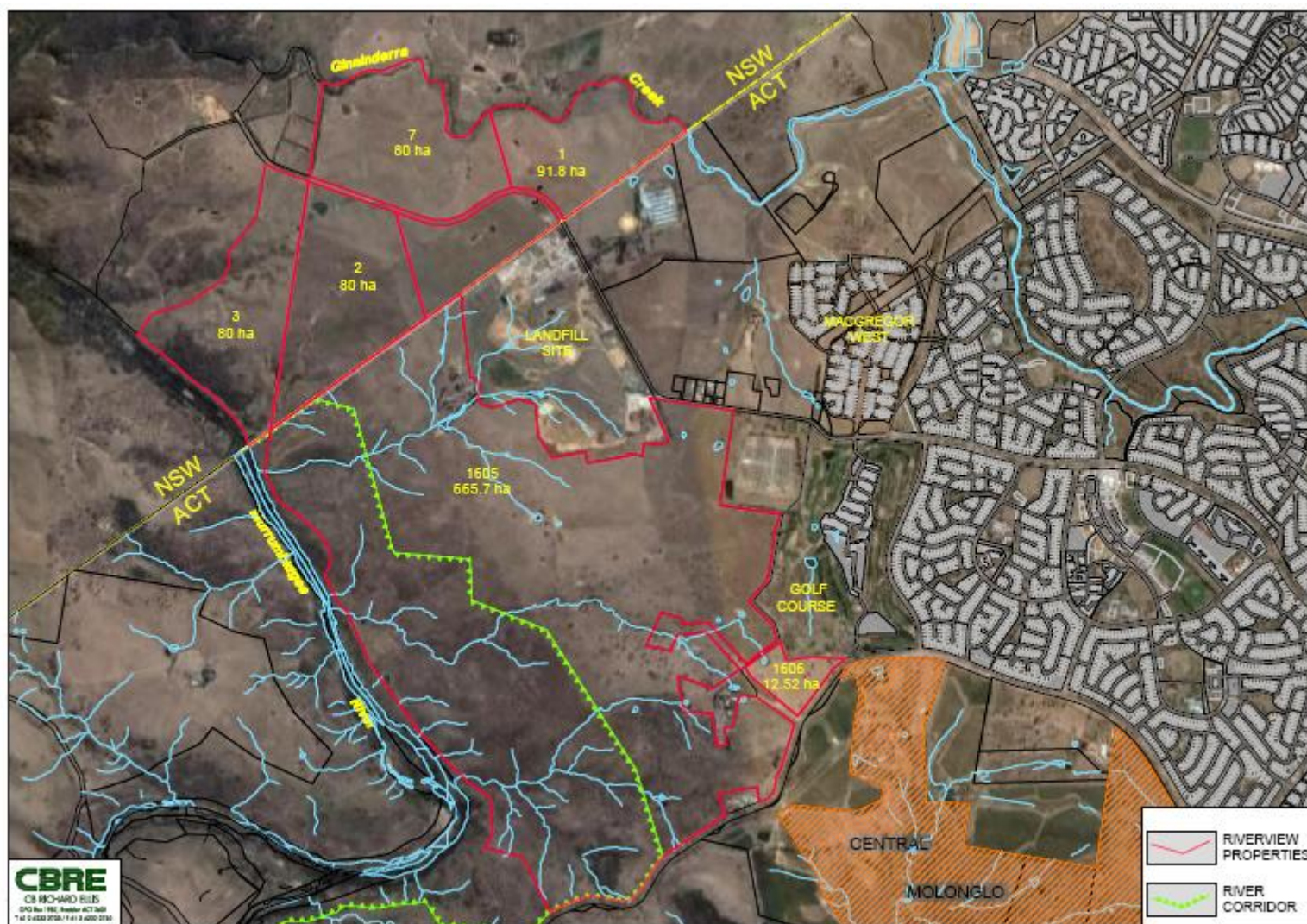


Figure 1. The Study Area at West Molonglo

2.3 Past and Present Land Use

The land has been used for grazing and other farming pursuits for over 150 years. Most of the land has been cleared of its original woodland vegetation over that period. The majority of the land is divided into large paddocks most of which have been pasture improved, including fertilizing, seeding and ploughing. The land is still used for grazing and cropping today.

3 Survey Methods

3.1 Flora Survey Methods

Date of Survey

The study area at Molonglo was investigated briefly in terms of its flora and fauna during visits in late October 2008, with the main surveys being carried out in late November and December 2008. Bearings were taken from colour aerial photographs showing the extent of the study area.

Purpose

The main purpose of the flora survey was to classify and describe the vegetation, to map the distribution of the plant communities, to record as many as possible of the plant species present and to search for threatened plant species.

Survey Techniques

The vegetation survey techniques combined multiple traverses of the study area with disciplined vegetation sampling on specific sites. The traverses, which were undertaken on foot and by motor vehicle, were targeted to cover the full topographic variation of the site, the full range of plant communities and potential habitat for threatened plant species. The traverses were also random because of their exploratory purpose.

During the current investigation, plant species found on the study area were sought throughout the land, with particular searches being carried out wherever indigenous plants were likely to be found. Both indigenous (native) and exotic (weed) species were identified and recorded.

Vegetation survey plots were temporarily established on sites in patches of native plants; a 20 metre by 20 metre plot (400 m²) was set out using a cord. The plots were selected to demonstrate variation within the vegetation. A *pro forma* or standard survey sheet was completed on each plot to record the following data:

Plot data:	plot identification number
	date of survey
	plot size
	plot location (including GPS reading at centre of plot)
	land tenure
	landform, geology and soil type
	slope (gentle, moderate, steep, very steep), aspect, altitude
Floristic data:	height and proportional coverage (% of each layer or stratum (tree canopy, middle storey, shrub understorey, ground cover)
	species present in each stratum
	abundance score for each species, as set out below
	if treeless, the closest tree species to the plot.

Floristic data for each species within each plot was gathered using a subjective abundance score based upon the following range of cover scores:

- 1 <5% uncommon to rare
- 2 <5% common
- 3 5% - 25% foliage cover
- 4 25% – 50% foliage cover
- 5 50% - 75% foliage cover
- 6 75% -100% foliage cover.

Notes were made on the structure and condition of the vegetation, and the height and proportional coverage of each layer. The general description of each plant community is based largely on the data collected during these vegetation sampling surveys.

Vegetation Mapping

The native vegetation occurring in an area is determined largely by biophysical attributes such as landform, elevation, aspect, geology and soil type. Most vegetation is affected to some extent by human activity. These variables strongly influence the structure and floristic composition of the vegetation and, usually with the aid of a topographic map and aerial photograph, enable the vegetation to be mapped.

Using this approach, a vegetation map for the study area was prepared by marking the boundaries of the various communities directly onto an aerial photograph during the field study.

The boundaries on the vegetation map are reasonably accurate, but it should be kept in mind that there is usually an ecotone or transition zone between communities, in which the vegetation changes gradually from one type to another.

Vegetation Classification

The vegetation communities on the study area were classified on the basis of their structure and the name(s) of the dominant species in the tallest stratum, using the structural classification system devised by Walker and Hopkins (1990). **Appendix 1** shows the various vegetation classes within the system; these include closed forest (rainforest), open forest, woodland, open woodland, isolated trees, shrubland, heathland, grassland, sedgeland and fernland, etc., depending on the growth form of the plants in the tallest stratum and the crown separation between the plants in the tallest stratum (whether touching, overlapping, separated, isolated, etc.).

Nomenclature

The plant species names in this report are the current names published by the National Herbarium of New South Wales in the *Flora of New South Wales* (Harden 1992-2002). Most of the common names are from the *Flora of New South Wales* (op. cit.), *Australian Plant Genera* by Baines (1981) and *Weeds of the South-east* by Richardson, Richardson and Shepherd (2006).

3.2 Fauna Survey Method

Date of Survey

Fauna surveys were conducted on the same days as the flora surveys; i.e. October to December 2008. The field survey concentrated on mammals, birds, reptiles and amphibians, with the aim of detecting as many as possible of the species present. The survey results indicate which fauna species were found, but should not be regarded as a full inventory of the species that would occur there; this could be obtained only during a long study spanning all seasons.

Techniques

Mammals were identified by sight and by interpreting their distinctive calls. The mammal survey also involved a ground search for scats, tracks and diggings. A spotlight was used to search for nocturnal mammals.

A bat survey was undertaken with ANABAT II echo-location instruments, which record the ultrasonic "calls" of insectivorous bats. The recordings were later analysed to identify the species that emitted them.

The birds on the study area were also identified by sight and by interpreting their calls. A spotlight was used to search for nocturnal birds. Timed bird surveys were undertaken in woodland areas and incidental observations were recorded throughout the study area.

A search for reptiles was conducted primarily using the technique of 'rock rolling'. Rocky areas were targeted within which rocks that could be moved were rolled over to expose any animals below. These rocks were replaced in the same place after inspection. Survey sheets were completed for each search area, including recording a GPS location, habitat information and the species observed and their numbers. Potential basking sites were also investigated, especially near water and on bare surfaces, and general vigilance was maintained for reptiles during all other survey work.

The frogs in the study area were identified by interpreting their distinctive calls. A search was conducted for frogs in moist areas and habitat niches, especially under rocks, wood and debris. Nighttime and daytime surveys were undertaken.

Nomenclature

The fauna species nomenclature in this report is based on the Australian Museum's *The Mammals of Australia* (Strahan 1995), *Australian Bats* (Churchill 1998), *Systematics and Taxonomy of Australian Birds* (Christidis & Boles 2008) and *Reptiles and Amphibians of Australia* (Cogger 1992).

Targeted Surveys

In addition to general flora and fauna surveys in the study area, the survey program carried out targeted surveys for threatened species and communities. Following discussions with officers of the NSW DECC and Environment ACT, interrogation of the NSW Wildlife Atlas and the Environment ACT website, assessment of the habitat in the study area and the consultant's experience in the region, the following species were selected for targeted field surveys.

Flora

Pomaderris pallida

Lepidium ginninderrense

Swainsona sericea

Yellow Box – Blakely's Red Gum Woodland

Fauna

Pink-tailed Worm Lizard *Aprasia paraulchella*

Birds Brown Treecreeper

Diamond Firetail

Hooded Robin

Painted Honeyeater

Speckled Warbler

Superb Parrot

Varied sittella

White-winged Triller

The above species and community are listed under one or more of the following pieces of legislation:

- *Threatened Species Conservation Act 1995* (NSW);
- *Nature Conservation Act 1980* (ACT);
- *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth).

3.3 Definitions

The following definitions used in this report are widely accepted in the botanical literature; most of those relating to grasslands are largely from the report by Rehwinkel (1997).

Forest: a community of relatively closely spaced trees (projective foliage cover >30%) growing taller than 10 metres.

Woodland: a community of well spaced trees (projective foliage cover 10-30%) growing to a height of 4 to 30 metres.

Open Woodland: a community of scattered trees (projective foliage cover <10% growing to a height of 4 to 30 metres.

Grassland: vegetation dominated by grasses and forbs, with <10% tree and/or shrub cover.

Native Grassland: grassland with >50% of vegetation cover composed of indigenous species, >50% of all species are native, and the minimum vegetation cover, alive or dead, is >10%.

Natural Grassland: native grassland considered to have had <10% tree and/or shrub cover at the time of European settlement.

Secondary Grassland: a native grassland remaining after the removal or dieback of previously occurring trees and/or shrubs, where these occupied >10% cover.

Native Pastures: containing native and introduced species, where introduced species occupy >50%, but <75% of both cover and species present, where pasture species have often been mechanically sown.

Exotic Grassland: where >75% of species and cover are composed of introduced plants.

Sown Pasture: where the dominant plants are sown exotic species (>75% cover), usually fertilised land used for grazing (e.g. Ryegrass and Clover).

Cropland: a species that is sown, usually following ploughing, for commercial harvest (e.g. Wheat) or stock feed.

Natural Temperate Grassland: a threatened grassland community listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act*. The Recovery Plan for Natural Temperate Grassland (Environment ACT 2006) provides the following information:

"The community is dominated by moderately tall (25-50cm) to tall (50cm – 1.0m), dense to open tussock grasses with up to 70% of the species being forbs. The community may be treeless or contain up to 10% cover of trees, shrubs or sedges. In the Southern Tablelands, Natural Temperate Grasslands are located at altitudes between 560 and 1200 metres in valleys influenced by cold air drainage and in broad plains. The community occurs within the geographical region of the Southern Tablelands of NSW and ACT, which extends southwards from the Abercrombie River to the Victorian Border, from Boorowa and Jindabyne to the west and Goulburn to Braidwood and Bombala to the east."

"Natural Temperate Grassland is a native ecological community that is dominated by native species of perennial tussock grasses. The dominant grasses are *Themeda triandra* [australis], *Austrodanthonia* species, *Bothriochloa macra* and *Poa* species. The upper canopy stratum generally varies in height from mid-high (0.25-0.5m) to tall (0.5-1.0m). There is also a diversity of native herbaceous plants (forbs), which may comprise up to 70% of species present. The community is naturally treeless or has less than 10% projective foliage cover of trees or shrubs in its tallest stratum. The ecological community that makes up NTG-ST [Natural Temperate Grassland – Southern Tablelands] is defined by the vegetation structure thought to have been present at the time of European settlement."

4 Flora

4.1 Description of the Vegetation

The vegetation in the study area originally consisted of woodland, probably of two main types, as demonstrated by the remnants that exist in the area today. The gentler topography across the eastern part of the land supported Yellow Box *Eucalyptus melliodora* - Blakely's Red Gum *Eucalyptus blakelyi* woodland to open woodland.

The steeper land, generally, would have been covered in a woodland of Broad-leaved Peppermint *Eucalyptus dives*, Inland Scribbly Gum *Eucalyptus rossii* and Red Stringybark *Eucalyptus macrorhyncha*, with Snow Gum *Eucalyptus pauciflora* and Black Cypress Pine *Callitris endlicheri* in some places. The Box-Gum woodland/open woodland would have had a grassy understorey, while the other woodland would often have a shrubby understorey.

Five plant communities occur on the study area. **Table 1**, below, provides a summary of the key species and notes on distribution. Each community is described in detail below the table. **Figure 2** shows the extent of the woodland in the southern part of the study area; the remainder of the land is exotic grassland, virtually treeless with scattered patches of native pasture. The information obtained from the seven vegetation survey quadrats (plots) that sampled the native grassland in the study area are presented in **Appendix 2**.



Figure 2. Woodland Areas in the Study Area.

