



MOLONGLO VALLEY VEGETATION SURVEY

Baseline Condition Assessment

Prepared for
Design & Development, Territory and Municipal Services Directorate

1 July 2013



DOCUMENT TRACKING

ITEM	DETAIL
Project Name	Molonglo Valley Vegetation Survey – Baseline Condition Assessment
Project Number	12CANECO-0020
Project Manager	Matthew Dowle 02 (8536 8670)
Prepared by	Matthew Dowle
Approved by	Bruce Mullins
Status	FINAL
Version Number	4
Last saved on	17 July 2013
Cover photo	Top Left: Brown Treecreeper (Andrew Palmer-Brodie). Top Right: <i>Eucalyptus blakelyi</i> (Matt Jones). Bottom Right: Patch B2 Kama Nature Reserve (Liz Norris). Bottom Left: Rock outcrop, Molonglo Valley (Andrew Palmer-Brodie)

This report should be cited as ‘Eco Logical Australia 2013. *Molonglo Valley Vegetation Survey – Baseline Condition Assessment*. Prepared for Design and Development, TAMS.’

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from Sarah Sharp (Natural Environment Management Consulting) and Sophie Clement (TAMS)

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Contents

1	Introduction	6
1.1	Background.....	6
1.2	Study area	6
1.3	Study aims	6
1.4	Ecological communities	9
1.4.1	Box-Gum Woodland	9
1.4.2	Natural Temperate Grasslands	10
2	Methodology	12
2.1	Field survey methodology.....	12
2.1.1	Baseline condition assessment	12
2.1.2	Vegetation unit assessment	13
2.1.3	Plot surveys - flora species diversity and abundance	13
2.1.4	Step-point transect - ground cover assessment.....	13
2.2	Limitations.....	16
3	Results	17
3.1	General overview.....	17
3.2	mapping recommendations	17
3.3	Baseline vegetation condition assessments.....	26
4	Summary & recommendations	45
4.1	Summary	45
4.2	Recommendations.....	46
4.2.1	General recommendations	46
4.2.2	Potentially recoverable Box-Gum Woodland.....	47
5	References	48
6	Appendix A: Evaluation	49
6.1	Introduction	49
6.2	Condition classification	49
6.3	Vegetation unit changes	53
6.3.1	Survey methodology	53
6.4	Survey effort	54
6.5	The location of survey sites	54
6.6	Observer bias and interpretation	54

6.6.1 Seasonal and climatic influences 56

6.6.2 Land use management..... 57

6.7 Management considerations for non-listed Box-Gum Woodland..... 65

6.8 West Molonglo 67

Appendix B: Plot Species List 68

List of Figures

Figure 1: General survey areas shown in green and study areas shown in red (original vegetation unit boundaries).....	8
Figure 2: Survey plot locations for Kama Nature Reserve, William-Hovell and West Molonglo.....	14
Figure 3: Survey plot locations for Spring Valley, River Park and Arboretum	15
Figure 4: Kama Nature Reserve Vegetation Units	20
Figure 5: River Park Vegetation Units	21
Figure 6: Spring Valley Farm Vegetation Units	22
Figure 7: West Molonglo Vegetation Units	23
Figure 8: Arboretum Vegetation Units	24
Figure 9: William Hovell Vegetation Units	25
Figure 10: Box-Gum Woodland vegetation condition classification 2013	51
Figure 11: Box-Gum Woodland vegetation condition classification 2009	52
Figure 12: Original survey effort and vegetation condition classification 2013	55

List of Tables

Table 1: EPBC Act Box-Gum Woodland definition	9
Table 2: NC Act Box-Gum Woodland definition	10
Table 3: Threatened flora and fauna species commonly associated with BGW and NTG	11
Table 4: Minimum number of plots per vegetation unit (adapted from DECC 2008).	13
Table 5: Recommended vegetation unit mapping amendments.....	18
Table 6: Vegetation units and number of plots completed per vegetation unit	26
Table 7: Kama Nature Reserve Conservation Area.....	28
Table 8: River Park Conservation Area.....	32
Table 9: Spring Valley Farm Conservation Area.....	35
Table 10: West Molonglo Conservation Area (units defined by Hogg 2012)	38

Table 11: Arboretum Conservation Area.....	41
Table 12: William Hovell Conservation Area.....	44
Table 13: Potential areas of habitat for fauna	45
Table 14: Kama Nature Reserve Conservation Area observed changes.	58
Table 15: River Park Conservation Area observed changes.	59
Table 16: Spring Valley Farm Conservation Area observed changes.	61
Table 17: West Molonglo Conservation Area observed changes (units defined by Nash and Hogg 2013).	62
Table 18: Arboretum Conservation Area observed changes.	63
Table 19: William Hovell Conservation Area observed changes.	64
Table 20: Management of non-listed Box-Gum Woodland	66
Table 21: Flora species list for Kama Nature Reserve.....	68
Table 22: Flora species list for Spring Valley Farm, Arboretum and William-Hovell.....	75
Table 23: Flora species list for Molonglo River Park and West Molonglo.....	81

Abbreviations

ABBREVIATION	DESCRIPTION
BGW	Box-Gum Woodland
ELA	Eco Logical Australia
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)
MNES	Matters of National Environmental Significance
NES Plan	Molonglo Valley Plan for the Protection of Matters of National Environmental Significance September 2011
NC Act	Nature Conservation Act 1980 (ACT)
NTG	Natural Temperate Grassland
TAMS	Territory and Municipal Services (ACT Government)
TEC	Threatened Ecological Community

1 Introduction

Eco Logical Australia Pty Ltd (ELA) was commissioned by Design and Development, Territory and Municipal Services Directorate (TAMS), to undertake a baseline vegetation condition survey of Matters of National Environmental Significance (MNES) within the Molonglo Valley.

1.1 BACKGROUND

In November 2011, the *Molonglo Valley Plan for the Protection of Matters of National Environmental Significance September 2011 (NES Plan)* was endorsed by the Commonwealth Government as part of a strategic assessment process to assess the potential impacts from the development within the Molonglo Valley, under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The NES Plan outlines the ACT Government's commitments in relation to avoidance and mitigation of potential impacts to MNES and offset measures. Commitments include the preparation and implementation of plans of management (Operation Plans) and adaptive management strategies and the establishment of offset areas (conservation areas), primarily consisting of Box-Gum Woodland (BGW) and Natural Temperate Grassland (NTG).

As part of the commitments, the NES Plan requires that the "ecological condition" for the conservation areas are measured using a peer reviewed, repeatable and scientifically robust methodology for examining and comparing the ecological condition over time. The information obtained from the field surveys will contribute to the development of Operational Plans and provide the baseline ecological condition information for on-going monitoring. The Operation Plans will provide the details for maintenance and enhancement actions to improve the ecological condition of these conservation areas and for on-going monitoring.

In a separate commitment outlined in the NES, Patch T at Misery Point and Misery (Barrer) Hill is to be set aside as a Restoration Project. A separate baseline vegetation survey of this area (NGH Environmental 2012) was undertaken as a first step in the development of the Restoration Project, and was not included in the field surveys for the Molonglo Baseline Condition Assessment.

1.2 STUDY AREA

Patches of BGW and NTG within the strategic assessment area constitute the majority of the conservation areas (study area), as detailed in the NES Plan (**Figure 1**). The conservation areas include:

1. Kama Nature Reserve and Buffer Woodland, Patch A, Patch B and O
2. River Park Woodland, Patch D, K, Q, R and S (excludes portions of D and K in development area)
3. Spring Valley Farm Woodland, Patch I, L, M and P
4. West Molonglo Woodland, Patch E, F and G
5. Arboretum Woodland, Patch GG and N
6. William Hovell Woodland, Patch H and C (excludes part of H in development area)

1.3 STUDY AIMS

The aim of the works is to provide data that will establish the baseline ecological condition for the conservation areas within the strategic assessment boundary. The data will be used as a basis for

ongoing ecological condition monitoring and assessment of conservation management actions implemented within and between remnants.

An overview of the baseline condition assessment is outlined in the '*Procedures Manual – Baseline Condition Assessment in the Lower Molonglo River Valley Conservations Areas 2012*' (Sharp 2012) and detailed in the text box below.

Text Box: *Baseline Condition Assessment*

The baseline condition assessment involves:

- Identifying the vegetation community that occurs within each patch
- Identifying the diversity of plant species and vegetation structure present in each patch and conservation area
- Identifying habitat features that may be supporting particular groups of fauna species
- Identifying the condition of each conservation area
- Identifying issues present that require management intervention (e.g. rabbit disturbance, dumping, erosion and invasive weeds) in each remnant and patch to guide the development and implementation of operational plans

The consultants are required to undertake the surveys to collect the data and to summarise it according to the interpretation guidelines (section 4).

The results of the baseline condition assessment and the consultant's report provides a comprehensive set of data that assists in assessing the condition of the sites prior to the application of management required under the Matters of National Environmental Significance agreement between the ACT Government and the Commonwealth Government (ACTPLA 2011) and will provide a benchmark of condition and diversity against which to compare changes based on implementation of conservation management within remnants and between remnants.

The information will then be used to:

- Identify a strategic conservation goal and desired outcomes for each conservation area
- Assist in the identification of actions required to manage the conservation areas for conservation (e.g. fencing or revegetation requirements) incorporated into an operational plan for each conservation area
- Identify what should be monitored to determine if the management being applied realise the desired outcomes

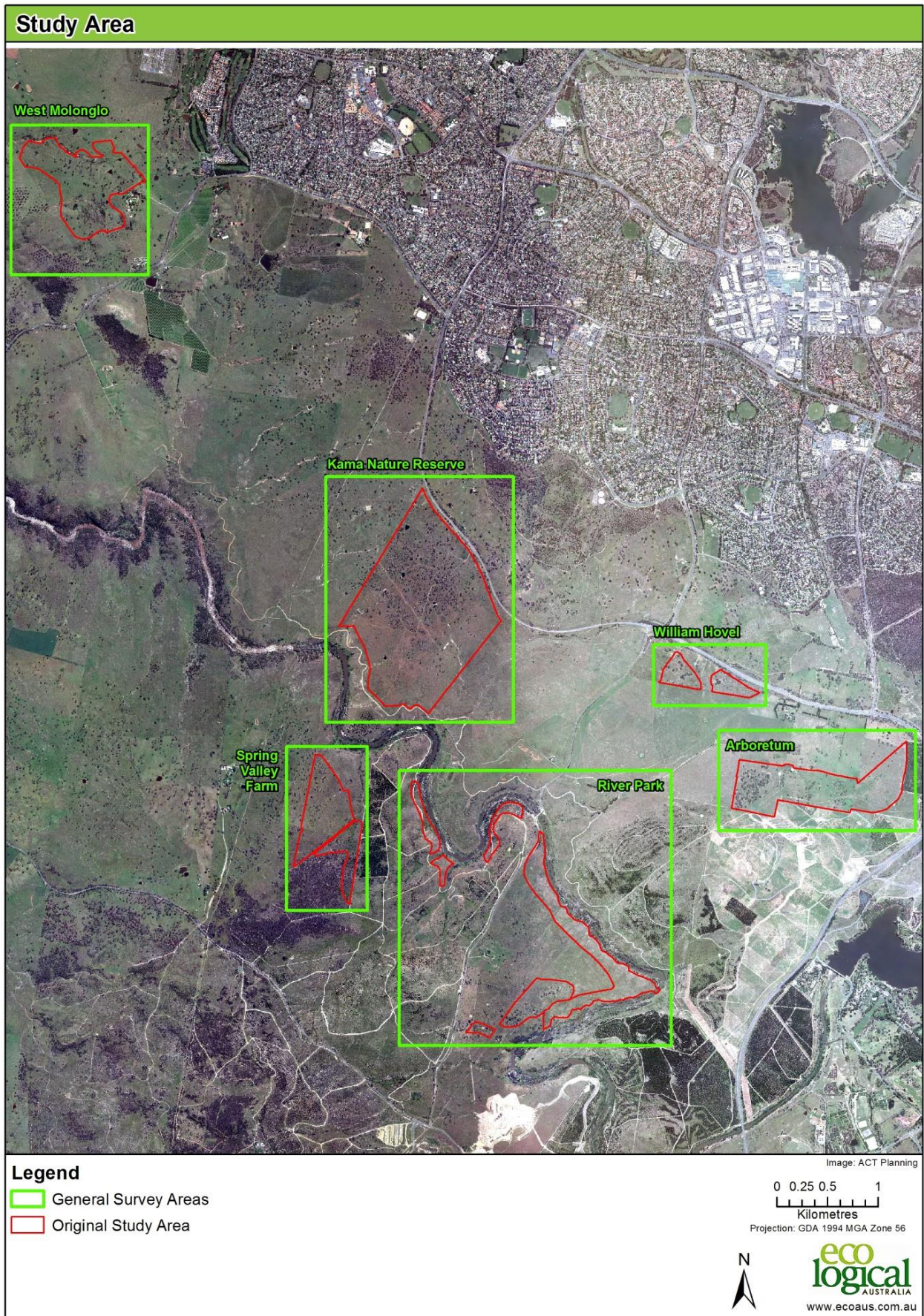


Figure 1: General survey areas shown in green and study areas shown in red (original vegetation unit boundaries)

1.4 ECOLOGICAL COMMUNITIES

BGW and NTG are ecological communities listed under Commonwealth and Territory legislation. They were mapped as part of the original environmental surveys for the strategic assessment process. The definitions (listing criteria) for the ecological communities are provided below in **Table 1** and **Table 2**.

1.4.1 Box-Gum Woodland

White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland (Box-Gum Woodland; BGW) is listed as a critically endangered ecological community under the EPBC Act. This ecological community can occur either as woodland or derived grassland from which the trees have been removed. According to the EPBC Act Listing Advice (TSSC, 2006):

Box–Gum Grassy Woodlands and Derived Grasslands are characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs, and the dominance, or prior dominance, of White Box, Yellow Box or Blakely’s Red Gum trees.

Sites dominated by other tree species that do not have *Eucalyptus melliodora* (Yellow Box), *E. albens* (White Box) or *E. blakelyi* (Blakely’s Red Gum) as dominants or co-dominants are not considered to be part of the ecological community.

BGW can provide important habitat for a number of plants and animals, including rare and threatened species (**Table 3**). This ecological community was once widespread across eastern Australia but now less than 5% remains in good condition of which most occurs in small isolated patches.

Table 1: EPBC Act Box-Gum Woodland definition

EPBC Act Definition and Mapping of Box-Gum Woodland
<p>A description of Box-Gum Woodland as listed under the EPBC Act is provided in two documents:</p> <ul style="list-style-type: none"> • The EPBC Act Listing Advice for Box-Gum Woodland (TSSC, 2006); and • An EPBC Act Policy Statement for Box-Gum Woodland (DEH, 2006). <p>The Listing Advice provides the legal definition and criteria for the ecological community, whereas the Policy Statement provides guidance about the ecological community for the public.</p> <p>It is important to note that the identification and mapping of Box-Gum Woodland in this project is based on the legal determination presented in the Listing Advice. This is due to a fundamental difference between the Listing Advice and the Policy Statement. The Policy Statement requires that criteria relating to the understorey must be applied:</p> <p style="text-align: center;"><i>to the 0.1 hectare of your patch that contains the most native species in the ground layer.</i></p> <p>This statement does not align with the definition of the ecological community provided in the Listing Advice which applies the understorey criteria to the <u>whole</u> of a patch. There is no requirement in the legal Listing Advice to focus on the most diverse 0.1 ha area within a patch.</p> <p>Given this inconsistency, the mapping of EPBC Act Box-Gum Woodland in this project is based on the definition of the ecological community contained within the Listing Advice from the Threatened Species Scientific Committee to the Commonwealth Minister for the Environment and is consistent with the legal instrument for this community as defined under the EPBC Act.</p>

BGW is also listed as endangered under the *Nature Conservation Act 1980* (NC Act), as ‘Yellow Box/Red Gum Grassy Woodland’. Similar to the Commonwealth listed threatened ecological community (TEC), the NC Act listed TEC comprises a canopy of either *E. blakelyi* or *E. melliodora* with a species-rich understory (Action Plan No. 10, ACT Government, 1999). Under the Act, BGW is defined by the following characteristics (**Table 2**).

Table 2: NC Act Box-Gum Woodland definition

- ≥ 40% crown cover of *Eucalyptus melliodora* (Yellow Box) or *Eucalyptus blakelyi* (Blakely’s Red Gum)
- Understory is not exotic pasture
- Remnants are not isolated trees or clumps

1.4.2 Natural Temperate Grasslands

Natural Temperate Grasslands of the Southern Tablelands of NSW and the Australian Capital Territory (Natural Temperate Grassland; NTG) is listed as an endangered ecological community under the EPBC Act and NC Act.

NTG is characterised by the presence of a tussock grass dominated landscape with a high diversity of herbs and forbs which can account for up to 70% of species diversity (ACT Government, 2005). NTG is considered to include up to a 10% cover of trees, shrubs or sedges and generally occurs between altitudes of 560 to 1200 metres in valleys or plains influenced by cold air drainage (ACT Government, 2005). It is usually dominated by two or more of the following perennial tussock forming grass species *Themeda triandra* (Kangaroo Grass), *Rytidosperma* spp. (Wallaby Grass), *Austrostipa* spp. (Spear Grass), *Bothriochloa macra* (Red-leg Grass) and *Poa* spp. (Snowgrass) (SEWPaC 2012).

NTG has been extensively degraded following European settlement (primarily through grazing and urban development). Areas of derived grassland (formed through the removal of canopy trees in woodland ecosystems), such as derived grassland areas that were originally BGW, are not considered to be a component of NTG.

Natural Temperate Grassland has the potential to provide habitat for a range of threatened flora and fauna. The species listed under the EPBC Act and NC Act, which are likely to utilise NTG are listed in **Table 3**.

Table 3: Threatened flora and fauna species commonly associated with BGW and NTG

SCIENTIFIC NAME	COMMON NAME	NC CONSERVATION STATUS	EPBC CONSERVATION STATUS
FLORA			
<i>Leucochrysum albicans</i> var. <i>tricolor</i>	Hoary Sunray	Not listed	Endangered
<i>Swainsona recta</i>	Small Purple-pea	Endangered	Endangered
<i>Rutidosia leptorrhynchoidea</i>	Button Wrinklewort	Endangered	Endangered
FAUNA			
<i>Climacteris picumnus</i>	Brown Treecreeper	Vulnerable	Not listed
<i>Daphoenositta chrysoptera</i>	Varied Sittella	Vulnerable	Not listed
<i>Grantiella picta</i>	Painted Honeyeater	Vulnerable	Not Listed
<i>Lalage sueurii</i>	White-winged Triller	Vulnerable	Not listed
<i>Lathamus discolor</i>	Swift Parrot	Vulnerable	Endangered
<i>Melanodryas cucullata</i>	Hooded Robin	Vulnerable	Not listed
<i>Perunga ochracea</i>	Perunga Grasshopper	Vulnerable	Not listed
<i>Polytelis swainsonii</i>	Superb Parrot	Vulnerable	Vulnerable
<i>Anthochaera phrygia</i>	Regent Honeyeater	Endangered	Endangered

* Information in the above table has been extracted primarily from *Action Plan No. 10, Yellow Box/Red Gum Grassy Woodland and Endangered Ecological Community* (ACT Government, 1999) and the Commonwealth SPRAT profiles for the individual species.

2 Methodology

The methods for the baseline condition assessment field surveys were provided to ELA by TAMS. A full description of the methods is provided in '*Procedures Manual – Baseline Condition Assessment in the Lower Molonglo River Valley Conservations Areas 2012*' (Sharp 2012). Data sheets for field surveys were provided by TAMS in electronic format (excel) and are outlined in the *Procedures Manual*.

2.1 FIELD SURVEY METHODOLOGY

The *Procedures Manual* outlined methods for surveying the baseline condition of vegetation within the Molonglo Valley, with the aim of establishing a scientifically, robust and repeatable annual on-going monitoring program. The *Procedures Manual* incorporates methods outlined in the *Survey guidelines for determining lowland vegetation classification and condition in the ACT* (CPR 2010).

Baseline GIS mapping was also supplied in conjunction with the *Procedures Manual*. The mapping divided the study area into vegetation units (patches) of previously identified patches of BGW and NTG. The patches of BGW and NTG were established as part of the initial surveys conducted for the strategic assessment process (ELA 2009). The vegetation units were then assessed according to the appropriate methodology outlined in the *Procedures Manual*.

2.1.1 Baseline condition assessment

Field surveys were conducted by ELA between 14 December 2012 and 7 January 2013. Field surveys were undertaken within each vegetation unit for the baseline condition assessment. Qualitative assessments were conducted at the vegetation unit level and quantitative assessments were conducted at the survey plot level.

The following data sheets were completed:

- At the vegetation unit level:
 - *BCA1* – Provides a qualitative description of the vegetation patch including dominant species present, weeds, disturbance factors and management issues
 - *BCA2* – Identifies the vegetation structure and dominant species in each stratum
 - *BCA3* – Identifies the diversity of plant species within the patch and their relative abundance, in addition to the species recorded within the survey plots
 - *BCA5* – Provides opportunistic observations of mature trees or significant weeds
 - *BCA11* – Assesses the condition and diversity of fauna habitat within the patch
 - *BCA12* – Assesses the condition and attributes of any water bodies / habitat present
- At the plot level:
 - *BCA6* – Qualitative description of the survey plot (either 50 x 20 m or 20 x 20 m) including GPS points and management issues
 - *BCA7* – Records the plant species diversity and cover abundance within each plot
 - *BCA9* – Step-point transect (100 points over 50 m) to record the frequency of ground cover categories less than 1 m in height

2.1.2 Vegetation unit assessment

A review of each vegetation unit was undertaken to determine the extent of the units' boundaries. The review was undertaken as a qualitative assessment to provide information in terms of the type of vegetation present, disturbance factors, overall condition and management considerations.

This was conducted by walking / traversing the vegetation unit. If it was determined that the vegetation unit was not homogenous in terms of likely management considerations (including considerations for vegetation structure, composition, condition, land use and disturbance etc.) and did not reflect the initial vegetation mapping, then the vegetation units were modified and/or split to reflect these differences (**Figure 2** and **Figure 3**).

The size and condition of the vegetation units dictated the number of survey plots (and transects) to be conducted, such that the larger and more diverse a patch (good condition), the greater the number of plots (**Table 4**).

Table 4: Minimum number of plots per vegetation unit (adapted from DECC 2008).

PATCH SIZE	NUMBER OF PLOTS	
	GOOD CONDITION	LOW CONDITION
0-2 ha	1 plot per patch	1 plot per patch
2-4 ha	2 plots per patch	1 plot per patch
4-20 ha	3 plots per patch	2 plots per patch
20-50 ha	4 plots per patch	3 plots per patch
50-100 ha	5 plots per patch	3 plots per patch

In vegetation units that contain woodland, shrubland or forest, a 20 x 50 m survey plot and 50 m step-point transect was established. In vegetation units that contained grassland, a 20 x 20 m survey plot and a 50 m step-point transect was established. Plots were established in areas representative of the vegetation unit.

2.1.3 Plot surveys - flora species diversity and abundance

From within each survey plot, an inventory of flora species within a 20 x 20 m quadrat was created and assigned a cover abundance score using the Braun-Blanquet scale (BCA7). A GPS recording was taken from each corner of the plot. A photo was taken from the south-west corner of the plot towards a sighter post established in the centre of the plot. The photos will serve as a photo-point reference for future surveys. Specimens not readily identifiable in the field were appropriately labelled, pressed and later identified. All data was subsequently entered into an excel spread sheet.

2.1.4 Step-point transect - ground cover assessment

Step-point transects were undertaken at each survey plot within each vegetation unit (BCA9). Transects were conducted along the centre axis of the 20 x 50 m or 20 x 20 m plot (where possible). A fine wire was used to collect 100 data points by recording the ground cover category touching the wire at the 50 cm intervals. The ground cover categories included: native herbaceous plants, exotic annual herbaceous plants, exotic perennial species, bare ground, rocks, litter and cryptogams. If more than one category was touching the wire, then each category was recorded at that point.

The data points were extrapolated to provide a percentage cover of each category and to determine the overall native percentage cover against exotic perennials.

