



Googong Township Pink-tailed Worm-lizard Protection and Management Plan

Version 6 - October 2019
Prepared for Googong Township Pty Ltd

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I declare that to the best of my knowledge, all the information contained in, or accompanying this document is complete, current and correct. I am duly authorised to sign this declaration on behalf of the holder of the EPBC Act approval for EPBC 2011/5892. I am aware that:

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Signed:

A handwritten signature in blue ink, appearing to read "Craig Harris".

10 October 2019.

Full name (please print): Mr Craig Harris - Assistant Project Director

Organisation: Googong Township Pty Ltd (formerly Googong Development Corporation)

EPBC Referral Number: EPBC 2011/5892

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Abbreviations and Common Terms

ACT TAMS	ACT Government Territory and Municipal Services Directorate (former)
ACT PCS	ACT Government Parks and Conservation Service
AHD	Australian Height Datum
APZ	Asset Protection Zone
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
CEMP	Construction Environmental Management Plan
Council	Queanbeyan-Palerang Regional Council
DPI	NSW Department of Planning and Infrastructure (former)
DPIE	NSW Department of Planning, Industry and Environment
DoEE	Commonwealth Department of Environment and Energy
DSEWPaC	Commonwealth Department of Sustainability, Environment, Water, Population and Communities (former)
EEC	Endangered Ecological Community
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPI	Environmental Planning Instrument
Googong IWC Project	Googong township Integrated Water Cycle Project
Googong township	The area encompassed by Googong township
GTPL	Googong Township Pty Ltd
LEP	<i>Queanbeyan Local Environmental Plan 2012</i>
LGA	Local Government Area
NPWS	NSW National Parks and Wildlife Service
OEH	NSW Office of Environment and Heritage (former)
PTWL	Pink-tailed Worm-lizard
PTWL Conservation Area	The area within Googong township dedicated and managed as a conservation area for Pink-tailed Worm-lizard
Study Area	The area of Googong township assessed as supporting PTWL habitat during the 2010 surveys
sp.	species (singular)
spp.	species (plural)
ssp.	subspecies
var.	variety
VPA	Voluntary Planning Agreement

1 Introduction

1.1 Purpose

A delegate of the Minister for the Environment approved, under the *Environment Protection & Biodiversity Conservation Act 1999* the development of Googong township on 19 May 2011 (EPBC 2011/5829) subject to a number of Conditions of Approval (CoA). CoA 1 relates to the protection and management of the Pink-tailed Worm-lizard *Aprasia parapulchella* (PTWL) within Googong township. CoA 1 has been addressed in this document in the manner detailed in Table 1 below.

The Googong township Integrated Water Cycle Project (Googong IWC Project), which includes construction and operation of a water recycling plant as well as potable water and wastewater services for the township, was approved by the NSW Department of Planning and Infrastructure (DPI) (now the Department of Planning, Industry and Environment [DPIE]) on 24 November 2011. Table 1 also includes the relevant NSW Project Approval CoA related to the protection of the PTWL.

Table 1: Relevant Conditions of Approval for the protection and management of the PTWL

Condition of Approval	Section/s
CoA 1 as per the EPBC Approval (EPBC 2011/5829)	
<i>The person taking the action must prepare and submit a Pink-tailed Worm-lizard Protection and Management Plan for the Minister's approval for the protection of Pink-tailed Worm-lizard (Aprasia parapulchella). The plan must include:</i>	Entire document
<i>i. Details of the establishment of the Pink-tailed Worm-lizard Conservation Area;</i>	2.1 2.2.1
<i>ii. Management measures to mitigate construction impacts;</i>	2.2.1 2.2.4
<i>iii. Measures for the management of the Pink-tailed Worm-lizard Conservation Area for before and after the conservation area's dedication to Queanbeyan City Council or other appropriate authority;</i>	2.2 2.3 2.4
<i>iv. Maps showing fences and other infrastructure;</i>	Figure 4
<i>v. Details of legal mechanisms to protect the conservation area in perpetuity; and</i>	2.4.5
<i>vi. Provision for public comment on the draft plan.</i>	3.2
<i>The plan must be submitted to the Minister for written approval within 6 months of the date of this approval.</i>	4.0
<i>The person taking the action must not commence construction within 50 metres of Pink-tailed Worm-lizard habitat until the Minister has approved the plan.</i>	2.2.1 Figure 2
<i>The approved Pink-tailed Worm-lizard Protection and Management Plan must be implemented.</i>	4.0
CoA B14 as per the Project Approval under Section 75J of the NSW Environmental Planning & Assessment Act 1979.	
<i>The Proponent shall establish and maintain in perpetuity a dedicated area of land on the project site for the conservation of the Pink-tailed Legless Lizard (Aprasia parapulchella) as outlined in the plan prepared in accordance with condition D9 and shown in Appendix 2.</i>	Entire document

Condition of Approval	Section/s
<i>(a) be prepared or peer reviewed by a suitably qualified ecologist;</i>	Prepared by Robert Speirs and Peer reviewed by Dr Will Osborne
<i>(b) be based on the recommendations in the EA and the objectives of the National Recovery Plan for the species;</i>	Appendix A
<i>(c) outline the roles and responsibilities of parties that would implement the plan</i>	Table 3
<i>(d) set out the appropriate objectives, actions and milestones for the Proponent, prior to handing over ownership of this land to Queanbeyan City Council;</i>	2.1.1
<i>(e) include:</i>	2.1
<i>(i) procedures to survey and mark the boundary of the conservation area and a 20 meter buffer zone;</i>	
<i>(ii) procedures for the establishment and maintenance of boundary fencing, including measures to promote kangaroo grazing;</i>	2.1
<i>(iii) procedures and success criteria for habitat restoration and weed management;</i>	2.3.1 2.3.2
<i>(v) a community education program;</i>	2.3.6
<i>(vi) procedures to achieve long-term security for the conservation area;</i>	2.4
<i>(vii) a program to monitor the Pink-tailed Legless Lizard population within the conservation area; and</i>	2.3
<i>(viii) a program which sets out milestone dates for achieving the actions and measures in the plan.</i>	Table 3

1.2 Background

Googong township is a new master-planned town for a population of some 16,000 people, which will be constructed over the next twenty years. The vision is for a new, vibrant and sustainable community with an economic town centre and strong sense of place.

Approval for Googong township has been achieved through three different approval pathways, outlined as follows:

- Approval to develop Googong township subdivision, urban development works and the Googong IWC Project was granted under sections 130(1) and 133 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 19 May 2011.
- For the approval of all infrastructure relating to the potable water, recycled water and sewage system for the township, an environmental assessment was prepared under (the now repealed) Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) to assess the impacts of construction and operation of infrastructure. On 24 November 2011, a Concept Approval for the ultimate development (Stage 1 and Stage 2) and a Project Approval for Stage 1 of the Googong IWC Project was granted by the NSW Planning Assessment Commission, under delegation from the Minister for Planning and Infrastructure. Stage 1 of the Project comprises the following infrastructure:
 - a water recycling plant (WRP);
 - temporary reservoirs for recycled and potable water;

- pumping stations for sewage, recycled water and potable water;
 - mains pipework (including rising and distribution mains) for sewage, recycled water and potable water to connect to Neighbourhood 1A (NH1A); and
 - connection to the stormwater management system.
- For the development of NH1A, approval was gained from Queanbeyan City Council (QCC) under Part 4 of the EP&A Act. NH1A includes construction of the subdivision and associated infrastructure including stormwater, roads, civil works and utilities.

To satisfy the relevant conditions of approval from the above described approvals, Biosis Pty Ltd (previously 'Biosis Research Pty Ltd') was engaged by the Googong Development Corporation (now 'Googong Township Pty Ltd' [GTPL]) in 2010 to prepare an assessment of the impacts of Googong township upon an area of known PTWL habitat occurring within the eastern extent of the township (refer to Figure 1). In order to inform this assessment, habitat quality mapping was completed and intensive targeted rock-turning surveys were conducted throughout the areas determined to constitute potential habitat for the species. PTWL habitat throughout the Study Area was mapped according to ranking criteria that incorporated the abundance and density of surface rocks as well as vegetation composition. Using these ranking criteria, the Study Area was segmented into areas of 'Very High', 'High', 'Medium' and 'Low' quality habitat for the PTWL.

The results of the field surveys and habitat mapping were used to inform the preparation of an assessment against the EPBC Act Significant Impact Criteria (Commonwealth of Australia 2008) and to make recommendations for the design and ongoing management of a proposed PTWL Conservation Area. In accordance with the recommendations provided, GTPL proposed to establish, rehabilitate and dedicate to public ownership, a 54 ha PTWL Conservation Area within Googong township. The proposed PTWL Conservation Area included the entire area mapped as 'Very High' quality habitat, the majority of the 'High' quality habitat and 'Medium' quality habitat as well as proposing to restore and protect areas of 'non-habitat', strategically located to increase habitat connectivity and reduce 'edge-effects' (refer to Figures 2 and 3). The EPBC Act Significant Impact Criteria assessment concluded that the proposed development of Googong township would be unlikely to result in a significant impact upon the PTWL, provided the proposed PTWL Conservation Area is established and appropriately managed in perpetuity.

As such, this approach to the management of the PTWL within Googong township was proposed by GTPL in the submission of an EPBC Act Referral of the proposed action to DSEWPaC for assessment of Googong township against the provisions of Part 9 of the EPBC Act.

1.3 Structure of this PTWL-P&MP

This PTWL-P&MP is structured in the following manner:

Section 2 – Details regarding the establishment, protection and management of the PTWL Conservation Area. Within Section 2:

- Subsection 2.1 details the PTWL Conservation Area concept including the conservation principles, design and location, and the proposed management zones;
- Subsection 2.2 details the initial works and management actions to be undertaken by GTPL;
- Subsection 2.3 details the monitoring and management of the PTWL Conservation Area to be undertaken by GTPL; and

- Subsection 2.4 details the monitoring and management of the PTWL Conservation Area to be undertaken by Queanbeyan-Palerang Regional Council (Council).

Section 3 – Details regarding the consultation and review undertaken during the preparation, and to be undertaken during implementation, of this PTWL-P&MP:

- Subsection 3.1 details the consultation undertaken during the development of this PTWL-P&MP;
- Subsection 3.2 details the provision that has been made for public and agency comment on this PTWL-P&MP; and
- Subsection 3.3 details the ongoing review procedure for this PTWL-P&MP.

Section 4 – A summary of the management actions to be undertaken and the parties responsible.

1.4 2019 Revision – PTWL-P&MP Version 6

1.4.1 2019 Implementation Review and Update

Section 3.3 of this PTWL-P&MP (Ongoing review of this PTWL – P&MP) states that –

This PTWL-P&MP is subject to review at least every five (5) years. Reviews will be undertaken to provide for adaptive management and to ensure that the objectives of the PTWL Conservation Area are being suitably achieved. The review will be conducted by GTPL prior to handover to Council and by Council post handover. GTPL and Council may conduct the review in-house if suitable expertise is available or engage another suitably qualified specialist/organisation.

GTPL, assisted by Capital Ecology, review the PTWL-P&MP on a regular basis to guide establishment of the PTWL Conservation Area and its ongoing monitoring and management. In addition to this, in August 2019 GTPL engaged Capital Ecology to review the PTWL-P&MP and prepare a 2019 Implementation Review and Update (Capital Ecology 2019) (copy provided as Appendix E) to provide a more structured and comprehensive review, notably to present the results of the review in a form suitable for review by the DoEE and others as appropriate.

As per the above, the key purpose of the 2019 Implementation Review and Update was to provide a review of the implementation of the PTWL-P&MP over its first five years and thereby guide ongoing adaptive management of the PTWL Conservation Area to ensure that the objectives of the PTWL Conservation Area continue to be achieved.

As detailed in the 2019 Implementation Review and Update, GTPL's implementation of the PTWL-P&MP is achieving the stated objectives and the current version (Version 5) remains a relevant and suitable management plan for the PTWL Conservation Area. Section 2 of the 2019 Implementation Review and Update provides the results of Capital Ecology's review of the implementation of the PTWL-P&MP over the last five years (September 2014 to September 2019).

1.4.2 PTWL-P&MP Version 6

Notwithstanding the above, as detailed in Section 3 of the 2019 Implementation Review and Update (Appendix E) informed by studies and observations from the last five years, there are several elements of the actions/commitments of the PTWL-P&MP Version 5 which require minor modification to best achieve the objectives of the PTWL Conservation Area and accommodate engineering constraints identified during detailed design for the future Neighbourhood 5 which will adjoin the PTWL Conservation Area's southern boundary. This PTWL-P&MP Version 6 has been prepared to incorporate these modifications.

2 Establishment, Protection and Management of the PTWL Conservation Area

2.1 The PTWL Conservation Area concept

2.1.1 Conservation principles

The following four principles recommended by Biosis and independently endorsed by PTWL expert Dr Will Osborne have been applied by GTPL in determining the location, design, establishment and management of the PTWL Conservation Area within Googong township:

- including, and thereby preventing the disturbance of, all areas of 'Very High' quality habitat and the majority of the areas of 'High' and 'Medium' quality habitat within the PTWL Conservation Area;
- providing a balanced outcome of urban development and a consolidated, contiguous PTWL Conservation Area that reduces habitat fragmentation and improves habitat quality for the species in the long term;
- optimising the habitat connectivity of the PTWL Conservation Area to the adjoining Googong Foreshores; and
- implementing an ongoing management regime that will effectively manage the PTWL Conservation Area for the conservation of the PTWL, whilst remaining fiscally responsible and practicable to implement and manage.

These principles have been considered by GTPL as 'objectives' to be met during the design and management of Googong township in order to facilitate development, whilst ensuring the development does not have a 'significant impact' (as defined pursuant to the EPBC Act) upon the population of PTWL.

2.1.2 Design and location of the PTWL Conservation Area

The PTWL Conservation Area, illustrated in Figures 2 and 3, has been designed to achieve a long-term net-benefit to PTWL habitat within the locality. With regard to the location and extent of the PTWL Conservation Area, it should be noted that of the PTWL habitat assessed as occurring within Googong township, the PTWL Conservation Area will encompass the following.

1. The entire 24.2 ha area of 'Very High' quality habitat.
2. The majority (6.66 ha or 58.8%) of the 'High' quality habitat. Of the remaining 4.67 ha or 41.2%:
 - approximately 2.99 ha will be removed by development of Neighbourhood 5;
 - approximately 1.68 ha will be located within two large lots (>1.5 ha), the majority of which is zoned E2 – Environmental Conservation, and therefore is unlikely to be directly impacted by development.
3. The majority (15.26 ha or 66.7%) of the area of 'Medium' quality habitat. The retained areas of 'Medium' quality habitat will be restored and, over time, become higher quality habitat.

2.1.3 Management zones

The PTWL Conservation Area will be divided into three (3) broad management zones:

- PTWL habitat zone – this is the majority of the PTWL Conservation Area;
- Habitat buffer zone – this is a 20 m zone at the urban interface; and
- Montgomery Creek zone – this is the area immediately adjacent to, and including, the creek line.

Table 2 provides details of the management zones including the objective habitat quality and the management actions to be implemented with the aim of achieving this objective.

Figure 3 shows the areas of key management actions, such as rock placement (detailed further in Section 2.2). Figure 3 also identifies the existing E2 zoning based on the Queanbeyan Local Environmental Plan 2012 (LEP). The E2 zoning contains certain additional management provisions.

Table 2: PTWL Conservation Area management zones

Zone	Area (ha)	Primary aims	Management actions
PTWL habitat zone	42.79	<ul style="list-style-type: none"> • Enhance PTWL habitat characteristics: <ul style="list-style-type: none"> - Moderate to high rock scatter density. - Native grass dominated groundstorey. - Low fuel loads. 	<ul style="list-style-type: none"> • Weed removal and control. • Targeted woody weed removal. • Maintain fuel loads and grassland vegetation, primarily by kangaroo grazing. • Placement of suitable habitat rocks translocated from elsewhere within Gogong township.
PTWL habitat buffer zone	4.51	<ul style="list-style-type: none"> • Manage edge effects. • Promote PTWL habitat characteristics. • Bushfire asset protection. 	<ul style="list-style-type: none"> • Weed removal and control. • Maintain fuel loads and grassland vegetation. High height slashing may be required. • Rubbish removal.
Montgomery Creek zone	2.14	<ul style="list-style-type: none"> • Maintain water quality and flows. • Enhance native vegetation. 	<ul style="list-style-type: none"> • Weed removal and control. • Native vegetation planting (riparian species).

2.1.4 Key threats and management priorities

A risk management approach has been undertaken with regard to the design and management of the PTWL Conservation Area, particularly with respect to the design, location and staging of the conservation area fencing. The risks, based on the likelihood and consequences of potential impacts, were discussed and agreed to by the Gogong Foreshores-Township Interface Working Group on 9 September 2011. This risk assessment was informed by the scientific advice from expert ecologists and utilised the experience of local land managers. The management approach discussed in the remainder of this section is based on the following threats to the conservation of the PTWL, in order of priority:

1. Trail bikes – the use of trail bikes within the PTWL Conservation Area is likely to disturb key habitat features, such as small surface rocks.

2. Four-wheel-drive vehicles – similar to trail bikes, four-wheel-drive vehicles may disturb habitat features. However, due to the steep topography throughout much of the PTWL Conservation Area movement within the PTWL Conservation Area by such vehicles is limited.
3. Unleashed/feral dogs and cats – these animals may excavate under and around habitat rocks and directly predate on PTWL individuals, however, the likelihood of this occurring is considered to be low.
4. Pedestrians – while the likelihood of people walking through areas of PTWL habitat is high, the level of impact upon the species, which may result from human foot traffic and other pedestrian access impacts is considered to be low.
5. Bush rock removal – while bush rock removal is recognised as a key threatening process to the PTWL, the fencing type and schedule detailed in Section 2.2.1 will prevent unauthorised vehicular access to the PTWL Conservation Area. Impacts associated with the removal of bush rocks without the aid of a vehicle (i.e. carrying by hand from the PTWL Conservation Area to residential properties) are considered to be unlikely and of low significance.

With regard to all the above priority risks, it has been identified by the Googong Foreshores-Township Interface Working Group that public education and community engagement is of key importance to the protection of the PTWL Conservation Area and the minimisation of the risks/impacts detailed above. Section 2.3.6 details the public education and community engagement actions that will be undertaken.

2.2 PTWL Establishment Works and Management by GTPL

2.2.1 Establishment of the PTWL Conservation Area boundary and fencing

Boundary form and function

The boundary fence between the PTWL Conservation Area and the surrounding urban areas of Googong township will be 1.8 m in height. To respond to the highest priority risks discussed in Section 2.1.4, the fence will be constructed using chain mesh with galvanised posts and rails at the top and approximately 0.9 m. This fence type is considered to be the most appropriate as it will:

- not create a visually unappealing barrier between the PTWL Conservation Area and the adjacent residential areas;
- be effective in preventing illegal access into the PTWL Conservation Area (entry without a key would require climbing over or cutting holes in the 1.8m boundary fence); and
- provide some deterrent to domestic cats and dogs which may escape or roam from the surrounding future residential areas.

Legal pedestrian access to the PTWL Conservation Area (i.e. for passive recreation purposes such as bushwalking, bird watching, etc) will only be made available via Googong Foreshores when open to the public (generally 8am to 5pm). No formed access tracks or other facilities will be established within the PTWL Conservation Area.

As shown in Figure 4, where the PTWL Conservation Area boundary meets the Googong Foreshores boundary, the PTWL Conservation Area fence will join the fence that will be constructed between the urban (residential) areas of the township and Googong Foreshores. This fence will be of the

same type and form, similarly designed in a manner that will minimise the risk of pest fauna species, illegal vehicular and pedestrian access into Googong Foreshores.

Existing fencing between the PTWL Conservation Area and the adjoining Googong Foreshores will be removed to allow for the free movement of kangaroos, wallabies and wombats between the conservation area and Googong Foreshores. An appropriate level of grazing by native herbivores will greatly assist in maintaining the grassland habitat desirable to PTWL and reduce fuel loads.

Maintaining and monitoring the fence around the PTWL Conservation Area to prevent illegal access into the PTWL Conservation Area will also prevent such access into Googong Foreshores. Upon construction of the adjacent residential properties, community surveillance of the PTWL Conservation Area will provide a considerable deterrent to people wishing to enter the PTWL Conservation Area illegally.

Gates with a six metre wide opening will be installed in the fence at a number of locations along the boundary, strategically chosen in order to provide emergency and other authorised access into the PTWL Conservation Area. The type and form of these gates will be consistent with that of the adjoining fence and they will be constructed in a manner that does not result in them becoming a weak point in the fence.

A 20 m wide 'buffer zone' will be established running around the inside of the boundary of the PTWL Conservation Area (refer to Figure 3). This buffer zone will be monitored during the twice-annual (spring and autumn) weed monitoring and management program (refer Section 2.3.1) and any disturbance or additional weed establishment/encroachment will be promptly and sensitively controlled. Alike the balance of the PTWL Conservation Area, the buffer zone will be managed for PTWL conservation and, as such, will not be used as a transport corridor, or other incompatible use. However, the buffer zone may form part of the asset protection zone (APZ) for adjacent residential properties and, as such, may be managed as an Outer Asset Protection Area in accordance with Planning for Bushfire Protection - A Guide for Councils, Planners, Fire Authorities and Developers (NSW Rural Fire Service 2006), which entails maintaining fuel loads at less than eight (8) tonnes per hectare (ha). It should be noted that in this environment, no additional measures are expected to be required to maintain such fuel loads. Notwithstanding this, asset protection for residences located opposite the PTWL Conservation Area will be primarily achieved by the road reserve and measures to be implemented within the residential properties. As previously stated, grazing by native herbivores at the desirable intensity to optimise PTWL habitat quality will also greatly reduce fuel loads within the PTWL Conservation Area.

In the event that native herbivore grazing is insufficient to maintain the required fuel loads within the buffer zone, slashing will be undertaken within the buffer zone to maintain fuel loads to Outer Protection Area standards. Slashing equipment will be thoroughly cleaned of all potentially weed seed laden material prior to entry and cutter blades will be set high enough to avoid rocks.

The boundary between the PTWL Conservation Area and the adjacent surrounding future residential development areas will be the area where 'edge effects' are most relevant and will require the highest degree of ongoing management. As such, all reasonable efforts have been made during the design of the PTWL Conservation Area to minimise the length of the boundary between the PTWL Conservation Area and the adjacent surrounding future residential development areas. This was achieved through the design of the PTWL Conservation Area in accordance with the principles discussed in Section 2.2.1 and on the advice of relevant experts. In particular, this related to consolidation of habitat areas to reduce fragmentation by restoring areas within the PTWL Conservation Area, thereby providing increased habitat connectivity and quality within the PTWL

Conservation Area and improving habitat connectivity to the adjoining Googong Foreshores. This process is illustrated in Figures 2 and 3, particularly on the southern side of Montgomery Creek.