Table 1
Plant communities on the study area

Community	Key species	Distribution
1. Box-Gum Woodland	<i>Eucalyptus melliodora</i> <i>Eucalyptus blakelyi</i>	This community occurs on gentle topography in the far south of the study area.
2. Peppermint - Stringybark Woodland	<i>Eucalyptus dives</i> <i>Eucalyptus macrorhyncha</i> <i>Eucalyptus pauciflora</i>	This community occurs on the steeper topography above the river valley, extending in some places onto the adjacent gentler sloping land.
3. Planted copses of trees	<i>Eucalyptus melliodora</i> <i>Eucalyptus blakelyi</i>	Planted stands of trees occur in the south of the area, distinguished by the lines of small trees.
4. Native Grassland	<i>Themeda australis</i> <i>Austrostipa</i> spp. <i>Austrodanthonia</i> spp.	Patches throughout the study area, but most diverse in the far south near the woodland areas.
5. Exotic Grassland (including sown pasture) <i>Lolium</i> sp.	<i>Avena</i> sp. <i>Hordeum</i> sp.	Covers most of the study area.
<u>Adjacent to Study Area</u>		
6. River Oak Forest	<i>Casuarina cunninghamiana</i>	Along the Murrumbidgee River.

Community 1**Box - Gum Woodland***Eucalyptus melliodora* - *Eucalyptus blakelyi*

Structure: This is a woodland of well spaced trees, with a grassy understorey. Where native grassland occurs without trees in areas of former woodland, it is considered to be a part of this community.

Floristic Composition: Yellow Box *Eucalyptus melliodora* and Blakely's Red Gum *Eucalyptus blakelyi* are the main trees; Broad-leaved Peppermint *Eucalyptus dives* and Snow Gum *Eucalyptus pauciflora* occur in some places where the two woodland communities overlap. *Eucalyptus blakelyi* is the most common tree and grows as large scattered paddock trees in the far south of the study area. The understorey is often a native grassland containing typical species such as Spear-grasses *Austrostipa* spp., Wallaby Grasses *Austrodanthonia* spp., Kangaroo Grass *Themeda australis*, Wheatgrass *Elymus scaber*, Weeping Grass *Microlaena stipoides* and Common Everlasting *Chrysocephalum apiculatum*.

Distribution: This community occurs on gentle topography and once occurred across much of the study area, but now exists as modified remnants in the far southern part of the study area.

Community 2**Peppermint - Stringybark Woodland***Eucalyptus dives* - *Eucalyptus macrorhyncha* - *Eucalyptus pauciflora* - *Eucalyptus rossii*

Structure: This is a woodland of fairly well spaced trees, mostly small, with a grassy understorey; some areas of regrowth contain quite densely-growing trees.

Floristic Composition: This woodland grows mainly on hilly terrain, being replaced by the above community on gentler topography, although the patterns are difficult to discern on the study area because so little woodland of any type is left. The main trees are Broad-leaved Peppermint *Eucalyptus dives*, Red Stringybark *Eucalyptus macrorhyncha* and Inland Scribbly Gum *Eucalyptus rossii*. Snow Gum *Eucalyptus pauciflora* occurs in one place along a gully. As noted above, the two woodland communities overlap and tree species from both communities occur together. The understorey is typically grassland similar to the above woodland, at least in the main areas remaining in the south of study area. On the dry upper slopes of the river valley, primarily in the far south-western corner of the study area, Black Cypress Pine *Callitris endlicheri* occurs with a suite of shrubby species not found in the woodland on the gentler topography. These shrubs include Daphne Heath *Brachyloma daphnoides*, Red-leaved Wattle *Acacia rubida* and Parrot Pea *Dillwynia sericea*. there are dense stands of the introduced Cootamundra Wattle *Acacia baileyana* in some places.

Distribution: Remnants of this woodland occur in the far south of the study area band on the slopes of the river valley. It grows in association with the above woodland in the far south of the study area.

Community 3**Planted Woodland/ copses of trees***Eucalyptus melliodora* - *Eucalyptus blakelyi* - *Eucalyptus macrorhyncha*

Structure: Rows of planted trees, mostly quite small; the understorey is an exotic, grazed grassland.

Floristic Composition: The plantings are of local tree species, particularly Yellow Box *Eucalyptus melliodora*, Blakely's Red Gum *Eucalyptus blakelyi* and Red Stringybark *Eucalyptus macrorhyncha*.

Distribution: This community occurs in copses or patches in the south-western corner of the study area, on the edge of the river valley.

Community 4**Native Grassland***Themeda australis* - *Austrostipa* spp. - *Austrodanthonia* spp.

Structure: A grassland dominated by grasses and herbaceous species, with few shrubs.

Floristic Composition: Grassland dominated by native species, particularly grasses and small herbaceous species. Typical species include Kangaroo Grass *Themeda australis*, Spear-grasses *Austrostipa* spp.,

Wallaby Grasses *Austrodanthonia* spp., and the other species listed on the survey sheets at Appendix 2. This grassland is not 'natural temperate grassland'.

Distribution: This community occurs mainly in the far south of the study area in association with the woodland remnants in that area. Previously, this grassland was the understorey to woodland, mainly the Box-Gum Woodland community that covered much of the gentler topography of the study area.

Community 5

Exotic Grassland (including sown pasture)

***Avena* sp. - *Hordeum* sp. - *Lolium* sp.**

Structure: A grassland with virtually no trees.

Floristic Composition: Dominated by exotic plants, particularly pasture species, many of which have been sown. These include Oats *Avena* sp., Barley Grass *Hordeum* sp. and Rye Grass *Lolium* sp. Typical pasture weeds are abundant, including widespread species such as Clover *Trifolium* spp; Bromus *Bromus* spp; Sheep Sorrel *Acetosella vulgaris* and Scotch Thistle *Onopordium acanthium*.

Distribution: Exotic grassland covers most of the study area and has dominated the farming land for decades.

Adjacent to Study Area

Community 6

River Oak Forest

Casuarina cunninghamiana

Structure: A tall forest to over 30 metres tall.

Floristic Composition: A forest of large River Oak.

Casuarina cunninghamiana trees, with a largely exotic understorey of trees, shrubs and herbs.

Distribution: Occurs as a narrow band of trees along the Murrumbidgee River; this is just outside the study area.

4.2 Plant Species Recorded

The plant species recorded in the study area are listed alphabetically under family name in **Appendix 3**. The list contains the names of 94 indigenous species and 69 exotic (introduced) species. No listed threatened plant species were found in the study area.

5 Fauna

5.1 Fauna Habitat

The fauna habitat in the study area can be conveniently discussed by dividing the land into several habitat zones. These are summarised below.

Zone 1 – River Corridor

The river corridor contains steep to very steep and rocky slopes, the river, and stands of woodland vegetation. Rocky outcrops are common in the area and form an important habitat for reptiles. Large trees of River Oak *Casuarina cunninghamiana* grow along the river, along with a tangle of exotic plants, including trees and herbs. Large pools and rocky shores are associated with the river.

Zone 2 – Plateau Woodland

The woodland of the plateau and upper slopes of the river corridor is very variable in terms of the age of the trees and the naturalness of the understorey. As noted in the vegetation description above, tree species and their size varies considerably from place to place.

Tree hollows are an important habitat component of remnant woodland and paddock trees. These hollows are utilised by many native species that would otherwise not be able to live and/or breed in the area, such as

bats, cockatoos and parrots. A brief survey of the obvious hollows in a sample of the large old trees in the far south of the study area recorded the following information:

Tree Species (no. in survey)	Average no. hollows per tree
<i>Eucalyptus blakelyi</i> (15)	3 (range: 1 - 5).
Dead Tree (1)	3

Zone 3 – Farm Land

The farmland is dominated by treeless exotic grassland, much of which is sown with exotic pasture species, as described in the vegetation description above. Rocky outcrops are relatively common on the edge of the river valley and are a significant habitat for reptiles.

5.2 Fauna Species Recorded

The fauna species recorded in the study area are listed in **Appendix 4**. Where available, fauna records from other works are also provided in the appendix to provide a better perspective on the district's fauna. In all, the current surveys recorded 16 mammals, 65 birds, seven reptiles, and three frogs. The fauna list at **Appendix 4** provides a reasonable inventory of the fauna known and expected to occur in the local area.

6 Results of Threatened Species Surveys

6.1 Flora

The vegetation survey identified and delineated the extent of the threatened community known as Box - Gum Woodland, as listed in the ACT. The community was not found in the NSW section of the study area. The extent of the woodland in the south of the study area, most of which is Box-Gum Woodland, is shown on **Figure 2**.

No threatened plant species were found in the study area. Given the level of field survey, it is reasonable to assume that such species do not occur on the gentler topography of the study area.

6.1 Fauna

The study located four listed threatened animal species; these are discussed below. Other threatened species previously recorded in the locality are also documented, although these were not recorded in this study.

Pink-tailed Worm Lizard

The lizard was found to be common in the study area; the records of the species are summarised in **Table 2** and their distribution shown on **Figure 3**. The lizard occurs amongst rock outcrops along the edge of the river corridor, where it was found at 14 sites out of a total of 25 survey sites (56%).

Table 2
Records of the Pink-tailed Worm Lizard in the study area

GPS Location ¹	Comment
55 679567 6100278	Two lizards observed.
55 679407 6100561	Two lizards observed.
55 679154 6100552	Two lizards observed.
55 679244 6100588	One lizard observed.
55 680623 6099460	One shed skin found.
55 679676 6099585	One lizard observed.
55 679899 6099338	One lizard observed.
55 679967 6099439	One lizard observed.
55 680507 6099070	One lizard observed.
55 680944 6098978	Two shed skins found.
55 680244 6100337	One lizard observed.
55 679173 6100393	One shed skin found.
55 679586 6100182	One shed skin found.
55 679845 6099989	One lizard observed.

1. GPS system used is WSG84.

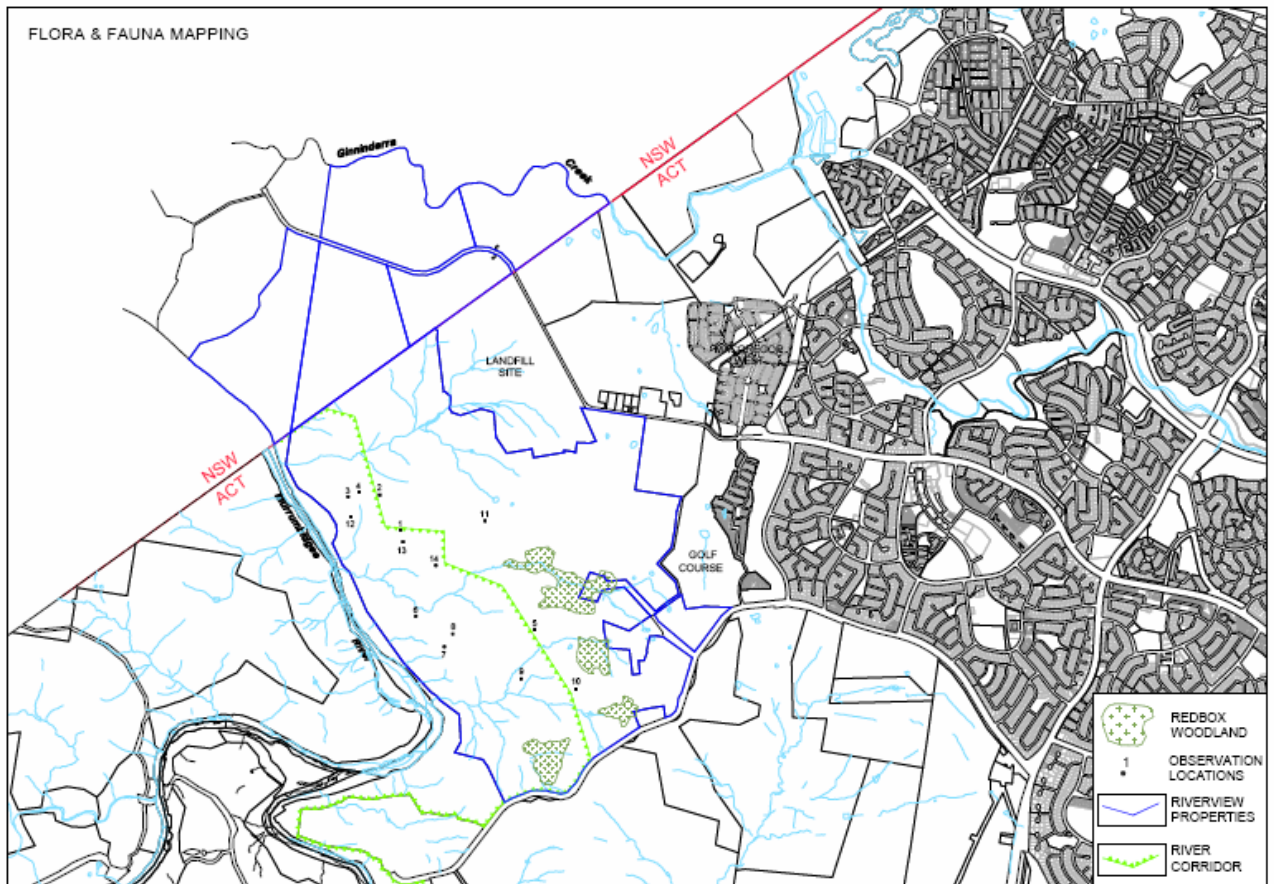


Figure 3. Location of Pink-tailed Worm Lizard Observations.
(Note error in key; Redbox Woodland should read Woodland Patch.)

Superb Parrot

The Superb Parrot was recorded in the study area and nearby; these records are summarised in **Table 3**.

Table 3
Records of the Superb Parrot in and near the study area

Location ¹	Comment
55 681077 6099553	One bird seen on 15.12.2008.
na	Near golf course east of study area; two birds observed flying overhead on 02.12.2008.

1. GPS system used is WSG84.

Eastern Bentwing-bat

The Eastern Bentwing-bat *Miniopterus schreibersii* was recorded at three bat sites (out of six survey sites). This bat roosts in caves and rock overhangs and sometimes buildings and other artificial structures. It is common and widespread and often recorded during bat surveys; the species is listed as threatened because it is vulnerable at its nursery caves. There is probably no roosting habitat in the study area, as the rock outcrops are too small and lack caves.

Speckled Warbler

The Speckled Warbler, listed in NSW but not the ACT, was observed in woodland in the far southern part of the study area, within the ACT. Although not listed in the ACT, this species, along with other woodland birds, is threatened.

Other Threatened Species

Threatened species recorded in the district but not found during this study are listed in **Table 4**. Some of these species may occur in the study area, although habitat for most of them is very limited or absent.

Table 4
Threatened fauna species known to have occurred in the local area

Common name	Taxonomic Name	Classification under		
		TSC Act ⁺	EPBC Act ⁺	ACT ⁺
Mammals				
Koala	<i>Phascolarctos cinereus</i>	V	-	-
Spotted-tailed Quoll	<i>Dasyurus maculatus maculatus</i>	V	E	V
Birds				
Brown Treecreeper	<i>Climacteris picumnus</i>	V	-	V
Diamond Firetail	<i>Stagonopleura guttata</i>	V	-	-
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	V	-	-
Hooded Robin	<i>Melanodryas cucullata</i>	V	-	V
Painted Honeyeater	<i>Grantiella picta</i>	V	-	V
Regent Honeyeater	<i>Xanthomyza phrygia</i>	E	E	E
Speckled Warbler	<i>Chthonicola sagittata</i>	V	-	-
Varied Sittella	<i>Daphoenositta chrysoptera</i>	-	-	V
White-winged Triller	<i>Lalage sueurii</i>	-	-	V
Frogs				
Green and Golden Bell Frog	<i>Litoria aurea</i>	E	V	

+ V = vulnerable, E = endangered, - = not listed.

