ACT Woodlands Restoration Project

Works Plan

Black Mountain to Murrumbidgee Corridor

Executive Summary

This Works Plan has been prepared to operationalise the principles outlined in the Act Woodland Implementation Plan (2011).

The Works Plan focuses activity for the first 18 months on developing a biodiversity corridor between Black Mountain and the Murrumbidgee River covering the reserve estate and leased land.

The existing condition of the land in the corridor is varied from high value conservation land through to degraded agricultural land. Accordingly, we have proposed restorative treatments that build connectivity through establishing woodland cover or improving condition of remnants to return missing elements (structural and/or floristic).

Through a combination of direct seeding, fencing, reintroducing woody debris and/or tubestock, and weed control we are proposing to restore 150 hectares of woodland across the corridor (over 18 to 24 months).

The actions we have proposed are targeted at addressing key threatening processes and barriers to restoration. Direct seeding is the most cost effective way of restoring woodland cover across large areas. Our proposed condition improvements focus on understory structural diversity to combat the scourge of the Noisy Miner. Our ground-storey condition improvements are designed to reintroduce iconic plant species lost from our landscapes due to decades of drought and uncontrolled grazing.

There may be opportunities to leverage additional funding from complementary programs.

The Works Plan has been broken down into five geographic areas and includes provisions for coordination, monitoring and evaluation and maintenance.

We have also identified opportunities to reconnect local communities with their woodlands through a series of community engagement and volunteering activities.

In summary, the outcomes to be achieved include:

- 36 hectares of new woodland created
- 12 hectares of woodland condition improved through re-introduction of woody debris and tubestock
- 101 hectares of condition improvements through reintroduction of missing mid-storey and ground-storey elements
- Education of surrounding communities (Aranda, Cook, Weetangera, Hawker, Holt) about the value of their woodlands and the ACT Government's actions to improve them
- New opportunities for volunteers to engage in environmental activities
- Enhanced capacity and engagement of and for the Park Care groups in the stewardship of their reserves
- Identification of habitats suitable for the reintroduction of threatened and rare plant species from other areas of the reserve estate

We trust the Works Plan we propose has found a balance between community needs, PCS needs and operational realities, but we would be happy to discuss refinements and adapt accordingly over time.

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ACT Woodlands Restoration Project

Works Plan

Black Mountain to Murrumbidgee Corridor

Introduction

This plan has been prepared for ACT Parks and Conservation Service, based on the ACT Woodland Restoration Implementation Plan (2011) prepared by the Woodlands Working Group. This plan is referred to in this document as The Implementation Plan. The following documents were also taken into consideration:

- Proposed components of a lower Molonglo Woodlands Restoration Strategy—prepared by Friends of The Pinnacle (FOTPIN) in consultation with Friends of Mt Painter (FOMP) and Friends of Aranda Bushland (FoAB) (refered to in this document as the Park Care Submission)
- Mount Painter Vegetation Plan (D Hogg, 2000)
- Action Plan 27—ACT Lowland Woodland Conservation Strategy (2004)
- Action Plan 28– ACT Lowland Native Grassland Conservation Strategy (2005)
- Fire Management Guidelines for Land Management Activities (2011)
- Strategic Bushfire Management Plan Version 2 (2009)

The Implementation Plan made 18 recommendations. The recommendations and principles used to guide preparation of this Restoration Plan are summarised as follows:

- Whole of landscape focus including urban areas and rural properties
- Connectivity — Belconnen Hills to Lower Molonglo and Murrumbidgee
- Whole ecosystem approach – birds, vegetation, small mammals and invertebrates
- Community engagement - Parkcare and Landcare, rural landowners
- Indigenous engagement - Ngunnawal
- Remnant protection and enhancement
- Riparian rehabilitation including dams and creeks/gullies
- Monitoring of restoration activities

The plan is proposed as a working document. Climatic conditions, site conditions and other factors will likely require adjustment and variation to the plan during the course of its roll-out.

Restoration Area

The scope of this plan is the Belconnen Hills to Lower Molonglo and the Murrumbidgee River, incorporating Black Mountain, Aranda Bushland, Mt Painter, The Pinnacle and Kama. Refer Figure 1. The initial focus is on public land however there is potential to work with rural landowners to achieve greater connectivity outcomes. This plan is the first stage of a four year proposal for delivery of the ACT Woodlands Implementation Plan, elements of which will overlap from year to year (ie monitoring and maintenance). Individual maps are provided as attachments to this plan.

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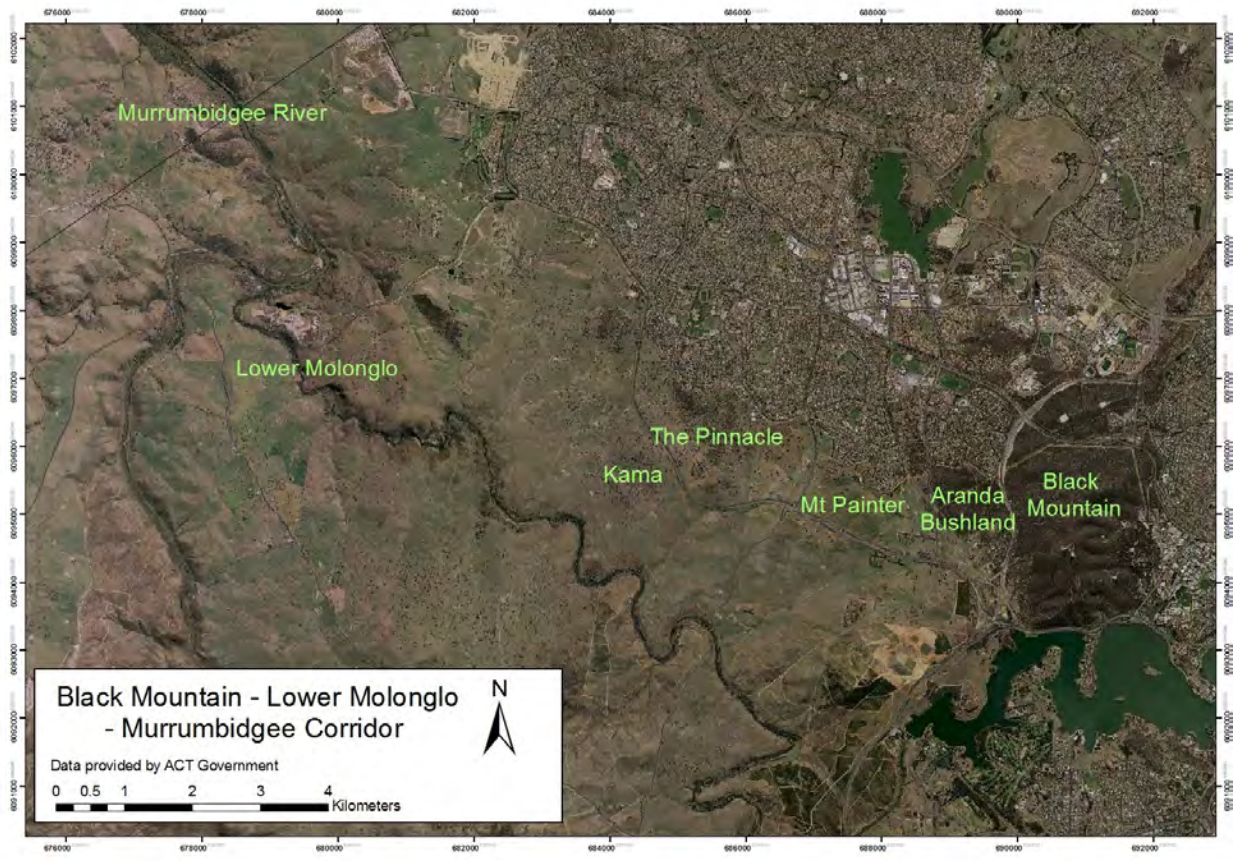
Restoration Area