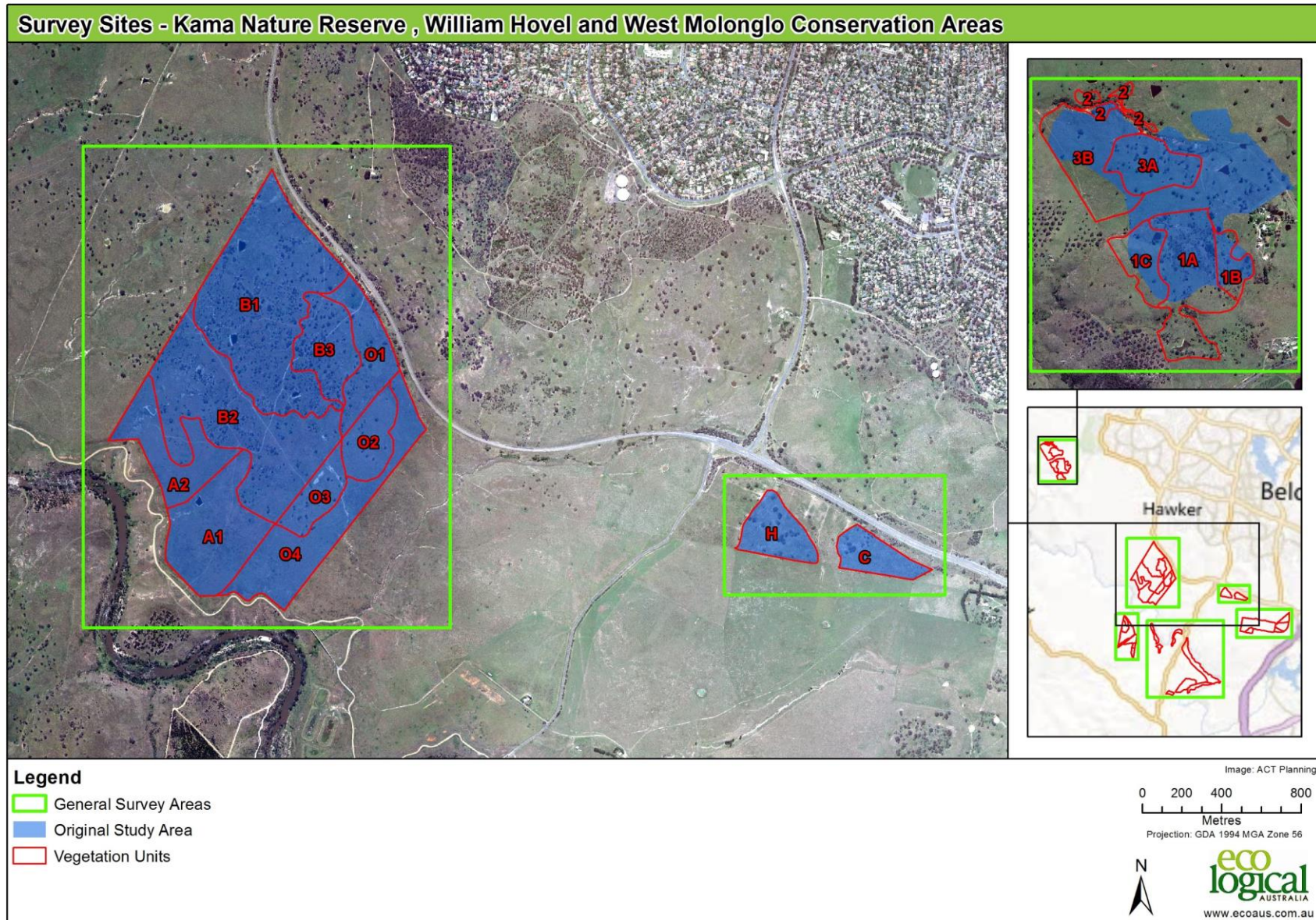


Figure 2: Survey plot locations for Kama Nature Reserve, William-Hovell and West Molonglo

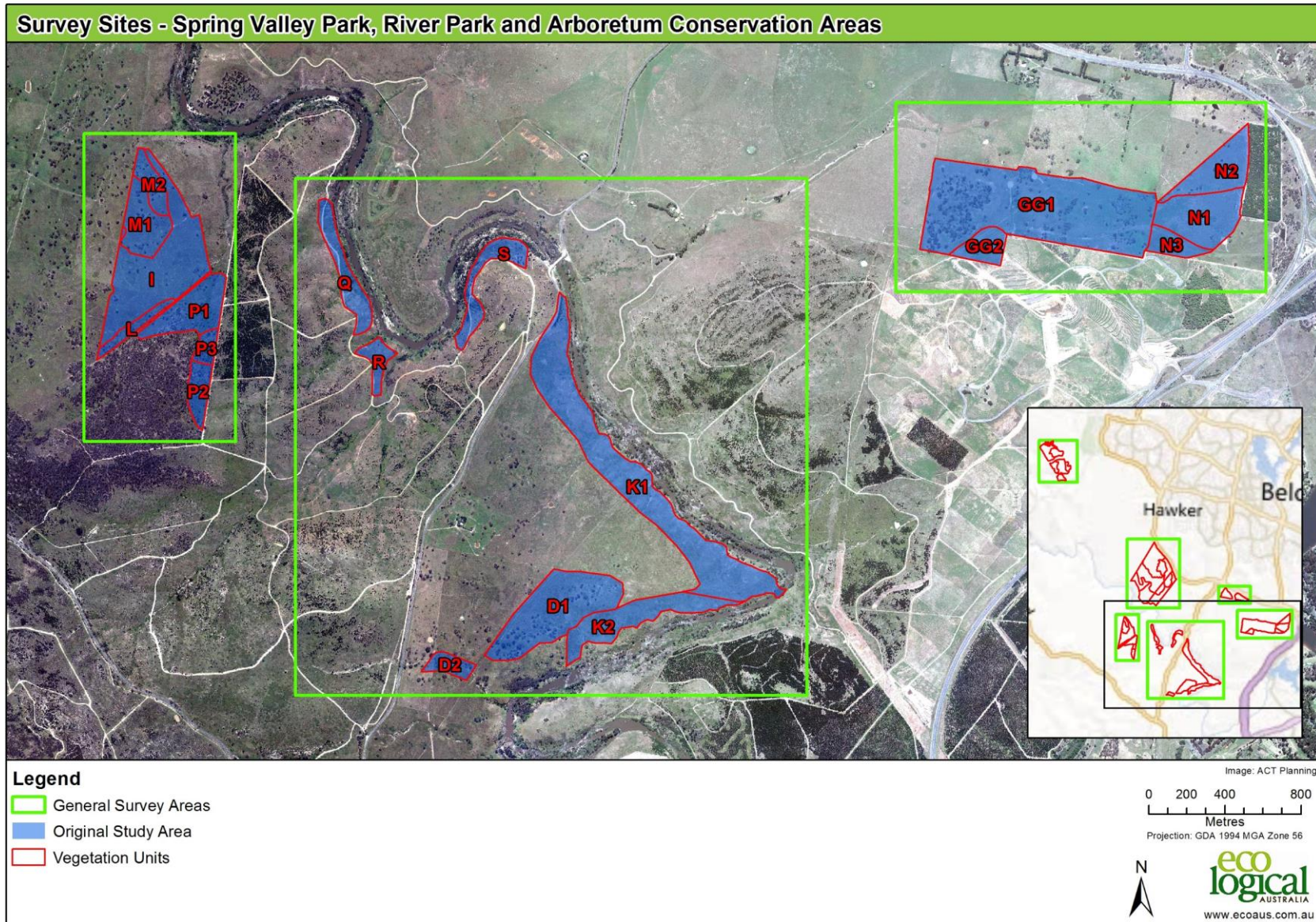


Figure 3: Survey plot locations for Spring Valley, River Park and Arboretum

2.2 LIMITATIONS

The timing of field survey for the baseline condition assessment was limited to December to January 2012/2013. Surveys for BGW and NTG are best conducted in autumn or spring when winter annuals are generally absent (autumn) and/or when the highest floristic diversity is present (spring) (DEH 2006; CPR 2010). The *Procedures Manual* designates the field surveys to be conducted during late-spring to early-summer during the time of highest floristic diversity.

Some areas previously mapped as BGW no longer met the listing criteria for the TEC, which is likely to have been a result of the timing of the field surveys and the land management regimes over the previous four years. However, in some of these areas that no longer met the listing criteria, but contained the appropriate overstorey and had a dominant native understorey where the perennial vegetation cover is greater than 50% native, are likely to meet the definition if surveyed within the optimum period (spring). Other areas are also likely to once again meet the BGW definition under an appropriate management regime.

The field surveys for this assessment were conducted at the end and outside of the optimum period. In addition, the field surveys were conducted following a period of below average rainfall. As such, it should be noted that species richness recorded during the surveys may not be as diverse as under average or above average rainfall. Low rainfall at the end of spring may cause winter annuals to die off quickly, while also delaying germination and growth in summer annuals. In addition, other species, such as annual or seasonal species, may have been unusually abundant at the time of the surveys, while others may have been absent (such as orchids and winter annuals).

3 Results

Eco Logical Australia conducted field surveys to collect data for the baseline condition assessments of the BGW and NTG conservation areas designated as part of the Molonglo Valley strategic assessment.

The raw data collected from the field surveys has been used for the baseline condition assessments presented in this report. The raw data has also been provided to TAMS for the purpose of future work, including for interpretation to develop benchmark condition scores for each vegetation and/or conservation patch.

Amendments to boundaries of vegetation units have been recommended in **Section 3.2**. In addition, it is recommended that a few vegetation units be split into different management zones (units) based on management actions required to maintain and enhance the ecological values of the area.

A summary of the results of the field surveys and an overview of the ecological condition for each vegetation unit is provided in **Section 3.3**.

3.1 GENERAL OVERVIEW

The field surveys were conducted following two months of dry conditions within the Canberra region. Approximately 31.4 mm of rain had been recorded in the two months preceding the field surveys. This followed an above average rainfall recorded in October 2012 (78 mm; average 63 mm). Rainfall data was measured from the Stromlo Forest station (Bureau of Meteorology 2012).

There were some consistencies observed across the Molonglo Valley as part of the baseline vegetation condition assessments:

- The abundance of exotic annual grasses (*Avena* sp., *Bromus* spp., and *Vulpia* sp.) was high to very high (live plants and/or dead standing) across the majority of vegetation units. These exotic annuals are excluded from the calculations to determine the percentage cover of natives. Exotic perennials are compared to the total native cover of annual and perennial species. The high exotic annual observations provide a qualitative assessment of the condition of the sites that were lower than the native cover values recorded in the results.
- Listed weed species, particularly *Hypericum perforatum* (St. John's Wort), were present in high numbers within all vegetation units.

The high abundance of exotic annuals and listed weeds presents a significant management issue to maintain and enhance the ecological condition of the MNES within the Molonglo Valley. The general recommendations to enhance and / or maintain the ecological condition of the vegetation are presented in the 'management consideration' column in **Section 3.3**.

3.2 MAPPING RECOMMENDATIONS

Vegetation unit boundaries represent a homogenous patch in terms of structure and composition. The *Procedures Manual* provides that the vegetation units will be managed as a separate unit to enhance / maintain its ecological condition. However, a number of vegetation units and boundaries have been recommended to be modified and/or split into separate units:

- In order to more accurately reflect the vegetation type or community observed in the field

- Based on likely management considerations and/or actions required to enhance and maintain the ecological condition of the MNES

The mapping changes are presented in the following maps (**Figure 4 – Figure 9**) and summarised in **Table 5** below.

Table 5: Recommended vegetation unit mapping amendments

ORIGINAL VEGETATION UNIT	NEW VEGETATION UNIT	AMENDMENT
B1, B2, B3 (Kama)	Same as previous	<p>Boundaries of the vegetation units have been modified slightly to reflect the overstorey where <i>E. mannifera</i> is observed.</p> <p>Boundaries of the vegetation units have been modified slightly to follow a slight change in the structure of the woodland / open woodland.</p>
K (Molonglo River Park)	K1 and K2	<p>The eastern and southern section of the original K vegetation unit has been split into K1 and K2.</p> <ul style="list-style-type: none"> • K1 – represents native dominated grassland in good condition with a high level of native diversity and low abundance of exotics. • K2 – represents exotic dominated grassland with a low diversity and cover of native species.
M (Spring Valley)	M1 and M2	<p>M1 and M2 have been designated due to the differences in overstorey species.</p> <p>The northern section of the original M vegetation unit is dominated by remnant <i>E. rossii</i> and <i>E. macrorhyncha</i> (mature and old growth), representing a different vegetation community to M1 (BGW). This area has been designated as M2; however, the management for conservation values should be consistent with M1 due to the similarities in the understorey and ground cover characteristics.</p>
P (Spring Valley)	P1, P2 and P3	<p>P1, P2 and P3 have been designated due to the differences in overstorey and understorey characteristics and the level of disturbance observed between the two areas.</p> <ul style="list-style-type: none"> • P1 – Overstorey dominated by <i>E. blakelyi</i>. Understorey is dominated by native grasses, contains a moderate to good diversity of native species and is generally low in exotic species abundance. • P2 – Combines a section of regenerating pines plantation which should be excluded from the BGW conservation area. It also includes an area mapped as the edge of a dry sclerophyll forest dominated by <i>E. macrorhyncha</i>, <i>E. nortonii</i> and <i>E. blakelyi</i>. The

		<p>dominant overstorey species don't meet the EPBC BGW definition. However, the understorey that is not part of the pine plantation is dominated by native grasses and is consistent with P1. It contains a high diversity of native forbs and could be managed for its conservation values.</p> <ul style="list-style-type: none"> • P3 – Regenerating pine plantation.
N (Arboretum)	N1 and N3	<p>The new patch N3 has been established from the southern section of the original N1 vegetation unit.</p> <ul style="list-style-type: none"> • N1 – Is a mix of native and exotic grasses with some scattered remnant trees. Moderately low native cover and diversity within unit, however, there are some localised native dominated patches. N1 has a lower occurrence of exotic annuals and listed weeds compared to N3. • N3 – represents an exotic pasture dominated by annual grasses (<i>Avena</i> sp. and <i>Vulpia</i> sp.) with a very high cover of St. John's Wort, Sweet Briar and thistles. There is a low native diversity and cover and no remnant trees. Significant control of exotic annuals and listed weed species is required to manage as a conservation area.
West Molonglo	1A, 1B, 1C, 2, 3A and 3B	<p>Recent detailed vegetation surveys were conducted within West Molonglo by Hogg (2012). The resulting vegetation mapping differs to the original mapping by ELA (2009) that was conducted on a broader scale.</p> <p>It is recommended that the most recent assessments and vegetation unit mapping boundaries generated by Hogg (2012) be incorporated into the baseline condition assessments.</p>