Sealed edge roads will be constructed around the majority of the boundary of the PTWL Conservation Area with residential lots located on the opposite side of the road. The location of roads in this manner is effective in discouraging the dumping of rubbish and the often well intentioned (however highly environmentally degrading) practice of spreading lawn clippings throughout the grassland over the back fence. In order to avoid the establishment of additional exotic plants and to prevent increases in the proportion of those already present, disturbance to the topsoil between the road and the PTWL Conservation Area boundary fence will be minimised. Should the placement of additional soil be required in this area, this soil will be sourced from adjacent areas and will be seeded with local native grasses. The use of soil sourced in this manner will assist in preventing the introduction of additional exotic plant species into the locality.

Boundary establishment schedule

The trigger for establishment is the commencement of residential subdivision works for Googong township within 50 m of the identified PTWL habitat. This trigger is considered to mark 'Year 0' of the PTWL Conservation Area and all works to establish the PTWL Conservation Area will proceed in stages from this point. Figures 2 and 3 show the indicative 'Year 0' trigger line.

In accordance with the above, the relevant stage of the PTWL Conservation Area boundary will be defined and fenced prior to any residential subdivision construction works commencing within 50 m of the relevant section of the identified PTWL Habitat. Fence construction will then proceed in stages, generally as per the diagrammatic representation provided in Figure 4.

The current land use and management regime (i.e. for agricultural purposes, notably sheep grazing) has been in place throughout the PTWL Conservation Area and surrounds for an extended period. This land use and management regime will continue until 'Year 0' as it will best allow for the maintenance of the PTWL habitat quality and the PTWL population within. The existing stock fencing within the PTWL Conservation Area and immediate vicinity will also remain without substantial alteration until 'Year 0' (Note: this does not preclude routine maintenance or replacement of the existing fences, if required). The continuation of the current land use and the retention of the existing stock fencing will also preclude public access to the PTWL Conservation Area prior to its formal establishment.

Note: The above boundary establishment schedule stipulates the timing by which establishment of the relevant stages of the PTWL Conservation Area boundary must occur. Given that expediting the establishment of the PTWL Conservation Area has only the potential to be beneficial for the conservation of the PTWL, GTPL may choose to bring forward establishment works at its discretion.

2.2.2 Weed Removal

Post establishment of Stage 1 of the PTWL Conservation Area boundary, woody weeds (i.e. Sweet Briar (*Rosa rubiginosa*) and African Boxthorn (*Lycium ferocissimum*)) have been controlled (via poisoning and physical removal) throughout the PTWL Conservation Area. GTPL engaged a qualified weed control contractor to undertake an intensive program of woody weed control/removal between November 2014 and January 2015. This initial weed control primarily targeted Blackberry and Sweet Briar (treatment via cut-stump poisoning and follow-up foliar spraying of regrowth) and covered the entire PTWL Conservation Area.

A targeted weed removal program (spot spraying) was implemented to control the Serrated Tussock (*Nassella trichotoma*) (approximately 50 plants were identified in 2010) located along the Montgomery Creek riparian zone within the PTWL Conservation Area. In January 2013 the 50 plants were located and sprayed with Glyphosate (with blue marker dye). These plants were checked during spring 2013 to ensure a thorough kill was achieved. The few remaining alive were sprayed at this time. Eradication of this weed species is essential to prevent its spread and proliferation throughout the PTWL Conservation Area. As such, GTPL have continued to undertake the monitoring and control works required to eradicate Serrated Tussock within the PTWL Conservation Area.

All weed removal works will be undertaken by trained and competent personnel using weed management techniques that are targeted to the species with minimal impact upon non-target species.

Specific efforts to eradicate or substantially reduce the other exotic grass and herbaceous species (primarily pasture species and common rural species), which are widespread throughout the PTWL Conservation Area are unwarranted. These species are generally considered 'naturalised' throughout the rural areas of the Southern Tablelands and, as such, efforts to eradicate them would be largely futile given their abundance throughout the wider locality. The removal of stock and associated nutrification of the soils, combined with the re-establishment and appropriate grazing of native grasses is likely to reduce the prominence of many of the exotic grasses and herbs within the PTWL Conservation Area.

The Radiata Pine (*Pinus radiata*) planted along the gully in the eastern part of the PTWL Conservation Area (refer Figure 2) will be retained as there is no evidence of wildings, and because of the impacts on PTWL habitat that would result from pine removal. There are also dense stands of Burgan (*Kunzea ericoides*) within the PTWL Conservation Area and, also because of PTWL habitat disturbance and that Burgan is habitat for small threatened birds, it is proposed to not remove Burgan. However, the extent of Burgan will be monitored via comparison of aerial imagery and if:

- the area of Burgan increases by greater than 10% on that evident in the 2012 aerial image; and/or
- the increased area/s of Burgan are in currently Very High or High quality PTWL habitat;

then the Burgan will be removed and reduced to pre-development levels, with priority to given to removing Burgan in or adjacent to Very High and High quality PTWL habitat.

2.2.3 Translocation of habitat resources and PTWL individuals

Importation of habitat rocks

Suitable habitat rocks removed by GTPL during the construction of the edge road and other excavations within the immediate vicinity of the PTWL Conservation Area will be imported into the PTWL Conservation Area. These rocks will then be scattered throughout the existing areas devoid of suitable habitat rocks or where such rocks are at low scatter density (refer to Figure 3). The rocks used for importation will be selected due to their small and/or flat characteristics. Large or spherical rocks will not be imported. Rocks will be scattered in a manner that results in a moderate to high scatter density whilst ensuring that rocks are not piled and do not result in excess of 30% ground cover. Care will be taken to avoid existing rocky areas and to minimise soil disturbance during delivery and scattering of these rocks.

To prevent the importation of additional weed species into the PTWL Conservation Area, only rocks removed from adjacent sections of Googong township will be imported.

PTWL salvage and translocation program

Prior to the importation of rocks discussed above (or concurrently if rock translocation is undertaken during seasonal conditions when PTWL can be found under rocks), any PTWL individuals uncovered outside of the PTWL Conservation Area within the existing habitat area (refer to Figure 2) will be translocated into the PTWL Conservation Area. It is important to note as the majority of high quality habitat and recorded locations of PTWL will be located within the PTWL Conservation Area, the numbers of PTWL individuals identified for translocation are expected to be low (and may be nil). This proposed salvage and translocation process is not essential to the overall protection of the PTWL or to the success of the PTWL Conservation Area, however, it will be undertaken as an additional conservation measure.

A licence to conduct the PTWL salvage and translocation program will be obtained from the NSW Department of Planning, Industry and Environment (DPIE) by a suitably qualified ecologist engaged by GTPL. Any specific conditions of this licence will be adhered during the conduct of the program. The DPIE will be notified of the proposed timing of the PTWL salvage and translocation program.

The PTWL salvage and translocation program will involve the turning (by a suitably qualified and experienced ecologist or similar) of all suitable habitat rocks and the capture of all PTWL found. Captured PTWL individuals will immediately be taken into the adjoining PTWL Conservation Area and released at the base of a suitable habitat rock located at least 20 m inward from the boundary. Care will be taken to ensure that the PTWL is able to make its way under the selected rock.

To prevent increases in competition in areas of existing habitat within the PTWL Conservation Area, all individuals translocated into the PTWL Conservation Area will be released in the areas of newly created/improved habitat (i.e. areas where imported rocks have been placed).

In order to maximise the number of individuals salvaged, if possible the PTWL salvage and translocation program should be completed when the conditions are suitable to survey for the species (i.e. <28 degree Celsius, sunny days in spring or autumn).

In addition to the PTWL salvage and translocation program, protocols to be adhered to if PTWL are discovered during construction works will be included in the site induction for all construction personnel working directly adjacent to the PTWL Conservation Area. The protocol that will be followed is to pause the activity and contact the relevant person on site nominated to capture and remove the PTWL encountered. The nominated person must be familiar with PTWL (i.e. be able to distinguish between a PTWL and a juvenile snake, etc). Upon notification, the nominated person will capture by hand (wearing gloves), and release the PTWL within the PTWL Conservation Area, as described above.

2.2.4 Re-establishment and encouragement of native grasses

A native grass re-establishment and encouragement program will be implemented throughout the PTWL Conservation Area. This will be aimed at facilitating and encouraging the dominance of native grasses (notably Kangaroo Grass and Red Grass) within the areas of the PTWL Conservation Area where they are not currently the dominant species due to exotic weed cover or soil disturbance.

The program will involve the re-establishment of Kangaroo Grass and Red Grass using stock grown from seed of local provenance (i.e. ACT and surrounds). These grasses will be re-established or boosted via the spreading of fertile Kangaroo Grass and Red Grass seed across the sections of the PTWL Conservation Area where disturbance to the soil surface has occurred during the removal of exotic weeds or the importation of habitat rocks. If required, the native grass re-establishment and encouragement program will occur as soon as practicable following the completion of these works.

2.2.5 Additional management measures during construction

In addition to the specific management measures detailed herein, the following standard construction best practice management measures will be implemented during all works within or adjacent to the PTWL Conservation Area, as follows:

1. Construction sites will be fenced for site security and safety reasons. Construction vehicles or personnel will not be permitted outside of the construction site fencing.
2. A Construction Environmental Management Plan (CEMP) will be prepared for the management of environmental issues during construction. The CEMP will detail the protection of ecological features of Googong township, including the location of the PTWL Conservation Area. The CEMP will also detail general environmental protection measures, such as sediment and erosion control measures to be undertaken during construction activities.
3. Construction personnel will be inducted. Inductions (and less formal, task-specific actions, such as 'toolbox talks') will include, where relevant, the location of the PTWL Conservation Area and the relevant protection measures required of the particular construction personnel. Generally, this will entail construction personnel being informed to remain within the designated construction sites/areas at all times.
4. In order to prevent the importation of additional weed species into the locality, all vehicles will be cleaned of all potentially seed laden material prior to entry.
5. Construction personnel will not bring any domestic pets into the site.
6. All rubbish will be removed from site and disposed at an appropriately licenced facility. No rubbish will be burned, buried or otherwise disposed of on site.

2.3 Monitoring and Management by GTPL

2.3.1 Weed monitoring and management

GTPL have engaged a professional weed control contractor to complete a weed monitoring and management program each year since the initial intensive program of woody weed control/removal in 2014-2015. This monitoring and management have been implemented to identify any regrowth of woody weeds and to locate any Serrated Tussock (or other 'Weed of National Significance' or otherwise high threat weed) that may have re-established within the PTWL Conservation Area. Any such regrowth or re-establishment has been appropriately controlled using targeted removal techniques.

GTPL will continue to commission the above described annual weed monitoring and management, including for Serrated Tussock. All weed monitoring and removal works will continue to be undertaken by trained and competent personnel using weed management techniques targeted to the species with minimal impact upon any non-target species.

2.3.2 Monitoring of native grass re-establishment success

If the native grass re-establishment and encouragement program (Section 2.2.4) is required to be implemented to rehabilitate disturbed areas, the success of the native grass program will be determined through the conduct of monitoring events by appropriately qualified and experienced personnel (botanist, ecologist, bush regenerator, etc), undertaken biannually (spring and autumn) following the spreading of the grass seed. The biannual monitoring events will continue until Kangaroo Grass and Red Grass combined comprise a minimum of 25% of the groundstorey cover

within the re-establishment areas. At each monitoring event, one (1) 4 m² (i.e. 2 m x 2 m) sampling plot per 1000 m² will be randomly located within each re-establishment area. The groundstorey biomass percentage of Kangaroo Grass and Red Grass within each sampling plot will be estimated and used to produce an average biomass percentage for the species within the polygon. If the biomass percentage is insufficient, further seed spreading or infill planting with these species will be undertaken to achieve the desired coverage.

It is envisaged that in the absence of stock grazing it is likely that Kangaroo Grass and Red Grass will readily establish and quickly become the dominant grass species within the re-establishment areas.

2.3.3 Monitoring of PTWL abundance and distribution

A PTWL monitoring program will be implemented to monitor the abundance and distribution of the PTWL throughout the PTWL Conservation Area.

The PTWL monitoring program will involve the turning of rocks across the entire PTWL Conservation Area and the recording of all PTWL individuals identified (i.e. numbers, locations recorded via GPS, etc). The survey effort to be completed will amount to approximately 15 hours of survey effort (i.e. two (2) ecologists for one (1) day), and, as such, the pace at which the survey staff move around the PTWL Conservation Area will need to be established accordingly.

Monitoring survey effort will be expended in a manner that provides a sample of habitat qualities ranging from 'Medium' to 'Very High', and specifically encompass areas where habitat creation/improvement (i.e. rock placement areas) has occurred.

The PTWL monitoring program is comprised of a measured amount of survey effort (i.e. 15 hours per survey event) spread at low intensity across the entire PTWL Conservation Area. Given the inherent disturbance to habitat involved in rock turning surveys, this approach will distribute the disturbance across a large area, and thereby, prevent the same specific areas being repetitively disturbed (as would be the case if defined survey plots were established).

The results of each monitoring event will be provided for inclusion in the NSW Wildlife Atlas as per the standard conditions of the scientific licence held by the ecologist/zoologist engaged to conduct the monitoring.

The PTWL monitoring program commenced in the spring 2015 which was the first year of residential subdivision construction works within 50 m of the mapped extent of PTWL habitat. The first monitoring was undertaken on Thursday 1 October 2015 and the second was undertaken on Tuesday 3 October 2017.

An additional 'preliminary' monitoring event was conducted during spring 2013 prior to the PTWL monitoring program commencing. The purpose of this monitoring event was to collect further baseline PTWL population data prior to any potential impacts from the early stages of Googong township being felt within the PTWL Conservation Area.

The results of the 2013, 2015, and 2017 monitoring events have been added to Figure 2. The results of these monitoring events are provided in Capital Ecology letter-form reports dated 16 October 2015 (Capital Ecology 2015) and 13 November 2017 (Capital Ecology 2017) (refer Appendix E). As detailed in the 2019 Implementation Review and Update (Appendix E), the three monitoring events completed to date have provided a baseline obtained prior to the substantial occupation of the adjacent residential areas. The results of these monitoring events indicate that the PTWL population is stable and the habitat across the PTWL Conservation Area remains characteristically unchanged from the original October 2010 habitat assessment and mapping.

The next monitoring event will occur in spring 2021, and monitoring events will occur at five-year intervals thereafter.

Whilst the PTWL monitoring program will be conducted in accordance with the above, a degree of flexibility will be maintained to allow for the incorporation of new or better survey techniques should these become known/developed in the future. Any such changes will be documented at the time of the review of this PTWL-P&MP, which is to occur at least every five (5) years.

2.3.4 Management of herbivores and feral predators

The feral herbivore European Rabbit (*Oryctolagus cuniculus*) was detected within the PTWL Conservation Area during the 2010 surveys. This species has been identified as an invasive species which suppresses the regeneration of natural grasses and forbs (NSW Scientific Committee 2002). High intensity grazing by rabbits is likely to adversely impact upon PTWL habitat by reducing the abundance of native grasses. In addition, the excavation of burrows and establishment of latrine sites by rabbits is likely to result in disturbance of PTWL habitat and increased weed infestation.

Whilst important for the maintenance of biomass and fuel loads, overgrazing by over-abundant kangaroo populations within the PTWL Conservation Area and the adjoining Googong Foreshores also has the potential to impact negatively upon the quality of the PTWL habitat.

Feral Cats (*Felis catus*) and the Red Fox (*Vulpes vulpes*) are known to predate upon small reptiles, including those of the family Pygopodidae. The impacts of these predators must be appropriately managed to protect the PTWL and other native fauna within the PTWL Conservation Area.

Given that herbivores and feral predators will move freely between Googong Foreshores and the PTWL Conservation Area, populations of herbivores and feral predators in the locality will be managed effectively by the existing and ongoing operations undertaken by the ACT Government Parks and Conservation Service (Googong Foreshores Draft Plan of Management 2007).

2.3.5 Prevention of domestic animal impacts upon PTWL

The following measures will be implemented to prevent domestic animals from roaming within the PTWL Conservation Area, as follows:

1. A public education and community engagement program will be developed and implemented (refer to Section 2.3.6).
2. A sealed edge road will be located between the PTWL Conservation Area and adjacent residential properties along the majority of the interface
3. The PTWL Conservation Area boundary fence will be installed to provide a deterrent to domestic animals through the installation of chain mesh fencing (refer to Section 2.2.1). This fence will be maintained.

2.3.6 Public education and community engagement

A public education and community engagement program is implemented by GTPL on an ongoing basis to educate the residents of, and the visitors to, Googong township. This program provides the following:

1. Signage at strategic locations along the PTWL Conservation Area boundary providing details relating to the:
 - a. biodiversity values of the PTWL Conservation Area and importance of protecting such values;

- b. management activities that have occurred and will continue to occur within the PTWL Conservation Area;
 - c. roles that the public can play in protecting the PTWL Conservation Area;
 - d. actions that will damage the PTWL Conservation Area and/or diminish the habitat values of the area to PTWL (i.e. recreational rock turning, bush rock collection, weed introduction, etc); and
 - e. party responsible for the management of the area and who members of the public should contact should they observe illegal or degrading activities being conducted within or immediately adjacent to the PTWL Conservation Area.
2. A section included within a welcome brochure (or similar) supplied to new residents and displayed in other relevant locations (Googong Foreshores visitor centre, community billboards, etc.) detailing the above.

2.4 Long term Monitoring and Management by Council

The PTWL Conservation Area will be maintained by GTPL at its cost until the completion of the development (issue of a subdivision certificate for creation of the 5,550 lots in Googong township). Prior to or at the time of the completion of the development (which is estimated to take 25 years), the PTWL Conservation Area will be dedicated to Council. This constitutes the binding arrangement incorporated into the Voluntary Planning Agreement (VPA) made by GTPL and Council. GTPL will work collaboratively with Council to manage the handover of the monitoring and management measures established by GTPL. The handover will also ensure compliance with Project Approval CoA D9(vi), which requires procedures to achieve long term security for the PTWL Conservation Area. The specific management measures that will continue under the management of Council are detailed below.

2.4.1 Ongoing weed monitoring and management

The weed monitoring and management program will continue in perpetuity. This program will identify any regrowth of woody weeds and locate any Serrated Tussock (or other 'Weed of National Significance' or otherwise high threat weed) that may have re-established within the PTWL Conservation Area. Any such regrowth or re-establishment has been appropriately controlled using targeted removal techniques.

As previously stated, all weed monitoring and removal works will be undertaken by trained and competent personnel using weed management techniques targeted to the species with minimal impact upon non-target species.

The 20 m wide buffer will continue to be regularly monitored and any disturbance or additional weed establishment/encroachment will be promptly and sensitively controlled. The use and management measures established by GTPL throughout the PTWL Conservation Area will not substantially alter upon handover to Council. That is, the entire PTWL Conservation Area will continue to be managed for the conservation of the PTWL.

2.4.2 Monitoring of native grass re-establishment success

If the native grass re-establishment is required to revegetate areas where disturbance to the soil surface has occurred during the removal of exotic weeds or the importation of habitat rocks (as per Section 2.2.4), the objectives of the native grass revegetation program will be met prior to handover to Council. In this case, Council will not be required to conduct specific monitoring of the re-establishment areas, however, it will conduct annual reviews of the vegetation cover and condition

throughout the PTWL Conservation Area. Should handover occur prior to the minimum of 25% of the groundstorey biomass objective being met throughout re-establishment areas, Council will ensure that any required additional seed spreading or infill plantings will be undertaken following handover.

2.4.3 Monitoring of PTWL abundance and distribution

The PTWL monitoring program will continue following handover to Council. The methodology and survey for the monitoring program will remain unchanged and continue to occur once every five (5) years.

2.4.4 Ongoing deterrence of unrestrained domestic animal access to the PTWL Conservation Area

The measures implemented by GTPL to deter domestic animals from roaming within the PTWL Conservation Area will remain in place under the management of Council, specifically:

- the public education and community engagement program, including signage, will continue; and
- the PTWL Conservation Area boundary fence will be maintained in order to deter domestic animals.

2.4.5 Legal mechanisms to protect the PTWL Conservation Area in perpetuity

Prior to commencement of construction within 50 metres of Stage 1 of the PTWL Conservation Area, an 88b Instrument was registered over the land, requiring the owners of Stage 1 of the Conservation Area to maintain it pursuant to the terms of the PTWL-P&MP. A similar 88b Instrument will be registered over Stage 2 of the PTWL Conservation Area prior to commencement of construction within 50 metres of Stage 2. These 88b Instruments are generally in accordance with that included in Appendix D. The Minister was notified upon registration of the 88b Instrument for Stage 1 prior to the commencement of construction within 50 metres of the Conservation Area, and the Minister will be notified upon registration of the 88b Instrument for Stage 2.

The dedication of the land for the PTWL Conservation Area is detailed within the Voluntary Planning Agreement (VPA) for Googong township. Following handover of the PTWL Conservation Area to Council, the PTWL Conservation Area will irrevocably become publicly owned land. It will then be the responsibility of Council to classify the land as community land and prepare a plan of management in accordance with the requirements of section 36 of Part 2 of the *Local Government Act 1993*. This will further enable the PTWL Conservation Area to be protected in perpetuity and provide Council with the authority to manage the land as an asset. This irrevocable dedication of the PTWL Conservation Area to public ownership will ensure that the land cannot be used for another purpose in the future.

Additionally, future development cannot occur within the PTWL Conservation Area, without the permission of Council or other relevant authority (as this would not be in accordance with the VPA). If such a proposal were to be put forward, it would be subject to the provisions of the EPBC Act with respect to protection of PTWL and its habitat, and a likely referral under the EPBC Act (as it would not be in accordance with Googong township EPBC Act referral, as approved) would be required.

Upon approval by the (Commonwealth) Minister in July 2012, the management measures and actions described herein became requirements of the approval under the EPBC Act. The DoEE may conduct compliance audits and may implement enforcement measures, if these requirements are not satisfactorily adhered to.

Furthermore, the poaching of PTWL or the unapproved disturbance of the habitat of threatened species in NSW is a criminal offence and offenders may be prosecuted in accordance with the provisions of the Biodiversity Conservation Act 2016 (BC Act).

3 Consultation and Review of this PTWL - P&MP

3.1 Consultation undertaken during the development of this PTWL – P&MP

3.1.1 Googong Township Foreshores Interface Working Group

As part of the EPBC Act referral for the township, a Googong Foreshores Township Interface Working Group (the 'Working Group') was formed in mid-2010 to facilitate alignment between the commitments that were being proposed in the various planning approval documents and the existing Googong Foreshores Draft Plan of Management (ACT Government Territory and Municipal Services 2007). Parties represented in the Working Group include:

- CIC Australia/GTPL.
- Commonwealth Department of Finance.
- Commonwealth Department of Sustainability, Environment, Water, Population and Communities, DSEWPaC (now the Department of the Environment and Energy).
- ACT Government Parks and Conservation Service.
- Icon Water.
- Queanbeyan-Palerang Regional Council.