7 Discussion of Key Issues

Plant Communities

The southern part of the study area supports remnants of the Yellow Box - Red Gum Woodland, an endangered community in the ACT. These remnants are primarily large, old paddock trees; plot surveys indicate that the understorey is native grassland in many places. Some areas of treeless native grassland occur nearby. This community is also listed in NSW, but there are apparently no remnants within that part of the study area. The NSW section of the study area does not contain any woodland, except for some small stands in the river valley. The presence of the threatened woodland community would need to be considered in planning for development in the southern part of the study area.

Plant Species

Native plant species diversity is very low across most of the paddocks on gentle topography, with increasing diversity apparent on the steeper and less improved parts of the paddocks, mostly towards the west. Some relatively high diversity native grassland occurs in the south of the study area, associated with the above woodland. No threatened plant species were located in the study area. It seems unlikely that any such species would occur in any areas likely to be developed.

Animal Species

Pink-tailed Worm Lizard *Aprasia parapulchella*

The lizard was found in rocky areas in the southern part of the study area, where it is apparently quite common. Retention of suitable habitat for this lizard must be an important consideration in developing plans for local changes to land use. Many of the rock outcrops are probably within the designated river corridor.

Superb Parrot *Polytelis swainsonii*

The Superb Parrot may well breed in the study area, most likely in the large old trees, dead and alive, in the south of the study area.

Speckled Warbler *Chthonicola sagittata*

Recorded in the ACT, within woodland in the far south of the study area. Although not listed in the ACT, this and other declining woodland birds are an important consideration in land use planning. Their primary habitat is the woodland.

Eastern Bentwing Bat *Miniopterus schreibersii*

A relatively common bat that is widespread; listed because it is vulnerable at its nursery/roost sites. There are no roost sites within the areas of the study area that are likely to be developed.

Other threatened species may occur in the study area from time to time. The Painted Honeyeater, for example, may occur along the river in the Sheoak Mistletoe *Amyema cambagei*. Additional threatened woodland birds probably occur in the area, such as the Diamond Firetail, and highly nomadic species such as Regent Honeyeater could turn up occasionally.

8 References

- Australian Government (2007). Agreement between the Commonwealth of Australia and the State of New South Wales relating to environmental impact assessment. Department of Environment and Water Resources, 18 January 2007.
- Baines, J. (1981). *Australian Plant Genera*. The Society for Growing Australian Plants, Surrey Beatty & Sons Pty Ltd, NSW, 406p.
- Briggs, J. & Leigh, J. (1996). *Rare or Threatened Australian Plants*. CSIRO, Canberra, 466p.
- Christidis, L. & Boles, W.E. (2008). *Systematics and Taxonomy of Australian Birds*, CSIRO Publishing, Melbourne.
- Churchill, S. (1998). *Australian Bats*. Reed New Holland, Sydney, 230p.
- Cogger, H. (1992). *Reptiles and Amphibians of Australia*. Reed, Sydney, revised ed., 775p.
- Commonwealth of Australia (1999). *Environment Protection and Biodiversity Conservation Act 1999*. Commonwealth Government, Canberra.
- Department of Environment and Heritage (DEH) (2006). *Significant Impact Guidelines: Matters of National Environmental Significance*. Canberra, May.
- Environment ACT (2006). National Recovery Plan for Natural Temperate Grassland of the Southern Tablelands (NSW and ACT): an Endangered Ecological Community. Environment ACT, Canberra, January, 54pp.
- Harden, G. (ed.) (1992-2002). *Flora of New South Wales. Volumes 1 - 4*. Royal Botanic Gardens/University of NSW Press, Sydney. incl. revised editions.
- National Capital Planning Authority (1990). Avifauna of the Australian Capital Territory, Final Report of the ACT Avifauna Database Project, Canberra Ornithologists Group/
- NSW Department of Planning (2007). Commonwealth Environment Protection and Biodiversity Conservation Act 1999. Guide to Implementation in NSW. NSW Planning, Sydney, May, 24p.
- NSW Department of Environment and Climate Change (DECC). NSW Wildlife Atlas. Computer database of species records, various contributors, periodically updated.
- NSW Department of Environment and Conservation (DEC) (2004). Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities. Working Draft. Prepared by the NSW NPWS and SMEC Australia.
- NSW Department of Environment and Climate Change (DECC) (2007). Threatened Species Assessment Guidelines; the Assessment of Significance. DECC, Sydney South, August, 12p.
- New South Wales (1979). *Environmental Planning & Assessment Act 1979*. NSW Government, Sydney.
- New South Wales (1994). *Fisheries Management Act 1994*. NSW Government, Sydney.
- New South Wales (1995). *Threatened Species Conservation Act 1995*. NSW Government, Sydney.
- New South Wales (2002). *Threatened Species Conservation Amendment Act 2002*. NSW Government, Sydney.
- New South Wales (1995). *State Environmental Planning Policy No. 44 - Koala Habitat Protection*. Government, Sydney.
- Rehwinkel, R. (1997). Grassy Ecosystems of the South Eastern Highlands. NPWS, Queanbeyan, July, 54pp.

Richardson, F. J., Richardson, R. G. & Shepherd, R. C. H. (2006). *Weeds of the South-east*. The authors, 438p.

Strahan, R. (1995). *The Mammals of Australia*. Australian Museum/Reed Books, Sydney, 756p.

Walker, J. & Hopkins, M. (1990). Vegetation. In *Australian Soil and Land Survey, Field Handbook*, McDonald, R., Isbell, R., Speight, J., Walker, J. & Hopkins, M. (eds). Inkata Press, Melbourne, 2nd ed., pp.58-86. First Published 1984.

Appendices

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Crown Separation	Closed or dense	Mid-dense	Sparse	Very sparse	Isolated plants	Isolated clumps
Field criteria	Touching - overlap	Touching – slight separation	Clearly separated	Well separated	Isolated	Isolated
Crown separation ratio	<0	0-0.25	0.25-1	1-20	>20	>20
Growth Form	Structural Formation Classes					
Tree	Closed forest	Open forest	Woodland	Open woodland	Isolated trees	Isolated clump of trees
Tree mallee	Closed mallee forest	Open mallee forest	Mallee woodland	Open mallee woodland	Isolated mallee trees	Isolated clump of mallee trees
Shrub	Closed shrubland	Shrubland	Open shrubland	Sparse shrubland	Isolated shrubs	Isolated clump of mallee shrubs
Mallee shrub	Closed mallee shrubland	Mallee shrubland	Open mallee shrubland	Sparse mallee shrubland	Isolated shrubs	Isolated clump mallee shrubs
Heath shrub	Closed heathland	Heathland	Open heath	Sparse heath	Isolated shrubs	Isolated clump of heath shrubs
Chenopod shrub	Closed chenopod shrubland	Chenopod shrubland	Open chenopod shrubland	Sparse chenopod shrubland	Isolated chenopod shrubs	Isolated clump of chenopod shrubs

Crown class	Closed dense or	Mid-dense	Sparse	Very sparse	Isolated plants	Isolated clumps
Foliage cover	>70	30-70	10-30	<10	<1	<1
Structural Formation Classes						
Tussock grass	Closed grassland	Grassland	Open grassland	Sparse grassland	Isolated grasses	Isolated clump of tussock grasses
Hummock grass	Closed hummock grassland	Hummock grassland	Open hummock grassland	Sparse hummock grassland	Isolated hummock grasses	Isolated clump of hummock grasses
Sod grass	Closed sod grassland	Sod grassland	Open sod grassland	Sparse sod grassland	Isolated sod grasses	Isolated clump of sod grasses
Sedge	Closed sedgeland	Sedgeland	Open sedgeland	Sparse sedgeland	Isolated sedges	Isolated clump of sedges
Rush	Closed rushland	Rushland	Open rushland	Sparse rushland	Isolated rushes	Isolated clump of rushes
Forb	Closed forbland	Forbland	Open forbland	Sparse forbland	Isolated forbs	Isolated clump of forbs
Fern	Closed fernland	Fernland	Open fernland	Sparse fernland	Isolated ferns	Isolated clump of ferns
Moss	Closed mossland	Mossland	Open mossland	Sparse mossland	Isolated mosses	Isolated clump of mosses
Vine	Closed vineland	Vineland	Open vineland	Sparse vineland	Isolated vines	Isolated clump of vines

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Appendix 2

Vegetation Survey Sheets

Grassland Survey Form		Kevin Mills & Associates	
Site Name: West Molonglo		Plot No.: M01	
Date: 27 November 2008		Community: Secondary Grassland	
Location: North of southern creek			
GPS (centre of plot): 55 0680559 6099900		Soil: Sandy clay	
Land Tenure: Freehold		Geology: Silurian volcanics.	
Altitude: approx.580m		Topography: midslope	
Slope: gentle		Aspect: South	
Species Cover: 1:<5% (uncommon); 2:<5% (common); 3:5-25%; 4:25-50%; 5:50-75%; 6:75-100%			
Natives		Exotics	
Asperula conferta	1	Acetosella vulgaris	1
Austrodanthonia carphoides	1	Avena sp.	1
Austrodanthonia racemosa	2	Bromus hordeaceus	1
Austrostipa bigeniculata	4	Carthamus lanatus	1
Austrostipa scabra	2	Cirsium vulgare	1
Carex inversa	1	Echium plantagineum	1
Convolvulus erubescens	1	Hypericum perforatum	2
Cynoglossum suaveolens	1	Hypochaeris radicata	1
Einadia nutans	1	Lolium sp.	2
Elymus scaber	4	Onopordium acanthium	1
Lomandra filiformis	1	Pentaschistis airoides	1
Oxalis perennans	1	Petrorhagia nanteuillii	1
Plantago varia	1	Picris hieracioides	1
Senecio quadridentatus	1	Polygonum aviculare	1
Solenogyne dominii	1	Trifolium arvense	2
Themeda australis	1	Trifolium glomeratum	3
Vittadinia gracilis	1	Vulpia sp.	1



Grassland Survey Form		Kevin Mills & Associates	
Site Name: West Molonglo		Plot No.: M02	
Date: 27 November 2008		Community: Secondary Grassland (Box-Gum Woodland)	
Location: South of southern creek.			
GPS (centre of plot): 55 0680486 6099746		Soil: Sandy clay	
Land Tenure: Freehold		Geology: Silurian volcanics.	
Altitude: approx.580m		Topography: Lower slope	
Slope: Gentle		Aspect: North	
Species Cover: 1:<5% (uncommon); 2:<5% (common); 3:5-25%; 4:25-50%; 5:50-75%; 6:75-100%.			
Natives		Exotics	
Alternanthera sp. A	1	Acetosella vulgaris	1
Aristida ramosa	1	Avena sp.	1
Asperula conferta	1	Briza minor	1
Austrodanthonia carphoides	1	Bromus hordeaceus	1
Austrodanthonia spp.	3	Cirsium vulgare	1
Austrostipa bigeniculata	6	Hypericum perforatum	2
Bothriochloa macra	1	Hypochaeris radicata	3
Cheilanthes sieberi	1	Lolium sp.	1
Chrysocephalum apiculatum	1	Pentaschistis airoides	2
Desmodium varians	1	Polygonum aviculare	1
Dichopogon fimbriatus	2	Trifolium arvense	1
Elymus scaber	2	Trifolium glomeratum	1
Eucalyptus blakelyi	1	Vulpia sp.	2
Lomandra filiformis	1		
Oxalis perennans	1		
Plantago varia	1		
Senecio quadridentatus	1		
Themeda australis	3		
Tricoryne elatior	1		
Vittadinia gracilis	1		
Wurmbea dioica	1		



Grassland Survey Form		Kevin Mills & Associates	
Site Name: West Molonglo		Plot No.: M03	
Date: 27 November 2008		Community: Secondary Grassland	
Location: Adjacent to northern creekbank			
GPS (centre of plot):		Soil: Sandy clay	
Land Tenure: Freehold		Geology: Silurian volcanics.	
Altitude: approx.580m		Topography: Lower slope	
Slope: Gentle		Aspect: north	
Species Cover: 1:<5% (uncommon); 2:<5% (common); 3:5-25%; 4:25-50%; 5:50-75%; 6:75-100%.			
Natives		Exotics	
Asperula conferta	1	Acetosella vulgaris	1
Austrodanthonia carphoides	2	Avena sp.	1
Austrodanthonia racemosa	2	Briza minor	1
Carex inversa	1	Bromus diandrus	1
Chrysocephalum semipapposum	1	Bromus hordeaceus	2
Daucus glochidiatus	1	Carthamus lanatus	1
Dichopogon fimbriatus	1	Cerastium fontanum	1
Elymus scaber	1	Echium plantagineum	1
Juncus sp.	1	Gamochaeta americanum	1
Leptorhynchos squamatus	1	Hypericum perforatum	2
Lomandra filiformis	1	Hypochaeris radicata	1
Microlaena stipoides	1	Lolium sp.	1
Oxalis sp.	1	Paspalum dilatatum	1
Poa sieberiana	1	Pentaschistis airoides	1
Rumex brownii	1	Trifolium arvense	2
Scutellaria humilis	1	Trifolium augustifolium	1
Solenogyne dominii	1	Trifolium campestre	1
Themeda australis	6	Trifolium glomeratum	2
Tricoryne elatior	1	Vulpia sp.	2
Vittadinia cuneata	1		
Wahlenbergia communis	1		
Wahlenbergia luteola	1		
Wurmbea dioica	1		



Grassland Survey Form		Kevin Mills & Associates	
Site Name: West Molonglo		Plot No.: M04	
Date: 28 November 2008		Community: Secondary Grassland	
Location: Near artists' colony.			
GPS (centre of plot): 55 0680992 6099271		Soil: Sandy clay, with some rock.	
Land Tenure: Freehold		Geology: Silurian volcanics.	
Altitude: approx.580m		Topography: Top of broad ridge.	
Slope: Gentle		Aspect: North	
Species Cover: 1:<5% (uncommon); 2:<5% (common), 3:5-25%; 4:25-50%; 5:50-75%; 6:75-100%.			
Natives		Exotics	
<i>Alternanthera</i> sp. A	1	<i>Acetosella vulgaris</i>	2
<i>Austrodanthonia racemosa</i>	3	<i>Avena</i> sp.	2
<i>Austrostipa bigeniculata</i>	3	<i>Bromus hordeaceus</i>	1
<i>Austrostipa scabra</i>	6	<i>Bromus rubens</i>	1
<i>Bothriochloa macra</i>	1	<i>Carthamus lanatus</i>	1
<i>Chenopodium pumilio</i>	1	<i>Conyza</i> sp.	1
<i>Crassula sieberiana</i>	1	<i>Echium plantagineum</i>	1
<i>Cynodon dactylon</i>	1	<i>Erodium cicutarium</i>	1
<i>Lomandra filiformis</i>	1	<i>Hordeum</i> sp.	1
<i>Microlaena stipoides</i>	2	<i>Hypericum perforatum</i>	1
<i>Pseudognaphalium luteoalbum</i>	1	<i>Hypochaeris radicata</i>	1
<i>Rumex brownii</i>	1	<i>Lolium</i> sp.	1
		<i>Paspalum dilatatum</i>	1
		<i>Phalaris</i> sp.	1
		<i>Picris hieracioides</i>	1
		<i>Trifolium arvense</i>	1
		<i>Trifolium glomeratum</i>	1
		<i>Trifolium subterraneum</i>	1
		<i>Vulpia</i> sp.	1



