M2G Biodiversity Offset Monitoring Report

Autumn 2015

Prepared for
Icon Water

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Project Manager	Andrew Palmer-Brodie 02 6103 2317
Prepared by	Antony von Chrismar, David Albrecht
Reviewed by	Andrew Palmer-Brodie
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Abbreviations

Abbreviation	Description
BOM	Bureau of Meteorology
DBH	Diameter at Breast Height
DSE	Dry Sheep Equivalent
EIS	Environmental Impact Statement
ELA	Eco Logical Australia Pty Ltd
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)*
HBT	Hollow Bearing Tree
LMA	Land Management Agreement
M2G	Murrumbidgee to Googong Water Transfer Project
MU	Management Unit
ODP	Offset Delivery Plan
PER	Public Environment Report
RFAC	Regional Feral Animal Control
TSC Act	*Threatened Species Conservation Act 1995*

Executive summary

The Biodiversity Offset site was provided to compensate for impacts resulting from the development of the Murrumbidgee to Googong Water Transfer Project (M2G). The offset site was surveyed in autumn 2015 as part of a twice-yearly monitoring program to inform the implementation and management of the offset.

The autumn 2015 surveys found that the offset site is in good condition and is responding well to management actions, such as the exclusion of stock, feral animal control and weed control works. Fauna habitat features are largely unchanged since the baseline surveys, and the site continues to support high biodiversity values including habitat for listed and declining woodland bird species, as well as populations of threatened and regionally significant flora species. A new threatened species for the site, *Thesium australe* (Austral Toadflax), was observed during the autumn 2015 surveys.

Weed control activities have been largely successful across the offset site, however, on-going control is recommended to further reduce the abundance and distribution of key weed species across the site.

The majority of erosion monitoring points have not shown signs of erosion since the baseline surveys, despite high rainfall events occurring during this time. The lack of erosion indicates that the soil is stable with a low risk of significant erosion occurring in the future. High levels of vegetative groundcover across the offset site and the continued exclusion of stock grazing further reduces the risk of erosion occurring.

Two erosion points within the main drainage line in the northern offset may require some attention to stabilise the creek bank. It is recommended that various rehabilitation options be considered, however, these need to consider access, proximity to high voltage power lines, the local and downstream hydrology, as well as cost. The active erosion sites require on-going monitoring.

The overall incidence of vertebrate pest species within the offset site was relatively high in autumn, with several observations of *Capra hircus* (Feral Goat) and *Sus scrofa* (Pig). *Vulpes vulpes* (European Fox) were also observed. It is recommended that these vertebrate pests be controlled.

The condition of the offset boundary fencing is considered adequate to exclude stock from the offset site. No priority management actions are required on-site, however, minor maintenance is required at some locations.

1 Introduction

1.1 Background

Eco Logical Australia Pty Ltd (ELA) was commissioned by Icon Water (formerly ACTEW Water) to deliver terrestrial ecology services as required by the environmental approval process for the Murrumbidgee to Googong Water Transfer Project (M2G).

The M2G projects falls under the jurisdiction of the Commonwealth Department of the Environment (previously, Department of Sustainability, Environment, Water, Population and Communities), NSW (Department of Planning), and ACT (ACT Planning and Land Authority) Governments and has been subject to assessment and environmental approval processes in all three jurisdictions. Project approval (granted in 2010) has been attained from all three governments, with a considerable number of approval conditions and commitments applied.

Under the environmental approvals process, Icon Water (conditioned as ACTEW Water) was required to provide compensatory habitat as an offset for vegetation and habitat losses arising from the construction activities for the M2G pipeline. The offset was required to be delivered to meet the conditions outlined in a range of documents including but not limited to, the Environmental Impact Statement (EIS) and Public Environment Report (PER) prepared for the development and relevant approval conditions.

1.2 Purpose of document

Under Condition 2.9b of the NSW Approval and Condition 3.1 of the Commonwealth approval conditions for the M2G Project (see Offset Delivery Plan (ODP) for further information), management and monitoring of the offset site is required. The ODP prepared by ELA (April 2012) describes the actions to be taken in establishing and managing the offset site according to the approval conditions and commitments, including the provision of monitoring actions (Eco Logical Australia 2012).

This report details the autumn monitoring surveys for 2015 that were undertaken in accordance with the methodology and aims established in the ODP. It is designed to be a standalone monitoring report consistent with the format of the previous biannual monitoring reports, but also to relate to the ODP. The purpose of this document is to report on the ecological condition of the site and the management actions conducted throughout the previous year, in order to guide future actions within the offset site.

1.3 Study area

Icon Water own a land parcel in southern ACT (Block 1675), referred to here as the Williamsdale property (or 'the property'). The property is approximately 208 hectares in size and is located just south of Williamsdale. The property is bounded by the Monaro Highway to the east; the NSW border to the south; Angle Crossing Road to the north; and the Murrumbidgee River corridor to the west (**Figure 1**). The monitoring surveys were conducted within the offset site (study area of approximately 110 ha), which is wholly contained within the property.

The offset site has been set aside for conservation due to its high biodiversity value; including the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed White Box, Yellow Box, Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box-Gum Woodland), threatened flora and fauna species and/or threatened species habitat.

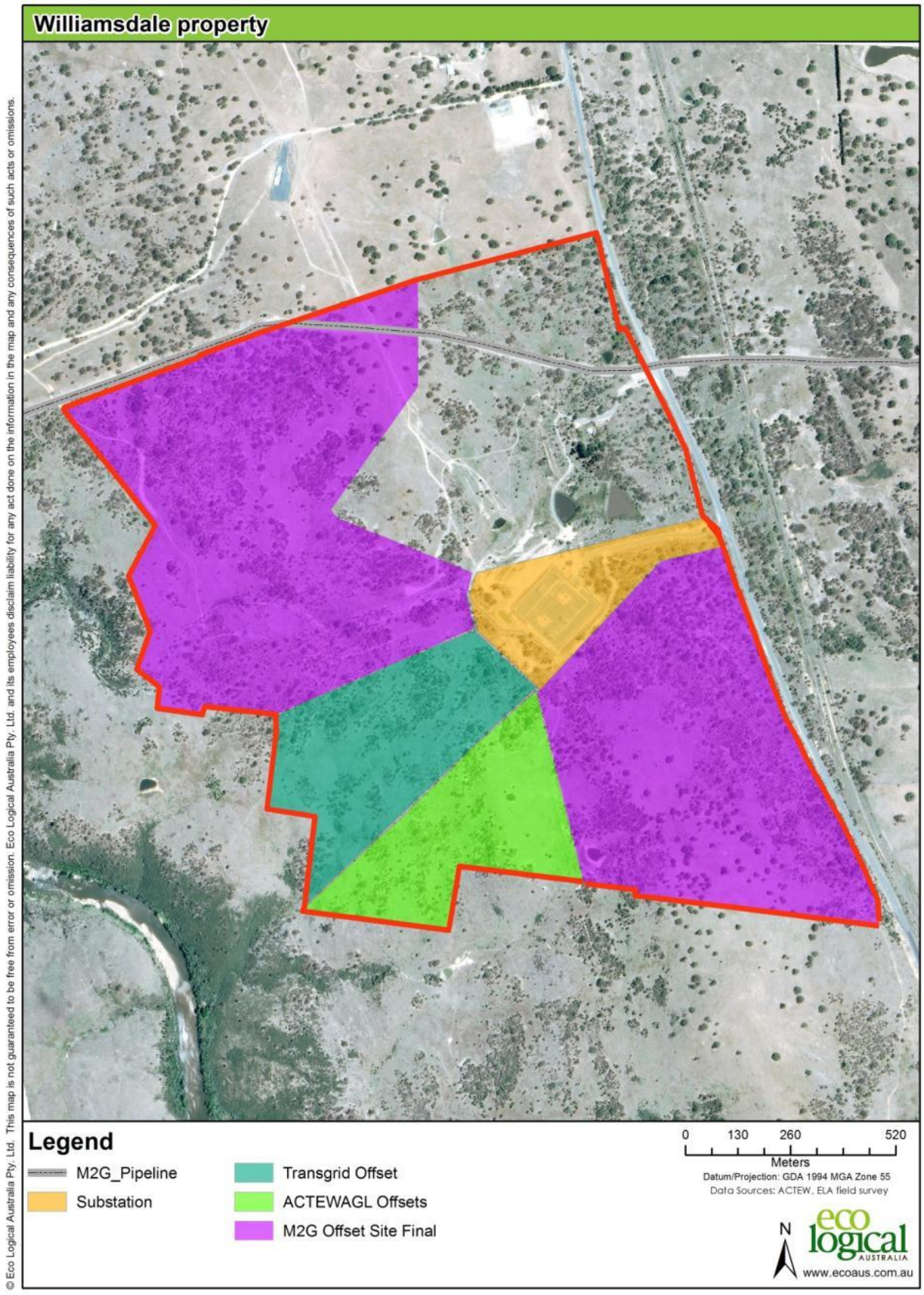

Figure 1: Study area

2 Field survey methods

The native vegetation and biodiversity values present within the offset site are managed under the ODP and its sub-plans. The ODP establishes the monitoring methodology for each of these values. A summary of the monitoring methodology outlined in the ODP is presented below, followed by the results of the autumn 2015 monitoring surveys. The autumn 2015 monitoring surveys were undertaken during the period 20-24 April 2015.

2.1 Vegetation monitoring plot methodology

The monitoring methodology has been adapted from the NSW Biobanking methodology to suit the offset site management requirements. The modified Biobanking methodology proforma uses a combination of quadrat and transect surveys to establish vegetation condition, and this approach is mirrored under the monitoring methodology.

Vegetation surveys have been designed to collect the following data:

- Species diversity, including native and exotic species.
- Cover abundance of native and exotic species.
- Identification of any threatened flora.
- Condition of the vegetation community.

2.1.1 Floristic quadrats

Eight 20 m x 20 m monitoring quadrats (plots) were established to collect baseline data on the condition and species composition of the offset site during autumn and spring each year (**Figure 2**). The quadrats are permanently erected and marked using a star picket at each corner tagged with flagging tape. The location of each quadrat has been referenced using a GPS device (north-west corner) and their location plotted on a map (**Figure 2**).

Each quadrat was surveyed by walking back and forth along 10 parallel transects approximately 2 m apart. A cumulative list of flora species within each quadrat was recorded and assigned a cover abundance score using the Braun-Blanquet scale.

Two of the eight plots (control plots) were chosen in order to observe natural changes in species composition over time. Both plots were located in areas of good quality EPBC Act listed Box-Gum Woodland and were free from noxious weeds at the time of establishment. Where possible, management actions, such as erosion control, or rehabilitation will not occur within these monitoring plots over the duration of the monitoring period. However, it is noted that some actions such as feral animal control occurs on an offset site scale. Also, if noxious weeds are observed within the control plots during the biannual monitoring surveys, the weeds will be identified, recorded and then removed. The removal of noxious weeds from the control plots is required to maintain the overall conservation principles of the offset site.

The other six monitoring plots were located in units where management actions were planned or likely to occur as outlined in the management sub-plans, in order to observe the effect that the actions have on ecological values and species composition over the course the monitoring program.

The monitoring plots are shown in **Figure 9 - Figure 16**. The GPS co-ordinates of the north-west corner of each monitoring plot are provided below in **Table 1**. A species list for each of the monitoring plots is included in **Appendix A**.

Table 1: Monitoring plot co-ordinates (GDA 1994 MGA Zone 55).

Monitoring plot	Plot location	Established	North-west corner		Transect	
			Easting	Northing	Easting	Northing
1	MU1A	October 2011	693669.49	6059272.51	693674.98	6059300.56
2	MU2B	March 2012	693529.99	6059555.34	693541.22	6059504.10
3	MU3	October 2011	693872.06	6059467.44	693874.65	6059490.73
4	MU4	October 2011	692349.35	6060568.08	692365.82	6060517.43
5	MU5	October 2011	692559.98	6059906.52	692526.40	6059902.85
6*	MU6	March 2012	692576.25	6060344.05	692622.53	6060358.54
7	MU7	March 2012	692860.59	6060583.39	692874.01	6060542.87
8*	MU3	October 2011	693414.37	6059863.02	693445.95	6059828.31

* Refers to the control plot

2.1.2 Point transects

A 50 m transect (50 m length of tape) was established at each of the monitoring plots to compliment the floristic quadrat surveys and to determine the projective foliage cover of various structural components of the community. Each transect was referenced using a GPS device and three photos were taken from the start of the transect (left side, centre, and right side). The 50 m transect was surveyed as follows:

- At every 1 m along the 50 m tape, the understorey layer was assessed (50 survey points per transect). The presence of native grass, native shrubs (<1m high), native other or exotic species was recorded at each point. For each group the number of hits was then tallied and doubled, and presented as a percentage cover for the whole site.
- At every 5 m along the 50 m tape, the percentage projective foliage cover of native and exotic species in the mid and overstorey layer was recorded (10 survey points per transect). For each group the cover values were then summed and divided by 10, and presented as a percentage cover for the whole site.

2.2 Flora inventory methodology

A cumulative list of species has been maintained since the initial baseline surveys were conducted. Species included on the list included those recorded within the eight monitoring plots and those encountered whilst traversing the sites during the weed, fence line and erosion monitoring surveys. A species list for offset site is provided in **Appendix A**.

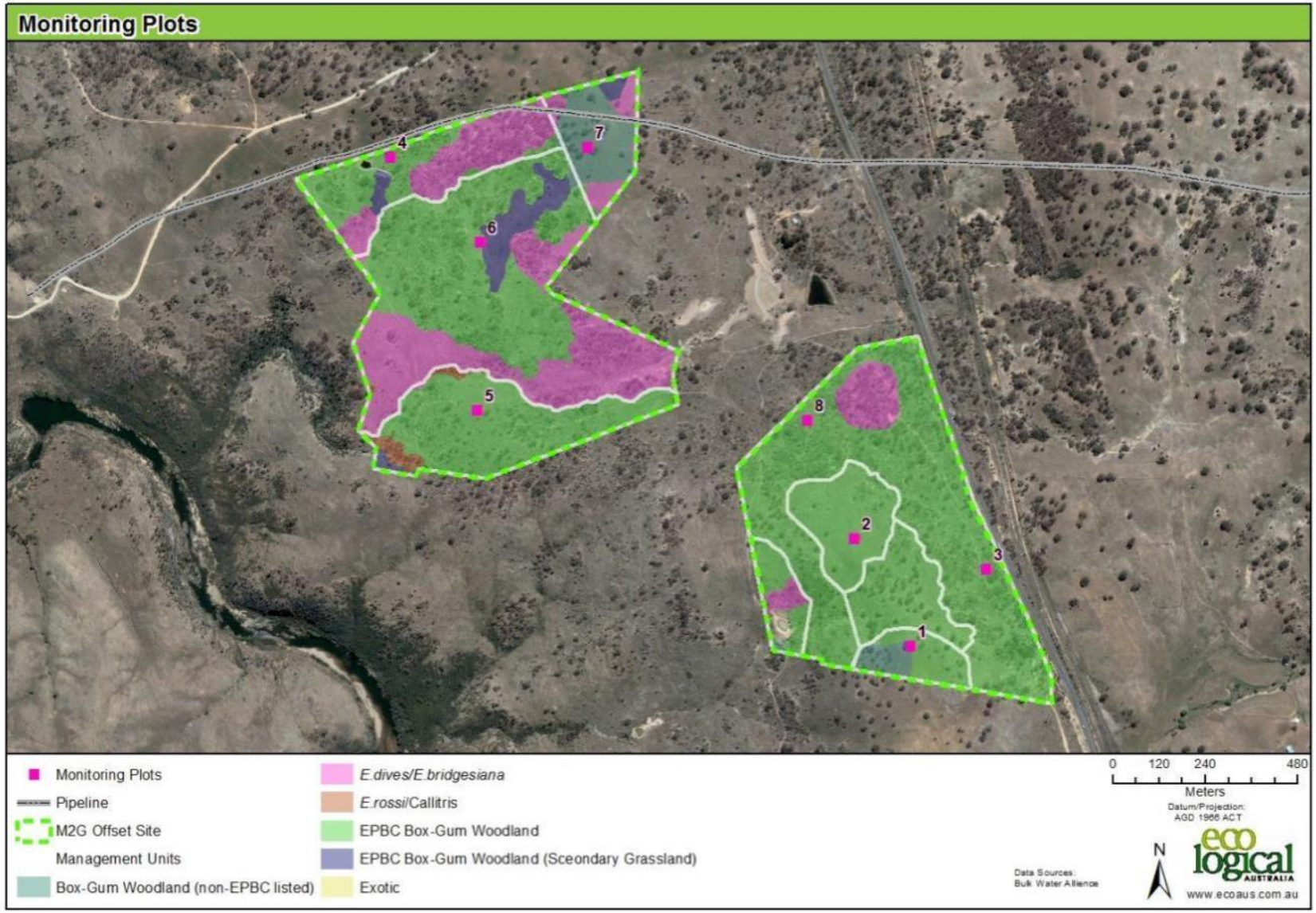

Figure 2: Monitoring plots, management units and baseline offset site ecological values

2.3 Swainsona recta monitoring

No monitoring of *Swainsona recta* is undertaken during the autumn monitoring period.