Figure 1 - Map of Restoration Area



The overarching goal is to provide connectivity and protection of existing biodiversity assets between Black Mountain and the Lower Molonglo in an east-west direction. Actions include site enhancement, creation of new patches and linkages in the reserve system, along with the potential to engage rural landowners through this program or others. General biodiversity outcomes expected as a result of proposed on-ground actions include: increased woodland cover; increased mid-storey for small bird habitat and mitigation of the effects of Noisy Miners; enhancement of ground-storey diversity; and species and structural enhancement for key threatened species.

The Implementation Plan identifies key restoration activities in each of the reserve areas as follows:

- *Aranda Bushland*
  Assisted natural regeneration; rabbit control; small scale planting in the Snow Gum area; and weed control (St Johns Wort).

- *Black Mountain Nature Reserve*
  Assisted natural regeneration; rabbit control; and weed control (St Johns Wort).

- *Kama Nature Reserve*
  Rabbit control; small scale targeted planting in Northern section to enhance woodland bird habitat; weed control (Patersons Curse and St Johns Wort).

- *Lower Molonglo*
  Assisted natural regeneration; weed control (Crack Willow, Blackberry and woody weeds).

- *Mt Painter*
  Small to medium scale plantings on lower slopes; rabbit control; weed control (Pattersons Curse, St Johns Wort, and Thistles).

- *The Pinnacle*
  Rabbit control; larges cale plantings and introduction of habitat elements; weeds (St Johns Wort, Pattersons Curse, Thistles, Verbascum and African Lovegrass).

Government Horse Paddocks (Cook) are included in the restoration area and there may be opportunities to undertake revegetation / enhancement activities on rural leasehold land if the rural landowners were to be engaged through this program. This would provide a landscape scale woodland connectivity outcome.

The restoration area shown in Figure 1 has been divided into five sections as follows:

- Black Mountain and Aranda Bushland
- Mt Painter and Cook Horse Paddocks
- The Pinnacle and North Kama
- Kama
- Molonglo and Murrumbidgee

An outline of proposed works, costs and maps has been provided for each section.

Background Information

Woody debris — an assessment of each area needs to be undertaken to determine the existing level of woody debris and any subsequent need for woody debris placement (based on research being undertaken at Mulligans Flat / Goorooyarroo). Initial outcomes of this research indicate that clumped areas of woody debris in areas of remnant woodland have proved to be beneficial in improving woodland bird habitat. Scattered rather than clumped woody debris has also been effective but to a lesser degree. The decay class of woody debris onsite and introduced also plays any important factor in habitat improvement (Pers. comm. Kate Boyd). Operational opportunities linking with urban tree renewal programs should be considered to enhance efficiencies. Due to the cost involved in transporting debris, a targeted approach to introducing this element should be adopted.

Leaky fencing — the cost of using this method of fencing identified in the Implementation Plan would only be economic if existing paddock alignment provided a suitable site for restoration activities and resources were available to manage the site accordingly, ie grazing as needed, alternative hazard reduction activities and weed control. The additional cost may be beyond the scope of this project and kangaroo numbers should continue to be addressed under the existing kangaroo control program.

Connectivity — the Park Care Submission suggests a maximum 100 metre spacing between vegetation (remnant / plantings) as an ideal distance to provide connectivity for small bird and mammal movement. This has been taken into consideration in the development of proposed revegetation activities, however due to existing lease arrangements, horse paddock agistment areas, native grassland and fire management zoning, it may not be possible to achieve this across the restoration area. Connectivity for individual plant and animal species requires different spatial considerations.

Molonglo Residential Development Stage 3 — it is unknown at this stage where proposed urban plantings are to be developed and where paddock trees and remnant vegetation will be retained. However research currently being undertaken by Fenner School ANU on Advanced Planning for Woodland Birds in Future Urban Areas has provided some preliminary recommendations such as: retain scattered trees; encourage natural regeneration, maintain high-quality riparian areas; retain Eucalypt woodlands; and maintain a structurally complex habitat. These recommendations concur with principles developed from other research on woodland bird habitat, as outlined in the Implementation Plan. During the planning stage for the residential development of this area these recommendations will be considered and streetscapes, urban parks and remnant vegetation will provide some connectivity to other areas of Belconnen Hills. This area has not been included in this report.

Woodland Condition—the woodland condition layers used on the attached maps have been provided by the ACT Government and are based on the following description from Action Plan 27 (2004:

- *Unmodified Lowland Woodland Structure* - (pre-1750 composition and structure)
  Floral and fauna diversity

- *Partially Modified Lowland Woodland*
  Relatively intact remnants of pre-European ecological community

- *Moderately Modified Lowland Woodland*
  Past disturbance resulting in disjunct age classes, characterised by disturbance tolerant species, less diversity of understorey species and structure.

