



ACT
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JUSTICE ROBERT HOPE PARK

OPERATIONAL MANAGEMENT
PLAN 2018-21



PROJECT NAME

Justice Robert Hope Park Offset Management Plan for Block 9 Section 64 Watson Residential Development and Negus Crescent Extension, ACT.

EPBC REFERRAL NUMBER

EPBC 2012/6418

LOCATION OF THE ACTION

Watson Block 7, Section 72, Canberra, Australian Capital Territory.

ACKNOWLEDGMENTS

The Parks and Conservation Service would like to acknowledge the contribution of all stakeholders who have commented on aspects of this plan, including the Watson Woodlands Working Group (John Briggs and Richard Larson specifically). We would also like to acknowledge the contribution of Lori Gould and Maya Potapowicz, who assisted in developing the plan.

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List of abbreviations

ACT	Australian Capital Territory
COG	Canberra Ornithologist Group
CR	Conservation and Research unit - within the Environment, Planning and Sustainable Development Directorate
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cwth)
EPSDD	Environment, Planning and Sustainable Development Directorate
LDA	Land Development Agency (now Suburban Land Agency)
MNES	Matters of National Environmental Significance
NC Act	Nature Conservation Act 1980 (ACT)
NSW	New South Wales
OMP	Offset Management Plan
PCS	ACT Parks and Conservation Service - within the Environment, Planning and Sustainable Development Directorate
WWWG	Watson Woodlands Working Group

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1. INTRODUCTION

This Plan has been prepared to meet the requirements of EPBC Act approval 2012/6418. On 29 November 2013, a delegate of the Minister for the Environment approved the residential development of Block 9, Section 64, Watson; the extension of Negus Crescent; and the offsite construction of stormwater works in Justice Robert Hope Park, Australian Capital Territory.

To offset the impact of the development, Justice Robert Hope Park was selected as an offset site. Condition 3 of the approval decision requires that an Environmental Management Plan is developed for the conservation and management of JRHP for the duration the impact occurs at the residential development site.

While the approval decision requires the development of an Environmental Management Plan, for the purpose of maintaining consistency with naming ACT Government offset planning documents, this document is titled an Offset Management Plan.

1.1 Background

The residential development of Block 9 Section 64 and the extension of Negus Crescent, Watson will significantly impact the critically endangered White Box – Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Woodland), and potential habitat for the critically endangered Regent Honeyeater (*Anthochaera phrygia*).

The action is subject to conditions outlined in the EPBC Act [approval decision](#) and includes the conservation and management of JRHP (also known as Watson Woodlands) to offset the loss of four hectares of Box Gum Woodland and Regent Honeyeater habitat from the residential development.

On 6 March 2017, a delegate of the Minister for the Environment and Energy, varied the approval decision. Condition 3 c was revoked to remove the requirement for an Outer Asset Protection Zone (OAPZ) within the offset site. The ACT Fire and Rescue advised that the 100 m wide OAPZ was not required and the removal of the 100 m wide OAPZ will increase the area of Box Gum Woodland that can be managed at the site. A 30 m wide Inner Asset Protection Zone is required to be maintained along the Negus Crescent Road Reserve, however, this is outside the offset area and will have no impact on the management of the offset site.

1.2 Purpose and scope

To meet the requirements of condition 3 of the approval decision, this OMP provides:

- » measures to maintain the condition of the Box Gum Woodland community in the offset site
- » measures to maintain the habitat for the Regent Honeyeater (*Anthochaera phrygia*).
- » details of the monitoring program for the Box Gum Woodland community within the offset site
- » details of the consultation process with the Watson Woodlands Working Group and other relevant parties (Section 1.6) over the proposed implications of management practices outlined in this Plan and
- » details of administration and funding arrangements including a schedule of anticipated costs;
- » details of contingency measures if there is a measured decline in the quality of the Box Gum Woodland community (as determined by the monitoring program); and
- » details regarding the management of other conservation values present in Justice Robert Hope Park that are listed under the EPBC Act and the ACT Government Nature Conservation Act 2014 (NC Act), which are not subject to the approval decision (Section 2.5).

1.3 Strategic context

The management of the offset site will contribute towards delivering the commitments within other regional and national plans, strategies and policies relating to:

- » the management and recovery of other nationally and locally listed threatened species (including contributing towards the ACT Government's Action Plans for threatened species and communities). This includes the protection and management of Swift Parrot (*Lathamus discolor*) and Superb Parrot (*Polytelis swainsonii*) habitat and the Hoary Sunray (*Leucochrysum albicans* var. *tricolor*).
- » addressing priority land management issues (e.g. reducing the impact from invasive plants and animals)
- » managing nearby reserves (e.g. Mount Majura Nature Reserve)
- » managing Canberra Nature Park.

Table 1 provides examples of the plans and strategies that managing the offset site will contribute to deliver.



Table 1: Links with regional and national strategies and recovery plans

Strategic Objective	Title
The management and recovery of threatened species and ecological communities	<p>ACT Nature Conservation Strategy 2013 – 2023 (ACT Government 2013)</p> <p>Box Gum Woodland and Derived Native Grassland</p> <p>The National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Department of Environment, Climate Change and Water NSW 2011)</p> <p>Action Plan No. 27 - ACT Lowland Woodland Conservation Strategy (ACT Government 2004)</p> <p>Regent Honeyeater</p> <p>National Recovery Plan for the Regent Honeyeater (Anthochaera Phrygia) (Department of Environment, Australian Government 2016)</p> <p>Action Plan No. 27 - ACT Lowland Woodland Conservation Strategy (ACT Government 2004)</p> <p>Woodland birds</p> <p>Action Plan No. 27 - ACT Lowland Woodland Conservation Strategy (ACT Government 2004)</p> <p>Superb Parrot</p> <p>National Recovery Plan for the Superb Parrot <i>Polytelis swainsonii</i> (Baker Gabb 2011)</p> <p>Action Plan No. 27 - ACT Lowland Woodland Conservation Strategy (ACT Government 2004)</p>
The assessment and management of places or objects with heritage value	<p>Cultural Heritage Reporting Policy (ACT Heritage Council 2015)</p>
Addressing land management issues	<p>Pest Plants</p> <p>ACT Weeds Strategy 2009 – 2019 (Department of Environment, Climate Change, Energy and Water 2009)</p> <p>Invasive Weeds Operations Plan (IWOP) – ACT Parks and Conservation Service (annual plan)</p> <p>Pest Animals</p> <p>ACT Pest Animal Management Strategy 2012-2022 (ACT Government 2012)</p> <p>Vertebrate Pest Management Operations Plan – ACT Parks and Conservation Service (annual plan)</p> <p>Controlled Native Species</p> <p>Eastern Grey Kangaroo: Controlled Native Species Management Plan 2017 (ACT Government 2017)</p> <p>Bushfire Management</p> <p>ACT Strategic Bushfire Management Plan Version 3 (ACT Government 2014)</p> <p>ACT Bushfire Operations Plan (ACT Government) (annual plan)</p>
Management of adjoining ACT Nature Reserves	<p>Draft Canberra Nature Park Plan of Management 2015-2025. ACT Government (in prep)</p>

1.4 Specific commitments

The Plan includes actions that specifically address the conditions of approval relating to the conservation and management of the offset site (Table 2).

Table 2: Conditions of approval reference table.

Number	Condition Requirement	Section
3.	To compensate for the loss of Box Gum Woodland at the development site, and for the better protection of listed threatened species and communities and listed migratory species, the approval holder must develop a Justice Robert Hope Park Environmental Management Plan for the conservation and management of Justice Robert Hope Park for the duration the impact occurs at the development site. The Justice Robert Hope Park EMP must be submitted to the Minister for approval within six months of substantial commencement at the development site. The Justice Robert Hope Park EMP must include:	This Plan
3a.	» details of an appropriate monitoring program to be undertaken by a suitably qualified expert, to monitor the condition of Box Gum Woodland in Justice Robert Hope Park, including undertaking baseline surveys of condition at the date of this approval;	Section 5.1
3b.	» measures to maintain the condition of Justice Robert Hope Park at a standard equivalent to or better than its condition at the date of this approval (as defined in the referral documentation and Condition 3a), by such means as are necessary, including but not limited to:	Section 4
(i)	» planting or seeding of native forbs and grasses consistent with the definition of EPBC Act listed Box Gum Woodland;	Section 4.2.3
(ii)	» weed management to meet statutory obligations;	Section 4.1.1
(iii)	» planting of trees consistent with the definition of EPBC Act listed Box Gum Woodland;	Section 4.2.3
(iv)	» control of feral and domesticated animals; and	Section 4.1.2
(v)	» control of unauthorised access, waste and pollution	Section 4.3.1 Section 4.3.4

Number	Condition Requirement	Section
3c	<ul style="list-style-type: none"> » measures to maintain the condition, of the Outer Asset Protection Zone (OAPZ) in Justice Robert Hope Park relative to its condition at the date of this approval (as defined in the referral documentation and Condition 3a). Such management shall: <ol style="list-style-type: none"> 1. be undertaken in accordance with the Bushfire Risk Assessment for the Proposed Residential Development Block 9 Section 64, Watson, Australian Capital Territory prepared for the Land Development Agency (August 2012) and the Strategic Bushfire Management Plan (ACT Government 2009); 2. permit understorey growth to at least 35cm; 3. retain coarse woody debris and hollows where permissible in accordance with Condition 3 c i; and 4. retain existing trees and saplings where permissible in accordance with Condition 3 c i. 	This condition was revoked on 6 March 2017
3d.	<ul style="list-style-type: none"> » consultation with local park-care groups and relevant parties over the proposed implications of management practices outlined in the Justice Robert Hope Park OMP. 	Section 1.6 Section 2.8
3e.	<ul style="list-style-type: none"> » details of administration and funding arrangements with the relevant parties who will be responsible for managing Justice Robert Hope Park including a schedule of anticipated costs. 	Section 1.5 Section 1.8 Section 6
5.	<p>The approval holder must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, and make them available upon request to the Department. Such records may be subject to audit by the Department or an independent auditor in accordance with Section 458 of the EPBC Act, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the Department’s website. The results of audits may also be publicised through the general media.</p>	Section 10
6.	<p>Within three months of every 12 month anniversary of substantial commencement of the action, the approval holder must publish a report on their website addressing compliance with each of the conditions of this approval, including implementation of any management plans as specified in the conditions. Documentary evidence providing proof of the date of publication and non-compliance with any of the conditions of this approval must be provided to the Department at the same time as the compliance report is published. Non-compliance with any of the conditions of this approval must be reported to the Department within 10 business days of their identification.</p>	Section 10

1.5 Roles and responsibilities

The ACT Parks and Conservation Service (PCS) will be primarily responsible for achieving the actions outlined in this Plan (unless otherwise stated) and will manage the offset site to maintain or improve the overall condition of the site in perpetuity. While the Land Development Agency (LDA) is the proponent for the development of Block 9 Section 64 Watson, the extension of Negus Crescent and offsite construction of stormwater works in Justice Robert Hope Park, the responsibility for complying with the conditions of approval have been included in the Deed of Agreement with the developer (Lonsdale 28 Pty Ltd). The Lonsdale 28 Pty Ltd therefore has shared responsibility (with PCS) to comply with the approval decision.

Table 3 outlines the relevant roles and responsibilities associated with delivering the Plan.

Table 3: Roles and responsibilities for implementing the Plan

Agency	Role	Responsibilities
EPSDD – Parks and Conservation Service (PCS)	Custodian and manager of offset site and nearby Mount Majura Nature Reserve.	<ul style="list-style-type: none"> Implement the Plan Use the results of the monitoring program to evaluate and refine management actions within the Plan Periodically review progress against performance measures Ensure all internal and external reporting requirements are met Ensure that all relevant records are effectively maintained Ensure that staff and contractors are appropriately qualified, licensed and experienced to undertake the tasks described in the Plan Provide support for volunteer Park Care activities Advise and assist management of bushfire fuel in accordance with the Strategic Bushfire Management Plan (ACT Government 2014a)
EPSDD - Conservation and Research	Conduct research on local flora and fauna, prepare scientific advice on ecological and natural resource management, conduct ecological surveys, biodiversity monitoring, and prepare and guide the implementation of threatened species recovery plans and the reintroduction of rare species into the ACT.	<ul style="list-style-type: none"> Assist PCS staff to interpret results from MNES monitoring programs and advise on when to adjust land management strategies to most effectively manage the MNES in line with the adaptive management strategy (Section 7). Provide general advice to PCS staff, on managing the conservation values within the offset site.
Watson Woodlands Working Group	Watson Woodlands Working Group is a group of volunteers with a common interest in protecting, enhancing and promoting the ecological values of the Justice Robert Hope Park.	Continue to undertake activities within the offset site in line with the Parks Conservation and Lands Volunteer Policy (ACT Government 2009) and the Plan.
LDA (now the Suburban Land Agency)	Proponent	Assist PCS in the preparation of the annual EPBC compliance report

Agency	Role	Responsibilities
Lonsdale 28 Pty Ltd	Developer of Block 9 Section 64 Watson and the extension of Negus Crescent. The development includes construction of stormwater infrastructure within the Justice Robert Hope Park boundary and replacement of boundary fences along the Negus Crescent.	Need to plan and undertake all works associated with the construction of stormwater infrastructure within Justice Robert Hope Park in consultation with PCS and in compliance with the Merit Track Notice of Decision (issued by EPSDD). Need to undertake all works within or along the Justice Robert Hope Park boundary in close and direct liaison with PCS. Responsibilities of the Developer in the context of compliance with the EPBC approval decision are outlined in Deed of Agreement between the Lonsdale 28 Pty Ltd and the Territory. Assist PCS in the preparation of the annual EPBC compliance report.
Deed Management section within EPSDD	Administration and manager of the Deed of Agreement	Responsible for ensuring Lonsdale 28 Pty Ltd is compliant with Deed of Agreement (as referred to in the EPBC approval decision).

1.6 Statutory bodies and community consultation

Consultation has been undertaken with all stakeholders identified in Table 4. This includes consultation with members of the Watson Woodlands Working Group (WWWG). This group has been actively working to improve the condition of the woodland community since the establishment of the park in 2001. Information provided by the WWWG has been utilised in developing the Plan.

Table 4: Details of stakeholder consultation

Stakeholder	Draft Version	Date consulted on draft version date
Michael Mulvaney (Senior Environmental Planner, CR)	5	April 2015
Greg Baines and Murray Evans (Senior Ecologists, CR)	7	December 2016
Steve Taylor (Senior Weeds Officer, PCS)	7	November & December 2016
Watson Woodlands Working Group (Richard Larson & John Briggs)	5 and 7	May 2015, November and December 2016, February 2017
Bob Taylor (Senior Manager, Deed Management, EPSDD)	7	February 2017
Geordie Edwards (Lonsdale 28 Pty Ltd)	7	February 2017

1.7 Process for Incorporating the offset site into Canberra Nature Park

The offset site is permanently protected within the ACT Reserve System. The process of applying a Pc- nature reserve overlay variation to the Territory Plan was completed on 19th August 2016. Justice Robert Hope Park will now be managed specifically for the conservation of the natural environment and to provide public use of the area for recreation, the education and research opportunities.