2.4 Weed monitoring methodology

The management of weeds within the M2G offset site is undertaken in accordance with the Weed Monitoring Sub-Plan. The sub-plan outlines the weed management activities to be undertaken in order to satisfy relevant approval conditions and commitments. As an action under the sub-plan, the monitoring of weeds within the offset is required on a biannual basis to incorporate the seasonal changes in weed abundance and weed control activities.

Weed monitoring is undertaken in autumn and spring using random meander transects, covering both the northern and southern offset. Searches focused on occurrences of declared species (*Cotoneaster* spp., *Crataegus monogyna*, *Eragrostis curvula*, *Hypericum perforatum*, *Nassella trichotoma*, *Pyracantha* spp., *Rosa rubiginosa*, *Rubus fruticosus* and various species of thistle), non-declared woody weeds and species not previously recorded for the site. A GPS record was taken when individuals of these species were encountered. Each GPS record generally represents multiple individuals. For widely distributed species such as *Hypericum perforatum* the GPS records are only indicative of the distribution of the species on site.

2.5 Erosion monitoring methodology

Erosion monitoring sites were established during the autumn 2012 monitoring surveys. During these baseline surveys a representative sample of erosion points within each of the main drainage lines were selected for future monitoring. For each erosion point selected, notes were made on their size, their location was recorded using a GPS and a photo was taken in order to observe any changes over time. A number of erosion monitoring points were discontinued from spring 2013 onwards, as these points did not shown signs of erosion since the baseline surveys, despite significant rain events occurring over this two year period.

When each monitoring survey is undertaken, a set of baseline photographs are taken into the field to facilitate accurate relocation of erosion monitoring photo points and assessment of change.

2.6 Fencing monitoring methodology

Fence monitoring was undertaken by traversing the Williamsdale property border and assessing the condition of the fence. Any damaged areas observed along the fence line were noted and a GPS point taken. Fence damage was categorised into three categories to represent the level of risk of unwanted grazers (such as cattle) entering the offset site:

- *Low risk*– Small holes observed at the bottom of the fence that does not require immediate attention and allows native fauna (e.g. wombats) to pass through.
- *Moderate risk* – Small to moderate sized holes or fence damage that requires monitoring, but no immediate action. Often observed along the fence line bordering the Murrumbidgee River corridor and represents a potential goat or sheep access point. Note; there can be a small difference between the low and moderate categories. However, other evidence such as tracks and scats that may represent feral presence was used to inform the level of risk.
- *High risk* – Represents points along the fence line requiring attention. These points represent a high risk of cattle and sheep entering the property.

2.7 Fauna habitat, selective fauna surveys and feral animal monitoring methodology

Feral animal monitoring, fauna habitat and fauna surveys of selective groups have been undertaken using a combination of techniques, including:

- Fauna habitat assessment and random meander surveys.
- Infra-red cameras.
- Nocturnal surveys including Anabats, spotlighting
- Opportunistic observations.

The locations of the infra-red cameras, spot-light transects, frog surveys and Anabats are shown in **Figure 4**.

2.7.1 Fauna habitat assessment

During the baseline survey a fauna habitat assessment was conducted within each 20 m x 50 m vegetation monitoring plot to observe the number of hollow bearing trees, length of fallen logs (greater than 10 cm width) and dominant habitat features present. In addition, a qualitative assessment of fauna habitat features was undertaken for each of the northern and southern offsets. This assessment included features such as, hollow-bearing trees, logs, litter, fallen timber, stags, surface or outcropping rocks, termite mounds, mistletoe presence, large trees, natural regeneration and exotic or native shrub thickets. These features were checked during each monitoring period to ensure they remained applicable.

The fauna habitat assessments are outlined in **Table 4** and **Table 5**

2.7.2 Infra-red camera surveys

The use of infra-red cameras was recommended as a monitoring method in the *autumn 2012 Monitoring Report* (ELA 2012). Remote cameras have been used with success in detecting the presence of feral pigs and other exotic animals, estimating abundance, and determining trapping success (Hamrick et al. 2011).

Two infra-red camera locations were set-up within the offset site and left for a minimum of five days, one within the northern offset and the other in the southern offset. The locations of the infra-red cameras (**Figure 4**) were chosen based on fauna signs, access to water and fauna tracks, such as pig-rooting, wombat tracks and game trails.

2.7.3 Nocturnal surveys

Targeted nocturnal fauna surveys were not undertaken in autumn 2015 due to inappropriate weather conditions during the survey period. Given the monitoring of the site which has been undertaken to date, it is considered that a good understanding of the nocturnal fauna that the site supports has been obtained.

2.7.4 Opportunistic observations

Visual and aural observations of all vertebrate fauna species (including signs of feral animal activity) were recorded opportunistically whilst conducting targeted monitoring surveys across the offset site and using random meander techniques (species list available in **Appendix B**). Locations of conservation significant fauna and signs of feral animal presence were referenced using a GPS device.

3 Biodiversity values

3.1 Flora

Approximately 213 native plant taxa (species, subspecies and varieties) have been recorded for the M2G offset site since the baseline surveys were undertaken (**Appendix A**). The list has continued to grow with each survey. The detection of new records for the site is influenced by factors such as time since cessation of grazing, seasonal conditions and meander routes chosen.

The flora recorded includes a range of widely distributed characteristic woodland species, several rare and uncommon species in the ACT and four threatened species listed under the EPBC Act (**Table 2**, **Table 3**, and **Figure 4**).

Plates of some of the threatened, rare and uncommon species are included in **Appendix B**.

The autumn 2015 surveys recorded the presence of *Thesium australe* (Austral Toadflax) within the offset site. Austral Toadflax is a small semi-parasitic herb which is often associated with dense areas of *Themeda triandra* (Kangaroo Grass). The species is characterised by its yellow-green colouration and small white flowers, and is listed as vulnerable under the EPBC Act (see **Figure 3**).

Figure 3: *Thesium australe* (Austral Toadflax)

3.1.1 Threatened flora species

An annotated list of nationally threatened species occurring on the offset is provided in **Table 2** below.

Table 2: Threatened flora species within the offset site

Species	EPBC Act Status	NC Act Status	Notes
Leucochrysum albicans var. *tricolor* (Hoary Sunray)	Endangered	Not listed	Endangered herbaceous perennial. Noted as rare in the offset site in spring 2014. The species is abundant within adjacent land managed by Transgrid where it is growing profusely on batters surrounding the substation. It is unclear whether Hoary Sunray has seeded naturally onto the batters or whether it has been planted. It is considered likely that the individuals within the offset site have originated from the adjacent population.
Pomaderris pallida (Pale Pomaderris)	Vulnerable	Not listed	Vulnerable shrub to about 1.5 m high. Located in the central western part of the northern offset. A solitary flowering adult plant approximately 90 cm high was found in spring 2014, surrounded by approximately 10 juveniles and 2 sub-adults (flowering but only about 30-40 cm high). The species is known to occur within the Murrumbidgee River corridor, and it appears that the population within the offset site has established as an outlier.
Swainsona recta (Small Purple-pea)	Endangered	Endangered	Endangered herbaceous perennial. This species was found on the M2G offset site during initial surveys of the site in 2010 but has not been encountered since. Three translocation exclosure plots have been established on site.
Thesium australe (Austral Toadflax, Toadflax)	Vulnerable	Not listed	Austral Toadflax is a hairless, yellowish-green perennial herb with slender, wiry stems to 40 cm high. The species is semi-parasitic on roots of a range of grass species notably Kangaroo Grass

3.1.2 Rare and uncommon ACT species

A number of species considered to be rare or uncommon within the ACT have also been recorded within the offset site to date. These species are outlined in **Table 3** below.

Table 3: Rare and uncommon species recorded within the offset site

Species	Notes
Austrostipa setacea (Corkscrew Grass)	Tufted perennial grass. Noted in the south-eastern corner of the southern offset in spring 2014. Dozens of plants recorded but extent of distribution on site not established.
Bossiaea prostrata (Creeping Bossiaea)	Prostrate perennial subshrub. Recorded in monitoring plot 5 in the northern offset and in the surrounding area. Relatively few localised patches known within offset.
Discaria pubescens (Australian Anchor Plant)	Rigid shrub with prominent paired stem spines. A localised patch of approximately 26 plants occurs in the northern offset. This species was in full flower in October.
Glossostigma elatinoides	Prostrate perennial wetland forb. Localised patch noted in spring 2014 on the banks of the dam in the northern offset. This species was in full flower in October.
Limosella australis (Australian Mudwort)	Diminutive perennial wetland forb. Localised plants noted in spring 2014 on the banks of the dam in the northern offset.
Microseris lanceolata (Yam Daisy)	Perennial forb with fleshy tuberous roots. Recorded in monitoring plot 3 in the southern offset. Generally occurs in better condition vegetation within the offset.
Plantago gaudichaudii (Narrow Plantain)	Perennial forb with thick fleshy taproot. Recorded in monitoring plots 3 (southern offset) and 4 (northern offset). Generally occurs in better condition vegetation within the offset.
Stylidium despectum (Dwarf Triggerplant)	Erect diminutive annual forb occurring in moist situations. Localised plants noted in spring 2014 along moist drainage line in the northern part of the southern offset.
Swainsona monticola (Notched Swainson-pea)	Low spreading herbaceous perennial. Noted in the south-eastern corner of the southern offset in spring 2014. Dozens of plants seen but extend of distribution on site not established. Plants probably die back to a rootstock in summer and are difficult to detect unless flowering.
Swainsona sericea (Silky Swainson-pea)	Low spreading herbaceous perennial. Recorded in monitoring plots 3 (southern offset) and 5 (northern offset) in spring 2014. This species was widely distributed across the north and southern offsets in spring 2014. Plants are difficult easily overlooked unless flowering.
Zornia dyctiocarpa	Low herbaceous perennial. Noted in the north eastern corner of the southern offset. Extend of distribution on site not established

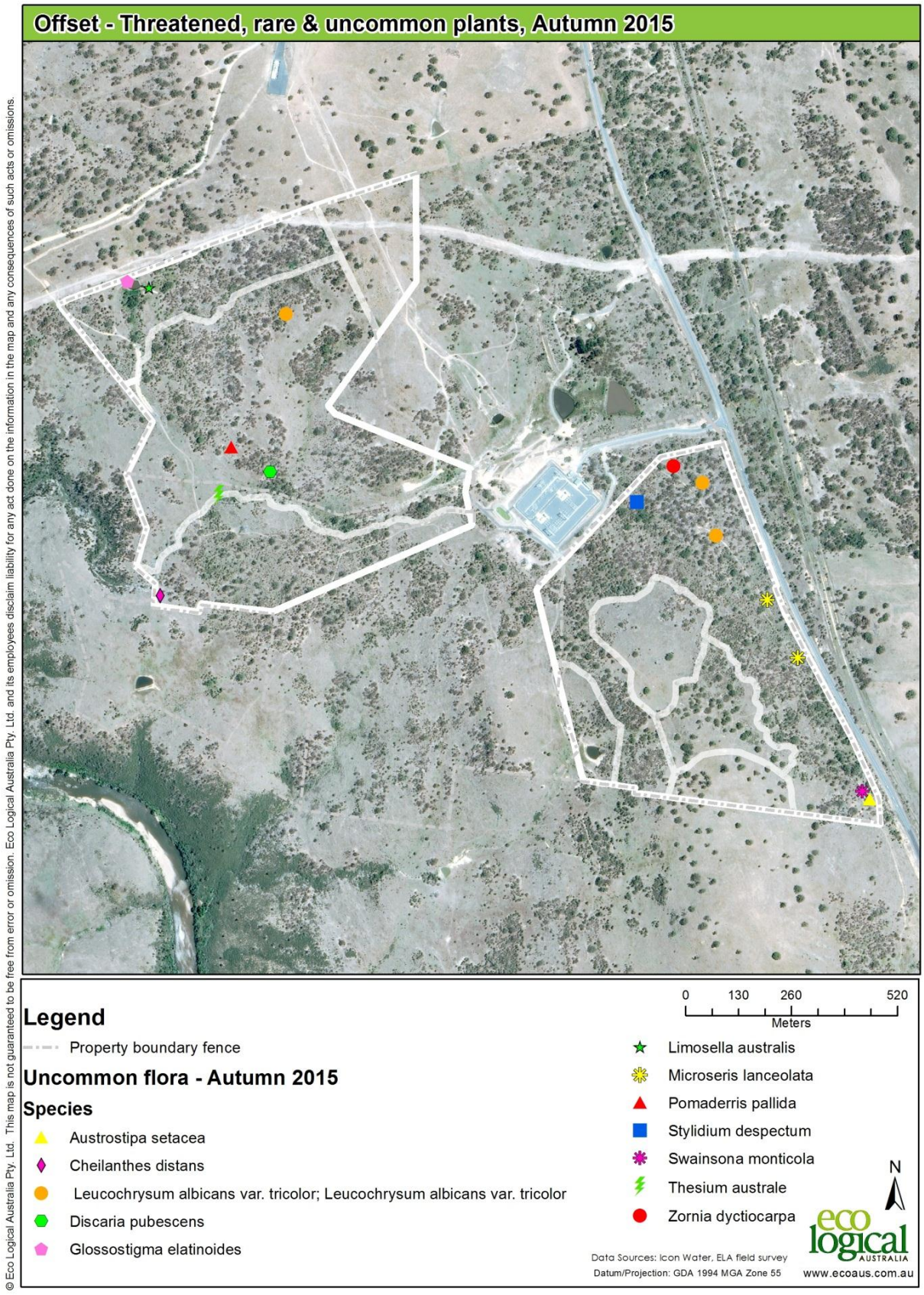

Figure 4: Opportunistic records of threatened, rare and uncommon flora species, autumn 2015

3.2 Fauna

Monitoring of fauna present on the offset site has been based on fauna habitat assessments, nocturnal surveys of arboreal mammals and frogs, Anabat surveys, infra-red camera surveys and opportunistic observations to date. A broad range of fauna species have been recorded within the offset site. Opportunistic surveys have recorded 63 bird species, 12 mammal species, six reptiles, and six amphibians. A cumulative list of species recorded is provided in **Appendix C**.

Weather conditions during the autumn monitoring period were not considered to be ideal for fauna survey due to the high winds experienced on three of the monitoring days. As a result, nocturnal surveys and Anabat surveys were not undertaken. However, as outlined above, a good understanding of the fauna species utilising the offset site has been obtained though previous monitoring periods. Previous monitoring on the offset site has recorded a number of woodland bird species recognised as being in decline throughout their range inlcuding the *Stagonopleura guttata* (Diamond Firetail), *Microeca fascinans* (Jacky Winter), *Aphelocephala leucopsis* (Southern White-face), *Chthonicola sagittatus* (Speckled Warbler), *Eopsaltria australis* (Eastern Yellow Robin) and *Lalage tricolor* (White-winged Triller).

Icon Water staff (John Turville and Grant Morey) also recorded the presence of *Varanus rosenbergi* (Rosenberg's Goanna – see **Figure 5**) within the offset site during a recent site visit in 2015. Rosenberg's Goanna are known from the local area, and have large home ranges. Rosenberg's Goanna are known to be associated with termite mounds which they utilise for the incubation of their eggs. Termite mounds are relatively rare within the offset site compared with similar environments around Canberra, however, the species is likely to utilise the offset site periodically for foraging and potentially breeding where termite mounds are available.

Rosenberg's Goanna is not listed under ACT or Commonwealth legislation but is considered Vulnerable under the NSW *Threatened Species Conservation Act 2005.*

Results of the autumn 2015 fauna surveys are outlined in the following subsections.

Figure 5: *Varanus rosenbergi* - Rosenberg's Goanna within the offset site (photo by Grant Morey, Icon Water)

3.2.1 Fauna habitat assessment

During the baseline surveys a rapid assessment was made of the range of fauna habitat features present across the offset site and their abundance (**Table 4**). The following categories were used to identify abundance or frequency of each feature:

- *Abundan*t = feature occurs in an almost continuous manner.
- *Common* = feature encountered commonly, i.e. without having to search for it.
- *Occasional* = feature occurs in more than a few cases, but not encountered frequently.
- *Rare* = feature observed very infrequently, one to a few cases at most.