Grassland Survey Form		Kevin Mills & Associates	
Site Name: West Molonglo		Plot No.: M05	
Date: 2 November 2008		Community: <i>E. blakelyi</i> Woodland/ Themeda grassland	
Location: Regrowth stand of <i>E. blakelyi</i>			
GPS (centre of plot): 55 0680963 6099080		Soil: Sandy clay	
Land Tenure: Freehold		Geology: Silurian volcanics.	
Altitude: approx.580m		Topography: Midslope	
Slope: Gentle		Aspect: Northwest	
Species Cover: 1:<5% (uncommon); 2:<5% (common), 3:5-25%; 4:25-50%; 5:50-75%; 6:75-100%.			
Natives		Exotics	
<i>Aristida ramosa</i>	3	<i>Acetosella vulgaris</i>	1
<i>Austrodanthonia carphoides</i>	2	<i>Briza minor</i>	1
<i>Austrodanthonia racemosa</i>	3	<i>Hypericum perforatum</i>	2
<i>Austrostipa scabra</i>	1	<i>Hypochaeris radicata</i>	1
<i>Bothriochloa macra</i>	1	<i>Pentaschistis airoides</i>	1
<i>Cheilanthes sieberi</i>	2	<i>Petrorhagia nanteuillii</i>	1
<i>Chrysocephalum apiculatum</i>	1	<i>Picris hieracioides</i>	1
<i>Convolvulus erubescens</i>	1	<i>Polygonum aviculare</i>	1
<i>Desmodium varians</i>	1	<i>Trifolium arvense</i>	1
<i>Elymus scaber</i>	2	<i>Trifolium augustifolium</i>	1
<i>Eucalyptus blakelyi</i>	3	<i>Trifolium subterraneum</i>	1
<i>Glycine tabacina</i>	1	<i>Vulpia</i> sp.	1
<i>Hydrocotyle laxiflora</i>	1		
<i>Hypericum gramineum</i>	1	Natives	
<i>Lomandra filiformis</i>	1	<i>Triptilodiscus pygmaeus</i>	1
<i>Microlaena stipoides</i>	1	<i>Themeda australis</i>	6
<i>Oxalis radicata</i>	1	<i>Tricoryne elatior</i>	1
<i>Panicum effusum</i>	2	<i>Wahlenbergia communis</i>	1
<i>Pseudognaphalium luteoalbum</i>	1	<i>Wurmbea dioica</i>	1
<i>Solenogyne dominii</i>	1		



Grassland Survey Form		Kevin Mills & Associates	
Site Name: West Molonglo		Plot No.: M06	
Date: 28 November 2008		Community: Secondary grassland.	
Location: Top of creek bank			
GPS (centre of plot): 55 0680803 6099654		Soil: Sandy clay.	
Land Tenure: Freehold		Geology: Silurian volcanics.	
Altitude: approx.580m		Topography: Lower slope	
Slope: Gentle		Aspect: South	
Species Cover: 1:<5% (uncommon); 2:<5% (common), 3:5-25%; 4:25-50%; 5:50-75%; 6:75-100%.			
Natives		Exotics	
Asperula conferta	1	Acetosella vulgaris	1
Austrodanthonia carphoides		Avena sp.	1
Austrodanthonia racemosa	3	Bromus hordeaceus	2
Austrostipa scabra	3	Bromus rubens	1
Carex inversa	1	Carthamus lanatus	1
Chrysocephalum apiculatum	2	Cirsium vulgare	1
Crassula sieberiana	1	Echium plantagineum	1
Elymus scaber	2	Hordeum sp.	1
Eucalyptus blakelyi	1	Hypericum perforatum	2
Leptorhynchos squamatus	1	Hypochaeris glabra	1
Lomandra filiformis	1	Hypochaeris radicata	2
Microlaena stipoides	5	Lolium sp.	1
Oxalis sp.	1	Onopordium acanthium	1
Panicum effusum	1	Pentaschistis airoides	1
Plantago varia	1	Phalaris	1
Poa sieberiana	1	Picris hieracioides	1
Rumex brownii	1	Polygonum aviculare	1
Solenogyne dominii	1	Trifolium arvense	2
Themeda australis	4	Trifolium campestre	1
Tricoryne elatior	1	Trifolium subterraneum	1
Wahlenbergia communis	1	Vulpia sp.	3
Wahlenbergia luteola	1		



Grassland Survey Form		Kevin Mills & Associates	
Site Name: West Molonglo		Plot No.: M07	
Date: 1 December 2008		Community:	
Location: Southern regrowth woodland			
GPS (centre of plot): 55 0680848 6099108		Soil: Clayey.	
Land Tenure: Freehold		Geology: Silurian volcanics.	
Altitude: approx.580m		Topography: Lower slope	
Slope: Gentle		Aspect: West	
Species Cover: 1:<5% (uncommon); 2:<5% (common), 3:5-25%; 4:25-50%; 5:50-75%; 6:75-100%.			
Natives		Exotics	
Aristida ramosa	1	Briza minor	1
Asperula conferta	1	Bromus hordeaceus	1
Austrodanthonia racemosa	3	Carthamus lanatus	1
Bothriochloa macra	1	Centaurium erythraea	1
Cheilanthes sieberi	1	Gamochaeta calviceps	1
Chenopodium pumilio	1	Hypericum perforatum	1
Desmodium varians	1	Hypochaeris radicata	1
Dichopogon fimbriatus	1	Lolium sp.	1
Einadia nutans	1	Pentaschistis airoides	1
Elymus scaber	1	Petrorhagia nanteuillii	1
Eucalyptus blakelyi	1	Picris hieracioides	2
Galium gaudichaudii	1	Polygonum aviculare	1
Gamochaeta sphaericum	1	Rosa rubiginosa	1
Glycine tabacina	1	Silene gallica	1
Hydrocotyle laxiflora	1	Trifolium arvense	2
Oxalis sp.	1	Trifolium augustifolium	1
Panicum effusum	1	Vulpia sp.	1
Rumex brownii	1	Natives	
Solenogyne dominii	1	Vittadinia cuneata	1
Themeda australis	6	Vittadinia muelleri	1
Tricoryne elatior	1	Wahlenbergia communis	1
Triptilodiscus pygmaeus	3	Wurmbea dioica	1



Appendix 3

List of Plant Species for the Study Area

Sinopteridaceae

Cheilanthes austrotenuifolia
Cheilanthes sieberi

Rock Fern
 Mulga Fern

Gymnospermae (Conifers)

Cupressaceae

Callitris endlicheri

Black Cypress Pine

Pinaceae

**Pinus radiata*

Radiata Pine

Angiospermae (Flowering Plants)

Aceraceae

**Acer negundo*

Box Elder

Amaranthaceae

Alternanthera sp. A
 **Amaranthus* sp.

Joyweed
 Amaranth

Anthericaceae

Tricoryne elatior

Yellow Rush-lily

Apiaceae

Daucus glochidiatus
 **Conium maculatum*
 **Foeniculum vulgare*

Native Carrot
 Hemlock
 Fennel

Asteraceae

Calotis lappulacea
Cassinia longifolia
Centipeda minima
Chrysocephalum apiculatum
Chrysocephalum semipapposum
Euchiton sphaericus
Leptorhynchus squamatus
Pseudognaphalium luteoalbum
Senecio quadridentatus
Solenogyne dominii
Triptilodiscus pygmaeus
Vittadinia cuneata
Vittadinia gracilis
Vittadinia muelleri
 **Arctotheca calendula*
 **Aster subulatus*
 **Carthamus lanatus*
 **Cirsium vulgare*
 **Conyza* sp.
 **Gamochaeta americana*
 **Gamochaeta calviceps*
 **Hypochaeris glabra*
 **Hypochaeris radicata*
 **Lactuca serriola*
 **Onopordium acanthium*
 **Silybum marianum*
 **Tolpis umbellata*

Yellow Burr-daisy
 Shiny Cassinia
 Spreading Sneezeweed
 Common Everlasting
 Clustered Everlasting
 Star Cudweed
 Scaly Buttons
 Jersey Cudweed
 Cotton Fireweed
 Smooth Solenogyne
 Austral Sunray
 Fuzzweed
 Woolly New Holland Daisy
 Narrow-leaf New Holland Daisy
 Capeweed
 Bushy Starwort
 Saffron Thistle
 Spear Thistle
 Fleabane
 American Cudweed
 Cudweed
 Smooth Flatweed
 Flatweed
 Prickly Lettuce
 Scotch Thistle
 Variegated Thistle
 Yellow Hawkweed

Boraginaceae**Echium plantagineum***Echium vulgare*

Paterson's Curse

Viper's Bugliss

Brassicaceae**Capsella bursa-pastoris***Lepidium* sp.**Rorippa nasturtium-aquaticum*

Shepherd's Purse

Peppercress

Watercress

Campanulaceae*Wahlenbergia communis**Wahlenbergia luteola*

Tufted Bluebell

Yellowish Bluebell

Caryophyllaceae**Petrohragia nanteuillii*

Proliferous Pink

Casuarinaceae*Casuarina cunninghamiana*

River Oak

Chenopodiaceae*Chenopodium pumilio**Einadia nutans***Chenopodium album*

Clammy Goosefoot

Nodding Saltbush

Fat Hen

Colchicaceae*Wurmbea dioica*

Early Nancy

Convolvulaceae*Convolvulus erubescens*

Australian Bindweed

Crassulaceae*Crassula sieberiana*

Stonecrop

Cyperaceae*Carex appressa**Carex inversa**Schoenoplectus validus***Cyperus eragrostis*

Tall Sedge

Knob Sedge

River Club-rush

Umbrella Sedge

Dilleniaceae*Hibbertia obtusifolia*

Grey Guinea Flower

Epacridaceae*Brachyloma daphnoides**Melichrus urceolatus*

Daphne Heath

Urn Heath

Fabaceae**Faboideae (subfamily)***Desmodium varians**Dillwynia sericea**Glycine tabacina**Indigofera australis**Pultenaea cunninghamii***Trifolium arvense***Trifolium augustifolium***Trifolium campestre***Trifolium glomeratum***Trifolium repens***Trifolium subterraneum*

Slender Tick-trefoil

Showy Parrot Pea

Vanilla Glycine

Austral Indigo

Bush Pea

Haresfoot Clover

Narrow-leaf Clover

Hop Clover

Clustered Clover

White Clover

Subterranean Clover

Mimosoideae (subfamily)*Acacia dealbata**Acacia implexa**Acacia rubida***Acacia baileyana*

Silver Wattle

Hickory Wattle

Red-leaved Wattle

Cootamundra Wattle

Gentianaceae**Centaurium erythraea*

Common Centaury

Geraniaceae*Geranium solanderi***Erodium cicutarium*

Native Geranium

Common Stork's-bill

Goodeniaceae*Goodenia hederacea*

Ivy Goodenia

Haloragaceae*Gonocarpus tetragynus*

Poverty Raspwort

Hypericaceae*Hypericum gramineum***Hypericum perforatum*

Small St John's Wort

St John's Wort

Juncaceae*Juncus australis**Juncus usitatus*

Austral Rush

Common Rush

Lamiaceae*Scutellaria humilis***Salvia verbenaca*

Dwarf Skullcap

Wild Sage

Lauraceae*Cassytha pubescens*

Downy Dodder-laurel

Lomandraceae*Lomandra filiformis**Lomandra longifolia*

Wattle Mat-rush

Spiny-headed Mat-rush

Loranthaceae*Amyema cabbagei*

Mistletoe

Lythraceae*Lythrum hyssopifolia*

Hyssop Loosestrife

Malvaceae**Malva neglecta***Modiola caroliniana*

Dwarf Mallow

Red-flowered Mallow

Myrtaceae*Eucalyptus blakelyi**Eucalyptus dives**Eucalyptus macrorhyncha**Eucalyptus melliodora**Eucalyptus pauciflora**Eucalyptus rossii**Kunzea ericoides**Leptospermum multicaule*

Blakely's Red Gum

Broad-leaved Peppermint

Red Stringybark

Yellow Box

Snow Gum

Inland Scribbly Gum

Burgan

Tea Teee

Onagraceae*Epilobium billardierianum*

Willowherb

Orobanchaceae**Orobanche minor*

Lesser Broomrape

Oxalidaceae*Oxalis perennans*

Grassland Wood Sorrel

Oxalis radicata

Wood Sorrel

Papaveraceae**Eschshoizia californica*

Californian Poppy

Phormiaceae*Stypandra glauca*

Nodding Blue Lily

Pittosporaceae*Bursaria lasiophylla*

Blackthorn

Plantaginaceae*Plantago varia*

Variable Plantain

**Plantago lanceolata*

Ribbed Plantain

Poaceae*Agrostis avenacea*

Blown Grass

Aristida ramosa

Three-awned Speargrass

Austrodanthonia racemosa

Wallaby Grass

Austrodanthonia carphoides

Short Wallaby Grass

Austrostipa bigeniculata

Tall Speargrass

Austrostipa densiflora

Brushtail Speargrass

Austrostipa scabra

Corkscrew

Bothriochloa macra

Red-leg Grass

Cynodon dactylon

Couch Grass

Dichelachne micrantha

Short-hair Plume-grass

Elymus scaber

Wheatgrass

Enneapogon nigricans

Nineawn Grass

Eragrostis sp.

Love-grass

Microlaena stipoides

Weeping Grass

Panicum effusum

Hairy Panic

Poa labillardieri

River Tussock

Poa sieberiana

Poa Tussock

Themeda australis

Kangaroo Grass

**Aira elegantissima*

Delicate Hairgrass

**Avena* sp.

Oats

**Briza maxima*

Large Quaking Grass

**Briza minor*

Lesser Quaking Grass

**Bromus cartharticus*

Prairie Grass

**Bromus diandrus*

Great Brome

**Bromus hordeaceus*

Soft Brome

**Dactylis glomerata*

Cocksfoot

**Eragrostis curvula*

African Lovegrass

**Holcus lanatus*

Yorkshire Fog

**Hordeum* sp.

Barley Grasses

**Lolium* sp.

Ryegrass

**Nassella trichotoma*

Serrated Tussock

**Phalaris aquatica*

Phalaris

Polygonaceae*Rumex brownii*

Swamp Dock

**Acetosella vulgaris*

Sheep Sorrel

**Polygonum aviculare*

Wireweed

**Rumex crispis*

Curled Dock

Portulacaceae*Portulaca oleracea*

Purslane

Rosaceae*Acaena ovina**Rubus parvifolius***Crataegus monogyna***Pyracantha* sp.**Rosa rubiginosa***Rubus fruticosus* sp. agg.