This protection status is additional to the approval decision requirements.

1.8 Funding arrangements

On-going funding to manage the offset area was secured in the ACT Government 2015–16 budget appropriation. Total funding secured is \$460,000 for the first 3 years and \$120,000 per year thereafter. Section 6 details how this funding will be appropriated.



2. OFFSET SITE DESCRIPTION

Justice Robert Hope Park (18.6 hectares) is located in Block 7, Section 72, Watson (Figure 1). Fifteen hectares of the offset site is classed as Box Gum Woodland [Jessop & Moore 2015]. It is an urban reserve that will be surrounded on three sides by residential development and urban infrastructure. The offset site is bounded to the north by Negus Crescent, to the east by Antill St, to the west by Roma Mitchell Crescent and along the southern boundary an electricity easement runs.

The offset site is situated at the western base of Mount Majura and has natural links to Mount Majura Nature Reserve through partially cleared land [Nash *et al.* 2006]. The site is gently sloping to the south-west.

2.1 Connectivity




The offset site connections traverse the Hackett Horse Holding Paddock complex to the east (refer to Figure 2). This horse paddock is designated CZ6: Leisure and Recreation zoning. Although partially cleared, remnant woodland vegetation in the horse paddocks link the offset site to Box Gum Woodland in the Mount Majura and Mount Ainslie Nature Reserves [Nash *et al.* 2012].

Canberra Ornithologists Group (COG) state that the site forms part of an important corridor linking Mount Majura with other woodland sites to the west through North Canberra, Mitchell and to Mulligans Flat (COG statement n.d.). This statement is supported by tracking research undertaken on Superb Parrots [Rayner *et al.* 2016].

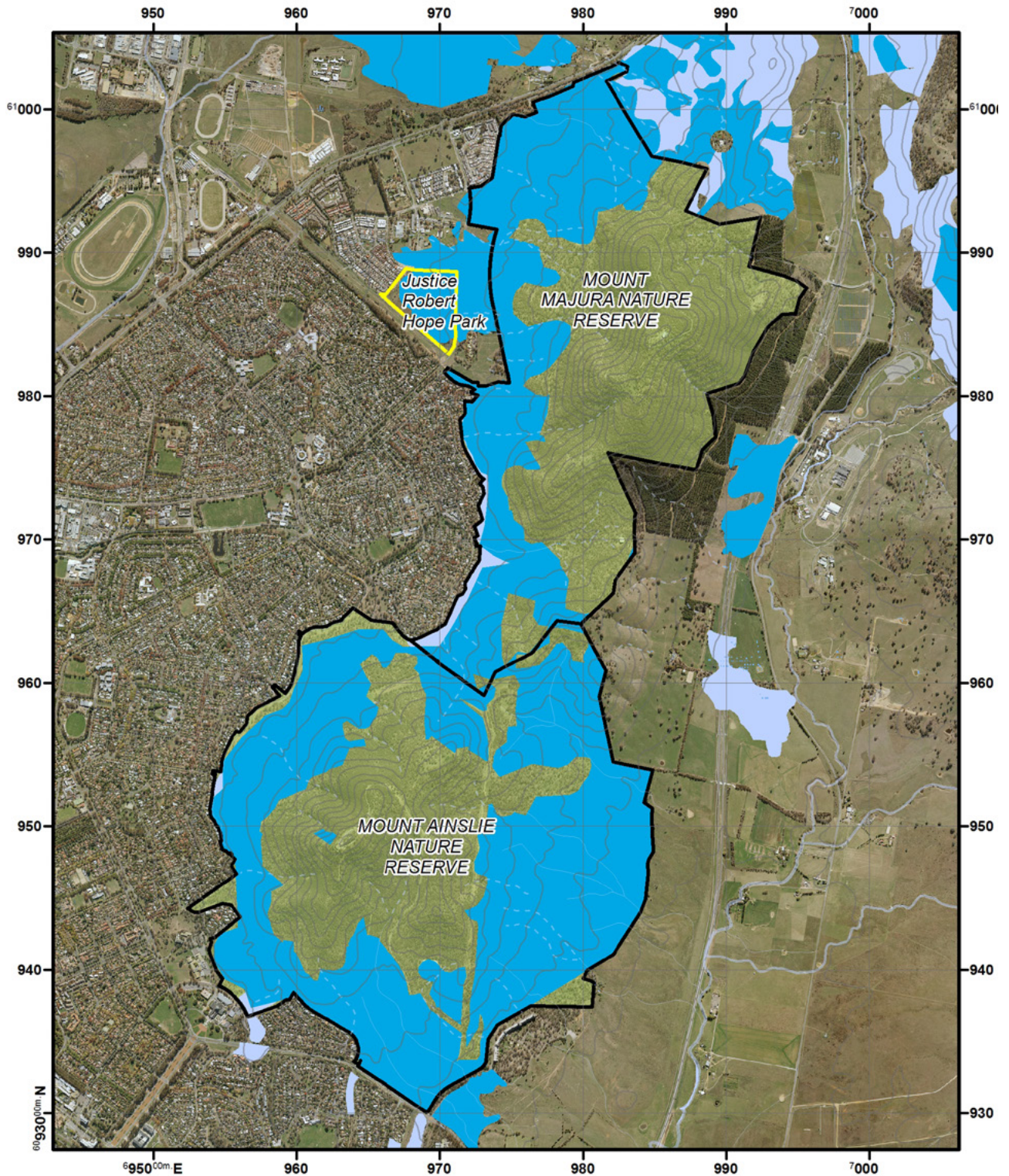
Tracking of Superb Parrots in northern ACT has revealed that Justice Robert Hope Park is significant foraging habitat for these threatened birds, which fly to the site from breeding areas to the north west [Rayner *et al.* 2016]. This suggests that sufficient connectivity exists within green spaces and peri urban habitats in northern ACT to facilitate the movement of the Superb Parrot, and presumably other bird species, from Justice Robert Hope Park to woodland patches to the north and to the east of Harrison that extend into New South Wales.

Map 1: Location and boundary of the Justice Robert Hope Park offset site



<p>Justice Robert Hope Park (Watson Woodlands) Location (EPBC 2012/6418)</p>	<p>100 50 0 100 Meters 1:7,976 When printed at A4</p>	 <p>© Copyright ACT Government</p>
<p> Nature Reserves  Watson Woodlands (Justice Robert Hope Park)</p>	<p>Coordinate System: GDA 1994 MGA Zone 55</p> <p>Prepared by: Laura Canackle ACT Parks and Conservation Service Environmental Offsets - Planning PO Box 158 Canberra ACT 2601</p> <p>Printed: 30 November 2018</p>	<p>Disclaimer: While all care is taken to ensure accuracy, the ACT Government does not warrant that the map is free from errors.</p> <p>Aerial Photography 2017</p>

Map 2: Landscape connectivity



<p>Justice Robert Hope Park (Watson Woodlands) Landscape Connectivity (EPBC 2012/6418)</p> <p> Nature Reserves</p> <p>Protected Box-Gum Woodland</p> <p> EPBC Listed Box-Gum Woodland</p> <p> ACT Listed Box-Gum Woodland</p>	<p>440 220 0 440 Meters</p> <p>1:35,069 When printed at A4</p> <p>Coordinate System: GDA 1994 MGA Zone 55</p>	<p> ACT Government</p> <p>© Copyright ACT Government</p> <p>Disclaimer: While all care is taken to ensure accuracy, the ACT Government does not warrant that the map is free from errors.</p> <p>Aerial Photography 2017</p>
	<p>Prepared by: Laura Canackle ACT Parks and Conservation Service Environmental Offsets - Planning PO Box 158 Canberra ACT 2601</p> <p>Printed: 30 November 2018</p>	

2.2 Conservation significance

Justice Robert Hope Park was chosen as an offset site for its significant conservation values. The primary vegetation is the critically endangered White Box – Yellow Box - Blakely’s Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Woodland). Figure 3 shows the extent of Box Gum Woodland in the offset site.

The offset site supports large, old hollow bearing (200-400 years old) Yellow Box (*Eucalyptus melliodora*) and Blakely’s Red Gum (*Eucalyptus blakelyi*) trees, which have large crowns and provide an important seasonal nectar source and valuable foraging habitat for canopy-dwelling birds and arboreal fauna (ACT Government, in prep). They also provide a range of hollows of various sizes in which birds and other woodland fauna can breed. Mistletoe can be observed in low densities scattered throughout the site providing an important foraging resource for native fauna. Justice Robert Hope Park also has a wide range of other habitat features including fallen timber, some scattered loose rock, a permanent dam and a mid-storey layer in localised areas comprising native shrubs [Nash *et al* 2012].

The offset site also supports six fauna species listed nationally, and / or in the ACT and NSW as threatened. This includes five species of birds, including the Superb Parrot, Swift Parrot and Regent Honeyeater, and one species of bat (Table 6). Five species of woodland plants considered rare in the ACT are also known to occur in the offset site including one that is listed as nationally endangered Hoary Sunray (*Leucochrysum albicans*) (Table 7) [Atlas of Living Australia 2016].

Justice Robert Hope Park also provides valuable education opportunities for local residents who are keen to learn about the natural environment and the Canberra Nature Park.

2.3 Land-use history

The Ngunnawal people are the original custodians of the land that is now Justice Robert Hope Park. It was the land management practices of the indigenous people that created the open “parkland” environment that was attractive to European settlers.

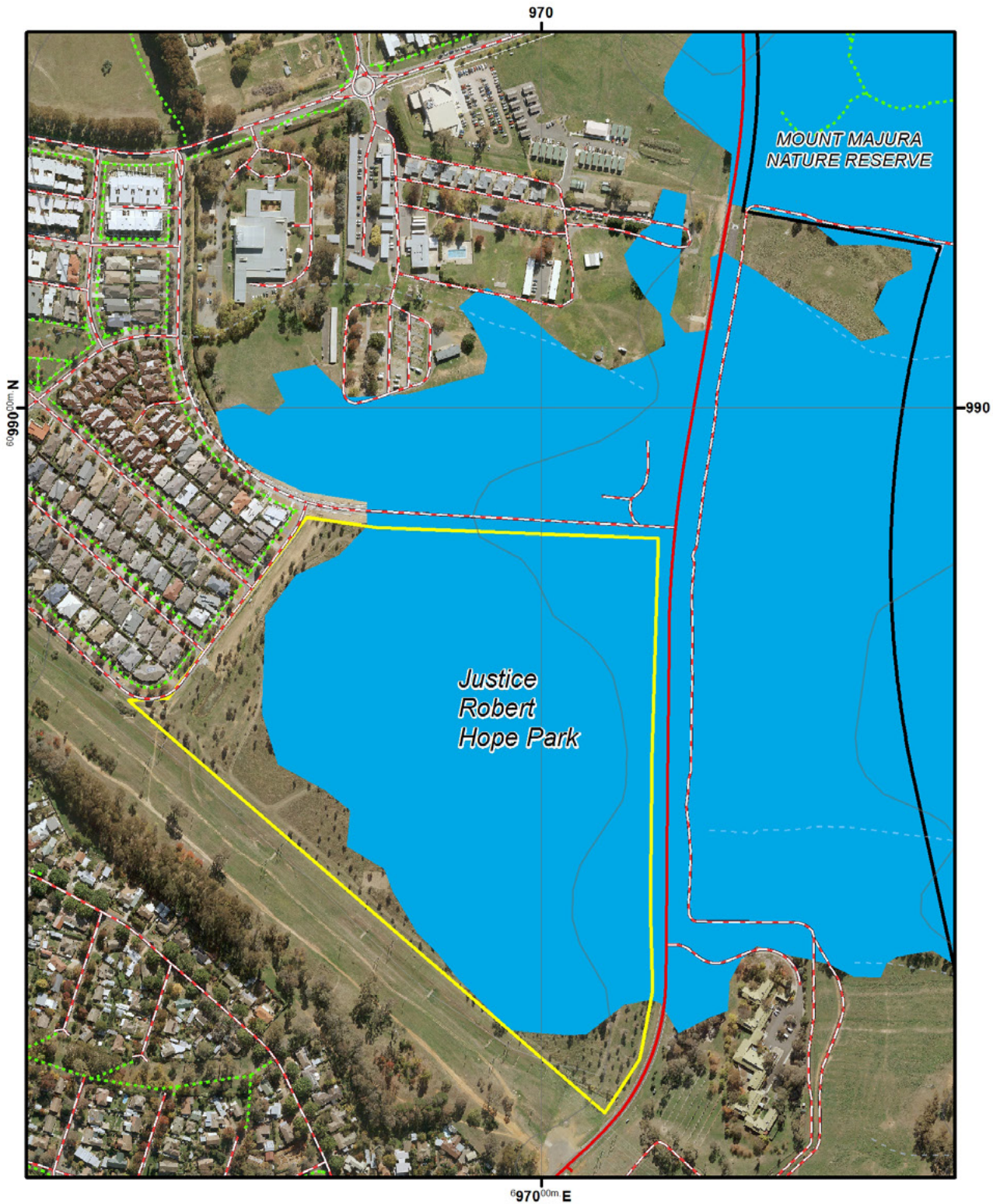
Post European settlement, the surrounding land was used for agriculture, particularly grazing of livestock. The offset site was a rural lease until 2001 and has a history of domestic stock grazing and partial tree clearing [J. Briggs 2016, pers. comm., November].

The suburb of Watson was gazetted in 1960. At this time the land in which the offset site sits was designated for tourism and residential development. In 2001, five hectares was protected from future urban development and designated as urban open space following community and environmental concerns (Larson 2008). It was soon after this that the Watson Woodlands Working Group (WWWG) were formed with their first formal working bee held on 29th September 2002 (Larson 2008). This group have subsequently been actively working to improve the condition of the conservation values within the site. Section 2.8 further describes the activities undertaken by the WWWG.

In 2002 the protected area was expanded to 18 ha and on 27th July 2005 the area was formally gazetted as Justice Robert Hope Park.