- *Substantially Modified Lowland Woodland*
  Fragmented woodland remnants where native understorey has been destroyed or highly modified.

- *Severely Modified Lowland Woodland*
  Paddock trees

General Information

Volunteer Engagement—the plan includes opportunities for the continued involvement of the Park Care groups in the restoration activities. Their level of involvement will depend on their capacity and priorities. Community plantings and other activities (ie bird walks and restoration talks) have the potential to attract further volunteers to the Park Care groups, as well as providing existing volunteers with opportunities for episodic volunteering within the urban area.

Ngunnawal Engagement— this program may provide opportunities for the Cotter Indigenous Green Team to undertake some training and develop new skills to enhance the work they are currently doing in the Cotter. This could include assisting with fencing; seed collecting; and weed control. This would need to be discussed with the ACT NRM Council. There may also be opportunity for Billabong Corporation to be involved through their current nursery activities, supported by Greening Australia.

Pest Control — the potential impacts of pest animal species such as rabbits, along with the impact of grazing by Kangaroos, may require the use of heavy duty tree guards to protect tubestock plantings. The costs provided have allowed for 450mm corflute tree guards. Depending on the expected level of feral animal and kangaroo impact at each site, larger guards may need to be used, which will increase the cost.

Strategic Bushfire Management Plan (SBMP) - provides fire management zoning and expected management strategies for each zone. This has been taken into consideration and the relevant zoning is noted for each section. The ACT Rural Fire Service will need to be consulted where proposed revegetation activities have potential conflict with fire management zones.

Hazard Reduction Guidelines—provide proposed hazard reduction methods on public land within the ACT. It also includes a list of recommended species appropriate for revegetation within these areas. Some negotiation may be required with the Fire Management Unit if species required for ecological outcomes are not already listed within these guidelines. Management actions such grazing or hazard reduction burns may impact on proposed revegetation activities, however the frequency and likelihood of these management activities is unknown and this will need to be confirmed to determine the most appropriate revegetation action for these sites.

Transmission Lines —have been shown on the maps for each section where there could be some impact on proposed revegetation activities. Planting within transmission line easements will restrict the species utilised. TransGrid Easement Planting With Native Birds In Mind (Southern Tablelands) brochure is attached to this plan for information purposes.

Species - will be determined on a site by site basis, based on the vegetation community, existing species / structure. Park Care groups have provided species recommendations for planting areas identified in their submission. A wide range of known provenance species appropriate for ACT woodland restoration activities (including upper mid and ground-storey) are available through the GA nursery. As additional species are identified for each site seed collection and propagation activities will be undertaken as required. GA holds relevant ACT seed collection licences. An allowance for seed collection activities has been included in the Summary of Activities provided in this plan.

Fencing – existing fences are shown on the PCL 2010 GIS layer on maps for each section, however their condition is unknown. Where existing fences have been utilised in mapped planting areas their stock proof condition will need to be confirmed.

Site preparation – This will be site specific and dependant on revegetation method—ie direct seeding or tubestock planting. Depending on nature of site and potential level of disturbance, there are several options available for tubestock planting, such as; hand digging; augering; spot cultivation; and ripping. Depending on pasture composition on planting sites spraying to reduce competition may be required. Direct seeding requires spraying of direct seeding lines prior to seeding.

Monitoring and Evaluation

Monitoring of existing woodland restoration projects is currently being undertaken on The Pinnacle and in Goorooyarroo. It is expected that when results of the monitoring and evaluation of these sites are available, the on-ground actions proposed in this report may be adapted to incorporate these findings.

Monitoring and evaluation of the restoration proposed in this report should be undertaken on a number of sites. Once restoration sites have been confirmed baseline data should be collected prior to activities being undertaken.

Monitoring should be undertaken annually and whilst it needs to have scientific rigour, the method used should be simple and easily replicated so that community groups could undertake the monitoring and recording of data. The ACT Vegetation Monitoring Manual developed by Greening Australia and PCS (Sarah Sharp) in 2010 would be used as a tool to develop and train community volunteers in the monitoring process. Many members of Park Care groups across the ACT have undertaken training delivered as part of the launch of this manual in 2011. There is the possibility of collaboration with tertiary institutions on specific monitoring projects but this can only be developed when restoration activities are more defined.

Suggested monitoring methods include:

- Selection of 5 sites across the restoration area (include leased land and reserved land)
- Bird surveys
- Vegetation composition
- Species survival rates

Cost

The cost has been calculated for Greening Australia to undertake the monitoring, evaluation and reporting. Park Care and other community volunteer monitoring (and training as required) has not been factored into the cost as at this stage the capacity of volunteers to undertake regular monitoring is unknown.

Initial data collection—1 day per site @ $1,000/day x 5 sites
Evaluation and reporting—2 days @ $1,000/day
Total $7,000

Ongoing monitoring (annually) would incur a similar cost per site, however it is expected that the number of monitoring sites will increase as the proposed future stages of the Implementation Plan are developed and on-ground works are undertaken.

Revegetation Options

Tubestock —this option is best suited to enhancement plantings within existing woodland areas, or in areas where accessibility for machinery (such as the direct seeder) is limited, and where volunteer community plantings are practical (ie accessibility for volunteers). Where site accessibility for volunteers is an issue contract planting could be undertaken. This includes reintroduction of threatened species and missing mid and ground storey flora. Tubestock numbers have been based on woodland densities of 500 stems / hectare for revegetation sites and 100-200 / ha for species enhancement sites. These figures will vary depending on assessment of individual needs of each site. Species enhancement plantings include mid-story and ground-storey species as appropriate for each site.

Direct seeding—this method could be used for larger revegetation sites (ie >2ha) where the landscape allows for use of machinery (ie spraying for site preparation, towing direct seeding machine behind 4WD). Direct seeding may be a viable option for several of the sites costed as tubestock planting. In this case the overall cost will be less than indicated. Some species, particularly understorey species, are not suited to direct seeding, or if space is scarce, tubestock planting may be a more reliable means of establishment.

Revegetation Options

Planting - several options for planting activities have been included in this document, including: Park Care volunteer plantings (either self-coordinated or GA coordinated and supplement with GA volunteers where required); GA coordinated small group plantings (such as GA Green Team volunteers); contract planting (ie GA Bush Crew); and Conservation Volunteers Australia volunteer groups. Access to sites, capacity of Park Care groups, and size of planting area will determine which method is most appropriate. Large scale community plantings (such as GA community planting events in the Cotter Catchment engaging hundreds of volunteers) will generally not be appropriate for these sites for the reasons mentioned.