The availability of fauna habitat features observed in autumn 2015 was consistent with the baseline monitoring surveys.

Table 4: Fauna habitat features observed across the offset site

Fauna habitat feature	Northern	Southern
Tree hollows	Occasional	Occasional
Large trees > 60 cm DBH	Occasional	Occasional
Dead standing trees	Occasional	Rare
Stumps (<2 m)	Rare	Rare
Mistletoes	Common	Common
Regenerating tree thickets	Abundant	Abundant
Native shrub thickets	Common	Occasional
Exotic shrub thickets	Occasional	Occasional
Logs (fallen)	Occasional	Occasional
Timber (fallen)	Occasional	Occasional
Litter (leaf, twig, bark)	Common	Common
Loose rocks	Common	Common
Outcropping rocks	Common	Common
Termite mounds	Rare	Rare
Meat ant nests	Occasional	Occasional
Earth banks/deep gully walls	Rare	Rare

An assessment of the dominant habitat features recorded within each 50 m x 20 m vegetation monitoring plot was also undertaken during the baseline surveys. These features were reassessed in autumn 2015. No significant change was observed relative to the baseline condition (**Table 5**).

Table 5: Habitat assessment within 50 m x 20 m vegetation monitoring plots

Plot	HBT	Logs	Comment	Dominant habitat features present within 50 m x 20 m plot Autumn 2015
1	0	0 m	No	Limited surface rocks; abundant exotic annuals
2	0	1 m	No	Surface and outcropping rocks abundant; course woody debris
3	0	11 m	No	Litter common; logs occasional; single ant's nest present
4	0	22 m	No	Developing canopy regeneration; occasional course woody debris
5	0	3 m	No	Developing canopy regeneration; ants nest; course woody debris; limited
6	0	0 m	No	Course woody debris common; developing canopy regeneration
7	0	8 m	No	Surface rocks and course woody debris uncommon; abundant exotic
8	0	14 m	No	Litter; course woody debris; bare ground; hollow logs; surface rocks

Key for table 5: *HBT's* = Hollow-bearing trees. *Logs* = length of fallen logs > 10 cm width. *Comment* = relates to whether a noticeable or significant change has occurred since the completion of the baseline surveys.

3.2.2 Infra-red camera surveys

All species detected by infra-red cameras have previously been recorded. A full list of fauna species observed during the monitoring surveys is outlined in **Appendix B**. Most commonly recorded species were *Macropus giganteus* (Eastern Grey Kangaroo), *Vulpes vulpes* (Fox) and *Vombatus ursinus* (Common Wombat).

3.3 Ecosystem health

The offset site supports a diverse range of flora, fauna and habitats. Since the removal of stock from the site, there has been an increase in the recruitment of shrub species such as *Acacia dealbata* and *Acacia rubida*, as well as an increase in recruitment of canopy species. The site supports diverse functional ecosystems and is considered to be in good health and likely to be resistant to disturbance events due to its diversity.

3.3.1 Lerp infestation 2015

While the offset has been in excellent health to date, the autumn 2015 surveys observed that a large proportion of the *Eucalyptus blakelyi* (Blakely's Red Gum) within the offset site have been subject to leaf attack by Lerps (Psyllids) as shown in **Figure 6**.

The term 'Lerp' refers to the waxy cover that sap sucking insects from the family Psyllidae create which protect the nymph stages from predation and environmental extremes (Stone and Urquhart, 1995). Lerps are a common occurrence on many Eucalypt species and can occasionally occur as large infestations during suitable conditions or when trees are particularly stressed such as following drought. Outbreaks have been shown to occur in a cyclical nature across many parts of Australia, often resulting in defoliation of large areas of Eucalypts (Collett, 2000). Severe infestations by lerps can be detrimental to trees resulting in leaf-drop, defoliation and subsequently die-back if the lerps are present over several seasons (Stone and Urquhart, 1995).

Anecdotal evidence suggests that Lerp infestations occur broadly across the ACT region with infestations also noted at Central Molonglo, Kama Nature Reserve, and within road side trees in Belconnen and North Canberra. The infestation is not confined to the M2G property, nor is it the only area affected.

Interactions between Lerps and Noisy Miners

Lerps are known to have a number of natural predators including parasitic wasps, spiders, mites and insectivorous birds (Collett, 2000). Studies have shown that aggressive honeyeater species such as the *Manorina melanophrys* (Bell Miner), which is common in coastal areas, and the closely associated *Manorina melanocephala* (Noisy Miner), can force other insectivorous (leaf gleaner) species, such as honeyeaters and pardalotes out of an area hence exacerbating the die-back issue.

The NSW Scientific Committee has listed '*Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners Manorina melanocephala'* as a key threatening process under the *Threatened Species Conservation Act 2005.* In the Final Determination, the NSW Scientific Committee found that Noisy Miner favour open, lightly timbered landscapes and habitat edges, and areas where the understory has been reduced or removed such as through grazing or shrub removal. The Committee also found that abundant Noisy Miners have been linked to vegetation remnants suffering from Eucalypt dieback as a result of lerp infestations. Following the removal of Noisy Miners, smaller insectivorous birds have been shown to return resulting in decreased leaf damage

and an increase in overall tree health (Grey 2008, as cited in the Final Determination for *Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners Manorina melanocephala').*

Noisy Miners are an abundant species on the M2G offset site and the surrounding areas. The species has been recorded during all survey periods since 2011. While the species has been recorded along with a substantial number of other woodland birds including many insectivorous species, no study of the relative abundance of Noisy Miner has been undertaken. There is the potential for the population of Noisy Miner on the property to reduce the resilience of the ecosystem to cope with stressors such as the lerps, should the species be sufficient in abundance to adversely affect the species composition of birds on the property to the detriment ofbeneficial species.

Weed management actions to control species such as *Rosa rubiginosa* and *Rubus fruticosus* have been undertaken within the property. It is possible that the weed control works could inadvertently create an environment that favours the Noisy Miner through reduction of the mid story cover. The offset site has shown regeneration of the shrub layer as previously noted since the cessation of grazing, however, assisted regeneration of the shrub layer could be investigated as a means of making the site less favourable to the Noisy Miner if the species is found to be adversely affecting the community composition of birds within the offset site.

Figure 6: Lerps on a Eucalyptus blakelyi leaf and associated damage

4 Vegetation monitoring

Since the first autumn monitoring event, species diversity has generally remained stable or increased across the majority of monitoring plots (**Figure 7**). The autumn 2015 monitoring data shows a slight decline from the 2014 data. Seasonal variation between the monitoring years significantly changes how readily detectable flora species are and is a major consideration when analysing trends in floristic data, particularly over a relatively short period. Peaks in diversity, such as that shown in the autumn 2014 data may be in response to the cessation of grazing (2012) or may be a factor of local rainfall or even timing of survey within the autumn period. Therefore, the fluctuations and declines from the 2014 autumn monitoring event are not necessarily an indication of site decline. In fact the stability/increase in diversity when comparing the 2013 data suggests that current management practices are improving and maintaining site condition.

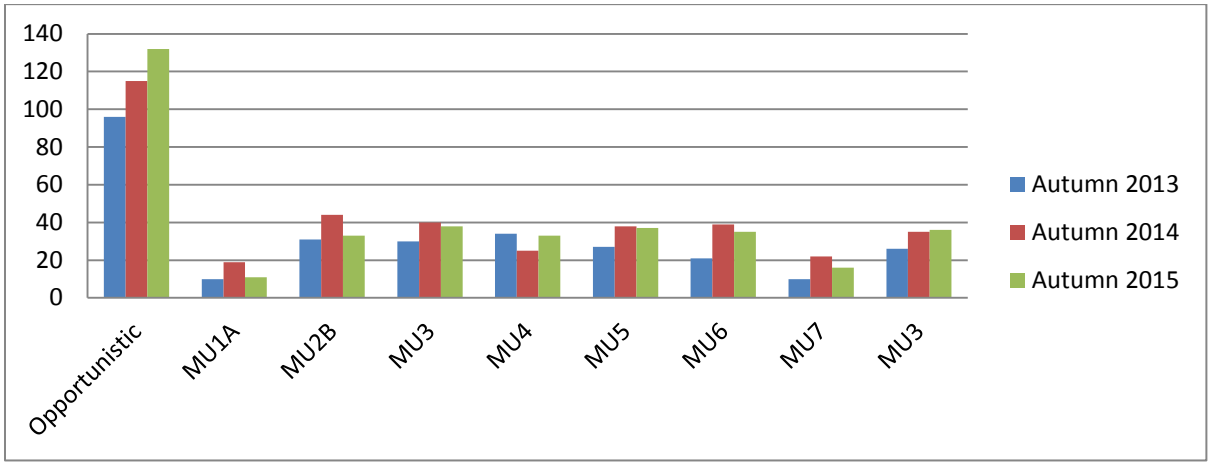

Figure 7: Number of native plant species per site for each autumn monitoring event.

The other consistent trend observed is an increase in the number of introduced species recorded across all plots in autumn 2015 relative to the number recorded in autumn 2013 surveys. This increase may be attributed to a range of factorsincluding the reduction in grazing pressure and corresponding increase in seeding events, which may have facilitated the spread of a range of introduced species already present on the greater site (**Figure 8**).

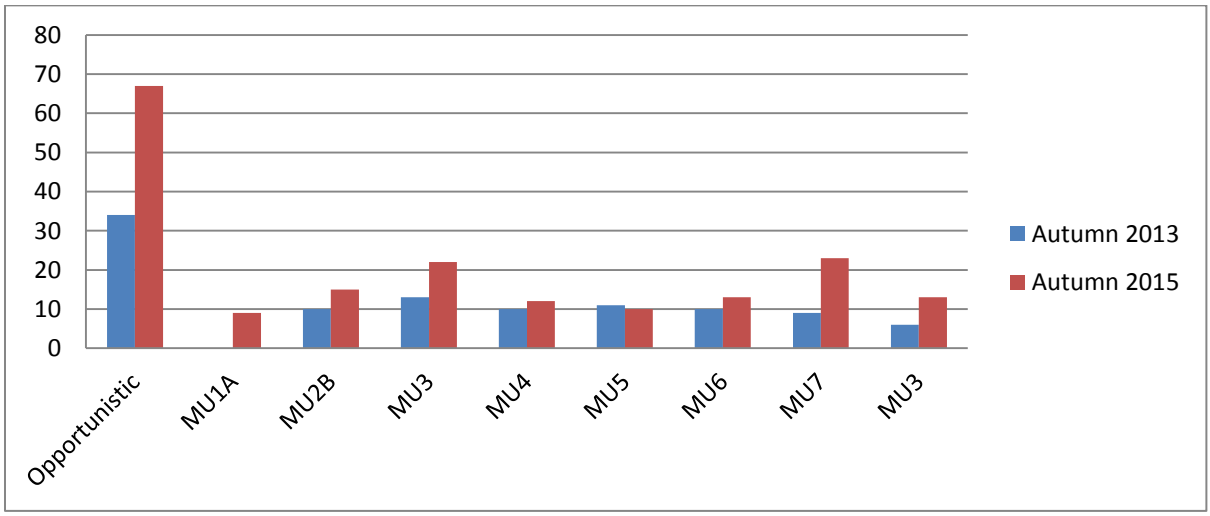

Figure 8: Number of exotic flora species recorded between autumn monitoring years.

All sites were below the overstorey cover and the total length of fallen logs benchmark values established for the ACT (Sharp & Milner 2014) . Saplings of overstorey species are present at most sites and in time will contribute to an increase in overstorey cover.

The results of the vegetation monitoring are provided in the following pages. The raw floristic data for each plot are provided in **Appendix A**.

4.1.1 Monitoring plot 1

Plot Description				
Management unit	MU1A		*Plot number*	1
Vegetation type	Box-Gum Woodland		*Condition*	Low-mod
Plot Statistics (%)	***Baseline***	**Aut. 2015**	**Overstorey**	
Native overstorey cover	*0*	0	Regeneration	Poor
Native midstorey cover	*0*	0	Species	*E. blakelyi*
Native understorey cover (grass)	*40*	28	**Habitat features**	
Native understorey cover (other)	*6*	22	Tree hollows	0
Exotic midstorey plant cover	*0*	0	Fallen logs	0 m
Exotic understorey plant cover	*58*	24		
Other (litter, bare, rock)	*N/R*	34		
Native species diversity	*14*	11		

Monitoring plot 1 is located within MU1A on the southern offset. The plot is composed of relatively lower condition Box-Gum Woodland. Few eucalypt saplings were observed in the vicinity of the plot but none were recorded in the plot or along the transect. Native species diversity was low-moderate (11 species), marginally more than recorded in the autumn 2013 surveys. 9 introduced species were recorded, with the number of species and cover being considerably higher than recorded during the baseline survey. *Carthamus lanatus* and *Trifolium subterraneum* dominate the plot. More frequent native species included *Austrostipa scabra, Bothriochloa macra* and *Carex inversa*. Fauna habitat features within MU1A have not changed noticeably since the baseline surveys. Native plant species richness, overstorey cover and the total length of fallen logs are well below benchmark values (Sharp & Milner 2014).

Figure 9: Monitoring Plot 1. (Left: Baseline monitoring photo, October 2011. Right: Monitoring photo April 2015)

4.1.2 Monitoring plot 2

Plot Description				
Management unit	MU2B		*Plot number*	2
Vegetation type	Box-Gum Woodland		*Condition*	Mod-Good
Plot Statistics (%)	***Baseline***	**Aut. 2015**	**Overstorey**	
Native overstorey cover	*0*	3	Regeneration	Yes
Native midstorey cover	*0*	2.5	Species	*E. blakelyi*
Native understorey cover (grass)	*80*	74	**Habitat features**	
Native understorey cover (other)	*4*	16	Tree hollows	0
Exotic midstorey plant cover	*0*	0	Fallen logs	1 m
Exotic understorey plant cover	*6*	2		
Other (litter, bare, rock)	*7*	24		
Native species diversity	*30*	33		

Monitoring plot 2 is located within MU2B within the southern offset. It is situated on a rocky hill containing Pink-tailed Worm Lizard habitat. Outcropping and surface rocks constitutes over 10% of the ground cover. It contains relatively good condition mature Box-Gum Woodland with scattered eucalypt saplings present. A total of 33 native species were recorded within the plot, two (2) more than during the baseline surveys. Frequent native species include *Chrysocephalum apiculatum, Austrostipa* bigeniculata and *Bothriochloa macra*. 15 introduced species were recorded, which is five (5) more than recorded in autumn 2013. Fauna habitat features within MU2B have not changed noticeably since the baseline surveys. Native plant species richness is above benchmark values (Sharp & Milner 2014), however overstorey cover and the total length of fallen logs are well below.

Figure 10: Monitoring Plot 2. (Left: Baseline monitoring photo, March 2012. Right: Monitoring photo April 2015)

4.1.3 Monitoring plot 3

Plot Description				
Management unit	MU3		*Plot number*	3
Vegetation type	Box-Gum Woodland		*Condition*	Mod-Good
Plot Statistics (%)	***Baseline***	**Aut. 2015**	**Overstorey**	
Native overstorey cover	*3.7*	7.5	Regeneration	Yes
Native midstorey cover	*5.2*	11.5	Species	*E. blakelyi*
Native understorey cover (grass)	*80*	52	**Habitat features**	
Native understorey cover (other)	*16*	10	Tree hollows	0
Exotic midstorey plant cover	*0.2*	0	Fallen logs	11 m
Exotic understorey plant cover	*10*	12		
Other (litter, bare, rock)	*N/R*	66		
Native species diversity	*27*	38		

Monitoring plot 3 is located within MU3 in the southern offset. The plot is located in moderate to good quality Box-Gum Woodland. A significant number of eucalypt saplings are present. A total of 38 native species were recorded within the plot, eight (8) more than during the autumn 2013 surveys. The understorey is dominated by *Themeda triandra*, with co-occurring native species having significantly lower cover values. The native mid-storey species *Bursaria spinosa* was present but rare. 22 introduced species were recorded, which was nine (9) more than that recorded in autumn 2013. Frequent weeds include *Aira* spp. and *Hypochaeris glabra*. Fauna habitat features within MU3 have not changed noticeably since the baseline surveys. Native plant species richness is above benchmark values (Sharp & Milner 2014), however overstorey cover and the total length of fallen logs are well below.