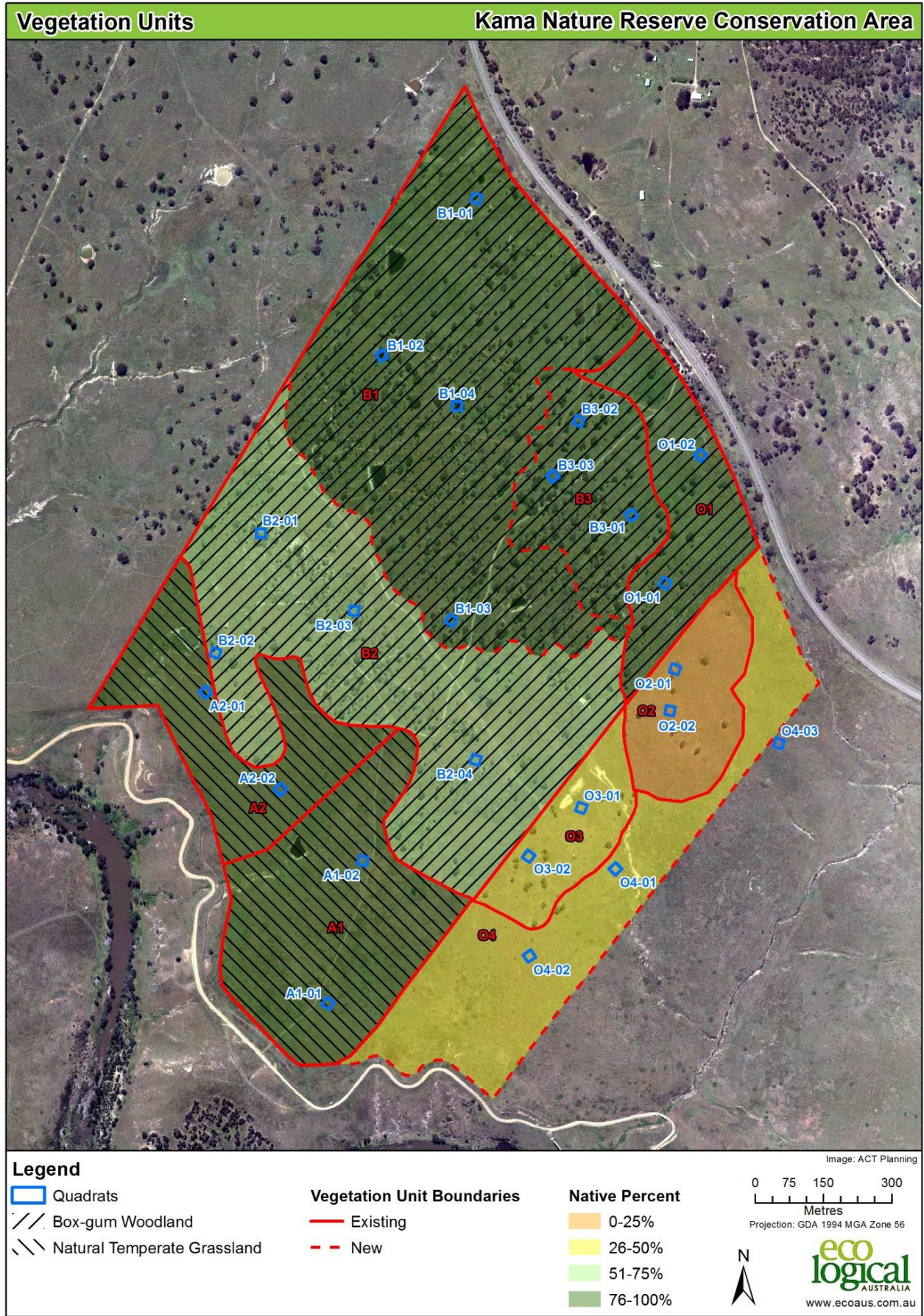


Figure 4: Kama Nature Reserve Vegetation Units

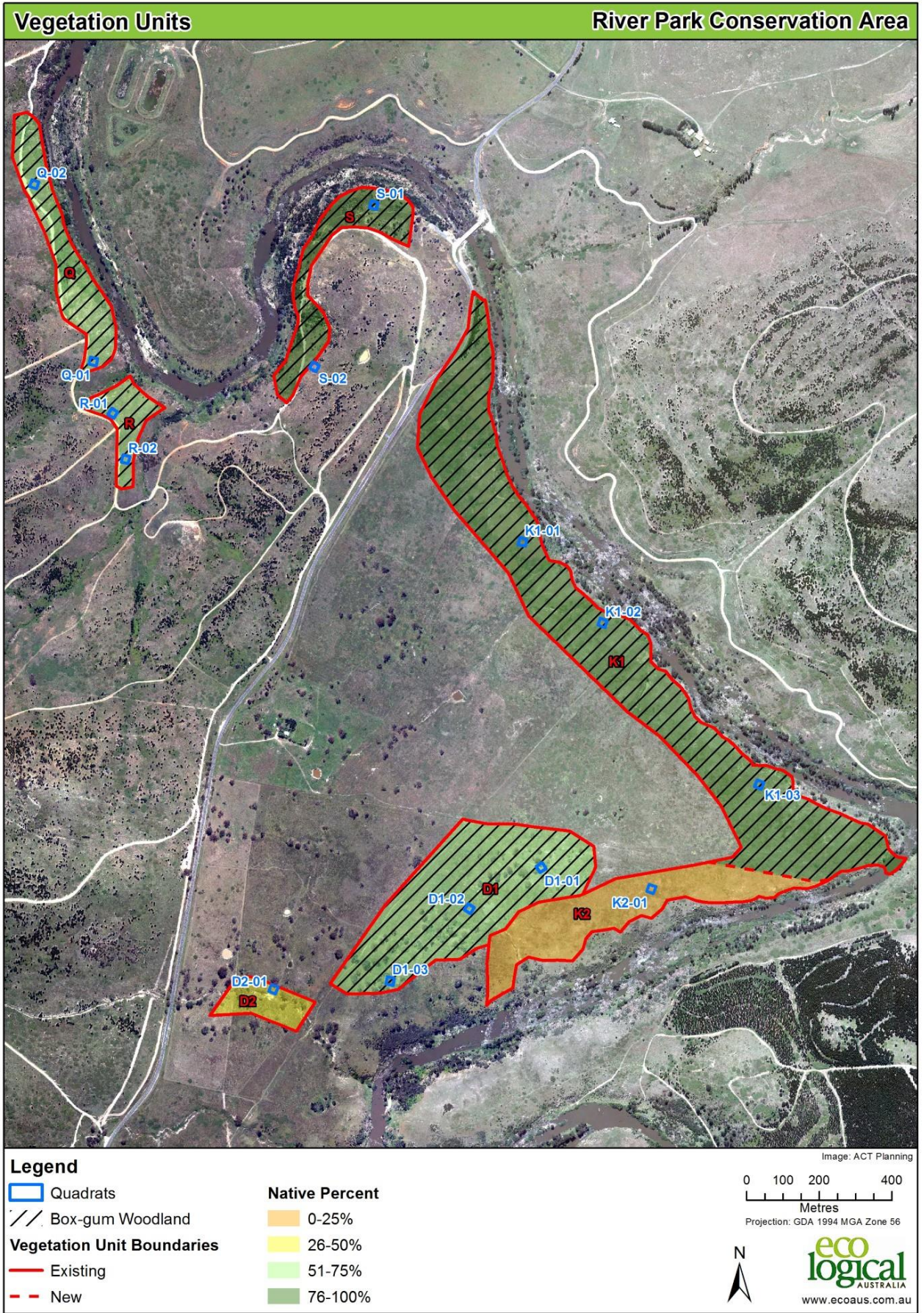


Figure 5: River Park Vegetation Units

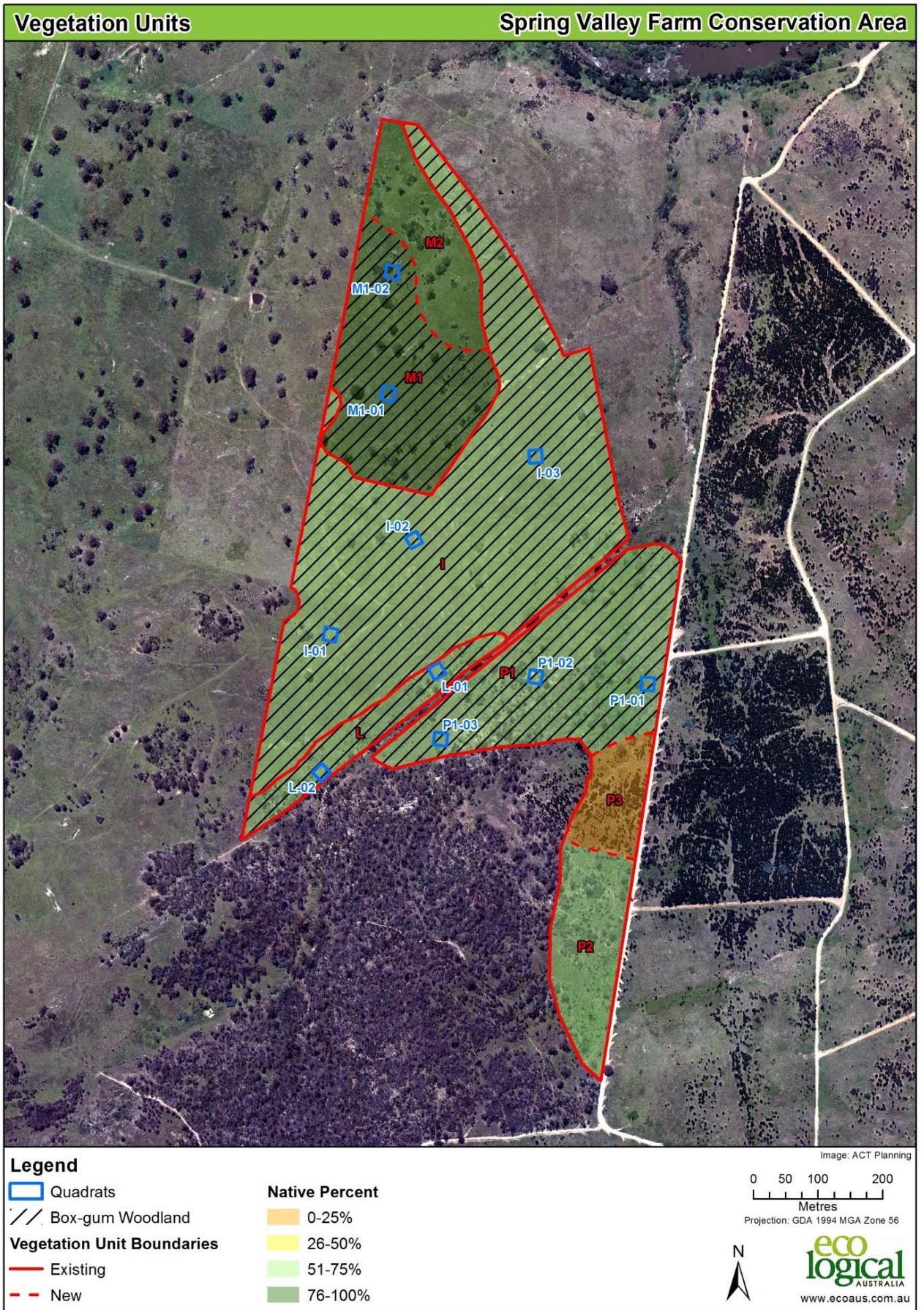


Figure 6: Spring Valley Farm Vegetation Units

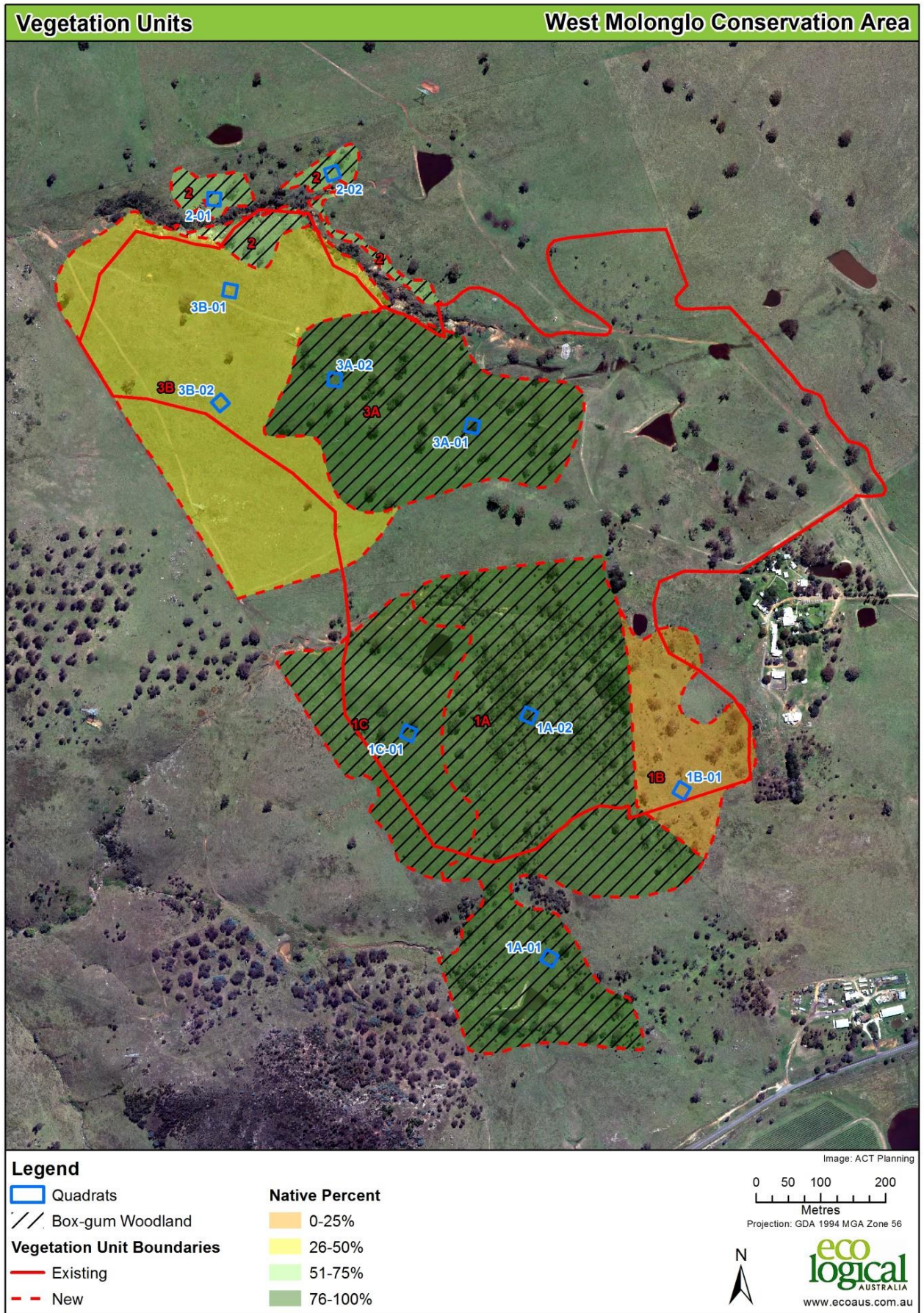


Figure 7: West Molonglo Vegetation Units

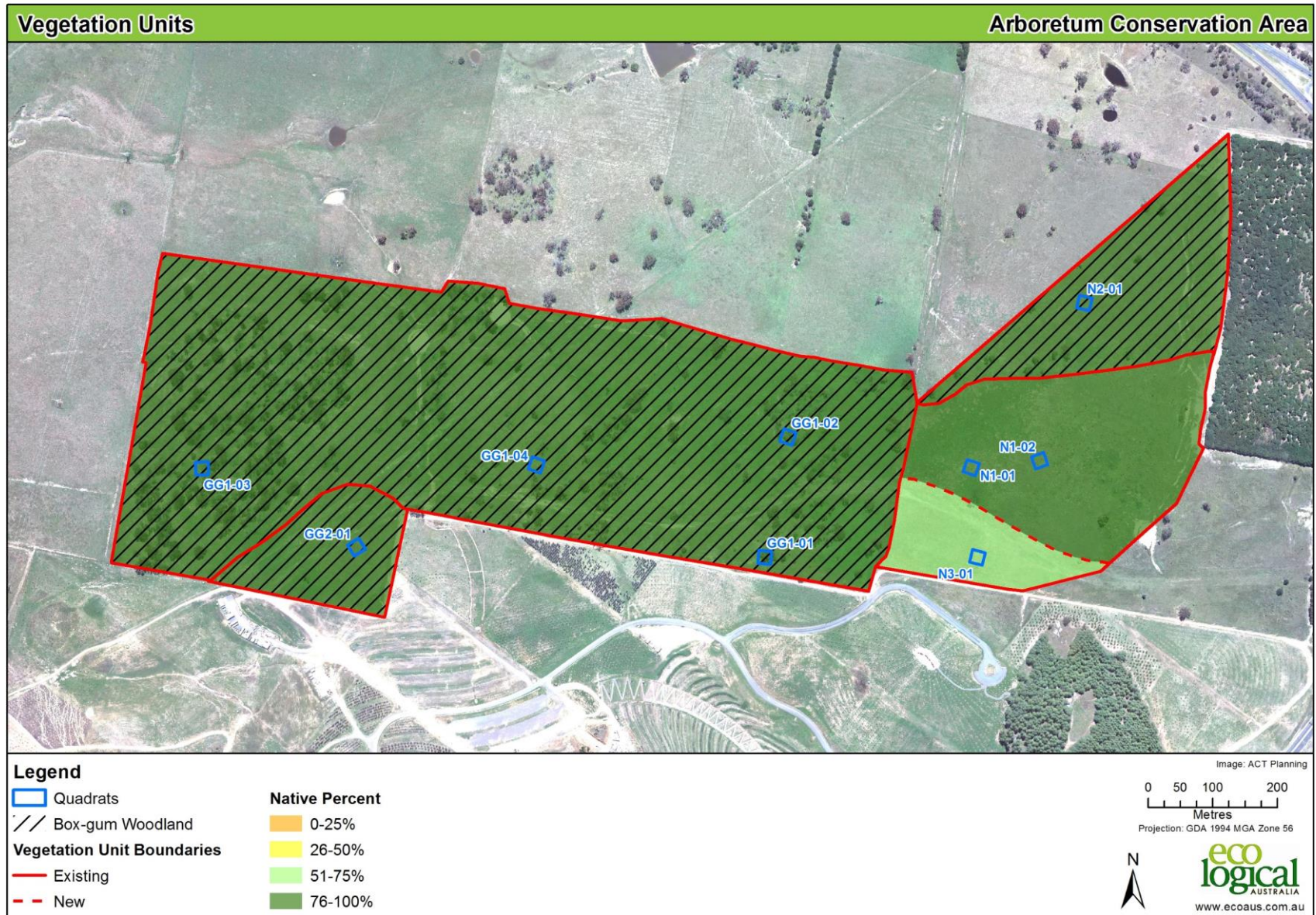


Figure 8: Arboretum Vegetation Units



Figure 9: William Hovell Vegetation Units

3.3 BASELINE VEGETATION CONDITION ASSESSMENTS

Field surveys for the baseline condition assessment were conducted in mid-summer from 14th December 2012 to 7th January 2013.

The number of survey plots conducted in each vegetation unit, following the initial review of vegetation unit boundaries is detailed in **Table 6** and the location of the plots is provided in **Figure 4 – Figure 9** above.

Table 6: Vegetation units and number of plots completed per vegetation unit

CONSERVATION AREA	VEGETATION UNIT	PLOTS	CONSERVATION AREA	VEGETATION UNIT	PLOTS
Kama Nature Reserve	B1	4	Spring Valley Farm	I	3
	B2	4		L	2
	B3	3		M1	2
	O1	2		M2	0
	O2	2		P1	3
	O3	2		P2	0
	O4	4		P3	0
	A1	2		West Molonglo	1A
A2	2	1B	1		
River Park	D1	3	1C		1
	D2	1	2		2
	K1	3	3A		2
	K2	1	3B		2
	Q	2	Arboretum		GG1
R	2	GG2			1
S	2	N1		3	
William Hovell	C	2		N2	1
	H	2		N3	1

An overview of the ecological values within each vegetation unit recorded as part of the field surveys for the baseline condition assessment are provided below in **Table 7 - Table 12**. The overview has been provided using both the quantitative and qualitative data recorded.

The following abbreviations and column headings have been used in **Table 7 - Table 12**:

- *Unit* = Vegetation unit identifier. Size of unit is provided in brackets.
- *ACT Vegetation Type* = The ACT vegetation community present. EPBC Act BGW or NTG is identified in brackets if it meets the TEC criteria.
- *O/S* = Overstorey
- *M/S* = Midstorey
- *U/S* = Understorey

- *Native SP # / Total* = Number of native species recorded at each plot (e.g. P1) compared to the total number of species recorded.
- *Native % Cover* = Total percentage cover of natives calculated against the cover of exotics perennials. This is presented as an average score from the plots within the vegetation unit. Plot scores are in brackets.
- *THS* = Terrestrial Habitat Score, converted to percentage of maximum score (39 for grassland or derived grassland and 72 for woodland or forest).
- *WBS* = Water Body Score, converted to percentage of maximum score (48 for rivers, creeks or chains of ponds and 54 for dams and wetlands).
- *N/A* = Not Applicable
- *N/R* = Not Recorded

Table 7: Kama Nature Reserve Conservation Area.

UNIT	ACT VEGETATION TYPE	DOMINANT SPECIES	NATIVE SP # / TOTAL	NATIVE % COVER	THS %	WBS %	VEGETATION UNIT DESCRIPTIONS	MANAGEMENT CONSIDERATIONS
B1 (51.2 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW)	O/S – <i>E. blakelyi</i> , <i>E. melliodora</i> , <i>E. dives</i> M/S – <i>B. spinosa</i> , <i>H. perforatum</i> L/S – <i>T. triandra</i> , <i>A. bigeniculata</i> , <i>Rytidosperma</i> spp., <i>Avena</i> sp., <i>Vulpia</i> sp.,	P1: 16/37 P2: 22/42 P3: 30/50 P4: 19/41	85 (76,96, 69,100)	69%	57%	Little disturbance observed in vegetation unit. However, patches of exotic annuals (<i>Avena</i> sp., <i>Vulpia</i> sp.) and listed weeds (<i>Hypericum perforatum</i> – St. John’s Wort) were recorded. A good native ground-cover is present with a moderate to high diversity of native herbs and forbs. A full cohort of tree ages is present, including significant natural regeneration and hollow-bearing trees, providing suitable habitat for woodland birds. Kangaroos are the main grazers presenting an overall low grazing intensity. Woodland structure provides good habitat for birds with a high occurrence of fallen litter, bark and logs. Several dams are also present within unit.	Listed weeds and exotic annuals (grasses) are common and scattered across the unit. Species include St. John’s Wort, Sweet Briar, thistle, and Paterson’s Curse. Survey plots 2, 3 and 4 could be considered as permanent monitoring plots. A program to survey woodland birds in consultation with COG is recommended. Woodland bird habitat.
B2 (42.7 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW)	O/S – <i>E. blakelyi</i> , <i>E. melliodora</i> . M/S – <i>B. spinosa</i> L/S – <i>T. triandra</i> , <i>H. perforatum</i> , <i>Avena</i> sp., <i>Vulpia</i> sp., <i>Elymus scaber</i> .	P1: 33/55 P2: 30/53 P3: 27/52 P4: 14/23	61 (41,70 36,97)	75%	N/A	Exotic grasses and weeds are in high abundance, but patches dominated by native grasses (<i>T. triandra</i> , <i>Elymus scaber</i> and <i>Rytidosperma</i> spp.) also occur within these areas. Diversity of flora species is high with a good representation of native herbs and forbs. Native trees are senescing, but good regrowth / natural regeneration is also present. Good fauna habitat is observed across all strata of the vegetation unit (including fallen branches, logs and litter) and amongst surface rocks. Kangaroos are the main grazers and overall grazing intensity is low.	Consideration could be given to managing Kama as a single unit, particularly B1, B2 and B3 as similar disturbances are present, and hence, similar conservation management actions likely to be required, such as the control of listed weeds and exotic annuals (grasses). Listed weeds include St. John’s Wort, thistle and Blackberry. Woodland bird habitat. Survey plots 1 and 4 would best serve as permanent monitoring plots.

UNIT	ACT VEGETATION TYPE	DOMINANT SPECIES	NATIVE SP # / TOTAL	NATIVE % COVER	THS %	WBS %	VEGETATION UNIT DESCRIPTIONS	MANAGEMENT CONSIDERATIONS
B3 (12.1 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW)	O/S – <i>E. mannifera</i> , <i>E. blakelyi</i> M/S – none L/S – <i>A. scabra</i> , <i>E. scaber</i> , <i>Vulpia</i> sp., <i>Bromus</i> sp., <i>Microlaena stipoides</i> , <i>Rytidosperma</i> spp.	P1: 13/30 P2: 27/48 P3: 26/41	90 (75,96, 100)	71%	N/A	<i>E. mannifera</i> and <i>E. blakelyi</i> recorded in the overstorey. This vegetation unit is representative of good condition woodland with high cover of natives compared to perennial exotics. However, there was also a high occurrence of exotic annuals (<i>Bromus</i> sp. <i>Avena</i> sp. and <i>Vulpia</i> sp.) and St. John's Wort recorded in the understorey. Diversity of native herbs and forbs is moderate. Unit provides good habitat for woodland birds with a number of remnant trees present, similar to adjacent units B1 & B2. Limited natural regeneration present.	Promotion of natural regeneration of overstorey species. Listed exotic species required for control include St. John's Wort, Paterson's Curse, thistles and Hawthorn. The high abundance of exotic annuals should be reduced to enhance native values. Woodland bird habitat. All plots could serve as a permanent monitoring site.
O1 (12.0 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW)	O/S – <i>E. blakelyi</i> , <i>E. melliodora</i> , <i>E. mannifera</i> M/S – none L/S – <i>Avena</i> sp., <i>A. bigeniculata</i>	P1: 24/38 P2: 12/32	90 (81,99)	44%	N/A	This vegetation unit contains a low to moderate diversity of species split fairly evenly between natives and exotics. <i>Austrostipa</i> spp. and <i>Avena</i> sp. dominate the understorey. The native % cover portrays a vegetation unit in relatively good condition, despite the high abundances of <i>Avena</i> sp. (annual exotic not counted in the native % cover calculations). Few remnant trees present with almost no natural regeneration occurring. However, regeneration is evident to the west of the unit in B3 and in the broader area in B1 & B2.	<i>Avena</i> sp. in very high abundance, particularly towards the north closer to William Hovell Drive. Lower abundance of St. John's Wort compared to other vegetation units within Kama (lower down slope). Other listed species include thistles and Paterson's Curse. Could be managed with the rest of Kama, particularly B1, B2 & B3 due to similar disturbance values. Survey plot 1 would best serve as a permanent monitoring plot.

UNIT	ACT VEGETATION TYPE	DOMINANT SPECIES	NATIVE SP # / TOTAL	NATIVE % COVER	THS %	WBS %	VEGETATION UNIT DESCRIPTIONS	MANAGEMENT CONSIDERATIONS
O2 (8.8 ha)	Exotic Pasture	O/S – <i>E. blakelyi</i> M/S – none L/S – <i>Phalaris aquatica</i> , <i>Avena</i> sp.	P1: 7/26 P2: 7/21	1 (1,0)	32%	N/A	There is little native diversity and a high abundance of weeds and exotic annuals. The vegetation unit is a disturbed site used for grazing cattle (<i>Phalaris</i> paddock). Few senescing paddock trees are present and no natural regeneration was observed. Fauna habitat values are low with no mature trees present and limited rocky habitat.	<i>Phalaris</i> paddock used for cattle grazing. Low abundance and diversity of native species. Could be managed together with O3 and O4. Listed exotics include St. John's Wort and thistles. Not representative of a TEC.
O3 (7.1 ha)	Exotic Pasture	O/S – <i>E. blakelyi</i> , <i>Rosa rubiginosa</i> , <i>Rubus fruticosus</i> M/S – <i>R. fruticosus</i> , <i>R. rubiginosa</i> L/S – <i>P. aquatica</i> , <i>Avena</i> sp.	P1: 10/26 P2: 7/24	31 (27,34)	41%	33%	<i>Phalaris</i> paddock used for cattle grazing with occasional patches of native grasses. Low diversity and low percentage cover of native species. Fauna habitat values are low similar to unit O2, with limited rocky habitat and limited overstorey. Farm dam and drainage line present in the north of the unit. Dry at the time of the surveys with evidence of active erosion occurring due to large bare patches. No vegetation present.	<i>Phalaris</i> paddock with low native diversity and abundance. Could be managed together with O2 and O4. Not representative of a threatened community. Listed weeds – St. John's, Blackberry, thistle and Sweet Briar. Either plot could be used as a monitoring site for vegetation units O2, O3 & O4.
O4 (22.3 ha)	Exotic Pasture	O/S – none M/S – <i>R. fruticosus</i> L/S – <i>P. aquatica</i> , <i>Avena</i> sp., <i>A. bigeniculata</i> .	P1: 12/28 P2: 6/17 P3: 9/20 P4: 10/27	38 (47,0, 86,17)	51%	N/A	<i>Phalaris</i> paddock used for cattle grazing with occasional patches of native grasses. Low diversity and low percentage cover of native species. Fauna habitat values are low similar to unit O2 and O3, due to limited overstorey and limited rocky outcrops / surface rocks.	High abundance of <i>Phalaris</i> and other exotics. Could be managed together with O2 and O3. Not representative of a listed threatened community. Listed weeds – St. John's, Blackberry and thistle. Plot 1 could be considered as a permanent monitoring site for vegetation units O2, O3 & O4.

UNIT	ACT VEGETATION TYPE	DOMINANT SPECIES	NATIVE SP # / TOTAL	NATIVE % COVER	THS %	WBS %	VEGETATION UNIT DESCRIPTIONS	MANAGEMENT CONSIDERATIONS
A1 (22.1 ha)	Kangaroo Grass – Wallaby Grass – Spear Grass Tableland Dry Tussock Grassland (EPBC NTG)	O/S – none M/S – none L/S – <i>T. triandra</i> , <i>H. perforatum</i> , <i>Poa labillardierei</i>	P1: 15/32 P2: 14/27	77 (66,89)	46%	43%	NTG dominated by <i>T. triandra</i> with >75% cover in patches. Diversity of native species is moderate with highest diversity recorded at rocky outcrops. Dense patches of St. John's Wort were observed right across the vegetation unit. Rocky outcrops provide habitat for <i>Aprasia parapulchella</i> (Pink-tailed Worm Lizard – PTWL). PTWL habitat has been mapped by Osborne and Wong over the previous 10 years throughout the Molonglo Valley, including Kama Nature Reserve. The habitat is suitable for <i>Delma impar</i> (Striped Legless Lizard – SLL). Observed artificial shelter surveys being conducted in A2. Dam present on western edge of unit – annual weeds present around dam. No overstorey present.	Very high abundance of St. John's Wort. Widespread across vegetation unit. Weed control is required. Listed weeds – St. John's, Blackberry, thistle and Paterson's Curse. SLL surveys in A1 could provide details on the extent of the population within Kama and support observations from survey being conducted in A2. Plot 1 from this vegetation unit could be considered as a permanent monitoring site for both A1 & A2.
A2 (14.5 ha)	Kangaroo Grass – Wallaby Grass – Spear Grass Tableland Dry Tussock Grassland (EPBC NTG)	O/S – none M/S – none L/S – <i>T. triandra</i> , <i>H. perforatum</i> , <i>P. labillardieri</i> , <i>Austrostipa</i> spp., <i>Rytidosperma</i> spp.	P1: 31/44 P2: 23/35	86 (99,73)	69%	31	NTG dominated by <i>T. triandra</i> with >75% dominance in some patches. Rocky outcrops are abundant in the northern section of the vegetation unit and contain highest native diversity. Areas not containing outcrops are low in diversity and contain significantly dense patches of St. John's Wort. Habitat for PTWL is present amongst the rocky outcrops and loosely embedded surface rocks. PTWL habitat has been mapped by Osborne and Wong over the previous 10 years throughout the Molonglo Valley, including Kama Nature Reserve. The habitat is suitable for SLL. Roof tiles were observed within the vegetation unit as part of artificial shelter surveys for SLL. Dam present in north-west corner of unit. No overstorey present.	Very high abundance of St. John's Wort. Widespread across vegetation unit. Vegetation Unit A1 and A2 could be managed as a single unit. Fence line currently provides a boundary between the two units. If SLL recorded in current survey, further surveys may be of benefit to obtain / monitor the population present. Plot 1 from this vegetation unit could be considered as a permanent monitoring site for both A1 & A2.

Table 8: River Park Conservation Area

UNIT	ACT VEGETATION TYPE	DOMINANT SPECIES	NATIVE SP # / TOTAL	NATIVE % COVER	THS %	WBS %	VEGETATION UNIT DESCRIPTIONS	MANAGEMENT CONSIDERATIONS
D1 (17.2 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW)	O/S – <i>E. blakelyi</i> , <i>E. melliodora</i> M/S – <i>C. monogyna</i> , <i>R. rubiginosa</i> , <i>C. lanatus</i> , <i>Onopordum</i> sp., <i>L. ferocissimum</i> L/S – <i>A. bigeniculata</i> , <i>A. scabra</i> , <i>Avena</i> sp., <i>Bromus</i> sp., <i>E. scaber</i> , <i>R. rubiginosa</i>	P1: 7/28 P2: 14/27 P3: 12/37	63 (67,35 88)	51%	43%	Vegetation unit dominated by exotic annuals. Small patches dominated by native grasses and forbs were observed amongst the exotic annuals. Exotic perennial abundance was generally low; except for patches of St. John’s Wort. A few rocky outcrops are present and contain the patches of highest native diversity. Remnant trees senescing and in moderate condition with some containing hollows. Limited natural regeneration occurring. The remnant trees (and resulting litter, fallen branches etc) and rocky outcrops contain moderate fauna habitat values. Grazing intensity across unit is low. Dam present with limited aquatic vegetation and moderate patches of bare ground. Some erosion present at the drainage point into the dam.	High exotic annuals and common listed weed species including <i>Eragrostis curvula</i> (African Lovegrass), St. John’s Wort, Paterson’s Curse, Blackberry, Horehound, Boxthorn and thistles. Plot 2 or 3 could be used as a permanent monitoring site.
D2 (2.3 ha)	Depauperate Native Pasture / Exotic Pasture	O/S – <i>E. blakelyi</i> , <i>E. melliodora</i> M/S – <i>E. blakelyi</i> , <i>C. monogyna</i> L/S – <i>Avena</i> sp., <i>Bromus</i> sp., <i>Vulpia</i> sp., <i>Austrostipa</i> spp., <i>Rytidosperma</i> spp., <i>H. perforatum</i>	P1: 24/48	30	60%	40%	Vegetation unit contains a native overstorey with a mixed native and exotic understorey. The unit borders an ephemeral drainage line (dry at time of field surveys), with remnant trees present and limited natural regeneration. These features provide some good fauna habitat values. No rocky outcrops were observed. High occurrence of exotic annuals. St John’s Wort is common and woody weeds occur occasionally within unit. Grazing intensity from kangaroos is generally low.	Listed exotic species include St John’s Wort, Hawthorn and Blackberry. A high abundance of exotic annuals and overall low native percentage cover is of concern. Does not currently represent a TEC. Dry drainage line runs through unit with construction occurring upstream, likely to influence future flow regimes. Boundaries for unit were difficult to distinguish due to high exotic annual cover extending beyond unit.