Justice Robert Marsden Hope AC CMG QC (1919-1999), was a barrister, judge and the first Chairman of the Heritage Council of NSW. Justice Hope’s Committee of Inquiry into the National Estate led to acknowledgment of the concept of a National Estate and that protection as part of our heritage, see www.northcanberra.org.au/watson-woodlands-working-group-2

Map 3: Extent of Box Gum Woodland within the offset site and adjacent areas



**Justice Robert Hope Park (Watson Woodlands)
Box-Gum Woodland Extent (EPBC 2012/6418)**

-  Nature Reserves
- Protected Box-Gum Woodland**
-  EPBC Listed Box-Gum Woodland
-  ACT Listed Box-Gum Woodland

60 30 0 60 Meters

1:5,168 When printed at A4

Coordinate System:
GDA 1994 MGA Zone 55

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Aerial Photography 2017

2.4 Significant communities

Table 5: Significant communities in the offset site

Community	Common-wealth listing*	ACT listing**	NSW listing***
White Box – Yellow Box - Blakely’s Red Gum Grassy Woodland and Derived Native Grassland	critically endangered	endangered	endangered

2.5 Significant species

2.5.1 Fauna

Table 6: Significant fauna recorded in the offset site

Scientific Name	Common Name	Common-wealth listing*	ACT listing**	NSW listing***
<i>Anthochaera phrygia</i>	Regent Honeyeater	critically endangered	critically endangered	critically endangered
<i>Lathamus discolor</i>	Swift Parrot	endangered	vulnerable	vulnerable
<i>Polytelis swainsonii</i>	Superb Parrot	vulnerable	vulnerable	vulnerable
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	-	-	vulnerable
<i>Chthonicola sagittata</i>	Speckled Warbler	-	-	vulnerable
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bent-winged Bat	-	-	vulnerable

2.5.2 Flora

Table 7: Significant flora recorded in the offset site

Scientific Name	Common Name	Common-wealth listing*	ACT listing**	NSW listing***	Notes
<i>Leucochrysum albicans</i>	Hoary Sunray	endangered	-	-	Considered to be rare in the ACT. Planted.
<i>Dianella longifolia</i> var. <i>longifolia</i>	Pale Flax Lily	-	-	-	Considered to be rare in the ACT
<i>Indigofera adesmiifolia</i>	Tick Indigo	-	-	-	Considered to be rare in the ACT. Planted.
<i>Microseris lanceolata</i>	Yam Daisy	-	-	-	Considered to be rare in the ACT. Planted.
<i>Plantago gaudichaudii</i>	Narrow Plantain	-	-	-	Considered to be rare in the ACT. Planted.

*Australian Government Environment Protection and Biodiversity Conservation Act

**Nature Conservation Act

***Threatened Species Conservation Act

2.6 Cultural heritage values

There are currently no registered cultural heritage values identified within the offset site, however indigenous heritage artefacts that have not been identified, may be present on site.

There is a nomination for the natural woodlands in the Canberra area “Molonglo River to Barton Highway Woodland” to be added to the register of cultural heritage, which would cover the offset site if successful. No other cultural heritage values (including Aboriginal or historic heritage values) have been identified to date.

2.7 Recreational values

Justice Robert Hope Park is used for walking, bird-watching and nature appreciation. Dogs on leash are permitted.

The rehabilitation works undertaken by the Watson Woodlands Working Group, have proven an excellent opportunity for local community engagement and environmental education more broadly.

2.8 Community involvement

The WWWG have been actively working to improve the condition of the woodland since 2002. They continue to have a strong influence on the management and improvement of the park. The Friends of Mount Majura also have an active interest in Justice Robert Hope Park as an area of connected woodland.

Examples of activities undertaken by the WWWG include:

- » Weed management: with a particular emphasis on woody weeds and invasive herbaceous species including Serrated Tussock, African Lovegrass, Chilean Needlegrass, St John’s Wort, Patterson’s Curse and Scotch Thistle.

- » Revegetation works: since 2002 the WWWG has planted approximately 700 trees and shrubs to help increase canopy density with a view to achieving benchmark levels for the Box Gum Woodland community. Revegetation of canopy species has been completed to the higher benchmark level and WWWG does not intend on planting more trees (J. Briggs 2016, pers. comm., December) as although no quantitative monitoring has been completed, survival of trees is reported as having been quite successful. Over 4,000 native forbs and grasses, including significant species such as the Hoary Sunray and a number of other wildflowers, have also been planted. The survivorship of these plantings has been mixed. Planting of groundcover species is to continue using those species which are locally indigenous and characteristic of Box Gum Woodland flora. The species planted are identified in Appendix A.
- » Informal monitoring of planting success, emergence of new native species, informal bird census and aerial photo analysis.

Figure 4 (a-e) depicts the increase in tree cover as a result of the plantings and the protection of regenerating trees and shrubs by the WWWG.

PCS supports the continuation of the activities undertaken by the WWWG and aims to maintain a strong and co-operative working relationship with the group. The past achievements and future intentions of the WWWG have been a major driver in the development of the Plan.

PCS and WWWG will continue to consult and engage with each other to deliver the conservation management works within the offset site, as outlined in the Plan.

For a history of the WWWG and their activities: www.northcanberra.org.au/wpcontent/uploads/2009/01/Woodlands-History1.pdf

2.9 Other

Richard Larson of the Watson Woodlands Working Group has located isolated examples of brachiopod and crinoid fossils on site which are mid-Silurian in age. This type of fossil is common in the Watson and Pialligo areas [R. Larson 2016, pers. comm., 14 November].

Map 4: Change in woody vegetation cover in Justice Robert Hope Park following habitat improvement work by the Watson Woodlands Working Group. a: 2004. b: 2009. c: 2012. d: 2014. e:2016.





3. CONSERVATION VALUES

3.1 White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

The EPBC Act approval decision recognises that the offset site includes approximately 15 hectares of Box Gum Woodland [Jessop & Moore 2015]. Another 3 hectares (approximately) supports predominantly native grass groundcover which has both natural and planted Yellow Box (*Eucalyptus melliodora*) trees. This adjoining area is functioning as part of the larger Box Gum Woodland patch. Figure 3 shows the extent of the Box Gum Woodland community in the offset site as recognised by the EPBC Act approval decision. The EPBC Listed Box gum Woodland layer contains the most current information on the distribution of the EPBC listed Box Gum Woodland in the ACT [assessed in November 2011]. The mapped extent of this community will be updated in time as data on changes to the extent is determined via the Box gum Woodland monitoring program.

3.1.1 Description

White Box-Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological communities (Box Gum Woodland) can occur either as woodland or derived native grassland (i.e. grassy woodland where the overstorey has been removed). It is characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs (where shrub cover comprises less than 30% cover), and a dominance or prior dominance of White Box (*Eucalyptus albens*) and/or Yellow Box and/or Blakely's Red Gum (*E. blakelyi*) trees. In the woodland state, tree cover is generally discontinuous and of medium height with canopies that are clearly separated [Threatened Species Scientific Committee, 2006].

To be considered as the listed ecological community, remnant areas must also:

- » have a predominantly native understorey where at least 50% of the perennial vegetation cover in the ground layer is made up of native species and
- » be 0.1 hectare or greater in size, contain an understorey with at least 12 native understorey species other than grasses, as well as at least one listed important species or
- » be 2 hectares or greater in size, with an average of 20 or more mature trees per hectare or displays evidence of natural regeneration of mature trees [Department of Environment, Climate Change and Water NSW 2011].

Mature trees are defined as those with a circumference of at least 125cm at 130cm above the ground. Regeneration must consist of naturally occurring juveniles of dominant overstorey species with a circumference of at least 15cm at 130cm above the ground [Department of Environment, Climate Change and Water NSW 2011].

Approximately 15 hectares of Justice Robert Hope Park is Box Gum Woodland. Prior to 2005 the remainder was predominantly derived grasslands as a result of past clearing [J. Briggs 2016, pers. comm., December]. Since 2005 natural regeneration and supplementary planting of Yellow Box trees by the Watson Woodlands Working Group across the treeless area have returned this to regenerating woodland.

The canopy is dominated by Yellow Box (approximately 80%), and Blakely's Red Gum (*E. blakelyi*) (approximately 20%), with the occasional Apple Box (*Eucalyptus bridgesiana*). Many of these are mature trees with diameters at breast height of over 1.3m [Gilles, 2000] and are estimated to be over 200 years old [Banks 1997]. The trees with large crowns provide an important seasonal nectar source and valuable foraging habitat for canopy-dwelling birds and arboreal fauna [Nash et al 2012].

A baseline assessment of the Box Gum Woodland was completed in 2014 [Jessop and Moore 2015]. Biometric and floristic value score data was recorded at seven plots within the reserve (figure 5). The assessment found that the understorey and midstorey support a low diversity of native flora. The understorey consists of a mosaic of degraded native and exotic groundcovers, with only several isolated patches exhibiting a moderate to high groundcover diversity. This groundcover is

dominated by native perennial grasses, exotic annual grasses and weeds. Native grass species present include Tall Spear Grass (*Austrostipa bigeniculata*) and Wallaby grasses (*Rytidosperma* spp.). The groundcover includes disturbance tolerant native forbs such as Common Everlasting (*Chrysocephalum apiculatum*) and a Goodenia (*Goodenia pinnatifida*). There are also a few scattered naturally occurring individuals of the locally rare Pale Flax Lily (*Dianella longifolia* var. *longifolia*). PCS and the WWWG have supplemented these species with plantings of native shrubs, forbs and grasses, including Tick Indigo (*Indigofera adesmiifolia*), Yam Daisy (*Microseris lanceolata*), Narrow Plantain (*Plantago gaudichaudii*) and Hoary Sunray (*Leucochrysum albicans* - a nationally listed threatened species). These four species are uncommon components of grasslands and open woodlands across the Canberra region. While the success of these plantings has been variable, in some areas, it is no longer possible to determine whether native forb populations are remnant or the product of recent reintroduction plantings [Jessop & Moore 2015]. There are at least 74 species of native forbs and grasses recorded within the offset site (Appendix A). Quadrat results are shown against 2016 monitoring data in Table 10 (section 5.6).

Jessop & Moore [2015] also found that the majority of the site exhibited a high proportion of exotic annual species, particularly Wild Oats (*Avena* sp.), Brome Grasses (*Bromus* spp.) and Patterson's Curse (*Echium plantagineum*), whilst approximately 2ha of the low-lying areas supported dense patches of Phalaris (*Phalaris aquatica*). There were also small patches of St John's Wort (*Hypericum perforatum*),

Chilean Needlegrass (*Nassella neesiana*) and scattered Serrated Tussock (*Nassella trichotoma*) and African Lovegrass (*Eragrostis curvula*). When this monitoring was undertaken in 2014, weeds were relatively widespread across most of the park but in low densities.

While small species such as annual Hairgrasses (*Aira* spp.) have minimal ecological impact, larger perennial species such as Phalaris (*Phalaris aquatica*) can form dense monocultures that exclude all other species. Patches of Phalaris (*Phalaris aquatica*) in some sections are forming monocultures that are excluding other species. Dense growth of annual exotic grasses or Patterson's Curse inhibits native groundcover recruitment, particularly during wetter seasons. Density also increases in lower lying areas, where nutrient levels tend to be higher and the soils remain moister for longer [J. Briggs 2016, pers. comm., December].



3.2 Hoary Sunray

3.2.1 Description

The Hoary Sunray (*Leucochrysum albicans* var. *tricolor*) is an everlasting-type daisy with foliage covered in white cottony hairs, and large flowers with white petals and a yellow centre. It occurs in a wide variety of grassland, woodland and forest habitats, generally on shallow, stony or relatively heavy soils [Sinclair 2010].

In Canberra, it occurs in semi-urban areas, on roadsides and in Mt Ainslie and Mt Majura Nature Reserves, being highly dependent on the presence of bare ground for germination and establishment. The seeds are wind-dispersed. Associated species are varied, but commonly include Kangaroo Grass (*Themeda triandra*) and Wallaby grasses (*Rytidosperma* spp.) in the ground layer, and often with a Yellow Box (*Eucalyptus melliodora*), or Blakely's Red Gum (*Eucalyptus blakelyi*) canopy [Sinclair 2010].

Hoary Sunray has been planted in Justice Robert Hope Park together with many other native wildflower species to increase native ground cover diversity. Natural populations are known in the nearby Mount Majura Nature Reserve and it is likely they once occurred in the offset site, which has conditions suitable for their persistence. Recruitment from some of the plantings has been observed over the last three years [J. Briggs 2016, pers. comm., December].

3.2.2 Habitat requirements

The Hoary Sunray is an obligate out-breeder that is entirely dependent on the transfer of pollen between individuals for successful reproduction. Pollination is affected by many different insects, including bees (*Apidae*) and flies (*Tephritidae*). Seed can probably disperse over many kilometres, will germinate fairly rapidly under a wide range of conditions, and can remain viable in the soil for at least a few months [Sinclair 2010].

The Hoary Sunray does not tolerate heavy competition from either native or exotic groundcover, and weeds can provide a threat [Sinclair 2010]. Management of weeds in Justice Robert Hope Park including Patterson's Curse, African Love Grass, Chilean Needle Grass, St. John's Wort and particularly annual exotic grasses (Wild Oats, Annual Rye and Brome) assists with protection of plants established in the site.



3.3 Regent Honeyeater

Grassy woodlands, which is habitat for the Regent Honeyeater (*Anthochaera phrygia*) was fairly common in the ACT, but has been significantly depleted due to clearing for agriculture, development and firewood. The Regent Honeyeater was recorded in areas of the ACT where it is now rarely observed including the slopes of Black Mountain, along the Murrumbidgee River, Tharwa, Castle Hill, and suburban Canberra [ACT Government 2004].

The last recorded sighting in the ACT was in March 2013, and the last sighting in the vicinity of the offset site was in 1995 [Nash *et al.* 2012].

The ACT region lies at the maximum altitudinal limit of the distribution of the Regent Honeyeater. In this region records show a preference by the species for Box Gum Woodland along the lower slopes of Mounts Ainslie and Majura, extending through Mulligans Flat Nature Reserve to the Sutton and Lake George areas.

3.3.1 Description

The Regent Honeyeater is a medium sized honeyeater with predominantly black feathers that are mottled white with yellow markings on the wings and tail [Department of the Environment 2016]. It is a striking and easily recognisable bird. As a migratory species, it would be an annual visitor to the Canberra region in Spring, although breeding records are rare – only five times in the ACT in the last fifty years [Bounds *et al.* 1996].

3.3.2 Habitat requirements

Nests are constructed in the branches of tall Eucalyptus species. Flowering Yellow Box (*E. melliodora*) is particularly important as a food and habitat resource. Insects common to the flowering gums are also an important food resource as they are fed to chicks while in the nest [Bounds *et al.* 1996].

Four pairs of Regent Honeyeater were observed nesting in trees adjacent to the Justice Robert Hope Park in 1995–96 when the Yellow Box (*E. melliodora*) trees and saplings were flowering profusely [Bounds *et al.* 1996]. It is noted that planted Mugga Ironbark (*E. sideroxylon*) at the Australian Heritage Village [to the north-west of the offset site], which has since been removed, also acted as an important food resource for these breeding birds. Breeding pairs are highly territorial.

Regent Honeyeaters rely on a relatively high density of food and habitat trees, predominantly in the form of flowering canopy species with hollows, for both feeding and nesting. Justice Robert Hope Park meets these criteria, with the many mature Yellow Box (*Eucalyptus melliodora*) and Blakely's Red Gum (*E. blakelyi*) trees providing habitat for this species.