Figure 11: Monitoring Plot 3. (Left: Baseline monitoring photo, October 2011. Right: Monitoring photo April 2015)

4.1.4 Monitoring plot 4

Plot Description				
Management unit	MU4		*Plot number*	4
Vegetation type	Box-Gum Woodland		*Condition*	Mod-Good
Plot Statistics (%)	***Baseline***	**Aut. 2015**	**Overstorey**	
Native overstorey cover	*4.7*	6.5	Regeneration	Yes
Native midstorey cover	*11.5*	9.5	Species	*E. blakelyi*
Native understorey cover (grass)	*74*	98	**Habitat features**	
Native understorey cover (other)	*18*	10	Tree hollows	0
Exotic midstorey plant cover	*2*	0	Fallen logs	22 m
Exotic understorey plant cover	*28*	6		
Other (litter, bare, rock)	*N/R*	16		
Native species diversity	*24*	33		

Monitoring plot 4 is located in the northern offset in MU4. It is located in moderate to good quality Box-Gum Woodland dominated by *E. blakelyi*. Good numbers of eucalypt saplings are present compared to the baseline survey. A total of 33 native species were recorded within the plot, one less than that recorded in the autumn 2013 monitoring. The understorey is dominated by *Themeda triandra*, *Microlaena stipoides, Asperula conferta* and *Haloragis heterophylla*. 12 introduced species were recorded, two more than the number recorded in the autumn 2013 monitoring. Frequent weeds include *Bromus hordeaceus* and *Hypochaeris radicata*. Control of *R. rubiginosa* seems to be now under control when compared to earlier years. Fauna habitat features within MU4 have not changed noticeably since the baseline surveys. Most site parameters are just below, within or above benchmark values (Sharp & Milner 2014), except for total length of fallen logs.

Figure 12: Monitoring Plot 4. (Left: Baseline monitoring photo, October 2011. Right: Monitoring photo April 2015)

4.1.5 Monitoring plot 5

Plot Description				
Management unit	MU5		*Plot number*	5
Vegetation type	Box-Gum Woodland		*Condition*	Mod-Good
Plot Statistics (%)	***Baseline***	**Aut. 2015**	**Overstorey**	
Native overstorey cover	*0*	5.5	Regeneration	Yes
Native midstorey cover	*11*	12.5	Species	*E. blakelyi*
Native understorey cover (grass)	*76*	46	**Habitat features**	
Native understorey cover (other)	*14*	16	Tree hollows	0
Exotic midstorey plant cover	*0*	0	Fallen logs	3 m
Exotic understorey plant cover	*4*	0		
Other (litter, bare, rock)	*16*	62		
Native species diversity	*29*	37		

Monitoring plot 5 is a control plot located in MU5. No management actions will occur within the boundaries of the plot. Plot 5 is located in moderate-good quality Box-Gum Woodland dominated by *E. blakelyi* with a significant amount of natural regeneration present. The plot supports a highly diverse understorey of graminoids and forbs with 37 native species recorded in autumn 2015, 10 species more than the autumn 2013 monitoring. The understorey is dominated by *Themeda australis* and *Chrysocephalum apiculatum*. 10 introduced species were recorded, which is a reduction of one since autumn 2013; however, no weed species currently has a cover value exceeding 5%. Fauna habitat features within MU5 have not changed noticeably since the baseline surveys. Native plant species richness is above benchmark values (Sharp & Milner 2014), however overstorey cover and the total length of fallen logs are well below.

Figure 13: Monitoring Plot 5. (Left: Baseline monitoring photo, October 2011. Right: Monitoring photo April 2015)

4.1.6 Monitoring plot 6

Plot Description				
Management unit *Vegetation type*	MU6 Box-Gum Woodland		*Plot number* *Condition*	6 Mod-Good
Plot Statistics (%)	***Baseline***	**Aut. 2015**	**Overstorey**	
Native overstorey cover	*5.3*	6	Regeneration	yes
Native midstorey cover	*0*	0	Species	*E. blakelyi*
Native understorey cover (grass)	*80*	76	**Habitat features**	
Native understorey cover (other)	*10*	12	Tree hollows	0
Exotic midstorey plant cover	*0*	0	Fallen logs	0 m
Exotic understorey plant cover	*8*	10		
Other (litter, bare, rock)	*N/R*	32		
Native species diversity	*28*	35		

Monitoring plot 6 is located in MU6, along the central ridge line of the property, in moderate-good quality Box-Gum Woodland dominated by *E. blakelyi.* The plot is situated in an intersection between the woodland and derived grassland forms of the ecological community. Various sized *E. blakelyi* saplings are present within the plot. The plot supports a diverse understorey of grasses and forbs with no species dominant. 35 native species were recorded in autumn 2015, compared with 21 species in the autumn 2013 monitoring. 13 introduced species were recorded, an increase of three (3) species since autumn 2013. Frequent weeds include *Trifolium arvense, Tolpis umbellata* and *Vulpia* spp. Fauna habitat features within MU6 have not changed noticeably since the baseline surveys. Native plant species richness is above benchmark values (Sharp & Milner 2014), however overstorey cover and the total length of fallen logs are well below.

Figure 14: Monitoring Plot 6. (Left: Baseline monitoring photo, March 2012. Right: Monitoring photo April 2015)

4.1.7 Monitoring plot 7

Plot Description				
Management unit	MU7		*Plot number*	7
Vegetation type	Box-Gum Woodland		*Condition*	low
Plot Statistics (%)	***Baseline***	**Aut. 2015**	**Overstorey**	
Native overstorey cover	*0*	0	Regeneration	No
Native midstorey cover	*0*	0	Species	*N/A*
Native understorey cover (grass)	*74*	62	**Habitat features**	
Native understorey cover (other)	*0*	18	Tree hollows	0
Exotic midstorey plant cover	*0*	0	Fallen logs	8 m
Exotic understorey plant cover	*34*	56		
Other (litter, bare, rock)	*N/R*	6		
Native species diversity	*13*	16		

Monitoring plot 7 is located within MU7 in the northern offset. The management unit is composed of degraded Box-Gum Woodland with the overstorey dominated by *E. blakelyi.* No recruitment of *E. blakelyi* was observed. Native species diversity in the plot was low (16 species), though this was an increase since the autumn 2013 monitoring by six (6) species. Only *Carex inversa* was common, though with less than 5% cover. Introduced species dominate the site, with 23 species recorded in autumn 2015, an increase of 14 species since the autumn 2013 monitoring. Dominant weeds in autumn 2015 were *Bromus diandrus* and *Trifolium subterraneum*. Fauna habitat features within MU7 have not changed noticeably since the baseline surveys. All site parameters were well below benchmark values (Sharp & Milner 2014), except for native understorey (other) cover.

Figure 15: Monitoring Plot 7. (Left: Baseline monitoring photo, March 2012. Right: Monitoring photo April 2015)

4.1.8 Monitoring Plot 8

Plot Description				
Management unit	MU3		*Plot number*	8
Vegetation type	Box-Gum Woodland		*Condition*	Mod-Good
Plot Statistics (%)	***Baseline***	**Aut. 2015**	**Overstorey**	
Native overstorey cover	*0*	7	Regeneration	Yes
Native midstorey cover	*8.5*	0.5	Species	*E. blakelyi*
Native understorey cover (grass)	*80*	76	**Habitat features**	
Native understorey cover (other)	*14*	14	Tree hollows	0
Exotic midstorey plant cover	*0*	0	Fallen logs	14 m
Exotic understorey plant cover	*4*	2		
Other (litter, bare, rock)	*N/R*	38		
Native species diversity	*26*	36		

Monitoring plot 8 is a control plot located in MU3. No management actions are proposed to occur within the bounds of the plot. The plot is located in good quality Box-Gum Woodland dominated by *E. blakelyi.* Various sized *E. blakelyi* saplings are present within the plot. The understorey species is dominated by *Themeda triandra* with a diverse range of co-occurring graminoids and forbs. 36 native species were recorded in autumn 2015, an increase of 10 species since the autumn 2013 surveys. 13 introduced species were recorded, seven (7) more than the number recorded in the baseline survey. Fauna habitat features have not changed noticeably since the baseline surveys. Native plant species richness is above benchmark values (Sharp & Milner 2014), however overstorey cover and the total length of fallen logs are well below.

Figure 16: Monitoring Plot 8. (Left: Baseline monitoring photo, October 2011. Right: Monitoring photo April 2015)

5 Weed monitoring

5.1 Weed management actions undertaken to date

Weed management on site has included control of the perennial grasses *Eragrostis curvula* (African Lovegrass) and *Nassella trichotoma* (Serrated Tussock) in mid-2012 and mid to late-2013, and control of the perennial broad-leaved species *Rosa rubiginosa* (Sweet Briar), *Rubus* sp. (Blackberry), and *Hypericum perforatum* (St. John's Wort) over the summer 2012 / 2013 and summer 2013 / 2014 periods.

Weed control works were undertaken across the offset site from the 9th – 15th December 2014. While control works were implemented in December 2014, the efficacy of these works appears to have been patchy with some individuals missed completely or only partially controlled. Off target damage was noted in some areas.

5.2 Weed monitoring results

A summary of the distribution and abundance of declared weed species across the offset site recorded during the monitoring survey is provided in **Table 6** below.

The indicative distribution of declared weed species across the offset site is mapped in **Figure 17** and **Figure 18**.

Table 6: Summary of prior weed occurrence and autumn 2015 monitoring results

Species	Weed occurrence prior to current surveys (baseline)	Autumn 2015 monitoring results
African Lovegrass (*Eragrostis curvula*)	Low, localised areas of dominance. Present across the offset site in isolated patches. Where it occurs, it forms a dense mat of tussocks and dominates the understory.	Relatively few isolated individuals or small patches were observed along tracks across the offset site with some heavier infestations around the main drainage line. Control appears to have been successful in most areas, however isolated infestations are still present. **MU occurrence**: MU2A, 6, 7 **Recommendation**: Follow-up weed control required targeting drainage lines and isolated individuals.
Serrated Tussock (*Nassella trichotoma*)	Low, scattered individuals in some areas. Present in open areas of the offset site. Primarily present as a number of scattered individuals within MU1 along the southern boundary.	Scattered plants persist near the southern boundary of the southern offset. Control work undertaken in mid to late-2013 appears to have been less successful than previously reported. **MU occurrence**: MU1A, 2B **Recommendation**: Follow-up weed control required in accordance with weed control program outlined in the sub-plan.

Species	Weed occurrence prior to current surveys (baseline)	Autumn 2015 monitoring results
Blackberry (*Rubus fruticosus*)	Low, localised areas of dominance. Predominantly found within the northern offset, and was more or less restricted to the drainage lines or moist areas.	Targeted control work has been highly successful. Occasional isolated patches and scattered young individuals were observed in autumn 2015. **MU occurrence**: MU1A, 1B, 3, 4, 5, 6, 7 **Recommendation**: Follow-up control.
Woody Weeds (Hawthorn, *Prunus, Pyracantha & Cotoneaster*)	Very low, isolated individuals. Present within the study area as isolated individuals.	Scattered plants persist throughout the offset site as some individuals were missed during the spraying operations. **MU occurrence**: MU3, 4, 5, 6, 7 **Recommendation**: Targeted control of isolated individuals.
St John's Wort (*Hypericum perforatum*)	Scattered and moderate occurrence across the offset site.	Despite control efforts over summer 2012/2013 and 2013/2014, the species remains extensively distributed across both the northern and southern offsets. *Chrysolina* Beetles, one of the main biological control agents for the species, have naturally established on site but have a patchy distribution. Total defoliation by *Chrysolina* Beetles was observed in some areas, but has not resulted in the death of the affected plants. **MU occurrence**: All units **Recommendation**: Closely monitor the distribution and abundance of *Chrysolina* Beetles across the offset sites. Physically redistributing beetles across the offset sites will maximise their effectiveness. Plants may recover if there is sufficient summer rain and if beetle populations are low (Briese et al 2000). Herbicide application may be required in shady areas under trees where *Chrysolina* Beetles are ineffective (Briese et al 2000).

Species	Weed occurrence prior to current surveys (baseline)	Autumn 2015 monitoring results
Thistles (*Carthamus lanatus, Carduus* spp. & *Onopordum* spp.)	Moderate, localised areas of dominance.	Thistles were recorded predominantly in areas with significant history of disturbance. *Carduus* spp. were commonly encountered beneath the canopy of trees. MU1 has a substantial cover of young *Carthamus lanatus* that will become denser as the season progresses. The adjacent property to the south also has a high cover of thistles, which makes any corrective action within the offset site difficult. **MU occurrence**: MU1A, 1B, 3, 4, 6, 7 **Recommendation**: For *Carthamus lanatus* particularly, consider control options within a broader program encompassing the adjacent property.
Sweet Briar (*Rosa rubiginosa*)	Moderate, widely distributed at low density with scattered individuals, some areas of dominance. Present across the offset site, often with larger infestations under mature trees.	Weed control work on *Rosa rubiginosa* appears to have been largely successful, despite re-sprouting that was observed in spring 2014. However, some re-sprouting was still observed and it expected that continued follow up work for the species is necessary. **MU occurrence**: All units. **Recommendation**: Follow up spot spraying of individuals missed or re-sprouting.

A cumulative total of 121 introduced species have been recorded for the offset site. A breakdown of species by life form is provided in **Table 7.**

Table 7: Number of introduced species by life form (based on spring 2014 monitoring data)

Life form	Number of species
Annual grasses	19
Annual sedges, rushes and irids	3
Perennial grasses	8
Perennial sedges and irids	3
Annual forbs (obligate)	74
Perennial forbs (obligate)	8
Shrubs and trees	6

Of note is the large proportion of annual weed species occurring on site. A total of 74 species occurring on site are annual forbs. There are 19 species of annual grass that occur on site.

A number of annual forbs and grasses are highly invasive and are well established across the offset site. Such species include *Aira* spp., *Briza minor*, *Bromus hordeaceus*, *Erodium cicutarium*, *Hypochaeris glabra*, *Linaria* spp., *Parentucellia latifolia*, *Pentaschistis airoides*, *Petrorhagia nanteuilii*, *Tolpis umbellata*, *Trifolium* spp. and *Vulpia* spp. Their impact on native flora can be significant if they occur in high densities, whether as individual species or as mixtures of multiple species. Several annual grasses including *Briza* spp., *Bromus* spp. and *Vulpia* spp. are particularly problematic. To date annual weeds have not been included in the control program at M2G.

Although it is impractical to attempt to control all of these species throughout the offset, their control in specific higher quality areas within the offset site could be considered. Control actions if undertaken should focus on the prevention of seed production in spring. Spring burning and the addition of carbon supplements have shown promise (Prober et al 2005). Weed burners, mowers or brush cutters are alternatives means of removing flowering parts before seed maturity. A specialist bush regeneration team may be required to undertake this work, as it requires a good knowledge of plant identification, the ability to recognise optimal timing for actions and familiarity with control techniques.

Prior to undertaking any weed control work of this nature, it would be essential to identify the areas within the offset that have particular values to manage (e.g. high plant diversity, presence of threatened or rare species, lower densities of competitive weeds). Mapping the occurrence and density of the range of competitive weed species on site, not just those declared species, would assist in identifying areas on vegetation in better condition. A map of this type would assist in planning a weed management program that is based on maintaining or improving the condition of the better quality areas and working outwards into areas in poorer condition. Control of some annual grass species would need to be a component of an area-based approach of this nature.

5.3 Adaptive management recommendations

- ELA recommends that continued control of African Lovegrass, Serrated Tussock, Sweet Briar, Blackberry, Hawthorn, *Prunus* sp., *Pyracantha* sp. and *Cotoneaster* sp. be undertaken, as required and as outlined in the weed management sub-plan.
- ELA recommends that control work on Thistles be undertaken, especially in the southern offset (particularly MU1B). This work should not be limited to the offset site but include control within the adjacent southern property for maximum effectiveness.
    - Control techniques such as the application of sugar and Kangaroo Grass mulch which are being investigated to control weeds within the pipeline corridor could also be beneficial in controlling thistles within the offset site in areas where they are a dominant component of the understory.

  Biological control (*Chrysolina* beetles) should be the primary control method for St John's Wort. It is recommended that the distribution and abundance of *Chrysolina* Beetles across the offset site be monitored through the spring and summer months and beetles redistributed to maximise their effectiveness. Herbicide application may be required in shady areas under trees where *Chrysolina* Beetles are ineffective.
- To provide guidance to the prioritisation of weed management actions and to enable better targeted protection of exceptional areas of the offset site, a map of key values which are desired to be protected should be developed (e.g. areas with high plant diversity, presence of threatened or rare species, lower densities of competitive weeds).