Assisted regeneration - the restoration activities outlined in this plan (such as fencing and enhancement planting, woody debris, and weed control) all provide opportunity for nature regeneration to occur within these sites. The success of these activities will be reliant on the continuation of existing feral animal and herbivore control programs.

Attachments

A - Aranda Bushland Recommendations and Maps

B - Mt Painter and Cook Horse Paddocks and Maps

C - The Pinnacle and North Kama Recommendations and Maps

D - Kama Nature Reserve Recommendations and Maps

E - Molonglo to Murrumbidgee Recommendations and Maps

Attachment A - Aranda Bushland

Aranda Bushland comprises areas of Natural Temperate Grassland, Grassy Box Woodland Community, Lowland Snow Gum Community and endangered species (*Swainsona recta*). Most of Aranda Bushland is in good condition, classified as 'partially modified' woodland and management actions are focused on weed control. The southern section of the reserve (between the rural leases) is classified as or 'substantially modified' although the Friends of Aranda Bushland (FoAB) and the ACT Parks and Conservation Service (PCS) have undertaken substantial weed control and revegetation activities within this area and the rural lease areas adjoining. (Refer Map A attached). Further enhancement of the Snow Gum Woodland area, along with revegetation on the rural lease will help provide a buffer to the high quality areas within the reserve. The restoration recommendations made in Table 1 aim to improve connectivity between Aranda Bushland and adjacent rural lease and reserve areas across the Belconnen Hills landscape. The recommendations take into consideration the following:

- Black Mountain comprises remnant open forest or regeneration. It is considered to be the most floristically rich section of Canberra Nature Park (Canberra Nature Park Management Plan 1999). The reserve requires rabbit control and weed control as identified in The Implementation Plan.

- FoAB have an existing arrangement with the Lessee adjoining the reserve. Continued weeding efforts by the group on the leased land enhance their work on Aranda Bushland and reduce weed infestation coming from the rural lease.

- Tubestock planting options include: fencing the gully and planting tubestock to improve connectivity and habitat (including wetland plantings around existing dam); clumped plantings within the two northern paddocks utilising existing paddock fencing to exclude stock from whole area; fenced shelter belts within northern paddock of rural lease as identified by FoAB. All of these options provide connectivity from the southern section of Aranda Bushland, across Bindubi Street to the Crown Road Reserve and existing Cook Horse Paddock plantings.

- Woodland restoration works on rural leased land adjoining the reserve would be subject to discussions with the rural landowner.

- With the support of FoAB, the Snow Gum Woodland area could be further enhanced by undertaking plantings additional to those already undertaken by FoAB. FoAB also identified this as an opportunity for them to source seed from *E. pauciflora* populations at similar altitude, propagate, grow and plant tubestock. The timing of seed collecting and propagation needs to be factored into the revegetation plan to allow sufficient time for the plants to be grown.

  Woody debris could be placed in the Snow Gum area prior to further plantings. This would provide some protection from grazing of tubestock as well as providing structure and habitat.

Notes:

Strategic Bushfire Management Plan (SBMP)

- The southern and northern sections of the reserve (Woodland and NTG) are identified as Landscape Fire Management Zones (potential for ecological burns as required).

Fire Management Guidelines for Land Management Activities

- The Snow Gum and NTG areas are not noted as having planned fuel reduction activities.

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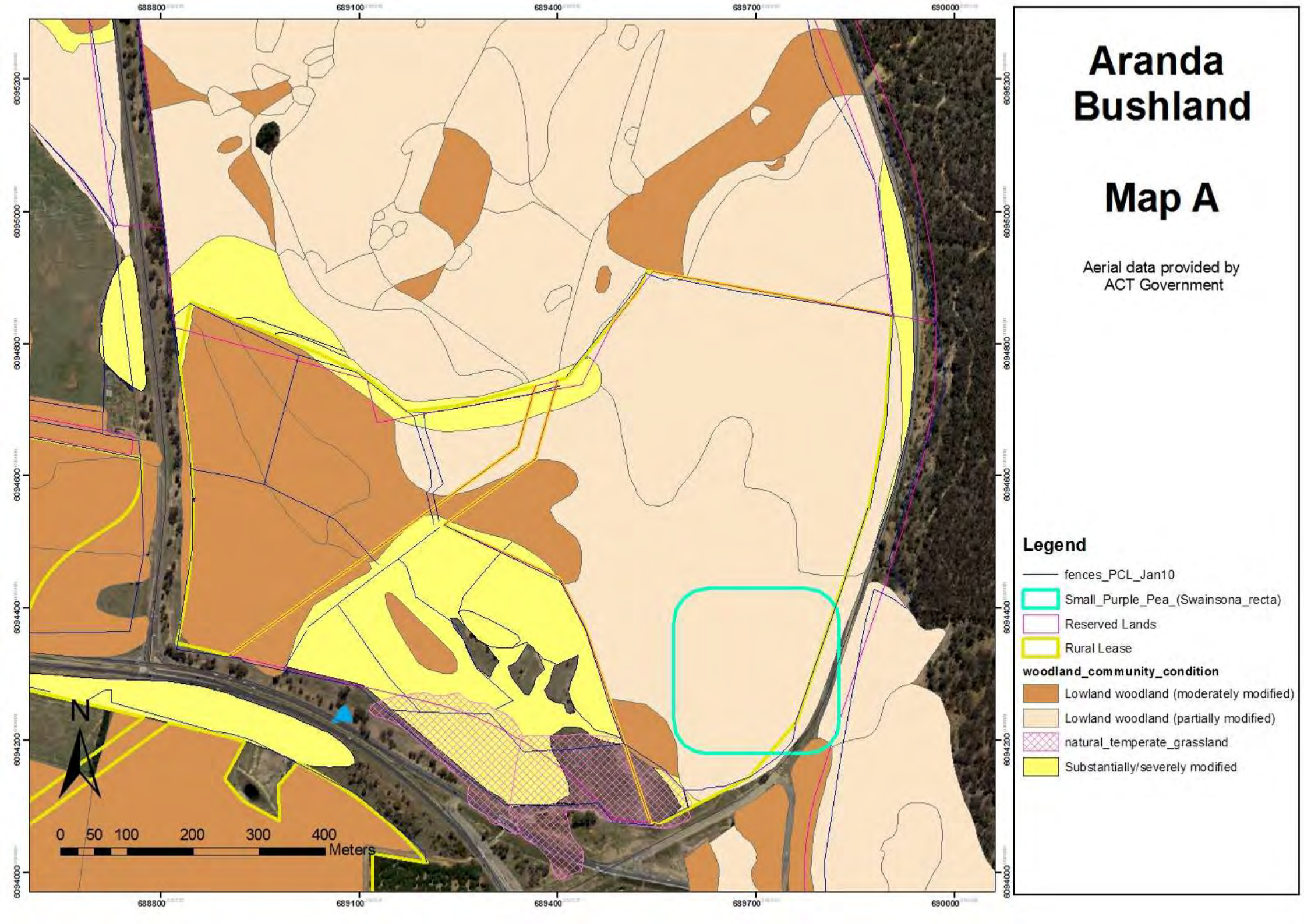