Sheep's Burr

Native Raspberry

Hawthorn

Fire Thorn

Sweet Briar

Black berry

Rubiaceae*Asperula conferta***Galium aparine*

Common Woodruff

Cleavers

Salicaceae**Salix babylonica***Salix* sp.

Weeping Willow

Willow

Scrophulariaceae**Linaria pelisserana***Verbascum thapsus***Veronica anagallis-aquatica*

Pelisser's Toadflax

Great Mullein

Blue Speedwell

Sterculiaceae*Brachychiton populneus*

Kurrajong

Thymelaeaceae*Pimelea curviflora*

Curved Rice-flower

Typhaceae*Typha orientalis*

Cumbungi

Appendix 4**List of Animal Species for the Study Area**

1. Recorded in the NSW Wildlife Atlas within 5 km of the study area.

2. Recorded in the study area in 2008.

3. ANABAT recordings: DE - definite identification; PR - probable identification, PO - possible identification.

* Introduced species are indicated by an asterisk (*).

MAMMAL SPECIES

FAMILY		NSW Wildlife Atlas¹	This Study²
Species			
ORNITHORHYNCHIDAE			
Platypus	<i>Ornithorhynchus anatinus</i>	1	
TACHYGLOSSIDAE			
Short-beaked Echidna	<i>Tachyglossus aculeatus</i>	1	
DASYURIDAE			
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	1	
PHASCOLARCTIDAE			
Koala	<i>Phascolarctos cinereus</i>	1	
VOMBATIDAE			
Common Wombat	<i>Vombatus ursinus</i>	1	
PHALANGERIDAE			
Common Brushtail Possum	<i>Trichosurus vulpecula</i>		2
MACROPODIDAE			
Eastern Grey Kangaroo	<i>Macropus giganteus</i>	1	2
Common Wallaroo	<i>Macropus robustus</i>	1	2
Red-necked Wallaby	<i>Macropus rufogriseus</i>	1	
Swamp Wallaby	<i>Wallabia bicolor</i>	1	
MOLOSSIDAE			
Eastern Freetail Bat	<i>Mormopterus species</i>		(PR) ³
White-striped Freetail Bat	<i>Nyctinomus australis</i>		(DE)
VESPERTILIONIDAE			
Eastern Bentwing Bat	<i>Miniopterus schreibersii</i>		(DE)
Long-eared Bat species	<i>Nyctophilus sp.</i>		(PR)
Gould's Wattled Bat	<i>Chalinolobus gouldii</i>		(DE)
Chocolate Wattled Bat	<i>Chalinolobus morio</i>		(DE)
Large Forest Bat	<i>Vespadelus darlingtoni</i>		(PR)
Southern Forest Bat	<i>Vespadelus regulus</i>		(PR)
Little Forest Bat	<i>Vespadelus vulturnus</i>		(DE)
CANIDAE			
Fox*	<i>Vulpes vulpes</i>	1	
LEPORIDAE			
Rabbit*	<i>Oryctolagus cuniculus</i>		2
Brown Hare*	<i>Lepus capensis</i>		2
BOVIDAE			
Cattle*	<i>Bos taurus</i>		2
CERVIDAE			
Deer*	<i>Cervus sp.</i>	1	2

BIRD SPECIES			
FAMILY		COG	This
Species		(1990) ¹	Study ²
PHASIANIDAE			
Stubble Quail	<i>Coturnix pectoralis</i>	1	2
Brown Quail	<i>Coturnix ypsilophora</i>	1	
ANATIDAE			
Blue-billed Duck	<i>Oxyura australis</i>		
Musk Duck	<i>Biziura lobata</i>	1	
Australian Wood Duck	<i>Chenonetta jubata</i>	1	
Pacific Black Duck	<i>Anas superciliosa</i>	1	
Grey Teal	<i>Anas gracilis</i>	1	
Hardhead	<i>Aythya australis</i>	1	2
PODICIPEDIDAE			
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>	1	2
Hoary-headed Grebe	<i>Poliiocephalus poliocephalus</i>	1	
Great Crested Grebe	<i>Podiceps cristatus</i>		
PHALACROCORACIDAE			
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>	1	
Great Cormorant	<i>Phalacrocorax carbo</i>	1	
PELECANIDAE			
Australian Pelican	<i>Pelecanus conspicillatus</i>	1	
ARDEIDAE			
White-faced Heron	<i>Egretta novaehollandiae</i>	1	2
White-necked Heron	<i>Ardea pacifica</i>	1	
Eastern Great Egret	<i>Ardea modesta</i>	1	
Cattle Egret	<i>Ardea ibis</i>	1	
Nankeen Night Heron	<i>Nycticorax caledonicus</i>	1	
THRESKIORNITHIDAE			
Glossy Ibis	<i>Plegadis falcinellus</i>		
Australian White Ibis	<i>Threskiornis molucca</i>	1	
Straw-necked Ibis	<i>Threskiornis spinicollis</i>	1	2
ACCIPITRIDAE			
Black Kite	<i>Milvus migrans</i>		2
Black-shouldered Kite	<i>Elanus axillaris</i>	1	
Whistling Kite	<i>Haliastur spheonurus</i>	1	
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	1	
Variable Goshawk	<i>Accipiter hiogaster</i>	1	
Grey Goshawk	<i>Accipiter novaehollandiae</i>	1	
Collared Sparrowhawk	<i>Accipiter cirrhocephalus</i>		2
Wedge-tailed Eagle	<i>Aquila audax</i>	1	2
Little Eagle	<i>Hieraaetus morphnoides</i>	1	
FALCONIDAE			
Brown Falcon	<i>Falco berigora</i>	1	
Australian Hobby	<i>Falco longipennis</i>	1	
Peregrine Falcon	<i>Falco peregrinus</i>	1	
Nankeen Kestrel	<i>Falco cenchroides</i>	1	2
RALLIDAE			
Purple Swampphen	<i>Porphyrio porphyrio</i>		2
Dusky Moorhen	<i>Gallinula tenebrosa</i>	1	2
Eurasian Coot	<i>Fulica atra</i>	1	

SCOLOPACIDAE

Red-necked Avocet	<i>Recurvirostra novaehollandiae</i>	1	
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CHARADRIIDAE

Black-fronted Dotterel	<i>Elsayornis melanops</i>	1	
Red-kneed Dotterel	<i>Erythrogonys cinctus</i>	1	
Banded Lapwing	<i>Vanellus tricolor</i>	1	
Masked Lapwing	<i>Vanellus miles</i>	1	

COLUMBIDAE

Rock Dove*	<i>Columba livia</i>		2
Common Bronzewing	<i>Phaps chalcoptera</i>	1	
Crested Pigeon	<i>Ocyphaps lophotes</i>	1	
Diamond Dove	<i>Geopelia cuneata</i>	1	
Peaceful Dove	<i>Geopelia striata</i>	1	

CACATUIDAE

Yellow-tailed Black-Cockatoo	<i>Calyptorhynchus funereus</i>	1	2
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	1	
Galah	<i>Eolophus roseicapillus</i>	1	2
Little Corella	<i>Cacatua sanguinea</i>		2
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	1	2

PSITTACIDAE

Australian King-Parrot	<i>Alisterus scapularis</i>	1	2
Superb Parrot	<i>Polytelis swainsonii</i>		2
Crimson Rosella	<i>Platycercus elegans</i>	1	2
Eastern Rosella	<i>Platycercus eximius</i>	1	2
Red-rumped Parrot	<i>Psephotus haematonotus</i>	1	2
Turquoise Parrot	<i>Neophema pulchella</i>		
Ground Parrot	<i>Pezoporus wallicus</i>		

CUCULIDAE

Pallid Cuckoo	<i>Cacomantis pallidus</i>	1	2
Brush Cuckoo	<i>Cacomantis variolosus</i>	1	
Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>	1	
Horsfield's Bronze-Cuckoo	<i>Chalcites basalis</i>	1	
Shining Bronze-Cuckoo	<i>Chalcites lucidus</i>	1	

STRIGIDAE

Southern Boobook	<i>Ninox novaeseelandiae</i>	1	2
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PODARGIDAE

Tawny Frogmouth	<i>Podargus strigoides</i>		2
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APODIDAE

White-throated Needletail	<i>Hirundapus caudacutus</i>	1	
Fork-tailed Swift	<i>Apus pacificus</i>	1	

HALCYONIDAE

Laughing Kookaburra	<i>Dacelo novaeguineae</i>	1	2
Sacred Kingfisher	<i>Todiramphus sanctus</i>	1	2

MEROPIIDAE

Rainbow Bee-eater	<i>Merops ornatus</i>	1	2
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CORACIIDAE

Dollarbird	<i>Eurystomus orientalis</i>	1	2
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MENURIDAE

Superb Lyrebird *Menura novaehollandiae* 1

CLIMACTERIDAE

White-throated Treecreeper *Cormobates leucophaea* 1

Brown Treecreeper *Climacteris picumnus* 1

MALURIDAE

Superb Fairy-wren *Malurus cyaneus* 1 2

PARDALOTIDAE

Spotted Pardalote *Pardalotus punctatus* 1

Striated Pardalote *Pardalotus striatus* 1 2

White-browed Scrubwren *Sericornis frontalis* 1 2

Speckled Warbler *Chthonicola sagittata* 1 2

Weebill *Smicrornis brevirostris* 1 2

Western Gerygone *Gerygone fusca* 1

White-throated Gerygone *Gerygone olbogularis* 1 2

Brown Thornbill *Acanthiza pusilla* 1

Buff-rumped Thornbill *Acanthiza reguloides* 1 2

Yellow-rumped Thornbill *Acanthiza chrysorrhoa* 1 2

Yellow Thornbill *Acanthiza nana* 1

Striated Thornbill *Acanthiza lineata* 1 2

Southern Whiteface *Aphelocephala leucopsis* 1

MELIPHAGIDAE

Red Wattlebird *Anthochaera carunculata* 1 2

Noisy Friarbird *Philemon corniculatus* 1 2

Noisy Miner *Manorina melanocephala* 1 2

Yellow-faced Honeyeater *Lichenostomus chrysops* 1 2

White-eared Honeyeater *Lichenostomus leucotis* 1

White-plumed Honeyeater *Lichenostomus penicillatus* 1

Brown-headed Honeyeater *Melithreptus brevirostris* 1 2

White-naped Honeyeater *Melithreptus lunatus* 1

Crescent Honeyeater *Phylidonyris pyrrhoptera* 1

New Holland Honeyeater *Phylidonyris novaehollandiae* 1

Eastern Spinebill *Acanthorhynchus tenuirostris* 1

White-fronted Chat *Epthianura albifrons* 1

PETROICIDAE

Scarlet Robin *Petroica boodang* 1

Flame Robin *Petroica phoenicea* 1

CINCLOSOMATIDAE

Eastern Whipbird *Psophodes olivaceus* 1

NEOSITTIDAE

Varied Sittella *Daphoenositta chrysoptera* 1

PACHYCEPHALIDAE

Rufous Whistler *Pachycephala rufiventris* 2

DICRURIDAE

Magpie-lark *Grallina cyanoleuca* 1 2

Rufous Fantail *Rhipidura rufifrons* 1 2

Grey Fantail *Rhipidura albiscapa* 1 2

Willie Wagtail *Rhipidura leucophrys* 1 2

CAMPEPHAGIDAE

Black-faced Cuckoo-shrike *Coracina novaehollandiae* 1 2

White-winged Triller *Lalage sueurii* 1

ORIOLIDAE

Olive-backed Oriole	<i>Oriolus sagittatus</i>	1	
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ARTAMIDAE

White-browed Woodswallow	<i>Artamus superciliosus</i>	1	
Dusky Woodswallow	<i>Artamus cyanopterus</i>	1	
Grey Butcherbird	<i>Cracticus torquatus</i>	1	
Australian Magpie	<i>Cracticus tibicen</i>	1	2
Pied Currawong	<i>Strepera graculina</i>	1	2
Grey Currawong	<i>Strepera versicolor</i>	1	

CORVIDAE

Australian Raven	<i>Corvus coronoides</i>	1	2
Little Raven	<i>Corvus mellori</i>	1	

CORCORACIDAE

White-winged Chough	<i>Corcorax melanorhamphos</i>	1	
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PTILONORHYNCHIDAE

Satin Bowerbird	<i>Ptilonorhynchus violaceus</i>	1	
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ALAUDIDAE

Eurasian Skylark*	<i>Alauda arvensis</i>	1	
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MOTACILLIDAE

Australasian Pipit	<i>Anthus novaeseelandiae</i>	1	2
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PASSERIDAE

House Sparrow*	<i>Passer domesticus</i>	1	2
Double-barred Finch	<i>Taeniopygia bichenovii</i>	1	2
Red-browed Finch	<i>Neochmia temporalis</i>	1	2
Diamond Firetail	<i>Stagonopleura guttata</i>	1	

FRINGILLIDAE

European Goldfinch*	<i>Carduelis carduelis</i>	1	2
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DICAEIDAE

Mistletoebird	<i>Dicaeum hirundinaceum</i>	1	
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HIRUNDINIDAE

Welcome Swallow	<i>Hirundo neoxena</i>	1	2
Tree Martin	<i>Petrochelidon nigricans</i>	1	2
Fairy Martin	<i>Petrochelidon ariel</i>	1	2

SYLVIIDAE

Australian Reed-Warbler	<i>Acrocephalus australis</i>	1	2
Rufous Songlark	<i>Cincloramphus mathewsi</i>	1	
Brown Songlark	<i>Cincloramphus cruralis</i>	1	2
Golden-headed Cisticola	<i>Cisticola exilis</i>	1	

ZOSTEROPIDAE

Silvereye	<i>Zosterops lateralis</i>	1	2
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MUSCICAPIDAE

Common Blackbird*	<i>Turdus merula</i>	1	2
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STURNIDAE

Common Starling*	<i>Sturnus vulgaris</i>	1	2
Common Myna*	<i>Sturnus tristis</i>	1	2

FROGS			
FAMILY		NSW Wildlife ¹ Atlas	This Study ²
Species			
MYOBATRACHIDAE			
Spotted Grass Frog	<i>Limnodynastes tasmaniensis</i>		2
Smooth Toadlet	<i>Uperoleia laevis</i>		2
HYLIDAE			
Green and Golden Bell Frog	<i>Litoria aurea</i>	1	
Peron's Tree Frog	<i>Litoria peronii</i>		2
REPTILES			
FAMILY		NSW Wildlife ¹ Atlas	This Study ²
Species			
CHELIDAE			
Long-necked Tortoise	<i>Chelodina longicollis</i>		2
SCINCIDAE			
Striped Skink	<i>Ctenotus robustus</i>		2
Copper-tailed Skink	<i>Ctenotus taeniolatus</i>		2
Boulenger's Skink	<i>Morethia boulengeri</i>		2
Eastern Blue-tongued Lizard	<i>Tiliqua scincoides</i>		2
ELAPIDAE			
Eastern Brown Snake	<i>Pseudonaja textilis</i>		2
Pink-tailed Worm Lizard	<i>Aprasia parapulchella</i>		2