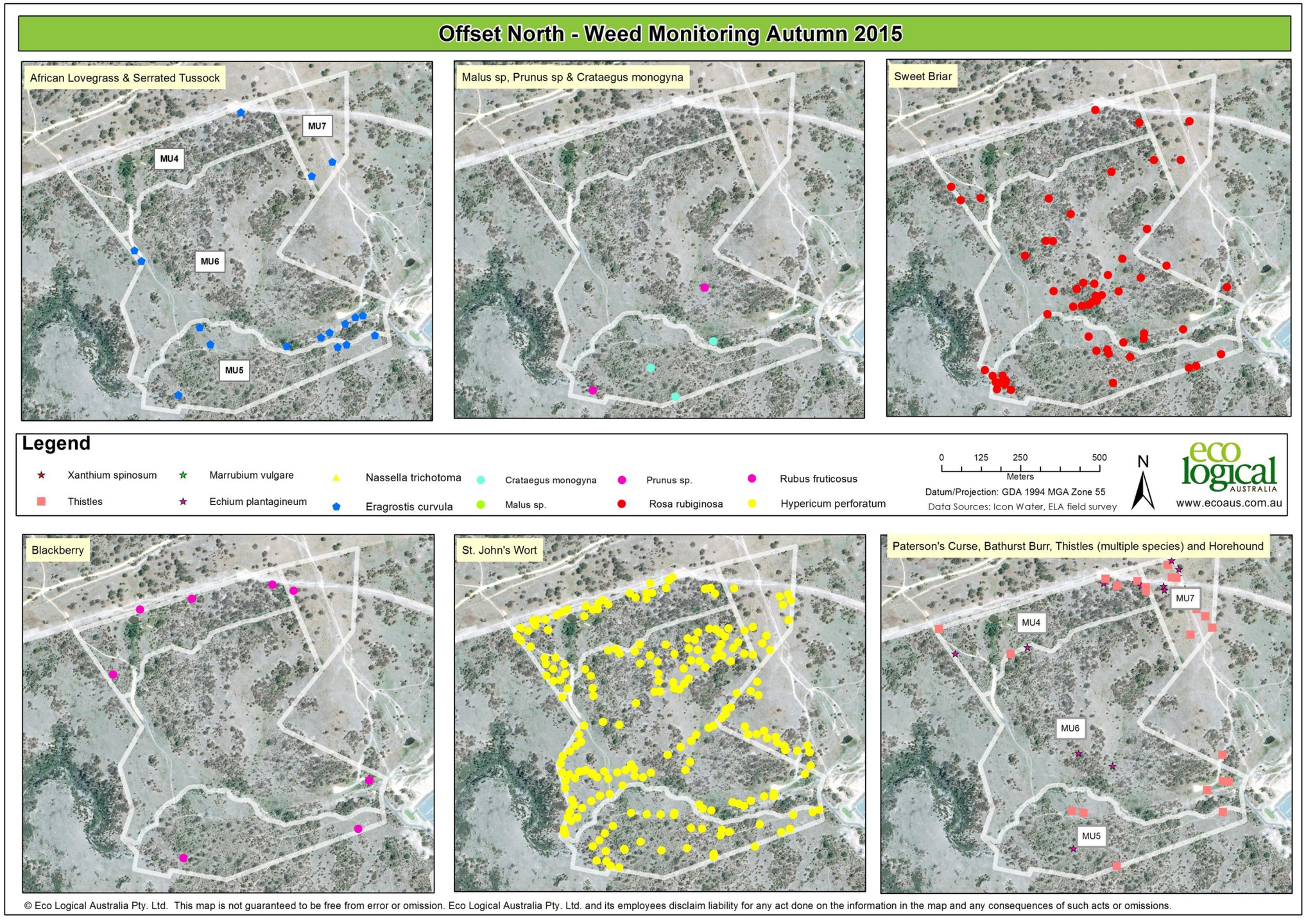

Figure 17: Relative weed distribution, northern offset

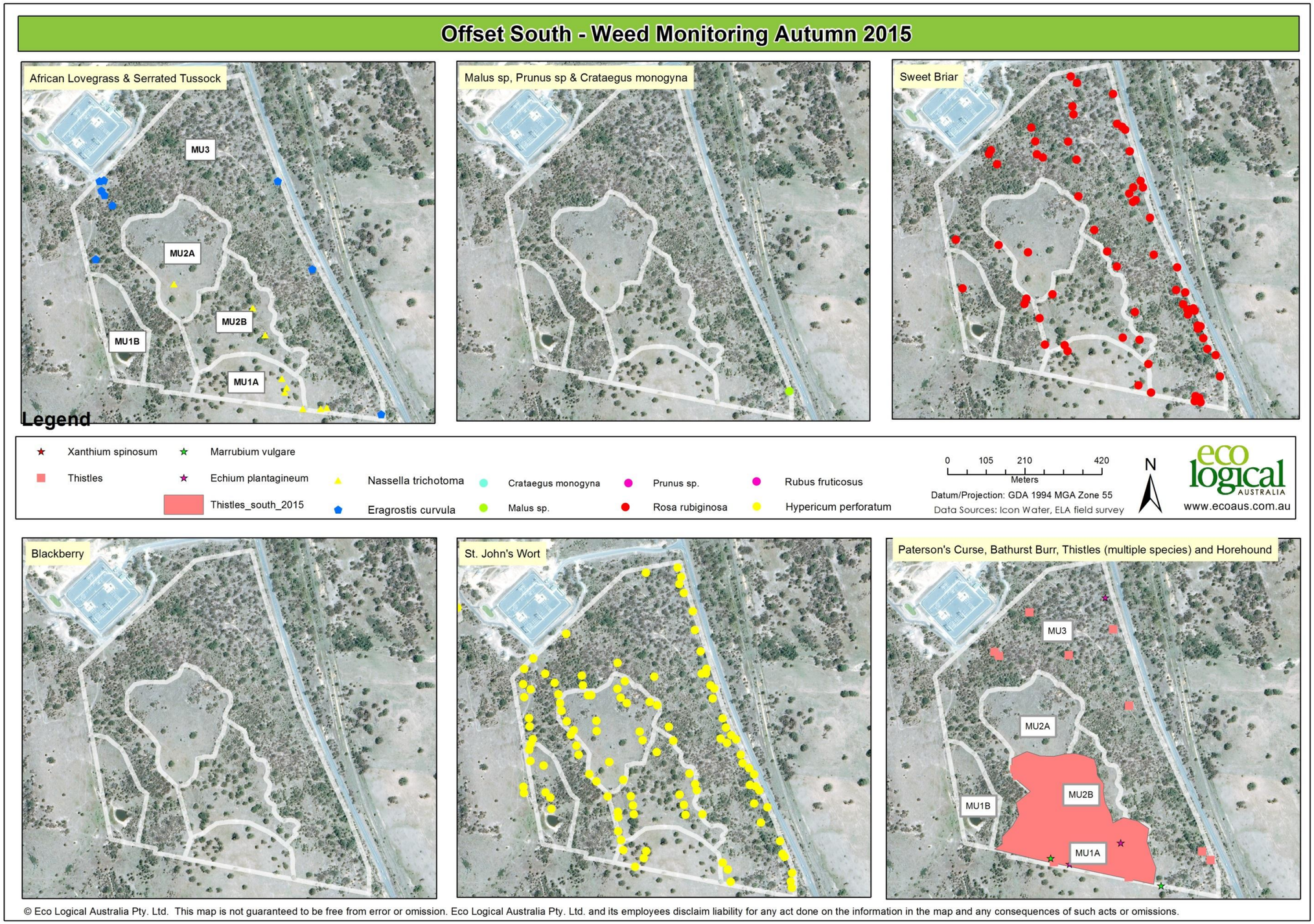

Figure 18: Relative weed distribution in the southern offset

6 Erosion monitoring

6.1 Erosion management actions undertaken to date

No on-ground erosion management activities have been undertaken to date. For further detail on management actions recommended refer to the ODP and Erosion Management Sub-plan.

During the ERG site visit to the M2G Biodiversity Offset on 22 October 2014, concern was expressed over potential erosion problems in two areas adjacent to the main drainage channel in the northern offset. The two sites are located along the main drainage line separating MU5 & MU6 within the northern offset. Recommendations around rehabilitation options were presented in the spring 2014 monitoring report. As recommended in the report, options to rehabilitate these points should be investigated.

6.2 Erosion monitoring point results – autumn 2015

Erosion monitoring point locations included in the autumn 2015 surveys are mapped in **Figure 19** and **Figure 20**.

The total annual rainfall to April 2015 was 306.2 mm (BOM 2015; Tharwa General Store, station 70083, approx. 8 km north-west). During this period rainfall was above the mean for January and April. A total of 138 mm of rain fell within the month leading up to the surveys. The largest rainfall event occurred between 7 and 8 April, with 110 mm of rain recorded.

The majority of erosion monitoring points are located along ephemeral drainage lines in the northern offset. The erosion points are in a variety of conditions; however, vegetative cover surrounding each point is generally sufficient to limit erosion potential. All of the monitoring points are currently stable, but some may require minor remediation works in the future if they are found to be continuously active and/or active following a significant rain event.

It should be noted that approval is required to undertake any remediation works within a drainage line (see erosion sub-plan), and may influence the type of work to be undertaken. A summary of the erosion points monitored within the offset property is provided below with a detailed description of each point and an accompanying photo.

Figure 19: Erosion monitoring points in northern offset

Figure 20: Erosion monitoring points in southern offset

Erosion Point 2:

Description: Situated within an ephemeral drainage line in MU4, northern offset.

Size: Approximately 4 m across, 0.8 m deep and 2.0 m in length.

Change: No significant change observed since baseline monitoring survey.

Action required: No works required at this stage.

Autumn 2012 (baseline)

Autumn 2015

Erosion Point 4:

Description: Located within an ephemeral drainage line within MU4, northern offset.

Size: Approximately 2.0 m wide, 0.5 m deep, 2.5 m long.

Change: No significant change observed since baseline monitoring survey.

Action required: No works required at this stage.

Autumn 2012 (baseline)

Autumn 2015

Erosion Point 6:

Description: Located within an ephemeral drainage line within MU4, northern offset. Evidence of sheet erosion along bank and some rilling.

Size: Approximately 6 m long, 1.5 m deep and 2.5 m wide.

Change: No change observed since baseline monitoring survey.

Action required: Consider removing erosion point from future monitoring surveys.

Autumn 2012

Autumn 2015

Erosion Point 7:

Description: Located along the main creek line within northern offset. Photo taken from Photo Point 1 (co-ordinates; 6059835, 692700) looking north-west (315^{o}) and showing the north bank.

Size: Approximately 20 m long and 1.0 m deep.

Change: No significant change observed since baseline monitoring period. However, low active erosion maybe occurring as water sheets off upslope area.

Action required: Targeted monitoring at photo point following >25mm/24hr period.

Autumn 2012 (baseline)

Autumn 2015

Erosion Point 8:

Description: Located along the main creek line within northern offset. Photo taken from Photo Point 1 (co-ordinates; 6059835, 692700) looking north-east (45^{o}) and showing the north bank (upstream from erosion point 7).

Size: Approximately 15 m long and 1.0 m deep.

Change: A small amount of erosion may be occurring on the northern bank.

Action required: Targeted monitoring at photo point following >25mm/24hr period. Rehabilitation measures to increase bank stability such as plantings could be considered.

Autumn 2012 (baseline)

Autumn 2015

Erosion Point 9:

Description: Situated near the western boundary of the southern offset.

Size: Approximately 20 m long and 1 m deep.

Change: No significant change observed since baseline monitoring survey.

Action required: No action required.

Autumn 2012 (baseline)

Autumn 2015

Erosion Point 10:

Description: Situated along the western fence line of the southern offset. Small area of erosion due to upslope runoff.

Size: Approximately 5.0 m long and 0.5 m deep.

Change: Some minor erosion has occurred adjacent to the new fence line since the baseline surveys (this is within the neighbouring property to the south of the offset site).

Action required: No immediate action required.

Autumn 2012 (baseline)

Autumn 2015

Erosion Point 13:

Description: Moderately sized erosion point in northern offset. Evidence of existing slumping.

Size: Approximately 4.0 m long, 1.5 m deep and 2-3.5 m wide.

Change: Some minor slumping at gully head previously occurred. No change since spring 2012.

Action required: No immediate action required.

Autumn 2012 (baseline)

Autumn 2015

Erosion Point 18:

Description: Located along an ephemeral drainage line within the northern offset. Evidence of stream bed exposure, pooling and in-stream vegetation.

Size: Approximately1.5 m deep, 3.0 m wide, 4.0 m long.

Change: No further slumping or erosion since autumn 2014 has occurred. Grasses and forbs have begun to colonise areas of bare soil (red circle).

Action required: No ground works required at this stage.

Autumn 2012 (baseline)

Autumn 2015

Erosion Point 21:

Description: Located west (just downstream) from the access track running along the western boundary in the northern offset. The site has developed a plunge pool, which has exposed the bedrock in some parts.

Size: 1-2 m wide, 0.6 m deep, 1.5-3 m long.

Change: No change since previous survey.

Action required: No action is required at this stage.

Spring 2012 (baseline)

Autumn 2015

Erosion Point 22: Point established at overflow point of southern dam during the spring 2013 monitoring surveys.

Description: Southern dam overflow – flowing water causing erosion at exit point.

Size: 20 cm wide, 30 cm deep, 1.5 m long.

Change: Water flow previously caused the erosion point to deepen and widen. Although the depth has reduced this point remains susceptible to further erosion.

Action required: No works required at this stage

Spring 2013 (baseline)

Autumn 2015

7 Feral animal monitoring

In accordance with the Feral Animal Sub-plan (see ODP) monitoring of the offset site for feral animal activity is being undertaken on a biannual basis to inform feral animal control actions.

7.1 Management actions to date

7.1.1 Feral pigs

The autumn and spring 2012 monitoring surveys identified *Sus scrofa* (Feral Pig) within the offset property. Prior to the autumn 2012 monitoring, this species had not been observed. Disturbance within the offset included pig rooting, often in areas associated with a forage source, and tracks through boggier areas of the site. The disturbance caused by the pigs was locally significant, but pig activity was at a low density across the whole of the offset.

It was recommended that the level of disturbance be monitored and appropriate action taken if the level of disturbance increased significantly. In response to the recommendation, Regional Feral Animal Control (RFAC) was engaged to conduct control activities at the M2G offset site from 11th September 2012 to 3rd October 2012. A total of 21 pigs were trapped and destroyed over the control period. Follow-up monitoring conducted by RFAC two weeks following control period did not record any fresh signs of feral pigs.

During the autumn 2014 monitoring surveys a small group of pigs were observed and widespread minor pig damage noted. In response Icon Water engaged RFAC to conduct further control activities at the M2G offset site. Over the control period between 16th June and 4th July 2014, a total of nine pigs were removed from the site.

7.1.2 Feral goats

Two herds of 60+ *Capra hircus* (Feral Goat) were observed within the offset site (also within adjacent property to the south) during the spring 2013 monitoring surveys. The species was considered likely to be utilising a large area, including the offset site, neighbouring properties and Murrumbidgee River corridor. The lack of disturbance (agriculture activities) within the offset site is likely to provide a refuge for the goats. The spring 2013 monitoring surveys observed localised goat camps (e.g. under a stand of trees) and increased grazing pressures at these points. However, the overall quality and condition of the offset site did not appear to be impacted significantly.

As a proactive measure Icon Water undertook goat control activities in December 2013. A total of 150 feral goats were removed from the offset site. Subsequent aerial monitoring did not record any goats within the offset site.

During the pig control and monitoring program undertaken by RFAC between 16th June and 4th July 2014, 28 feral goats were recorded within the offset site. The species is considered likely to be utilising a large area, including the offset site, neighbouring properties and Murrumbidgee River corridor and is likely to be present within the offset site intermittently.

7.2 Feral animal monitoring results – autumn 2015

Monitoring of feral animals using infra-red cameras (**Figure 21**) and opportunistic observations was conducted as part of the monitoring surveys. Targeted searches were undertaken around drainage

lines, permanent water sources and along animal tracks for fresh signs (scats & tracks) of feral animal activity.

7.2.1 *Vulpes vulpes* (European Fox)

A total of two Foxes were observed within the offset site, individuals were also recorded on remote cameras and scats were detected within the offset site.

7.2.2 *Oryctolagus cuniculus* (European Rabbits) and *Lepus europaeus* (Hares)

Rabbits were observed frequently within the offset site, small warrens were observed at a couple of locations and some individuals appear to be free living.

7.2.3 *Dama dama* (Feral Fallow Deer)

No fallow deer were recorded during the autumn 2015 surveys.

7.2.4 *Capra hircus* (Feral Goat)

Feral Goats were observed on two occasions, with an adult female and three kids observed initially and then an additional 16 adults observed. Scats were also observed across the site.