Linkages between large patches of remnant vegetation is also critical for the movement of the Regent Honeyeater across the landscape and migration more generally.

The presence of food and nesting habitat within Justice Robert Hope Park and the proximity of the site to the adjacent Mount Majura woodlands make it possible that the Regent Honeyeater may revisit the site. The last sighting was however, 20 years ago and a decline in their numbers more broadly [ACT Government 2004], places question on the likelihood of this occurring.

Ecologist Murray Evans [2016, pers. comm., 13 December] states that the best way to improve Regent Honeyeater habitat is to protect large Yellow Box (*E. melliodora*) trees which have the potential to flower profusely and ensure that there are sufficient young Yellow Box trees to grow and replace old ones as they senesce. Protection and appropriate management of Regent Honeyeater habitat within Justice Robert Hope Park will continue in the hope that the species may one day again be observed in the area.

3.4 Superb Parrot

The Superb Parrot is regularly observed within Justice Robert Hope Park in summer and its visitation to the park has increased markedly since December 2014. Since then, the species has been observed frequently in the offset site, with flocks of up to 30 birds seen [J. Briggs 2015, pers. comm.]. Tracking of birds from a north Canberra breeding population has revealed that Justice Robert Hope Park is an important foraging area for the Superb Parrot [Rayner *et al* 2016].

3.4.1 Description and life cycle

The Superb Parrot is a slender grass-green parrot, about 400mm in length, with a distinctively long tail. The male has brilliant green plumage with yellow-green underparts. The forehead, throat and cheeks are yellow and there is a scarlet band across the neck. The female is green, with a dull bluish-green face [ACT Government 2004].

It is estimated that the Superb Parrot is sexually mature at two to three years [Low 1980]. Females lay between four to six white eggs on a bed of decayed wood in a hollow branch or a hole in the trunk of a large eucalypt [Low 1980]. Eggs are incubated for about 20 days, with chicks fledgling at about five weeks. The female remains at the nest throughout incubation and until the chicks are well developed [ACT Government 2014b].

During incubation males travel to and from foraging sites where they collect food for the sitting females. Males and females will both forage for chicks and frequently join small foraging flocks, which may also consist of non-breeding birds [Department of the Environment 2015].

In the ACT region the Superb Parrot arrives during August to breed, departing the following January. It appears to have distinctive and separate breeding and foraging areas. Breeding appears to be confined to the Central Molonglo Valley and Throsby Ridge. It is thought that between 10–20 pairs of Superb Parrot breed at each location, with little feeding activity at either breeding site [ACT Government 2014b]. Rayner *et al* (2016) found evidence that aggregated breeding benefited newly fledged young and this was facilitated by the clustering of multiple large, hollow bearing trees.

The parrots can travel up to 10km from breeding to foraging areas, following corridors of trees [J. Bounds 2015, pers. comm.]. Foraging largely occurs within suburban Belconnen and the Gungahlin suburb of Harrison, where birds feed on the seeds or flowers of planted trees and shrubs including elms (*Ulmus* sp.), Red Ironbark (*Eucalyptus sideroxylon*), Wattles (*Acacia* spp.) or on grass seed on suburban sports grounds [ACT Government 2014b]. Justice Robert Hope Park has been found to be an important foraging site during bird tracking research in the 2015 breeding period [Rayner *et al* 2016].

The species tends to return to traditional nest sites, though use of a nest within a particular year will depend on seasonal conditions. In the non-breeding season, birds are usually in small flocks of up to 30 with equal proportions of males and females [ACT Government 2014b]. The exact relationship between breeding and non-breeding ranges is unclear [Department of the Environment 2015].

3.4.2 Habitat requirements

This species inhabits Box-Gum Woodlands where they forage in trees, understory shrubs and on the ground for their diet of grass seeds, herbaceous plants, fruits berries, nectar, grain, buds, flowers and insects [NSW Office of Environment and Heritage 2016b]. Superb Parrots preferentially seek out large (>60cm dbh) trees in Box-Ironbark forests and Woodlands because they provide reliable and predictable nectar flows.

Suitable nesting trees are a critical resource. Across its range the Superb Parrot usually nests in hollow limbs or holes deep in the trunk of large woodland or riparian eucalypts, usually near a permanent water source. Preferred nesting trees in the ACT are within Blakely's Red Gum (*E. blakelyi*), Yellow Box (*E. melliodora*) or Scribbly Gum (*E. rossii*) [ACT Government 2014b].





3.5 Swift Parrot

Small numbers of Swift Parrots (*Lathamus discolor*) are recorded intermittently in the ACT although not each year [Brereton 1998], and is an occasional winter visitor to Justice Robert Hope Park and more regularly in the adjacent Mount Majura Woodlands. The Swift Parrot is likely to occur anywhere in the lower elevated parts of the ACT below 700 m. Records of the species over the last 25 years are from inner Canberra suburbs and Gungahlin and Hall [ACT Government 2005].

3.5.1 Description

The Swift Parrot is a small, streamlined, bright grass green parrot, about 250mm in length. It has a dusky red spike-shaped tail, red forehead and throat bordered by yellow, and blue crown and cheeks. The male has numerous dark red markings on the face, shoulders and tail. It is a migratory species that spends winter on the Australian mainland, returning to Tasmania to breed in summer [ACT Government 2005].

3.5.2 Habitat requirements

The Swift Parrot is dependent on a diversity of habitats to provide a range of foraging resources, with emphasis on lerps and nectar availability. Use of different habitats is dependent of prevailing climatic conditions and corresponding food availability [ACT Government 2004]. Vegetation structure and proximity to foraging sites are likely to be important for roost site selection however further information is required to identify these habitat components and their importance for the species.

The Swift Parrot is mainly an arboreal feeder, usually in the outer canopy of Eucalyptus trees. Their main food is nectar, also psyllids, seeds and fruit. They occasionally come to ground to drink and feed on seeds and fallen material [Higgins 1999]. Due to the variable production of nectar and lerps across the range of the Swift Parrot, it needs a broad range of habitats to provide a range of foraging resources including Box Gum Woodlands.

Urban impacts, grazing and declining tree health all contribute to reduced tree regeneration which alters the age structure of woodland habitat, and reduces the long-term viability of foraging resources. Swift Parrots are less likely to occur in degraded foraging sites as the abundance of large, aggressive nectar feeders (e.g. Noisy Miner, *Manorina melanocephala*) is higher [ACT Government 2004].



3.6 Other conservation assets

Four locally rare plants, a regionally vulnerable bat and other woodland birds (Section 2.5) are also known to occur in Justice Robert Hope Park [Atlas of Living Australia 2016].

3.6.1 Woodland birds

Two woodland birds, the Gang Gang Cockatoo (*Callocephalon fimbriatum*) and the Speckled Warbler (*Chthonicola sagittata*) are considered to be declining in the ACT and are listed as vulnerable in NSW. Both are heavily reliant on woodland habitat for foraging and breeding. The woodlands of Justice Robert Hope Park provide known habitat for both species. The Speckled Warbler has raised young in the area [Canberra Ornithologists Group, n.d.].

There are numerous other woodland birds recorded in the adjacent Mount Majura Nature Reserve that are likely to expand their ranges into Justice Robert Hope Park if woodland condition and connectivity are improved. Nash *et al.* (2009) provide a detailed list and assessment.

3.6.2 Habitat requirements

Habitat connectivity and diversity are critical for woodland birds. The offset site is an important component of a regionally important woodland link [Barrett and Love 2012]. Priority must be given to maintaining or creating connectivity between remnant woodland patches, and providing a range of habitat values including:

- » maintaining a diverse understorey of shrubs, herbs and forbs
- » maintaining areas of grassland that support insects and other invertebrates
- » providing fallen timber for additional foraging habitat and
- » preserving large living and dead trees for perching, roosting, nesting and foraging [ACT Government 2004].

Habitat diversity will also contribute towards reducing the competitive advantage of the native Noisy Miner (*Manorina melanocephala*), which can exclude other birds through aggressive behaviour.

3.6.3 Other species

The locally vulnerable Australasian Bent-winged Bat (*Miniopterus schreibersii* subsp. *oceanensis*) is also known to frequent Justice Robert Hope Park, and is thought to utilise tree hollows as roosting sites [Atlas of Living Australia 2016a].

4. HABITAT IMPROVEMENT PLAN

The following sections describe the current management issues applicable to the offset site and outlines how these issues will be addressed. The actions to address these issues will both complement and be additional to the pre-existing land management actions undertaken by PCS and the WWWG. Actions identified in this section will also contribute towards fulfilling conditions outlined in the approval decision.

4.1 Over-abundant or invasive plants, animals and pathogens

4.1.1 Invasive plants

In accordance with the approval conditions, weed management must be undertaken to meet statutory obligations. Table 8 identifies weeds that are present within Justice Robert Hope Park and that are of high priority for control.

Table 8: Weeds to be controlled in Justice Robert Hope Park under statutory obligations in the ACT Pest Plants and Animals (Pest Plants) Declaration 2005 [ACT Government 2012b].

Common Name	Scientific Name	Weed of National Significance*	ACT Declaration**
African Lovegrass	<i>Eragrostis curvula</i>	No	Must be contained
Chilean Needlegrass	<i>Nassella neesiana</i>	Yes	Must be contained/prohibited
Cotoneaster	<i>Cotoneaster spp.</i>	No	Prohibited
Paterson's Curse	<i>Echium plantagineum</i>	No	Must be contained
Scotch Thistle	<i>Onopordum acanthium</i>	No	Must be contained
Serrated Tussock	<i>Nassella trichotoma</i>	Yes	Must be contained/prohibited
St John's Wort	<i>Hypericum perforatum</i>	No	Must be contained

* www.environment.gov.au/biodiversity/invasive/weeds/weeds/lists/wons.html

** www.environment.act.gov.au/__data/assets/pdf_file/0007/575071/ACT-Weeds-Strategy-2009-2019.pdf

Weed control will be undertaken to contain the weeds listed in Table 8 and meet statutory requirements and reduce the threat to the MNES. Weed control programs will be delivered by appropriately trained and licenced contractors, staff and volunteers, who are experienced in working in areas of high conservation value and are able to differentiate weeds from the native plants species (including the native grasses, herbs and forbs) that occur on the site. Any incursions of new weed species (both within the reserve and along the adjacent roadside) will also be promptly controlled.

PCS staff, contractors and volunteers will continue to map all weed control activities undertaken within the offset site to monitor weed distribution and record any new outbreaks, particularly for the key weed species. A summary of the weed management activities carried out each year will be included in the annual report. Maps of weeds treated over the 2016–17 financial year, including density and extent figures (Appendix 3).

Areas of bare ground resulting from weed spraying will be seeded with native grasses including Kangaroo Grass (*Themeda triandra*) and/ or revegetated with locally indigenous native plants which form part of the Box Gum Woodland community.

An experiment will be undertaken by the WWWG in collaboration with PCS to spray out areas of Phalaris and seed the areas with Kangaroo Grass. Three plots, each up to 20m x 20m in area (see Figure 5) will be mown and sprayed out in Autumn and again in Spring of 2017. The plots will be fenced and sown to Kangaroo Grass in Autumn/Winter of 2018 using seed harvested or acquired by PCS [J. Briggs and N. Bruns 2016, pers. comm., December]. It is hoped the Kangaroo Grass will grow to form a dense stand that will out-compete the exotic grasses [J. Briggs 2016, pers. comm., December].

Prior to the conduct of weed control activities, PCS will ensure contractors and volunteers are briefed on the area's values, weeds to be targeted, areas to avoid and other matters to ensure avoidable secondary impacts do not occur (e.g. spray drift and impact on non-target species). All vehicles are to be cleaned prior and after site entry to avoid weed spread.

4.1.2 Invasive animals

The dominant invasive animals at the site are rabbits and foxes. Cats, some of which may live in adjacent residential areas, are also occasionally seen in the park. Dogs are permitted in the reserve, but only on leads and are not considered to be an invasive animal in this context.

The control of foxes is usually undertaken using 1080 baits and shooting. Due to the offset site's proximity to residential housing, these methods of control are not available.

Rabbits can become over-abundant following good seasons and severely impact on native vegetation. Grazing and burrowing by rabbits can cause erosion, reduce the recruitment and survival of native flora as well as threatening the survival of a number of native fauna species by altering habitat, reducing food resources, displacing small native mammals from their burrows and attracting introduced predators such as foxes [NSW Office of Environment and Heritage 2016a]. Rabbits can also cause significant losses and damage to native forb species by digging around the root crowns [J. Briggs 2016, pers. comm., November]. For this reason, it is essential that grazing pressure from rabbits is managed to ensure that sustainable levels of native plant recruitment are achieved and revegetated plants are protected.

Rabbit control works were undertaken in 2016 (burrows fumigated). Rabbit populations will be appropriately managed within the offset site and in accordance with the ACT Pest Management Strategy [ACT Government 2012a]. All efforts will be made to control rabbits in conjunction with neighbouring land managers.

4.1.3 Invasive pathogens

There are no known pathogen infestations in Justice Robert Hope Park.

The incidence of *Phytophthora cinnamomi* in the ACT is low and there is no known record of *P. cinnamomi* within the offset site or surrounding landscape. Nonetheless, dieback caused by *P. cinnamomi* is a key threatening process to the Box Gum Woodland community under the EPBC Act. Once present it can dramatically modify the structure and composition of native plant communities, resulting in habitat degradation for dependant flora and fauna [Commonwealth of Australia 2014].

To reduce the risk of *P. cinnamomi* entering the offset site, staff, contractors and volunteers will be educated on the threat imposed by *P. cinnamomi* and procedures to follow in order to reduce the risk of infection. Following guidelines in the Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi* (Commonwealth of Australia 2014a), activities will include:

- » cleaning vehicles and equipment before entering the offset site
- » ensuring *P. cinnamomi* hygiene protocols are included in works contracts
- » avoiding or minimising the importation of raw materials (e.g. gravel, sand, soil and water).

It is noted that if an infestation occurs, chemical control options are very limited and prevention is the best management strategy.

4.2 Enhancement

4.2.1 Biomass management

- » Natural grassy ecosystems require active biomass management to maintain their ecological condition, to provide habitat for component species, to promote recovery of threatened species and to reduce threats to the ecological community, such as weed infestation (ACT Government, in prep). Options for biomass management include grazing (by native herbivores), mowing, slashing and burning (ACT Government, in prep).

Grazing

The preferred method for grass biomass management is grazing by native herbivores (kangaroos), with other methods (fire/slashing/mowing) used in circumstances where grazing by native herbivores is unable to maintain the desired grass biomass/structure at a site (ACT Government, in prep).

- » The ground layer biomass is grazed by kangaroos. Rabbits are also applying browsing pressure but their control will reduce this degree of pressure. There are no plans to allow cattle or sheep grazing in Justice Robert Hope Park as these animals will cause damage to the regenerating forbs, shrubs and trees.