The Working Group developed broad objectives and specific actions, such as the location of fencing, which have been incorporated into this PTWL-P&MP. Relevant members of the Working Group have also been consulted on specific aspects related to the protection and management of the PTWL. A meeting of the Working Group was held on 9 September 2011 specifically to review the first draft of this PTWL-P&MP. Subsequent proposed revisions of this PTWL-P&MP were presented to the Working Group members for their review and comment at biannual (May and November) meetings.

3.1.2 Further consultation undertaken during 2011

In order to finalise the EPBC Act referral and ensure the ongoing protection of the PTWL, several meetings were held with DSEWPaC in early 2011. During this time, additional consultation and peer review was also undertaken with Dr Will Osborne, an expert on the PTWL in the ACT and surrounding region of NSW. Further consultation with Dr Osborne occurred in relation to the specific measures contained in this PTWL-P&MP.

3.2 Public and agency comment on the draft PTWL - P&MP

In accordance with CoA 1, provision was made for public comment on the final draft PTWL-P&MP.

A copy of the final draft PTWL-P&MP was placed on public exhibition for a two (2) week period from 1 October to 14 October 2011. Public notices were placed in the Queanbeyan Age and Canberra Times newspapers advertising the commencement of the public exhibition period and providing details for the submission of response(s) following review of the PTWL-P&MP. An electronic copy of the PTWL-P&MP was also provided to DSEWPaC, Council, NSW Office of Environment and Heritage (Queanbeyan Office), Friends of Grasslands (FoG) and Dr Osborne for their review and comment.

Three (3) submissions were received on the review of the final draft PTWL-P&MP. Appendix B provides a list of the issues raised in the submissions received and their consideration. A number of minor amendments to this PTWL-P&MP were undertaken following consideration of these submissions.

3.3 Ongoing review of this PTWL – P&MP

This PTWL-P&MP is subject to review at least every five (5) years. Reviews will be undertaken to provide for adaptive management and to ensure that the objectives of the PTWL Conservation Area are being suitably achieved. Reviews will be conducted by GTPL prior to handover to Council and by Council post-handover. GTPL and Council may conduct reviews in-house if suitable expertise is available or engage another suitably qualified specialist/organisation.

4 Summary of Management Actions and Responsibilities

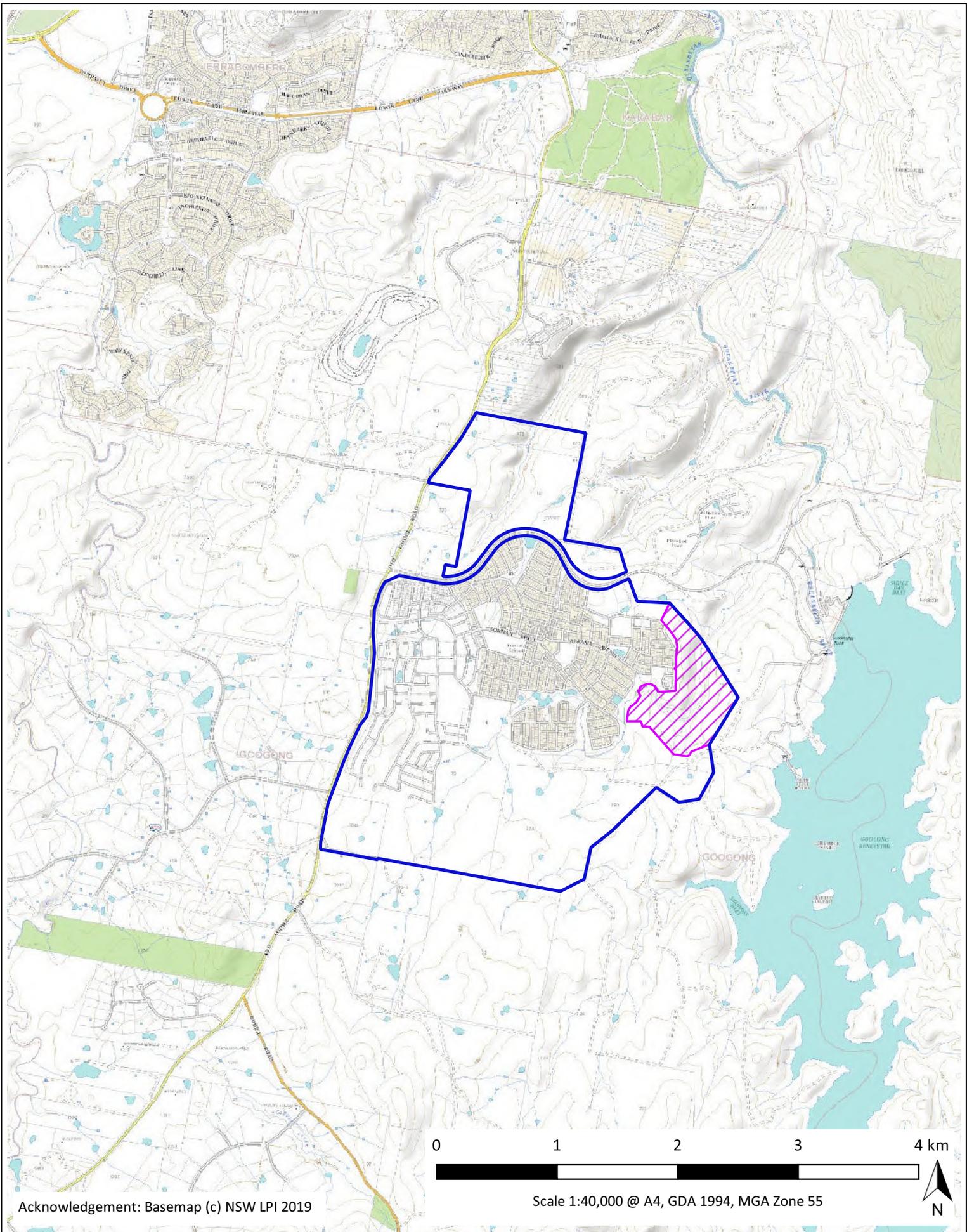
A summary of the management actions and responsible parties for each management action is provided in Table 3. Timings noted start with the 'Year 0' (being the year that residential subdivision construction works first occurred within 50 m of the identified PTWL habitat (refer to Figure 2 for the 'Year 0' trigger line). As residential subdivision construction works commenced beyond the 'Year 0' trigger line in 2015, 2016 became 'Year 1' and thereon.

Table 3: PTWL Conservation Area management summary

Management action	Timing and details	Responsible party
Preparation of the PTWL-P&MP	Submission to the DSEWPac for Ministerial approval by 19 November 2011 (as per the requirements of Condition of Approval 1).	GTPL
Preparation of the PTWL-P&MP (referred to as an Aprasia Conservation Management Plan)	Prepared in consultation with DPIE and DSEWPac and submitted to the Director-General for approval by the end of June 2012 (as per the requirements of CoA D9).	GTPL
Continuation of farming activities and retention of existing stock fencing	The current management and use of the PTWL Conservation Area for agricultural purposes (notably sheep grazing) continued without substantial alteration until 'Year 0' and will continue until completion of Stage 2 of the PTWL Conservation Area. The existing stock fencing within the PTWL Conservation Area and immediate vicinity remained without substantial alteration until 'Year 0'. This fencing will be removed during establishment of Stage 2 of the PTWL Conservation Area. Note: this does not preclude routine maintenance or replacement of the existing fences if required.	GTPL & Private land owner/manager
Establishment and boundary fencing (Stage 1)	Precise boundary delineation to be determined during detailed design of the relevant section of Googong township. Fencing of the relevant section (Stage 1) of the PTWL Conservation Area was constructed prior to residential subdivision construction works occurring within 50 m of the PTWL Habitat (refer to Figure 2 for the 'Year 0' trigger line).	GTPL
Weed removal, monitoring and management	Removal of woody weeds was undertaken following the construction of the first section of PTWL Conservation Area fencing. The small Serrated Tussock infestation was eradicated within six (6) months following the approval of this PTWL-P&MP.	GTPL
	Ongoing monitoring and management of weeds will continue by GTPL prior to handover to Council and by Council post-handover. Commenced in 'Year 1'.	GTPL & Council
Importation of habitat rocks	Suitable habitat rocks will be removed from the areas of habitat (refer to Figure 2) outside of the PTWL Conservation Area and scattered within the PTWL Conservation Area. This occurred for Stage 1 in November 2014 and it will occur for Stage 2 prior to works commencing within 50 m of the 'Year 0' trigger line.	GTPL

Management action	Timing and details	Responsible party
Translocation of PTWL	<p>In combination with the above importation of rocks, PTWL will be translocated from identified habitat areas (refer to Figure 2), prior to the commencement of construction in those areas. The PTWL removed will be immediately translocated into the PTWL Conservation Area and, to the extent possible, will occur during the suitable survey season for the species (i.e. during suitable weather in spring or autumn).</p> <p>This occurred for Stage 1 in November 2014 and it will occur for Stage 2 prior to works commencing within 50 m of the 'Year 0' trigger line.</p>	GTPL Engaged ecologist
Monitoring of PTWL abundance and distribution	<p>The PTWL monitoring program commenced in spring 2015 which was the first spring following the first year of works within 50 m of the PTWL Conservation Area. Monitoring events were also undertaken in spring 2013 and spring 2017.</p> <p>The next monitoring event will occur in spring 2021, and monitoring events will occur at five-year intervals thereafter.</p> <p>Following handover to Council, the PTWL monitoring program will continue to occur once every five (5) years.</p>	GTPL & Council
Re-establishment and encouragement of native grasses.	<p>Re-establishment and encouragement of native grasses throughout areas disturbed during woody vegetation removal and rock placement will occur immediately following the completion of these works, or following the completion of the section of these works.</p> <p>Note: grass re-establishment will only be required should the weed removal and/or rock placement works result in removal/disturbance of the native groundcover.</p>	GTPL
Monitoring of native grass re-establishment	<p>Monitoring of native grass re-establishment (if this occurs) will be conducted on a biannual basis by GTPL prior to handover. Council will conduct annual overview monitoring of the vegetation composition and condition throughout the PTWL Conservation Area post handover.</p>	GTPL & Council
Boundary fencing (Stage 2)	<p>Installation of Stage 2 of the PTWL Conservation Area fence (refer to Figure 4) will be undertaken prior to the commencement of construction works within 50 m of the PTWL Habitat (refer to Figure 2 for the 'Year 0' trigger line) south of Montgomery Creek.</p>	GTPL
Review of the PTWL-P&MP	<p>The PTWL-P&MP will be reviewed at least every five (5) years.</p>	GTPL will be responsible for this review prior to handover and Council will be responsible post-handover.

Figures



Acknowledgement: Basemap (c) NSW LPI 2019

Scale 1:40,000 @ A4, GDA 1994, MGA Zone 55

Figure 1. Locality Plan

Capital Ecology Project No: 2832
 Drawn by: R. Speirs
 Date: 30 September 2019

Legend

- Googong Township
- PTWL Conservation Area - Revised Boundary 20190930



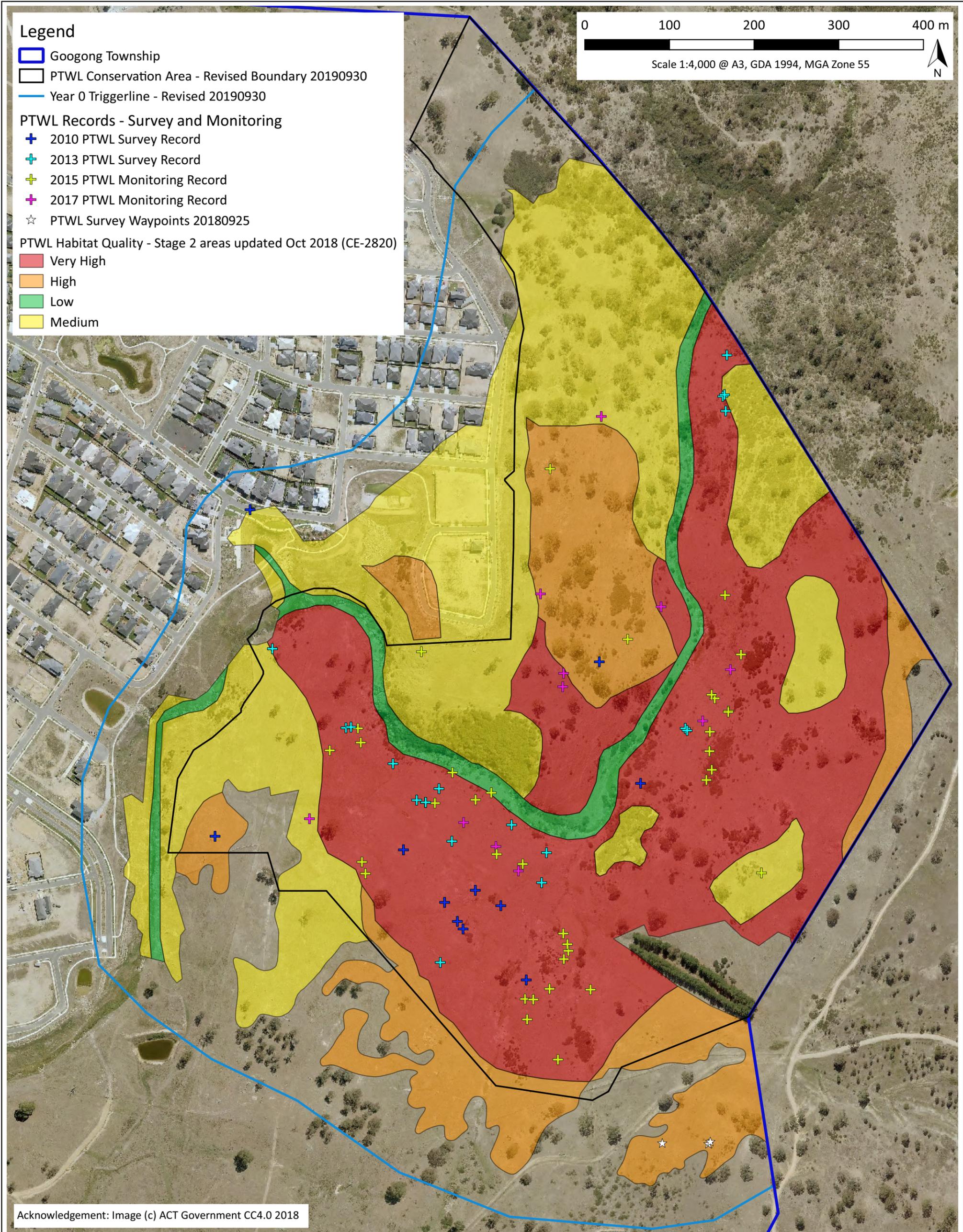


Figure 2. PTWL Habitat Assessment

Capital Ecology Project No: 2832
 Drawn by: R. Speirs
 Date: 1 October 2019

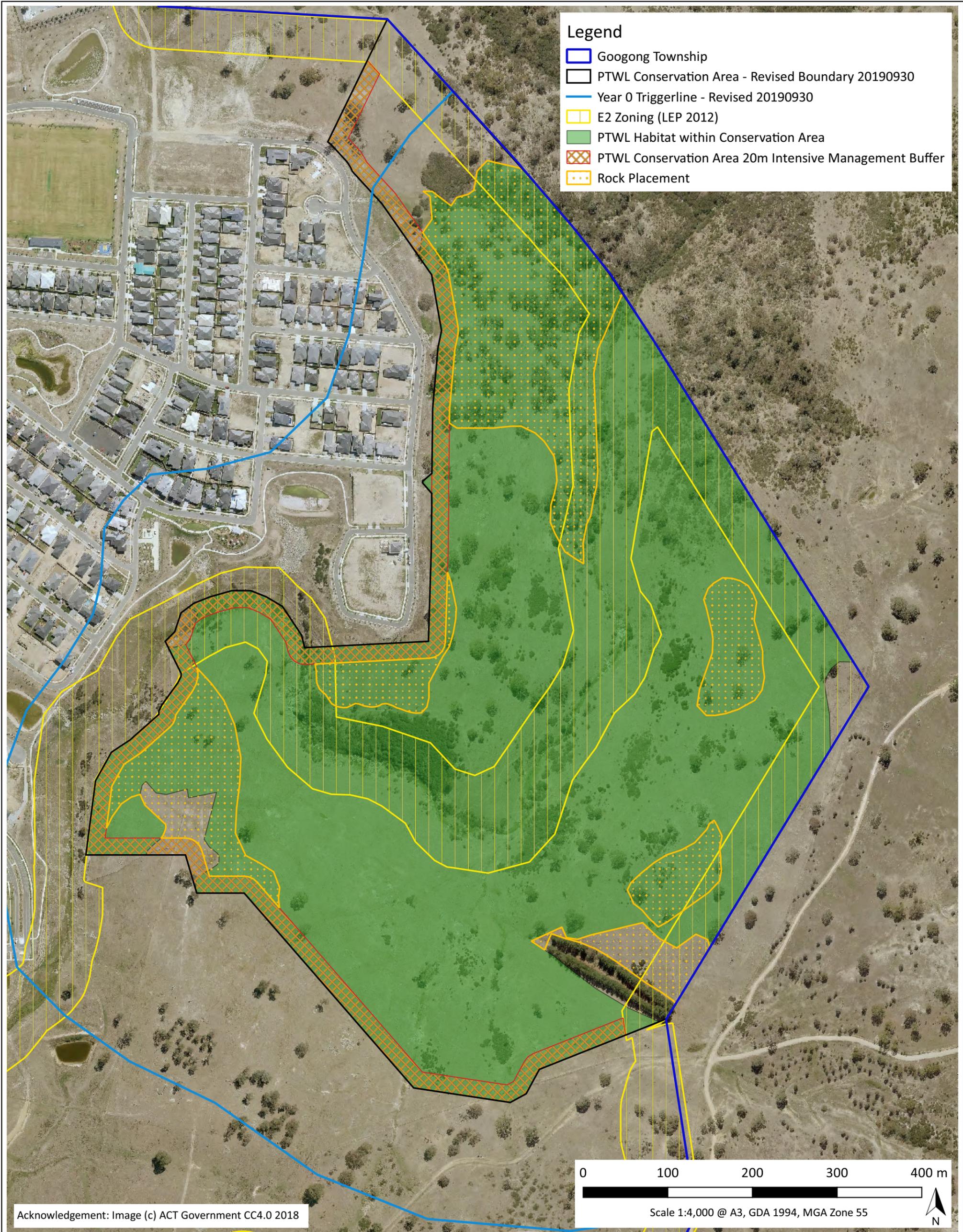


Figure 3. PTWL Conservation Area Protection and Management

Capital Ecology Project No: 2832
 Drawn by: R. Speirs
 Date: 1 October 2019



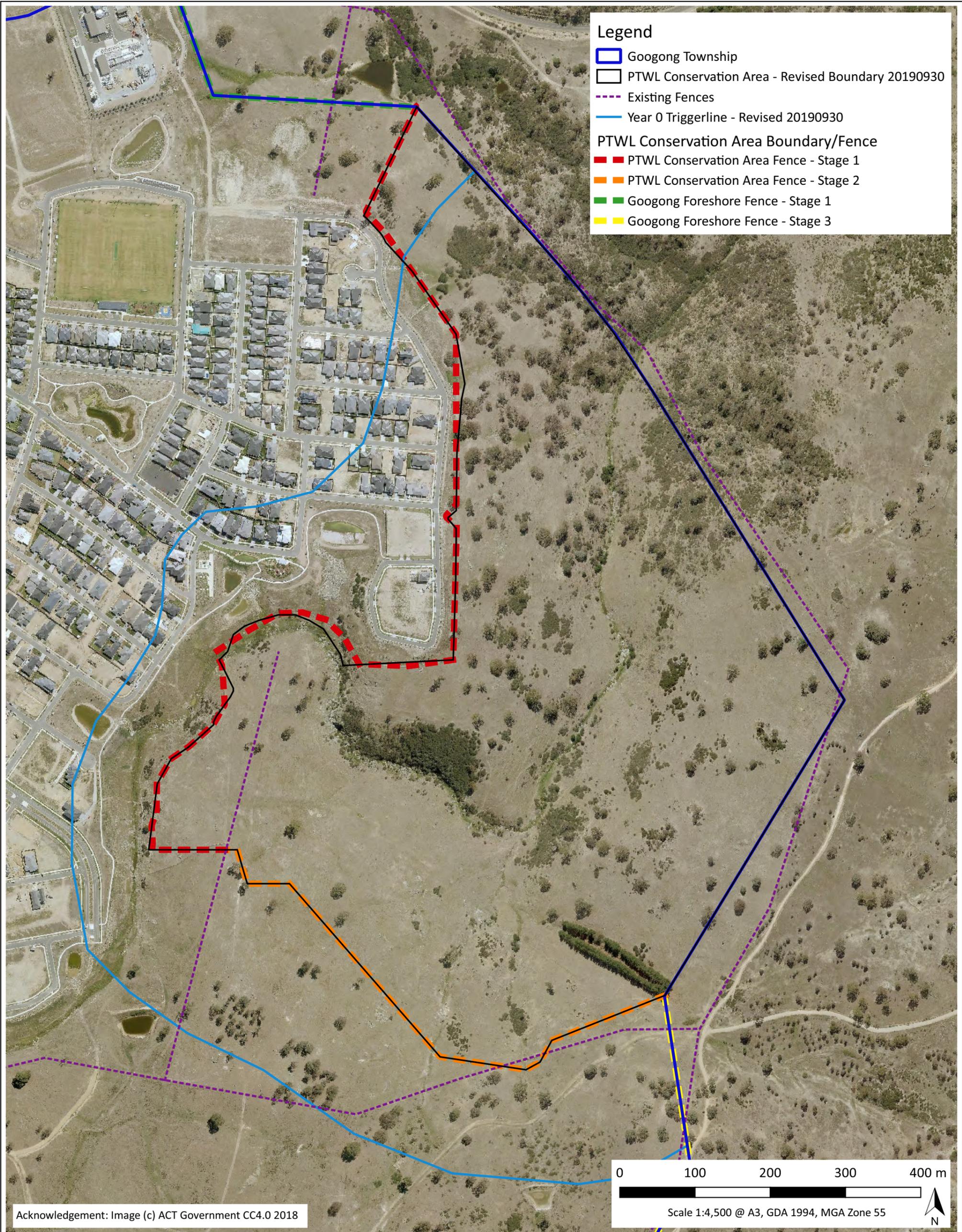


Figure 4. PTWL Conservation Area Fencing Plan

Capital Ecology Project No: 2832
 Drawn by: R. Speirs
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Appendices

Appendix A. Background to the PTWL at Googong

Description of the PTWL Conservation Area and Surrounds

The PTWL Conservation Area will encompass a section of Montgomery Creek and associated hillslopes and will incorporate approximately 54 ha of land located within the Queanbeyan River catchment, approximately 10 km south of Queanbeyan, New South Wales. The land to the west, northwest and south of the PTWL Conservation Area is, in its current form, predominantly cleared of native woody vegetation and has been subjected to grazing and pasture improvement.