7.2.5 *Sus scrofus* (Feral Pig)

Several feral pigs were observed at one location and pig diggings were recorded at a number of locations across the site.

7.2.6 *Bos Taurus* (Cattle)

A lone unpolled Hereford male was observed in early June by Icon water personnel.

A single individual was also captured on the remote camera situated at the dam in the southern offset. Evidence of the animal utilising the offset site was also recorded opportunistically at various locations (scats and tracks).

7.3 Recommendations and actions

- Undertake control for Feral Pigs during winter 2015 and summer 2016
- Monitor Feral Goats numbers within the offset site during winter/spring 2015 and undertake control if more than 50 individuals are observed to be utilising the offset site.
- Liaise with Parks and Conservation Service to expand existing fox baiting programs during 2015 to include the offset site.
- Report presence of feral animal activity (for goat, pig and deer) to the local control agencies. This will assist with information that may guide any broad or landscape scale control activities.

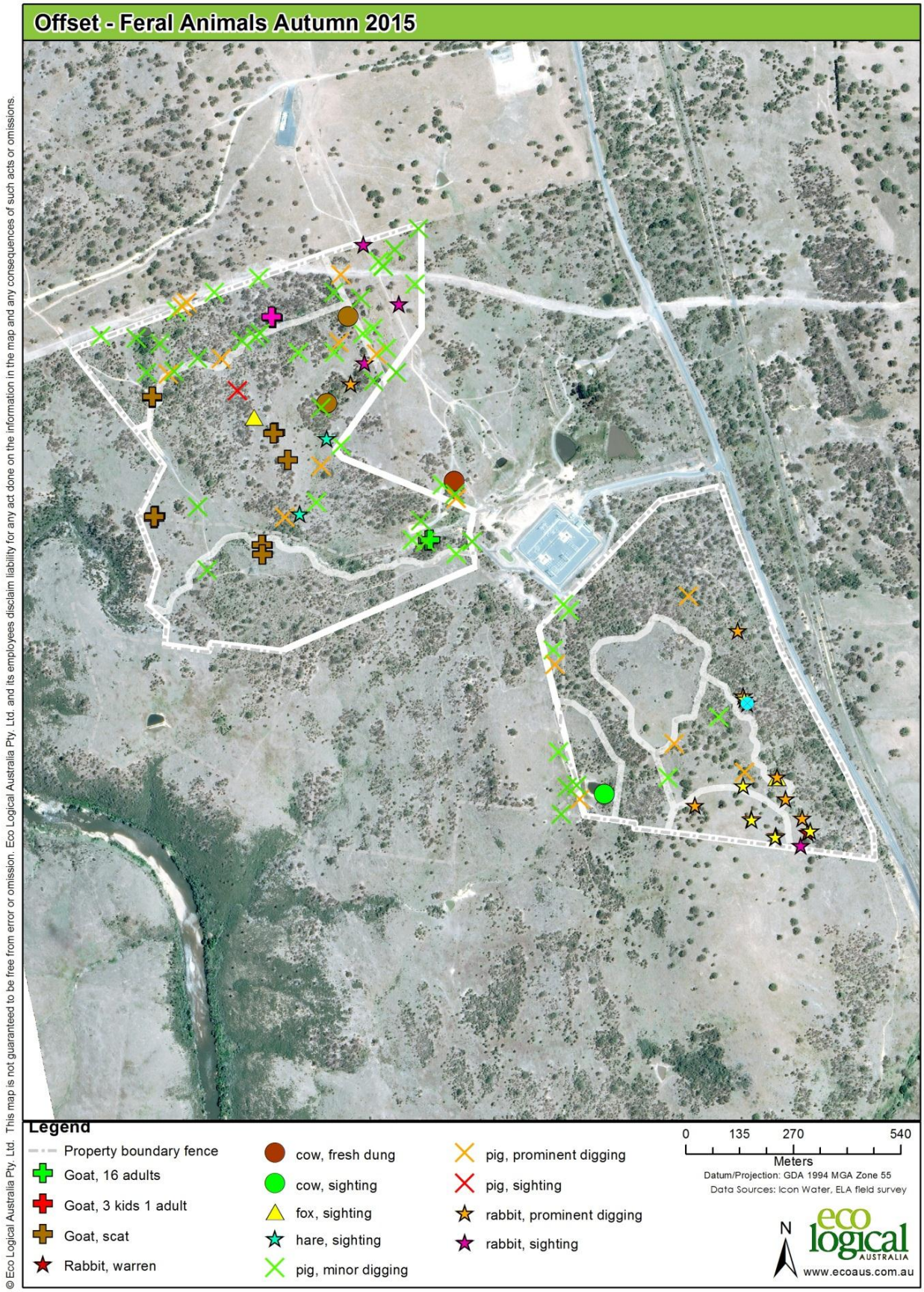

Figure 21: Feral animal observations

8 Fencing monitoring

8.1 Management actions to date

Fencing of the offset site was one of the required actions highlighted in the ODP. Fencing is required to prevent grazers, such as sheep and cattle entering the offset site from the neighbouring properties. The primary aim of a stock proof fence is to keep grazing stock out of an area (e.g. conservation area) where it is bordered by a private rural property. This type of fencing generally consists of 4 or 5 stranded wire (including 2 or 3 barbed wire strands) with wooden posts and/or star-pickets, approximately 1.2 m high.

In response to recommendations in previous monitoring reports, all internal fencing within the offset site was removed in June 2013 to enhance the wildlife friendly nature of the offset site, and be consistent with the biodiversity conservation ideals of the ODP and associated sub-plans.

No fence maintenance has been undertaken in the period since the spring 2014 monitoring survey.

8.2 Fencing monitoring results

The results of the autumn 2015 fencing monitoring survey are outlined below based on the main boundaries:

- *Northern boundary*: Small holes at the base of the northern boundary fence were recorded and require continued monitoring. The small holes allow the free movement of wombats and small kangaroos across property boundaries. Minor maintenance maybe required at these points once the pipeline fence has been removed (currently acting as an additional barrier), if sheep are grazed in the paddock north of the Williamsdale property and holes become large enough for individuals to enter the offset site.
- *Eastern boundary*: The eastern boundary fence of the Williamsdale property, adjacent to the Monaro Highway is mostly considered adequate. One section approximately five metres in length where the fence crosses a drainage line (north of the entrance to the sub-station) requires replacing. However, it does not pose an immediate risk to stock entering the offset site. Grazing of stock does not occur along the Monaro Highway and other internal fencing within the Williamsdale property (e.g. boundary of the sub-station and newly erected section along MU7) provide a barrier to the offset site. A section of fence in the south eastern corner has been damaged by a falling tree limb and will require repair. Small holes similar to those observed along the northern boundary were also recorded at points on the eastern boundary and require continued monitoring.
- *Western boundary*: The western boundary fence is adequate to exclude stock. However, minor maintenance is recommended for consideration for a few points where animals (e.g. wombats, kangaroos and potentially goats) have created small to moderate sized holes. These points are identified as low risk damage in **Figure 22**. There is no risk of stock entering the offset site at these points as the western boundary borders the Murrumbidgee River corridor where grazing does not occur. However, some of these points may be used by goats to enter the property and should be considered as an additional action following the removal of the goats from the offset site.
- *Southern boundary*: The southern boundary fence is adequate to exclude stock. However, Small holes at the base of the southern boundary fence were recorded and require continued monitoring. Two gates along the southern boundary fence were observed to be open during the monitoring surveys.

8.3 Recommendations

The overall condition of the Williamsdale property and offset boundary fencing is considered adequate to exclude grazing by stock within the offset site.

It is recommended that the fence continue to be monitored to ensure that it is maintained as an effective barrier to the movement of stock. It is also recommended that the gate to the Gigerline Nature Reserve remain closed to minimise the number of access points to the property.

Consideration should be given to the eventual replacement of the netting fence along the Monaro highway and in other areas that it occurs along the boundary of the property. Netting fences are typical of old agricultural boundary fencing and were designed to minimise the movement of rabbits between neighbouring properties. This style of fencing is not wildlife friendly and can require considerable ongoing maintenance.

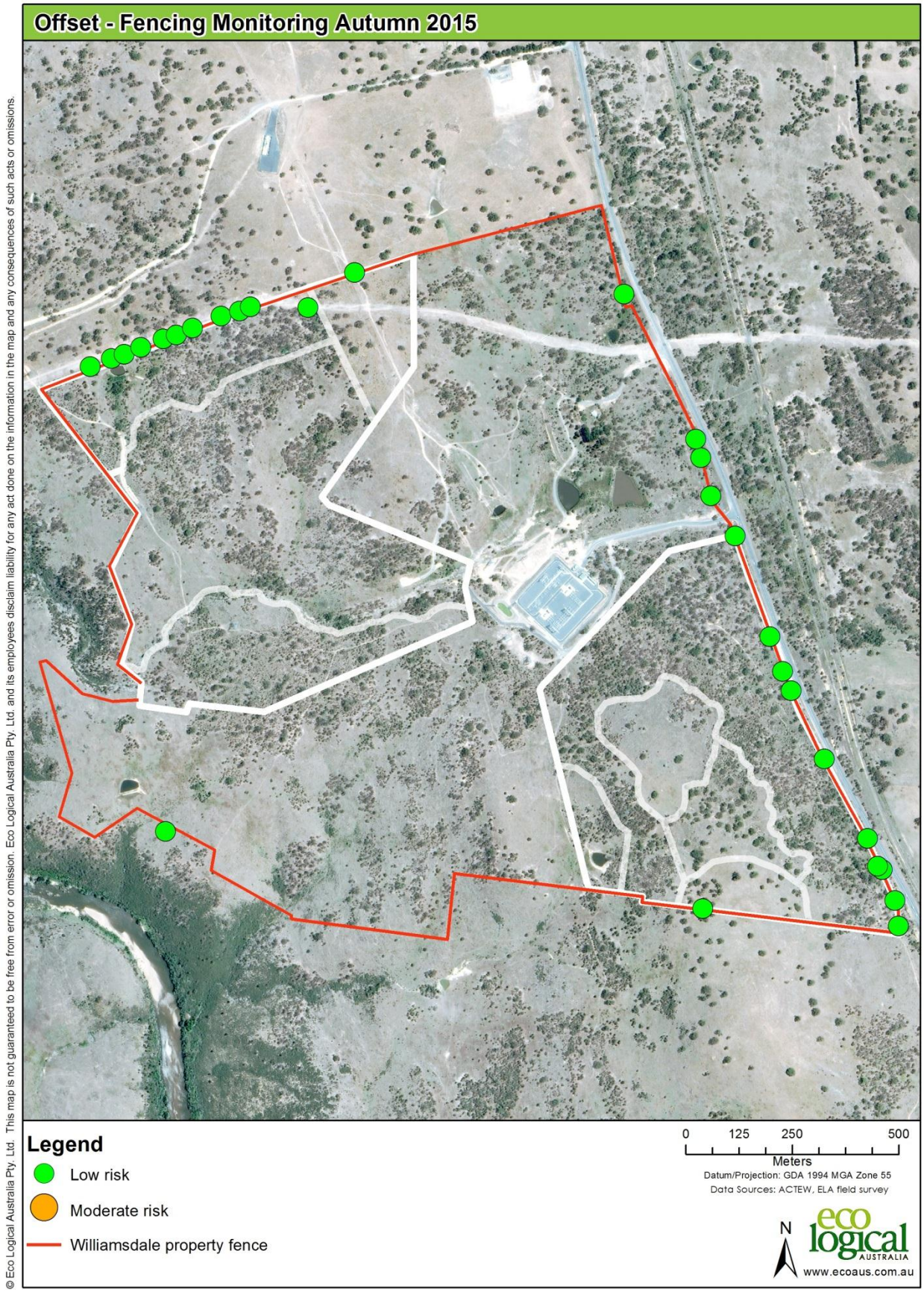

Figure 22: Williamsdale property fence with points recommended for repair

9 Summary

9.1 General

The offset site is considered to be in good condition and is providing habitat for a range of threatened, rare and uncommon flora and fauna species. The management actions implemented to date appear to be working satisfactorily; however, some on-going maintenance is required in a small number of areas.

The monitoring which has been undertaken over the past four years has provided a good understanding of the fauna species which are present and utilising the offset site. As such, it is recommended the following components of monitoring be discontinued as part of the standard monitoring actions as it is unlikely that new species will detected.

- Anabat surveys
- Spot lighting
- Frog surveys

While these surveys are not required to be undertaken as a component of the standard monitoring surveys, it is recommended that they be undertaken as outlined in section 9.1.2 below, and every 4-5 years thereafter.

9.1.1 Ecosystem health

The autumn 2015 surveys recorded an infestation of Lerps on *Eucalyptus blakelyi* within the offset site. While the infestation appears to be widespread through the ACT region based on opportunistic observations, Lerp infestations can be exacerbated by exclusion of insectivorous bird species by Noisy Miner which could result in a reduction in the resilience of the ecosystem limiting its ability to respond to stressors such as a Lerp outbreak. The following recommendations have been made in response to the lerp outbreak observed:

- Undertake a quantitative bird survey in winter and spring to:
  - Assess whether winter migrants (e.g. Regent Honeyeater) are opportunistically taking advantage of the lerp
  - Assess the abundance and distribution of Noisy Miner within the offset site
  - Assess the abundance of insectivorous bird species
  - Assess how vegetation structure may influence bird assemblage
  - Provide a quantitative baseline for future monitoring
- Assess the distribution of shrub regeneration across the offset site and determine whether assisted regeneration or other intervention is necessary to:
  - reduce the suitability of the site for the Noisy Miner.
  - provide refuge for leaf gleaners/insectivorous birds

9.1.2 Timing of future monitoring

Once an initial 5 year monitoring period has been completed (following completion of surveys in spring 2015), it is no longer considered necessary to undertake the full suite of monitoring actions with the same frequency, as a good understanding of the condition of the offset site and the values that it contains will have been achieved.

It is recommended that the frequency of the monitoring be reduced to once every 2 years during spring only. This will still enable sufficient information to be obtained to track the progress of the site and identify any areas of concern. However, while it is not considered necessary to undertake the full suite of monitoring actions with the same frequency, it is recommended that interim site visits be undertaken approximately every 6 months to ensure that any potential issues such as large increases in the feral animal population, erosion events and new weed infestations continue to be detected quickly and can be dealt with appropriately. Interim monitoring can be undertaken opportunistically by suitably qualified and experienced Icon Water personnel. Icon Water personnel should also be encouraged to make opportunistic observations when on site and respond to events such as flooding and fire to assess impacts to the offset site. It is recommended that monitoring be implemented as follows:

Figure 23 Proposed monitoring schedule 2015 to 2021

Year	Monitoring required
Spring 2015	• Standard monitoring as per previous years • No spotlighting, Anabat or frog surveys required.
Autumn - summer 2016	• Interim monitoring (Icon Water personnel) every 6 months
Spring 2017	• Full monitoring program (floristic plots, weed surveys, fence surveys and erosion monitoring)
Autumn - summer 2018	• Interim monitoring (Icon Water personnel) every 6 months
Spring 2019	• Full monitoring program (floristic plots, weed surveys, fence surveys and erosion monitoring) • Undertake spotlighting, Anabat and frog surveys
Autumn - summer 2020	• Interim monitoring (Icon Water personnel) every 6 months
Spring 2021	• Full monitoring program (floristic plots, weed surveys, fence surveys and erosion monitoring) • Review frequency of monitoring following spring 2021 to determine if the monitoring is achieving the desired objectives.

9.2 Bushfire

The access track through the offset site is in a satisfactory condition.

Grazing levels across the property are moderate which is controlling the ground layer and preventing a build-up of biomass occurring.

9.3 Rehabilitation works

No rehabilitation works have been undertaken to date. The monitoring surveys have recorded a consistently low diversity of native species and lack of natural regeneration of the canopy or midstorey within MU7. The vegetation within MU7 is dominated by exotic species.

9.4 Threatened, rare and uncommon plant species

Four nationally threatened, and 11 rare and uncommon ACT plant species occur on the offset site. Although no species is imminently threatened within the offset site it is recommended that basic periodic monitoring be undertaken to ensure that the population of these species on site are maintained over time. Factors to consider monitoring include:

- population numbers
- evidence of recruitment
- potential threats such as grazing or browsing and weed competition

Staff and contractors should be made aware of these species and their locations on site to minimise inadvertent damage to populations. This is particularly important for personnel involved in spraying herbicides.

9.5 Weeds

Primary control of weeds across the site has reduced the abundance and distribution of key weed species, however, follow up control is required to target any individuals missed or those that are resprouting. On-going weed control is still required within the offset site for species such as African Lovegrass, Serrated Tussock, Sweet Briar, Blackberry, Hawthorn, *Prunus* sp., and *Pyracantha* sp.