Mowing and/or slashing

Mowing will not be used extensively due to the restricted access resulting from the large amount of young trees planted throughout the offset site. Mowing will be used to maintain management and walking trails. Small patches of dense exotic grasses will be mown in some years when the grasses are starting to flower in order to prevent seeding and hopefully to thus reduce future exotic grass densities in these areas.

Ecological burning

PCS does not commit to implement an ecological burning program within the offset site over the life of the Plan.

PCS does however, reserve the right to undertake an ecological burning trial, if at the advice of a suitably qualified ecologist, considers it beneficial for the management of the Box Gum Woodland community. This is in line with an adaptive management strategy.

The implementation of any ecological burning trial is dependent on the availability of staff and equipment resources. Any ecological burns will comply with the Ecological Guidelines for Fuel and Fire Management Operations [Kitchin and Matthews 2012].

4.2.2 Regeneration

Woodland trees began to regenerate in several places within Justice Robert Hope Park following the end of the long drought in 2010. By this time domestic stock grazing had also been removed from the reserve. The WWWG began extensive planting of trees in the reserve in 2005 and by 2010 most of the site where there was low or no tree cover had been planted.

Regeneration of indigenous trees and shrubs will be promoted within the Box Gum Woodland to improve connectivity and wildlife movement between the offset site, the adjacent reserves and the surrounding landscape. Regenerating canopy species may also eventually form hollows and provide nesting sites for the Superb Parrot and other woodland birds.

The aim is for tree and shrub cover to reach the benchmark condition of the Box Gum Woodland community [ACT Government 2015a]. Environmental monitoring undertaken in 2014 [Jessop & Moore 2015] indicates that the canopy is typical of natural woodlands in that it is scattered and supports a up to 18.5% projected foliage cover. This canopy cover figure is within ACT vegetation benchmark level (11–32% foliage cover) [ACT Government 2015a]. Midstorey projected foliage cover was between 0.8% and 8.3%, and predominantly consisted of regenerating woodland tree saplings, with few shrubs [Jessop & Moore 2015]. This figure is also within ACT vegetation benchmark level (0 and 12.5%) [ACT Government 2015a].

The WWWG planted small numbers of the threatened Hoary Sunray (*Leucochrysum albicans* var. *tricolor*) within the offset site and this has subsequently started naturally regenerating nearby to the planted areas. It is almost certain that this regeneration is from seed distributed from the planted specimens [J. Briggs 2016, pers. comm., December].

Weed control, pest animal management and the use of tree guards to protect seedlings will reduced the threats to regenerating trees and shrubs within Justice Robert Hope Park.

4.2.3 Revegetation

WWWG and PCS have planted trees, shrubs and groundcover plants within the offset site. The flora list in Appendix 1 identifies which species have been planted and which grow naturally within the site.

Sufficient canopy species have been planted to exceed the benchmark for Box Gum Woodlands once these plantings mature. There are no plans to plant any more trees within the offset site. Planted trees have been protected with tree guards made of wire netting, which are left in place for up to 3 years [J. Briggs 2016, pers. comm., December].

Further planting of mid layer shrub species will occur in patches within the reserve to provide mid story bird habitat as well as structural complexity to the reserve. This would have the added benefit of reducing impacts by the introduced Indian Myna and the native Noisy Miner who prefer a more open woodland setting. A correlation has been found between increased shrub cover in revegetation sites, and reduced Noisy Miner numbers [N. Taws 2015, pers. comm.] as they prefer an open flight path for feeding. Some shrubs have been planted in patches throughout the offset site and more will be planted using species characteristic of the Box Gum Woodland community including Australian Blackthorn (*Bursaria spinosa*) and Wattles (five *Acacia* spp.) [J. Briggs 2016, pers. comm., December].

At the time of the 2014 monitoring, native forb cover and diversity is well below benchmark across most of the reserve [Jessop & Moore 2015].

Future forb planting programs will focus on species that were found to be the most successful in previous plantings by the WWWG. This includes included Lemon Beauty Heads (*Calocephalus citreus*), Common Everlasting (*Chrysocephalum apiculatum*) and Clustered Everlasting (*Chrysocephalum semipapposum*). Forb plantings will focus on areas with least exotic grass and other weed species present and these could include the halo areas developing under the expanding canopies of planted and naturally recruited trees. [J. Briggs 2016, pers. comm., November]. The WWWG have observed that planted trees and more recently naturally recruited trees create a “halo effect” whereby the exotic grass cover in most seasons is heavily suppressed beneath the tree canopies out to the drip line. The number and size of “halo” areas will increase as planted trees become further established.

A weed control experiment (detailed in Section 4.1.1) aimed at reducing the extent of *Phalaris* will include revegetating bare areas (after mowing and a series of herbicide applications) with Kangaroo Grass seed. It is hoped the Kangaroo Grass will grow to form a dense stand that will out-compete the exotic grasses [J. Briggs 2016, pers. comm., December].

Forb re-introductions in the vicinity of monitoring plots 1, 3 and 6 [Jessop & Moore 2015] have met with varying success [J. Briggs 2016, pers. comm., December].

Any revegetation works will abide by the following principles:

- » The objective will be for tree cover, mid story and ground layer to be maintained within or increased to benchmark levels for the Box Gum Woodland community (species richness 35, tree cover 11–32%, shrub cover 0–12.5%, native grass cover 23–63%, other native groundcover 8-16.5%) [ACT Government 2015a].
- » Any future shrubs plantings will be configured in clumps, with the clumps spaced at a minimum distance of 150m to assist in the movement of the Superb Parrot and other woodland birds across the landscape.
- » Emphasis will be given to planting local native plant species that improve foraging and nesting habitat for woodland birds, including the Superb Parrot and Regent Honeyeater.
- » All revegetated plants will be protected by tree guards and/or fenced to protect them from rabbits and/or kangaroos. Any fencing around regenerated plants would need to remain for at least 3 years to protect from grazing [G. Fifield 2015, pers. comm.].
- » All revegetation projects will be subject to a monitoring and maintenance program.

4.2.4 Erosion and soil disturbance

There is a small risk of erosion occurring on gentle slopes above the sump located in the western corner of Justice Robert Hope Park. There are no signs of significant erosion within the park.

The site will be managed to avoid instances of heavy soil disturbance. This includes limiting vehicle access across the site during or after rain periods, when soils are wet.

4.2.5 Placement of woody debris

Habitat diversity will be increased slightly in the offset site through the addition of a small amount of large diameter woody debris salvaged from the adjacent development area. The additional woody debris increases the protection of small plants from grazing at a local scale and will provide unique micro-habitats that are beneficial to both fauna and flora species [ACT Government in prep].

Any additional woody debris available will be placed around the lower retention basin.

4.2.6 Improving frog habitat

To improve frog habitat, woody debris will be placed within and around the retention basin within the western section of the Offset site.

Frog habitat will be regulated through monthly water quality testing by the WWWG [Waterwatch Australia Steering Committee 2002]. The data gathered is submitted to ACT Waterwatch and is uploaded to the Atlas for Living Australia [R. Larson 2016, pers. comm., December].

PCS will monitor the frogs within the dam using the ACT Frogwatch frog census method (Frogwatch ACT and Region 2008). Frogs will be monitored concurrently with the annual Frogwatch census.

4.3 Assets and Infrastructure

4.3.1 Fencing (control of unauthorised access)

The majority of Justice Robert Hope Park is fenced and some internal fencing is present. Internal fencing has been assessed and is considered redundant. This fencing is to be removed although temporary fencing will be erected where it is necessary to protect regeneration or revegetation. There are four gates that provide public access, and a further three locked gates that provide vehicle access to the park. One is located on the Stirling Avenue side, one on Antill St and one on Negus Crescent. These gates are kept locked to control unauthorised access.

The fencing on the western side may be removed to allow the installation of drains from the proposed development site and if removed, will be replaced as part of the drain installation works. The fence on the northern side is outside the offset site boundary and crosses the area designated for the extension of Negus Crescent. The gate on Negus Crescent will require moving or replacement with the construction of the new section of road and removal of the existing fence. This section of fencing, and its associated gate, will be replaced as part of the road construction by the developer. Timing for any fence removal and replacement will largely be determined by the timeframe for the development of Block 9, Section 64, Watson, and the Negus Crescent extension. Any new fencing will be erected using wildlife friendly specifications.

The fence on the southern side (Stirling Avenue) does not fully align with the current reserve boundary and will require partial replacement. The fence on the eastern side (Antill Street) is correctly aligned but needs some repairs and the addition of two Kangaroo entry 'gates'.

PCS will remove and replace the boundary fences on the eastern and southern sides of Justice Robert Hope Park to control unauthorised access. Two Kangaroo gates will be installed on the eastern side of Justice Robert Hope Park to improve movement of Kangaroos between Justice Robert Hope Park and adjacent woodland areas. The new boundary fence will be erected using wildlife friendly specifications.

Access gates will be added or replaced to address any future increase in visitor numbers. Unauthorised access will be controlled by ensuring gates large enough for a vehicle to pass through will remain locked at all times when not in use by PCS or the WWWG.

4.3.2 Tracks and trails

Existing tracks provide minimal access to the site. There are poorly defined management tracks entering the reserve in the north-east corner which will be kept maintained via slashing. A formed track with markers is proposed to provide more suitable access for local residents into the reserve. The route of this track is to be determined in discussion with PCS and WWWG and will be designed to minimise disturbance to vegetation within the reserve.

4.3.3 Visitor infrastructure

To meet the conditions of approval for the residential development of Block 9 Section 64, Watson, domestic animals must be controlled within the offset site. Totems with prominent 'Dogs on leash' signage will also be installed.

General park signage and signs identifying prohibited activities will be installed or upgraded at access points as appropriate.

Old park information signage will be replaced. New signage will provide visitors with information about the natural conservation values found within the offset site, including the significance of the fossils.

4.3.4 Waste and pollution

Rubbish is rarely dumped within the offset site. Any waste or rubbish (including old fencing materials) will however, be removed by PCS. When internal fences are removed, all fencing materials will be removed from the site.

The offset site includes a stormwater settling pond that receives water from the adjacent residential development. Any incidents of pollution in the stormwater that enters the settling pond will be reported to the EPA by PCS staff.

4.4 Community Engagement

4.4.1 Recreation

Justice Robert Hope Park is regularly used by members of the public. Dogs are permitted providing they stay on a leash and are kept under control at all times.

Justice Robert Hope Park will continue to be accessible to the WWWG to undertake a variety of rehabilitation works, and other members of the community for passive recreation such as bird watching and walking. A new track consisting of a slash line will be constructed and defined using track markers.

General park signage and signs identifying prohibited activities will be installed or upgraded at access points as appropriate (Section 4.8.3).

4.4.2 Interpretation

Existing interpretive signage is old and faded. New signage highlighting the conservation values within Justice Robert Hope Park will be installed at key entrance points into the reserve.

4.5 Managing Cultural Heritage Values

The ACT Government [Heritage Act 2004](#) includes specific provisions that require a person to report the discovery of an Aboriginal place or object to the Heritage Council within five working days. There are also provisions and penalties that apply if a person damages any Aboriginal place or object in the ACT (ACT Government 2015b).

The Cultural Heritage Reporting Policy (ACT Heritage Council 2015) details the cultural assessment and reporting requirements for projects that could impact on places or objects with heritage value. This may include some operational and habitat restoration projects. A cultural heritage assessment and associated reporting will be undertaken in accordance with the guidelines described in this document. The ACT Heritage Unit can provide further advice on assessment requirements.



5. MONITORING PLAN

All monitoring will be undertaken by ACT Government staff or the WWWG Opportunities will also be provided to community groups and volunteers to participate in the monitoring program, where appropriate.

Monitoring results will underpin continual improvement of restoration techniques under an adaptive framework, and will be documented as part of annual reporting (and published on the internet).

Accurate records will be kept for all activities to ensure reporting and monitoring requirements are met.

The results of the monitoring program will also be disseminated within the ACT Government to better inform the management of the conservation values within the ACT, and will feed into a process of review and adaptive management.

An assessment of the extent and condition of the Box Gum Woodland community in the offset site was undertaken in 2014 [Jessop & Moore 2015]. This assessment was undertaken following the NSW Biometric methods [NSW Government 2011] as specified by the ACT Government [Jessop & Moore 2015]. This assessment provides a baseline from which PCS can demonstrate maintenance or improvement in the general extent and quality of the Box Gum Woodland community within this offset site and compliance with the primary objective identified in Section 1.3.

Monitoring results will be assessed by PCS staff and ACT Government ecologists. The results will enable a direct comparison of the habitat quality against benchmark condition [ACT Government 2015a] as well as being able to monitor change compared to baseline over time. Vegetation benchmarks are quantitative measures of variables within vegetation communities from a reference site i.e. a site with minimal modification or disturbance [ACT Government 2016b]. The benchmarks provide an indication of the quality of a site compared to an unmodified, high quality site.

5.1 Monitoring MNES

5.1.1 Box Gum Woodland mapping

A greater understanding of the quality and extent of BGW is required across the ACT woodland offset reserves to help inform land management actions and future monitoring programs. Mapping the condition of patches will support management decisions at each offset site including targeting appropriate restoration and weed management areas, and guiding planting requirements such as tree, shrub or understorey plantings.

Detailed community condition mapping took place in spring (October – November) 2017. The on ground boundaries of the Plant Community Type (PCT) were first accurately mapped using a GPS. Following this the mapped PCTs were divided into vegetation zones based on visible differences including structure, floristic composition and intactness of the vegetation, and mapped on ground using a GPS. Vegetation zones for Box Gum Woodland include:

- » Appropriate canopy present, canopy regeneration, native dominated groundstorey, high, moderate or low diversity of forbs
- » Appropriate canopy absent, native dominated groundstorey, high, moderate or low diversity of forbs
- » Appropriate canopy present, exotic dominated groundstorey, canopy regeneration absent or present
- » Appropriate canopy absent, exotic dominated groundstorey.

Once detailed woodland condition mapping has been completed, the location of monitoring plots will be assessed to ensure that monitoring represents all vegetation types and conditions within the reserve.

5.1.2 Box Gum Woodland monitoring

A baseline assessment of the habitat quality and floristic diversity within the Box Gum Woodland community in the offset site was undertaken in spring 2014 using the NSW Biometric Method [NSW Government 2011]. Seven permanent monitoring plots were established [Jessop & Moore 2015]. See section 3.1.1 for the baseline description.

Future monitoring will be undertaken by a suitably qualified contractor at least every three years from the baseline assessment in spring 2014, using the same methodology as previously [Jessop & Moore 2015]. However monitoring will take place more frequently initially to remain consistent with the offsets Box Gum Woodland monitoring program, allowing seasonal comparisons across reserves (Table 9).