Aranda Bushland

Map A

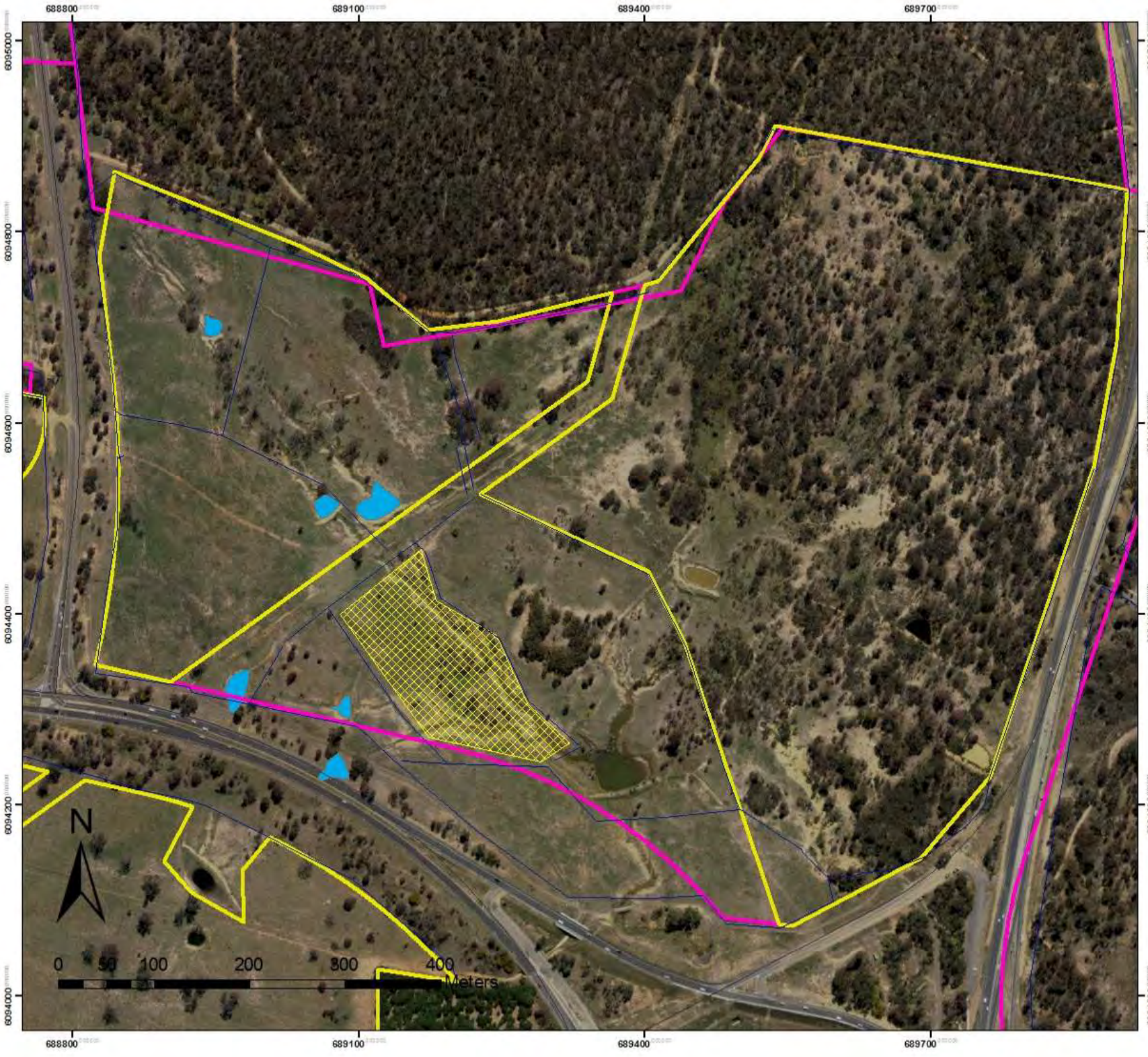
Aerial data provided by ACT Government

Legend

- fences_PCL_Jan10
- Small_Purple_Pea_(Swainsona_recta)
- Reserved Lands
- Rural Lease

woodland_community_condition

- Lowland woodland (moderately modified)
- Lowland woodland (partially modified)
- natural_temperate_grassland
- Substantially/severely modified



Aranda Bushland

Map B

Aerial data provided by
ACT Government

Legend

- fences_PCL_Jan10
- Woody Debris and Planting
- Rural Lease
- Reserved Lands

Attachment B - Mt Painter and Cook Horse Paddocks

Mt Painter comprises areas of moderately modified and severely modified woodland. Refer Map A attached. Cook Horse Paddocks adjoin the reserve to the east and there are areas of rural lease to the west and south. Substantial tubestock plantings were undertaken by ACT Parks and Conservation Service (PCS) on Mt Painter in early 2011. The Friends of Mt Painter (FOMP) have also been undertaking small scale plantings and regular weeding activities over many years with direction from the revegetation plan developed for Mt Painter by David Hogg in 2000. A map of the revegetation projects undertaken by FOMP is attached. The Hogg report identified woodland density plantings as one of the favourable options for revegetation of Mt Painter, to preserve views, allow for fire fuel reduction and enhance biodiversity. The restoration recommendations made in Table 1 have taken into consideration the following:

- FOMP have identified several areas for tubestock planting to enhance connectivity from the horse paddocks east to Aranda Bushland and from Mt Painter remnant vegetation west to the Pinnacle.