9.6 Erosion

No change in erosion points was recorded since the spring 2014 surveys. The spring 2014 report recommended investigating erosion management works at two locations. It is recommended that these sites as a minimum continue to be monitored and added to the existing program.

9.7 Feral animal

The overall incidence of feral animals within the offset site was moderate. Both Feral Pig and Goat were observed on a number of occasions and evidence of their habitation of the site was obvious at a number of locations. Foxes were observed on two occasions within the offset in higher numbers than in previous years. Rabbits and Hares were observed on occasion and warrens were also located.

9.8 Fencing

The condition of the Williamsdale property and offset boundary fencing is considered adequate to exclude stock grazing from the offset site, however, some minor repairs are likely to be required.

9.9 Grazing

Regular counts of 10-20 kangaroos were made during the 2015 surveys. However, it is estimated that up to 100 kangaroos maybe utilising the offset site and surrounding properties at any one time.

The LMA (ACT Government) for the Williamsdale property does not outline a suitable grazing level for the 'Active Conservation' rural enterprise. Previously, the grazing intensity for the Williamsdale property was set at a Dry Sheep Equivalent (DSE) of 600.

The ACT Kangaroo Management Plan (ACT Government, 2010) indicates that a direct comparison between sheep and kangaroos in terms of DSE is inaccurate due to inherent ecological differences between the two species. However, the Kangaroo Management Plan (KMP) suggests that a DSE of 0.6 per kangaroo for an unharvested population is probably a reasonable comparison for the ACT region. Using this DSE, the Williamsdale property has the capacity to support up to 360 Kangaroos.

An alternative measure to calculate the number of Kangaroos that a property can support is to look at the relative density. The KMP suggests a density of between 0.6 and 1.5 Kangaroos per hectare. The Williamsdale property is approximately 208 ha in size, which means that using the density calculation, the property could support between 124 – 312 kangaroos in total. Current kangaroo densities are considered to be appropriate to the management objectives of the site.

Opportunistic observations of grazing pressure within and adjacent to the *Swainsona recta* exclosure plots indicate that the offset site is currently grazed at moderate intensity, consistent with the conservations principles outlined in the ODP. The diversity of native herbs and forbs has increased substantially since the baseline surveys, supporting the continuation of current grazing levels. The current level of grazing appears to be preventing perennial native grasses from becoming too dense, thus allowing a range of other ground storey species to co-exist with the dominant grasses. In the absence of fire, appropriate levels of grazing are critical for maintaining species diversity in grassy woodlands.

10 Management recommendations

A summary of the recommended adaptive management actions relating to the offset site is provided in **Table 8** below. The actions relate to the appropriate ODP sub-plan and are based on the results presented in the above sections.

Table 8: Summary of proposed actions relating to the ODP

ODP Sub-Plan	Action status	Recommended management actions
Weed	On-going control and monitoring.	No additional recommendations following the autumn 2015 monitoring period. The spring 2014 report recommended the following: • Maintain weed control program as outlined in ODP and weed sub-plan. Follow-up control of African Lovegrass, Serrated Tussock, Sweet Briar, Blackberry, Hawthorn, Prunus sp., and Pyracantha sp. should be undertaken to maximise the effectiveness of the primary control work completed. • Thistles (predominantly *Carthamus lanatus*) remain abundant near the southern edge of the southern offset and it is recommended that steps be taken to contain their spread throughout the remainder of the property. This work should not be limited to the offset site but include control within the adjacent southern property for maximum effectiveness if possible. It is recommended that trial plots (e.g. 5x5m) be established to ascertain the most appropriate treatment for the thistles. Trials could include the following treatments: o Application of sugar or sawdust (to bind nitrogen and limit growth of species such as thistles which require high nitrogen levels) o Application of broadleaf herbicide o Controlled burn o Application of Kangaroo grass mulch (including seed heads) • It is recommended that biological control, rather than herbicides be utilised as the principal control method for St John's Wort. The *Chrysolina* beetle is the primary biological control agent, and is already present on the offset site having naturally dispersed into the property from the surrounding lands. The distribution and abundance of *Chrysolina* Beetles across the offset site should be monitored and beetles redistributing to maximise their effectiveness. Herbicide application may be required in shady areas under trees where *Chrysolina* Beetles are ineffective. • As the issue of exotic annual grasses has become

ODP Sub-Plan	Action status	Recommended management actions
		more significant over the monitoring period, it would be beneficial to investigate the implementation of a strategic small scale control of competitive exotic annual grasses in the high value parts of the offset. This is consistent with adaptive management approach to weed control. A specialist bush regeneration team may be required to undertake this work. Mapping vegetation condition, including the occurrence and density of the range of competitive weed species would be an essential precursor to any control work of this nature. • Biannual weed monitoring program should be continued with greater emphasis placed on the detection of new weeds to the site. This would assist in the early detection of new weed outbreaks and facilitate early intervention whilst population numbers are still low. • Monitor Weed management activities are applicable to all Management Units.
Rehabilitation	To be considered.	No additional recommendations following the autumn 2015 monitoring period. The spring 2014 report recommended the following: • It is recommended that consideration be given to low density scattered plantings in MU7. Plantings should include over storey (*Eucalyptus blakelyi, E. melliodora*) and shrubs such as, *Bursaria spinosa, Acacia spp., Cassinia sp., and Dodonaea sp*. Plantings need to consider the proximity to the powerlines and need to maintain an appropriate easement. Within the powerline easement consideration could be given the plantings of low shrubs, forbs and native grasses. Rehabilitation works could trial the use of Kangaroo Grass mulch to suppress weeds and introduce seed into the site. • Prior to any planting works, weed control needs to be undertaken, particularly for broad leaf exotic species. Plantings should be monitored to ensure that they are not outcompeted by exotic annual grass growth during the growing season. • Box-Gum Woodland, the dominant vegetation community within MU7 is an open woodland community with a typically absent or scattered mid-storey of native shrubs. Any plantings considered should mimic the structure and species diversity present in the remainder of the offset site. There are likely to be suitable locations to collect seed within the offset site to ensure that local provenance is preserved.

ODP Sub-Plan	Action status	Recommended management actions
Sediment and erosion Control	Action required.	No additional recommendations following the autumn 2015 monitoring period. The spring 2014 report recommended the following: • The majority of sites within the offset are considered to be stable and no immediate action is required. • Potential remediation work to be considered along main drainage line within MU 5 & 6. It is recommended that further investigations of the hydrology and soils within the drainage line be undertaken to inform potential rehabilitation options. Rehabilitation options should utilise local provenance in plantings, and species selected should be appropriate to the landscape position and reflect those species which currently occur on site. Rehabilitation options will need to consider the underlying cause behind the erosion occurring, cost estimates, access and appropriateness of undertaking control works.
Bushfire	Complete. On-going monitoring.	• It is recommended that the track continues to be maintained in a condition to facilitate bush fire management. If track management is required in the future, it is recommended that care is taken to ensure that the track remains in good condition and does not widen due to overuse, incorrect maintenance, or result in erosion. The track would ideally remain in a grassed condition. Applicable to MU's 3, 4 & 6.
Feral animal control	Action and on-going monitoring required.	• Undertake control of Feral Pigs during winter 2015 • Undertake control of Feral Goats during winter/spring 2015 • Implement a fox baiting program during 2015 • Rabbit numbers are currently low, but they could increase with fox control. It is recommended that both species are monitored post control. Continue biannual monitoring of all feral animals to establish if control activities are required in the future. Applicable to all Management Units.
Fencing	Completed in August 2012 and June 2013. On-going maintenance and monitoring	• Moderate risk fencing breeches should be addressed (**Figure 22**) • No immediate major actions required. However, replacement of a small section of fence along the eastern boundary is required and maintenance of moderate damaged points should be considered.
Grazing	On-going monitoring	• No immediate actions required. Grazing level is considered to be appropriate to the management objectives of the site. Grazing should be continually monitored and control measures considered if necessary.

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Appendix A: Flora species list

D = dead

+ = few, small cover (<5%)

r = solitary, small cover (<5%)

1 = numerous (up to 5%)

2 = 5-25%

3= 25-50%

4= 50-75%

5=>75%

Note: The species cumulative list includes all species observed over all monitoring surveys.

Native species

Plot Number	Opportunistic	1	2	3	4	5	6	7	8
Species (cumulative list)	Autumn 2015	MU1A	MU2B	MU3	MU4	MU5	MU6	MU7	MU3
Acacia dealbata	x								
Acacia mearnsii									
Acacia rubida	x								
Acaena novae-zelandiae						+			
Acaena echinata									
Acaena ovina			+	+	+		+		+
Acrotriche serrulata	x								
Ajuga australis	x								
Alternanthera denticulata									
Alternanthera sp. A	x							1	

Plot Number	Opportunistic	1	2	3	4	5	6	7	8
Amphibromus nervosus									
Amyema pendula subsp. *pendula*	x								
Aphanes australiana									
Aristida ramosa	x		+				1		1
Arthropodium minus	x								R
Arthropodium sp.									R
Asperula conferta	x		+	+	1	+			
Asplenium flabellifolium									
Astroloma humifusum									
Austrostipa bigeniculata	x		+						
Austrostipa densiflora	x								
Austrostipa scabra	x	1	2		1	+	2		2
Austrostipa setacea	x								
Austrostipa sp.									
Bossiaea buxifolia	x						+		
Bossiaea prostrata	x					+			
Bothriochloa macra	x	1	2	1	1	1	2	+	
Brachycome sp.									
Brachyloma daphnoides	x								
Brachyscome dentata									
Bulbine bulbosa									
Bursaria spinosa subsp. lasiophylla	x			+					
Callistemon sieberi	x								
Callitris endlicheri	x								
Calocephalus citreus	x								
Calotis scabiosifolia var. integrifolia	x								
Carex appressa	x							R	
Carex breviculmis		2			1	1			

Plot Number	Opportunistic	1	2	3	4	5	6	7	8
Carex inversa	x			+			1	2	
Carex sp.									
Cassinia aculeata	x								
Cassinia quinquefaria	x						R		
Cassinia longifolia	x								
Centipeda cunninghamii	x								
Cheilanthes sieberi	x		1	+			1		+
Chrysocephalum apiculatum	x			+		2	1		+
Chrysocephalum semipapposum	x		2	+			+		
Clematis leptophylla	x				R		R		
Convolvulus angustissimus	x								+
Cotula australis									
Craspedia variabilis	x				+				
Crassula helmsii									
Crassula peduncularis									
Crassula sieberana		1						+	
Cryptandra amara	x					2	+		
Cymbonotus lawsonianus	x		1		R		1		+
Cymbonotus preissianus	x			+		+			
Cymbonotus sp.			+					1	
Cymbopogon refractus	x		R				R		
Cynoglossum suaveolens	x								
Cyperus lhotskyanus	x								
Daucus glochidiatus	x			R					
Desmodium varians	x		+	R		+	+		+
Dianella revoluta	x								
Dichelachne sp.	x		+	+	+	+			+
Dichelachne micrantha						+			

Plot Number	Opportunistic	1	2	3	4	5	6	7	8
Dichondra repens	x		1			+			
Dichopogon fimbriatus									
Dillwynia sp. Yetholme									
Discaria pubescens									
Diuris semilunulata									
Dodonaea viscosa subsp. angustissima	x								
Drosera peltata									
Dysphania pumilio	x								
Einadia nutans subsp. *nutans*	x						+		
Elatine gratioloides	x								
Eleocharis acuta	x								
Elymus scaber	x		+	+	1	+	+		
Enneapogon nigricans	x		R			R	+		R
Epilobium billardiereanum	x								
Epilobium hirtigerum	x								
Eragrostis brownii	x				1				+
Erodium crinitum	x							+	
Eryngium ovinum	x			+	R				
Eucalyptus blakelyi	x		2	2	2	2	2		2
Eucalyptus bridgesiana	x								
Eucalyptus dives	x								
Eucalyptus mannifera									
Eucalyptus melliodora	x	R						2	
Eucalyptus rossii	x								
Euchiton japonicus	x		+	1		1			
Euchiton sphaericus	x						+		+
Euchiton sp.					+				+
Euphorbia dallachyana	x	R					R		

Plot Number	Opportunistic	1	2	3	4	5	6	7	8
Fimbristylis dichotoma	x		+						R
Galium gaudichaudii	x			R					
Geranium retrorsum	x				+	+		1	
Geranium solanderi	x		+	1	+	+	1		
Geranium sp.									
Glossostigma elatinoides	x								
Glycine clandestina	x		R						
Glycine tabacina	x								
Gonocarpus tetragynus	x			+		1			1
Goodenia hederacea									
Goodenia pinnatifida	x			R					
Haloragis heterophylla	x				1				R
Hibbertia obtusifolia	x								
Hydrocotyle laxiflora	x		+	1	1	+	+		
Hymenochilus cynocephalus									
Hypericum gramineum	x			1	1	1			1
Hypoxis hygrometrica									
Indigofera australis	x								
Isoetopsis graminifolia									
Isolepis hookeriana									
Isotoma fluviatilis subsp. *australis*									
Juncus australis	x							+	
Juncus bufonius									
Juncus filicaulis									
Juncus homalocaulis	x				+				
Juncus subsecundus	x			R	+			+	
Juncus ?usitatus									
Kunzea ericoides	x								

Plot Number	Opportunistic	1	2	3	4	5	6	7	8
Kunzea parvifolia	x								
Lachnagrostis filiformis	x								
Leptorhynchos squamatus	x			+	+				1
Leptospermum continentale	x								
Leucochrysum albicans var. *tricolor*	x								
Limosella australis									
Linum marginale	x				2				
Linum trigynum L.						+			
Lomandra bracteata							1		1
Lomandra filiformis subsp. *coriacea*	x		+	+	1	1			
Lomandra filiformis subsp. *filiformis*									
Lomandra longifolia									
Lomandra multiflora	x								
Luzula densiflora	x					+			
Lythrum hyssopifolia	x								
Melichrus urceolatus	x		R			1	R		R
Microlaena stipoides	x	1	+	1	2	1	+	2	1
Microseris lanceolata									
Microtis sp.									
Montia fontana subsp. chondrosperma									
Myosotis australis									
Ophioglossum lusitanicum	x								1
Oreomyrrhis eriopoda	x								
Oxalis sp.								+	
Oxalis perennans		+		+					
Oxalis radicosa									
Oxalis thompsoniae									
Panicum effusum	x	1		R	1	+	+	+	R

Plot Number	Opportunistic	1	2	3	4	5	6	7	8
Pellaea calidirupium	x								
Persicaria prostrata	x								
Pimelea curviflora									
Plantago gaudichaudii	x			1					
Plantago varia	x			+					
Poa labillardieri	x			R	1				+
Poa sieberiana var. hirtella	x			+					
Poa sieberiana var. *sieberiana*	x		R		+	+			
Poa sp.									
Pomaderris angustifolia	x								
Pomaderris pallida									
Poranthera microphylla									
Potamogeton ochreatus	x								
Pseudognaphalium luteoalbum									
Pultenaea procumbens	x								
Ranunculus lappaceus	x								
Ranunculus pumilio var. *pumilio*									
Ranunculus sessiliflorus var. *sessiliflorus*									
Rhodanthe anthemoides									
Rubus parvifolius									
Rumex brownii	x	1		+				1	
Rytidosperma caespitosum						1			
Rytidosperma carphoides	x						+		
Rytidosperma laeve	x			R					+
Rytidosperma pallidum	x		+						
Rytidosperma racemosum	x	1	+				2	1	
Rytidosperma sp.									
Schoenus apogon	x								

Plot Number	Opportunistic	1	2	3	4	5	6	7	8
Scleranthus diander	x								
Scleranthus fascicularis	x			R			R		
Sebaea ovata									
Senecio phelleus									
Senecio quadridentatus	x					R	R		
Solanum linearifolium									
Solenogyne dominii	x				1				1
Solenogyne gunnii	x				+				
Sporobolus sp.	x								
Stackhousia monogyna	x			R		+			R
Stylidium despectum									
Swainsona monticola									
Swainsona recta (propagated)	x								
Swainsona sericea									
Thelymitra pauciflora									
Thelymitra sp.									
Themeda triandra	x		R	3	2	3			3
Thysanotus patersonii									
Thysanotus tuberosus									
Tricoryne elatior	x			R		R			R
Tripogon loliiformis	x				+		+		1
Triptilodiscus pygmaeus									
Veronica calycina									
Veronica sp.			+			+			
Vittadinia cuneata	x		+			+	1		
Vittadinia gracilis			+		+				
Vittadinia muelleri	x						1		1
Wahlenbergia communis	x		+			+	+		+

Plot Number	Opportunistic	1	2	3	4	5	6	7	8
Wahlenbergia gracilenta									
Wahlenbergia gracilis									
Wahlenbergia multicaulis	x								
Wahlenbergia sp.									
Wahlenbergia stricta									
Wurmbea dioica	x								+
Xerochrysum viscosum	x								
Zornia dyctiocarpa									

Exotic species

Plot Number	Opportunistic	1	2	3	4	5	6	7	8
Species (cumulative list)	**Autumn 2015**	**MU1A**	**MU2B**	**MU3**	**MU4**	**MU5**	**MU6**	**MU7**	**MU3B**
Acetosella vulgaris	x		+				+	+	
Aira caryophyllea									1
Aira elegantissima	x								
Aira sp.			+	D1		D1			
Anagallis arvensis	x		R	D+	+		R		
Arctotheca calendula									
Avena barbata	x			D+					
Briza maxima									
Briza minor	x			1					
Bromus diandrus	x			D+				+	
Bromus hordeaceus	x			+					
Bromus rubens									
Bromus sp.		1			1				
Capsella bursa-pastoris									
Carduus pycnocephalus	x								

Plot Number	Opportunistic	1	2	3	4	5	6	7	8
Carduus tenuiflorus	x								
Carduus sp.							R		
Carthamus lanatus	x	3							
Centaurea melitensis	x								
Centaurium erythraea	x			1	+	1			1
Cerastium glomeratum									
Chondrilla juncea	x	2					R		
Cicendia quadrangularis									
Cirsium vulgare	x			+		+		+	
Conyza sp.							R		
Conyza bonariensis	x								R
Conyza sumatrensis	x								
Cotoneaster sp.									
Crataegus monogyna	x								
Cynodon dactylon	x							R	
Cynosurus echinatus	x		R	D1					
Cyperus eragrostis	x							+	
Cyperus lhotskyanus								R	
Cyperus sp.									
Echium plantagineum	x	R							
Eleusine tristachya (Lam.) Lam.	*x*								
Eragrostis cilianensis									
Eragrostis minor	*x*								
Eragrostis curvula	x			R	R			R	
Erodium botrys		1							
Erodium cicutarium	x							R	
Erodium moschatum									
Erodium sp.									