The monitoring uses biometric methods [NSW Government 2011], which is consistent with the methods required for the ACT Environmental Offsets Calculator [ACT Government 2016b]. This method includes measurements of native and exotic species diversity, percentage cover of native grass, forbs, shrubs and canopy and presence of woody debris. Vegetation monitoring also includes the floristic value score (FVS) methods defined by Rehwinkel (2007, 2015), which uses plant diversity and cover measurements to calculate a score. These combined methods provide structural and compositional indicators that can be linked to vegetation condition and habitat quality [Gibbons *et al* 2009, Lawley *et al* 2016]. Consequently these indicators can be reviewed against the benchmark condition for the vegetation type to determine vegetation condition and fauna habitat quality.

The results will be assessed against 2014 benchmark condition (see Tables 10 and 11) and assessed to monitor change compared to baseline over time [Rehwinkel 2007]. This assessment methodology provides a standard baseline from which PCS can demonstrate any change in the quality and extent of the Box Gum Woodland community within this offset site and compliance with the primary objective identified in Section 1.4. A comparative analysis of the 2014 and 2016 monitoring results is presented and discussed further in section 5.6.

5.1.3 Hoary Sunray

Hoary Sunray (*Leucochrysum albicans* var. *tricolor*) populations have been established within the Offset by ParkCare volunteers through the successful translocation of seed sourced from the adjacent Mount Majura Nature Reserve. As the established patches of Hoary Sunray are not located within the long-term box-gum woodland monitoring plots, a separate monitoring methodology is required.

Baseline data on the Hoary Sunray population was collected in spring (October) 2017. Two populations, and three patches, were found in the reserve. The boundaries of each patch were walked with a GPS, and the length and width measured with a measuring tape. In each patch, a 1m x 1m quadrat was used to count plants. The quadrat was placed randomly within the site, and counts repeated until the average was considered to represent variation in numbers in each patch. The patch and count details were mapped and recorded as a spatial (GIS) layer. Subsequent monitoring will occur every 3 years to observe any change in extent and density. Monitoring is programmed to appropriate seasonal windows (spring flowering).

The longevity of the 'everlasting daisy' flowers provides a sufficient window to account for stochastic events, such as adverse weather patterns or fire conditions. Spring burns/wildfire could influence detectability. Accordingly population data for Hoary Sunray is disseminated to the ACT Government Protected Plants (GIS) layer and subsequent versions of the ACT Emergency Services Bushfire Suppression Atlas. As a consequence future burn planning can account for the Hoary Sunray populations and their monitoring requirements.

Management actions aim to improve the habitat in line with the National Recovery Plan for the Hoary Sunray *Leucochrysum albicans* var. *tricolor* [Sinclair 2010]. Specifically, recovery action 4.1 states that management should control threats to this species from pest plants. PCS has committed to target key weeds that are a statutory obligation to control, which will lead to an improvement in this species' habitat. The control of exotic grasses, some of which are a statutory obligation to control, will also result in a significant improvement in this species' habitat. The experimental control of Phalaris discussed in section 4.1.1, if successful, will result in the creation of areas of suitable habitat for Hoary Sunray.

Table 9: MNES monitoring program schedule

Monitoring activity	Parameters measured	Timeframe	Guidelines
Box Gum Woodland monitoring	<ul style="list-style-type: none"> » 20m x 20m plot » Native plant species richness » Floristic Value Score » Photo-monitoring (NE corner) » 50m transect » Native over-storey cover » Native mid-storey cover » Native ground cover (grass, shrubs and other) » Exotic plant cover » 20m x 50m plot » Number of large trees » Number of trees with hollows » Total length of fallen logs » Entire zone » Regeneration of canopy species 	<ul style="list-style-type: none"> » Spring (October – November): 2014 (complete), 2016 (complete), 2018, 2019, 2020, 2023, 2026, 2029 and 2032 	<ul style="list-style-type: none"> » Floristic Value Score: A Revised Floristic Value Scoring Method to assess grassland condition [Rehwinkel 2015]. » Monitoring methods: Operational Manual for BioMetric 3.1. A tool for assessing clearing and ecological thinning proposals on terrestrial biodiversity under the <u>Native Vegetation Act 2003</u> [NSW Government 2011]. » Monitoring Guidelines for Box-Gum Woodlands [ACT Government 2015c]. » ACT Environmental Offsets Calculator Operational Manual [ACT Government 2016b].
Box Gum Woodland mapping	<ul style="list-style-type: none"> » Extent of Box Gum woodland community and community condition classes within the reserve 	<ul style="list-style-type: none"> » Spring (October – November): 2017 (complete), 2027 and 2033 	<ul style="list-style-type: none"> » Plant community type mapping: Monitoring Guidelines for Box-Gum Woodlands (ACT Government 2015c). » Condition class mapping methods developed by the Capital Ecology in consultation with ACT Government.
Hoary Sunray monitoring	Population size and density of Hoary Sunray	Spring (during peak flowering as indicated by nearby Mt Majura populations, to improve detectability): 2017 (complete), 2020, 2023, 2026, 2029 and 2032	Methods developed in consultation with the vegetation ecologist at Conservation Research (ACT Government).

5.2 Monitoring other conservation values

Other conservation values including the presence and abundance of rare and declining plants will be monitored as part of the floristic monitoring of the Box Gum Woodland.

5.3 Monitoring invasive plants

PCS staff and contractors will continue to utilise the collector application when undertaking weed control to gather data on the species of weed and the area within which that species is controlled. This data is then uploaded to ArcGIS to enable assessment of any change in extent of the weed species controlled. This monitoring will be undertaken whenever weed control works occur.






5.4 Photo monitoring points

Seven photo monitoring points (see Figure 5) have been established in Justice Robert Hope Park, located at the north-east corner of each vegetation monitoring plot. These will be monitored at the same time as floristic surveys. Aerial photography will also be able to track changes in vegetation cover over time, particularly for mid and upper storey species.

Map 5: The location of seven vegetation monitoring plots within Justice Robert Hope Park.



**Justice Robert Hope Park (Watson Woodlands)
Monitoring and Trial sites (EPBC 2012/6418)**

-  20m x 50m quadrat
-  20m x 20m quadrat
-  Hoary Sunray Populations - Average Quadrat Densities
-  Experimental Phalaris aquatica control plots
-  BGW Monitoring Plots (NE corner)

40 20 0 40 Meters

1:3,350 When printed at A4

Coordinate System:
GDA 1994 MGA Zone 55

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Disclaimer: While all care is taken to ensure accuracy, the ACT Government does not warrant that the map is free from errors.

Aerial Photography 2017

Each point indicates the north-east corner of the 20x20m and 20x50m plot, and the location of photo monitoring points. Experimental *Phalaris aquatica* control plots are shown in pink.

5.5 Water quality and frog monitoring

A constructed dam (associated with former agricultural land use on the site) is located in the south-east corner of JRHP (see figure 3). This water body has been selected for long term water quality and frog monitoring in collaboration with WWWG, Frogwatch and Waterwatch program coordinators – as this action is delivered by these partners.

The respective monitoring methodologies are outlined within the Community Frogwatch Census Kit (Mantle 2008) and the ACT Waterwatch Volunteer Manual [Waterwatch 2016]. The regional Frogwatch and Waterwatch programs are facilitated by dedicated volunteer coordinators who brief participants on appropriate monitoring methods. For example, no amphibians are trapped during the Frogwatch monitoring program. Frog calls are recorded for identification, in addition to any visual observations from the bank. All Macro-Invertebrates (waterbugs) collected within water samples are returned to the source after on-site Waterwatch monitoring.

Water quality will be monitored within the offset site monthly by the WWWG in accordance with the Waterwatch Guidelines (Waterwatch Australia Steering Committee, 2002). The annual Frogwatch census occurs over 1-2 nights, during a 2 week-long data collection period, scheduled during October each year. Frogwatch reports are archived for public viewing on the Gininderra Catchment Group webpage. Waterwatch reports are archived for public viewing on the ACT Government Waterwatch webpage. Data for both programs is stored within the Atlas of Living Australia public database.

5.6 Performance measures, benchmarks and completion criteria

The primary offset commitment to which all management actions within the JRHP OMP support is to: “maintain the condition of Justice Robert Hope Park at a standard equivalent to or better than its condition at the date of this approval” (Condition 3b; Table 2). Accordingly, the completion criteria for this site is to ‘maintain’ the quality and extent of Box Gum Woodland (and associated woodland bird habitat) within JRHP, at a standard equivalent to or better than the 2014 baseline condition indicators.

To determine whether implemented management actions (section 4. Habitat Improvement Plan) have maintained Box Gum Woodland quality and extent within JRHP, to a standard equivalent to or better than the 2014 baseline indicators, field based monitoring (section 5. Monitoring Plan) will be delivered every 3 years as part of an adaptive land management approach (section 7. Adaptive Management). Comparing data collected in subsequent monitoring years against the 2014 baseline allows for evidence based performance targets to be derived for each 3-year OMP review, if condition indicators are assessed as having declined from the 2014 baseline.

5.6.1 Maintaining Box Gum Woodland (and the associated woodland bird habitat)

Comparative results of the 2014 and 2016 monitoring are presented in Table 10 (quadrat) and Table 11 (transect). As SMEC (2017) explain in the report ACT Box-Gum Woodland Offset Monitoring 2016 (section 3.6.3): “There are no substantial changes in either the quadrat or transect metrics recorded at Justice Robert Hope Park between 2014 and 2016, indicating that the site is relatively stable”. SMEC suggest that the variation observed between years was likely to be a combination of: minor differences in transect alignments; and seasonal variation in groundcover composition.

From a land management perspective, the only cautionary results were a marginal increase in the ‘weed score’ and the ‘presence of significant weeds’ within monitoring plots. As SMEC (2017) explain, after high winter rainfall in 2016, exotic annual grasses formed dense swathes through the offset site.

As the monitoring data was collected in September 2016, the influence of seasonal weather factors is further supported by Australian Government Bureau of Meteorology data, which confirms that the four months from June to September 2016 were the wettest such period on record for the ACT, with rainfall 127% above average recorded at Canberra Airport (Australian Government BOM, 2017).

Other quadrat metrics were generally consistent between years. Minor variation in metrics that would be expected to be largely static, such as canopy cover and the number of large trees, is likely to be due to minor variation in the physical plot layout. Transect metrics have more difference between the years, which is likely to be a combination of minor differences in transect alignment and seasonal variation in groundcover composition.

Table 10: Comparison of quadrat averages and ranges for Justice Robert Hope Park: 2014 and 2016.

Metric	Average 2014	Average 2016	Range 2014	Range 2016
NPS	8.9	9	4-28	5-26
EPS	10.4	12.6	8-12	8-17
NLT	1.1	0.9	0-3	0-2
FL	14.2	18.5	0-93	0-84
OR	N/A	1	N/A	0.7-1
HBT	0.4	0.7	0-1	0-2
TS	0.1	0.1	0-1	0-1
SW	0.9	1.1	0-1	0-3
WS	6.4	9.7	3.2-8.9	5.1-15.7
FVS	5.7	5.6	0.6-27.5	1-24.2

NPS: number of native plant species (0.04 ha plot); **EPS:** number of exotic plant species (0.04 ha plot); **QRA:** qualitative regen abundance (0.04 ha plot); **QRH:** qualitative regen health (0.04 ha plot); **NLT:** number of large trees in 0.1 ha plot; **FL:** length of fallen logs in 0.1 ha plot; **OR:** proportion of native overstorey species regenerating in vegetation zone; **HBT:** hollow-bearing trees (0.1 ha plot); **TS:** number of threatened plant species (0.04 ha plot); **SW:** significant weeds in each plot (0.04 ha); **WS:** weed score; **FVS:** floristic value score.

Table 11: Comparison of transect averages and ranges for Justice Robert Hope Park: 2014 and 2016.

Plot	Average 2014	Average 2016	Range 2014	Range 2016
NOS	9.9	18.1	0-18.5	0-30
NMS	4.9	2.6	0.8-8.3	0-7
NGCG	19.1	14	2-36	2-44
NGCS	0.6	0.3	0-2	0-2
NGCO	0	1.1	0	0-6
ECAG	60	59.7	24-92	2-98
ECPG	12	0.6	0-72	0-2
ECO	-	17.4	-	6-30
LWX	-	13.7	-	0-84
L	7.1	21.9	0-18	6-46
R	0	0.3	0	0-2
BG	1.4	5.4	0-8	0-12
C	0	0.6	0	0-2

NOS: native overstorey cover (50 m transect); **NMS:** native midstorey cover (50 m transect); **NGCG:** native ground cover – grasses (50 m transect); **NGCS:** native ground cover – subshrubs (50 m transect); **NGCO:** native ground cover – ‘other’ (50 m transect); **ECAG:** exotic annual cover - grasses (50 m transect); **ECPG:** exotic perennial cover - grasses (50 m transect); **ECO:** exotic cover- ‘other’ (50 m transect); **LWX:** level X weeds (50 m transect); **L:** litter (50 m transect); **R:** rock (50 m transect); **BG:** bare ground (50 m transect); **C:** cryptogram (50 m transect).

These results highlight the influence that stochastic events can have as drivers of change within ecosystems: such as the role of variable seasonal weather patterns in influencing the emergence, growth and proliferation of pest plants. Despite persistent weed control programs, highly invasive weeds will germinate and proliferate during favourable conditions (for that species) where legacy seed banks exist. Snapshots of the data must be considered in the context of longer term trends to assess control program effectiveness over time. Treating large ‘flush’ events when conditions drive the germination of key invasive weeds is a crucial action to diminish legacy seed banks, which are common within former agricultural areas. Targeted PCS pest plant treatment programs have followed on from the September 2016 plot monitoring period (see maps of treated pest plant infestations as shown in Appendix C) and will continue through this OMP cycle and beyond, as outlined in section 4. Habitat Improvement Plan (4.1.1 Invasive plants).

5.6.2 Data driven performance targets

The key data driven performance target for this 3-year OMP management cycle is to achieve a reduction in the ‘weed score’ and ‘presence of significant weeds’ (Table 10) to 2014 baseline level or below. Weeds of concern identified by the 2016 plot monitoring were African boxthorn (*Lycium ferocissimum*), St John’s wort (*Hypericum perforatum*), and Chilean needlegrass (*Nassella neesiana*). PCS land managers will conduct targeted treatment programs. To track interim progress towards the target between box-gum woodland monitoring cycles, land managers will review annual treated weed map and adapt the management programs where necessary to better target the species of concern.

5.6.3 Hoary Sunray

A baseline assessment was completed by PCS ecologists in spring 2017. Table 5 shows the location and extent of the 3 Hoary sunray patches identified within the offset site. The patch to the east of the site was surveyed with 8 x 1m x 1m quadrats, resulting in an average density of 10 plants per square metre. The larger patch to the west of the site was surveyed with 7 x 1m x 1m quadrats, resulting in an average density of 22 plants per square metre. The smaller patch to the west of the site was surveyed with 4 x 1m x 1m quadrats, resulting in an average density of 20 plants per square metre.