Appendix 5 Fauna Survey Sheets

5.1. Bird Survey Results

Bird Count Form		Kevin Mills & Associates	
Site Name: West Molonglo		Area No.: 1	
Date: 28 November 2008		Time: 7.30 am – 8.00 am	
Location: North of southern creek			
GPS: 55 0681210 6098580		Soil: Sandy clay	
Land Tenure: Freehold		Geology: Silurian volcanics.	
Altitude: approx.580 m		Topography: midslope	
Slope: gentle		Aspect: South	
Bird species			
Australasian Grebe	2		
Australian Magpie	2		
Australian Raven	1		
Australian Wood Duck	11		
Black-faced Cuckoo-shrike	1		
Crested Pigeon	1		
Crimson Rosella	6		
Eastern Rosella	4		
Galah	4		
Laughing Kookaburra	1		
Magpie-lark	1		
Pacific Black Duck	2		
Red Wattlebird	1		
Sacred Kingfisher	1		
Striated Pardalote	2		
Sulphur-crested Cockatoo	4		
Superb Fairy-wren	2		
Tree Martin	6		
White-throated Gerygone	1		
Yellow-rumped Thornbill	2		
Common Myna*	1		
Common Starling*	10		

Bird Count Form		Kevin Mills & Associates	
Site Name: West Molonglo		Area No.: 2	
Date: 28 November 2008		Time: 8.00am – 8.30 am	
Location: South of southern creek			
GPS: 55 0680592 6098557		Soil: Sandy clay	
Land Tenure: Freehold		Geology: Silurian volcanics.	
Altitude: approx.580 m		Topography: Lower slope	
Slope: gentle		Aspect: North	
Bird species			
Australian Magpie	1		
Black-faced Cuckoo-shrike	1		
Buff-rumped Thornbill	5		
Common Starling*	7		
Crimson Rosella	4		
Double-barred Finch	1		
Eastern Rosella	2		
Galah	2		
Grey Fantail	2		
Laughing Kookaburra	1		
Rainbow Bee-Eater	1		
Rufous Whistler	1		
Speckled Warbler	2		
Striated Pardalote	1		
Striated Pardalote	1		
Striated Thornbill	2		
Stubble Quail	1		
Sulphur-crested Cockatoo	1		

Bird Count Form		Kevin Mills & Associates	
Site Name: West Molonglo		Area No.: 3	
Date: 2 December 2008		Time: 7.40 am – 8.10 am	
Location: Planted trees			
GPS: 55		Soil: Sandy clay.	
Land Tenure: Freehold		Geology: Silurian volcanics.	
Altitude: approx.580 m		Topography:	
Slope: Gentle.		Aspect: North	
Bird species			
Australian Kestrel	1		
Australian Magpie	5		
Australian Raven	3		
Crimson Rosella	4		
Eastern Rosella	2		
Galah	35		
Laughing Kookaburra	1		
Little Corella	1		
Pied Currawong	1		
Yellow-rumped Thornbill	3		

Bird Count Form		Kevin Mills & Associates	
Site Name: West Molonglo		Area No.: 4	
Date: 2 December 2008		Time: 7.05 am – 7.35 am	
Location: Red Gum Regrowth Area			
GPS (centre of plot): 55		Soil: Clayey.	
Land Tenure: Freehold		Geology: Silurian volcanics.	
Altitude: approx.580 m		Topography: Upper slope.	
Slope: Gentle.		Aspect: West	
Bird species			
Australian King-Parrot	3		
Australian Magpie	2		
Australian Wood Duck	4		
Black-faced Cuckoo-shrike	1		
Buff-rumped Thornbill	3		
Crested Pigeon	3		
Crimson Rosella	6		
Eastern Rosella	2		
Galah	3		
Grey Fantail	2		
Noisy Friarbird	3		
Pied Currawong	1		
Striated Pardalote	2		
Sulphur-crested Cockatoo	1		
Superb Fairy-wren	4		
Weebill	1		
Yellow-rumped Thornbill	2		
Common Myna*	1		
Common Starling*	1		

Bird Count Form		Kevin Mills & Associates	
Site Name: West Molonglo		Area No.:5	
Date: 2 December 2008		Time: 6.30 - 7.00 am	
Location: Woodland around eroded gully			
GPS: 55 0680486 6099746		Soil: Sandy clay.	
Land Tenure: Freehold		Geology: Silurian volcanics.	
Altitude: approx.580 m		Topography: Broad gully floor.	
Slope: Gentle.		Aspect: North	
Bird species			
Australian Magpie	1		
Australian Raven	1		
Brown-headed Honeyeater	2		
Crimson Rosella	5		
Eastern Rosella	2		
Galah	3		
Grey Fantail	1		
Laughing Kookaburra	2		
Magpie-lark	2		
Pallid Cuckoo	1		
Red-rumped Parrot	1		
Striated Pardalote	2		
Sulphur-crested Cockatoo	4		
Superb Fairy-wren	2		
Common Myna*	3		
Common Starling*	8		

BIRD SURVEY FORM		6	
PROJECT West Molongolo			
Name of surveyor	Deryk Engel	Contact number	0408258129
Date of survey	11/12/08		
Location description	Gully in centre of study area.		
Start details		Finish details	
Easting (6 digits)	681021	Easting (6 digits)	680586
Northing (7 digits)	6099831	Northing (7 digits)	6100016
Start time (24hr)	07.09	Finish time	07.53
Weather Details At start of survey, record:		Cloud cover*	100%
Wind direction/speed*	E and 1	Rain*	N/A
Temperature (°C)	18.8	Moon*	3

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Sulphur Crested Cockatoo	>10	Seen/Heard	UC	
Crimson Rosella	7	Seen	MC	
Australian Raven	1	Heard		
Superb Fairy-wren	12	Seen	LS	
Striated Pardalote	5	Seen	At nest	
Common Starling*	>10	Seen	AC	
Common Myna*	2	Seen	AC	
Noisy Friarbird	7	Seen	FL	
Magpie-lark	1	Heard		
Yellow-rumped Thornbill	4	Seen	LC	
Pallid Cuckoo	1	Heard		
Red-browed Finch	4	Seen	SH	
White-browed Scrubwren	5	Seen	SH	
Australian Magpie	3	Seen	MC	
Buff-rumped Thornbill	3	Seen	SH	
Eastern Spinebill	1	Seen	FL	
Laughing Kookaburra	2	Heard		
Grey Fantail	2	Seen	SH	
Red-rumped Parrot	9	Seen	AC	
Welcome Swallow	1	Seen	AC	
Galah	2	Seen	AC	
Peregrine Falcon	1	Seen	FL	

BIRD SURVEY FORM**7****PROJECT** West Molonglo

Name of surveyor	Deryk Engel	Contact number	0408258129
Date of survey	11/12/08		
Location description	Fenced regenerating woodland, south eastern corner of the study area.		
Start details		Finish details	
Easting (6 digits)	681185	Easting (6 digits)	681204
Northing (7 digits)	6099399	Northing (7 digits)	6099074
Start time (24hr)	08.00	Finish time	08.21
Weather Details At start of survey, record:		loud cover*	100%
Wind direction/speed*	E and 1	Rain*	N/A
Temperature (°C)	18.8	Moon*	3

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Australian Magpie	9	Seen	GR	
Eastern Rosella	2	Seen	MC	
Nankeen Kestrel	2	Seen	UC	
Common Starling*	2	Seen	UC	
Sulphur Crested Cockatoo	>5	Seen	UC	
Galah	2	Seen	MC	
Striated Pardalote	2	Seen	LC	
Superb Fairy-wren	2	Seen	GR	
Pied Currawong	1	Seen	UC	
Black-faced Cuckoo-shrike	1	Seen	UC	
Australian Raven	1	Heard		
Grey Fantail	2	Seen	UC	
Crested Pigeon	1	Heard		
Common Blackbird*	1	Heard		
Red Wattlebird	1	Heard		
Red-rumped Parrot	5	Seen	UC	
Double-barred Finch	2	Heard		
White-browed Scrubwren	1	Seen	LC	
Magpie-lark	2	Seen	UC	
Buff-rumped Thornbill	2	Seen	UC	
Crimson Rosella	2	Seen	UC	

BIRD SURVEY FORM**8****PROJECT** West Molonglo

Name of surveyor	Deryk Engel	Contact number	0408258129
Date of survey	11/12/08		
Location description	Fenced regenerating woodland, south eastern corner of the study area.		
Start details		Finish details	
Easting (6 digits)	681204	Easting (6 digits)	680952
Northing (7 digits)	6099072	Northing (7 digits)	6099320
Start time (24hr)	08.22	Finish time	08.44
Weather Details At start of survey, record:		Cloud cover*	100%
Wind direction/speed*	E and 1	Rain*	N/A
Temperature (°C)	18.8	Moon*	3

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
House Sparrow*	3	Seen	GR	
Eastern Rosella	2	Seen	LC	
Crimson Rosella	2	Seen	MC	
Australian Magpie	2	Seen	UC	
Willy Wagtail	1	Heard		
Common Myna*	1	Seen	UC	
Common Starling*	1	Seen	AC	
Magpie-lark	2	Seen	UC	
Sulphur Crested Cockatoo	>5	Seen	UC	
Galah	2	Seen	MC	
Pied Currawong	1	Seen	UC	
Yellow-rumped Thornbill	4	Seen	LC	
Crested Pigeon	1	Heard		
Striated Pardalote	2	Seen	LC	
Fairy Martin	2	Seen	AC	
Pallid Cuckoo	1	Heard		
Australian Wood Duck	19	Seen	Dam	
Grey Teal	2	Seen	Dam	
Red-rumped Parrot	2	Seen	MC	
Australian Raven	1	Heard		
Black-faced Cuckoo-shrike	4	Seen	AC	

Note: Brown Hare, Eastern Grey Kangaroo and Rabbit all observed during bird survey.

BIRD SURVEY FORM**9****PROJECT** West Molonglo

Name of surveyor	Deryk Engel	Contact number	0408258129
Date of survey	15/12/08		
Location description	Gully within central portion of the study area, western end.		
Start details		Finish details	
Easting (6 digits)	680595	Easting (6 digits)	680680
Northing (7 digits)	6100021	Northing (7 digits)	6100002
Start time (24hr)	07.28	Finish time	07.48
Weather Details At start of survey, record:		Cloud cover*	10%
Wind direction/speed*	0	Rain*	N/A
Temperature (°C)	15.1	Moon*	3

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Sulphur Crested Cockatoo	>10	Seen	UC	
Superb Fairy-wren	3	Seen	SH	
Noisy Friarbird	1	Heard		
Common Starling*	>10	Seen	AC/UC	
Red-rumped Parrot	5	Seen	UC	
Galah	1	Seen	FL	
Black-faced Cuckoo-shrike	2	Seen	UC	
Yellow-rumped Thornbill	2	Seen	UC	
Common Myna*	1	Heard		
Crimson Rosella	2	Seen	FL	
Magpie-lark	1	Seen	UC	
Striated Pardalote	2	Seen	UC	
Wedge-tailed Eagle	1	Seen	LC	
White-browed Scrubwren	4	Seen	SH	
Grey Fantail	1	Seen	SH	
Willy Wagtail	1	Seen	MC	
Little Corella	2	Seen	FL	

BIRD SURVEY FORM**10****PROJECT** West Molongolo

Name of surveyor	Deryk Engel	Contact number	0408258129
Date of survey	15/12/08		
Location description	Gully within central portion of the study area, western end.		
Start etails		Finsh details	
Eastig (6 digits)	680951	Easting (6 digits)	681197
Northing (7 digits)	6099434	Northing (7 digits)	609929
Start time (24hr)	07.52	Finish time	08.27
Weather Details, At start of survey, record:		Cloud cover*	20%
Wind direction/speed*	E and 1	Rain*	N/A
Temperature (°C)	16.7	Moon*	3

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Crimson Rosella	5	Seen	MC	
Red-rumped Parrot	3	Seen	MC	
Striated Pardalote	2	Seen	MC	
Sulphur Crested Cockatoo	>10	Seen	GR	
Common Myna*	2	Seen	AC	
Common Starling*	>10	Seen	FL	
Yellow-rumped Thornbill	4	Seen	SH	
Australian Magpie	3	Seen	UC	
Galah	4	Seen	UC	
Eastern Rosella	2	Seen	FL	
Superb Parrot	1	Seen	AC	681077 6099553
Nankeen Kestrel	2	Seen	UC	
Australian Raven	2	Heard		
Magpie-lark	1	Heard		
Pallid Cuckoo	1	Heard		
Superb Fairy-wren	3	Seen	SH	
Noisy Friarbird	1	Heard		
Red Wattlebird	1	Heard		
Common Blackbird*	1	Heard		
Welcome Swallow	1	Seen	Dam	
Black-faced Cuckoo-shrike	1	Heard		
Crested Pigeon	2	Seen	MC	
Little Corella	1	Heard		
Laughing Kookaburra	2	Seen	UC	
Eastern Rosella	1	Seen	AC	
Rainbow Bee-eater	1	Heard		

Note: *Limnodynastes tasmaniensis* heard calling from creek line and three Rabbits disturbed.

5.2 Bat Survey Results

ULTRASONIC CALL ('ANABAT') SURVEY FORM

1

PROJECT West Molongolo

Name of surveyor	D.Engel	Contact number	0408258129
Name of person analysing calls	D.Engel	Contact number	0408258129
Date of survey	10/12/08	Detector handheld or set and left	Set and left
Location description	Middle (northern bank) of wooded gully, centre of study area.		
Time delay used - yes/no	Yes	Anabat Unit	SD1
Location			
Easting (6 digits)	686628	Northing (7 digits)	6100103
Start time (24hr)	20.21	Finish time	Collected after dawn
Weather Details At start of survey, record:		Cloud cover*	100%
Wind direction/speed*	SE and 1	Rain*	N/A
Temperature (°C)	20.8	Moon*	N/A

DEFINITE	PROBABLE	POSSIBLE
Species name	Species name	Species name
Gould's Wattled Bat <i>Chalinolobus gouldii</i>	Freetail Bat <i>Mormopterus</i> sp. 4	
Little Forest Bat <i>Vespadelus vulturnus</i>	Eastern Bentwing Bat <i>Miniopterus schreibersii</i>	
White-striped Freetail Bat <i>Nyctinomus australis</i>	Large Forest Bat <i>Vespadelus darlingtoni</i>	
Long-eared Bat <i>Nyctophilus</i> sp.		