UNIT	ACT VEGETATION TYPE	DOMINANT SPECIES	NATIVE SP # / TOTAL	NATIVE % COVER	THS %	WBS %	VEGETATION UNIT DESCRIPTIONS	MANAGEMENT CONSIDERATIONS
K1 (33.2 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW – Derived Grassland)	O/S – none M/S – none L/S – <i>T. triandra</i> , <i>A. bigeniculata</i> , <i>Avena</i> sp.	P1: 19/36 P2: 17/34 P3: 14/28	85 (74,84, 96)	51%	N/A	K1, containing Plots 1-3 is representative of good condition native grassland (EPBC BGW –derived grassland). It contains a high diversity of native herbs and forbs and is dominated by <i>T. triandra</i> and <i>Austrostipa</i> spp. Annual and perennial weeds are generally low, except the western edge that has St. John’s Wort and Blackberry often in the drainage lines. Rocky outcrops are common across the break of slope and are known habitat for PTWL (previous surveys by Osborne and Wong across the Molonglo Valley). The outcrops also contain the patches of highest native diversity. Vegetation unit K1 borders the Molonglo River to the south and is primarily north-east facing. The lack of an overstorey limits the fauna habitat values present.	Original vegetation unit K is recommended to be split into two management zones. St. John’s Wort, Sweet Briar and Blackberry are present but in low abundance. Exotic annual grasses also in low abundance. Surrounding areas to the north contain higher abundances of weeds that threaten to establish themselves within the unit. Rocky areas are PTWL habitat. Plot 1 would be the best of the three survey sites to serve as a permanent monitoring plot.
K2 (10.2 ha)	Exotic Pasture	O/S – none M/S – <i>R. fruticosus</i> , <i>R. rubiginosa</i> L/S – <i>P. aquatica</i> , <i>Bromus</i> sp., <i>H. perforatum</i>	P4: 11/25	14	N/R	N/A	Vegetation unit K2 has been split from the original vegetation unit K. It borders the Molonglo River, is steep leading down to the river and is primarily south facing. K2 is almost entirely exotic dominated with a large range of exotic species in high abundance (<i>P. aquatica</i> , <i>Avena</i> sp., <i>Bromus</i> sp., <i>Vulpia</i> sp., <i>R. fruticosus</i> , <i>R. rubiginosa</i> , <i>H. perforatum</i>). Very low native diversity, but some moderate diversity patches existing within the rocky outcrops. The lack of an overstorey limits the fauna habitat values present.	High abundance and diversity of exotic annuals and weeds. Listed species include St. John’s Wort, Sweet Briar, Blackberry, thistles and Paterson’s Curse

UNIT	ACT VEGETATION TYPE	DOMINANT SPECIES	NATIVE SP # / TOTAL	NATIVE % COVER	THS %	WBS %	VEGETATION UNIT DESCRIPTIONS	MANAGEMENT CONSIDERATIONS
Q (6.0 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW – Derived Grassland)	O/S – <i>Acacia dealbata</i> , <i>Pinus radiata</i> M/S – <i>R. fruticosus</i> L/S - <i>A. scabra</i> , <i>Avena</i> sp., <i>H. perforatum</i> , <i>Rytidosperma</i> spp.	P1: 16/33 P2: 22/40	64 (66,62)	71%	N/A	Vegetation unit is a moderate to good condition derived grassland with a mixture of exotic and native grasses and forbs. The unit occurs on the southern bank of the Molonglo River. The area adjacent and to the south of the unit was historically a pine plantation and currently contains large areas of Blackberry regrowth and pine wildings. The unit also contains pine regrowth. Exotic annuals observed in patches of high abundance. Fauna habitat is high due to the presence of rocky outcrops, a range of fallen little and branches and a range of tree age cohorts.	Exotic weeds and annual species – St John’s Wort, African Lovegrass, Blackberry, thistle, <i>Avena</i> sp. Pines currently exist as a significant part of the overstorey. Planting of native overstorey species (e.g. <i>E. blakelyi</i> , <i>E. melliodora</i>) would increase long-term habitat values. Rocky areas could contain PTWL.
R (2.5 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW – Derived Grassland)	O/S – none M/S – <i>Acacia rubida</i> , <i>Pinus radiata</i> L/S – <i>A. bigeniculata</i> , <i>A. scabra</i> , <i>Avena</i> sp., <i>H. perforatum</i>	P1: 14/32 P2: 15/31	67 (64,71)	74%	N/A	Moderate to steep slope above Molonglo River west of Coppins Crossing. The derived grassland is dominated by native grasses (<i>Austrostipa</i> spp.) with patches of exotic species. Some granite outcrops occur and are associated with shrubs and small trees. <i>A. rubida</i> and <i>P. radiata</i> occur around rocky outcrop only and are not widespread. Fauna habitat is confined to the scattered rocky areas and dense <i>Acacia</i> thickets. Grazing is low intensity and primarily by kangaroos.	Common listed exotic weeds for targeted control include St. John’s Wort and Blackberry. <i>Nassella trichotoma</i> (Serrated Tussock) and Paterson’s Curse are also listed weeds present, but in low abundance. Rocky areas could contain PTWL. Plot 1 could be a monitoring site for units Q, R & S.
S (5.6 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW – Derived Grassland)	O/S – <i>Eucalyptus</i> spp. M/S – <i>Leptospermum</i> sp. L/S – <i>T. triandra</i> , <i>A. scabra</i> , <i>E. curvula</i> , <i>H. perforatum</i>	P1: 15/29 P2: 31/50	81 (85,78)	61%	N/A	Native dominated derived grassland (<i>T. triandra</i> , <i>A. scabra</i>) with patches of exotic annuals and weeds. Similar to patches Q & R. Scattered pines occur across the unit. Species diversity varies with highest diversity occurring amongst rocky outcrops. Fire has removed canopy and mid-storey cover. Large areas of bare ground present allowing opportunities for the establishment of exotics. Scattered native trees (<i>E. bridgesiana</i> , <i>E. dives</i> , and <i>E. polyanthemos</i>) exist but are primarily saplings / young Eucalypts.	Exotic weeds and annual species – St John’s Wort, African Lovegrass, Blackberry, thistle, <i>Avena</i> sp. Pines currently scattered across vegetation unit. Rocky areas could contain PTWL. Plot 2 could be considered as a monitoring site for units Q, R & S

Table 9: Spring Valley Farm Conservation Area

UNIT	ACT VEGETATION TYPE	DOMINANT SPECIES	NATIVE SP # / TOTAL	NATIVE % COVER	THS %	WBS %	VEGETATION UNIT DESCRIPTIONS	MANAGEMENT CONSIDERATIONS
I (20.7 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW – Derived Grassland)	O/S - <i>E. blakelyi</i> , <i>E. melliodora</i> M/S – <i>E. blakelyi</i> L/S – <i>Avena</i> sp., <i>A. scabra</i> , <i>R. racemosum</i> , <i>Vulpia</i> sp., <i>H. perforatum</i> , <i>Trifolium</i> sp.	P1: 22/38 P2: 18/40 P3: 18/33	71 (72,74, 65)	64%	N/A	Vegetation unit I is native dominated with a moderate diversity of native herbs and forbs, but many native species are uncommon. Weed and exotic annual (<i>Avena</i> sp. and <i>Verbascum thapsus</i>) abundance generally increased as you moved down the slope with the upper slopes generally more native. Natural regeneration is present, but limited to the north-east corner of the unit. Rocky outcrops / surface rocks are fairly common across the unit and contain the areas of highest diversity. A number of mature hollow-bearing trees are scattered across the vegetation unit, providing fauna habitat values. Grazing intensity is low (kangaroos). Adjacent paddocks (west) are grazed by cattle and likely to have also previously grazed within unit I; however, no recent signs were evident.	Exotic annual grasses (<i>Avena</i> sp.), St. John's Wort, and Paterson's Curse particularly in the eastern section and north of the fence line. Promotion of natural regeneration is recommended. All plots could be equally considered to serve as a monitoring site for Spring Valley Farm.
L (2.2 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW)	O/S - <i>E. blakelyi</i> M/S – <i>E. blakelyi</i> L/S – <i>T. triandra</i> , <i>Vulpia</i> sp., <i>Bromus</i> sp., <i>Avena</i> sp.	P1: 26/46 P2: 30/48	70 (71,69)	74%	N/A	The ground layer is native dominated, primarily by <i>T. triandra</i> . There is a moderate to high diversity of native herbs and forbs and large amounts of nature regeneration of the overstorey (saplings). There are patches with high amounts of exotic annuals and weeds, but general abundance across the unit is fairly low to moderate. Variety of fauna habitat values present within the vegetation unit; ephemeral drainage line, hollow-bearing trees, surface rocks and fallen branches and litter. A drainage line running south-west to north-east borders the vegetation unit, providing small amounts of aquatic habitat. There was water within the drainage line at the time of the field surveys.	Targeted control for listed weeds - St. John's Wort and Blackberry. Reduce and limit the spread of exotic annual grasses. Promotion of fauna habitat values and protection of aquatic habitat / drainage line. Plot 2 is likely to be the best monitoring site from unit L for Spring Valley Farm.

UNIT	ACT VEGETATION TYPE	DOMINANT SPECIES	NATIVE SP # / TOTAL	NATIVE % COVER	THS %	WBS %	VEGETATION UNIT DESCRIPTIONS	MANAGEMENT CONSIDERATIONS
M1 (6.7 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW)	O/S – <i>E. blakelyi</i> , <i>E. melliodora</i> M/S – <i>E. blakelyi</i> L/S – <i>Austrostipa</i> spp., <i>Vulpia</i> sp., <i>Bromus</i> sp. <i>Rytidosperma</i> spp.	P1: 22/41 P2: 20/39	86 (95,76)	65%	N/A	The site has an understorey dominated by native grasses (<i>Austrostipa</i> sp.) with patches dominated by exotic annuals (<i>Avena</i> sp. and <i>Bromus</i> sp.) and a moderate diversity of native forbs. Remnant trees are mature / old growth with a high proportion containing hollows of different sizes. Rocky outcrops were common across the site and contain a high proportion of the diversity. These features provide the majority of fauna habitat values for the vegetation unit. Weeds were common across the site, but less persistent than in other areas within the Molonglo Valley at the time of the surveys. Natural regeneration was present, but low. Grazing intensity was low with Kangaroos being the main grazers. Historic grazing of cattle was evident (patches of exotic annuals and perennial species under mature trees).	This unit has been separated into M1 and M2 Listed weeds (St. John’s Wort, Sweet Briar, thistles) and exotic annuals require control. Promotion of natural regeneration of the overstorey is recommended. Plot 2 is likely to be the best monitoring site from unit M for Spring Valley Farm
M2 (3.1 ha)	Red Stringybark – Scribbly Gum Tableland Forest	O/S – <i>E. rossii</i> , <i>E. macrorhyncha</i> M/S – <i>E. rossii</i> , <i>E. macrorhyncha</i> L/S – <i>Austrostipa</i> spp., <i>Vulpia</i> sp., <i>Bromus</i> sp. <i>Rytidosperma</i> spp.	N/R	N/R	N/R	N/R	The northern section of the vegetation unit has been mapped as a separate management unit (M2). It has an overstorey dominated by <i>E. rossii</i> (Scribbly Gum) and <i>E. macrorhyncha</i> (Red Stringybark) and thus, does not conform to EPBC BGW. However, it contains good conservation values with understorey characteristics consistent with M1. The diversity and abundance of native species and the terrestrial habitat score would also be consistent with M1.	Despite not meeting EPBC BGW definition, M2 could be managed in a consistent manner with M1 for its conservation values. St. John’s Wort. Sweet Briar and thistles are present.

UNIT	ACT VEGETATION TYPE	DOMINANT SPECIES	NATIVE SP # / TOTAL	NATIVE % COVER	THS %	WBS %	VEGETATION UNIT DESCRIPTIONS	MANAGEMENT CONSIDERATIONS
P1 (7.8 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW)	O/S – <i>E. blakelyi</i> M/S – <i>E. blakelyi</i> , <i>R. fruticosus</i> , <i>K. ericoides</i> L/S – <i>A. scabra</i> , <i>Rytidosperma</i> spp., <i>Vulpia</i> sp., <i>Lomandra</i> spp., <i>C. apiculatum</i> , <i>R. fruticosus</i> .	P1: 16/33 P2: 27/47 P3: 25/43	74 (70,86, 66)	71%	N/A	The BGW section of the site is dominated by mature <i>E. blakelyi</i> and a high abundance and cover of <i>E. blakelyi</i> regeneration. Native grasses dominate the understorey and the vegetation unit is generally low in exotic perennials and annuals, which is consistent with other units in Spring Valley. However, the exotic abundance increases on the eastern section of the vegetation unit adjacent to the access track between the unit and the pine plantations (particularly for Blackberry and St. John’s Wort). The variety of tree age cohorts, presence of hollow bearing trees, ephemeral drainage line, fallen litter and logs and surface rocks provides a variety of fauna habitat values.	The original vegetation unit P requires splitting into three zones / units (P1, P2 & P3). St. John’s Wort and Blackberry are scattered across the vegetation unit. Regular weed control is likely to be required, particularly along the eastern border of the vegetation unit. Other listed species include African Lovegrass, thistles and Paterson’s Curse. Good adjacent habitat for woodland birds. Plot 3 is likely to be the best monitoring site from unit P1 for Spring Valley Farm.
P2 (1.7 ha)	Tree Plantation (<i>Pinus</i> sp.)	O/S – <i>Pinus</i> sp. M/S – <i>Pinus</i> sp., <i>R. fruticosus</i> L/S – N/R	N/R	N/R	N/R	N/R	P2 is representative of a regenerating pine plantation. This patch of pine wildings links to a larger pine plantation immediately to the east of the vegetation unit.	This vegetation unit has been separated from P1 because it is a regenerating pine plantation. SJW and Blackberry are present. This unit is not reflective of a TEC.
P3 (3.2 ha)	Bundy – Red Stringybark Grassy Woodland	O/S – <i>E. macrorhyncha</i> , <i>E. nortonii</i> , & <i>E. blakelyi</i> M/S – <i>E. blakelyi</i> L/S – <i>A. scabra</i> , <i>Rytidosperma</i> spp., <i>Vulpia</i> sp., <i>C. apiculatum</i>	N/R	N/R	N/R	N/R	P2 is the area south of the pine plantation (P3) and represents a dry sclerophyll forest dominated by <i>E. macrorhyncha</i> , <i>E. nortonii</i> , and <i>E. blakelyi</i> . It contains a high diversity of native forbs and contains similar habitat values and other ground cover characteristics to P1, It does not meet the EPBC Act definition for BGW.	The dominant overstorey species does not meet EPBC BGW. However, the understorey is consistent with P1 that it is dominated by native grasses, and thus, could be managed for its conservation values. Good adjacent habitat for woodland birds.

Table 10: West Molonglo Conservation Area (units defined by Hogg 2012)

UNIT	ACT VEGETATION TYPE	DOMINANT SPECIES	NATIVE SP # / TOTAL	NATIVE % COVER	THS %	WBS %	VEGETATION UNIT DESCRIPTIONS	MANAGEMENT CONSIDERATIONS
1A (19.5 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW)	O/S – <i>E. melliodora</i> , <i>E. blakelyi</i> M/S – <i>E. blakelyi</i> , <i>E. melliodora</i> L/S – <i>Austrostipa</i> spp., <i>T. triandra</i>	P1: 14/35 P2: 18/34	85 (72,98)	61%	37%	The site has a predominately native understorey with exotic annual grasses and weeds such as St. John's Wort, thistles and <i>Avena</i> sp. present in localised patches. The woodland patch in the northern part of the unit has remnant trees surrounded by thick patches of regenerating <i>E. blakelyi</i> . A few remnant paddock trees contain hollows and there is a good amount of fallen leaves, bark and branches to provide potential fauna habitat. Rocky outcrops and surface rocks were also common across the vegetation unit.	Significant weed present include St. John's Wort and Thistles. <i>Avena</i> sp. was abundant in localised patches and should be managed to limit its potential to spread. Potential significant woodland bird species habitat. Rocky areas could contain PTWL. Plot 1 could be considered as a monitoring site for West Molonglo as part of the units 1A and 1C.
1B (4.2 ha)	Exotic Pasture	O/S – <i>E. blakelyi</i> M/S – <i>E. blakelyi</i> L/S – <i>P. aquatica</i> , <i>Avena</i> sp., <i>Vulpia</i> sp., <i>H. perforatum</i>	P1: 3/13	0	46%	N/A	The site is exotic dominated (exotic pasture grass, >75% <i>Phalaris</i>) with very low native species diversity and abundance. <i>E. blakelyi</i> mature trees provide some fauna habitat values with hollows present in varying sizes.	Understorey is dominated by an exotic perennial and therefore does not meet the EPBC Act definition for BGW. Protection of mature trees for their habitat values. Listed weeds include St. John's Wort, African Lovegrass and thistles. Not a plot to be used as a monitoring site.

UNIT	ACT VEGETATION TYPE	DOMINANT SPECIES	NATIVE SP # / TOTAL	NATIVE % COVER	THS %	WBS %	VEGETATION UNIT DESCRIPTIONS	MANAGEMENT CONSIDERATIONS
1C (7.1 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW)	O/S – <i>E. melliodora</i> , <i>E. blakelyi</i> M/S – <i>E. blakelyi</i> , <i>E. melliodora</i> L/S – <i>M. stipoides</i> , <i>Austrostipa</i> spp., <i>Avena</i> sp., <i>Vulpia</i> sp., <i>T. triandra</i> , <i>H. lanatus</i>	P1: 15/38	92	60%	37%	Predominately native derived grassland with few healthy mature <i>E. blakelyi</i> persistent. However, native species diversity is relatively low. Exotic diversity is moderate. Exotic perennial cover is low and exotic annual cover is high. A farm dam is situated in the north-east of the vegetation unit. The dam was approximately half full at the time of the surveys with some large patches of bare soil around the edges. Grazing intensity is moderate with cattle being the primary grazers. Habitat values are primarily associated with the farm dam and limited rocky outcrops / surface rocks. Mature trees are present, but rare.	Significant weeds present include Serrated Tussock (recently controlled), St. John's Wort and thistles. Promotion of native species (forbs and herbs) could be considered and along with the enhancement of overstorey regeneration.
2 (2.3 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW – Derived Grassland)	O/S – <i>E. dives</i> , <i>E. blakelyi</i> M/S – none L/S – <i>Vulpia</i> sp., <i>Avena</i> sp., <i>Bromus</i> sp., <i>T. triandra</i> , <i>H. perforatum</i>	P1: 20/38 P2: 21/41	75 (80,71)	57%	N/A	Grassland dominated by a mix of St. John's Wort and exotic annuals. There is a good native element within the unit dominated by <i>T. triandra</i> , which is heavily grazed, <i>R. racemosum</i> and <i>A. bigeniculata</i> . Few scattered remnant trees across unit representative of historical grazing and clearing. Main grazers within the unit are cattle and kangaroos. There is a small element of natural regeneration; however, most of the overstorey is senescing paddock trees. Health of trees range from poor to moderate to good. Fauna habitat values are limited to the paddock trees (no hollows recorded). No rocky outcrops were observed.	Significant abundance of exotic annual grasses and St. John's Wort. Other listed species include thistles and Paterson's Curse. A drainage line with significant erosion (filled with timber) occurs adjacent to the south of the vegetation unit.

UNIT	ACT VEGETATION TYPE	DOMINANT SPECIES	NATIVE SP # / TOTAL	NATIVE % COVER	THS %	WBS %	VEGETATION UNIT DESCRIPTIONS	MANAGEMENT CONSIDERATIONS
3A (9.9 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW)	O/S – <i>E. blakelyi</i> M/S – <i>R. fruticosus</i> L/S – <i>Avena</i> sp., <i>Bromus</i> sp., <i>Austrostipa</i> spp., <i>Vulpia</i> sp., <i>P. aquatica</i> , <i>H. perforatum</i>	P1: 12/36 P2: 8/23	88 (88,89)	40%	N/A	A lower quality site containing scattered remnant trees with exotic annual (<i>Avena</i> sp.) understorey. Remnant trees are mature / old growth with a few hollows providing habitat for woodland birds. Fallen branches, logs and litter occurred occasionally. There is little to no natural tree regeneration occurring and the diversity of native species is low to moderate with the higher diversity patches localised amongst smaller areas dominated by native grasses (<i>A. bigeniculata</i> and <i>B. macra</i>). The native % score suggests a higher quality / native dominated vegetation unit than the quality descriptions provide.	St. John's Wort and thistles common. High proportion of exotic annual grasses (<i>Avena</i> sp., <i>Bromus</i> sp. and <i>Vulpia</i> sp.) across the vegetation unit. Promotion of natural regeneration. This patch barely meets the EPBC BGW woodland criteria. It has an appropriately native dominated understorey (amongst the perennial vegetation) and it contains natural regeneration of the overstorey, but contains low native diversity. Plot1 would be the best of the two sites to serve as a permanent monitoring plot for unit 3A.
3B (16.8 ha)	Exotic Pasture	O/S – <i>E. melliodora</i> , <i>E. blakelyi</i> M/S – none L/S – <i>Avena</i> sp., <i>Vulpia</i> sp., <i>Bromus</i> sp., <i>H. perforatum</i>	P1: 16/35 P2: 7/25	28 (31,26)	35%	N/A	Predominately exotic understorey containing a high cover of exotic annual grasses and St. John's Wort. The native species diversity and native cover is low. Fauna habitat values are limited within the vegetation unit. A rocky outcrop occurs towards the south-west of the unit. Few remnant trees remain from past clearing for grazing with some containing hollows. Grazing intensity low at the time of survey. Grazers include cattle and kangaroos.	Common significant weeds include St. John's Wort, Paterson's Curse, and thistle. Exotic annual grasses very high abundance. This unit does not meet the EPBC Act definition for BGW, due to the predominant abundance of exotic understorey species. Both plots unlikely to serve as a good permanent monitoring site.

Table 11: Arboretum Conservation Area

UNIT	ACT VEGETATION TYPE	DOMINANT SPECIES	NATIVE SP # / TOTAL	NATIVE % COVER	THS %	WBS %	VEGETATION UNIT DESCRIPTIONS	MANAGEMENT CONSIDERATIONS
GG1 (43.9 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW)	O/S - <i>E. blakelyi</i> , <i>E. melliodora</i> M/S – <i>E. blakelyi</i> , <i>E. melliodora</i> , <i>R. rubiginosa</i> L/S – <i>A. bigeniculata</i> , <i>A. scabra</i> , <i>Rytidosperma</i> spp., <i>M. stipoides</i> , <i>Bromus</i> sp.	P1: 26/54 P2: 17/43 P3: 13/38 P4: 21/44	85 (78, 84,94, 100)	64%	N/A	Vegetation Unit GG contains EPBC Act BGW in varying conditions. Remnant trees are overall in good condition although dieback of the canopy is present at some locations. Areas of higher native diversity were observed on rocky hilltops and ridges. Weeds were fairly common but patchy across the site with higher abundances occurring on the lower slopes and drainage lines. Fauna habitat values are high with a range of hollow-bearing trees, litter and logs and rocky outcrops present. Moderate grazing intensity occurs from cattle and kangaroos.	Listed weed species present including, Hawthorn, Boxthorn, St. John’s Wort, Paterson’s Curse, Sweet Briar, Blackberry and thistles. Potential significant woodland bird species habitat. Plot 1 and 4 could be considered as suitable permanent monitoring sites.
GG2 (3.7 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW – Derived Grassland)	O/S – none M/S – <i>R. rubiginosa</i> L/S – <i>A. bigeniculata</i> , <i>Bromus</i> sp., <i>Avena</i> sp., <i>H. perforatum</i>	P1: 17/38	100	49%	N/A	Vegetation unit is derived grassland with a mix of exotic grasses and good patches of native species. There is no remnant overstorey present and fauna habitat values are generally low. Common weeds include Sweet Briar, St. John’s Wort and exotic annual grasses.	Listed weeds include Sweet Briar, St. John’s Wort, thistles and Paterson’s Curse. Limiting the spread of exotic annuals. Planting of overstorey species or promotion of natural regeneration from adjacent vegetation unit (GG1). Unlikely to serve as a reliable permanent monitoring site.

UNIT	ACT VEGETATION TYPE	DOMINANT SPECIES	NATIVE SP # / TOTAL	NATIVE % COVER	THS %	WBS %	VEGETATION UNIT DESCRIPTIONS	MANAGEMENT CONSIDERATIONS
N1 (10.2 ha)	Depauperate Native Pasture / Exotic Pasture	O/S – <i>E. melliodora</i> , <i>E. blakelyi</i> M/S – <i>R. rubiginosa</i> L/S – <i>A. bigeniculata</i> , <i>Lolium</i> sp., <i>M. stipoides</i> , <i>Vulpia</i> sp.	P1: 11/30 P2: 12/31	90 (92,88)	44%	N/A	Vegetation unit is a mix of native and exotic grasses with limited scattered remnant trees, some of which contain hollows suitable for fauna habitat (woodland birds). Otherwise fauna habitat values are limited. The difference in the values from the native % cover demonstrates the patchiness in native understorey dominance. Grazing intensity at the time of the surveys was very low; however, past grazing and land use suggest pasture improvement. Similar array of listed weed species to those recorded in GG1 (Sweet Briar, St. John's Wort and exotic annual grasses).	Vegetation Unit N1 was split with N3 developed from the southern section (north facing slope) of the original N1. Listed weeds include Sweet Briar, St. John's Wort, thistles and Paterson's Curse. Limiting the spread of exotic annuals. Promotion of natural regeneration of the overstorey. Plot 1 would be the most likely of the two plots to serve as a permanent monitoring site.
N2 (7.8 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW)	O/S – <i>E. blakelyi</i> , <i>E. melliodora</i> M/S – <i>R. rubiginosa</i> L/S – <i>A. bigeniculata</i> , <i>A. scabra</i> , <i>Rytidosperma</i> spp.	P1: 13/25	99	49%	39%	Good native grass cover with a low diversity of herbs and forbs in the understorey (very high native %). Weeds generally have a low abundance, but are scattered across the vegetation unit. No exotic perennials and low exotic annuals. Remnant trees are mature and senescing and most contain hollows with a good representation of hollow sizes across the whole unit, providing habitat for woodland birds. A pair of cockatoos was observed nesting in a large hollow. Evidence of long grazing history. Under all mature trees is a biosphere of exotic species / weeds including, <i>Bromus</i> spp., <i>Hirshfeldia incana</i> , <i>Vulpia</i> sp., and thistles. However, a low grazing intensity was observed at the time of the field surveys. Dam is present in the east of N2. It had no water at the time of the field surveys, with large patches of bare ground observed within and surrounding the dam.	The unit is in relatively good condition, in relation to abundance of exotics. It is recommended that weed control be targeted to St. John's Wort and Sweet Briar. Other listed weeds include Thistles and Paterson's Curse Maintaining the low cover of exotic annuals. It is possible that the current low levels are due to the grazing regime. Would likely to serve as a good / representative site of the arboretum conservation area for monitoring purposes.