The maintenance of the Hoary Sunray population against 2017 baseline conditions (extent and density) will be assessed every 3 years by PCS staff, or a suitably qualified consultant (as specified in section 5.1). Given that the population of Hoary Sunray at JRHP has been established through human intervention, habitat suitability will be evaluated before further plantings occur if a sustained decline across multiple seasons is observed. Seasonal trends will be also be considered when analysing the population data to account for potential climatic drivers of change. The greatest identified threat to maintaining the quality and extent of Hoary Sunray is the presence of invasive weeds with JRHP.

A decline in the cover of weed species (as indicated by invasive weed monitoring and the Box Gum Woodland monitoring programs), will also be used as a performance measure for this species in accordance with management action 4.1 from the National Recovery Plan for the Hoary Sunray *Leucochrysum albicans* var. *tricolor* [Sinclair 2010]. Monitoring results will underpin continual improvement of restoration techniques under an adaptive framework, and will be documented as part of annual reporting. Accurate records will be kept for all activities to ensure reporting and monitoring requirements are met. The results of the monitoring program will also be disseminated within the ACT Government to better inform the management of this species within the ACT.

5.7 Limitations and uncertainties

Known limitations and uncertainties are present in the utilised monitoring methodology. These include:

Seasonal variation:

Whilst it is specified that monitoring takes place during the optimal period for species detection, seasonal conditions vary from year to year that will impact on the results. For example, wet conditions in winter and early spring will result in a high proportion of exotic annual grasses and weeds being present, which can influence opinion on native cover or conceal native species. Overly dry conditions in winter and early spring can result in very low germination of native forbs, reducing species diversity measures.

Seasonality impacts also include delay or early onset of flowering of forbs. If this is not detected, it can result in reduced species diversity measures or insufficient diagnostic material to accurately identify plants.

Seasonal variation between surveys can be prevented as much as practicable by ensuring that the personnel engaged for monitoring are highly experienced in vegetation monitoring and local conditions, so that changes in flowering time or exotic cover can be predicted and survey methods adjusted to accommodate the change in conditions. Dry seasons, with low forb presence, are unavoidable, and must be considered in reporting and comparisons with baseline data.

Observer bias:

Differing surveyors between monitoring events, can result in different results, including underestimation of species diversity and different cover measurements i.e. canopy cover, native grass cover, shrub cover. This can be prevented as much as practicable by ensuring that the surveyors engaged for monitoring events are highly experienced in plant identification and vegetation community composition.

Indication of increase/decrease in quality:

Uncertainties occur around the amount of change required to accurately indicate an increase or decrease in quality of a site, rather than just seasonal variation. Any significant changes noted between monitoring events will be investigated in collaboration with ACT Government ecologists to determine the causes, and will require an inspection of monitoring data from numerous sites in the ACT to look for wider patterns to determine if changes indicate seasonal variation or site specific change in condition. Keeping the timing of woodland monitoring consistent across all offset sites in the ACT will provide a broad scale record of woodland condition in lowland ACT within that particular year, and will assist in determining if the vegetation condition is changing, or due to seasonal effects.



6. MANAGEMENT ACTION PLAN

6.1 Planning

Activity	Description	Responsibility	Estimated Completion Timeframe	Estimated [#] Budget 2016-17 to 2017-18	Estimated [#] Ongoing Operational Costs (p.a.)
Activities Declaration	Prepare an Activities Declaration for the Justice Robert Hope Park Nature Reserve pursuant to the ACT NC Act 2014.	PCS	2018-19	-	-
Consult with ACT Heritage Unit	Inform the ACT Heritage Unit of operational or habitat restoration works which could impact potential cultural heritage sites within the offset sites.	PCS	Ongoing	-	-
Cultural heritage assessment reporting and management requirements Section 4.5	<ul style="list-style-type: none"> » Follow the guidelines outlined in the <u>Cultural Heritage Reporting Policy</u> (ACT Heritage Council 2015). This document details the cultural assessment and reporting requirements for projects that could impact on places or objects with indigenous or historic heritage value. » Any discovery of an Aboriginal place or object will be reported to the Heritage Council within five working days. 	PCS	Ongoing	-	-
Utility notifications Section 4.8	<ul style="list-style-type: none"> » Follow the procedures required when planning works within the vicinity of utility infrastructure. » Adhere to the Code of Practice between PCS and ActewAGL [ERM 2009]. 	PCS	Ongoing	-	-
Offset Management Plan review Section 11	The Plan will be reviewed and updated within six (6) months of the submission to the ACT Government of consultant reports prepared as part of the 2020 Box Gum Woodland monitoring program (Section 5.1). The reviewed plan will be submitted to the Commonwealth Department of the Environment for approval. Until the revised plan is approved, the offset site will be managed in accordance with the Plan.	PCS	Six (6) months from completion of 2020 BGW monitoring report	-	-

6.2 Capital improvement works (and associated planning)

Activity	Description	Responsibility	Estimated Completion Timeframe	Estimated# Budget 2016-17 to 2018-19	Estimated# Ongoing Operational Costs (p.a.)
Fencing	» Replace offset boundary fences and gates	PCS	2018-19	\$40,000	\$2000
Section 4.3.1	» Remove internal fencing. » New fences to be installed using wildlife friendly specifications including kangaroo access gates.		(completed 2017)		
Tracks and Trails	» Construct new formed visitor discovery trail with track markers.	PCS	2019-20	\$60,000	\$4000
Section 4.8.2	» Establish and maintain slashed management tracks		Ongoing.	-	-
Visitor infrastructure	» Install large reserve signage and small “Dogs on leash” signs.	PCS	2018-19	\$9000	\$500
Section 4.3.3	» Replace existing interpretation signs.		2019-20	\$15,000	\$500

6.3 Environmental enhancement and operational works

Activity	Description	Responsibility	Estimated Completion Timeframe	Estimated# Budget 2016-17 to 2018-19	Estimated# Ongoing Operational Costs (p.a.)
Waste Section 4.3.4	Waste will be removed from the offset site including old fencing materials and general litter.	PCS	Ongoing	-	-
Weed control Section 4.1.1	<ul style="list-style-type: none"> » Target key weeds that are of a statutory obligation for control: <ul style="list-style-type: none"> » African Lovegrass » Woody weeds » Chilean Needlegrass » Paterson's Curse » Scotch Thistle » Serrated Tussock » St John's Wort » Spot spraying is the preferred method of control in conjunction with slashing in areas of dense weed infestations. » All weed control efforts to be mapped and reviewed annually to monitor effectiveness of weed control program. 	PCS to engage suitably qualified contractors, and the WWWG as appropriate.	Annually	\$10,000 p.a.	\$10,000
Invasive animals Section 4.1.2	<ul style="list-style-type: none"> » Control rabbits in line with ACT Pest Management Strategy » Coordinate the above activities with those in the Mount Majura Nature Reserve if practicable 	PCS	Annually	-	-
Revegetation Section 4.2.3	<ul style="list-style-type: none"> » Native grass seed to be used for revegetation as appropriate » Shrubs characteristic of Box Gum Woodland communities are to be planted to the higher benchmark within the offset site to improve bird habitat. » Revegetate around the storm water settling pond with aquatic plants to maintain frog habitat. » Temporary fencing or guards to be erected around revegetation to protect from grazing. 	PCS and WWWG	2016-17 (completed) 2018-19	\$12,000 p.a.	\$8,000
Woody debris relocation Section 4.7	<ul style="list-style-type: none"> » If available, woody debris will be sourced from the Development site and placed appropriately in consultation with the WWWG 	PCS, WWWG and developers	2016-17 (completed)	\$5000	-
Increasing habitat for hollow nesting animals	Investigate options to increase the nesting habitat for birds and arboreal mammals.		2018-19	\$5,000	-

6.4 Monitoring program and review

Proposed Activity	Description of Proposed Works	Responsibility	Estimated Completion Timeframe	Estimated# Budget 2016-17 to 2018-19	Estimated# Ongoing Operational Costs (p.a.)
Water Quality and Frog Habitat Section 4.2.6	<ul style="list-style-type: none"> » Water quality testing will be completed monthly using waterwatch guidelines. » Frog populations within the offset site will be monitored annually in accordance with the Frogwatch Census method. 	PCS and WWWG	Annually	-	-
Box Gum Woodland mapping Section 5.1	Engage a suitably qualified expert to map the extent and condition of Box Gum Woodland within the reserve.	PCS to engage a suitably qualified expert	2017 (complete), 2027 and 2033	\$4,000	\$4,000 per mapping event
Box-Gum Woodlands monitoring Section 5.1	Engage a suitably qualified expert to undertake monitoring of existing plots within the Box-Gum Grassy Woodlands community (as described in Table 9) PCS Ecologists to review monitoring data to identify any changes occurring over time within the Box-Gum Woodland community.	PCS to engage a suitably qualified expert	2017 (complete), 2018, 2019, 2020, 2023, 2026, 2029 and 2032	\$10,000	\$38,000 for 2020, 2023 and 2026 combined
Hoary Sunray monitoring Section 5.1	PCS staff to establish baseline data and undertake monitoring of the Hoary Sunray population. PCS staff will map the extent of Hoary Sunray populations within the offset site at each monitoring event to ensure change over time in extent of the population can be assessed.	PCS staff	2017 (complete), 2020, 2023, 2026, 2029 and 2032	\$500	-
Photo monitoring Section 5.6	To be undertaken as part of the Box Gum Woodland monitoring.	PCS to engage a suitably qualified expert	2016 (complete), 2018, 2019, 2020, 2023, 2026, 2029 and 2032	-	-

6.5 Management resources

Proposed Activity	Description of Proposed Works	Responsibility	Estimated Completion Timeframe	Estimated# Budget 2016-17 to 2018-19	Estimated# Ongoing Operational Costs (p.a.)
Staffing	To deliver the actions outlined in this, plan resources to support a part-time Senior Ranger (Ranger Grade 3) position and vehicle	PCS	On-going	\$148,000	\$55,000
Training	All personnel, including contractors, involved in managing the offset site must be trained in the requirements and appropriate management of Box-Gum Woodlands.	PCS and CR	As needed	-	-

#The estimated costs and timeframes required to deliver on the proposed works are based on current information from experienced PCS staff and external service providers who manage reserves with similar land management issues and requirements. Some variation to these estimates could occur due to factors such as external environmental influences (e.g. climate, pest plant and animal population dynamics etc.), increased material costs, increased contractor costs, contractor availability etc. Note: items without allocated funds will be delivered using PCS staff or funded as part of other actions identified in this plan.



7. ADAPTIVE MANAGEMENT

Adaptive management is a systematic process for continually improving management practices through learning from the outcomes of previous management (Umwelt 2014). A strong feedback loop between monitoring and management will be established. This will enable a flexible approach to the management requirements of the site, allowing ongoing feedback and refinement of the management strategy to achieve offset approval conditions.

Adaptive management of the offset site will comprise of adapting conservation and land management actions in response to:

- » legislative change
- » any unforeseen or unplanned management threats;
- » advances in research and land management techniques
- » ecological data from the monitoring program

As discussed in section 5.6, if the analysis of comparable monitoring data indicates a decline in one or more MNES condition attributes below baseline thresholds (see Tables 10 and 11), PCS planners will:

1. establish specific data driven performance targets within the next 3-year Offset Management Plan
2. revise and implement related management actions to address the decline, with the aim of the MNES condition to increase back to baseline level.

'Revising management actions' must involve evaluating the current land management approach and adapting based on the following options:

- » Improve knowledge of the issue (e.g. more detailed pest plant and animal infestation mapping)
- » Conduct wider consultation on management practices (e.g. ACT Government ecologists, PCS Vertebrate Pest Officer, PCS Weeds Officer, external knowledge holders, field manuals and relevant strategic plans - see Table 1)
- » Brief and involve community partners in management
- » Advocate for an increase in management resources
- » Alter the timing of management actions
- » Increase the frequency of management actions
- » Alter the treatment methods
- » Address external drivers (e.g. adjacent infestation sources)
- » Select an alternate contractor
- » Improve evaluations and maintenance of delivered actions
- » Conduct consistent GIS mapping of management to track interventions/treatment programs and provide interim progress feedback to land managers between 3-year monitoring cycles.

As a long-term monitoring data set builds over time, snapshots of the data must be considered in the context of longer-term trends and seasonal variability when planning management responses.

Any changes to the management of the offset site outside the scope of what is considered as adaptive management will be presented to the Department of the Environment for approval prior to implementation.

8 RECORD MANAGEMENT

PCS will maintain accurate records substantiating any activities associated with or relevant to the conditions of approval, including measures taken to implement the Plan. Any activities undertaken by Watson Woodlands Working Group will also be recorded and provided to PCS staff to assist with monitoring and reporting.

9 REPORTING

9.1 Standard reporting schedule

The ACT Government, Environment, Planning and Sustainable Development Directorate (EPSDD), is responsible for submitting an annual report to the Australian Government, Department of Environment and Energy by the **30th August each year**. This report will be published on the ACT Government environmental offsets register ([EPSDD webpage](#)). Documentary evidence providing proof of the date of publication and any non-compliance of any of the conditions within the approval decision will be submitted to the Commonwealth at the same time as the report is published.

The reporting will demonstrate how the Suburban Land Agency (previously known as the Land Development Agency), Deed Management and the ACT PCS, all within the EPSDD and Lonsdale 28 Pty Ltd have complied with the conditions in the approval decision for the development of the Residential development, Block 9 Section 64, Watson, and extension of Negus Crescent (EPBC 2012/6418). Specifically:

- » The Deed Management section in EPSDD are responsible for complying with conditions 1a, 1b, 1c, 1d, 1e, 1f, 1g, 1h and 1i
- » Lonsdale 28 Pty Ltd are responsible for complying with conditions 2 and 4
- » PCS are responsible for complying with conditions 3a, 3b-i, 3b-ii, 3b-iii, 3b-iv, 3b-v, 3c, and 3d
- » All parties are responsible for complying with conditions 5, 6, 7 and 8.
- » In addition, this report also demonstrates how PCS has implemented the management plan for the Justice Robert Hope Park offset area on behalf of Suburban Land Agency.

9.2 Reporting of unanticipated or unapproved incidents

Unanticipated impacts to MNES will be reported at time of incidence (or within 2 business days) along with any mitigation or rectification activities. Reporting will include a “lessons learned” summary and a schedule of costs, as well as an overview of any further action required.

10. REVIEW

The management actions outlined in the Plan will be reviewed and updated in 2021 and six (6) months after the finalisation of reports prepared as part of the 2020 Box Gum Woodland monitoring program (Section 5.1). After this the plan will be review every 5 years. Any updates will be in response to:

- » the outcomes of the monitoring program (Section 5)
- » advances in our knowledge of the habitat requirements and life cycle of the MNES and
- » any unforeseen or unplanned threats to the conservation values within the offset site.

The revised Plan will be developed in consultation with key stakeholders as described in Sections 1.5 and 1.6. The Plan will be updated before this time if a significant event (e.g. bushfire) occurs that requires changes to the Plan. A review will also be undertaken if directed by the Commonwealth Minister for the Department of the Environment.