ULTRASONIC CALL ('ANABAT') SURVEY FORM

2

PROJECT West Molongolo

Name of surveyor	D.Engel	Contact number	0408258129
Name of person analysing calls	D.Engel	Contact number	0408258129
Date of survey	10/12/08	Detector handheld or set and left	Set and left
Location description	Head (eastern end) of wooded gully, centre of study area.		
Time delay used - yes/no	Yes	Anabat Unit	Zcaim
Location			
Easting (6 digits)	681067	Northing (7 digits)	6099765
Start time (24hr)	20.21	Finish time	Collected after dawn
Weather Details At start of survey, record:		Cloud cover*	100%
Wind direction and speed*	SE and 1	Rain*	N/A
Temperature (°C)	20.8	Moon*	N/A

DEFINITE	PROBABLE	POSSIBLE
Species name	Species name	Species name
Gould's Wattled Bat <i>Chalinolobus gouldii</i>	Little Forest Bat <i>Vespadelus vulturnus</i>	
Chocolate Wattled Bat <i>Chalinolobus morio</i>	Southern Forest Bat <i>Vespadelus regulus</i>	
White-striped Freetail Bat <i>Nyctinomus australis</i>		
Large Forest Bat <i>Vespadelus darlingtoni</i>		
Eastern Bentwing Bat <i>Miniopterus schreibersii</i>		

ULTRASONIC CALL ('ANABAT') SURVEY FORM**3****PROJECT** West Molongolo

Name of surveyor	D.Engel	Contact number	0408258129
Name of person analysing calls	D.Engel	Contact number	0408258129
Date of survey	11/12/08	Detector handheld or set and left	Set and left
Location description	Within fenced woodland (eastern end), south eastern corner of the property.		
Time delay used - yes/no	Yes	Anabat Unit	Anabat II & tape
Location			
Easting (6 digits)	686628	Northing (7 digits)	6100103
Start time (24hr)	19.11	Finish time	21.55
Weather Details At start of survey, record:		Cloud cover*	90%
Wind direction and speed*	E and 2	Rain*	N/A
Temperature (°C)	21.9	Moon*	N/A

Detector collected at 21.55 due to rain commencing to fall and steadily getting heavier.

DEFINITE	PROBABLE	POSSIBLE
Species name	Species name	Species name
Gould's Wattled Bat <i>Chalinolobus gouldii</i>		

ULTRASONIC CALL ('ANABAT') SURVEY FORM**4****PROJECT** West Molongolo

Name of surveyor	D.Engel	Contact number	0408258129
Name of person analysing calls	D.Engel	Contact number	0408258129
Date of survey	11/12/08	Detector handheld or set and left	Set and left
Location description	West end of planted/regenerated woodland within southern portion of the study area.		
Time delay used - yes/no	Yes	Anabat Unit	Anabat II & tape
Location			
Easting (6 digits)	680162	Northing (7 digits)	6099291
Start time (24hr)	19.22	Finish time	21.55
Weather Details At start of survey, record:		Cloud cover*	90%
Wind direction/speed*	E and 2	Rain*	N/A
Temperature (°C)	21.9	Moon*	N/A

Detector collected at 21.55 due to rain commencing to fall and steadily getting heavier.

DEFINITE	PROBABLE	POSSIBLE
Species name	Species name	Species name
Gould's Wattled Bat <i>Chalinolobus gouldii</i>	Freetail Bat <i>Mormopterus</i> sp. 4	

ULTRASONIC CALL ('ANABAT') SURVEY FORM

5

PROJECT West Molongolo

Name of surveyor	D.Engel	Contact number	0408258129
Name of person analysing calls	D.Engel	Contact number	0408258129
Date of survey	14/12/08	Detector handheld or set and left	Set and left
Location description	Western end (northern bank) of wooded gully, centre of study area.		
Time delay used - yes/no	Yes	Anabat Unit	Anabat II & tape
Location			
Easting (6 digits)	680590	Northing (7 digits)	6100019
Start time (24hr)	20.38	Finish time	Collected after dawn
Weather Details At start of survey, record:		Cloud cover*	100%
Wind direction/speed*	SW and 1	Rain*	N/A
Temperature (°C)	16.0	Moon*	N/A

DEFINITE	PROBABLE	POSSIBLE
Species name	Species name	Species name
Gould's Wattled Bat <i>Chalinolobus gouldii</i>	Freetail Bat <i>Mormopterus</i> sp. 4	

ULTRASONIC CALL ('ANABAT') SURVEY FORM

6

PROJECT Molongolo

Name of surveyor	D.Engel	Contact number	0408258129
Name of person analysing calls	D.Engel	Contact number	0408258129
Date of survey	14/12/08	Detector handheld or set and left	Set and left
Location description	Western end of fenced woodland, south eastern portion of the study area.		
Time delay used - yes/no	Yes	Anabat Unit	Anabat II & tape
Location			
Easting (6 digits)	680961	Northing (7 digits)	6099434
Start time (24hr)	20.49	Finish time	Collected after dawn
Weather Details At start of survey, record:		Cloud cover*	100%
Wind direction/speed*	SW and 1	Rain*	N/A
Temperature (°C)	16.0	Moon*	N/A

DEFINITE	PROBABLE	POSSIBLE
Species name	Species name	Species name
Gould's Wattled Bat <i>Chalinolobus gouldii</i>	Little Forest Bat <i>Vespadelus vulturnus</i>	
Long-eared Bat <i>Nyctophilus</i> sp.	Southern Forest Bat <i>Vespadelus regulus</i>	
White-striped Freetail Bat <i>Nyctinomus australis</i>	Eastern Bentwing Bat <i>Miniopterus schreibersii</i>	

5.3 Spotlighting Survey Results

SPOTLIGHTING SURVEY FORM

1

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Date of survey	10/12/08	Vehicle or foot	Foot
Wattage of spotlight	100 watts		
Location description	Central gully / woodland		
Start details		Finish details	
Easting (6 digits)	680931	Easting (6 digits)	680611
Northing (7 digits)	6099774	Northing (7 digits)	6099964
Start time (24hr)	21.09	Finish time	21.29
Weather Details At start of survey, record:		Cloud cover*	100%
Wind direction and speed*	E and 1	Rain*	N/A
Temperature (°C)	16.7	Moon*	N/A

Date, time (24h)	Species Name	Ob type	No Indi	Grid reference (full AMGs)	Accuracy	Comments
	Common Brush-tailed Possum	O	1			
	Boobook Owl	O	1			
	White-striped Freetail Bat	H	1			

SPOTLIGHTING SURVEY FORM

2

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Date of survey	10/12/08	Vehicle or foot	Vehicle
Wattage of spotlight	100 watts		
Location description	Across study area, commencing in south eastern corner and finishing in middle of the site. Included stopping to do the walking transect along the central gully.		
Start details		Finish details	
Easting (6 digits)	681165	Easting (6 digits)	680855
Northing (7 digits)	6099446	Northing (7 digits)	6100153
Start time (24hr)	20.43	Finish time	22.00
Weather Details At start of survey, record:		Cloud cover*	100%
Wind direction/speed*	E and 1	Rain*	N/A
Temperature (°C)	16.7	Moon*	N/A

Date, time (24h)	Species Name	Ob type	No Indi	Grid reference (full AMGs)	Accuracy	Comments
	<i>Litoria peronii</i>	H	Several			
	Eastern Grey Kangaroo	O	>5			
	Rabbit*	O	1			
	Brown Hare*	O	1			
	Common Brush-tailed Possum	O	2			

SPOTLIGHTING SURVEY FORM

3

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Date of survey	11/12/08	Vehicle or foot	Foot
Wattage of spotlight	100 watts		
Location description	Woodland, south eastern corner.		
Start details		Finish details	
Easting (6 digits)	681166	Easting (6 digits)	680962
Northing (7 digits)	6099451	Northing (7 digits)	6099172
Start time (24hr)	21.09	Finish time	21.29
Weather Details			
At start of survey, record:		Cloud cover*	100%
Wind direction and speed*	E and 2	Rain*	N/A
Temperature (°C)	18.6	Moon*	N/A

Date, time (24h)	Species Name	Ob type	No Indi	Grid reference (full AMGs)	Accuracy	Comments
	Common Brush-tailed Possum	O	6			
	<i>Uperolia laevigata</i>	H	Numerous			

Two Common Wallaroo observed whilst traversing between spotlighting locations.

SPOTLIGHTING SURVEY FORM

4

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Date of survey	11/12/08	Vehicle or foot	Vehicle
Wattage of spotlight	100 watts		
Location description	Planted/regenerated woodland.		
Start details		Finish details	
Easting (6 digits)	680016	Easting (6 digits)	680162
Northing (7 digits)	6099357	Northing (7 digits)	6099291
Start time (24hr)	21.42	Finish time	22.00
Weather Details			
At start of survey, record:		Cloud cover*	100%
Wind direction and speed*	E and 1	Rain*	N/A
Temperature (°C)	16.7	Moon*	N/A

Date, time (24h)	Species Name	Ob type	No.	Grid reference (full AMGs)	Accuracy	Comments
	Rabbit*	O	1			
	Common Brush-tailed Possum	O	2			
	Tawny Frogmouth	O	1			
	Unidentified Deer*	O	6			
	Common Wallaroo	O	1			

Quail (unidentified) flushed whilst traversing across a paddock between end of spotlighting transect and exit gate. Light rain started to fall by the end of the vehicle transect, this getting heavier during the night.

SPOTLIGHTING SURVEY FORM**5****PROJECT** West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Date of survey	11/12/08	Vehicle or foot	Vehicle
Wattage of spotlight	100 watts		
Location description	Woodland remnants on site including wooded gully.		
Start details		Finish details	
Easting (6 digits)	681165	Easting (6 digits)	680590
Northing (7 digits)	6099446	Northing (7 digits)	61000196100019
Start time (24hr)	20.49	Finish time	21.06
Weather Details At start of survey, record:		Cloud cover*	100%
Wind direction/speed*	E and 1	Rain*	N/A
Temperature (°C)	16.7	Moon*	N/A

Date, time (24h)	Species Name	Ob type	No.	Grid reference (full AMGs)	Accuracy	Comments
	Unidentified Deer*	O	1			
	Common Brush-tailed Possum	O	1			
	Rabbit*	O	1			
	Australian Wood Duck	O	2			

Spotted Grass Frog (*Limnodynastes tasmaniensis*) observed on bitumen outside of recycling facility.

5.4 Reptile Survey results

HERPTOFAUNA CENSUS SURVEY SHEET 1

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Number of surveyors	1	Date of survey	2-12-08
Location description			
Start details		Start details	
Easting (6 digits)	679733	Easting (6 digits)	679733
Northing (7 digits)	6100483	Northing (7 digits)	6100483
Start time (24hr)	11.37	Start time (24hr)	11.55
Weather Details At start of survey, record:		Cloud cover*	20%
Wind direction/speed*	W and 1	Rain*	N/A
Temperature (°C)	21.5	Moon*	N/A

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Striped Skink <i>Ctenotus robustus</i>	1	Hand capture	Under rock	183 rocks and 3 crevices searched. Hand torch used to search crevices.

HERPTOFAUNA CENSUS SURVEY SHEET 2

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Number of surveyors	1	Date of survey	2-12-08
Location description			
Start details		Start details	
Easting (6 digits)	679567	Easting (6 digits)	679567
Northing (7 digits)	6100278	Northing (7 digits)	6100278
Start time (24hr)	12.05	Start time (24hr)	12.20
Weather Details At start of survey, record:		Cloud cover*	20%
Wind direction/speed*	W and 1	Rain*	N/A
Temperature (°C)	23.8	Moon*	N/A

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Pink-tailed Worm Lizard <i>Aprasia parapulchella</i>	2	hand capture	Under rock	97 rocks turned and 1 crevice investigated.

HERPTOFAUNA CENSUS SURVEY SHEET 3

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Number of surveyors	1	Date of survey	2-12-08
Location description			
Start details		Start details	
Easting (6 digits)	679397	Easting (6 digits)	679397
Northing (7 digits)	6100305	Northing (7 digits)	6100305
Start time (24hr)	12.22	Start time (24hr)	12.35
Weather Details At start of survey, record:		Cloud cover*	20%
Wind direction/speed*	W and 1	Rain*	N/A
Temperature (°C)	23.8	Moon*	N/A

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
nil				132 rocks turned

HERPTOFAUNA CENSUS SURVEY SHEET 4

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Number of surveyors	1	Date of survey	2-12-08
Location description			
Start details		Start details	
Easting (6 digits)	679407	Easting (6 digits)	679407
Northing (7 digits)	6100561	Northing (7 digits)	6100561
Start time (24hr)	12.37	Start time (24hr)	12.44
Weather Details At start of survey, record:		Cloud cover*	20%
Wind direction/speed*	W and 1	Rain*	N/A
Temperature (°C)	25.4	Moon*	N/A

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Pink-tailed Worm Lizard <i>Aprasia parapulchella</i>	2	hand capture	Under rock	36 rocks turned.

HERPTOFAUNA CENSUS SURVEY SHEET 5

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Number of surveyors	1	Date of survey	2-12-08
Location description			
Start details		Start details	
Easting (6 digits)	679626	Easting (6 digits)	679626
Northing (7 digits)	6100587	Northing (7 digits)	6100587
Start time (24hr)	12.46	Start time (24hr)	13.00
Weather Details At start of survey, record:		Cloud cover*	10%
Wind direction/speed*	W and 2	Rain*	N/A
Temperature (°C)	25.4	Moon*	N/A

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
nil				131 rocks turned.

HERPTOFAUNA CENSUS SURVEY SHEET				6
PROJECT West Molonglo				
Name of surveyor	D.Engel	Contact number	0408258129	
Number of surveyors	1	Date of survey	2-12-08	
Location description				
Start details		Start details		
Easting (6 digits)	679154	Easting (6 digits)	679154	
Northing (7 digits)	6100552	Northing (7 digits)	6100552	
Start time (24hr)	13.10	Start time (24hr)	13.13	
Weather Details At start of survey, record:		Cloud cover*	20%	
Wind direction and speed*	W and 1	Rain*	N/A	
Temperature (°C)	25.4	Moon*	N/A	

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Pink-tailed Worm Lizard <i>Aprasia parapulchella</i>	2	hand capture	Under rock	39 rocks turned.