UNIT	ACT VEGETATION TYPE	DOMINANT SPECIES	NATIVE SP # / TOTAL	NATIVE % COVER	THS %	WBS %	VEGETATION UNIT DESCRIPTIONS	MANAGEMENT CONSIDERATIONS
N3 (3.1 ha)	Depauperate Native Pasture / Exotic Pasture	<p>O/S – none</p> <p>M/S – <i>R. rubiginosa</i></p> <p>L/S – <i>Vulpia</i> sp., <i>Avena</i> sp., <i>H. perforatum</i></p>	P1: 6/25	60	33%	N/A	<p>Exotic pasture (<i>Avena</i> sp. and <i>Vulpia</i> sp.) with a high cover of St. John's Wort, woody weeds and thistles. Low native cover and diversity was observed across the whole vegetation unit.</p> <p>However, patches of native grasses do exist in, but are uncommon.</p> <p>Fauna habitat values are low and no water body present</p>	<p>Vegetation Unit N3 was originally part of N1.</p> <p>High abundance of St. John's Wort and exotic annuals.</p> <p>Significant weed control activities would be required.</p> <p>Listed species also include Sweet Briar, thistles and Paterson's Curse</p> <p>Not representative of a TEC due to no overstorey / regeneration and low diversity.</p>

Table 12: William Hovell Conservation Area

UNIT	ACT VEGETATION TYPE	DOMINANT SPECIES	NATIVE SP # / TOTAL	NATIVE % COVER	THS %	WBS %	VEGETATION UNIT DESCRIPTIONS	MANAGEMENT CONSIDERATIONS
C (6.9 ha)	Yellow Box – Red Gum Tableland Grassy Woodland (EPBC BGW)	O/S – <i>E. blakelyi</i> M/S – <i>R. rubiginosa</i> , <i>C. monogyna</i> , <i>Prunus</i> sp. L/S – <i>Avena</i> sp., <i>Bromus</i> sp., <i>Vulpia</i> sp., <i>A. bigeniculata</i> , <i>P. aquatica</i>	P1: 11/33 P2: 16/36	60 (47,73)	40	N/A	Vegetation unit is used as a horse agistment paddock similar to unit H. Remnant paddock trees are present and senescing (moderate to poor health), but provide current habitat for a range of bird species. The unit is dominated by exotic annuals and perennials, including St. John’s Wort and Sweet Briar. However, extensive patches in good condition dominated by <i>A. bigeniculata</i> occur across the site (as represented in the native % cover). No natural regeneration was observed.	Disturbance from horse agistment. Heavy weed abundance from Sweet Briar, St. John’s Wort, thistles, Paterson’s Curse and exotic annuals requires control. Current states of some smaller patches within the vegetation unit are not representative of a TEC, but vegetation unit as a whole represents low quality BGW. Plot 1 is a marginal site and could be considered as a permanent monitoring plot for the William Hovell Conservation area.
H (8.6 ha)	Yellow Box – Red Gum Tableland Grassy Woodland	O/S – <i>E. melliodora</i> M/S – <i>R. rubiginosa</i> L/S – <i>Bromus</i> sp., <i>Avena</i> sp., <i>A. bigeniculata</i> , <i>H. perforatum</i>	P1: 5/21 P2: 12/32	60 (20,100)	37	N/A	Vegetation unit is used as a horse agistment paddock similar to unit C. Dominated by <i>Avena</i> sp. and <i>Bromus</i> sp. with a range of other exotic (including perennials such as Sweet Briar) common across the vegetation unit. Contains a low to moderate diversity of native species; however, native dominated grass patches (<i>A. bigeniculata</i>) exist only amongst the rocky outcrops. Rocky outcrops are scattered across the unit and provide fauna habitat values. Remnant trees (<i>E. melliodora</i>) exist in a range of conditions providing habitat (littler, bark, fallen logs) for woodland birds. Exotic species (e.g. thistles) are common at the base of these remnant trees. No natural regeneration was observed.	Disturbance from horse agistment. Rabbit warrens present. Listed weeds include Sweet Briar, St. John’s Wort, Horehound, and thistles. Exotic annuals are in high abundance. Unit is not representative of a TEC. Could resurvey at another time to re-confirm EPBC BGW. At the time of the field surveys, this patch did not meet the EPBC definition for BGW despite having an <i>E. blakelyi</i> dominant overstorey, because: <ul style="list-style-type: none"> it did not contain 12 or more native non-grass species (it contained 11). nor was there natural regeneration of the overstorey or 20 trees per hectare. Boundaries of unit were difficult to determine with adjacent areas containing similar ground cover characteristics.

4 Summary & recommendations

4.1 SUMMARY

Eco Logical Australia conducted field surveys over December 2012 & January 2013 to collect data for the baseline vegetation condition of the BGW and NTG conservation areas designated as part of the Molonglo Valley strategic assessment. The areas had been previously surveyed in December 2008 (ELA 2009).

At the time of the field surveys, there were large areas dominated by exotic annual grasses (*Avena* sp., *Bromus* spp., and *Vulpia* sp.) and significant patches of St. John's Wort observed in almost all vegetation units, which was likely a result of the above seasonal rains at the beginning of spring. The high abundance of these exotic annuals and St. John's Wort present a significant management consideration for the patches of MNES and the ability to maintain and/or enhance the ecological condition of these areas is compromised. However, the majority of patches surveyed still conformed to the EPBC Act definition for the listed BGW or NTG ecological community.

The level of grazing intensity varied across the study area, with a generally low grazing intensity observed. Kangaroos were recorded as the primary grazers. Grazing by cattle was recorded at West Molonglo, Molonglo River Park, Arboretum and Spring Valley Farm. Two patches (C & H) at William Hovell conservation area were used as horse agistment paddocks.

There were no listed threatened flora species recorded during the field surveys. However, it is noted that surveys were conducted outside of the optimal flowering times for some threatened flora species.

Rocky outcrops often provided the patches with the highest diversity of native species and with hollow-bearing trees (mature paddock trees) contributed significantly to the fauna habitat values of the vegetation unit. Conservation areas that contain potential important habitat for fauna species are outlined in the **Table 13** below. This list is not intended to be comprehensive, but is based on the primary habitat features observed during the field surveys.

Table 13: Potential areas of habitat for fauna

CONSERVATION AREA	POTENTIAL FAUNA HABITAT – VEGETATION UNITS
Kama Nature Reserve	Woodland birds - B1, B2 & B3
	Pink-tailed Worm Lizard - A1 & A2
	Striped Legless Lizard - A1 & A2
River Park	Pink-tailed Worm Lizard – K1, Q, R & S
Spring Valley Farm	Woodland birds – P1 & P3
West Molonglo	Woodland birds – 1A
	Pink-tailed Worm Lizard – 1A
Arboretum	Woodland Birds – GG1
William Hovel	Pink-tailed Work Lizard – C & H

The majority of vegetation units originally identified as BGW patches were confirmed as the TEC as part of the baseline condition assessments. However, the following areas as a conclusion of these field surveys, do not currently fulfil the EPBC Act BGW listing criteria, but may under appropriate management regimes:

- H, N1, N3

These vegetation units represent areas of potentially recoverable BGW that:

- Display a dominant overstorey of *E. blakelyi* and/or *E. melliodora*;
- Have a dominant native understorey where the perennial vegetation cover is greater than 50% native;
- Contain less than 12 native non-grass understorey species;
- Are greater than 2 hectares in size;
- Contain less than 20 mature trees per hectare; and
- Currently have no natural regeneration of the dominant overstorey species.

It is likely that with appropriate management actions, some of these vegetation units could once again meet the EPBC Act definition for BGW. Management actions would need to facilitate the natural regeneration of the overstorey and/or regeneration of native species (grasses, herbs and forbs) in the seed bank.

In addition to the above vegetation units, the following patches did not meet the EPBC Act BGW listing criteria and are unlikely to meet the listed TEC even under appropriate management regimes:

- D2, K2, O2, O3, O4, 1B, 3B

These patches contain an understorey where the perennial vegetation cover is greater than 50% exotic. These areas would require significant intervention, such as the stripping of exotic vegetation and then re-seeding with native grasses, herbs and forbs and appropriate follow-up management actions (e.g. maintenance, watering and weed control). The vegetation units O2 & O4 were not originally mapped as BGW (ELA 2009).

The remaining patches that do not meet the EPBC Act definition for BGW are M2, P2 and P3. These patches do not contain an overstorey dominated *E. blakelyi*, *E. melliodora* or *E. albicans* (White Box). However, M2 and P3 contain an understorey consistent with BGW and could be managed for their ecological values.

4.2 RECOMMENDATIONS

4.2.1 General recommendations

It is recommended that any management actions to maintain or enhance the ecological values of the patches of MNES first consider the control and/or removal of exotic annual grasses and St. John's Wort, where possible. If eradication or removal is not possible, then actions to suppress exotic annual and weed spread is essential.

Following weed control or suppression, increasing the native species diversity or promoting the restoration of the seed bank should be considered. This could be achieved either through ecological burns or controlled grazing regimes to find a balance between suppressing exotic annual and weed growth to allow native species growth or sowing native species directly. Grazing intensity and duration is likely to have a significant influence on the growth of exotic annuals, as well as the growth of native species and native diversity within these conservation areas. ELA does not recommend that livestock

grazing be introduced to sites currently ungrazed, but rather that grazed patches be weaned off livestock grazing. Wherever livestock grazing is used as a conservation management tool, it must be accompanied by a clear set of objectives and frequent monitoring (both during the presence and absence of grazing).

In addition, areas of derived grassland with remnant mature trees present could be managed to promote the natural regeneration of the overstorey (*E. blakelyi* and *E. melliodora*).

4.2.2 Potentially recoverable Box-Gum Woodland

The promotion of natural regeneration of the overstorey species in the potentially recoverable BGW patches may lift these woodland areas to the EPBC TEC. A reduction in the biomass and ground layer density needs to occur to allow the establishment of the dominant overstorey species seedlings. A number of processes are required for this to happen and are discussed below.

Burning or grazing reduces the biomass; however, sustained or continuous grazing is not preferred as it will reduce the cover and abundance of more palatable species, some of which are rarer species (native non-grass understorey species) in grasslands and grassy woodlands. A rotational or pulse method of grazing may cause a heavy impact for a short amount of time, but is probably the most effective at quickly reducing biomass, creating inter-tussock spaces and the reducing unwanted exotic annual species. This grazing method should be monitored and follow adaptive management principles to promote grazing at appropriate and most effective times.

The change in ground cover biomass throughout the year should also be observed and monitored. Such observations would inform the most appropriate time to graze to reduce the biomass of exotic annuals and any dense native patches and allow the establishment and growth of the naturally regenerating overstorey species. Grasslands are considered highly dynamic and responsive to rainfall events, which will promote the growth of a different swathe of annual or perennial species depending on the season (e.g. winter rains may result in dense swathes of annual grasses indicating August as a good time to graze).

The action of only spraying exotic species would be difficult and expensive and is not recommended as a primary management action. Most of the biomass is annual grasses and herbs which are spread over large areas. Spraying would result in the killing of non-target species, however, the spraying of noxious species should be considered by management.

The ACT action plan 27 '*ACT lowland woodland conservation strategy*' has identified a number of management principles for the conservation of woodland area across the ACT (ACT Government 2004). This document should be consulted to inform any conservation management plans and to ensure consistency with other BGW areas across the ACT.

5 References

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6 Appendix A: Evaluation

6.1 INTRODUCTION

ELA was commissioned by TAMS to undertake a baseline vegetation condition assessment of the conservation areas from the Molonglo Valley strategic assessment (*Molonglo Valley Vegetation Survey – Baseline Condition Assessment, ELA 2013*). The field surveys took place between December 2012 and January 2013 and assessed the ecological condition of previously mapped BGW and NTG in the Molonglo Valley (ELA 2009).

At the conclusion of the *Molonglo Valley Vegetation Survey – Baseline Condition Assessment*, there were patches previously mapped as Box-Gum Woodland that failed to meet the listing criteria. As a consequence, some patches were divided to eliminate patches that did not meet the listing criteria. TAMS asked if ELA could provide (where possible) an explanation behind the observed differences between the two field assessments for inclusion in the original report as an *Evaluation Chapter*.

It is important to note that comparing results from the two field surveys is difficult and interpreting and comparing the results should be undertaken with caution. Different survey methodologies, survey effort, seasonality, field staff, the location of survey sites, land management and survey objectives will influence outcomes.

While the 2009 surveys were aimed at identifying the presence and relative distribution of Box-Gum Woodland within the Molonglo Strategic Assessment area, the primary aim of the 2013 surveys was to provide an assessment of baseline condition for the mapped Box-Gum Woodland units for future monitoring purposes.

The aim of this evaluation chapter (Appendix A) is to provide:

1. A condition classification and map for BGW patches consistent with the very low, low, moderate and high relative condition classes developed for the original BGW field survey report *EPBC Listed Flora Community and Species Mapping in the Molonglo Valley* (ELA 2009).
2. Explanation for possible changes (dimensional, vegetation condition and classification change) in each of the vegetation patches from the original BGW surveys conducted (ELA 2009).
3. Comments on whether some vegetation patches that were in relatively lower condition could be managed to improve their ecological condition.
4. Background information on West Molonglo to support an explanation for the different survey boundaries, methodology and change in results, between the original surveys (ELA 2009) and the recent baseline condition assessment.

6.2 CONDITION CLASSIFICATION

To provide greater insight into the quality of the EPBC Act Box-Gum Woodland across the field survey areas, the ecological community was assigned and mapped into four different condition classes. It is important to note that these condition classes are not part of the EPBC Act listing, but have been used to provide further detail about the relative floristic diversity identified in each patch of Box-Gum Woodland from the field surveys (**Figure 10**).

The condition classes were developed as part of the original Box-Gum Woodland survey report (ELA 2009; **Figure 11**), and have been reproduced for this evaluation chapter in an attempt to provide consistency. The condition class of each patch is based on an assessment of the number of non-grass native species present within each unit at the time of the field surveys.

Box-gum Woodland Vegetation Condition Mapping 2013

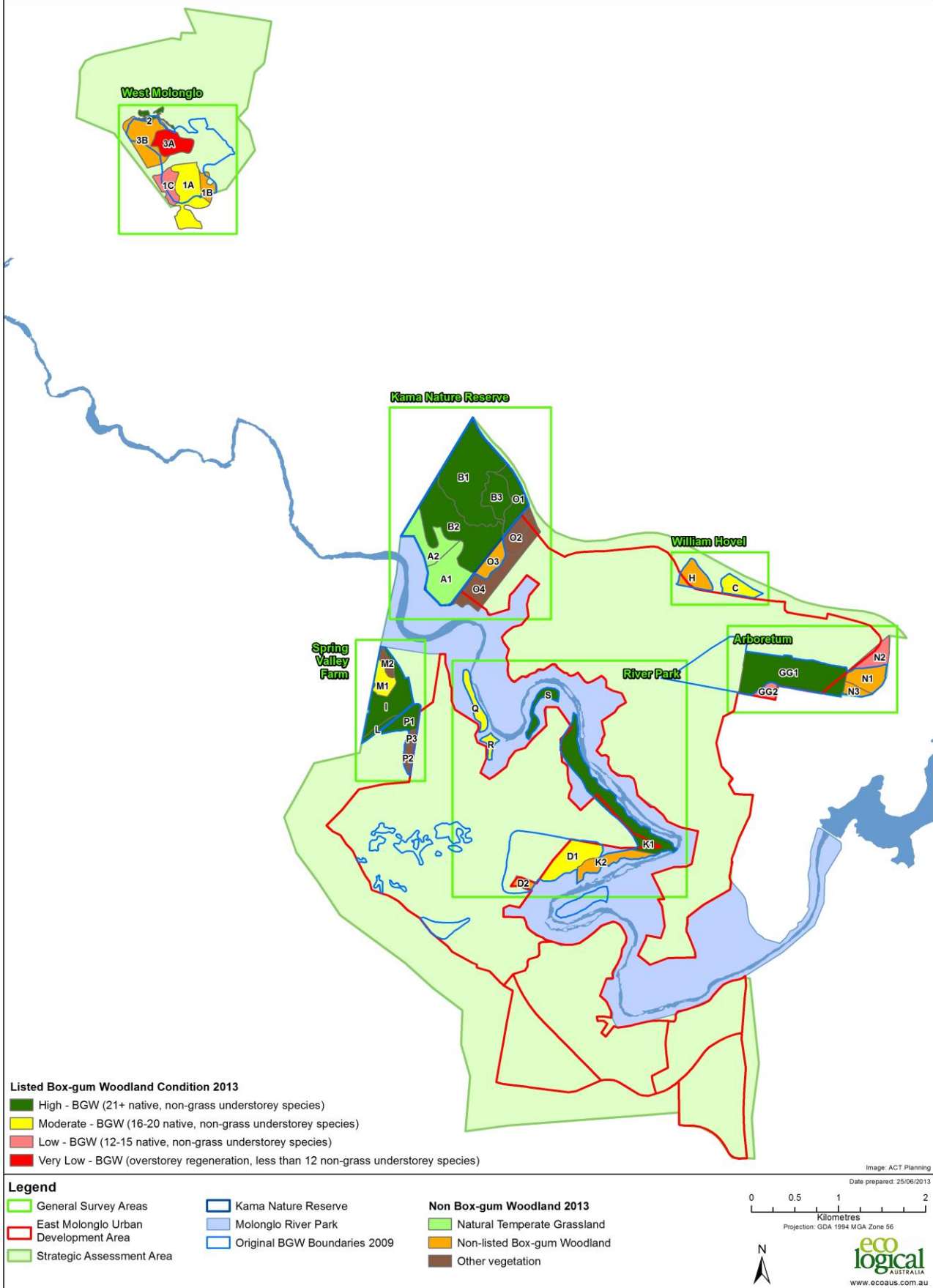


Figure 10: Box-Gum Woodland vegetation condition classification 2013

Box-gum Woodland Vegetation Condition Mapping 2009

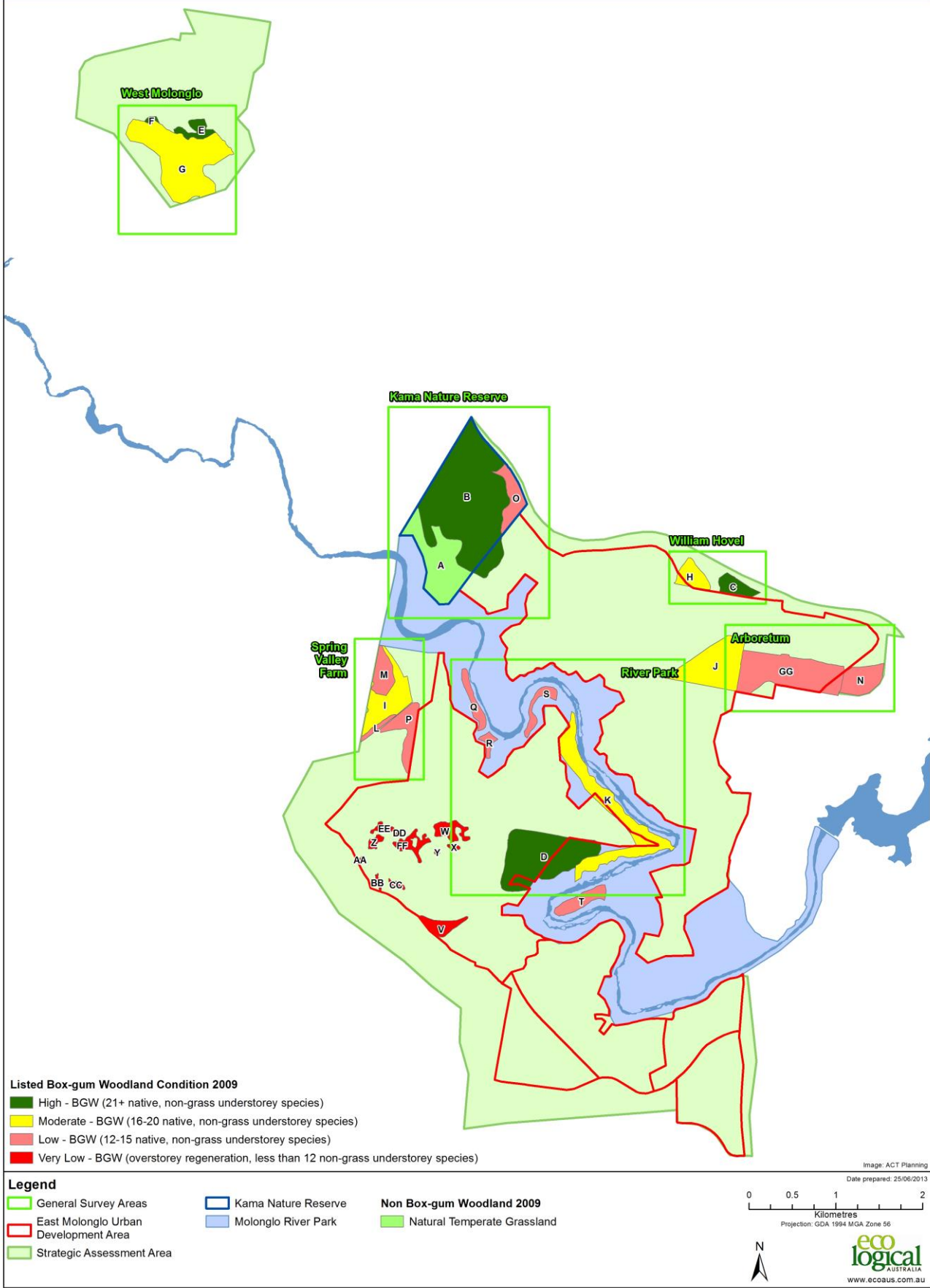


Figure 11: Box-Gum Woodland vegetation condition classification 2009

6.3 VEGETATION UNIT CHANGES

Differences in the field survey results (perceived ecological condition) were observed between the original BGW surveys (ELA 2009) and the recent baseline condition assessments (ELA 2013). As mentioned, differences are expected to occur because of the different field survey methodologies used, seasonality and climactic variability, and because the purpose for conducting each survey was different.

However, an explanation for differences observed between the two surveys for changes in dimension, classification and condition for each vegetation unit is provided, where possible, and outlined in **Table 14 - Table 19** below.

The explanations are broadly based around:

- Survey methodology
- Survey effort
- Seasonal and climatic influences
- The location of survey sites
- Observer bias and interpretation
- Land use management
- Survey objectives and limitations

6.3.1 Survey methodology

Survey methodology is selected based on the aims of an individual project and the desired results and applications. A range of different methodologies are available for assessing vegetation condition, and each method is likely to produce different levels of detail, and types of information. The methodology utilised for the field surveys differed between the two projects (ELA 2009 & ELA 2013).

The aim of the original field survey (ELA 2009) was to identify vegetation within the Molonglo Strategic Assessment Area that met the EPBC Act listing criteria for Box-Gum Woodland, by validating ACT Government GIS mapped areas identifying potential Box-Gum Woodland. During this original survey a traverse (or random meander) of no less than 100 m was conducted within each polygon with a tree cover greater than 10% or if *Eucalyptus melliodora* (Yellow Box) or *E. blakelyi* (Blakely's Red Gum) was or once was the dominant tree species. This approach was deemed the most effective method to determine the floristic diversity of “the patch” as defined under the listing criteria, and is standard practice for determining the presence of Box-Gum Woodland and is the recommended method at the Territory level (*Survey Guidelines for determining lowland vegetation classification and condition in the ACT – Conservation Planning and Research 2010*).

While the 2009 surveys were aimed at identifying the presence and relative distribution of Box-Gum Woodland within the Molonglo Strategic Assessment area, the primary aim of the 2013 surveys was to provide an assessment of baseline condition for the mapped Box-Gum Woodland units for future monitoring purposes. This required the collection of information that would inform operational plans and management actions for the purpose of managing the areas for conservation and increasing ecological condition. This required the selection of potential monitoring sites (plots) comprised of a standard floristic quadrat (20 m x 20 m), which is a common assessment unit used by ecologists to provide an inventory of flora species. The methodology undertaken for the condition assessment was provided in the *Procedures Manual – Baseline Condition Assessment in the Lower Molonglo River Valley Conservations Areas 2012* (Sharp 2012).

A difference of field survey methodology will inherently produce different results, due to the differences in purpose and survey intensity of the method used. For example, by conducting transects (random

meander) the surveyor has the ability to capture slight variability within the patch, such as rocky knolls. Given the more rigid nature of a (20 m x 20 m) quadrat, there is less scope to target the full range of micro-climates present within a site. In addition, a single transect can result in a larger area being surveyed compared to a single quadrat. However, the more quadrats surveyed within each patch (where typically a single transect is conducted), the chance that a higher diversity of species will be identified is increased. This may have occurred for the increase in condition class from moderate to high for Patch K1, where three floristic quadrats were conducted, as well as the addition of opportunistic observations within the patch.

6.4 SURVEY EFFORT

Survey effort is the number of sites surveyed as part of the survey program. Figure 5 of the ELA 2009 illustrates the location of traverses undertaken for the project. These traverses have been overlaid on the most recent survey mapping (**Figure 12**). The number of original traverses was influenced by the number of polygons depicted in the available ACT vegetation mapping, and time and budget constraints. Some of the patches that have changed from BGW to non-BGW vegetation were part of larger patches and not subject to a traverse.

Increased survey effort, as evident in West Molonglo (Nash and Hogg 2013) will enable finer detail in the end product. As evidenced through other parts of the Molonglo area, increased survey effort has identified in some patches variability not previously detected, where a level of homogeneity was assumed.

6.5 THE LOCATION OF SURVEY SITES

To satisfy the listing advice for BGW, a patch must satisfy particular criteria. The location of 400 m² quadrats in this project may not have captured the floristic diversity present across the whole patch, thereby reducing the condition scores observed or demoting the classification of the patch to non-BGW.

Further, based on the outcomes of traverses from the survey in 2009, mappers have made assumptions about the representativeness of the traverse in relation to the patch and the uniformity of vegetation within the patch. This may not always be correct with increased survey effort.

6.6 OBSERVER BIAS AND INTERPRETATION

Survey results can also differ due to the surveyors' interpretation of a patch (homogenous vegetation area) and the purpose for defining each patch (or vegetation unit). The terms "lumpers" and "splitters" are common references to vegetation mappers with different mapping approaches; lumpers tend to view the similarities in vegetation and call them a patch, while splitters tend to see the differences at a finer scale and rationalise creating more patches or units. For example, in the original survey the aim was to identify broad vegetation units, while the aim of the baseline condition assessments was to collect information to inform operational management plans. Some patches created for the baseline condition assessment, which were part of a larger vegetation unit in the original survey, have been divided into smaller management areas (e.g. Patches D1 & D2). Therefore, the data underpinning the diversion is based on a quadrat based assessment, rather than a traverse over a broader area. There is potential for both patches to support a level of floristic diversity, however, was not captured in the quadrat survey.