Landform, topography and soils

The topography of the PTWL Conservation Area is dominated by a moderately to deeply incised section of the Montgomery Creek valley. The surrounding elevated lands to the west, north and south generally comprise gently undulating hills, which will be developed for Googong township. The elevation within the PTWL Conservation Area ranges from 720 m Australian Height Datum (AHD) along the western boundary to 640 m AHD at the point at which Montgomery Creek enters Googong Foreshores.

The geology of the local area consists of Silurian volcanics including the Colinton volcanics and the Capanana Formation (Jenkins 2000). There are various tuffs with minor siltstone, shale, sandstone and limestone (Jenkins 2000). Soils within the Study Area are shallow, infertile, strongly acidic and moderately drained, with outcropping granitic rock, predominantly granodiorite (Jenkins 2000).

Management history and current vegetation condition

The majority of Googong township was cleared of native tree cover by felling and firing carried out post European settlement of the area during the early to mid nineteenth century (Navin Officer 2003). The steepest sections of the Montgomery Creek hillslopes were not cleared, likely due to the skeletal nature of the soils and difficult topography. As is evidenced by the existence of granite tors, scattered surface rocks and the general unevenness of the landscape, it can be determined that the cleared land within and directly adjoining the PTWL Conservation Area has not been subject to cultivation or levelling. Excavation and soil movement within the vicinity of the PTWL Conservation Area appears to have been limited to that associated with the construction of dams across the branches of Montgomery Creek, upstream of the PTWL Conservation Area.

Notwithstanding the above, the PTWL Conservation Area and adjoining sections of Googong township have been subject to grazing (notably by sheep) at various intensities for an extended period, likely extending back to the onset of pastoralism post European settlement. The grassland/pasture throughout the more open and flat land located to the west, northwest and south of the PTWL Conservation Area has undergone substantial pasture improvement and modification. The resulting grassland/pasture in the pasture improved areas, whilst supporting a native grass component (i.e. primarily *Austrostipa* spp. and *Austrodanthonia* spp.), is dominated by exotic pasture grasses and weeds.

The groundstorey vegetation throughout the PTWL Conservation Area supports a much higher proportion and diversity of native grasses and forbs. Whilst much of the PTWL Conservation Area supports a component of exotic pasture grasses and weeds, native grasses and forbs represent a much larger component of the groundstorey biomass. Kangaroo Grass (*Themeda triandra*) and other native species more sensitive to intense grazing and elevated soil fertility, constitute a substantial component of the groundstorey biomass throughout much of the PTWL Conservation Area. No evidence is present to suggest that the land within the PTWL Conservation Area has been subject to

a lower intensity grazing regime (i.e. sheep grazing appears to have occurred throughout the entire eastern section of Googong township). It can therefore be envisaged that the persistence of native grasses (notably Kangaroo Grass) and forbs has occurred primarily through the exclusion of pasture improvement management practices carried out to elevate soil fertility ((i.e. spreading of fertiliser (especially superphosphate), incorporation of clover and other exotic pasture species, etc)).

A number of dense stands of Burgan (*Kunzea ericoides*) occur within the PTWL Conservation Area. Burgan is a large dense spreading Tea-tree like native shrub growing to approximately four metres in height. Generally considered a pioneer species, it vigorously occupies areas devoid of groundstorey vegetation and often inhibits the growth of native grasses and forbs.

With regard to the above, it can be determined that whilst the vegetation and landform within the PTWL Conservation Area have been impacted upon by a long history of grazing, the land and associated vegetation type and condition within the PTWL Conservation Area has not been degraded to the extent of that located throughout the surrounding areas of Googong township. The management of the PTWL Conservation Area for pastoral purposes has resulted in the introduction of exotic grasses, herbaceous and woody weeds and has reduced the dominance of native groundstorey vegetation. In this regard, it would reasonably be expected that the condition of the groundstorey vegetation and associated PTWL habitat value throughout the PTWL Conservation Area would continue to degrade if the past and current management regime was to be maintained into the future.

Ecology and Habitat of Pink-tailed Worm-lizard

The PTWL is a small fossorial reptile from the family Pygopodidae (legless lizards), which has a maximum snout vent length of 14 cm and a total length of about 24 cm. PTWL is oviparous (egg laying) with a clutch size of two. Females may need to reach an age of about three (3) or four (4) years before they can reproduce. There is little data on the breeding behaviour of this species (Osborne and Coghlan 2004). The PTWL is moderately common within the ACT region and is often the most abundant reptile at locations within its defined habitat type (Osborne *et al.* 1991).

The species lives beneath surface rocks and occupies ant galleries where it feeds on ants, particularly their eggs and larvae (Osborne and Jones 1995). Key habitat features for the presence of PTWL are a cover of native grasses (particularly Kangaroo Grass), sparse or no tree cover, little or no leaf litter, and scattered small rocks shallowly embedded in the soil surface (Osborne and Jones 1995).

In the Canberra region, the species is found in areas containing acid volcanic rock types - Late Silurian acid volcanics - that are derived from decomposing rhyodacite, rhyolite or dacite or other Silurian volcanic rocks (Osborne and Coghlan 2004). The distribution of the species is centred on the ACT and this appears to be related to less soil (and rock) disturbance evidenced by the presence of a native grass cover, particularly Kangaroo Grass, Red-leg Grass (*Bothriochloa macra*) and Wattle Mat-rush (*Lomandra filiformis*) (Osborne and Jones 1995). The likelihood of occurrence of PTWL increases with increasing cover of Kangaroo Grass, which is a key botanical indicator of suitable habitat in the ACT region, along with Red-leg Grass and Wattle Mat-rush (Jones 1992, 1999; Osborne & Coghlan 2004). Alternatively, dominance of speargrasses (*Austrostipa falcata*, *A. bigeniculata*) and Tussock Grass (*Poa labillardieri*) decreases the likelihood of finding the species (Osborne and Coghlan 2004; ACT Government 2007; ACT Government 2005).

PTWL habitat sites in the Queanbeyan region support native grassland, derived grassland and open and dry woodland habitats, usually with many loose and partially embedded rocks. Groundcover is typically dominated by Kangaroo Grass and wallaby grasses (*Astroanthonia spp.*) (R. Rehwinkel

pers. comm.). Open woodland habitats are dominated by Yellow Box (*Eucalyptus melliodora*) and Blakely's Red Gum (*E. blakelyi*), while dry forest areas are dominated by Broad-leaved Peppermint (*E. dives*) and Candlebark (*E. rubida*) (Brown 2010).

Notwithstanding, moderate numbers of disturbed sites dominated by exotic ground cover species, such as Wild oats (*Avena* spp.), Fescues (*Vulpia* spp.), Flat weeds (*Hypochaeris* spp.) and Bromes (*Bromus* spp.) have been found to support at least some individuals, although it was not known if these sites support viable populations (Osborne and Coghlan 2004).

Distribution of Pink-tailed Worm-lizard

Regional

The PTWL occurs in south-eastern Australia, where it is widely but patchily distributed from Gunnedah in northern NSW through southern NSW and the ACT to Bendigo in central Victoria (Brown 2010). Other locations within this geographic area include near Cooma, Yass, Albury, Cootamundra, Tarcutta and Queanbeyan (DEWHA 2008a; DECC 2009). Records cover a wide altitudinal range, from about 200 m altitude near Bendigo to over 800 m altitude in the ACT (Brown 2010).

Locality

The PTWL is regarded as moderately common within the ACT and region where it has a wide and scattered distribution along the rocky hills and slopes of the Murrumbidgee, Molonglo and Queanbeyan River corridors (Brown 2010). The PTWL has been widely recorded throughout Googong Foreshores and surrounding areas (Johnstone Centre 2004). Surveys completed by the Johnstone Centre (2004) throughout the wider locality (encompassing Googong township) recorded seventeen individuals at two (2) locations: thirteen (13) within the "Talpa" property located within the Queanbeyan River catchment approximately two kilometres to the north of the Study Area; and, four within the "McLean" property located within the Jerrabomberra Creek catchment approximately three (3) kilometres to the west of the PTWL Conservation Area.

Habitat assessments carried out during broader ecological surveys completed by Biosis Research (2009) throughout Googong township identified the PTWL potential habitat associated with the lower reaches of Montgomery Creek. This potential habitat (in addition to the previously recognised potential habitat on Reservoir Hill) was surveyed by Biosis Research with two live PTWL and one slough (shed skin) being recorded within the area to become the PTWL Conservation Area (Biosis Research & Ecwise Environmental 2009). In order to more accurately determine the significance of the PTWL population occurring along Montgomery Creek, in spring 2010 GTPL commissioned Biosis Research to conduct intensive targeted surveys and prepare habitat quality mapping throughout the areas of previously identified potential habitat. Approximately 6,200 suitably sized shelter rocks were turned and 13 live *A. parapulchella* individuals and three sloughs (shed skins) were recorded.

Owing to the results and observations of the 2010 study and previous studies conducted by Biosis Research (2009) and the Johnstone Centre (2004), the PTWL habitat associated with the lower reaches of Montgomery Creek is considered to constitute the only considerable area of PTWL habitat within Googong township.

Threats to Pink-tailed Worm-lizard

The main threats to PTWL as described in the 'National Recovery Plan for the Pink-tailed Worm-lizard *A. parapulchella* (Draft)' (Brown 2010) are:

- Habitat loss and fragmentation;

- Removal of rocks;
- Heavy grazing and trampling;
- Invasion of habitat by weeds;
- Modification of habitat i.e. tree planting, invasion of woody shrubs in native grasslands;
- Changed fire regimes, which lead to a change in vegetation structure;
- Recreational activities; and
- Predation by introduced predators.

Appendix B. Submissions received during Public Exhibition of the PTWL – P&MP

A copy of the final draft Pink-tailed Worm-lizard Protection and Management Plan (PTWL-P&MP) was placed on public exhibition for a two (2) week period from 1 October to 14 October 2011. Public notices were placed in the Queanbeyan Age and Canberra Times advertising the commencement of the public exhibition period and providing details for the submission of response(s) to the PTWL-P&MP. An electronic copy of the PTWL-P&MP was also provided to DSEWP&C, Queanbeyan City Council, NSW Office of Environment and Heritage (Queanbeyan Office), Friends of Grasslands (FoG) and Dr Will Osborne for their review and comment.

Error! Not a valid bookmark self-reference. below provides a list of the issues raised in the three (3) submissions received and appropriate consideration of these issues. Minor amendments to the PTWL-P&MP have been undertaken following the consideration of these submissions.

Table 4: Issues raised in submissions received during the exhibition of the final draft PTWL-P&MP

Issue raised / opinion provided	Consideration and response
Friends of Grasslands (FoG)	
<p>FoG provided the following points regarding the PTWL-P&MP:</p> <ol style="list-style-type: none"> 1. No concerns raised and statement the plan covers all of the elements that FoG considers important in conserving the PTWL and maintaining its habitat. 2. Support the inclusion of the 20 m buffer zone outside the area defined as 'high quality PTWL habitat'. <p>Express an interest in viewing the results of the proposed PTWL monitoring program.</p>	<p>The approved PTWL-P&MP and any associated monitoring results will be provided on Googong website.</p>
Submission from member of the public	
<p>Mountain bikes (MTB) track construction and formal access (pedestrian) tracks are not included as an identified threat in the plan. The issue of erosion caused by the creation of any informal tracks (caused by walkers or MTBs) within the PTWL Conservation Area is not defined.</p>	<p>The purpose of the PTWL Conservation Area is to conserve, protect and manage a substantial and viable area of PTWL habitat specifically for the conservation of this species. Whilst people will not be specifically excluded from the PTWL Conservation Area (access will be provided from Googong Foreshores), the area is not proposed to become a reserve with 'park-like' facilities, aimed at catering for pedestrian or other recreational access or usage.</p> <p>A maintained 20 m buffer zone along the perimeter of the PTWL Conservation Area will be provided primarily to reduce 'edge effects'. It also will enable access to the area for walking and serve as an asset protection zone (APZ). No formed access tracks are proposed within the PTWL Conservation Area for pedestrian / MTB (or other) usage.</p> <p>MTB and pedestrian access is unlikely to result in significant disturbance to the PTWL Conservation Area or the PTWL protected within. Furthermore, the construction of any formal (formed) access tracks within the PTWL</p>

Issue raised / opinion provided	Consideration and response
	<p>Conservation Area would result in significantly more disturbance and disconnection of PTWL habitat than that caused by informal tracks that may be created by pedestrians or occasional MTB passage.</p> <p>As detailed in this PTWL-P&MP, the monitoring of the vegetation cover and composition and the PTWL population within the PTWL Conservation Area will be undertaken to ensure that the objectives set out in the PTWL-P&MP are achieved.</p> <p>Section 2.2.1 of this PTWL-P&MP has been amended to reflect the above (i.e. that no additional formed access tracks will be established within the PTWL Conservation Area).</p>
<p>Use of imported topsoil for restoration between the proposed road and the PTWL habitat fence (of the PTWL Conservation Area) would result in weeds.</p>	<p>The PTWL-P&MP does not specify the use of 'imported' topsoil for restoration in this area. The PTWL-P&MP specifies the requirement for the topsoil to not be contaminated with weed seed.</p>
<p>The loss of any medium or high value habitat should not occur due to the proposal. The location of the proposed fencing should be situated 20 m from the (blue) 'Year 0' trigger line (Figures 2 and 3) and be extended to meet the existing (Googong Foreshores) fence line in the south of the proposed PTWL Conservation Area.</p>	<p>The establishment, improvement and management of the PTWL Conservation Area will occur as an 'offset' for the impacts upon PTWL that will result from the development of Googong township. The PTWL Conservation Area and its delineation has been determined and agreed in consultation with DSEWPaC (and other stakeholders) throughout the EPBC Act referral process. The delineation and proposed establishment of the PTWL Conservation Area was also independently reviewed and endorsed by a recognised authority on the conservation of the species (Dr W. Osborne). Whilst the establishment of the PTWL Conservation Area will result in the removal of some areas of 'High' or 'Medium' quality habitat, all areas of 'Very High' quality habitat will be retained, as considerable improvement of habitat quality and connectivity is a primary objective of the design and establishment of the PTWL Conservation Area and this PTWL-P&MP.</p> <p>As stated in this PTWL-P&MP, the overarching objective of the PTWL Conservation Area is to provide a 'balanced outcome of urban development and a consolidated, contiguous PTWL Conservation Area that reduces habitat fragmentation and improves habitat quality for the species in the long term'. The approved design of the PTWL Conservation Area has been determined in order to specifically meet this outcome.</p> <p>No change to the PTWL-P&MP is required to address this issue.</p>
<p>NSW Department of Industry, Planning and Environment (DPIE)</p>	
<p>The commencement date for implementation of the PTWL-P&MP should be within 2 years of consent.</p>	<p>The schedule for implementation of this PTWL-P&MP has been determined in accordance with the schedule for the staged development of Googong township. This staged development and the corresponding staged establishment of the PTWL Conservation Area is in accordance with the EPBC Act Conditions of Approval.</p> <p>The immediate establishment and management of the PTWL Conservation Area is impracticable and unnecessary given the existing landuse and management within and directly adjoining the PTWL Conservation Area will not substantially change in the years prior to the establishment of the PTWL Conservation Area (i.e. the land will continue to be fenced and managed for agricultural purposes, primarily grazing). The extended past</p>

Issue raised / opinion provided	Consideration and response
	<p>period of this landuse and management has not prevented the persistence of a viable population of PTWL within a substantial area of high quality PTWL habitat.</p>
<p>Removal of bush rock should be identified as a management priority.</p>	<p>Whilst bush rock removal is recognised as a key threatened process to PTWL, the fencing type and schedule detailed in Section 2.2.1 will prevent unauthorised vehicular or pedestrian access to the PTWL Conservation Area. The collection of rocks from the PTWL Conservation Area and removal on foot via Googong Foreshores would be entirely impractical and therefore is not a considerable risk.</p> <p>Prior to development, the land adjacent to the PTWL Conservation Area will remain private property managed for agricultural purposes. Fencing of the relevant boundary section will be completed prior to the commencement of the adjacent residential development. As such, at no point prior to or following establishment of the PTWL Conservation will unauthorised vehicular access be permitted or be reasonably practical.</p> <p>Section 2.1.4 of the PTWL-P&MP has been amended to specifically address management of bush rock removal.</p>
<p>The legal mechanism and the structures behind the conservation agreement should be strengthened to ensure the reserve is secured in perpetuity.</p>	<p>The PTWL Conservation Area is a biodiversity offset for Googong township and this area and its delineation has been determined and agreed in consultation with DSEWPaC (and other stakeholders) throughout the EPBC Act referral process. The establishment of the PTWL Conservation Area was based on recommendations to exclude any development from areas identified as 'Very High' quality PTWL habitat and the objective of providing a balanced outcome between development and the long term improvement of PTWL habitat and reduction in fragmentation of the species, whilst assisting in maintaining connectivity.</p> <p>In addition, the PTWL Conservation Area will be handed over to Council and a plan of management in accordance with the requirements of the <i>Local Government Act 1993</i> will be prepared to provide for the protection of the land and the species in perpetuity. The irrevocable dedication of the PTWL Conservation Area to Council will ensure the area will not be used for another purpose in the future.</p> <p>Section 2.4.5 of the PTWL-P&MP provides details of the legal mechanisms to protect the PTWL Conservation Area in perpetuity.</p>
<p>Long-term funding availability.</p>	<p>The long-term management and associated funding of the PTWL Conservation Area has been guaranteed through the development of a Voluntary Planning Agreement (VPA) between GTPL and Council made in accordance with the <i>Environmental Planning and Assessment Act 1979</i>. The VPA specifies the funding arrangements for the PTWL Conservation Area (and the overall Googong township) and provides that GTPL are to maintain all costs associated with the establishment and ongoing management PTWL Conservation Area until the last residential lots in the township are created (an approximate duration of 25 years). It is noted that any development within Googong township is unable to proceed unless it is in accordance with the requirements of this VPA.</p> <p>Section 2.4.5 has been amended to state the above.</p>
<p>Monitoring plots should be established to enable replication</p>	<p>Monitoring survey effort will be expended in a manner that provides a sample of habitat qualities ranging from 'Medium' to 'Very High', and</p>

Issue raised / opinion provided	Consideration and response
<p>and to prevent wide spread habitat disturbance.</p>	<p>specifically encompassing areas where habitat creation/improvement (i.e. rock placement areas and native grass re-establishment areas) has occurred.</p> <p>The PTWL monitoring program has been designed in a manner that will involve a measured amount of survey effort (i.e. 15 hours per monitoring event) spread at low intensity across the entire PTWL Conservation Area. Given the inherent disturbance to habitat involved in rock turning surveys, this approach will spread the disturbance across a large area, and thereby, prevent the same specific areas being disturbed repetitively (as would be the case if defined survey plots were established). Repetitive and high intensity turning of rocks is known to substantially disturb PTWL habitat and reduce the likelihood of PTWL inhabitation of the specific rocks (Dr W. Osborne pers. comm; R. Speirs pers. obs.). In this regard, repetitively surveying the same plots of habitat for PTWL would likely result in progressively lower numbers being recorded. Such results would provide inaccurate indications regarding actual population numbers and the success of the establishment and management of the PTWL Conservation Area.</p> <p>The results of each monitoring event will be provided for inclusion in the NSW Wildlife Atlas, as per the standard conditions of the scientific licence held by the ecologist/zoologist engaged to conduct the monitoring.</p> <p>The PTWL monitoring program will provide invaluable data regarding the continued viability of the population, and hopefully, will illustrate that the conservation and protection of the PTWL Conservation Area (and associated works) has increased the size and secured the viability of the population in the long-term.</p> <p>Whilst the PTWL monitoring program will be conducted in accordance with the above, a degree of flexibility will be maintained to allow for adaptive management and for the incorporation of new or better survey techniques should these become known/developed in the future.</p> <p>Section 2.3.3 of the PTWL-P&MP has been amended to state the above.</p>
<p>Areas of imported rock should be identified as suitable areas for potential translocation of PTWL.</p>	<p>It is agreed that the use of the areas where imported rock has been placed will be the most suitable areas for the release of PTWL during future translocation of PTWL into the PTWL Conservation Area.</p> <p>Section 2.2.4 has been amended to include the following: 'To prevent increases in competition in areas of existing habitat within the PTWL Conservation Area, all individuals translocated into the PTWL Conservation Area will be released in the areas of newly created/improved habitat (i.e. areas where imported rocks have been placed).</p>
<p>Weed management to commence as soon as possible.</p>	<p>Of the weed species present within and in the vicinity of the PTWL Conservation Area, only Serrated Tussock (approximately 50 plants were identified in November 2010) is considered to have the potential to substantially increase in abundance in the period preceding the establishment of the PTWL Conservation Area. The additional exotic flora species occurring within the PTWL Conservation Area are common agricultural weeds and pasture species unlikely to increase in prevalence whilst the land use and management regime remains largely unchanged.</p> <p>A targeted weed removal program (spot spraying) has been implemented to control the Serrated Tussock located along the Montgomery Creek riparian zone within the PTWL Conservation Area. In January 2013 the 50</p>

Issue raised / opinion provided	Consideration and response
	<p>plants were located and sprayed with Glyphosate (with blue marker dye). These plants will be checked during spring 2013 to ensure a thorough kill was achieved. Any plants remaining alive and any others located within the PTWL Conservation Area will be sprayed at this time.</p> <p>Section 2.2.2 of the PTWL-P&MP has been amended to reflect the above.</p>
<p>Asset Protection Zone must be mapped in the plan.</p>	<p>The precise location and extent of the Asset Protection Zone (APZ) to be located along the interface between the PTWL Conservation Area and the adjacent Googong township residential (subdivision) area is unable to be specified, as the detailed design for the subdivision has not been determined. However, where required, the 20 m wide buffer zone will form part of the APZs for the adjacent residential properties and, as such, will be managed as an Outer Asset Protection Area (in accordance with the Planning for Bushfire Protection A Guide for Councils, Planners, Fire Authorities and Developers, NSW Rural Fire Service, 2006), which entails maintaining fuel loads at less than eight (8) tonnes per hectare (ha). The manner in which this 20 m wide buffer zone may be managed for asset protection purposes is detailed in Section 2.2.1.</p> <p>No change to the PTWL-P&MP is required to address this issue.</p>
<p>Signage and walking trails to be erected to control disturbances to the reserve.</p>	<p>The purpose of the PTWL Conservation Area is to conserve, protect and manage a substantial and viable area of PTWL habitat specifically for the conservation of this species. Whilst people will not be specifically excluded from the PTWL Conservation Area (access will be provided from Googong Foreshores), the area is not proposed to become a reserve with 'park-like' facilities, aimed at catering for pedestrian or other recreational access or usage.</p> <p>No formed access tracks will be established within the PTWL Conservation Area.</p> <p>Signage will be located at strategic locations along the boundary of the PTWL Conservation Area to advise the purpose of the PTWL Conservation Area and be provided as part of the overall education program to be implemented by GTPL for Googong township. Section 2.3.6 of this PTWL-P&MP provides details in relation to the above.</p> <p>No change to the PTWL-P&MP is required to address this issue.</p>
<p>Thinning of <i>Kunzea eriocoides</i> needs to be assessed.</p>	<p>The thinning of dense clumps of Burgan (<i>Kunzea eriocoides</i>) will occur as it will reduce shading of PTWL habitat, encouraging the growth of Kangaroo Grass and other native groundstorey species, which increase habitat quality for the PTWL. Reduced shading also increases the thermoregulatory benefit offered by habitat rocks to PTWL, and thus, increases their utilisation of these important habitat features. It should be noted, however, that the thinning of Burgan will not become a widespread operation, nor will it aim to remove or substantially reduce the presence of the species within the PTWL Conservation Area or the very extensive adjoining Googong Foreshores.</p> <p>Section 2.2.3 of the PTWL-P&MP has been amended to provide additional detail regarding the above.</p>

Appendix C. Submissions received during consultation under Part 3A Project Approval

The Part 3A Project Approval was not issued at the time of NSW Office of Environment and Heritage’s review of the PTWL-P&MP approved by DSEWPaC on 17 July 2012. Therefore, as required under the Part 3A Project Approval CoA D9, a copy of the DSEWPaC approved PTWL-P&MP was provided to the NSW Office of Environment and Heritage (Queanbeyan Office) on 16 October 2012. Comments were received from NSW Office of Environment and Heritage (Queanbeyan Office) on 26 November 2012.