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APPENDICES

Appendix A. Flora species list in offset site.

Scientific Name (*exotic species)	Common Name	Notes
Trees		
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	Natural and Planted
<i>Eucalyptus bridgesiana</i>	Apple Box	Natural and Planted
<i>Celtis triandra*</i>	European Nettle Tree	
<i>Crataegus monogyna*</i>	Hawthorn	
<i>Eucalyptus goniocalyx</i>	Bundy	Planted
<i>Eucalyptus mannifera</i>	Brittle Gum	
<i>Eucalyptus melliodora</i>	Yellow Box	Natural and Planted
Small Trees and Shrubs		
<i>Acacia dealbata</i>	Silver Wattle	Planted
<i>Acacia genistifolia</i>	Spreading Wattle	Planted
<i>Acacia implexa</i>	Hickory Wattle	Natural and Planted
<i>Acacia parramattensis</i>	Parramatta Green Wattle	Natural and Planted
<i>Acacia rubida</i>	Red Stemmed Wattle	Planted
<i>Bursaria spinosa ssp lasiophylla</i>	Australian Blackthorn	Planted
<i>Cassinia arcuata</i>	Sifton Bush	
<i>Cassinia longifolia</i>	Cauliflower Bush	
<i>Exocarpos cupressiformis</i>	Native Cherry	
<i>Gynatrix pulchella</i>	Native Hemp	Planted
<i>Indigofera adesmiifolia</i>	Tick Indigo	Planted
<i>Indigofera australis</i>	Australian Indigo	Planted
<i>Lycium ferocissimum*</i>	African Boxthorn	Weed of National Significance
<i>Marrubium vulgare*</i>	White Horehound	
<i>Prunus sp.*</i>	Ornamental Plum	
<i>Pyracantha sp.*</i>	Firethorn	
<i>Rosa rubiginosa*</i>	Sweet Briar	
Herbs		
<i>Acaena ovina</i>	Sheep's Burr	
<i>Ajuga triandra</i>	Austral Bugle	Planted
<i>Asperula conferta</i>	Common Woodruff	
<i>Bulbine bulbosa</i>	Bulbine Lily	Planted

Scientific Name (*exotic species)	Common Name	Notes
<i>Bulbine glauca</i>	Rock Bulbine	Planted
<i>Acetosella vulgaris</i> *	Sheep Sorrell	
<i>Arctotheca calendula</i> *	Capeweed	
<i>Calocephalus citreus</i>	Lemon Beauty-heads	Natural and Planted
<i>Carex inversa</i>	Knob Sedge	
<i>Centaurium erythraea</i> *	Common Centuary	
<i>Cheiranthra cyanea</i>	Finger Flowers	Planted
<i>Chrysocephalum apiculatum</i>	Common Everlasting	
<i>Chrysocephalum semipapposum</i>	Clustered Everlasting	Natural and Planted
<i>Clematis microphylla</i>	Small-leaved Clematis	Planted
<i>Convolvulus angustissimus ssp angustissimus</i>	Australian Bindweed	
<i>Conyza bonariensis</i> *	Flaxleaf Fleabane	
<i>Craspedia variabilis</i>	Billy Buttons	Planted
<i>Cullen microcephalum</i>	Dusk Scurf-pea	Planted
<i>Cynoglossum australe</i>	Austral Hounds Tongue	Planted
<i>Cynoglossum suaveolens</i>	Sweet Hounds Tongue	
<i>Dianella longifolia var longifolia</i>	Pale Flax-Lily	Considered to be rare in the ACT
<i>Dichopogan fimbriatum</i>	Nodding Chocolate Lily	Planted
<i>Dysphania pumilio</i>	Small Crumbweed	
<i>Echium plantagineum</i> *	Paterson's Curse	ACT Contained Pest Plant
<i>Einadia nutans ssp nutans</i>	Climbing Saltbush	
<i>Erodium cicutarium</i> *	Common Storksbill	
<i>Eryngium ovinum</i>	Blue Devil	Natural and Planted
<i>Euchiton sphaericus</i>	Cudweed	
<i>Geranium solanderi</i>	Native Geranium	
<i>Glycine tabacina</i>	Glycine Pea	
<i>Goodenia pinnatifida</i>	Ivy Goodenia	
<i>Haloragis heterophylla</i>	Variable Raspwort	
<i>Helichrysum luteoalbum</i>	Jersey Cudweed	
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort	
<i>Hypericum gramineum</i>	Small St John's Wort	
<i>Hypericum perforatum</i> *	St John's Wort	
<i>Hypochaeris glabra</i> *	Flatweed	
<i>Hypochaeris radicata</i> *	Flatweed	
<i>Juncus triandra</i>	Australian Pinrush	
<i>Juncus usitatus</i>	Common Rush	

Scientific Name (*exotic species)	Common Name	Notes
<i>Juncus sp</i>	Rush	
<i>Leptorhynchos squamatus</i>	Scaly Button	Planted
<i>Leucochrysum albicans var tricolor</i>	Hoary Sunray	EPBC Listed (MNES), Planted
<i>Linum marginale</i>	Native Flax	Planted
<i>Lomandra filiformis ssp coriacea</i>	Wattle Matrush	
<i>Lomandra filiformis ssp filiformis</i>	Wattle Matrush	
<i>Lotus triandra</i>	Austral-trefoil	Planted
<i>Microseris lanceolata</i>	Yam Daisy	Planted
<i>Medicago sp*</i>	Medic	
<i>Onopordum acanthium*</i>	Scotch Thistle	
<i>Oreomyrrhis eriopoda</i>	Native Carraway	Planted
<i>Oxalis perennans</i>	Native Oxalis	
<i>Plantago gaudichaudii</i>	Narrow Plantain	Considered to be rare in the ACT, Planted
<i>Plantago lanceolata*</i>	Ribwort Plantain	
<i>Plantago varia</i>	Variable Plantain	Natural and Planted
<i>Podolepis jaceoides</i>	Copper-wire Daisy	Planted
<i>Ranunculus lappaceus</i>	Common Buttercups	Planted
<i>Rumex brownii</i>	Swamp Dock	
<i>Schoenus apogon</i>	Fluke Bogrush	
<i>Solanum nigrum*</i>	Black Nightshade	
<i>Solenogyne dominii</i>	Smooth Solenogyne	
<i>Tragopogon porrifolius*</i>	Salsify	
<i>Tricoryne elatior</i>	Yellow Rush Lily	
<i>Trifolium subterraneum.*</i>	Subterranean Clover	
<i>Triptilodiscus pygmaeus</i>	Common Sunray	
<i>Vittadinia cuneata var cuneata</i>	Fuzzweed	Planted
<i>Vittadinia muelleri</i>	Narrow-Leaved New Holland Daisy	Planted
<i>Wahlenbergia sp</i>	Bluebell	
<i>Wurmbea dioica var dioica</i>	Early Nancy	
<i>Xerochrysum viscosum</i>	Sticky Everlasting	Natural and Planted
Grasses, Rushes and Sedges		
<i>Aira spp.*</i>	Aira	
<i>Austrostipa bigeniculata</i>	Knead Speargrass	
<i>Austrostipa scabra ssp falcata</i>	Slender Speargrass	
<i>Avena spp.*</i>	Wild Oats	
<i>Bothriochloa macra</i>	Redleg Grass	

Scientific Name (*exotic species)	Common Name	Notes
<i>Bromus diandrus</i> *	Great Grass	
<i>Bromus hordaceus</i> *	Soft Grass	
<i>Bromus sp</i> *	Brome	
<i>Chloris truncata</i>	Windmill Grass	
<i>Cymbopogon refractus</i>	Barbed Wire Grass	Planted
<i>Cynodon dactylon</i> *	Couch Grass	
<i>Cyperus eragrostis</i> *	Umbrella Sedge	
<i>Dactylis glomerata</i> *	Cocksfoot	
<i>Elymus scaber (now Anthosachne scabra)</i>	Common Wheatgrass	
<i>Eragrostis brownii</i>	Brown's Lovegrass	
<i>Eragrostis curvula</i> *	African Love Grass	
<i>Festuca arundinacea</i> *	Tall Fescue	
<i>Holcus lanatus</i> *	Yorkshire Fog	
<i>Hordeum leporinum</i> *	Barley Grass	
<i>Lolium sp</i> *	Ryegrass	
<i>Microlaena stipoides</i>	Weeping Grass	Natural and Planted
<i>Nassella neesiana</i> *	Chilean Needlegrass	Weed of National Significance
<i>Nassella trichotoma</i> *	Serrated Tussock	Weed of National Significance
<i>Panicum effusum</i>	Hairy Panic	
<i>Paspalum dilatatum</i> *	Couch	
<i>Phalaris aquatica</i> *	Phalaris	
<i>Poa bulbosa</i> *	Bulbous Bluegrass	
<i>Poa sieberiana</i>	Snowgrass	Natural and Planted
<i>Rytidosperma carphoides</i>	Short Wallaby Grass	
<i>Rytidosperma erianthum</i>	Hill Wallaby Grass	
<i>Rytidosperma sp 1</i>	Wallaby Grass	
<i>Rytidosperma sp 2</i>	Wallaby Grass	
<i>Sorghum leiocladum</i>	Wild Sorghum	Planted
<i>Sporobolus creber</i>	Slender Rats-tail Grass	
<i>Themeda triandra</i>	Kangaroo Grass	Natural and Planted
<i>Vulpia sp</i> *	Rats-tail Fescue	
Mistletoe		
<i>Amyema miquelii</i>	Box Mistletoe	
Ferns		
<i>Cheilanthes austrotenuifolia</i>	Rock Fern	
*Denotes Exotic Animal		

Appendix B. Fauna species list for offset site and adjacent areas

Scientific Name	Common Name	Notes
Birds		
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	
<i>Acanthiza lineata</i>	Striated Thornbill	
<i>Acanthiza nana</i>	Yellow Thornbill	
<i>Acanthiza pusilla</i>	Brown Thornbill	
<i>Acanthiza reguloides</i>	Buff-rumped Thornbill	
<i>Accipiter fasciatus</i>	Brown Goshawk	
<i>Alisterus scapularis</i>	Australian King-parrot	
<i>Anas superciliosa</i>	Pacific Black Duck	
<i>Anthochaera carunculata</i>	Red Wattlebird	
<i>Anthochaera phrygia</i>	Regent Honeyeater	EPBC Listed (MNES)
<i>Ardea pacifica</i>	White-necked Heron	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	
<i>Cacatua sanguinea</i>	Little Corella	
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo	
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Vulnerable in NSW
<i>Chenonetta jubata</i>	Australian Wood Duck	
<i>Chrysococcyx lucidus</i>	Shining Bronze-cuckoo	
<i>Chthonicola sagittata</i>	Speckled Warbler	Considered to be rare in the ACT
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	
<i>Corcorax melanorhamphos</i>	White-winged Chough	
<i>Cormobates leucophaeus</i>	White-throated Treecreeper	
<i>Corvus coronoides</i>	Australian Raven	
<i>Cracticus tibicen</i>	Australian Magpie	
<i>Cracticus torquatus</i>	Grey Butcherbird	
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	
<i>Dicaeum hirundinaceum</i>	Mistletoebird	
<i>Eolophus roseicapillus</i>	Galah	
<i>Glossopsitta concinna</i>	Musk Lorikeet	
<i>Grallina cyanoleuca</i>	Magpie-lark	
<i>Hirundo neoxena</i>	Welcome Swallow	
<i>Lathamus discolor</i>	Swift Parrot	EPBC Listed (MNES)
<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater	
<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater	
<i>Malurus cyaneus</i>	Superb Fairy-wren	

Scientific Name	Common Name	Notes
<i>Manorina melanocephala</i>	Noisy Miner	
<i>Melithreptus lunatus</i>	White-naped Honeyeater	
<i>Microeca fascinans</i>	Jacky Winter	
<i>Myiagra rubecula</i>	Leaden Flycatcher	
<i>Ocyphaps lophotes</i>	Crested Pigeon	
<i>Oriolus sagittatus</i>	Olive-backed Oriole	
<i>Pachycephala rufiventris</i>	Rufous Whistler	
<i>Pardalotus punctatus</i>	Spotted Pardalote	
<i>Pardalotus striatus</i>	Striated Pardalote	
<i>Passer domesticus</i> *	House Sparrow	
<i>Phaps chalcoptera</i>	Common Bronzewing	
<i>Philemon corniculatus</i>	Noisy Friarbird	
<i>Platycercus elegans</i>	Crimson Rosella	
<i>Platycercus eximius</i>	Eastern Rosella	
<i>Polytelis swainsonii</i>	Superb Parrot	EPBC Listed (MNES)
<i>Psephotus haematonotus</i>	Red-rumped Parrot	
<i>Rhipidura albiscapa</i>	Grey Fantail	
<i>Rhipidura leucophrys</i>	Willie Wagtail	
<i>Rhipidura rufifrons</i>	Rufous Fantail	
<i>Smicrornis brevirostris</i>	Weebill	
<i>Strepera graculina</i>	Pied Currawong	
<i>Sturnus tristis</i> *	Indian Myna*	
<i>Sturnus vulgaris</i> *	Common Starling*	
<i>Todiramphus sanctus</i>	Sacred Kingfisher	
<i>Zosterops lateralis</i>	Silvereye	
Mammals		
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	
<i>Lepus europaeus</i> *	European Hare	
<i>Macropus giganteus</i>	Eastern Grey Kangaroo	
<i>Miniopterus schreibersii ssp oceanis</i>	Australasian Bent-wing Bat	Vulnerable in NSW
<i>Oryctolagus cuniculus</i> *	European wild rabbit	
<i>Tadarida triandra</i>	White-striped Free-Tail Bat	
<i>Vespadelus regulus</i>	Southern Forest Bat	
<i>Vespadelus vulturnus</i>	Little Forest Bat	
<i>Vulpes vulpes</i> *	European Red Fox	

Scientific Name	Common Name	Notes
Reptiles		
<i>Pogona barbata</i>	Common Bearded Dragon	
<i>Tiliqua rugosa</i>	Shingleback Lizard	
<i>Tiliqua scincoides</i>	Eastern Blue-tongued Lizard	
Amphibians		
<i>Crinia parinsignifera</i>	Plains Froglet	
<i>Crinia signifera</i>	Common Eastern Froglet	
<i>Limnodynastes peronii</i>	Brown-striped Frog	
<i>Limnodynastes tasmaniensis</i>	Spotted Grass Frog	
<i>Litoria peronii</i>	Peron's Tree Frog	
<i>Litoria verreauxii</i>	Whistling Tree Frog	
<i>Neobatrachus sudelli</i>	Spotted Burrowing Frog	
<i>Uperoleia laevigata</i>	Smooth Toadlet	
Invertebrates		
<i>Heteronympha merope</i>	Common Brown Butterfly	

*Denotes Exotic Animal