Surveys by different experienced observers will often yield variable results (Garrod and Keith 2009). This may have contributed to some of the variability in the results of the 2013 field surveys where ELA relied on five ecologists, in order to complete the surveys in a short time period.

Box-gum Woodland Vegetation Condition Mapping 2013

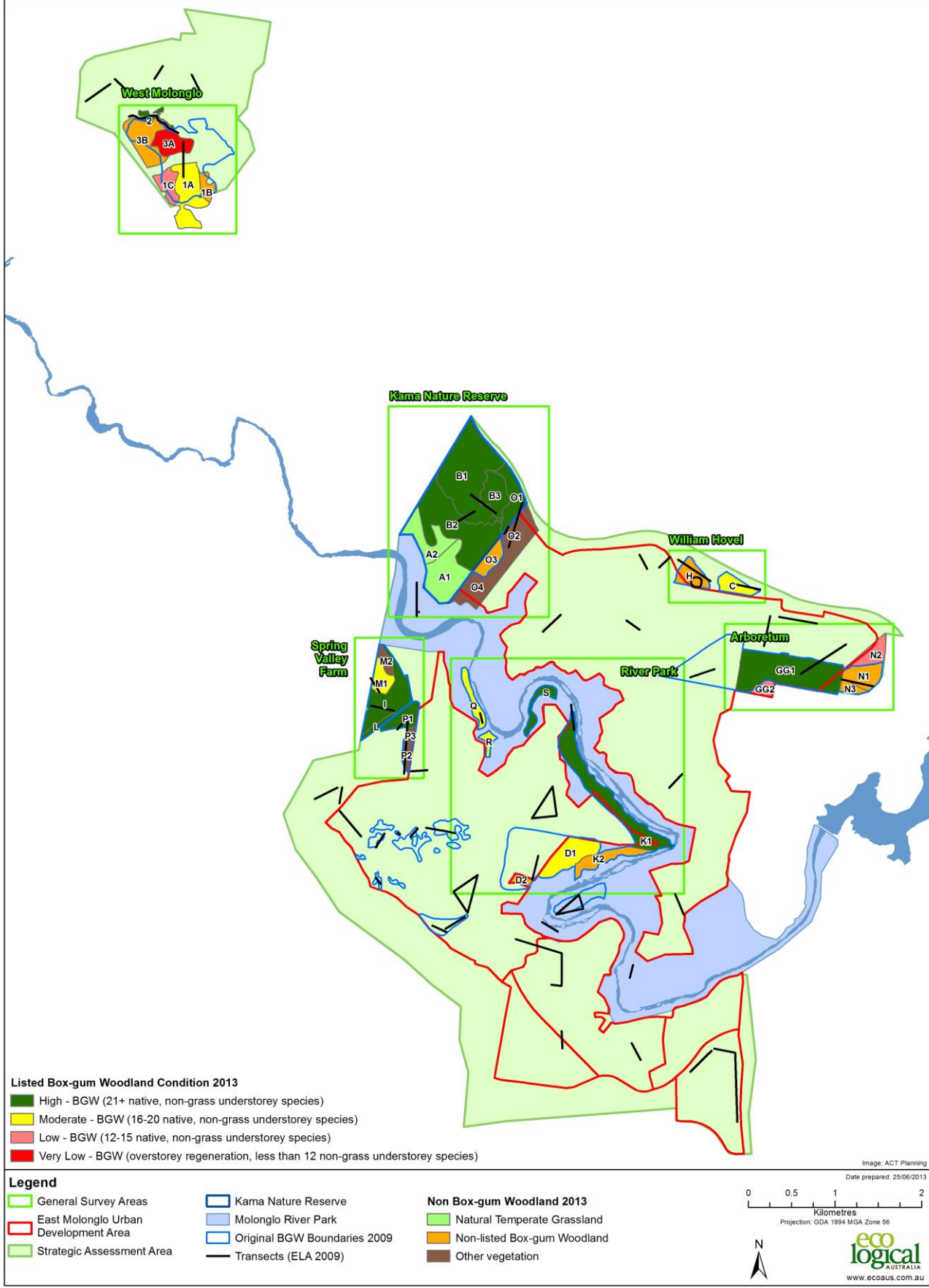


Figure 12: Original survey effort and vegetation condition classification 2013

6.6.1 Seasonal and climatic influences

One of the main observations recorded in the baseline condition assessments was the abundance of exotic species (particularly annuals) across almost all patches and the potential for this to reduce the abundance of native perennial species compared to exotic species. The comparison of native perennial abundance versus exotic perennial abundance is an important step for determining whether a patch of vegetation meets the EPBC listing criteria for BGW (DEH 2006).

The preceding few spring and summer seasons (late 2010 – early 2012) saw above average rainfall across eastern Australia as a result of the La Nina weather pattern. However, the driest end to a year for 2012 was also recorded since 2006 (BOM 2013). Annual exotic species have vigorous growth and prolific seed production that enable them to initially compete with, or in some cases displace, native vegetation. The above annual rainfall over the previous two springs / summers is likely to explain some of the abundance of exotic annuals observed during the baseline condition assessments. In other monitoring programs in the south west slopes, which also experienced higher than average annual rainfall, ELA observed dramatic increases in grass cover. The increased grass biomass from the previous year collapsed into the inter-tussock spaces which affected the diversity and abundance of herbs that often fill this space. In a study of exotic grasses in ungrazed grasslands of South Australia, the abundance of exotic annual grasses was positively correlated with mean annual rainfall and soil properties, while native perennial grasses were not correlated with any environmental variables (Lenz and Facelli 2005). Furthermore, in a separate study investigating competition between native perennial and exotic annual grasses, the competition interaction in the first growing season favoured exotic species (Corbin and Antonio 2004). However, over time the native grasses significantly reduced the biomass and productivity of exotic annuals, suggesting that in future seasons (particularly drier seasons) exotic annual growth is likely to be reduced. Whilst the latter two studies focused on exotic annual growth, the importance is in the competition with native perennial grasses during a time (above average rainfall) where exotic perennial growth (of grasses) is also likely to be increased; thereby suppressing native perennials overall. The dynamic nature of grasslands and grassy woodlands as influenced by climate and seasons, will affect results.

The timing of field survey for the baseline condition assessment was limited to December to January 2012/2013. Surveys for BGW and NTG are best conducted in autumn when winter annuals are generally absent (autumn) or spring when the highest floristic diversity is present (DEH 2006; CPR 2010). The *Procedures Manual* designates the field surveys to be conducted during late-spring to early-summer during the time of highest floristic diversity.

Some areas previously mapped as BGW no longer met the listing criteria for the TEC under the different survey methodology (noting this was a non-optimal survey methodology for determining the community). The different classification may have been influenced by the timing of the field surveys and the land management regimes over the previous four years. Some of these patches no longer meeting the listing criteria may meet the criteria if surveyed within the optimum period (spring). Other areas are also likely to meet the BGW definition under an appropriate management regime (**Section 1.4**).

The field surveys for this assessment were conducted outside of the optimum survey period. In addition, the field surveys were conducted immediately following a few months of below average rainfall (BOM 2013) that may have caused many native herbs and forbs to perish or become unrecognisable. Low rainfall at the end of spring may cause winter annuals to die off quickly, while also delaying germination and growth in summer annuals. Therefore, it should be noted that species richness recorded during the baseline condition assessments may not be as diverse as under different conditions (e.g. above average rainfall).

6.6.2 Land use management

All patches surveyed as part of the baseline condition assessments occur on land that is currently used for grazing purposes, excluding the patches within Kama Nature Reserve. The grazing and land use management within each of these areas is likely to differ and vary in intensity, weed control and the use of any fertilisers. Considering that four years had passed since the original Box-Gum Woodland surveys were conducted, it is possible that changes in the vegetation have occurred due to land use management. The EPBC Act Policy Statement 3.5 *White box - yellow box - Blakely's red gum grassy woodlands and derived native grasslands* (DEH 2006) provides examples of activities that could have a significant impact on the ecological community (see text box below).

It is important to note that the management of areas adjacent to a patch of Box-Gum Woodland can also indirectly impact upon the ecological community.

The Commonwealth's EPBC Policy Statement 3.5 - *White box - yellow box - Blakely's red gum grassy woodlands and derived native grasslands.*

Examples of activities that could have a significant impact include:

- *Clearing trees or understorey vegetation in patches of the ecological community or vegetation next to the ecological community*
- *Inappropriate grazing regimes*
- *Introducing potentially invasive pasture species such as Phalaris, into the proximity or within patches*
- *Introducing or increasing the amount of nutrients in patches such as through fertiliser run-off or spray drift*
- *Firewood collection and inappropriate burning practices*

The grazing of domestic stock itself may not necessarily always degrade the ecological community and can in fact provide a useful management tool for vegetation patches. However, if grazing pressure is increased by running more stock, changing the time of year of grazing or increasing the time stock spend in a patch then significant changes are more likely to occur (DEH 2006).

An example of vegetation degradation and/or lowering of a condition class can be observed through the Molonglo River Park patches D1 (17.2 ha) and D2 (2.3 ha). These patches have been created from the original patch D (51.7 ha) after incorporating the East Molonglo Urban Development Footprint. It is possible that a combination of land use management within the patch (grazing) and within the adjacent area (urban development), along with the preceding climatic conditions (leading to high exotic annual growth) and survey methodology (small patch and quadrat survey) has lowered the condition in patch D1 and D2. The degradation of the vegetation within these patches is consistent across the broader area (bordered by Molonglo River, Coppins Crossing Road and Uriarra Road). This is also evidenced by the relatively lower ecological condition and high exotic abundance observed in patch K2.

Table 14: Kama Nature Reserve Conservation Area observed changes.

Unit	Vegetation type (2013)	BGW condition class (2013)	Original BGW classification (2008)	Observed changes		
				Vegetation classification	Dimensional	Vegetation condition
B1 (51.2 ha)	Box-Gum Woodland (EPBC)	High	High	No observed change	Part of original 2008 BGW survey Patch 'B'. See Table 5 for management boundary recommendations	No observed change
B2 (42.7 ha)	Box-Gum Woodland (EPBC)	High	High	No observed change	Part of original 2008 BGW survey Patch 'B'. See Table 5 for management boundary recommendations	No observed change
B3 (12.1 ha)	Box-Gum Woodland (EPBC)	High	High	No observed change	Part of original 2008 BGW survey Patch 'B'. See Table 5 for management boundary recommendations	No observed change
O1 (12.0 ha)	Box-Gum Woodland (EPBC)	High	Low	No observed change	Part of original 2008 BGW survey Patch 'O'	Increase in relative condition due to a diversity of native herbs and forbs. Likely a result of inclusion within Kama and adjacent high condition vegetation
O2 (8.8 ha)	Exotic Pasture	Not EPBC Act BGW	Not EPBC Act BGW	Not included in original 2008 BGW survey	Not included in original 2008 BGW survey	Not included in original 2008 BGW survey
O3 (7.1 ha)	Exotic dominated vegetation or Non-listed Box-Gum Woodland	Not EPBC Act BGW	High	Patch O3 was originally included as part of the adjacent Patch B, due to overstorey trees present. Ecological boundaries can exist across land use boundaries. However, the difference in land use in this case (grazing management) is likely to have resulted in the change in vegetation classification to exotic pasture from BGW,	Part of original 2008 BGW survey Patch 'B'. It was separated from Patch B and included in Patch O due to it being outside of Kama and reflecting the likely differences in management / conservation actions required	Changes also likely to be a result of the difference in land use management. Kama is managed as a conservation reserve while this patch is within a grazing paddock
O4 (22.3 ha)	Exotic Pasture	Not EPBC Act BGW	Not EPBC Act BGW	Not included in original 2008 BGW survey	Not included in original 2008 BGW survey	Not included in original 2008 BGW survey

Unit	Vegetation type (2013)	BGW condition class (2013)	Original BGW classification (2008)	Observed changes		
				Vegetation classification	Dimensional	Vegetation condition
A1 (22.1 ha)	NTG	Not EPBC Act BGW	Not EPBC Act BGW	No observed change	Part of original 2008 BGW survey Patch 'A'	Has a higher abundance of St. John's Wort and exotic annuals
A2 (14.5 ha)	NTG	Not EPBC Act BGW	Not EPBC Act BGW	No observed change	Part of original 2008 BGW survey Patch 'A'	Has a higher abundance of St. John's Wort and exotic annuals

Table 15: River Park Conservation Area observed changes.

Unit	Vegetation type (2013)	BGW condition class (2013)	Original BGW classification (2008)	Observed changes		
				Vegetation classification	Dimensional	Vegetation condition
D1 (17.2 ha)	Box-Gum Woodland (EPBC)	Moderate	High	No observed change	Part of original 2008 BGW survey Patch D	A small reduction in relative condition was observed (lower diversity of native forbs and herbs and high abundance of exotic annuals). This is likely to be a combination of land use management, survey methodology differences, reduction in size from original patch and survey season
D2 (2.3 ha)	Exotic dominated vegetation or Non-listed Box-Gum Woodland	Not EPBC Act BGW	High	No longer meets the BGW definition due to the native perennial understorey being <50% (only 30%) and low diversity of native forbs	Part of original 2008 BGW survey Patch D that is now bordered by East Molonglo urban development area	Reduced condition likely to be a result of land use management. Other factors may include survey methodology differences, division of the larger patch, reduction in size from original patch and survey season. This is consistent with the reduced condition observed in Patches D1 and K2, which are subjected to the same land use management

Unit	Vegetation type (2013)	BGW condition class (2013)	Original BGW classification (2008)	Observed changes		
				Vegetation classification	Dimensional	Vegetation condition
K1 (33.2 ha)	Box-Gum Woodland Derived Grassland (EPBC)	High	Moderate	No observed change	Part of original 2008 BGW survey Patch K. Patch was divided to reflect the native and exotic differences observed between the newly developed Patches K1 and K2	An increase in relative condition was observed (increased native diversity), possibly due to higher survey effort in this patch and low grazing intensity
K2 (10.2 ha)	Exotic dominated vegetation or Non-listed Box-Gum Woodland (Derived Grassland)	Not EPBC Act BGW	Moderate	No longer meets the BGW definition due to the native perennial understorey being 13% (<50%) and low diversity of native forbs	Part of original 2008 BGW survey Patch K. Patch was divided to reflect the native and exotic differences observed between the newly developed Patches K1 and K2	Reduced condition likely to be a result of land use management and absence of survey from this portion of the patch in 2008 BGW survey. Other factors may include survey methodology differences, reduction in size from original patch and survey season. This is consistent with the reduced condition observed in Patches D1, which is subjected to the same land use management
Q (6.0 ha)	Box-Gum Woodland Derived Grassland (EPBC)	Moderate	Low	No observed change	No observed change	An increase in relative condition was observed (increased native diversity), possibly due to higher survey effort in this patch and low grazing intensity
R (2.5 ha)	Box-Gum Woodland Derived Grassland (EPBC)	Moderate	Low	No observed change	No observed change	An increase in relative condition was observed (increased native diversity), possibly due to higher survey effort in this patch and low grazing intensity
S (5.6 ha)	Box-Gum Woodland Derived Grassland (EPBC)	High	Low	No observed change	No observed change	An increase in relative condition was observed (increased native diversity), possibly due to higher survey effort in this patch and low grazing intensity

Table 16: Spring Valley Farm Conservation Area observed changes.

Unit	Vegetation type (2013)	BGW condition class (2013)	Original BGW classification (2008)	Observed changes		
				Vegetation classification	Dimensional	Vegetation condition
I (20.7 ha)	Box-Gum Woodland Derived Grassland (EPBC)	High	Moderate	No observed change	No observed change	An increase in relative condition was observed (increased native diversity), possibly due to higher survey effort in this patch and low grazing intensity
L (2.2 ha)	Box-Gum Woodland (EPBC)	High	Low	No observed change	No observed change	An increase in relative condition was observed (increased native diversity), possibly due to higher survey effort in this patch and low grazing intensity
M1 (6.7 ha)	Box-Gum Woodland (EPBC)	Moderate	Low	No observed change	Part of original 2008 BGW survey Patch M. Patch was divided to reflect the change in vegetation classification due to dominant overstorey species	An increase in relative condition was observed (increased native diversity), possibly due to higher survey effort in this patch and low grazing intensity
M2 (3.1 ha)	Red Stringybark – Scribbly Gum Tableland Forest	Not EPBC Act BGW	Low	Dominant overstorey species in Patch M2 are <i>E. macrorhyncha</i> (Red Stringybark) and <i>E. rossii</i> (Scribbly Gum).	Part of original 2008 BGW survey Patch M. Patch was divided to reflect the change in dominant overstorey species	Not included in BGW condition classification. However, likely to have a higher relative condition based on native diversity present
P1 (7.8 ha)	Box-Gum Woodland (EPBC)	High	Low	No observed change	Part of original 2008 BGW survey Patch P. Patch was divided to reflect the change in vegetation classification (dominant overstorey species)	An increase in relative condition was observed (increased native diversity), possibly due to higher survey effort in this patch and low grazing intensity
P2 (3.2 ha)	Bundy – Red Stringybark Grassy Woodland	Not EPBC Act BGW	Low	Dominant overstorey species in Patch P2 are <i>Eucalyptus nortonii</i> (Bundy) and <i>E. macrorhyncha</i> (Red Stringybark)	Part of original 2008 BGW survey Patch P. Patch was divided to reflect the change in vegetation classification due to dominant overstorey species	Not included in BGW condition classification. However, likely to have a higher relative condition based on native diversity, due to lack of grazing within the patch
P3 (1.7 ha)	Tree Plantation (<i>Pinus</i> sp.)	Not EPBC Act BGW	Low	Dominant overstorey species in Patch P3 are <i>Pinus radiata</i> (Pine trees)	Part of original 2008 BGW survey Patch P. Patch was divided to reflect the change in vegetation classification due to dominant overstorey species	Not included in BGW condition classification

Table 17: West Molonglo Conservation Area observed changes (units defined by Nash and Hogg 2013).

Unit	Vegetation type (2013)	BGW condition class (2013)	Original BGW classification (2008)	Observed changes		
				Vegetation classification	Dimensional	Vegetation condition
1A (19.5 ha)	Box-Gum Woodland (EPBC)	Moderate	Moderate	No observed change	Part of original 2008 BGW survey Patch G. Has been changed to reflect the recent high intensive field surveys (Nash and Hogg 2013)	No observed change
1B (4.2 ha)	Exotic dominated vegetation or Non-listed Box-Gum Woodland	Not EPBC Act BGW	Moderate	Does not meet BGW definition due to a lack of native perennial cover. This patch was almost entirely dominated by exotic perennial grasses (e.g. <i>Phalaris aquatica</i>)	Part of original 2008 BGW survey Patch G. Has been changed to reflect the recent high intensive field surveys (Nash and Hogg 2013)	Reduced condition likely to be a result of a combination of land use management (grazing paddock), intensive recent field surveys, error in original survey results, patch interpretation and field survey methodology differences
1C (7.1 ha)	Box-Gum Woodland (EPBC)	Low	Moderate	No observed change	Part of original 2008 BGW survey Patch G. Has been changed to reflect the recent high intensive field surveys (Nash and Hogg 2013)	Reduced condition likely to be a result of land use management, smaller patch size and seasonal differences
2 (2.3 ha)	Box-Gum Woodland Derived Grassland (EPBC)	High	Moderate	No observed change	Part of original 2008 BGW survey Patch G. Has been changed to reflect the recent high intensive field surveys (Nash and Hogg 2013)	Increased condition likely to be a result of increased survey effort
3A (9.9 ha)	Box-Gum Woodland (EPBC)	Very low	Moderate	No observed change	Part of original 2008 BGW survey Patch G. Has been changed to reflect the recent high intensive field surveys (Nash and Hogg 2013)	Reduced condition may have resulted from seasonal differences, land use management, separation of patch due to dominance of exotics in the understorey and survey methodology differences
3B (16.8 ha)	Exotic dominated vegetation or Non-listed Box-Gum Woodland	Not EPBC Act BGW	Moderate	No longer meets the BGW definition due to the native perennial understorey being only 28% (<50%) and low diversity of native forbs	Part of original 2008 BGW survey Patch G. Has been changed to reflect the recent high intensive field surveys (Nash and Hogg 2013)	Reduced condition likely to be a result of a combination of land use management, survey methodology differences, intensive recent field surveys and survey season

Table 18: Arboretum Conservation Area observed changes.

Unit	Vegetation type (2013)	BGW condition class (2013)	Original BGW classification (2008)	Observed changes		
				Vegetation classification	Dimensional	Vegetation condition
GG1 (43.9 ha)	Box-Gum Woodland (EPBC)	High	Low	No observed change	No observed change	Increased condition likely to be a result of increased survey effort
GG2 (3.7 ha)	Box-Gum Woodland Derived Grassland (EPBC)	Low	Not surveyed	This patch was added and not originally mapped as BGW	This patch was added for the 2013 surveys and not originally mapped as BGW from the 2008 surveys	This patch was added for the 2013 surveys and not originally mapped as BGW from the 2008 surveys
N1 (10.2 ha)	Non-listed Box-Gum Woodland	Not EPBC Act BGW	Low	At the time of the field surveys, this patch did not meet the EPBC definition for BGW. The patch had a native perennial understorey greater than 50% (at 90%). However, it did not contain 12 or more native non-grass species, nor was natural regeneration of the overstorey observed. This patch contained a very high abundance of exotic annuals and St. John's Wort	Part of original 2008 BGW survey Patch N	Reduced condition likely to be a result of a combination of land use management, survey methodology differences, and survey season
N2 (7.8 ha)	Box-Gum Woodland (EPBC)	Low	Not surveyed	This patch was added and not part of the original BGW survey	This patch was added for the 2013 surveys and not originally mapped as BGW from the 2008 surveys	This patch was added for the 2013 surveys and not originally mapped as BGW from the 2008 surveys
N3 (3.1 ha)	Non-listed Box-Gum Woodland	Not EPBC Act BGW	Low	At the time of the field surveys, this patch did not meet the EPBC definition for BGW. The patch had a native perennial understorey greater than 50% (at 60%). However, it did not contain 12 or more native non-grass species, nor was natural regeneration of the overstorey observed. This patch contained a very high abundance of exotic annuals and St. John's Wort	Part of original 2008 BGW survey Patch N	Reduced condition likely to be a result of a combination of land use management, survey methodology differences, and survey season

Table 19: William Hovell Conservation Area observed changes.

Unit	Vegetation type (2013)	BGW condition class (2013)	Original BGW classification (2008)	Observed changes		
				Vegetation classification	Dimensional	Vegetation condition
C (6.9 ha)	Box-Gum Woodland (EPBC)	Moderate	High	No observed change	No observed change	Reduced condition likely to be a result of a combination of land use management (horse adjustment paddock), survey methodology differences, and survey season. Also consistent with a reduced condition observed in Patch H
H (8.6 ha)	Non-listed Box-Gum Woodland	Not EPBC Act BGW	Moderate	At the time of the field surveys, this patch did not meet the EPBC definition for BGW. The patch had native perennial understorey being greater than 50% native. However, it did not contain 12 or more native non-grass species (it contained 11), nor was natural regeneration of the overstorey observed	No observed change	Reduced condition likely to be a result of a combination of land use management (horse adjustment paddock), survey methodology differences, and survey season. Also consistent with a reduced condition observed in Patch C

6.7 MANAGEMENT CONSIDERATIONS FOR NON-LISTED BOX-GUM WOODLAND

Some areas previously mapped as Box-Gum Woodland no longer met the EPBC Act listing criteria for the ecological community within the patches defined for the baseline condition assessment. As identified above, this is likely to have primarily occurred due to the survey methodology used (difficult to compare results), survey effort, survey location, seasonality, climatic conditions and land management regimes.

Some patches that no longer met the listing criteria, but contained the appropriate overstorey and had a native understorey, may meet the definition if surveyed within the optimum period (spring). Other areas may meet the Box-Gum Woodland definition under an appropriate management regime and minimal interference, such as the removal of intensive grazing and promotion of natural regeneration. Other areas may require additional management actions such as weed control or burning regimes.

Section 4.2.2 of the *Molonglo Valley Vegetation Survey Baseline Condition Assessment* report (ELA 2013) outlines some of these basic management actions and principles that are recommended to achieve the listing criteria in the future. The EPBC Act Policy Statement 3.5 *White box - yellow box - Blakely's red gum grassy woodlands and derived native grasslands* (DEH 2006) also addresses this issue (see text box below).

The Commonwealth's EPBC Policy Statement 3.5 - *White box - yellow box - Blakely's red gum grassy woodlands and derived native grasslands*.

Can areas be rehabilitation?