HERPTOFAUNA CENSUS SURVEY SHEET				7
PROJECT West Molonglo				
Name of surveyor	D.Engel	Contact number	0408258129	
Number of surveyors	1	Date of survey	2-12-08	
Location description				
Start details		Start details		
Easting (6 digits)	679244	Easting (6 digits)	679244	
Northing (7 digits)	6100588	Northing (7 digits)	6100588	
Start time (24hr)	13.15	Start time (24hr)	13.26	
Weather Details At start of survey, record:		Cloud cover*	20%	
Wind direction and speed*	W and 1	Rain*	N/A	
Temperature (°C)	25.4	Moon*	N/A	

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Pink-tailed Worm Lizard <i>Aprasia parapulchella</i>	1	hand capture	Under rock	165 rocks turned.
Striped Skink <i>Ctenotus robustus</i>	1	hand capture	Under rock	

HERPTOFAUNA CENSUS SURVEY SHEET				8
PROJECT West Molonglo				
Name of surveyor	D.Engel	Contact number	0408258129	
Number of surveyors	1	Date of survey	11-12-08	
Location description				
Start details		Start details		
Easting (6 digits)	680623	Easting (6 digits)	680623	
Northing (7 digits)	6099460	Northing (7 digits)	6099460	
Start time (24hr)	8.52	Start time (24hr)	9.07	
Weather Details At start of survey, record:		Cloud cover*	100%	
Wind direction and speed*	E and 1	Rain*	N/A	
Temperature (°C)	20.8	Moon*	N/A	
SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Pink-tailed Worm Lizard <i>Aprasia parapulchella</i>	1	Shed skin	Under rock	87 rocks turned.
Striped Skink <i>Ctenotus robustus</i>	1	hand capture	Under rock	

HERPTOFAUNA CENSUS SURVEY SHEET 9

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Number of surveyors	1	Date of survey	11-12-08
Location description			
Start details		Start details	
Easting (6 digits)	680514	Easting (6 digits)	680496
Northing (7 digits)	6099476	Northing (7 digits)	6099396
Start time (24hr)	9.10	Start time (24hr)	9.31
Weather Details			
At start of survey, record:		Cloud cover*	100%
Wind direction and speed*	E and 1	Rain*	N/A
Temperature (°C)	20.8	Moon*	N/A

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
nil				193 rocks turned.

HERPTOFAUNA CENSUS SURVEY SHEET 10

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Number of surveyors	1	Date of survey	11-12-08
Location description			
Start details		Start details	
Easting (6 digits)	680278	Easting (6 digits)	680278
Northing (7 digits)	6099734	Northing (7 digits)	6099734
Start time (24hr)	9.53	Start time (24hr)	10.18
Weather Details			
At start of survey, record:		Cloud cover*	100%
Wind direction/speed*	E and 1	Rain*	N/A
Temperature (°C)	20.8	Moon*	N/A

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Boulenger's Skink <i>Morethia boulengeri</i>	1	hand capture	under rock	159 rocks turned.
Striped Skink <i>Ctenotus robustus</i>	2	hand capture	under rock	
Olive Legless Lizard <i>Delma inornata</i>	1	hand capture	under rock	

Six unidentified Deer seen when traversing between herptofauna search sites.

HERPTOFAUNA CENSUS SURVEY SHEET 11

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Number of surveyors	1	Date of survey	11-12-08
Location description			
Start details		Start details	
Easting (6 digits)	679676	Easting (6 digits)	679676
Northing (7 digits)	6099585	Northing (7 digits)	6099585
Start time (24hr)	16.30	Start time (24hr)	16.38
Weather Details			
At start of survey, record:		Cloud cover*	90%
Wind direction/speed*	E and 2	Rain*	N/A
Temperature (°C)	23.7	Moon*	N/A

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Pink-tailed Worm Lizard <i>Aprasia parapulchella</i>	1	hand capture	Under rock	36 rocks turned.

HERPTOFAUNA CENSUS SURVEY SHEET 12

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Number of surveyors	1	Date of survey	11-12-08
Location description			
Start details		Start details	
Easting (6 digits)	679899	Easting (6 digits)	679903
Northing (7 digits)	6099338	Northing (7 digits)	6099303
Start time (24hr)	16.42	Start time (24hr)	16.53
Weather Details At start of survey, record:		Cloud cover*	90%
Wind direction/speed*	E and 2	Rain*	N/A
Temperature (°C)	23.7	Moon*	N/A

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Pink-tailed Worm Lizard <i>Aprasia parapulchella</i>	1	hand capture	Under rock	111 rocks turned.

HERPTOFAUNA CENSUS SURVEY SHEET 13

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Number of surveyors	1	Date of survey	11-12-08
Location description			
Start details		Start details	
Easting (6 digits)	679989	Easting (6 digits)	679989
Northing (7 digits)	6099356	Northing (7 digits)	6099356
Start time (24hr)	16.59	Start time (24hr)	17.20
Weather Details At start of survey, record:		Cloud cover*	90%
Wind direction/speed*	NE and 2/3	Rain*	N/A
Temperature (°C)	22.3	Moon*	N/A

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
nil				169 rocks turned.

HERPTOFAUNA CENSUS SURVEY SHEET 14

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Number of surveyors	1	Date of survey	11-12-08
Location description			
Start details		Start details	
Easting (6 digits)	679967	Easting (6 digits)	679967
Northing (7 digits)	6099439	Northing (7 digits)	6099439
Start time (24hr)	17.22	Start time (24hr)	17.31
Weather Details At start of survey, record:		Cloud cover*	90%
Wind direction and speed*	NE and 2/3	Rain*	N/A
Temperature (°C)	22.3	Moon*	N/A

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Pink-tailed Worm Lizard <i>Aprasia parapulchella</i>	1	hand capture	Under rock	72 rocks turned.

HERPTOFAUNA CENSUS SURVEY SHEET				15
PROJECT West Molonglo				
Name of surveyor	D.Engel	Contact number	0408258129	
Number of surveyors	1	Date of survey	11-12-08	
Location description				
Start details		Start details		
Easting (6 digits)	680507	Easting (6 digits)	680507	
Northing (7 digits)	6099070	Northing (7 digits)	6099070	
Start time (24hr)	17.45	Start time (24hr)	18.10	
Weather Details		Cloud cover*	90%	
At start of survey, record:				
Wind direction and speed*	NE and 2/3	Rain*	N/A	
Temperature (°C)	22.3	Moon*	N/A	

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Pink-tailed Worm Lizard <i>Aprasia parapulchella</i>	1	hand capture	Under rock	87 rocks turned.
Pink-tailed Worm Lizard <i>Aprasia parapulchella</i>	1	shed skin found	Under rock	

HERPTOFAUNA CENSUS SURVEY SHEET				16
PROJECT West Molonglo				
Name of surveyor	D.Engel	Contact number	0408258129	
Number of surveyors	1	Date of survey	11-12-08	
Location description				
Start details		Start details		
Easting (6 digits)	680944	Easting (6 digits)	680944	
Northing (7 digits)	6098978	Northing (7 digits)	6098978	
Start time (24hr)	18.40	Start time (24hr)	18.58	
Weather Details		Cloud cover*	90%	
At start of survey, record:				
Wind direction/speed*	NE and 2/3	Rain*	N/A	
Temperature (°C)	23.9	Moon*	N/A	

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Pink-tailed Worm Lizard <i>Aprasia parapulchella</i>	2	shed skins found	Under two separate rocks	123 rocks turned.

HERPTOFAUNA CENSUS SURVEY SHEET				17
PROJECT West Molonglo				
Name of surveyor	D.Engel	Contact number	0408258129	
Number of surveyors	1	Date of survey	15/12/08	
Location description				
Start details		Start details		
Easting (6 digits)	680236	Easting (6 digits)	680236	
Northing (7 digits)	6100047	Northing (7 digits)	6100047	
Start time (24hr)	8.36	Start time (24hr)	8.44	
Weather Details		Cloud cover*	30%	
At start of survey, record:				
Wind direction/speed*	E and 1	Rain*	N/A	
Temperature (°C)	22.3	Moon*	N/A	

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
nil				31 rocks turned.

HERPTOFAUNA CENSUS SURVEY SHEET 18

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Number of surveyors	1	Date of survey	15/12/08
Location description			
Start details		Start details	
Easting (6 digits)	680257	Easting (6 digits)	680236
Northing (7 digits)	6100159	Northing (7 digits)	6100047
Start time (24hr)	8.46	Start time (24hr)	8.56
Weather Details At start of survey, record:		Cloud cover*	30%
Wind direction/speed*	E and 1	Rain*	N/A
Temperature (°C)	22.3	Moon*	N/A

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Boulenger's Skink <i>Morethia boulengeri</i>	1	Hand capture	Under rock	63 rocks turned.

HERPTOFAUNA CENSUS SURVEY SHEET 19

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Number of surveyors	1	Date of survey	15/12/08
Location description			
Start details		Start details	
Easting (6 digits)	680244	Easting (6 digits)	680244
Northing (7 digits)	6100337	Northing (7 digits)	6100337
Start time (24hr)	8.58	Start time (24hr)	9.10
Weather Details At start of survey, record:		Cloud cover*	30%
Wind direction/speed*	E and 1	Rain*	N/A
Temperature (°C)	22.3	Moon*	N/A

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Pink-tailed Worm Lizard <i>Aprasia parapulchella</i>	1	Hand capture	Under rock	115 rocks turned.

HERPTOFAUNA CENSUS SURVEY SHEET 20

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Number of surveyors	1	Date of survey	15/12/08
Location description			
Start details		Start details	
Easting (6 digits)	680127	Easting (6 digits)	680127
Northing (7 digits)	6100523	Northing (7 digits)	6100523
Start time (24hr)	9.12	Start time (24hr)	9.19
Weather Details At start of survey, record:		Cloud cover*	30%
Wind direction and speed*	E and 1	Rain*	N/A
Temperature (°C)	22.3	Moon*	N/A

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
nil				46 rocks turned.

HERPTOFAUNA CENSUS SURVEY SHEET 21

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Number of surveyors	1	Date of survey	15/12/08
Location description			
Start details		Start details	
Easting (6 digits)	679173	Easting (6 digits)	679173
Northing (7 digits)	6100393	Northing (7 digits)	6100393
Start time (24hr)	9.26	Start time (24hr)	9.42
Weather Details At start of survey, record:		Cloud cover*	30%
Wind direction/speed*	E and 1	Rain*	N/A
Temperature (°C)	22.3	Moon*	N/A

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Pink-tailed Worm Lizard <i>Aprasia parapulchella</i>	1	shed skin found	Under rock	133 rocks turned.
Copper-tailed Skink <i>Ctenotus taeniolatus</i>	1	hand capture	Under rock	
Striped Skink <i>Ctenotus robustus</i>	1	hand capture	Under rock	

HERPTOFAUNA CENSUS SURVEY SHEET 22

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Number of surveyors	1	Date of survey	15/12/08
Location description			
Start details		Start details	
Easting (6 digits)	679376	Easting (6 digits)	679376
Northing (7 digits)	6100271	Northing (7 digits)	6100271
Start time (24hr)	9.51	Start time (24hr)	10.11
Weather Details At start of survey, record:		Cloud cover*	30%
Wind direction/speed*	E and 1	Rain*	N/A
Temperature (°C)	25.6	Moon*	N/A

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
nil				132 rocks turned.

HERPTOFAUNA CENSUS SURVEY SHEET 23

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Number of surveyors	1	Date of survey	15/12/08
Location description			
Start details		Start details	
Easting (6 digits)	679586	Easting (6 digits)	679659
Northing (7 digits)	6100182	Northing (7 digits)	6100225
Start time (24hr)	10.12	Start time (24hr)	10.32
Weather Details At start of survey, record:		Cloud cover*	30%
Wind direction/speed*	E and 1	Rain*	N/A
Temperature (°C)	25.6	Moon*	N/A

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Pink-tailed Worm Lizard <i>Aprasia parapulchella</i>	1	shed skin found	Under rock	105 rocks turned.
Spotted Grass Frog <i>Limnodynastes tasmaniensis</i>	1	hand capture	Under rock	

HERPTOFAUNA CENSUS SURVEY SHEET 24

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Number of surveyors	1	Date of survey	15/12/08
Location description			
Start details		Start details	
Easting (6 digits)	679699	Easting (6 digits)	679699
Northing (7 digits)	6100320	Northing (7 digits)	6100320
Start time (24hr)	10.33	Start time (24hr)	10.43
Weather Details At start of survey, record:		Cloud cover*	10%
Wind direction/speed*	SW and 1	Rain*	N/A
Temperature (°C)	27.5	Moon*	N/A

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
nil				92 rocks turned.

HERPTOFAUNA CENSUS SURVEY SHEET 25

PROJECT West Molonglo

Name of surveyor	D.Engel	Contact number	0408258129
Number of surveyors	1	Date of survey	15/12/08
Location description			
Start details		Start details	
Easting (6 digits)	679845 6099989	Easting (6 digits)	679845
Northing (7 digits)		Northing (7 digits)	6099989
Start time (24hr)	10.46	Start time (24hr)	10.56
Weather Details At start of survey, record:		Cloud cover*	10%
Wind direction/speed*	SW and 1	Rain*	N/A
Temperature (°C)	27.5	Moon*	N/A

SPECIES	No. INDIVS	RECORD TYPE	MICRO HABITAT	COMMENTS
Pink-tailed Worm Lizard <i>Aprasia parapulchella</i>	1	Hand capture	Under rock	69 rocks turned.

Reptile Survey Form

Kevin Mills & Associates

Site Name: West Molonglo

26

Date: 27 November 2008

Time: 15 mins

Location:

GPS: 55 0680451 6099326 (AGD 66)

Soil: Rocky outcrop, clayey.

Land Tenure: Freehold

Geology: Silurian volcanics.

Altitude: approx. 580m

Topography: Upper slope.

Slope: Gentle.

Aspect: West.

Species No./Comment

Striped Skink 1

Reptile Survey Form

Kevin Mills & Associates

Site Name: West Molonglo

27

Date: 27 November 2008

Time: 20 mins

Location:

GPS: 55 0680216 6099675 (AGD 66)

Soil: Rocky outcrop, clayey.

Land Tenure: Freehold

Geology: Silurian volcanics.

Altitude: approx. 580m

Topography: Upper slope.

Slope: Gentle.

Aspect: West.

Species No./Comment

Striped Skink 5

Reptile Survey Form		Kevin Mills & Associates
Site Name: West Molonglo		28
Date: 27 November 2008	Time: 15 mins	
Location:		
GPS: 55 0679861 609956 (AGD 66) - error	Soil: Rocky outcrop, clayey.	
Land Tenure: Freehold	Geology: Silurian volcanics.	
Altitude: approx. 580m	Topography: Upper slope.	
Slope: Gentle.	Aspect: West.	
Species	No./Comment	
Striped Skink	2	
Boulenger's Skink	1	

Reptile Survey Form		Kevin Mills & Associates
Site Name: West Molonglo		29
Date: 27 November 2008	Time: 15mins	
Location:		
GPS: 55 0679974 6099932 (AGD 66)	Soil: Rocky outcrop, clayey.	
Land Tenure: Freehold	Geology: Silurian volcanics.	
Altitude: approx. 580m	Topography: Upper slope.	
Slope: Gentle.	Aspect: West.	
Species	No./Comment	
Striped Skink	1	

Reptile Survey Form		Kevin Mills & Associates
Site Name: West Molonglo		30
Date: 29 October 2008	Time: 15 mins	
Location:		
GPS: 55 0680451 6099326 (AGD 66)	Soil: Rocky outcrop, clayey.	
Land Tenure: Freehold	Geology: Silurian volcanics.	
Altitude: approx. 580m	Topography: Upper slope.	
Slope: Gentle.	Aspect: West.	
Species	No./Comment	
Striped Skink	1	
Eastern Brown Snake	1	
Pink-tailed Worm Lizard	Shed skins found at this site in November.	