Table 5 below provides a list of the issues raised by the NSW Office of Environment and Heritage (Queanbeyan Office) and appropriate consideration of these issues. Minor amendments to the final PTWL-P&MP (to become Final – Version 3) were undertaken following consideration of the submission.

Table 5: Issues raised in comments received from NSW Office of Environment and Heritage

Issue raised / opinion provided	Consideration and response
NSW Office of Environment and Heritage (November 2012)	
Monitoring of PTWL abundance and distribution in the Conservation Area commence as soon as possible	<p>In light of the advice and request provided by the DPIE, Googong Township Pty Ltd (GTPL) agreed to commission an additional monitoring event in Spring 2013. The purpose of this monitoring event was to collect baseline PTWL population data (as per the specifications provided in the PTWL-P&MP) prior to any potential impacts from the early stages of Googong township being felt within the PTWL Conservation Area. It is understood that with the addition of this spring 2013 monitoring event, the DPIE will not require any other monitoring events prior to those required in accordance with the approved PTWL-P&MP.</p> <p>Section 2.3.3 of the PTWL-P&MP has been updated to reflect the commitment to an additional monitoring event in Spring 2013. The results of the Spring 2013 monitoring event have been added to Figure 2 for Version 4 of this PTWL-P&MP</p>
Similarly, the fencing and signage around the PTWL conservation area should be established prior to the first residents moving into the development to ensure the area is clearly identified and protected and that even the first residents are aware of the value and importance of this area	<p>The timing specified in this PTWL-P&MP for the establishment of the fencing and signage along the interface between the PTWL Conservation Area and adjacent development will result in its establishment prior to the public being able to access the area. Until such time as the trigger for 'Year 0' is reached, and the corresponding fencing requirements fulfilled, the land encompassed by the PTWL Conservation Area and adjoining areas will remain as private rural grazing land, not legally accessible to the public. It is understood that this has provided the clarification the DPIE required regarding the timing of fence and signage establishment. Accordingly, no amendment to the PTWL-P&MP is proposed.</p>

Appendix D. Section 88B Instrument

INSTRUMENT SETTING OUT TERMS OF EASEMENTS, POSITIVE COVENANTS AND RESTRICTIONS ON USE INTENDED TO BE CREATED PURSUANT TO SECTION 88B AND SECTION 88BA, CONVEYANCING ACT, 1919

Lengths are in metres:

(Sheet 1 of 4)

Plan: DP []

Plan of subdivision of []
covered by subdivision certificate no.

Full name and address of proprietor of the land:

Googong Township Pty Limited
ACN 154 515 593
Level 3, 64 Allara Street
Canberra ACT 2600

Full name and address of mortgagee of the land:

[]
[]
[]
[]

PART 1 - CREATION

Number of item shown in the intention panel on the plan:	Identity of easement or positive covenant to be created and referred to in the plan:	Burdened lot(s) or parcel(s):	Benefited lot(s), road(s), bodies or Prescribed Authorities
1.	Positive covenant (A)	[Lot 14 in DP 1164687]	Lot 7 in DP 592796
2.	Positive covenant (B)	[Lot 15 in DP 1164687]	Lot 7 in DP 592796

PART 1A - RELEASE

Number of item shown in the intention panel on the plan:	Identity of easement or positive covenant to be released and referred to in the plan:	Burdened lot(s) or parcel(s):	Benefited lot(s), road(s), bodies or Prescribed Authorities
3.			

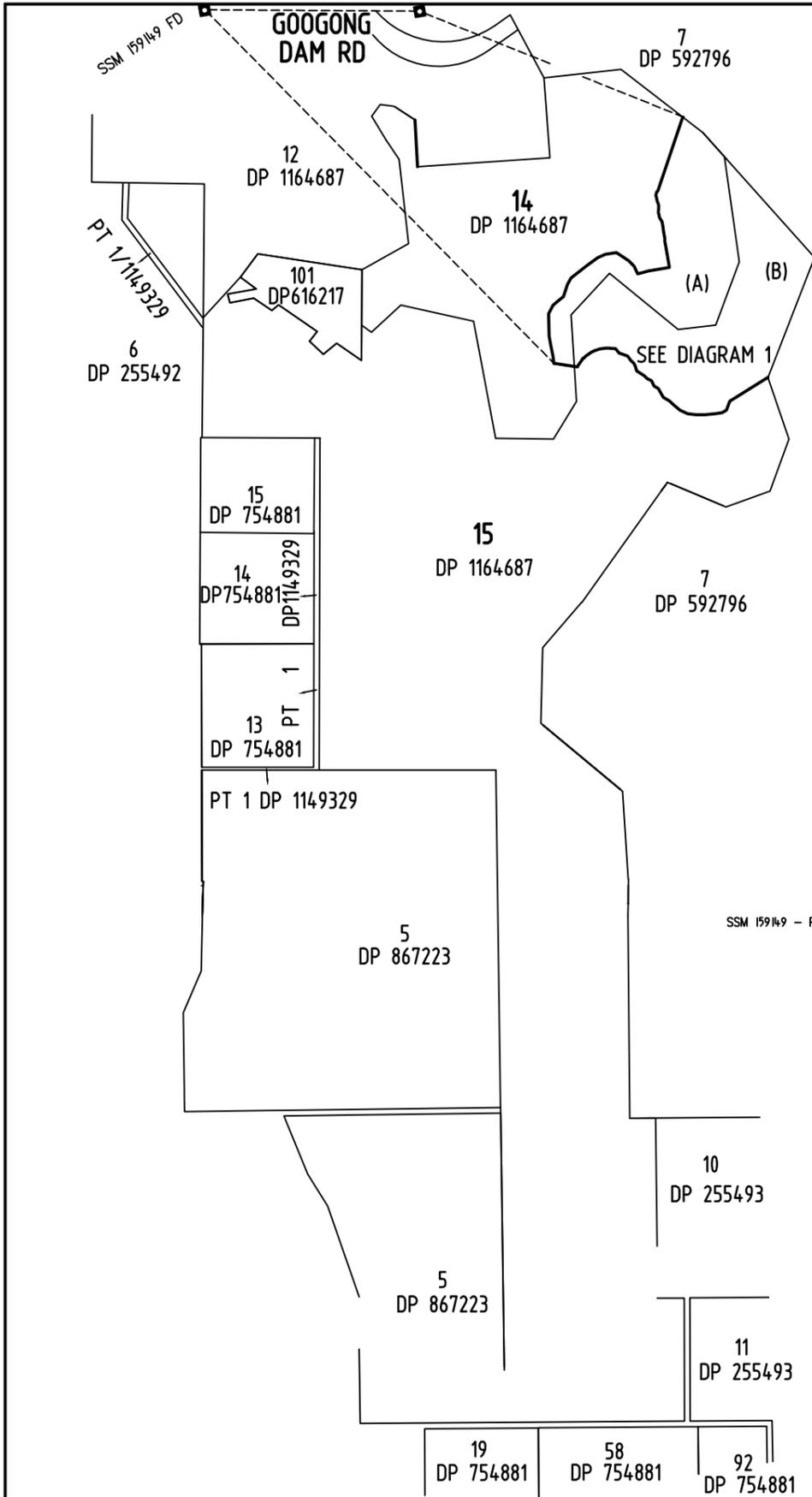
PART 2 - TERMS

1. Interpretation

1.1 Definitions

These meanings, in any form, apply unless the contrary intention appears:

Authority means any governmental or semi-governmental or local government authority,

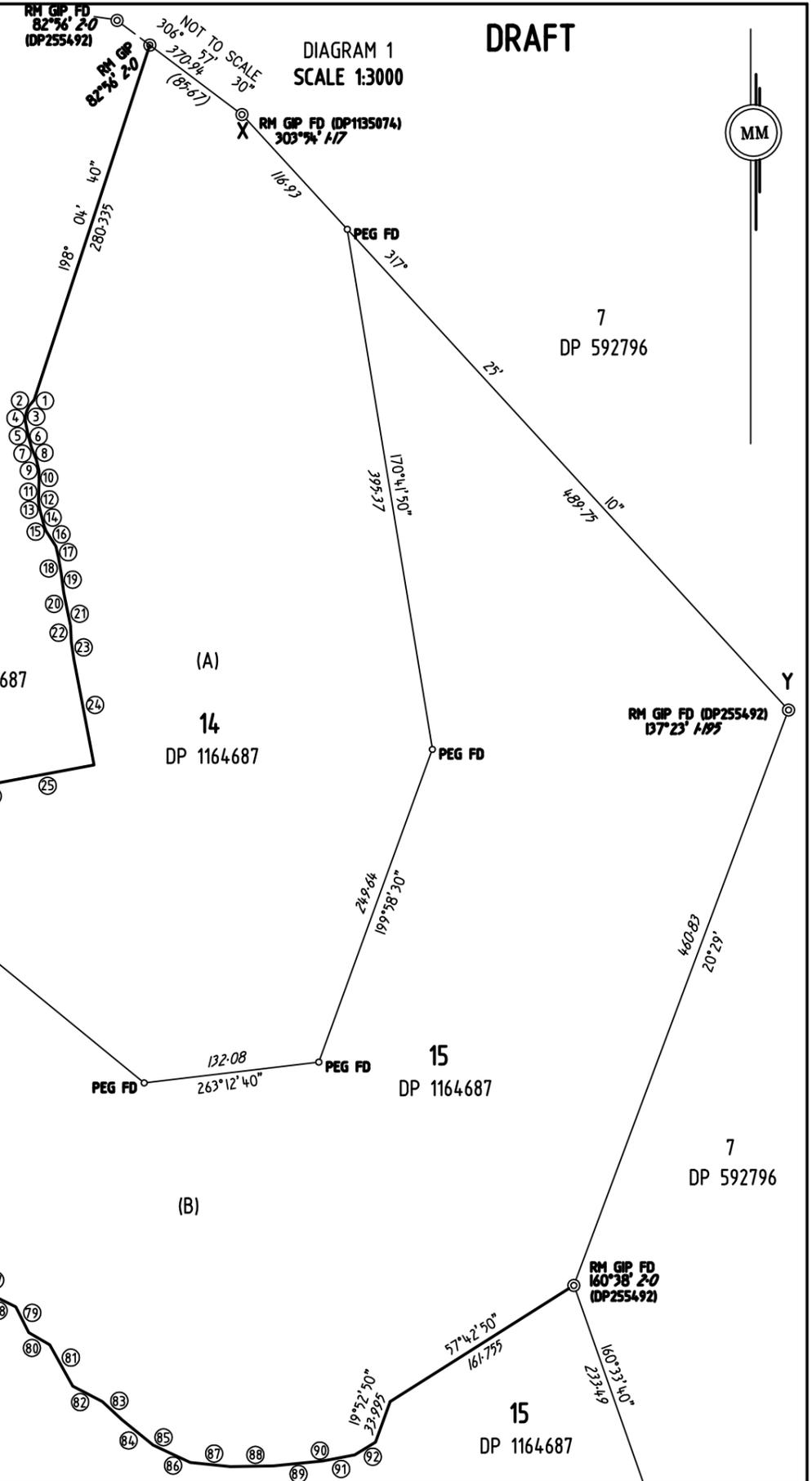


SHORT BOUNDARYS

Ref	Bearing	Distance	Ref	Bearing	Distance	Ref	Bearing	Distance
1	219°25'20"	5.935	34	244°50'10"	28.87	67	93°59'10"	8.345
2	204°51'	3.92	35	234°25'	20.82	68	93°59'10"	15.765
3	193°36'	3.92	36	234°25'	6.84	69	142°00'50"	19.515
4	182°21'20"	3.92	37	234°25'00"	5.32	70	107°31'50"	14.64
5	168°36'10"	11.035	38	231°36'30"	12.125	71	109°09'40"	18.88
6	165°38'	8.345	39	231°36'30"	74.92	72	144°01'40"	18.63
7	158°36'40"	1.795	40	207°02'10"	26.33	73	131°59'40"	15.57
8	158°36'40"	8.905	41	198°32'50"	46.265	74	152°58'10"	12.395
9	165°51'50"	8.68	42	229°53'	23.41	75	164°11'10"	16.925
10	180°32'20"	8.46	43	227°47'20"	25.21	76	122°19'40"	32.625
11	181°44'20"	13.79	44	207°26'10"	34.675	77	131°39'50"	13.8
12	174°51'20"	3.92	45	177°28'30"	79.865	78	116°06'	17.355
13	166°21'50"	5.61	46	168°29'	30.315	79	153°17'	21.66
14	165°44'	10.26	47	168°29'	41.37	80	119°49'50"	18.285
15	156°06'20"	3.92	48	170°22'10"	27.465	81	151°00'30"	35.46
16	147°33'	13.465	49	97°27'50"	10.43	82	117°41'30"	25.205
17	166°56'20"	9.175	50	97°27'50"	30.125	83	132°42'	19.94
18	170°11'50"	11.915	51	97°27'50"	13.61	84	129°10'	30.275
19	172°24'30"	14.195	52	97°27'50"	16.68	85	115°04'40"	13.3
20	168°51'50"	16.495	53	97°27'50"	14.005	86	115°04'40"	17.395
21	167°15'20"	9.01	54	26°14'20"	7.115	87	95°57'40"	30.225
22	177°58'30"	12.0	55	33°24'30"	2.16	88	88°57'30"	32.385
23	170°50'10"	13.625	56	33°24'30"	18.06	89	84°19'40"	37.0
24	169°12'50"	80.40	57	39°30'40"	11.245	90	79°19'40"	6.28
25	259°24'50"	76.995	58	47°40'20"	9.025	91	79°19'40"	18.525
26	255°20'20"	6.535	59	52°34'20"	18.95	92	58°18'10"	18.22
27	254°05'50"	17.03	60	59°33'50"	10.12			
28	254°05'40"	15.48	61	64°44'20"	5.38			
29	334°38'10"	30.965	62	64°44'20"	3.395			
30	313°55'30"	27.375	63	64°44'10"	2.615			
31	302°44'50"	19.01	64	72°02'20"	18.95			
32	302°44'50"	33.105	65	81°28'	20.22			
33	260°16'50"	41.2	66	89°04'20"	11.39			

SSM 159149 - PM 161690 90°14'45" 540.18 MGA

NOTES:
(A) POSITIVE COVENANT
(B) POSITIVE COVENANT



SURVEY PRACTICE REGULATIONS 2006 CLAUSE 35 (1) AND CLAUSE 61(2)

MARK	MGA CO-ORDINATES ZONE 55		CLASS	ORDER	METHOD	ORIGIN
	EASTING	NORTHING				
CP87270920	701796.70	6078534.92	D	4	SCIMS	FOUND
CR 65	703090.86	6078710.13	D	4	SCIMS	FOUND
CR 67	703719.66	6078370.28	D	4	SCIMS	FOUND
COMBINED SEA LEVEL AND SCALE FACTOR 0.99999						
SOURCE: SCIMS ON LINE 6/03/2008						
SSM 159149	702625.25	6078633.13	D	NA	CADASTRAL TRAVERSE	FOUND
PM 161690	703165.43	6078630.81	D	NA	CADASTRAL TRAVERSE	FOUND

Table of mm

Surveyor: Michael Roy Stapleton Date of Survey: 11 JUNE 2012 Surveyor's Ref: 03074L CHECKLIST 2010M7100(1023) Partial Survey	PLAN OF LAND BURDENED BY COVENANT OVER LOTS 14 AND 15 DP 1164687	LGA: QUEANBEYAN CITY Locality: GOOGONG Subdivision No: N/A Lengths are in metres Reduction Ratio 1:15000	Registered DP
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Appendix E. 2019 Implementation Review and Update



Googong Pink-tailed Worm-lizard Protection and Management Plan

2019 Implementation Review and Update

October 2019

Prepared for Googong Township Pty Ltd

Document Information

Report for: Googong Township Pty Ltd

Prepared by: Robert Speirs

Capital Ecology project no.: 2832

Citation: Capital Ecology (2019). *Googong Pink-tailed Worm-lizard Protection and Management Plan – 2019 Implementation Review and Update*. October 2019. Prepared for Googong Township Pty Ltd.
Author: R. Speirs. Project no. 2832.

Version Control

Version	Internal reviewer	External reviewer	Date of issue
Draft 01	Dr Sam Reid	Tim Corby (GTPL)	30/08/2019
Final 01	Robert Speirs	-	02/09/2019
Final 02	Robert Speirs	-	02/10/2019

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- Tim Corby, Development Manager, Googong Township Pty Ltd.

Disclaimer

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1 Introduction

1.1.2 Background

The former Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) approved the development of Googong Township (on 19 May 2011) subject to a number of Conditions of Approval (CoA) (Ref EPBC 2011/5829). CoA 1 relates to the protection and management of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) vulnerable listed Pink-tailed Worm-lizard *Aprasia parapulchella* (PTWL) within Googong Township. CoA 1 states the following.

The person taking the action must prepare and submit a Pink-tailed Worm-lizard Protection and Management Plan for the Minister's approval for the protection of Pink-tailed Worm-lizard (Aprasia parapulchella). The plan must include:

- i. Details of the establishment of the Pink-tailed Worm-lizard Conservation Area;*
- ii. Management measures to mitigate construction impacts;*
- iii. Measures for the management of the Pink-tailed Worm-lizard Conservation Area for before and after the conservation area's dedication to Queanbeyan City Council or other appropriate authority;*
- iv. Maps showing fences and other infrastructure;*
- v. Details of legal mechanisms to protect the conservation area in perpetuity; and*
- vi. Provision for public comment on the draft plan.*

The plan must be submitted to the Minister for written approval within 6 months of the date of this approval.

The person taking the action must not commence construction within 50 metres of Pink-tailed Worm-lizard habitat until the Minister has approved the plan.

The approved Pink-tailed Worm-lizard Protection and Management Plan must be implemented.

In accordance with CoA 1, a Pink-tailed Worm-lizard Protection and Management Plan (PTWL-P&MP) (Version 2, dated 4 July 2012) was prepared by Biosis (Biosis 2012¹) on behalf of Googong Township Pty Ltd (GTPL) and submitted to the Minister. Version 2 was approved by the Minister's Delegate, Charmayne Murray, on 17 July 2012. As detailed in Version 2, the trigger for commencement of works to establish, protect and improve the PTWL habitat within the PTWL Conservation Area was the commencement of construction works within 50 m of the identified Pink-tailed Worm-lizard habitat (referred to as the 'Year 0 Trigger Line'). The PTWL-P&MP underwent four revisions subsequent to the initial approval. The current version, Version 5, dated 6 July 2014 (Biosis 2014²), was submitted to the Minister on 16 July 2014 and was approved by the Minister's Delegate, Shane Gaddes, on 2 September 2014.

¹ Biosis (2012). *Googong Township Pink-tailed Worm-lizard Protection and Management Plan – Version 2*. Prepared for Googong Township Pty Ltd. Author: R. Speirs, Biosis Pty Ltd, Canberra. Project 18082.

² Biosis (2014). *Googong Township Pink-tailed Worm-lizard Protection and Management Plan – Version 5*. Prepared for Googong Township Pty Ltd. Author: R. Speirs, Biosis Pty Ltd, Canberra. Project 18082.

1.1.3 Purpose

Section 3.3 of the PTWL-P&MP (Ongoing review of this PTWL – P&MP) states that –

This PTWL-P&MP is subject to review at least every five (5) years. Reviews will be undertaken to provide for adaptive management and to ensure that the objectives of the PTWL Conservation Area are being suitably achieved. The review will be conducted by GTPL prior to handover to Council and by Council post handover. GTPL and Council may conduct the review in-house if suitable expertise is available or engage another suitably qualified specialist/organisation.

GTPL, assisted by Capital Ecology, review the PTWL-P&MP on a regular basis to guide establishment of the PTWL Conservation Area and its ongoing monitoring and management. In addition to this, GTPL have engaged Capital Ecology to review the PTWL-P&MP and prepare this Implementation Review and Update to provide a more structured and comprehensive review, notably to present the results of the review in a form suitable for review by the Department of the Environment and Energy (DoEE) and others as appropriate.

As per the above, the key purpose of this document is to provide a review of the implementation of the PTWL-P&MP over its first five years and thereby guide ongoing adaptive management of the PTWL Conservation Area to ensure that the objectives of the PTWL Conservation Area continue to be suitably achieved.