Plot Number	Opportunistic	1	2	3	4	5	6	7	8
Festuca arundinacea									
Galium aparine									
Galium divaricatum	x								
Geranium molle	x								
Hedypnois rhagadioloides subsp. cretica									
Hirschfeldia incana									
Holcus lanatus									
Hordeum glaucum	x								
Hordeum leporinum									
Hypericum perforatum	x		+	1	1	1	1	+	+
Hypochaeris glabra	x		+	+		+			+
Hypochaeris radicata	x		+	+	2		1	+	
Isolepis levynsiana									
Isolepis marginata									
Juncus capitatus									
Lactuca serriola	x								
Lepidium sp.	x								
Linaria arvense	x		+	R					
Linaria pelisseriana	x								+
Linum trigynum L.	x								
Lolium perenne									
Lolium rigidum									
Malva nicaeensis									
Malva parviflora	x							+	
Marrubium vulgare	x							+	
Medicago arabica									
Modiola caroliniana	x							+	
Moenchia erecta									

Plot Number	Opportunistic	1	2	3	4	5	6	7	8
Nassella trichotoma	x	+							
Onopordum acanthium	x								
Orobanche minor	x								
Parentucellia latifolia									
Paronychia brasiliana	x	+	+						
Paspalum ?dilatatum	x				R				
Pentaschistis airoides									
Petrorhagia nanteuilii	x		+	1	1	D+	D1	+	1
Phalaris aquatica	x							R	
Plantago lanceolata	x		+		+	1	+	+	
Poa pratensis									
Polygonum aviculare	x								
Prunus sp.									
Pyracantha sp.									
Reseda luteola	x								
Rosa rubiginosa	x		DR	D+		D+		+	R
Romulea rosea var. *australis*									
Rubus fruticosus								R	
Sanguisorba minor									
Setaria parviflora	x								
Sherardia arvensis									
Sisymbrium orientale									
Sisyrinchium sp. A									
Solanum nigrum	x								
Sonchus asper	x			R			+	+	
Sonchus oleraceus	x								
Spergularia rubra									
Stellaria media								+	

Plot Number	Opportunistic	1	2	3	4	5	6	7	8
Taraxacum officinale	x								
Tolpis umbellata	x		+				1		
Tragopogon dubius	x						+		
Trifolium arvense	x				+		1		+
Trifolium angustifolia	x			+					+
Trifolium campestre	x			R					
Trifolium cernuum									
Trifolium dubium	x			+		+			+
Trifolium glomeratum	x			R					+
Trifolium repens	x								
Trifolium sp.		1			1				
Trifolium subterraneum	x							2	
Urtica urens	x								
Verbascum thapsus	x	R	+					+	
Verbena ?incompta	x				R			R	
Veronica anagallis-aquatica									
Veronica arvensis									
Vicia sativa									
Vulpia bromoides									
Vulpia muralis									
Vulpia myuros									
Vulpia sp.			1	1		1			+

Appendix B: Flora plates – Rare and uncommon species

Photo 1: Hoary Sunray (*Leucochrysum albicans var. tricolor*)

Photo 2: Pale Pomaderris (*Pomaderris pallida*)

Photo 3: Hairy Anchor Plant (*Discaria pubescens*)

Photo 4: *Swainsona monticola*

Photo 5: *Zornia dyctiocarpa*

Photo 6: *Bossiaea prostrata*

Photo 7: *Stylidium despectum*

Photo 8: *Glossostigma elatinoides*

Photo 9: *Thesium australe*

Appendix C: Fauna lists

Fauna observations

Fauna species recorded during the biannual monitoring surveys from spring 2011 to autumn 2015, either through opportunistic observations or targeted survey are outlined below.

A = autumn, B = spring.

Common Name	Latin Name	2011	2012 A	2012 B	2013A	2013B	2014A	2014B	2015A
Australasian Grebe	*Tachybaptus novaehollandiae*		✓		✓	✓	✓		✓
Australian Magpie	*Gymnorhina tibicen*	✓	✓	✓	✓	✓	✓	✓	✓
Australian Raven	*Corvus coronoides*	✓	✓	✓	✓	✓	✓	✓	✓
Australian Wood Duck	*Chenonetta jubata*			✓	✓	✓			✓
Australian King Parrot	*Alisterus scapularis*								✓
Black-faced Cuckoo-Shrike	*Coracina novaehollandiae*		✓	✓		✓		✓	
Brown Falcon	*Falco berigora*					✓		✓	✓
Common Bronze wing	*Phaps chalcoptera*	✓			✓		✓	✓	
Crested Pigeon	*Ocyphaps lophotes*				✓	✓	✓		✓
Diamond Firetail	*Stagonopleura guttata*	✓			✓				
Double Barred Finch	*Taeniopygia bichenovii*				✓				
European Goldfinch	*Carduelis carduelis*				✓				
Fan-tailed Cuckoo	*Cacomantis flabelliformis*					✓		✓	
Galah	*Eolophus roseicapillus*	✓		✓		✓		✓	✓
Grey Butcherbird	*Cracticus torquatus*		✓	✓					✓

Common Name	Latin Name	2011	2012 A	2012 B	2013A	2013B	2014A	2014B	2015A
Grey Fantail	*Rhipidura albiscapa*	✓	✓	✓		✓	✓	✓	✓
Grey Shrike-Thrush	*Colluricincla harmonica*		✓		✓	✓	✓	✓	✓
Hard Head	*Aythya australis*			✓	✓				
Honeyeater, White-Eared	*Lichenostomus penicillatus*	✓	✓		✓				✓
Honeyeater, White-Plumed	*Lichenostomus penicillatus*				✓	✓			
Honeyeater, Yellow Faced	*Lichenostomus chrysops*			✓				✓	✓
Horsfield's Bronze Cuckoo	*Chrysococcyx basalis*							✓	
Jacky Winter	*Microeca fascinans*	✓		✓		✓			
Kookaburra	*Dacelo novaeguineae*	✓		✓					✓
Leaden Flycatcher	*Myiagra rubecula*			✓					
Magpie Lark	*Grallina cyanoleuca*	✓	✓	✓	✓	✓	✓	✓	✓
Masked Lapwing	*Vanellus miles*					✓		✓	
Nankeen Kestrel	*Falco cenchroides*					✓		✓	
Noisy Friarbird	*Philemon corniculatus*			✓		✓		✓	
Noisy Miner	*Manorina melanocephala*	✓	✓	✓	✓	✓	✓	✓	✓
Pacific Black Duck	*Anas superciliosa*			✓	✓	✓		✓	✓
Pardalote, Spotted	*Pardalotus punctatus*	✓	✓	✓	✓		✓	✓	✓
Pardalote, Striated	*Pardalotus striatus*	✓		✓	✓	✓	✓	✓	✓
Pied Butcherbird	*Cracticus nigrogularis*							✓	
Pied Currawong	*Strepera graculina*	✓	✓	✓	✓	✓	✓	✓	✓
Quail	*Coturnix sp.*	✓				✓			

Common Name	Latin Name	2011	2012 A	2012 B	2013A	2013B	2014A	2014B	2015A
Red-Browed Finch	*Neochmia temporalis*			✓	✓	✓		✓	
Red Wattlebird	*Anthochaera carunculata*					✓		✓	✓
Robin, Eastern Yellow	*Eopsaltria australis*						✓		
Robin, Flame	*Petroica phoenicea*	✓					✓		
Robin, Hooded	*Melanodryas cucullata cucullata*	✓							
Robin, Scarlet	*Petroica boodang*		✓		✓		✓		✓
Rosella, Crimson	*Platycercus elegans*	✓	✓	✓	✓	✓	✓	✓	✓
Rosella, Eastern	*Platycercus adscitus*	✓	✓	✓	✓	✓		✓	✓
Red-rumped Parrot	*Psephotus haematonotus*								✓
Sacred Kingfisher	*Todiramphus sanctus*			✓					
Shining Bronze Cuckoo	*Chrysococcyx lucidus*							✓	
Silvereye	*Zosterops lateralis*								✓
Southern White-face	*Aphelocephala leucopsis*						✓		
Speckled Warbler	*Chthonicola sagittatus*				✓		✓		
Sulphur-Crested Cockatoo	*Cacatua galerita*	✓				✓	✓	✓	
Superb Fairy Wren	*Malurus cyaneus*	✓	✓	✓	✓	✓	✓	✓	✓
Thornbill, Brown	*Acanthiza pusilla*	✓		✓	✓	✓		✓	✓
Thornbill, Buff-rumped	*Acanthiza reguloides*								✓
Thornbill, Yellow	*Acanthiza nana*								✓

Common Name	Latin Name	2011	2012 A	2012 B	2013A	2013B	2014A	2014B	2015A
Thornbill, Yellow-rumped	*Acanthiza chrysorrhoa*	✓	✓	✓	✓	✓	✓	✓	
Tree Martin	*Petrochelidon nigricans*					✓			
Wedge-Tailed Eagle	*Aquila audax*	✓	✓		✓		✓		✓
Wee bill	*Smicrornis brevirostris*				✓			✓	✓
Welcome Swallow	*Hirundo neoxena*								✓
Whistler, Golden	*Pachycephala pectoralis*	✓	✓			✓			
Whistler, Rufous	*Pachycephala rufiventris*			✓	✓	✓		✓	
White-bellied Sea-Eagle	*Haliaeetus leucogaster*					✓			
White-faced Heron	*Egretta novaehollandiae*								✓
White-fronted Gerygone	*Gerygone olivacea*			✓		✓		✓	
White-naped Honeyeater	*Melithreptus lunatus*								✓
White Throated Tree Creeper	*Cormobates leucophaeus*	✓	✓	✓	✓	✓	✓	✓	✓
White-winged Chough	*Corcorax melanorhamphos*		✓	✓		✓		✓	✓
White-winged Triller	*Lalage sueurii*							✓	
Willie Wagtail	*Rhipidura leucophrys*	✓	✓		✓	✓		✓	✓
Yellow Tailed Black Cockatoo	*Calyptorhynchus funereus*				✓				
		27	22	30	33	38	23	37	38

Mammals	Latin Name					2013B	2014A	2014B	2015A

Common Name	Latin Name	2011	2012 A	2012 B	2013A	2013B	2014A	2014B	2015A
Brushtail Possum	*Trichosurus vulpecula*					✓	✓	✓	
Cow	*Bos Taurus*	✓					✓		✓
European Rabbit	*Oryctolagus cuniculus*	✓	✓	✓	✓	✓	✓	✓	
Feral Goat	*Capra aegagrus hircus*		✓	✓	✓	✓	✓		✓
Feral Pig	*Sus scrofa*		✓			✓	✓		✓
Fox	*Vulpes vulpes*	✓	✓	✓	✓	✓	✓	✓	✓
Hare Brown	*Lepus capensis*								✓
Kangaroo	*Macropus giganteus*	✓	✓	✓	✓	✓	✓	✓	✓
Sheep	*Ovis aries*				✓	✓			
Sugar Glider*	*Petaurus breviceps*					✓	✓		
Swamp Wallaby	*Wallabia bicolor*					✓	✓	✓	
Wallaroo, Common	*Macropus robustus*							✓	✓
Wombat	*Vombatus ursinus*	✓	✓	✓	✓	✓	✓	✓	✓
		5	6	5	6	9	9	6	8

Other	Latin Name					2013B	2014A	2014B	2015A
Delicate skink	*Lamphrolis delicata*							✓	
Eastern Bearded Dragon	*Pogona barbata*			✓					
Eastern Common Froglet	*Crinia signifera*		✓	✓	✓	✓	✓	✓	✓
Eastern Long-	*Chelodina*		✓		✓	✓	✓		✓

Common Name	Latin Name	2011	2012 A	2012 B	2013A	2013B	2014A	2014B	2015A
necked Tortoise	*longicollis*								
Eastern Water Dragon	*Intellagama lesueurii*								
Echidna	*Tachyglossus aculeatus*					✓			✓
Grass Skink	*Lampropholis delicata*								✓
Mountain Dragon	*Rankinia diemensis*	✓							
Peron's Tree Frog	*Litoria peronii*					✓		✓	
Plains Froglet	*Crinia parinsignifera*			✓	✓	✓	✓	✓	✓
Red Bellied Black Snake	*Pseudechis porphyriacus*							✓	
Smooth Toadlet	*Uperoleia laevigata*					✓		✓	
Uperoleia sp.	*Uperoleia sp.*								✓
Spotted Marsh Frog	*Limnodynastes tasmaniensis*			✓	✓	✓	✓	✓	✓
Whistling Tree Frog	*Litoria verreauxii*			✓		✓		✓	
		1	2	5	4	8	4	8	5

ecological AUSTRALIA

HEAD OFFICE
Suite 4, Level 1
2-4 Merton Street
Sutherland NSW 2232
T 02 8536 8600
F 02 9542 5622

SYDNEY
Level 6
299 Sussex Street
Sydney NSW 2000
T 02 8536 8650
F 02 9264 0717

ST GEORGES BASIN
8/128 Island Point Road
St Georges Basin NSW 2540
T 02 4443 5555
F 02 4443 6655

CANBERRA
Level 2
11 London Circuit
Canberra ACT 2601
T 02 6103 0145
F 02 6103 0148

NEWCASTLE
Suites 28 & 29, Level 7
19 Bolton Street
Newcastle NSW 2300
T 02 4910 0125
F 02 4910 0126

NAROOMA
5/20 Canty Street
Narooma NSW 2546
T 02 4476 1151
F 02 4476 1161

COFFS HARBOUR
35 Orlando Street
Coffs Harbour Jetty NSW 2450
T 02 6651 5484
F 02 6651 6890

ARMIDALE
92 Taylor Street
Armidale NSW 2350
T 02 8081 2681
F 02 6772 1279

MUDGEE
Unit 1, Level 1
79 Market Street
Mudgee NSW 2850
T 02 4302 1230
F 02 6372 9230

PERTH
Suite 1 & 2
49 Ord Street
West Perth WA 6005
T 08 9227 1070
F 08 9322 1358

WOLLONGONG
Suite 204, Level 2
62 Moore Street
Austinmer NSW 2515
T 02 4201 2200
F 02 4268 4361

GOSFORD
Suite 5, Baker One
1-5 Baker Street
Gosford NSW 2250
T 02 4302 1220
F 02 4322 2897

DARWIN
16/56 Marina Boulevard
Cullen Bay NT 0820
T 08 8989 5601

BRISBANE
PO Box 1422
Fortitude Valley QLD 4006
T 0400 494 366

1300 646 131
www.ecoaus.com.au