Many areas that were formerly part of the ecological community are now too degraded to be included in the listed ecological community. Many of these degraded areas may respond to assisted regeneration, and may still provide important habitat for birds and other animals. Degraded areas that should be given priority for regeneration include:

- *Large patches*
- *Patches containing mature trees (especially those with hollows)*
- *Areas of vegetation that link together patches of the ecological community in the landscape*
- *Patches that occur in those regions in which the ecological community has been most heavily cleared and degraded*
- *Patches that contain rare, declining or threatened species*

To assist in the recovery of the ecological community you can:

- *Protect patches of the listed ecological community through the development of conservations agreements and covenants*
- *Protect patches from weeds by preventing soil disturbance in and around patches, and through the speedy eradication of any new invasion*
- *Avoid the use of fertilisers in or near patches*
- *Avoid planting trees in very small derived grassland sites as they may reduce the floral diversity through competition for light, nutrients and water*
- *Expand patches by planting / seeding at the edge rather than within patches*
- *implement strategic grazing such as resting pastures at appropriate times, e.g. when native perennial grasses are seeding*
- *undertake burning or slashing where native tussock grasses have built up to a high level to open inter-tussock spaces for tree seedlings, ground layer species and shrubs to establish*

Table 20: Management of non-listed Box-Gum Woodland

Patch	Likelihood of becoming BGW	Perennial native/exotic ratio	Reasons or potential management actions required*
H	High	60:40	There is a high chance that this patch could meet the definition if surveyed during the optimal survey period for an increased chance of recording native forbs and herbs. This patch would be assisted by the removal of horse agistment, weed control and promotion of natural regeneration.
K2	Low	14:86	Native perennial vegetation cover recorded at 14% native. Very high exotic annual and perennial abundance. This patch would require significant intervention and long-term management.
M2	No	76:24	Dominant overstorey species are not representative of Box-Gum Woodland and therefore will not meet the listing definition under future management. However, this patch is adjacent to M1 and contains high ecological values and native diversity.
N1	High	90:10	There is a moderate to high chance that this patch could meet the definition if surveyed during the optimal survey period. The perennial understorey vegetation is predominantly native within the patch. N1 borders N2 and the GG patches where a lot of native diversity was recorded. This patch would be assisted by the suppression of exotic annuals, to promote native growth and diversity and natural overstorey regeneration. Actions could include removal of grazing and weed control.
N3	Moderate	60:40	Similar to Patch N1. However, Patch N3 had a significantly higher abundance of exotic annual species and lower native/exotic perennial cover ratio. This patch would be assisted by the suppression of these exotic annuals, to promote native growth and diversity and natural overstorey regeneration.
O3	Low	31:69	Patch O3 only had a perennial understorey of 31% native (perennial ratio native: exotic of 31:69). There was also a very high occurrence of exotic annuals and currently exists with a grazing paddock.
P2	No	N/R	Dominant overstorey species are not representative of Box-Gum Woodland and therefore will not meet the listing definition under future management. However, this patch is adjacent to a large wooded area and contains high ecological values and native diversity.
P3	No	N/R	The patch is representative of a regenerating pine plantation. Significant intervention would be required.
1B	No	0:100	Paddock dominated by <i>Phalaris aquatica</i> (Phalaris), an exotic perennial grass used for pasture and grazing purposes.

3B	Moderate	28:72	Patch 3B only had 28% native perennial vegetation cover. There was also a very high occurrence of exotic annuals across the patch and a low diversity of native herbs and forbs. Regeneration of the overstorey was also absent. Grazing was evident within the patch. The suppression of the exotic annual and perennials would be required along with a strategic management regime to promote natural regeneration of the overstorey and native perennial growth.
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* The potential management actions are not exhaustive of all the possible actions required, but have been identified to highlight the potential effort required to rehabilitate and manage the patch back to EPBC Act listed Box-Gum Woodland.

N/R = Not recorded

6.8 WEST MOLONGLO

The vegetation patch boundaries for the West Molonglo baseline condition assessment were based on the most recent surveys conducted by Nash and Hogg (2013). It was determined in consultation with TAMS and Sarah Sharp (TAMS expert ecological consultant), that these survey boundaries would be most applicable due to their recent and intensive nature. As identified earlier, increased survey effort, as evident in West Molonglo (Nash and Hogg 2013), will enable finer detail in the end product.

Appendix B: Plot Species List

The key for interpreting the data in the following tables is provided below. Important BGW species are in bold type.

KEY (COVER ABUNDANCE SCORE)
5 = > 75%
4 = 50-75%
3 = 25-50%
2 = 5-25%
1 = numerous < 5% (>15 individuals)
+ = few < 5% (4-15 individuals)
r = solitary < 5% (< 4 individuals)

Table 21: Flora species list for Kama Nature Reserve

LOCATION VEGETATION UNIT PLOT	KAMA NATURE RESERVE																								
	A1	A1	A2	A2	B1	B1	B1	B1	B2	B2	B2	B2	B3	B3	B3	O1	O1	O2	O2	O3	O3	O4	O4	O4	O4
	1	2	1	2	1	2	3	4	1	2	3	4	1	2	3	1	2	1	2	1	2	1	2	3	4
<i>Acacia rubida</i>																									
<i>Acaena novae-zelandiae</i>																									
<i>Acaena ovina</i>			+	+	r	+		+								r									
<i>Acaena</i> sp.																									
* <i>Acetosella vulgaris</i>	1	+		+	+		1	2	+	+	1		1	1		+	1	1	+	1	1	2	1		1
<i>Acrotriche serrulata</i>																									
* <i>Aira</i> sp.	+	r			r		r		1				+	1	1		1								1
<i>Ajuga australis</i>																									
<i>Alternanthera nana</i>																									
<i>Amyema</i> sp.																r									
* <i>Anagallis arvensis</i>										+	r														
<i>Aristida ramosa</i>						+																			
<i>Aristida</i> sp.																									
<i>Aristida vagans</i>																									
<i>Arthropodium milleflorum</i>												+													
<i>Arthropodium</i> sp.																									

LOCATION	KAMA NATURE RESERVE																								
VEGETATION UNIT	A1	A1	A2	A2	B1	B1	B1	B1	B2	B2	B2	B2	B3	B3	B3	O1	O1	O2	O2	O3	O3	O4	O4	O4	O4
PLOT	1	2	1	2	1	2	3	4	1	2	3	4	1	2	3	1	2	1	2	1	2	1	2	3	4
Asperula conferta										r	+	r													
Astroloma humifusum			r																						
<i>Austrostipa bigeniculata</i>	1	+			3	3	1	1	1	+			+		1	2	3	+	+	2	3	2		1	1
<i>Austrostipa densiflora</i>					1		2																		
<i>Austrostipa scabra</i>	1	+	2	2			2	2	1				3	3	3	1	2		r		2	1		+	1
<i>Austrostipa</i> sp.																							r		
* <i>Avena</i> sp.	1	1	r	1	2	1		2	1	3		1	2		1	1	3	1	2	3	2	3	1	2	4
Bossiaea buxifolia															2										
<i>Bothriochloa macra</i>					r										1										
<i>Brachyloma daphnoides</i>			1																						
* <i>Briza maxima</i>																									
* <i>Briza minor</i>						+	r		1		+	1													
* <i>Bromus cartharticus</i>																		1							
* <i>Bromus diandrus</i>							1	2	1		+		1	+			1		r	2	2	1			1
* <i>Bromus hordeaceus</i>	1	r									+					+	2	1	1						
* <i>Bromus molliformis</i>																				2	1	1	1		
* <i>Bromus rubens</i>			r	+	1								r	+			1								
* <i>Bromus</i> sp.						1	1	2	1			1	2		1	2								1	
Bulbine bulbosa				+																					
<i>Bursaria spinosa</i>										1															
Calotis lappulacea																									
* <i>Capsella bursa-pastoris</i>																									
<i>Carex appressa</i>	+					+				1	2				r					r					
<i>Carex breviculmis</i>										+	1														
<i>Carex inversa</i>				+	+			+	+	1		+	r	+		1									
<i>Carex</i> sp.																									
* <i>Carthamus lanatus</i>	r				r	r			+	r				+	r	r	+			r	+	r	+		
<i>Cassinia longifolia</i>																									
* <i>Centaurium erythraea</i>												1													
* <i>Centaurium</i> sp.	r	r	1	+		1	1		1			+	r		1	r	+								
* <i>Cerastium</i> sp.																									
<i>Chamaesyce drummondii</i>																									
<i>Cheilanthes austrotenuifolia</i>									r																
Cheilanthes distans																									
<i>Cheilanthes sieberi</i>		r					+								+	2	r								
<i>Chenopodium album</i>																									

LOCATION	KAMA NATURE RESERVE																								
VEGETATION UNIT	A1	A1	A2	A2	B1	B1	B1	B1	B2	B2	B2	B2	B3	B3	B3	O1	O1	O2	O2	O3	O3	O4	O4	O4	O4
PLOT	1	2	1	2	1	2	3	4	1	2	3	4	1	2	3	1	2	1	2	1	2	1	2	3	4
<i>Chloris truncata</i>																							r		
* <i>Chondrilla juncea</i>	1	1	+	+	1		1							r	1		1					1	1	r	1
<i>Chrysocephalum apiculatum</i>	1	1	2	1			+		1						1										
* <i>Cirsium vulgare</i>					r	+	r	+		1	r					r					r				
<i>Clematis leptophylla</i>																									
<i>Convolvulus angustissimus</i>	+	r	+			+	r			+				r	1	r		r	r	1		r		r	r
* <i>Conyza</i> sp.		+	+	+	+	1	1	+	+	+	r		r	r	+	r	r				r		+	r	1
<i>Craspedia variabilis</i>																									
<i>Crassula sieberana</i>																									
* <i>Crataegus mono</i>																									
<i>Cymbonotus lawsonianus</i>			r	1					r			r		r		r									
<i>Cymbopogon refractus</i>																									
* <i>Cynodon dactylon</i>																									
<i>Cynoglossum suaveolens</i>	r																								
* <i>Cynosurus echinatus</i>									+		r								+						
* <i>Cyperus eragrostis</i>										1	r														
* <i>Dactylis glomerata</i>																									
<i>Desmodium varians</i>			+			1	1		+				r	1	1	r	r					1	r	1	1
<i>Dianella revoluta</i>			+																						
<i>Dichelachne crinita</i>			1			1			+		+					1									
<i>Dichelachne mycanthra</i>										2															
<i>Dichondra repens</i>	+																+					r			
<i>Echinopogon caespitosum</i>																									
* <i>Echium plantagineum</i>			+							r			r				1	r							
<i>Einadia nutans</i>							+	1		r				1											
<i>Eleocharis acuta</i>										+	r														
* <i>Eleusine tristachya</i>																									
<i>Elymus scaber</i>	1			1	1	2	2	2	1	+	+	2	2	2	1	1	1		+	1	1	1	1		
<i>Enneapogon nigricans</i>			+					1																	
<i>Epilobium billardioreanum</i>			r							r	r														
<i>Eragrostis brownii</i>										r															
* <i>Eragrostis curvula</i>								1																	
* <i>Eragrostis</i> sp.											r								r						
<i>Erodium crinitum</i>																									
<i>Eryngium ovinum</i>			1	1					r			r			+										
<i>Eucalyptus blakelyi</i>						2	2		4	r	3	+						+		+					

LOCATION	KAMA NATURE RESERVE																								
VEGETATION UNIT	A1	A1	A2	A2	B1	B1	B1	B1	B2	B2	B2	B2	B3	B3	B3	O1	O1	O2	O2	O3	O3	O4	O4	O4	O4
PLOT	1	2	1	2	1	2	3	4	1	2	3	4	1	2	3	1	2	1	2	1	2	1	2	3	4
<i>Eucalyptus dives</i>								2																	
<i>Eucalyptus mannifera</i>							1							+											
<i>Eucalyptus melliodora</i>						r	1	r		r															
<i>Eucalyptus polyanthemos</i>																									
<i>Eucalyptus rossii</i>																r									
<i>Euchiton sphaericus</i>									+					r											
<i>Euchiton</i> sp. (native)					r	+	r		+					+	1	+				r					
<i>Galium gaudichaudii</i>			+																						
* <i>Gamochaeta americana</i>									r																
<i>Geranium solanderi</i>				1				1	r	1	+		1												
<i>Glycine clandestina</i>							1	1																	
<i>Glycine tabacina</i>					+			1								1						1		r	
<i>Gonocarpus tetragynus</i>			+						r																
<i>Goodenia hederacea</i>			1	+			r					r			1										
<i>Haloragis heterophylla</i>									r	2	1													+	
<i>Hibbertia obtusifolia</i>																									
<i>Hibbertia riparia</i>																									
* <i>Hirschfeldia incana</i>								r		+								r						r	
* <i>Holcus lanatus</i>		1										3		+		r			+						
* <i>Hordeum (Critesion)</i> sp.								+																	
<i>Hydrocotyle laxiflora</i>						2	1	1	+	r		1		1	+										
<i>Hypericum gramineum</i>									+		+														
* <i>Hypericum perforatum</i>	3	+	+	3	2	2	+	1	2	2	1	1	+	1	1	1	+	r	+	+	+	1	1	+	+
* <i>Hypochaeris radicata</i>	+		+	+	+	1	+		+	1	+			1	1	1		r	r	1	1	1		+	1
<i>Isolepis gaudichaudiana</i>										+															
<i>Isotoma fluviatilis</i>												r													
<i>Juncus australis</i>									+	1	+														
<i>Juncus fockei</i>												r													
<i>Juncus subsecundus</i>																									
<i>Juncus</i> sp. (native)		+				+	r									1						r			
<i>Kunzea ericoides</i>																									
<i>Lachnagrostis filiformis</i>					r				+		+										r				
* <i>Lactuca serriola</i>					r								r				+						r		
* <i>Lepidium africanum</i>								+																	
<i>Leptorhynchos squamatus</i>			+						1			1													
<i>Leptospermum</i> sp.																									

LOCATION	KAMA NATURE RESERVE																									
VEGETATION UNIT	A1	A1	A2	A2	B1	B1	B1	B1	B2	B2	B2	B2	B3	B3	B3	O1	O1	O2	O2	O3	O3	O4	O4	O4	O4	
PLOT	1	2	1	2	1	2	3	4	1	2	3	4	1	2	3	1	2	1	2	1	2	1	2	3	4	
<i>Leucopogon fletcheri</i>																										
* <i>Linaria pelisseriana</i>																										
* <i>Lolium perenne</i>						2		2																		
* <i>Lolium rigidum</i>							2		1	+	r				+			+		1	1					
* <i>Lolium</i> sp.																										
<i>Lomandra bracteata</i>																										
<i>Lomandra filiformis</i>	+	+						+								+	1	r							r	
<i>Lomandra filiformis coriacea</i>			1	+				+		+			1	1								r			+	
<i>Lomandra multiflora</i>		r	1	1	r	1	r	1	r					+		1	+	r								
<i>Lomandra</i> sp.															+											
<i>Luzula densiflora</i>			r																							
* <i>Lycium ferocissimum</i>																										
<i>Lythrum hyssopifolia</i>												r														
* <i>Malva</i> sp. (<i>parviflora</i>)							1																			
* <i>Marrubium vulgare</i>																										
* <i>Medicago</i> sp.																			r							
<i>Melichrus urceolatus</i>			r																							
<i>Mentha diemenica</i>																										
<i>Microlaena stipoides</i>					1		2	1		+	+		1	2	1		1					1	1			
<i>Microtis unifolia</i>																										
* <i>Modiola caroliniana</i>								1							r				+	+	+	r	r	r	+	
* <i>Nassella trichotoma</i>	r																									
* <i>Oenothera mollissima</i>																										
* <i>Onopordum acanthium</i>					r														+	+		+			1	
* <i>Orobanche minor</i>	r					+	r	+							r	r										
<i>Oxalis perennans</i>				r		+	r		r						r	r	r	r	r				r			
<i>Panicum effusum</i>			r																							
* <i>Paronychia brasilliana</i>						+	r	+	r			r			+			r				r				
* <i>Paspalum dilatatum</i>										+	r															
<i>Persicaria prostrata</i>																										
* <i>Petrorhagia nanteuilii</i>	1	r	r		+	1	1		1	r			1	1	1						1	1		r	r	
* <i>Phalaris aquatica</i>					1					r	1								5	5	3	3	2	5	1	1
<i>Pimelea curviflora</i>			+																							
* <i>Pinus radiata</i>																										
* <i>Plantago lanceolata</i>	r	+		+	1	2	1	+	2	1	1	r	r	1	+	+	r	+	r	1		1			+	
<i>Plantago varia</i>												1										1				

LOCATION	KAMA NATURE RESERVE																											
	VEGETATION UNIT				A1	A1	A2	A2	B1	B1	B1	B1	B2	B2	B2	B2	B3	B3	B3	O1	O1	O2	O2	O3	O3	O4	O4	O4
PLOT	1	2	1	2	1	2	3	4	1	2	3	4	1	2	3	1	2	1	2	1	2	1	2	1	2	3	4	
<i>Plantago</i> sp. (native)																												
<i>Poa labillardierei</i>	1	1		3																								
<i>Poa sieberiana</i>										+	1	+	3	r			1			r								
* <i>Polygonum aviculare</i>																								r				
* <i>Prunus</i> sp.																												
* <i>Rosa rubiginosa</i>			r		r	r	r	r	r	+	r	r		r	r		r	r	r	r	r	r	r		r			r
* <i>Rubus fruticosus</i>										+	r		r										r	r	r			
<i>Rubus parvifolius</i>										+																		
<i>Rumex brownii</i>	+			1	1	+		+		+	r			r					r	r	r				r			r
<i>Rytidosperma caespitosum</i>		1	1	1			1	1	1	1	1			1	2	1	1	r	r							2		
<i>Rytidosperma carphoides</i>	1		r		1		1		1	1				r	1	+												
<i>Rytidosperma laevis</i>																												
<i>Rytidosperma pilosa</i>																												
<i>Rytidosperma racemosum</i>	1	1	+	1	3		2		1	1	+	+	1	1	1	1	1						2	2	1		1	
<i>Rytidosperma</i> sp.				+		2								1														
* <i>Salvia verbenaca</i>					r													r										
<i>Schoenus apogon</i>			r			+	+		+		r						r											
<i>Scleranthus biflorus</i>																												
<i>Senecio</i> sp. (quad)		+	r	r	+	+	r	r	+	+	r					r								r				r
* <i>Silene gallica</i>																												
<i>Solanum cinereum</i>																												
* <i>Solanum nigrum</i>						r		r									r											
<i>Solenogyne dominii</i>																												
* <i>Sonchus asper</i>																												
* <i>Sonchus</i> sp.					1	r		r		r	+																	r
* <i>Taraxacum</i> sect. Ruderalia											r																	
<i>Themeda triandra</i>	4	5	4	4	2	2	1	2	3	3	2	2	1		+	4	1											
* <i>Tolpis barbata</i>		+					+		1																			
<i>Tradescantia spathacea</i>						+				r																		
* <i>Tragopogon</i> sp.	+		+					+		r		r		r			1											
<i>Tricoryne elatior</i>		+		r							r			r														
* <i>Trifolium angustifolium</i>																	r											
* <i>Trifolium arvense</i>	+		r	r	1	1	1	1	1		+			+					+				1					
* <i>Trifolium glomeratum</i>																												
* <i>Trifolium</i> sp.									1	r	r					+				1								
<i>Triptilodiscus pygmaeus</i>									r							+												

LOCATION	KAMA NATURE RESERVE																								
VEGETATION UNIT	A1	A1	A2	A2	B1	B1	B1	B1	B2	B2	B2	B2	B3	B3	B3	O1	O1	O2	O2	O3	O3	O4	O4	O4	O4
PLOT	1	2	1	2	1	2	3	4	1	2	3	4	1	2	3	1	2	1	2	1	2	1	2	3	4
Unknown forb																									
* <i>Verbascum thapsus</i>	r				r								r				r			r				r	r
* <i>Verbascum virgatum</i>				r																					
<i>Verbena bonariensis</i>																									
<i>Vittadinia cuneata</i>				r											1										
<i>Vittadinia gracilis</i>							r		1															+	r
<i>Vittadinia muelleri</i>			1											r	+	+						r			r
<i>Vittadinia</i> sp.														r											
* <i>Vulpia bromoides</i>																									
* <i>Vulpia muralis</i>											1							1		1	1	1	1	3	
* <i>Vulpia</i> sp.	1	r	1	+	+	2	1	3	1	1		1	2	2	1	2	1		1					1	
<i>Wahlenbergia communis</i>							r								r										
<i>Wahlenbergia gracilis</i>							r				r														
<i>Wahlenbergia luteola</i>																									
<i>Wahlenbergia</i> sp.	+		+	1											+										
<i>Wahlenbergia stricta</i>													+							r					
<i>Wurmbea dioica</i>																									
<i>Xanthium spinosum</i>																									
Total	32	27	44	35	37	42	50	41	55	53	52	23	30	48	41	38	32	26	21	26	24	28	17	20	27

Table 22: Flora species list for Spring Valley Farm, Arboretum and William-Hovell

LOCATION	SPRING VALLEY FARM										ARBORETUM								WILLIAM - HOVELL				
VEGETATION UNIT	M	M	P	P	P	I	I	I	L	L	GG1	GG1	GG1	GG1	GG2	N1	N1	N2	N3	H	H	C	C
PLOT	1	2	1	2	3	1	2	3	1	2	1	2	3	4	1	1	2	1	1	1	2	1	2
<i>Acacia rubida</i>																							
<i>Acaena novae-zelandiae</i>																							
<i>Acaena ovina</i>	+		+	+	r	+				1	1			r							r		
<i>Acaena</i> sp.									+														
* <i>Acetosella vulgaris</i>	1	1		1	+	1	1	1	1	1	1	1		+		1	+	+				1	1
<i>Acrotriche serrulata</i>					+																		
* <i>Aira</i> sp.	1	+		+		1	1	1	1	1				r									
<i>Ajuga australis</i>																						r	r
<i>Alternanthera nana</i>										r								r					
<i>Amyema</i> sp.																							
* <i>Anagallis arvensis</i>							r			r													
<i>Aristida ramosa</i>				2	1	r																	
<i>Aristida</i> sp.										+													
<i>Aristida vagans</i>									r	+													
<i>Arthropodium milleflorum</i>																							
<i>Arthropodium</i> sp.																							
<i>Asperula conferta</i>																							
<i>Astroloma humifusum</i>																							
<i>Austrostipa bigeniculata</i>	4	2	1	1		r		1	+		1	2	3	2	4	3	3	4	3	2	2	1	3
<i>Austrostipa densiflora</i>																							
<i>Austrostipa scabra</i>	2	3		3	3	3	2	4	r	2	2	1	+	1		1	1	2	1				
<i>Austrostipa</i> sp.																							
* <i>Avena</i> sp.	1	1	1			2	4	3		1	+	1	+	r	+	1	+		2	2	1		2
<i>Bossiaea buxifolia</i>																							
<i>Bothriochloa macra</i>						r	1	1	r	+	1			2	1			r			+	r	r
<i>Brachyloma daphnoides</i>				r	r																		
* <i>Briza maxima</i>				1	r																		
* <i>Briza minor</i>						+	1			+	1												
* <i>Bromus cartharticus</i>												2											r
* <i>Bromus diandrus</i>	+	1		1								+								3	3	1	1
* <i>Bromus hordeaceus</i>	1	1	+	1																2	2		
* <i>Bromus molliformis</i>							1	1	1	1												2	
* <i>Bromus rubens</i>	r																						
* <i>Bromus</i> sp.	2	2		1	2						1	2	2	1	2	1	1	1					
<i>Bulbine bulbosa</i>																							

LOCATION	SPRING VALLEY FARM										ARBORETUM								WILLIAM - HOVELL				
VEGETATION UNIT	M	M	P	P	P	I	I	I	L	L	GG1	GG1	GG1	GG1	GG2	N1	N1	N2	N3	H	H	C	C
PLOT	1	2	1	2	3	1	2	3	1	2	1	2	3	4	1	1	2	1	1	1	2	1	2
<i>Bursaria spinosa</i>																							
<i>Calotis lappulacea</i>																							r
* <i>Capsella bursa-pastoris</i>												r											
<i>Carex appressa</i>		+	2				+																
<i>Carex breviculmis</i>							r																
<i>Carex inversa</i>				r	+				r	+	+	+	r		+	r	r					+	
<i>Carex</i> sp.						+				+													
* <i>Carthamus lanatus</i>		r										r	+	r	+	+	r	+	+	1	+	r	r
<i>Cassinia longifolia</i>																							
* <i>Centaurium erythraea</i>																							
* <i>Centaurium</i> sp.			r	+		1			1	+													
* <i>Cerastium</i> sp.																r							
<i>Chamaesyce drummondii</i>						r	+			+			r										
<i>Cheilanthes austrotenuifolia</i>																							
<i>Cheilanthes distans</i>																							r
<i>Cheilanthes sieberi</i>	+	+		1	+	1	+			+													+
<i>Chenopodium album</i>													r				r					r	
<i>Chloris truncata</i>												r											
* <i>Chondrilla juncea</i>	1	r		r	1	1	+	+		r		r	+	r	+	1	+	1	1	1	+	+	1
<i>Chrysocephalum apiculatum</i>				1					r		1												
* <i>Cirsium vulgare</i>			r								+	+	r	r	r							r	
<i>Clematis leptophylla</i>																							
<i>Convolvulus angustissimus</i>	r								r		+	r			r	r	+					r	
* <i>Conyza</i> sp.	r	+	r	1	1	+	+		+		r		r	r	r	+		+	+		r	+	
<i>Craspedia variabilis</i>																							
<i>Crassula sieberana</i>						+	r		r									r					
* <i>Crataegus mono</i>											1	+										r	
<i>Cymbonotus lawsonianus</i>								r															
<i>Cymbopogon refractus</i>																							
* <i>Cynodon dactylon</i>																							
<i>Cynoglossum suaveolens</i>											r	r	r									r	
* <i>Cynosurus echinatus</i>				+					+														
* <i>Cyperus eragrostis</i>		r	r				1																
* <i>Dactylis glomerata</i>																							
<i>Desmodium varians</i>	1				+	+	+	r	+		1		r	r						r			+
<i>Dianella revoluta</i>																							
<i>Dichelachne crinita</i>			1	1	+				r	r													