As detailed herein, GTPL's implementation of the PTWL-P&MP is achieving the stated objectives and the current version remains a relevant and suitable management plan for the PTWL Conservation Area. Notwithstanding this, informed by studies and observations from the last five years, there are several elements of the actions/commitments of the PTWL-P&MP which require minor modification to best achieve the objectives of the PTWL Conservation Area and accommodate engineering constraints identified during detailed design for the future Neighbourhood 5 which will adjoin the PTWL Conservation Area's southern boundary.

Accordingly, this 2019 Implementation Review and Update provides the following.

1. In Section 2, the results of Capital Ecology's review of the implementation of the PTWL-P&MP over the last five years.
2. In Section 3 (and associated figures), details of the proposed modifications to:
 - a. Stage 2 of the PTWL Conservation Area boundary; and
 - b. the future implementation of the PTWL-P&MP, including the remaining establishment works and the ongoing/future monitoring and management.

2 2019 Implementation Review

Based on Table 4 (Summary of Management Actions and Responsibilities) of the PTWL-P&MP, Table 1 below provides a consolidated list of the actions/commitments of the PTWL-P&MP and a review of the current (August 2019) implementation of these actions/commitments. This review is informed by studies completed by Capital Ecology (i.e. PTWL population monitoring etc.), periodic on-ground observations (i.e. fence progress, weed treatment success etc.), knowledge of the progress of urban development in the vicinity of the PTWL Conservation Area, and discussions with GTPL staff as required to confirm works undertaken.

Table 1. Implementation of PTWL-P&MP and included actions/commitments

Action/Commitment	Description	Timing	Implementation – At August 2019	Future/Ongoing Works
Preparation of the PTWL-P&MP	Submission to the DSEWPaC for Ministerial approval under the EPBC Act (as per the requirements of EPBC Act CoA 1).	By 19 November 2011.	Version 2 of the PTWL-P&MP was prepared, submitted to DSEWPaC and approved by the Minister's Delegate on 17 July 2012. The PTWL-P&MP has since undergone four revisions with the current Version 5, dated 6 July 2014, approved by the Minister's Delegate on 2 September 2014.	N/A
Continuation of farming activities and retention of existing stock fencing	The current management and use of the PTWL Conservation Area for agricultural purposes (notably sheep and cattle grazing) will continue without substantial alteration until 'Year 0'. The existing stock fencing within the PTWL Conservation Area and immediate vicinity will remain without substantial alteration until 'Year 0'. Note: this does not preclude routine maintenance or replacement of the existing fences if required.	Until 'Year 0'.	During September 2015 residential subdivision works for Neighbourhood 1B commenced within 50 m of the 'Year 0 Trigger Line'. As such, much of the previous stock fencing in the vicinity of Stage 1 of the PTWL Conservation Area has been removed. The set sheep stocking of the PTWL Conservation Area and adjoining land has been replaced by light to moderate cattle and sheep grazing under short-term agistment.	Continue the current periodic grazing until residential subdivision works for Neighbourhood 5 commence within 50 m of the 'Year 0 Trigger Line' for Stage 2. At this time the connectivity with adjacent rural land will be severed and the PTWL Conservation Area will be grazed by native herbivores (i.e. primarily Eastern Grey Kangaroos). Note: As detailed in Section 3, GTPL have decided to bring forward establishment of the Stage 2 boundary to occur in the 2019-20 financial year, rather than wait for the Stage 2 trigger. Notwithstanding this, the periodic grazing will continue until the Stage 2 trigger as it may be required to appropriately manage bushfire hazard prior to the development of Neighbourhood 5 and its associated edge road and other bushfire management and access measures.
Establishment and boundary fencing (Stage 1)	Precise boundary delineation to be determined during detailed design of the relevant section of Googong township. Fencing of the relevant section (Stage 1) of the PTWL Conservation Area. Relevant existing internal fencing will be removed. Existing fencing will be retained where required for access and land management purposes, particularly south of Montgomery Creek. A construction exclusion fence will be established between the sewer infrastructure construction footprint and the PTWL Conservation Area boundary. As illustrated in Figure 5, the fence will run parallel to and at least five metres from the PTWL Conservation Area boundary. The construction exclusion fence will be constructed of sturdy materials, fit for purpose and maintained for the duration of construction works.	Stage 1 of the boundary to be established, and fence constructed, prior to residential subdivision construction works occurring within 50 m of the PTWL habitat.	During September 2014 GTPL engaged a registered surveyor to survey and mark Stage 1 of the PTWL Conservation Area boundary. Construction of the PTWL Conservation Area boundary fence along Stage 1 of the PTWL Conservation Area boundary was completed during August 2015. The fence was constructed in accordance with the specifications provided in Section 2.2.1 of the PTWL-P&MP. The existing stock fencing within Stage 1 of the PTWL Conservation Area has been removed. A construction exclusion fence (temporary sectioned fence) was established between the sewer infrastructure construction footprint and Stage 1 of the PTWL Conservation Area. This fence was maintained until the permanent Stage 1 boundary fence was constructed along that section of the boundary.	N/A

Action/Commitment	Description	Timing	Implementation – At August 2019	Future/Ongoing Works
Weed removal, monitoring and management	Removal of woody weeds.	To be undertaken following the construction of the first section of PTWL Conservation Area fencing.	GTPL engaged a qualified weed control contractor to undertake an intensive program of woody weed control/removal between November 2014 and January 2015. This initial weed control primarily targeted Blackberry and Sweet Briar (treatment via 'cut-stump' poisoning) and covered the entire PTWL Conservation Area.	N/A
	Eradication of small Serrated Tussock infestation on Montgomery Creek.	To be eradicated within six (6) months following the approval of this PTWL-P&MP.	The initial approx. 50 plants were sprayed in 2012. Ecologists and weed control contractors working in the PTWL Conservation Area have maintained appropriate surveillance on an ongoing basis for newly established plants. Several young plants were located in January 2015 and these were removed. No plants were observed during the PTWL monitoring undertaken in October 2015 (Capital Ecology 2015 ³) and October 2017 (Capital Ecology 2017 ⁴).	N/A
	Monitoring and management of weeds.	To be conducted on an ongoing twice-annual basis by GTPL prior to handover to Council and by Council post handover.	The success of the initial woody weed removal works was assessed by the ecologists during the October 2015 PTWL monitoring. The initial works were thorough with all mature plants having been cut and treated. However, as was expected with these species, approximately three quarters of the treated plants were noted to be resprouting from the base. As such, GTPL engaged a qualified weed control contractor to complete follow-up weed control over the summer of 2015-16 and summer 2016-17. Capital Ecology observed very little woody weed regeneration during the 2015 PTWL monitoring and no new growth during 2017 PTWL monitoring. Observations by R. Speirs while leading a community engagement tour in October 2018, together with those during a Capital Ecology site inspection in March 2019, indicate that woody weeds have been largely eradicated from the PTWL Conservation Area.	GTPL will continue to monitor for weed occurrence within the PTWL Conservation Area and ensure that targeted weed control is applied if significant weeds are identified.
Importation of habitat rocks	Suitable habitat rocks will be removed from the areas of habitat (refer Figure 2) outside of the PTWL Conservation Area and scattered within the PTWL Conservation Area.	Prior to the commencement of urban development works in the adjoining areas. To occur during the suitable survey season for the species (i.e. during suitable weather in spring or autumn).	On 4 and 5 November 2014 an ecologist assisted by a team with a small loader worked across all the mapped PTWL habitat located outside of the PTWL Conservation Area and within the Neighbourhood 1B development footprint. In total 29 tonnes of suitable habitat rocks were collected, transported into the PTWL Conservation Area and scattered to augment 'low' and 'moderate' quality habitat. This commitment is therefore completed for Stage 1.	Prior to the commencement of residential subdivision works within 50 m of the 'Year 0 trigger line' adjoining Stage 2 (i.e. for Neighbourhood 5), the same rock collection and relocation will occur encompassing all of the remaining PTWL habitat located outside of the PTWL Conservation Area and proposed to be impacted by development. <u>Note:</u> As detailed in Section 2, substantial areas of PTWL habitat located in Neighbourhood 5 will be located at the back of large (i.e. >1.5 ha) lots (refer Figure 3). The majority of this habitat will not be impacted and thus will not be subject to rock relocation activities.
Translocation of PTWL	In combination with the above importation of rocks, PTWL will be translocated from identified habitat areas (refer Figure 3). The PTWL removed will be immediately translocated into the adjoining portion of the PTWL Conservation Area and released.	Prior to the commencement of urban development works in the adjoining areas. To occur during the suitable survey season for the species (i.e. during suitable weather in spring or autumn).	Two PTWL individuals were found during the above described rock relocation for Stage 1, these were immediately moved into the adjoining portion of the PTWL Conservation Area and released under the newly placed rocks. This commitment is therefore completed for Stage 1.	As stated above, prior to the commencement of residential subdivision works within 50 m of the 'Year 0 trigger line' adjoining Stage 2 (i.e. for Neighbourhood 5), the same rock collection and relocation must occur encompassing all of the remaining PTWL habitat located outside of the PTWL Conservation Area and proposed to be impacted by development. All PTWL found during this rock relocation will be moved into the adjoining portion of the PTWL Conservation Area and released under newly placed rocks.

³ Capital Ecology (2015). *Googong Township Pink-tailed Worm-lizard Conservation Area 2015 population monitoring results*. Capital Ecology project no. 2686.

⁴ Capital Ecology (2017). *Googong Township Pink-tailed Worm-lizard Conservation Area – 2017 population monitoring results*. Capital Ecology project no. 2754.

Action/Commitment	Description	Timing	Implementation – At August 2019	Future/Ongoing Works
				Note: As detailed in Section 2, substantial areas of PTWL habitat located in Neighbourhood 5 will be located at the back of large (i.e. >1.5 ha) lots (refer Figure 3). The majority of this habitat will not be impacted and thus will not be subject to rock relocation activities.
Monitoring of PTWL abundance and distribution	Monitoring of PTWL abundance and distribution as described in Section 2.3.3 of the PTWL-P&MP.	The PTWL monitoring program will commence the spring following the first year of works within 50 m of the PTWL Conservation Area. The program will then occur every second year until handover of the PTWL Conservation Area to Council. Following handover to Council, the PTWL monitoring program will occur once every five (5) years in perpetuity.	In accordance with Section 2.3.3 of the PTWL-P&MP, the PTWL monitoring program commenced in the spring following the first year of residential subdivision construction works within 50 m of the mapped extent of PTWL habitat. Given that such works commenced in 2015, the first monitoring was undertaken on Thursday 1 October 2015 and the second was undertaken on Tuesday 3 October 2017. The Capital Ecology letter-form reports dated 16 October 2015 (Capital Ecology 2015) (refer Appendix A) and 13 November 2017 (Capital Ecology 2017) (refer Appendix B) provide the results of these monitoring events. It is noted that an additional monitoring event was undertaken in spring 2013 prior to the actual commencement of the monitoring program. This additional pre-construction monitoring event was requested by the NSW Office of Environment and Heritage (OEH) to establish baseline data for the PTWL Conservation Area prior to any development in the vicinity.	As per the PTWL-P&MP, the next PTWL monitoring event is scheduled to occur in spring 2019. However, as detailed in Section 3, it is proposed to delay the next monitoring event to Spring 2021.
Re-establishment and encouragement of native grasses.	Re-establishment and encouragement of native grasses throughout the areas disturbed during woody vegetation removal and rock placement.	To occur immediately following the completion of these works, or following the completion of the section of these works.	The woody weed control methods employed within the PTWL Conservation Area (i.e. on-foot cut-stump herbicide application) have not resulted in soil disturbance or other groundstorey disturbance. Similarly, the rock placement has involved the use of only small equipment that has not disturbed to soil surface. As such, no native grass re-establishment works have been required to date and is unlikely to be required in future if only the same methods are employed.	N/A – Unless future works result in soil disturbance.
Monitoring of native grass re-establishment	Monitoring of native grass re-establishment.	Monitoring of native grass re-establishment to be conducted on biannual basis by GTPL prior to handover. Council will conduct annual overview monitoring of the vegetation composition and condition throughout the PTWL Conservation Area post handover.	As stated above, no native grass re-establishment has been required to date and is unlikely to be required in future if only the same methods are employed. The vegetation composition and condition throughout the PTWL Conservation Area has been inspected by ecologists during each PTWL monitoring event and numerous other visits to the area. To date no notable changes to the vegetation or habitat values within the PTWL Conservation Area have been observed.	N/A – Unless future works result in soil disturbance. It will be important to continue periodic vegetation monitoring, particularly post the Stage 2 trigger at which time stock grazing will cease.
Boundary fencing (Stage 2)	Installation of Stage 2 of the PTWL Conservation Area fence (refer to Figure 3). Precise boundary delineation to be determined during detailed design of the relevant section of Googong township.	To be undertaken prior to the commencement of construction works within 50 m of the PTWL Habitat (refer to Figure 4 for the PTWL-P&MP for the 'Year 0' trigger line) south of Montgomery Creek.	N/A	The boundary for Stage 2 of the PTWL Conservation Area will be established and fenced prior to the commencement of residential subdivision works within 50 m of the 'Year 0 trigger line' adjoining Stage 2. Note: As detailed in Section 3, GTPL have decided to bring forward establishment of the Stage 2 boundary to occur in the 2019-20 financial year, rather than wait for the Stage 2 trigger.

Action/Commitment	Description	Timing	Implementation – At August 2019	Future/Ongoing Works
Physical removal of Radiata Pine and thinning of Burgan	Removal of Radiata Pine and thinning of Burgan.	To occur following construction of Stage 2 of the PTWL Conservation Area fence (noted above).	N/A	<p>As detailed in Section 3, it is likely that the potential benefits of these works will be outweighed by the likely dis-benefits given the following.</p> <ul style="list-style-type: none"> - The extent of Burgan coverage within the PTWL Conservation Area has not changed noticeably over the past nine years (2010 to 2019) (R. Speirs pers. obs.). Indeed, as shown in Figure 4, a recent mapping exercise completed by Capital Ecology to compare the Burgan coverage visible in the 2012 and 2018 ACT Government high resolution aerial images found no substantial change in coverage. This provides a strong indication that the Burgan coverage is unlikely to increase substantially in future. - The Burgan is of considerable habitat value to the numerous small woodland birds that occur in the locality, a number of which are threatened species. - There is no evidence to suggest that the Radiata Pines are ‘seeding’ into the PTWL Conservation Area or broader locality. Given that they are now mature and cone-baring, this likely indicates that they are sterile. - The ground disturbance that would occur from such works would likely increase erosion potential, encourage weed establishment, and may disturb PTWL habitat. <p>In light of the above, the physical removal of Radiata Pine and thinning of Burgan is no longer proposed.</p>
Review of the PTWL-P&MP	The PTWL-P&MP will be reviewed.	At least every five (5) years.	<p>GTPL, assisted by Capital Ecology, review the PTWL-P&MP on a regular basis to guide establishment of the PTWL Conservation Area and its ongoing monitoring and management.</p> <p>This Implementation Review and Update has been prepared to provide a more structured and comprehensive review, notably to present the results of the review in a form suitable for review by the Department of the Environment and Energy (DoEE) and others as appropriate.</p>	<p>GTPL will continue to review the PTWL-P&MP on a regular basis and will complete another formal review (such as this Implementation Review and Update) at least every five (5) years. Accordingly, GTPL will complete the next formal review within five (5) years of the date of this document.</p> <p>Council will complete the above reviews post handover.</p>

3 Proposed Modifications

As detailed in Table 2, GTPL’s implementation of Version 5 of the PTWL-P&MP is achieving the stated objectives and it remains a relevant and suitable management plan for the PTWL Conservation Area.

Notwithstanding the above, informed by studies and observations from the last five years, there are several elements of the actions/commitments of the PTWL-P&MP which require minor modification to:

- best achieve the objectives of the PTWL Conservation Area;
- allow for avoidance of impacts to a significant Aboriginal heritage site; and
- accommodate engineering constraints identified during detailed design for the future Neighbourhood 5 which will adjoin the PTWL Conservation Area’s southern boundary.

These modifications are detailed in Table 2 and illustrated in figures as relevant.

All other elements of the PTWL-P&MP are proposed to continue to be implemented unchanged.

Table 2. Proposed Modifications

Proposed Modification
PTWL Conservation Area – Establishment
<p>1. Stage 2 boundary alignment</p> <p>During 2018/19 GTPL have commissioned the studies required for the structure planning process for Googong Township Neighbourhoods 3-5. These detailed studies have included engineering studies (traffic, civil, flooding, etc.), an Aboriginal heritage assessment, a tree survey, and a full biodiversity assessment applying the NSW Biodiversity Assessment Method (BAM) (Capital Ecology 2019⁵ in prep.). The Stage 2 boundary alignment has also been initially assessed by a fencing contractor. These recent studies have identified the following of direct relevance to the Stage 2 boundary alignment.</p> <p>a. Targeted rock-turning surveys and habitat mapping for the PTWL were required components of the BAM assessment. As shown in Figure 2, the targeted surveys recorded three PTWL individuals outside of the approved PTWL Conservation Area boundary and in an area not mapped as habitat in October 2010 (Biosis Research 2011⁶, author R. Speirs). Whilst the 2010 habitat mapping was found to be generally accurate along the other sections of the Stage 2 boundary, the mapping has been refined along the entire Stage 2 boundary. These refinements are unlikely to indicate habitat change over time, rather they likely reflect the ability to map rocky habitat with greater accuracy due to the availability of modern high-resolution aerial imagery (i.e. Nearmap® and ACT Government). As shown in Figure 3, whilst a greater area of PTWL habitat has now been mapped in the area adjacent to the eastern extent of the Stage 2 boundary, this habitat will be located within large lots (>1.5 ha) the majority of which will not be impacted (i.e. development being limited to the designated building envelopment, boundary fences, and driveway).</p>

⁵ Capital Ecology (2019). *Googong Township – Neighbourhoods 3 to 5 – Biodiversity Certification Assessment Report*. Working Draft – May 2019 – Not for Distribution. Prepared for Googong Township Pty Ltd. Authors: S. Reid & R. Speirs. Project no. 2820.

⁶ Biosis Research (2011). *Googong Township – Pink-tailed Worm-lizard (Aprasia parapulchella) Impact Assessment Report*. Unpublished report to CIC Australia Limited.

- b. As shown in Figure 3, a significant Aboriginal heritage site has been identified outside of the currently approved PTWL Conservation Area boundary. As it will be effective in protecting this significant site, it is proposed to increase the PTWL Conservation Area in this area to include this site.
- c. The initial assessment by a fencing contractor has noted that the currently approved PTWL Conservation Area boundary alignment includes many bends and traverses several large rocky outcrops. Constructing the fence along this alignment will cost significantly more, result in substantially greater ground disturbance, and reduce the structural integrity of the resulting fence. As shown in Figure 3, it is proposed to make some minor modifications to the boundary alignment to reduce the number of bends and avoid large rocky outcrops.
- d. The topography of the land immediately to the south of portions of the Stage 2 boundary is such that it will require substantial adjustments to surface heights to facilitate a workable edge road design and provide adequate fall for sewer and drainage purposes. These adjustments will be achieved through construction of retaining walls rather than broad batters, thereby confining impacts to outside of Stage 2 of the PTWL Conservation Area.

With regard to the above proposed adjustments to the Stage 2 boundary alignment, the following salient points are noted.

- a. The total area of the PTWL Conservation Area will essentially remain the same (i.e. currently approved = 53.47 ha / proposed = 53.39 ha).
- b. The proposed alignment remains consistent with achieving the four ‘conservation principles’ as set out in Section 2.1.1 of the PTWP-P&MP. Notably, the PTWL will encompass the entire area of ‘very high’ quality habitat and the majority of the ‘high’ and ‘medium’ quality habitat.
- c. As noted in Table 3 of the PTWL-P&MP, the *“Precise boundary delineation to be determined during detailed design of the relevant section of Googong township”*. The proposed adjustments to the Stage 2 boundary alignment are minor and it is reasonable to consider them as consistent with the flexibility afforded by the PTWL-P&MP.

2. Stage 1 boundary alignment

As noted in Table 1, during September 2014 GTPL engaged a registered surveyor to survey and mark Stage 1 of the PTWL Conservation Area boundary, and construction of Stage 1 was completed during August 2015. The fence was constructed in accordance with the specifications provided in Section 2.2.1 of the PTWL-P&MP and is shown in Figure 3.

As illustrated in Figure 3, GTPL proposes to replace the southern tip of the existing Stage 1 fence and realign the boundary. This boundary realignment is required to accommodate the recently identified engineering constraints described above, notably to provide for the required surface heights to facilitate a workable edge road and adequate fall for sewer and drainage purposes. The total reduction to the PTWL Conservation Area will be 0.09 ha.

3. Timing of boundary establishment

GTPL have decided to bring forward the construction of Stage 2 of the boundary fence to occur in the 2019-2020 financial year rather than wait until the relevant trigger (i.e. development within 50 m of the PTWL habitat in Stage 2). This will complete the establishment of the PTWL Conservation Area boundary (i.e. Stage 2 fence construction, importation of habitat rock, and PTWL translocation) and will be a positive outcome for the conservation of the PTWL at Googong.

PTWL Conservation Area – Monitoring and Management

1. Physical removal of Radiata Pine and thinning of Burgan

It is likely that the potential benefits of these works will be outweighed by the likely dis-benefits given the following.

- The extent of Burgan coverage within the PTWL Conservation Area has not changed noticeably over the past nine years (2010 to 2019) (R. Speirs pers. obs.). Indeed, as shown in Figure 4, a recent mapping exercise completed by Capital Ecology to compare the Burgan coverage visible in the 2012 and 2018 ACT Government high resolution aerial images found no substantial

change in coverage. This provides a strong indication that the Burgan coverage is unlikely to increase substantially in future.

- The Burgan is of considerable habitat value to the numerous small woodland birds that occur in the locality, a number of which are threatened species.
- There is no evidence to suggest that the Radiata Pines are 'seeding' into the PTWL Conservation Area or broader locality. Given that they are now mature and cone-bearing, this likely indicates that they are sterile.
- The ground disturbance that would occur from such works would likely increase erosion potential, encourage weed establishment, and may disturb PTWL habitat.

In light of the above, the physical removal of Radiata Pine and thinning of Burgan is no longer proposed.