  Cook Horse Paddocks – FOMP recommend widening of existing shelter belts and establishment of new shelter belts. This removes land from horse agistment creating, from a management perspective, small impractical paddocks within the northern section of the horse paddocks.

  Instead, establishing a new shelter belt east/west across the paddocks at a width of between 20-30 metres provides connectivity between the paddocks and Aranda Bushland as well as benefits for grazing management, without major loss of agistment land. The managers of ACT Government horse paddocks (Territory Agistment) have provided in principle support for this option (refer Map B).

  In discussions with Territory Agistment it was noted that several of the existing shelter belt fences have recently been replaced or upgraded. It would be a substantial fencing investment to now remove these fences to widen the shelter belts. Supplementary tubestock plantings within existing shelter belts would provide species and structure enhancement enabling a cost effective biodiversity gain.

  Coulter Drive – two areas parallel to Coulter Drive were identified by FOMP for tubestock plantings. The area to the west of Coulter Drive is identified for bushfire mowing under the Fire Management Guidelines and therefore probably not suitable for large scale plantings which would impede mowing activities (reintroduction of specialist ground storey species that could persist under the mowing regime might be possible).

  The area of reserved land on the eastern side of Coulter Drive adjacent the rural lease has potential for either clumped or widely spaced tubestock plantings to extend the existing roadside plantings. The area may be subject to ecological burns under the Fire Management Guidelines and discussions would need to be held with the Fire Management Unit to ensure plant densities and species were appropriate and proposed burning regime would not impact on plantings (ie timing/frequency). (Refer Map B).

- Supplementary plantings for species and structural enhancement could be undertaken in the woodland area to the east of the horse paddocks (the 'Wildflower Triangle, adjacent to Bindubi Street) as well as within the Crown Road Reserve.

- There could be opportunity to collect *Swainsona recta* (threatened species) seed from the population in the southern section of Aranda Bushland and introduce this species into the Wildflower Triangle area of Mt Painter. The viability of this project would depend on the health and size of the existing Aranda population and whether seed collection would be permitted. Discussions would need to be held with ecologists within PCS and the Research and Planning Unit as to the viability of this proposal. FOMP would need to be active participants in this project. This option has not been included in Table 1.

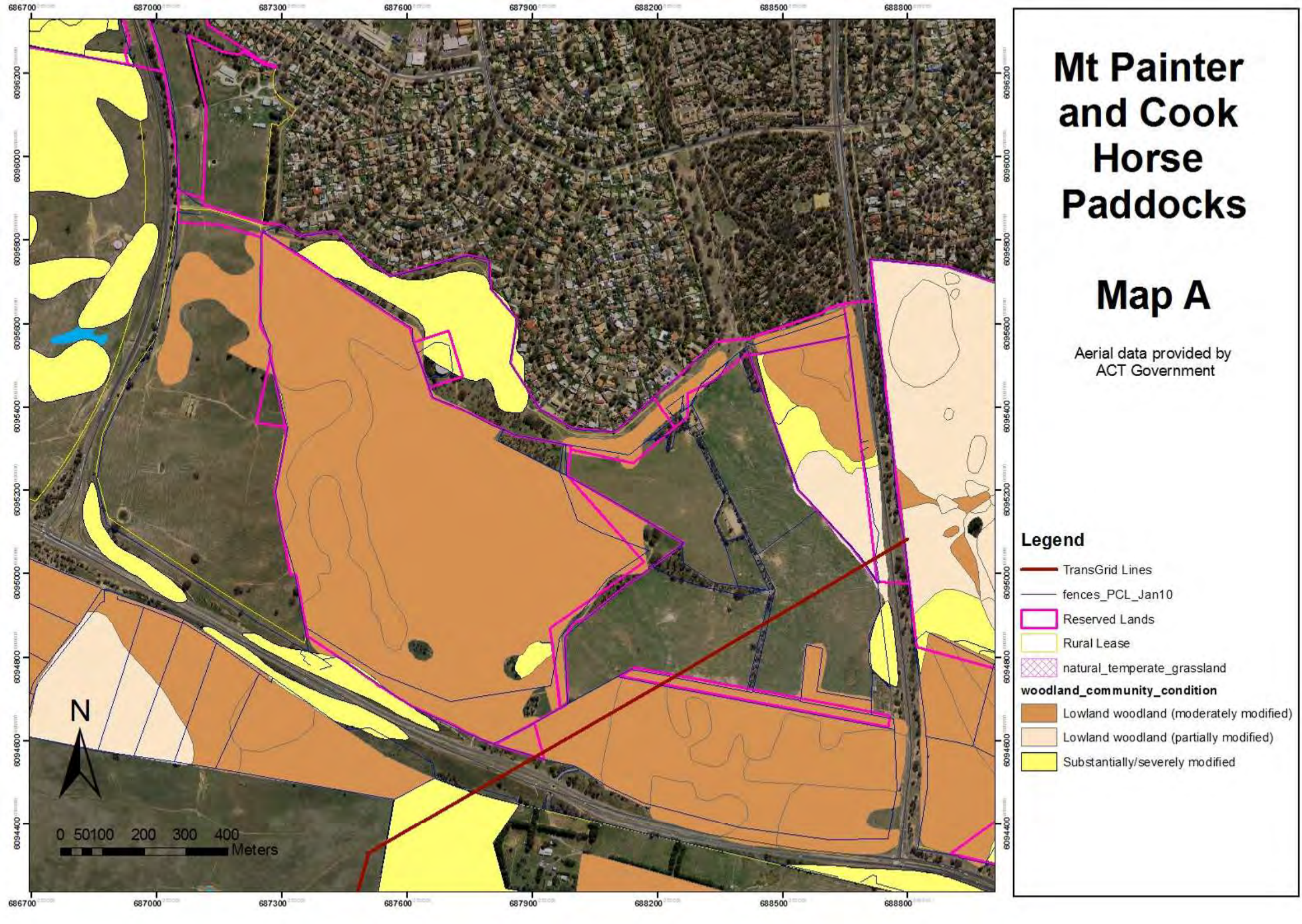
Notes:

Strategic Bushfire Management Plan (SBMP)

- The proposed tubestock planting area adjacent to Coulter Drive appears to be within the reserve and is identified as Landscape Fire Management Zone (potential for ecological burns as required).