LOCATION	SPRING VALLEY FARM										ARBORETUM								WILLIAM - HOVELL				
VEGETATION UNIT	M	M	P	P	P	I	I	I	L	L	GG1	GG1	GG1	GG1	GG2	N1	N1	N2	N3	H	H	C	C
PLOT	1	2	1	2	3	1	2	3	1	2	1	2	3	4	1	1	2	1	1	1	2	1	2
Dichelachne mycanthra																							
<i>Dichondra repens</i>	r	+																					
<i>Echinopogon caespitosum</i>																							
* <i>Echium plantagineum</i>	r	r	r		r		+			+	+	+	+	+	+	r	r	+	1	+		1	+
<i>Einadia nutans</i>											r		1								r		+
<i>Eleocharis acuta</i>																							
* <i>Eleusine tristachya</i>														r									
<i>Elymus scaber</i>	1		1	1	1	+			+	+		1		2	2	1	+	1	1				
<i>Enneapogon nigricans</i>						+		r															
<i>Epilobium billardiereanum</i>			r		+			r					r		r								
<i>Eragrostis brownii</i>										1				r									
* <i>Eragrostis curvula</i>						+			+														
* <i>Eragrostis sp.</i>							r		r														
<i>Erodium crinitum</i>							r																
Eryngium ovinum											1												
<i>Eucalyptus blakelyi</i>		+	2	1					2	2	2	2		+									
<i>Eucalyptus dives</i>																							
<i>Eucalyptus mannifera</i>																							
<i>Eucalyptus melliodora</i>											2										r		
<i>Eucalyptus polyanthemos</i>																							
<i>Eucalyptus rossii</i>																							
<i>Euchiton sphaericus</i>						+		r	+														
<i>Euchiton sp. (native)</i>	1	r		+		+			1					r				1	+				
Galium gaudichaudii																							
* <i>Gamochoaeta americana</i>																							
<i>Geranium solanderi</i>	r	r							r			1									r		
Glycine clandestina		r		r																			
Glycine tabacina	1	1		+	+							r	1	r	1	+	r				+		
<i>Gonocarpus tetragynus</i>				r																			
Goodenia hederacea				r																			
<i>Haloragis heterophylla</i>			1		+				1	1													
Hibbertia obtusifolia				r																			
Hibbertia riparia																							
* <i>Hirschfeldia incana</i>											+	+	1			r		1	+	+	+	+	1
* <i>Holcus lanatus</i>			2		1		+		+	2													
* <i>Hordeum (Critesion) sp.</i>											+	1	1			1	+						
<i>Hydrocotyle laxiflora</i>	+	r	r							+		+									+		

LOCATION	SPRING VALLEY FARM										ARBORETUM								WILLIAM - HOVELL				
VEGETATION UNIT	M	M	P	P	P	I	I	I	L	L	GG1	GG1	GG1	GG1	GG2	N1	N1	N2	N3	H	H	C	C
PLOT	1	2	1	2	3	1	2	3	1	2	1	2	3	4	1	1	2	1	1	1	2	1	2
<i>Hypericum gramineum</i>			r				r	r															
* <i>Hypericum perforatum</i>	1	1	2	1	2	2	1	1	2	+	+	r		r	+		+		2	1	1		1
* <i>Hypochaeris radicata</i>	+	+	+		+	1		+	1	1	r	r	+	+	+	+							+
<i>Isolepis gaudichaudiana</i>																							
<i>Isotoma fluviatilis</i>																							
<i>Juncus australis</i>								+															
<i>Juncus fockei</i>																							
<i>Juncus subsecundus</i>							+			+													
<i>Juncus</i> sp. (native)	r	1	1		r				+									1					
<i>Kunzea ericoides</i>				r					+	r													
<i>Lachnagrostis filiformis</i>										+													
* <i>Lactuca serriola</i>											r		+	+	r		+		r		r	r	+
* <i>Lepidium africanum</i>													r										
<i>Leptorhynchos squamatus</i>																							
<i>Leptospermum</i> sp.																							
<i>Leucopogon fletcheri</i>				1																			
* <i>Linaria pelisseriana</i>																							
* <i>Lolium perenne</i>																							r
* <i>Lolium rigidum</i>		r									1	1	1		1	3	2						
* <i>Lolium</i> sp.																						r	
<i>Lomandra bracteata</i>	+	1		2	+																		
<i>Lomandra filiformis</i>	+			+	+			r			r										r	1	
<i>Lomandra filiformis coriacea</i>	+	+	+	r	+	+	1	r	+	+	1		r	1	1								r
<i>Lomandra multiflora</i>															r								r
<i>Lomandra</i> sp.							+																
<i>Luzula densiflora</i>		r																					
* <i>Lycium ferocissimum</i>											r	r	r										r
<i>Lythrum hyssopifolia</i>							r			+													
* <i>Malva</i> sp. (parviflora)																			r	r	+		
* <i>Marrubium vulgare</i>											r	+	r						r	r	+	+	
* <i>Medicago</i> sp.																							
<i>Melichrus urceolatus</i>																							
<i>Mentha diemenica</i>																						+	
<i>Microlaena stipoides</i>	+	1							2	+	+	3	2	3	1	2	1		1	+		1	
<i>Microtis unifolia</i>																							
* <i>Modiola caroliniana</i>					r			r				+	1					r	r	r	r		
* <i>Nassella trichotoma</i>																							

LOCATION	SPRING VALLEY FARM										ARBORETUM								WILLIAM - HOVELL					
VEGETATION UNIT	M	M	P	P	P	I	I	I	L	L	GG1	GG1	GG1	GG1	GG2	N1	N1	N2	N3	H	H	C	C	
PLOT	1	2	1	2	3	1	2	3	1	2	1	2	3	4	1	1	2	1	1	1	2	1	2	
<i>*Oenothera mollissima</i>																								
<i>*Onopordum acanthium</i>													+							+	1		r	
<i>*Orobancha minor</i>											+									r				
<i>Oxalis perennans</i>	+	r				+	+	r	+	+		r		r		r	r			r		1		
<i>Panicum effusum</i>																								
<i>*Paronychia brasiliiana</i>											1	1	1	+	+				r				r	
<i>*Paspalum dilatatum</i>							r						1				r							
<i>Persicaria prostrata</i>																								
<i>*Pettorhagia nanteuillii</i>	+	r	+	1	+	1	1	+	+	+	+				+			+	r					
<i>*Phalaris aquatica</i>												+	+	r		+			r	1	+	1	2	
<i>Pimelea curviflora</i>																								
<i>*Pinus radiata</i>																								
<i>*Plantago lanceolata</i>	+		1	+	+		+		+		1					r	r	+	1		+	1		
<i>Plantago varia</i>																								
<i>Plantago sp. (native)</i>																								
<i>Poa labillardierei</i>																								
<i>Poa sieberiana</i>		r		+	+					+	1													
<i>*Polygonum aviculare</i>												r					r						+	
<i>*Prunus sp.</i>											r				r								+	r
<i>*Rosa rubiginosa</i>	r		r	r	r		r			r	+		r	r	+	r	+		r	r	r	2	+	
<i>*Rubus fruticosus</i>	r		2	r			r	r	r	+			r	r										
<i>Rubus parvifolius</i>																								
<i>Rumex brownii</i>	r						+	r	+		1	1	1	1	1	+	r	+	+	+	+	+	+	
<i>Rytidosperma caespitosum</i>				2	1	3		+	1	+		+			1	r	+						1	
<i>Rytidosperma carphoides</i>	r				+						2			+	1			+						
<i>Rytidosperma laevis</i>																								
<i>Rytidosperma pilosa</i>										r														
<i>Rytidosperma racemosum</i>	1	1	+						+		2	3	2	3	1	+	1	1	1		1	+	1	
<i>Rytidosperma sp.</i>																								
<i>*Salvia verbenaca</i>											1	1	1	1	+	+	+	+	1		1			
<i>Schoenus apogon</i>				1						+														
Scleranthus biflorus																								
<i>Senecio sp. (quad)</i>				+																				
<i>*Silene gallica</i>						+	1	+	+	+														
<i>Solanum cinereum</i>								r																
<i>*Solanum nigrum</i>																								
Solenogyne dominii											+													

Molonglo Valley Vegetation Survey – Baseline Condition Assessment

LOCATION	SPRING VALLEY FARM										ARBORETUM								WILLIAM - HOVELL				
VEGETATION UNIT	M	M	P	P	P	I	I	I	L	L	GG1	GG1	GG1	GG1	GG2	N1	N1	N2	N3	H	H	C	C
PLOT	1	2	1	2	3	1	2	3	1	2	1	2	3	4	1	1	2	1	1	1	2	1	2
<i>*Sonchus asper</i>																	+						
<i>*Sonchus</i> sp.			r		r						r	r	r		r	r	r	r					
<i>*Taraxacum</i> sect. Ruderalia																							
<i>Themeda triandra</i>	+	+	+	1	2	1	+		4	1	1				+								
<i>*Tolpis barbata</i>				r		+		+	+														
<i>Tradescantia spathacea</i>																							
<i>*Tragopogon</i> sp.															r			r				+	r
<i>Tricoryne elatior</i>			r		r	+		+		+					r								
<i>*Trifolium angustifolium</i>		1	+								r				r						r		
<i>*Trifolium arvense</i>	r	1		1	r	1	1	1	1	1				1	+				+				
<i>*Trifolium glomeratum</i>				1							+	+	r	r									
<i>*Trifolium</i> sp.		1		1			+		+					+		r	r		+				
<i>Triptilodiscus pygmaeus</i>						+																	
Unknown forb																							
<i>*Verbascum thapsus</i>	+				+	r		1			r								r		+		
<i>*Verbascum virgatum</i>					r																		
<i>Verbena bonariensis</i>			r		r																		
<i>Vittadinia cuneata</i>											+			r				+					
<i>Vittadinia gracilis</i>														r								r	
<i>Vittadinia muelleri</i>						1		+		1	1												
<i>Vittadinia</i> sp.																							
<i>*Vulpia bromoides</i>																							
<i>*Vulpia muralis</i>						1				3													
<i>*Vulpia</i> sp.	2	2	3	2	2		1	1	2		1	1	1	1	1	1	2	1	2	2		1	+
<i>Wahlenbergia communis</i>									+		1				r								
<i>Wahlenbergia gracilis</i>																							
<i>Wahlenbergia luteola</i>					r						1			r									
<i>Wahlenbergia</i> sp.					r																		
<i>Wahlenbergia stricta</i>																							
<i>Wurmbea dioica</i>						+																	
<i>Xanthium spinosum</i>												r	r										
Total	41	39	33	47	43	38	40	33	46	48	54	43	38	44	38	30	31	25	25	21	32	33	36

Table 23: Flora species list for Molonglo River Park and West Molonglo

LOCATION	MOLONGLO RIVER PARK														WEST MOLONGLO									
VEGETATION UNIT	K	K	K	K	D1	D1	D1	D2	R	R	S	S	Q	Q	1A	1A	1B	1C	2	2	3A	3A	3B	3B
PLOT	1	2	3	4	1	2	3	1	1	2	1	2	1	2	1	2	1	1	1	2	1	2	1	2
<i>Acacia rubida</i>											r													
<i>Acaena novae-zelandiae</i>	1	1	+	+		1			+															
<i>Acaena ovina</i>	+		+			1		+		+	1	r	+	+	+			r	r		+			
<i>Acaena</i> sp.																								
<i>*Acetosella vulgaris</i>	1	1		1	1		1	2	1	+			1	1	+	1	1	1	1	1	1	1	1	1
<i>Acrotriche serrulata</i>																								
<i>*Aira</i> sp.								1	1	1	r	r	1	1		1			1	+				
<i>Ajuga australis</i>																								
<i>Alternanthera nana</i>																								
<i>Amyema</i> sp.																								
<i>*Anagallis arvensis</i>																		r						
<i>Aristida ramosa</i>									+	r				1										
<i>Aristida</i> sp.																								
<i>Aristida vagans</i>																								
<i>Arthropodium milleflorum</i>																								
<i>Arthropodium</i> sp.																				+				
<i>Asperula conferta</i>								+						r					+	r				
<i>Astroloma humifusum</i>																								
<i>Austrostipa bigeniculata</i>	+	1		1	2	4	2	2	3	r		+	+	+				+		1	1	2	+	1
<i>Austrostipa densiflora</i>				1															1					
<i>Austrostipa scabra</i>	+		3	2		1			1	3		2	3	2	3	+		r		+				
<i>Austrostipa</i> sp.																								
<i>*Avena</i> sp.	1	2	2		1	2	1	+	1	2		+	2	1	2	+	2	2		3	1	3	3	4
<i>Bossiaea buxifolia</i>																				+				
<i>Bothriochloa macra</i>			+						+	1		r	r	2				+			3			
<i>Brachyloma daphnoides</i>												r												
<i>*Briza maxima</i>																								
<i>*Briza minor</i>								+			r			+		1		r	2	+			+	
<i>*Bromus cartharticus</i>																								
<i>*Bromus diandrus</i>	+	1			4		2	1		r									+	1	2	2		+
<i>*Bromus hordeaceus</i>		1			1		2		1						1						2	2		
<i>*Bromus molliformis</i>										1			+	1						1				
<i>*Bromus rubens</i>															1									
<i>*Bromus</i> sp.	1	1	1	3		1		2							1	1	1	2	1	2	2	2	3	2
<i>Bulbine bulbosa</i>																								
<i>Bursaria spinosa</i>																								

LOCATION	MOLONGLO RIVER PARK														WEST MOLONGLO									
VEGETATION UNIT	K	K	K	K	D1	D1	D1	D2	R	R	S	S	Q	Q	1A	1A	1B	1C	2	2	3A	3A	3B	3B
PLOT	1	2	3	4	1	2	3	1	1	2	1	2	1	2	1	2	1	1	1	2	1	2	1	2
Calotis lappulacea																								
*Capsella bursa-pastoris																								
Carex appressa															r	+								
Carex breviculmis									r															
Carex inversa					r			r			r										1	r		+
Carex sp.																								
*Carthamus lanatus	r			1	r		+	r									+							1
Cassinia longifolia	r												r											
*Centaurium erythraea																								
*Centaurium sp.	r	+							1	+		1		+				r	+	+				
*Cerastium sp.																								
Chamaesyce drummondii																								
Cheilanthes austrotenuifolia																								
Cheilanthes distans																								
Cheilanthes sieberi			r										r	r			r							
Chenopodium album																								
Chloris truncata																		r						r
*Chondrilla juncea	+	1	1	1		1	r	r	+	1		+	1	+	1	r			r		+	1	r	+
Chrysocephalum apiculatum	r	1																						
*Cirsium vulgare								r											r	+				+
Clematis leptophylla																	r							
Convolvulus angustissimus	r	r									r		r											+
*Conyza sp.	r	+	+	1	r	1		r	r	1	r	+	+	+	r	1		+		+	+	1		+
Craspedia variabilis																								1
Crassula sieberana																								
*Crataegus mono			r				r																	
Cymbonotus lawsonianus																								
Cymbopogon refractus										1			1											
*Cynodon dactylon																		+	r			+		
Cynoglossum suaveolens																								
*Cynosurus echinatus																								
*Cyperus eragrostis					r		r	r									r	1				r		r
*Dactylis glomerata												r												
Desmodium varians	+										r	r	+			1	+			+		1		+
Dianella revoluta																								
Dichelachne crinita		+										r	+											
Dichelachne mycanthra																								

LOCATION	MOLONGLO RIVER PARK														WEST MOLONGLO									
VEGETATION UNIT	K	K	K	K	D1	D1	D1	D2	R	R	S	S	Q	Q	1A	1A	1B	1C	2	2	3A	3A	3B	3B
PLOT	1	2	3	4	1	2	3	1	1	2	1	2	1	2	1	2	1	1	1	2	1	2	1	2
<i>Dichondra repens</i>																								
<i>Echinopogon caespitosum</i>													r											
* <i>Echium plantagineum</i>					+	1	r		r	+		r	+		1		+	+	r		r	+		+
<i>Einadia nutans</i>					1		1																	
<i>Eleocharis acuta</i>																								
* <i>Eleusine tristachya</i>					1																			
<i>Elymus scaber</i>			+	1		1	1	1	+		r			r					2	1			+	+
<i>Enneapogon nigricans</i>	+	+	+						r				+						r					
<i>Epilobium billardioreanum</i>								+										r					+	
<i>Eragrostis brownii</i>								r																
* <i>Eragrostis curvula</i>											2	+												
* <i>Eragrostis</i> sp.																1		1	+				+	
<i>Erodium cicutarium</i>														r										
<i>Eryngium ovinum</i>								r																
<i>Eucalyptus blakelyi</i>				+			r									2	r	r	r		r			
<i>Eucalyptus dives</i>												r												
<i>Eucalyptus mannifera</i>																								
<i>Eucalyptus melliodora</i>																		r						
<i>Eucalyptus polyanthemus</i>																1								
<i>Eucalyptus rossii</i>																								
<i>Euchiton sphaericus</i>																								
<i>Euchiton</i> sp. (native)								r			r			r				r		1	1		+	
<i>Galium gaudichaudii</i>																								
* <i>Gamochaeta americana</i>																								
<i>Geranium solanderi</i>					+		+														r	r		
<i>Glycine clandestina</i>		+											r											
<i>Glycine tabacina</i>	+	r					1			r			r	r										
<i>Gonocarpus tetragynus</i>																	+							
<i>Goodenia hederacea</i>																								
<i>Haloragis heterophylla</i>								2					+			1		1	+				1	
<i>Hibbertia obtusifolia</i>																								
<i>Hibbertia riparia</i>			r																					
* <i>Hirschfeldia incana</i>				+	1		1	r					r								r	r		
* <i>Holcus lanatus</i>								r								2		1	+	1			+	
* <i>Hordeum (Critesion)</i> sp.					2		1																	
<i>Hydrocotyle laxiflora</i>							r										r			r				
<i>Hypericum gramineum</i>													r	r		+		r					+	

LOCATION	MOLONGLO RIVER PARK														WEST MOLONGLO									
VEGETATION UNIT	K	K	K	K	D1	D1	D1	D2	R	R	S	S	Q	Q	1A	1A	1B	1C	2	2	3A	3A	3B	3B
PLOT	1	2	3	4	1	2	3	1	1	2	1	2	1	2	1	2	1	1	1	2	1	2	1	2
<i>*Hypericum perforatum</i>	2	1	1	2	+	3	r	2	3	2	+	2	2	1	2	1	+	1	2	3	1	1	3	2
<i>*Hypochaeris radicata</i>		1	+		+	1	r	1			+	1	1	+	1	+	+	1	1	1	+	r	1	+
<i>Isolepis gaudichaudiana</i>																								
<i>Isotoma fluviatilis</i>																								
<i>Juncus australis</i>																							1	
<i>Juncus fockei</i>																								
<i>Juncus subsecundus</i>																				+			+	
<i>Juncus sp. (native)</i>							r	+			r					1		+	+	r	1			
<i>Kunzea ericoides</i>																								
<i>Lachnagrostis filiformis</i>												r												
<i>*Lactuca serriola</i>								+																
<i>*Lepidium africanum</i>																					r			
<i>Leptorhynchos squamatus</i>															r									
<i>Leptospermum sp.</i>											+	r												
<i>Leucopogon fletcheri</i>																								
<i>*Linaria pelisseriana</i>															+									
<i>*Lolium perenne</i>																		+						
<i>*Lolium rigidum</i>					1															r	1		r	r
<i>*Lolium sp.</i>																								
<i>Lomandra bracteata</i>	+		r				r	r									r							
<i>Lomandra filiformis</i>					+	1		1				+			1			1			r	+		
<i>Lomandra filiformis coriacea</i>			r	r		1		r		r				r					1	+				+
<i>Lomandra multiflora</i>	1	1	+	r		1		+			+	+	r		1									
<i>Lomandra sp.</i>																								
<i>Luzula densiflora</i>																								
<i>*Lycium ferocissimum</i>					r																			
<i>Lythrum hyssopifolia</i>																								
<i>*Malva sp. (parviflora)</i>																								
<i>*Marrubium vulgare</i>					+																			
<i>*Medicago sp.</i>												r												
<i>Melichrus urceolatus</i>	r	+																						
<i>Mentha diemenica</i>																								
<i>Microlaena stipoides</i>							2					+	1			2		3	r		1	1		
<i>Microtis unifolia</i>												r												
<i>*Modiola caroliniana</i>		r					1										r	+				r		
<i>*Nassella trichotoma</i>									1															
<i>*Oenothera mollissima</i>										r	r	r												

LOCATION	MOLONGLO RIVER PARK														WEST MOLONGLO									
VEGETATION UNIT	K	K	K	K	D1	D1	D1	D2	R	R	S	S	Q	Q	1A	1A	1B	1C	2	2	3A	3A	3B	3B
PLOT	1	2	3	4	1	2	3	1	1	2	1	2	1	2	1	2	1	1	1	2	1	2	1	2
<i>*Onopordum acanthium</i>							r													r	r			
<i>*Orobanche minor</i>																								
<i>Oxalis perennans</i>	r														1		r		+		r	r		
<i>Panicum effusum</i>														r										
<i>*Paronychia brasiliiana</i>					+		1								r						r			
<i>*Paspalum dilatatum</i>											r							r						
<i>Persicaria prostrata</i>																							r	
<i>*Petrohragia nanteuilii</i>	r		+				+	r	1	1		r	1	1	+	1		r						r
<i>*Phalaris aquatica</i>				3				2						r			5		+		3		+	+
<i>Pimelea curviflora</i>																								
<i>*Pinus radiata</i>													+											
<i>*Plantago lanceolata</i>	+	1				+	1	+	+	+	+	r	1	+	r			r	+	r		+	+	
<i>Plantago varia</i>																					r			
<i>Plantago sp. (native)</i>																					r			
<i>Poa labillardierei</i>				r																				
<i>Poa sieberiana</i>		+				r		+	r	+				r	+	1			r	r				
<i>*Polygonum aviculare</i>																								
<i>*Prunus sp.</i>																								
<i>*Rosa rubiginosa</i>		r	r	+	+	r	r	+	r	r		r	r	r		+		r		r	r		r	r
<i>*Rubus fruticosus</i>	1			1		r	+	+	r	r			1	1									r	
<i>Rubus parvifolius</i>																								
<i>Rumex brownii</i>				r	r		+	+		r		r	r				r		+	+	r	+	r	+
<i>Rytidosperma caespitosum</i>	+	1	1			1		+	1	1	+	+	1							+				
<i>Rytidosperma carphoides</i>						+			1			+	+	1										
<i>Rytidosperma laevis</i>												r							+					
<i>Rytidosperma pilosa</i>																								
<i>Rytidosperma racemosum</i>	r			1		1	1	+	+	1		+	1	1	1	1			2	1	1		+	+
<i>Rytidosperma sp.</i>		r													+									
<i>*Salvia verbenaca</i>				r			r								1									
<i>Schoenus apogon</i>								+				+							1	+			+	
<i>Scleranthus biflorus</i>											r													
<i>Senecio sp. (quad)</i>	r	+				r		+						r		+								
<i>*Silene gallica</i>			+									r												
<i>Solanum cinereum</i>																								
<i>*Solanum nigrum</i>					r		1																	
<i>Solenogyne dominii</i>																								
<i>*Sonchus asper</i>																								

LOCATION	MOLONGLO RIVER PARK														WEST MOLONGLO									
VEGETATION UNIT	K	K	K	K	D1	D1	D1	D2	R	R	S	S	Q	Q	1A	1A	1B	1C	2	2	3A	3A	3B	3B
PLOT	1	2	3	4	1	2	3	1	1	2	1	2	1	2	1	2	1	1	1	2	1	2	1	2
* <i>Sonchus</i> sp.																								
* <i>Taraxacum</i> sect. <i>Ruderalia</i>																								
<i>Themeda triandra</i>	4	4	2			1		r	+		1	3		1	1	3		2	3	2			1	
* <i>Tolpis barbata</i>	+	+									r													
<i>Tradescantia spathacea</i>																								
* <i>Tragopogon</i> sp.			r					r																r
<i>Tricoryne elatior</i>								r				r		r										
* <i>Trifolium angustifolium</i>	r		+												1						1			
* <i>Trifolium arvense</i>	r	r	1			+			1	1	1	1	1	1	1					+			+	+
* <i>Trifolium glomeratum</i>									+						1						1			
* <i>Trifolium</i> sp.		r		1	r		+	r							1	1		r			1	1		
<i>Triptilodiscus pygmaeus</i>																								
Unknown forb																				r				
* <i>Verbascum thapsus</i>	1	r	1	+		+	r		1			1	1	+	+								+	+
* <i>Verbascum virgatum</i>																								
<i>Verbena bonariensis</i>																								
<i>Vittadinia cuneata</i>																								
<i>Vittadinia gracilis</i>																			r					
<i>Vittadinia muelleri</i>		r													+	+								
<i>Vittadinia</i> sp.									r	c			1								+			
* <i>Vulpia bromoides</i>												+												
* <i>Vulpia muralis</i>									1		r	+	1	1										
* <i>Vulpia</i> sp.	1			1	1	2	1	3							1	1	1	2	3	2	2	3	3	3
<i>Wahlenbergia communis</i>												r	r	+										
<i>Wahlenbergia gracilis</i>																				+				
<i>Wahlenbergia luteola</i>																								
<i>Wahlenbergia</i> sp.	+	1	1	r					+															
<i>Wahlenbergia stricta</i>												+	r											
<i>Wurmbea dioica</i>																								
<i>Xanthium spinosum</i>																								
Total	36	34	28	25	28	27	37	48	32	31	29	50	33	40	35	34	13	38	38	41	36	23	35	25

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