2. Monitoring of PTWL abundance and distribution

Table 3 of the PTWL-P&MP states that *"The PTWL monitoring program will commence the spring following the first year of works within 50 m of the PTWL Conservation Area. The program will then occur every second year until handover of the PTWL Conservation Area to Council. Following handover to Council, the PTWL monitoring program will occur once every five (5) years in perpetuity."*

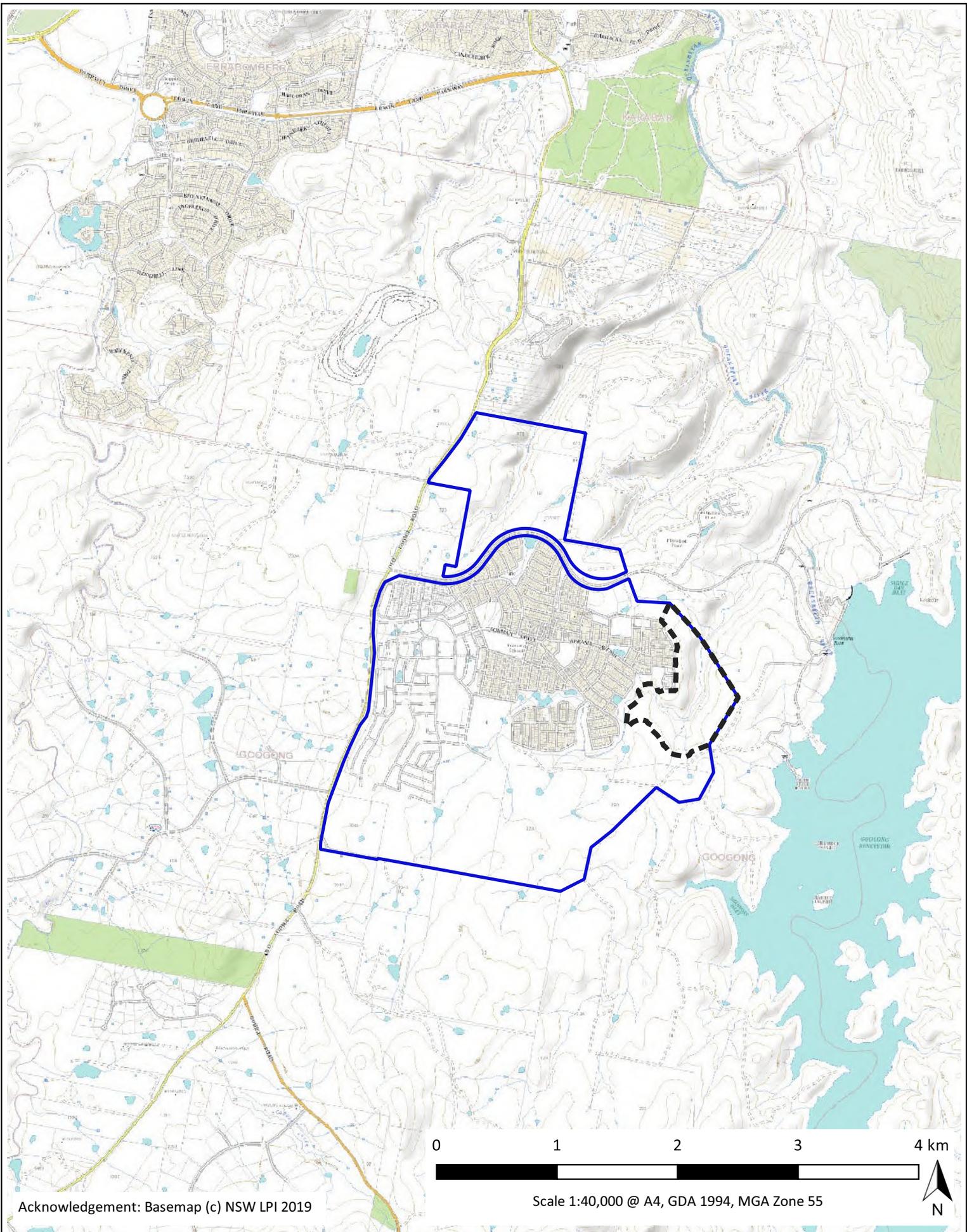
As detailed in Table 1, the PTWL monitoring program commenced in the spring following the first year of residential subdivision construction works within 50 m of the mapped extent of PTWL habitat. Given that such works commenced in 2015, the first monitoring was undertaken on Thursday 1 October 2015 and the second was undertaken on Tuesday 3 October 2017. The results of these monitoring events, and for the previous spring 2013 monitoring event, are presented in the Capital Ecology letter-form reports provided as Appendix A and Appendix B. The PTWL records from all monitoring events completed to date are shown in Figure 3.

The results of the three monitoring events completed to date (i.e. spring 2013 pre-commencement baseline survey, spring 2015, and spring 2017) indicate that the PTWL population is stable and the habitat across the PTWL Conservation Area remains characteristically unchanged from the original October 2010 habitat assessment and mapping. Based on this monitoring history, it can be reasonably inferred that further two-yearly monitoring events will likely provide the same or similar results.

In light of the above, and given the considerable degree of disturbance that repeated turning of rocks causes to PTWL habitat, it is proposed to delay the next monitoring event to spring 2021 (i.e. four years from the 2017 event). The PTWL population within the PTWL Conservation Area would then be monitored on five-year intervals.

As detailed above, GTPL plans to bring forward the establishment of Stage 2 of the PTWL Conservation Area boundary to the 2019-2020 financial year. This will involve the fence construction, importation of habitat rock, and PTWL translocation for Stage 2. With these works being completed in the 2019-2020, it will be beneficial to allow the translocated rocks a minimum of one year to bed in before the next monitoring event.

Figures



Acknowledgement: Basemap (c) NSW LPI 2019

Scale 1:40,000 @ A4, GDA 1994, MGA Zone 55

Figure 1. Locality Plan

Capital Ecology Project No: 2832
 Drawn by: A. Vincent
 Date: 1 July 2019

Legend

-  Googong Township
-  PTWL Conservation Area



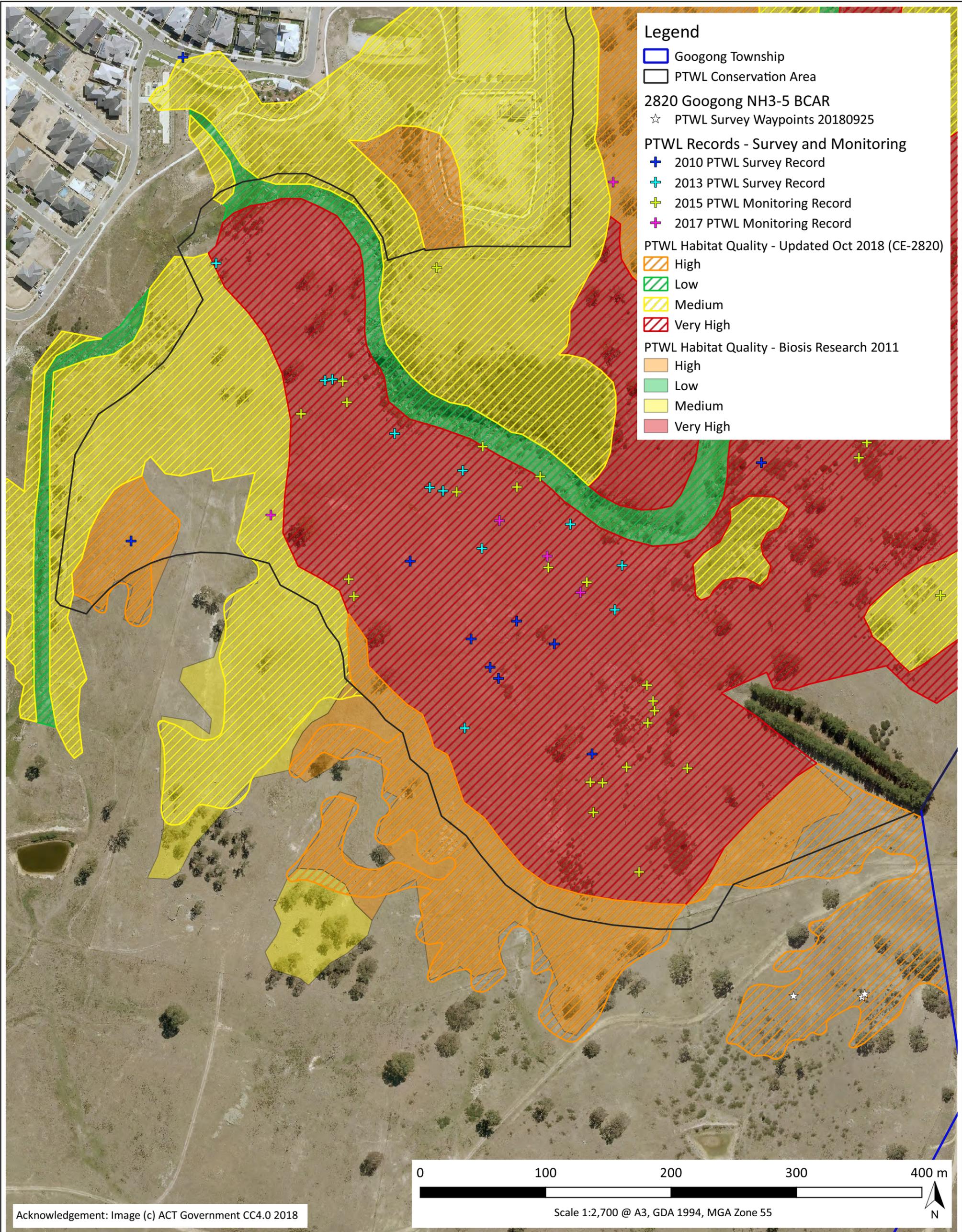


Figure 2. Stage 2 PTWL Habitat Mapping Refinements

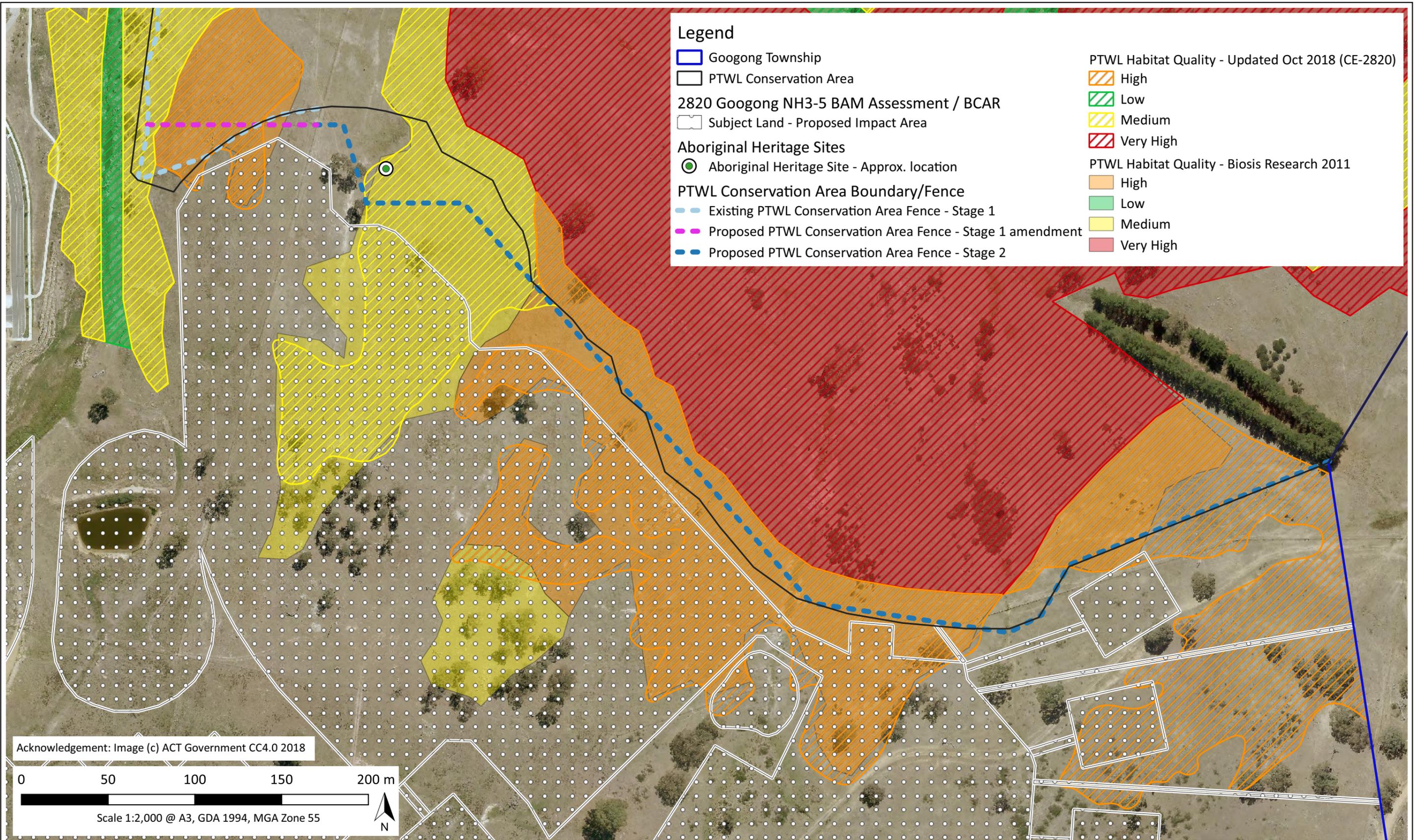


Figure 3. PTWL Conservation Area – Proposed Stage 2 Boundary Modifications

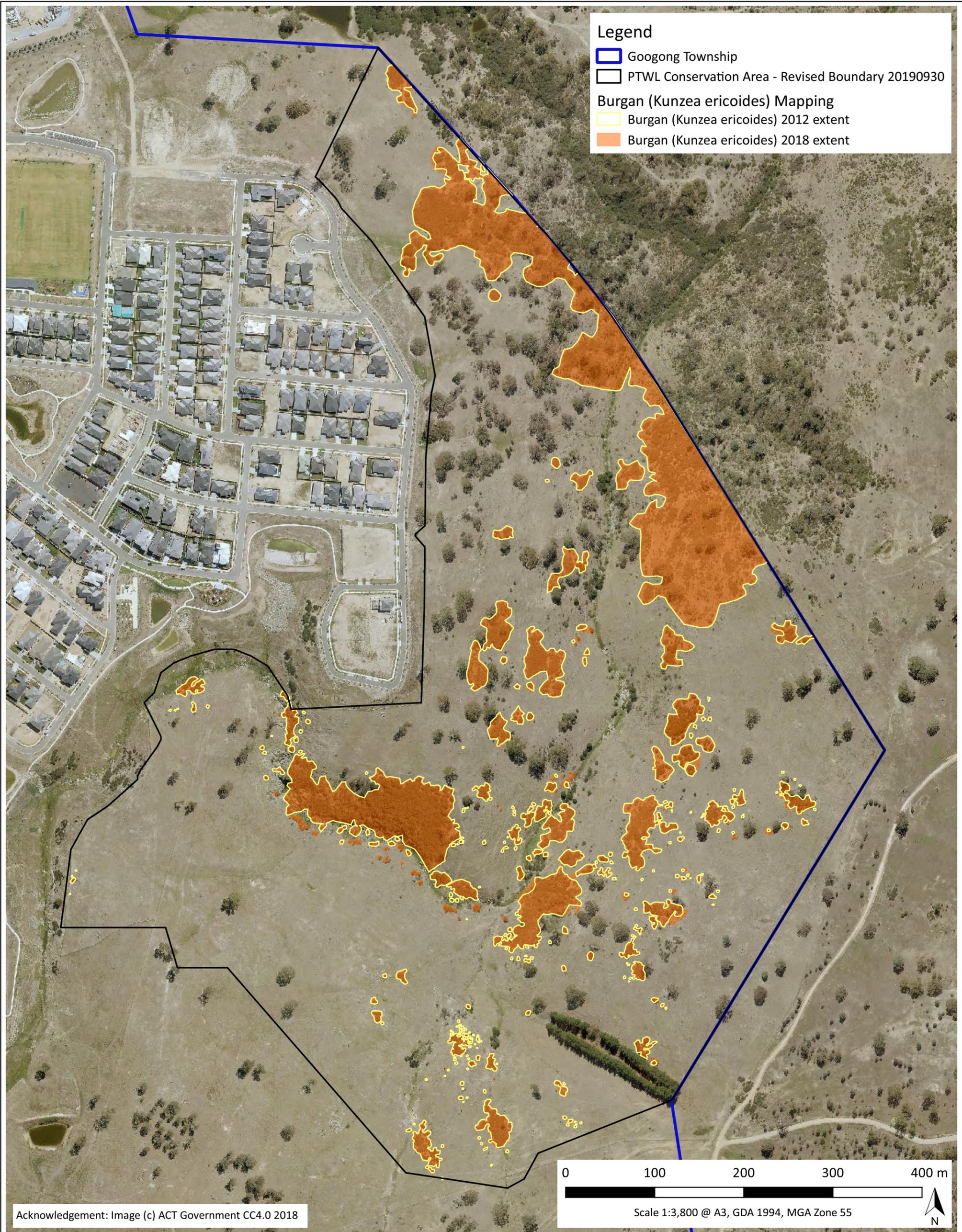


Figure 4. Comparison of Borgan Coverage 2012 to 2018

Capital Ecology Project No: 2832
 Drawn by: R. Speirs
 Date: 2 October 2019



Appendices

Appendix A. 2015 PTWL Population Monitoring Results



16 October 2015

Mr Matthew Frawley
Landscape Manager
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Googong Township Pink-tailed Worm-lizard Conservation Area 2015 population monitoring results

Capital Ecology project no. 2686

Dear Mr Frawley,

This letter provides the results of the 2015 Pink-tailed Worm-lizard (PTWL) monitoring event undertaken throughout the Googong Township PTWL Conservation Area, Googong, NSW. The location of the PTWL Conservation Area and Googong Township within the Googong locality are shown in Figure 1. The PTWL is listed as vulnerable pursuant to both the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the New South Wales *Threatened Species Conservation Act 1995* (TSC Act).

Methodology

In accordance with Section 2.3.3 of the current PTWL Protection and Management Plan (PTWL P&MP, July 2014) for the Googong Township PTWL Conservation Area, the PTWL monitoring program was required to commence in the spring following the first year of residential subdivision construction works within 50 m of the mapped extent of PTWL habitat. Given that such works commenced in early 2015, the first monitoring event was due in spring 2015. As such, the monitoring event reported on herein is the first event undertaken as part of the PTWL monitoring program. It is noted however that an additional monitoring event was undertaken in spring 2013 prior to the actual commencement of the monitoring program. This additional pre-construction monitoring event was requested by the NSW Office of Environment and Heritage (OEH) to establish baseline data for the PTWL Conservation Area prior to any development in the vicinity.

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The 2015 monitoring event was undertaken on Thursday 1 October 2015 which was a sunny day with minimum temperature of 11.5 °C and maximum of 23.3 °C (Bureau of Meteorology records for nearest weather station, Tuggeranong). Approximately 15 person-hours were spent turning rocks (three ecologists for approximately five hours) with survey effort expended as evenly as possible across the 'medium' to 'very high' quality habitat within the PTWL Conservation Area. The survey was tracked via a handheld GPS which was carried by one of the three ecologists, this track is shown in Figure 2.

The survey involved turning suitable habitat rocks and recording the location, number of individuals and approximate size of PTWL found. Care was taken to ensure that all rocks turned were returned to their pre-disturbed position. All PTWL found were left *in situ* and none were harmed.

Results

Thirty eight (38) individual PTWL were recorded during the survey under 36 rocks (refer Plate 1). Figure 2 illustrates the location of the PTWL recorded. The 2015 monitoring data is provided in Table 1 below. Unlike the 2010 survey and the 2013 monitoring event during which only adult PTWL were recorded, six (6) juvenile PTWL (≤ 12 cm total length) were recorded during the 2015 monitoring event.

Table 1. PTWL records from the 2015 PTWL monitoring event

PTWL ID	Approx. Total Length (cm)	PTWL ID	Approx. Total Length (cm)
1	15	20	15
2	20 (same rock as 1)	21	19
3	10 (same rock as 1)	22	22
4	22	23	21
5	18	24	12
6	20	25	23
7	18	26	22
8	8	27	19
9	20	28	20
10	15	29	22
11	16	30	15
12	22	31	20
13	11	32	22
14	9	33	12
15	20	34	21
16	23	35	20
17	18	36	10
18	23	37	18
19	20	38	20

In addition to many scorpions, spiders, centipedes and other common invertebrates, a number of non-target herpetofauna species were recorded during the monitoring. The non-target species name and manner in which the species was recorded are listed in Table 2.

Table 2. Non-target herpetofauna

Species Name	Common Name	Record Type and Quantity
Reptiles		
<i>Ctenotus robustus</i>	Eastern Striped Skink	11 – under rocks
<i>Ctenotus taeniolatus</i>	Copper-tailed Skink	15 – under rocks
<i>Lampropholis delicata</i>	Delicate Skink	4 – under rocks
<i>Morethia boulengeri</i>	South-eastern Morethia Skink	7 – under rocks
<i>Pseudechis porphyriacus</i>	Red-bellied Black Snake	2 – basking near Montgomery Creek
<i>Pseudonaja textilis</i>	Eastern Brown Snake	1 – moving through grass on upper slope
<i>Diplodactylus vittatus</i>	Eastern Stone Gecko	3 – under rocks
Amphibians		
<i>Crinia parinsignifera</i>	Plains Froglet Common	Few heard calling from Montgomery Creek
<i>Crinia signifera</i>	Eastern Froglet	Many heard calling from Montgomery Creek
<i>Limnodynastes dumerilii</i>	Eastern Banjo Frog / Pobblebonk	2 - heard calling from Montgomery Creek
<i>Limnodynastes tasmaniensis</i>	Spotted Marsh Frog	4 – under rocks Many heard calling from Montgomery Creek
<i>Uperoleia laevigata</i>	Smooth Toadlet	2 – under rocks

Discussion

The 2015 monitoring event recorded PTWL at numerous locations within the Googong PTWL Conservation Area, with greater numbers recorded than the 2013 monitoring event (25) and far greater numbers than the 2010 survey (13). These numbers are likely to reflect uncontrollable variation in specific factors which influence PTWL utilisation of rocks (timing, conditions etc.) rather than to indicate a longitudinal positive trend in PTWL abundance. Notwithstanding this, the higher numbers recorded, together with the observed presence of juvenile PTWL are positive indications of the ongoing health of the population within the PTWL Conservation Area.

As is shown by a comparison between the 2015 results illustrated in Figure 2 of this report and Figure 2 of the PTWL-P&MP, most of the PTWL were recorded in similar locations as those in 2013 with a few new locations recorded. This general consolidation of data indicates the densely populated patches within the PTWL Conservation Area, an observation that is likely to become increasingly apparent with repeat monitoring events.

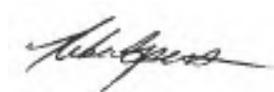
Given that the PTWL recorded during this monitoring event were all located within or immediately adjacent to 'high' or 'very high' quality habitat (as mapped in 2010), no adjustment to the habitat quality mapping provided in the PTWL-P&MP is recommended at this time.