Fire Management Guidelines for Land Management Activities

- The Guidelines identify most of the horse paddocks (all except the south west paddock) as grazing area. There is also a small triangular section of Nature Reserve adjoining the eastern boundary of the Tully lease which is noted as grazing for hazard reduction. A section of the reserve between the Captain Cook Track and the Painter Reservoir Track has been identified for hazard reduction burns. Some areas alongside tracks are identified for bushfire mowing.



Mt Painter and Cook Horse Paddocks

Map A

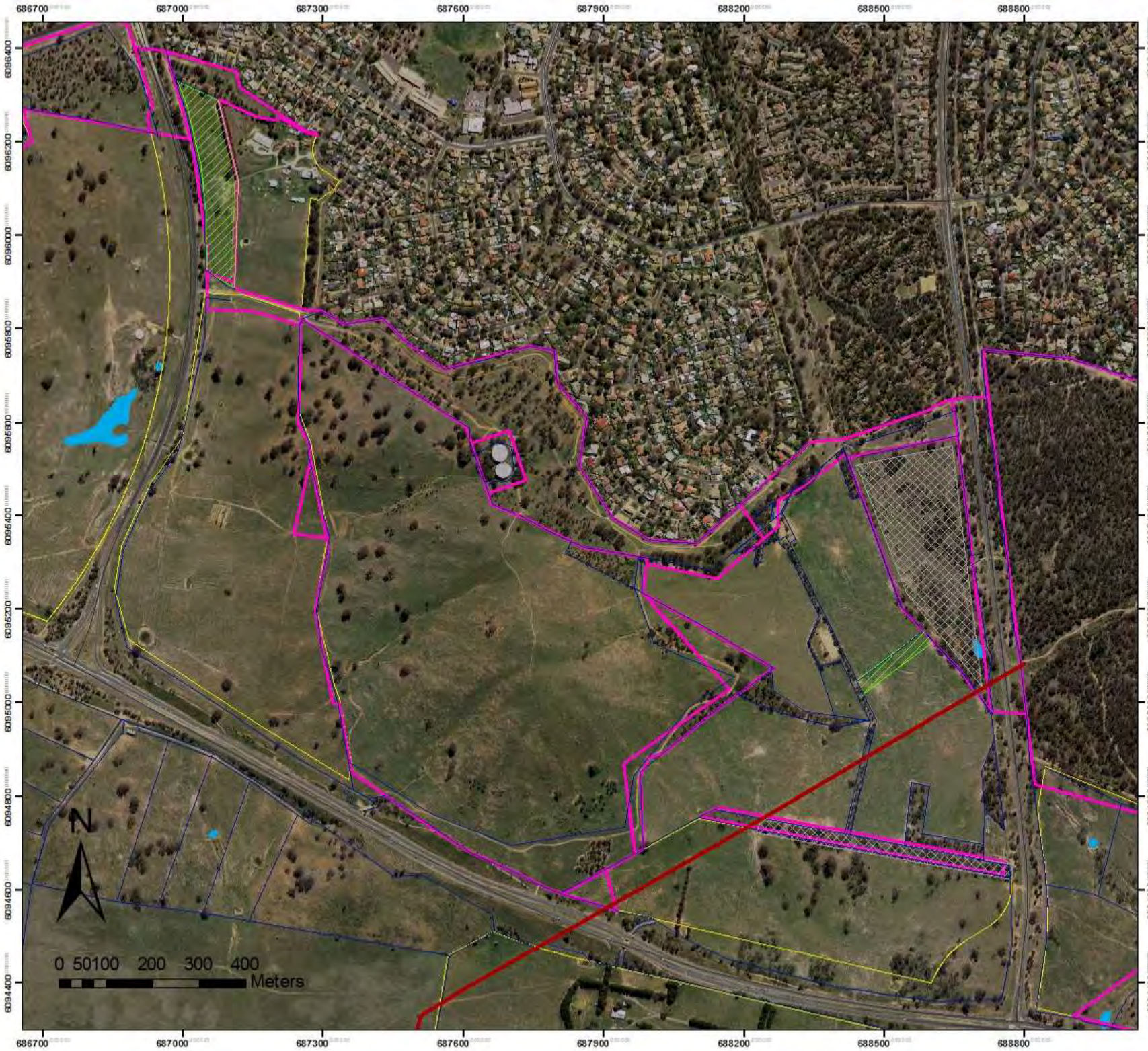
Aerial data provided by ACT Government

Legend

- TransGrid Lines
- fences_PCL_Jan10
- Reserved Lands
- Rural Lease
- natural_temperate_grassland

woodland_community_condition

- Lowland woodland (moderately modified)
- Lowland woodland (partially modified)
- Substantially/severely modified



Mt Painter and Cook Horse Paddocks

Map B

Aerial data provided by ACT Government

Legend

- TransGrid Lines
- fences_PCL_Jan10
- Enhancement Planting_2
- Tubestock Planting_2
- Reserved Lands
- Rural Lease

Attachment C - The Pinnacle and North Kama

Much of The Pinnacle Nature Reserve is classified as Substantially or Severely Modified Woodland. There is *Aprasia parapuchella* habitat noted within the central section of the reserve. North Kama is classified as partially or moderately modified woodland. The rural lease to the south east of The Pinnacle comprises areas of Substantially or Severely modified woodland. There is a narrow strip of rural leased land to the west of the reserve. The restoration recommendations made in Table 1 have taken into consideration the following:

- The Friends of The Pinnacle (FoTPIN) are already undertaking small community planting activities within the reserve for species enhancement. They have proposed further plantings (FoTPIN map attached – provided by John Brannan February 2011 along with associated revegetation plan). The submission from the Belconnen Hills Park Care Groups (Proposed Components of a Lower Molonglo Woodlands Restoration Strategy) also outlines revegetation options (noted below).

- There have been several plantings within The Pinnacle over the years (refer FoTPIN map attached). These plantings have been successful however now lack structure and understorey diversity in some areas. It is unknown as to whether understorey species were included in the original plantings. Clumped understorey plantings within some of these areas would improve small bird habitat.