The rocks transferred into the PTWL Conservation Area in November 2014 appear to be 'bedding in' well and many now support colonies of the small black ants favoured by the PTWL. Notwithstanding this, most of the rocks require more time to be suitably embedded for utilisation by the PTWL. The recording of a single PTWL under a transferred rock is a positive observation and it is likely that more individuals will be recorded under these rocks during future monitoring events.

Whilst not a threatened species, the record of the Eastern Stone Gecko (refer Plate 2) within the PTWL Conservation Area is an interesting observation and a further indication of the high reptile diversity in the PTWL Conservation Area.

I trust that this letter-report provides the information required and is of use to Googong Township Pty Ltd. If, however, you should have any questions relating to this letter, please do not hesitate to contact us to discuss.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Robert Speirs".

Robert Speirs

Director / Principal Ecologist

Attachments:

Photo plates

Figure 1. Locality Plan

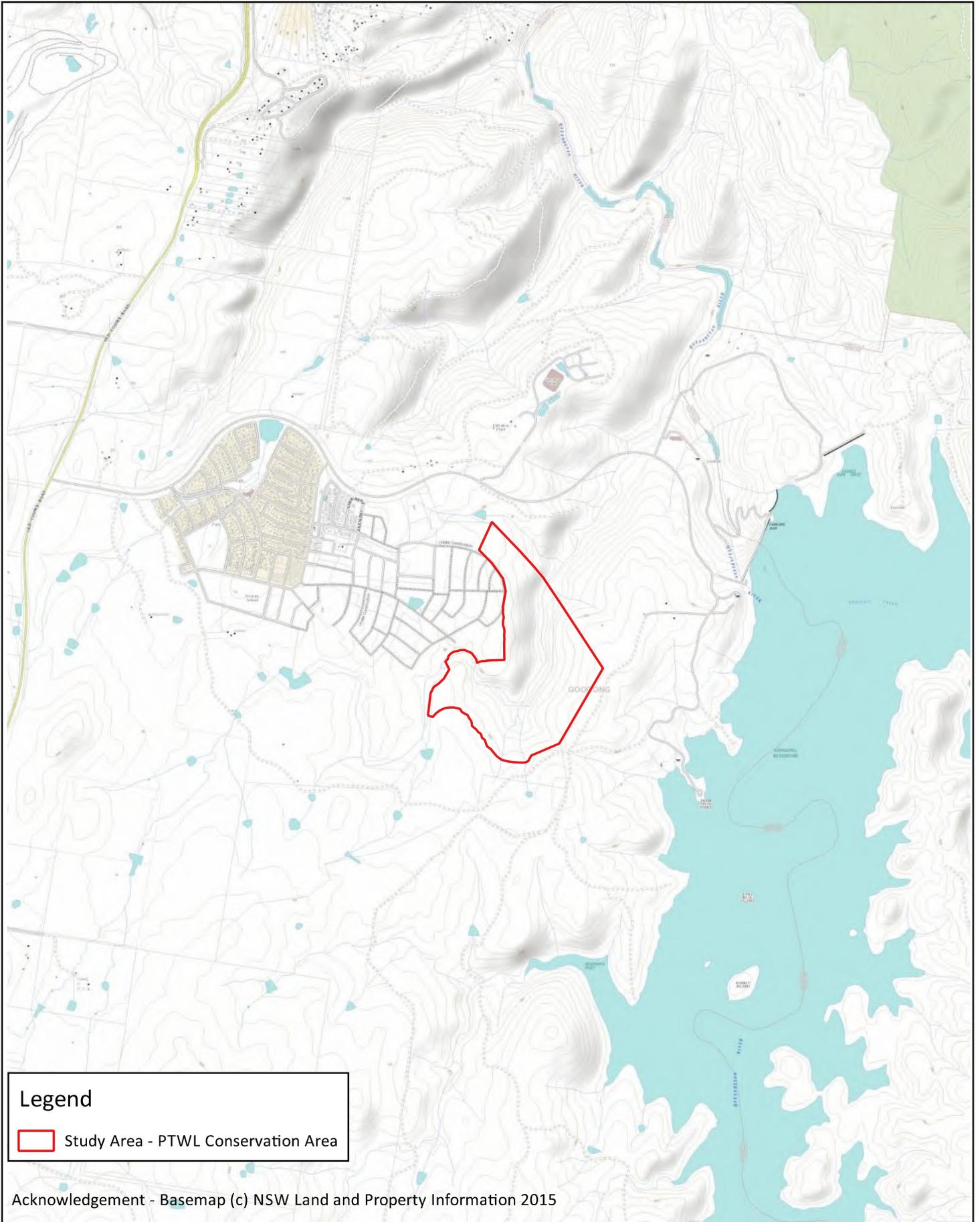
Figure 2. 2015 PTWL Monitoring Results



Plate 1: Adult Pink-tailed Worm-Lizard (*Aprasia parapulchella*)



Plate2: Eastern Stone Gecko (*Diplodactylus vittatus*)



Legend

 Study Area - PTWL Conservation Area

Acknowledgement - Basemap (c) NSW Land and Property Information 2015

Figure 1 - Locality Plan

0 500 1000 1500 2000 m



Scale 1:33,000 @ A4, GDA 1994, MGA Zone 55



Project No: 2686
 Drawn by: R. Speirs
 Date: 15 October 2015

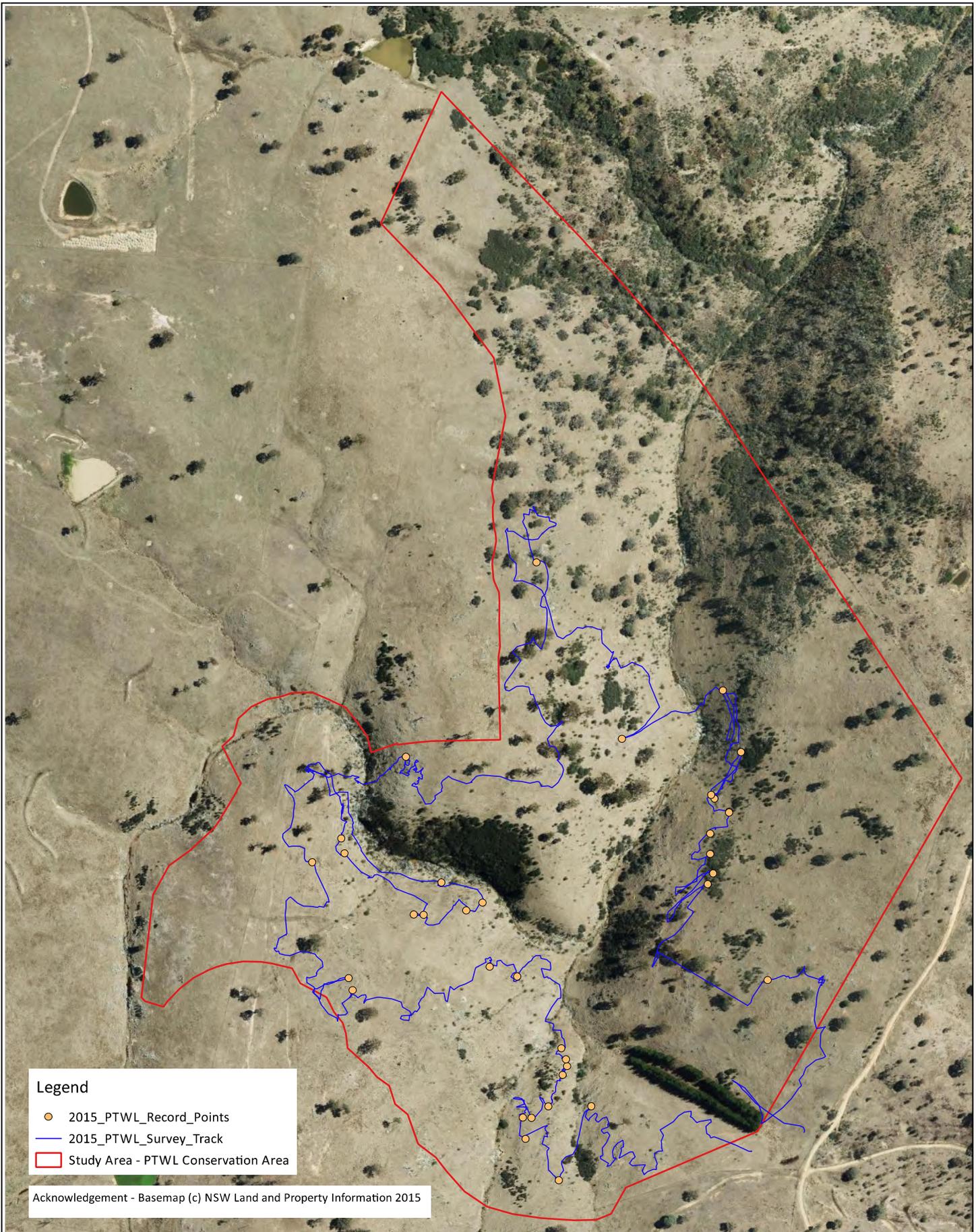


Figure 2 - 2015 PTWL Monitoring Results



Scale 1:5,000 @ A3, GDA 1994, MGA Zone 55

Appendix B. 2017 PTWL Population Monitoring Results



13 November 2017

Matthew Frawley
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Googong Township Pink-tailed Worm-lizard Conservation Area – 2017 population monitoring results

Capital Ecology project no. 2754

Dear Mr Frawley,

This letter provides the results of the 2017 Pink-tailed Worm-lizard (PTWL) monitoring event undertaken throughout the Googong Township PTWL Conservation Area, Googong, NSW. The location of the PTWL Conservation Area and Googong Township within the Googong locality are shown in Figure 1. The PTWL is listed as vulnerable pursuant to both the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the New South Wales *Biodiversity Conservation Act 2016* (BC Act).

Methodology

In accordance with Section 2.3.3 of the PTWL Protection and Management Plan (PTWL P&MP, July 2014) for the Googong Township PTWL Conservation Area, the PTWL monitoring program commenced in spring 2015, following the first year of residential subdivision construction works. In accordance with the PTWL P&MP, the next round of monitoring was scheduled to occur in spring 2017. As such, the monitoring event reported on herein is the second event undertaken as part of the PTWL monitoring program. It is noted however that an additional monitoring event was undertaken in spring 2013 prior to the actual commencement of the monitoring program. This additional pre-construction monitoring event was requested by the NSW Office of Environment and Heritage (OEH) to establish baseline data for the PTWL Conservation Area prior to any development in the vicinity.

The 2017 monitoring event was undertaken on Tuesday 3 October 2017, which was a sunny day with minimum temperature of 5.2 °C and maximum of 24.8 °C (Bureau of Meteorology records for nearest

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weather station, Tuggeranong). Approximately 15 person-hours were spent turning rocks (three ecologists for approximately five hours) with survey effort expended as evenly as possible across the 'medium' to 'very high' quality habitat within the PTWL Conservation Area. The survey was tracked via a handheld GPS which was carried by one of the three ecologists, and is shown in Figure 2.

The survey involved turning suitable habitat rocks and recording the location, number of individuals and approximate size of PTWL found. Care was taken to ensure that all rocks turned were returned to their pre-disturbed position. All PTWL found were left *in situ* and none were harmed.

Results

Fourteen (14) individual PTWL were recorded during the survey under 11 rocks (refer Plate 1). Figure 2 illustrates the location of the PTWL recorded. The 2017 monitoring data is provided in Table 1 below. One juvenile PTWL (≤ 12 cm total length) was recorded during the 2017 monitoring event.

Table 1. PTWL records from the 2017 PTWL monitoring event

PTWL ID	Approx. Total Length (cm)	PTWL ID	Approx. Total Length (cm)
1	20	8	18
2	15	9	17
3	15	10	10
4	18	11	16
5	16	12	17
6	15	13	18
7	16	14	17

In addition to many scorpions, spiders, centipedes and other common invertebrates, a number of non-target herpetofauna species were recorded during the monitoring. The non-target species name and manner in which the species was recorded are listed in Table 2.

Table 2. Non-target herpetofauna

Species Name	Common Name	Record Type and Quantity
Reptiles		
<i>Ctenotus robustus</i>	Eastern Striped Skink	3 – seen basking on rocks
<i>Ctenotus taeniolatus</i>	Copper-tailed Skink	3 – under rocks
<i>Lampropholis delicata</i>	Delicate Skink	1 – under rocks
<i>Morethia boulengeri</i>	South-eastern Morethia Skink	5 – under rocks
Amphibians		
<i>Crinia parinsignifera</i>	Plains Froglet Common	Few heard calling from Montgomery Creek
<i>Crinia signifera</i>	Eastern Froglet	1 – under rock. Many heard calling from Montgomery Creek

Species Name	Common Name	Record Type and Quantity
<i>Limnodynastes tasmaniensis</i>	Spotted Marsh Frog	Many heard calling from Montgomery Creek

Discussion

To maintain consistency across years, the 2017 monitoring event took place at the same time of year as the 2015 and 2013 monitoring events. One benefit of this approach is that the composition of the PTWL population will be similar across monitoring events. A drawback of this approach is that weather conditions between monitoring events may vary. The weather conditions in the weeks prior to the 2017 monitoring event were far drier than those in 2015 and 2013. These conditions are not ideal for PTWL surveys as it is our experience that more individuals are found under rocks following substantial rainfall events.

The 2017 monitoring event recorded PTWL at numerous locations within the Googong PTWL Conservation Area. However, the number recorded (14) was lower than the 2015 monitoring event (38) and 2013 monitoring event (25), yet very similar to the 2010 survey (16). These numbers likely reflect variation in specific factors which influence PTWL utilisation of rocks rather than indicating a negative trend in PTWL abundance. The low rainfall across winter and early spring, in particular, is likely to have been an important factor in the lower numbers recorded in 2017.

A comparison between the 2013 results (refer Figure 2 of the PTWL-P&MP) and those from 2015 and 2017 (shown in Figure 2) shows that most PTWL were recorded in similar locations across monitoring events. This indicates that there are densely populated patches within the PTWL Conservation Area. Given that the PTWL recorded during the 2013, 2015 and 2017 monitoring events have all been located within or immediately adjacent to 'high' or 'very high' quality habitat (as mapped in 2010), no adjustment to the habitat quality mapping provided in the PTWL P&MP is recommended at this time.

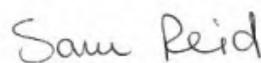
One individual was found in rocky habitat created by the rock translocation works undertaken in November 2014. These rocks have 'bedded in' well and many support colonies of the small black ants favoured by the PTWL. The record of a PTWL under a transferred rock is a positive observation and it is likely that more individuals will be recorded under these rocks during future monitoring events.

We trust that this letter-report provides the information required and is of use to Googong Township Pty Ltd. If, however, you should have any questions relating to this letter, please do not hesitate to contact us.

Yours sincerely,



Robert Speirs
Director / Principal Ecologist



Dr Sam Reid
Consultant Ecologist

Attachments:

Figure 1. Locality Plan

Figure 2. 2017 PTWL Monitoring Results

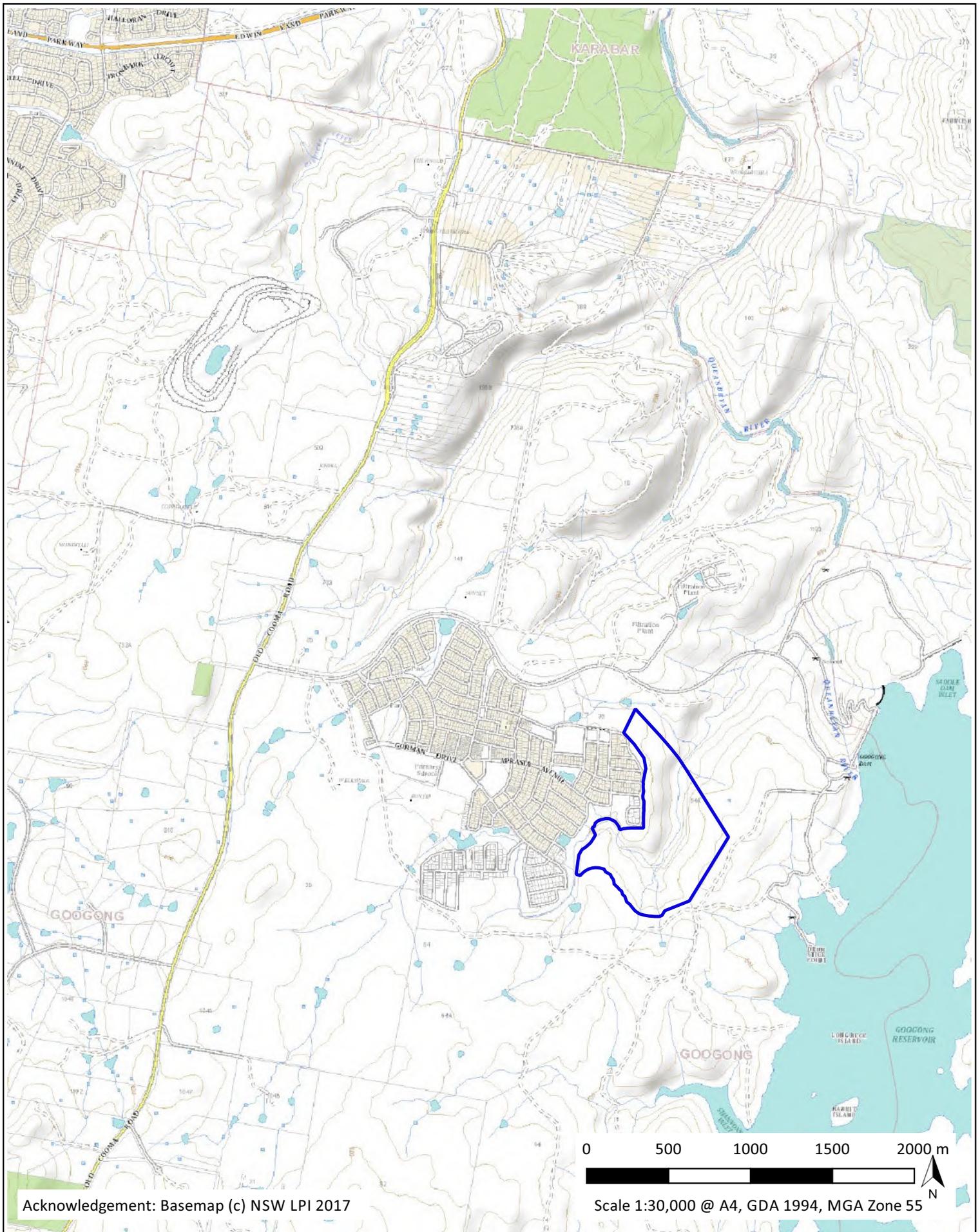


Figure 1. Locality Plan

Legend

 Study Area - PTWL Conservation Area



Capital Ecology Project No: 2754
 Drawn by: R. Speirs
 Date: 7 November 2017

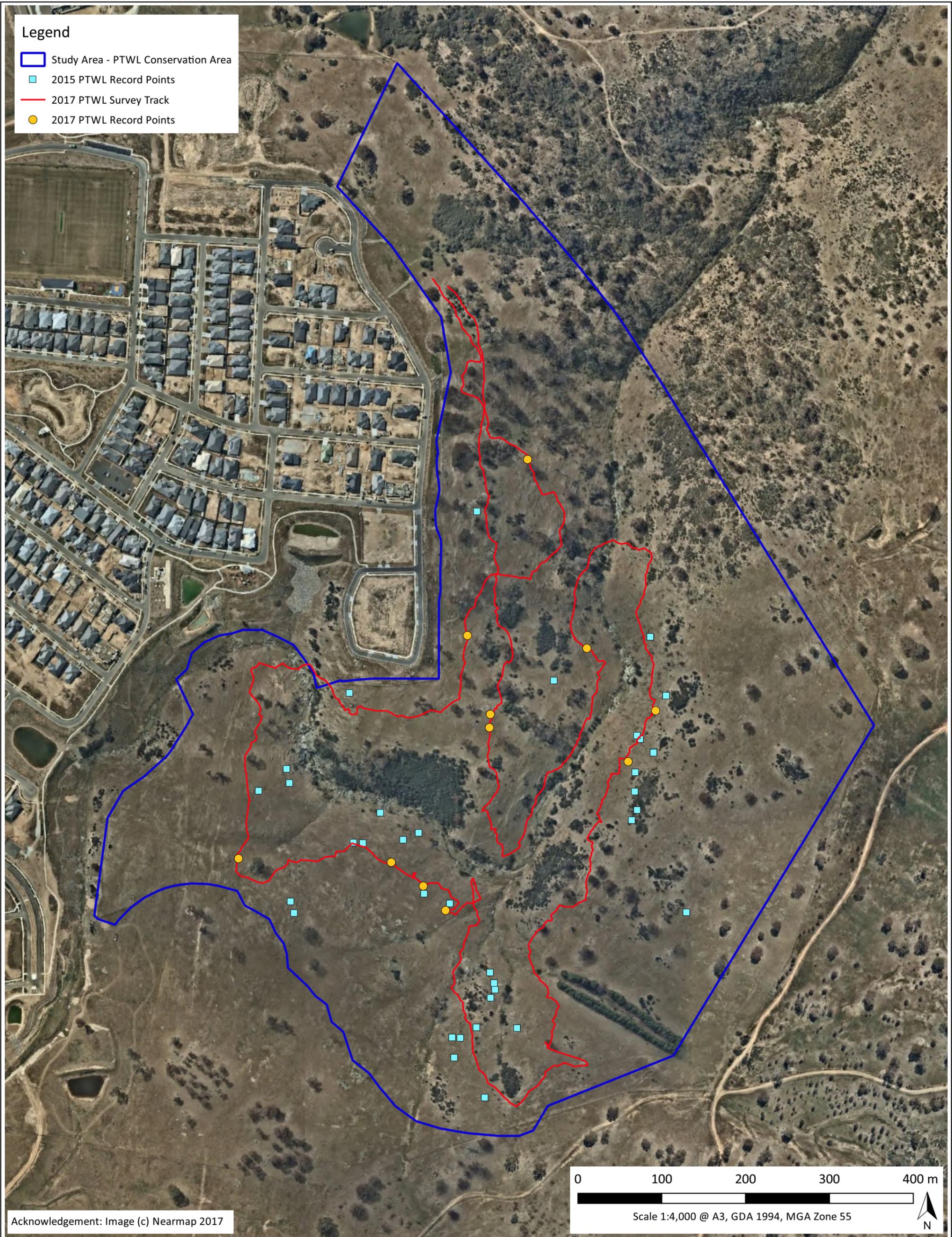


Figure 2 - 2017 PTWL Monitoring Results

Capital Ecology Project No: 2754
 Drawn by: S. Reid
 Date: 7 November 2017