- Within The Pinnacle there are several rocky knoll areas and some areas of *Aprasia parapuchella* habitat (noted on Map A attached – GIS threatened species data provided by ACT Government). These open grassy and rocky areas provide habitat for a wide range of species and should be maintained as such. Some areas noted for revegetation on the FoTPIN map may impact on the *Aprasia parapuchella* habitat (areas 4 and 5).

- The area known as North Kama is zoned Strategic Fire Fighting Advantage Zone (see notes below). Improving vegetation connectivity and enhancing remnant vegetation by adding under/mid- storey species may be in conflict with the aims of this zone. Discussions would need to be held with the Rural Fire Service to determine a reasonable compromise so that both fire and ecological outcomes can be reached. The following revegetation options would be dependent on the outcome of these discussions:

    - The area shown in red as ‘A’ (on Map B attached) has a steep incline down to William Hovell Drive. There is potential to plant tubestock to enhance this area of woodland (predominantly *Eucalyptus dives* on the slopes). This area is not currently grazed (pers. comm. Kate Boyd), however is noted as potential grazing for hazard reduction. Given the steep conditions and potential for erosion, this area may be better suited to a hazard reduction method other than grazing which would allow species enhancement tubestock planting.

    - The Belconnen Hills submission from the Park Care groups notes planting of ‘islands’ across the landscape in 1ha cells, at distances of no more than 100m apart where there are currently weeds / no trees, and species enhancement plantings in areas comprising weeds / trees. Given the potential for grazing for hazard reduction (see notes below) in the North Kama area, fencing of these plantings would be required. It would be more practical and economical to utilise existing fencing wherever possible and to extend and enhance areas of remnant woodland or paddock trees rather than construct many new fences around new plantings. Taking this into account, suggested planting areas are shown on Map B attached.

    - Potential enhancement plantings are indicated on Map B. Woody debris could also be placed in these areas for structure as well as tubestock planting protection. Woody debris has not been costed for this site.

Notes:

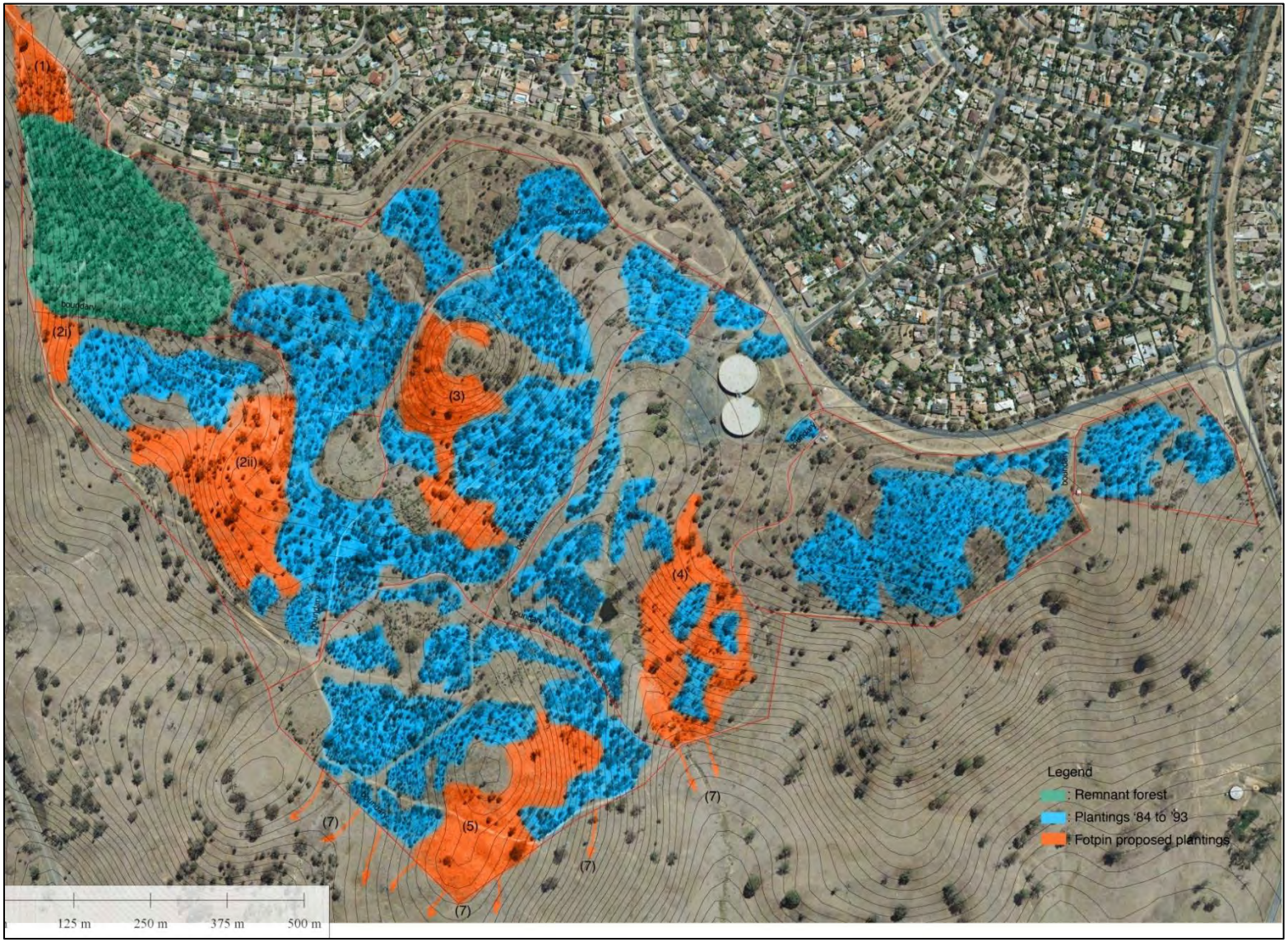
Strategic Bushfire Management Plan (SBMP)

- The whole area referred to as North Kama is identified as Strategic Fire Fighting Advantage Zone. These areas are 'corridors established to break up major fire runs in instances where initial attack fails …..These zones are strategically located to slow the spread of unplanned fires and reduce fire intensity and spotting.'

Fire Management Guidelines for Land Management Activities

- The Guidelines identify most of The Pinnacle for potential hazard reduction burns. The area south of The Pinnacle (known as North Kama) is identified as grazing for hazard reduction, although grazing is not currently undertaken across the whole area (Pers. comm. Kate Boyd).

FoTPIN Map – provided by John Brannan February 2011



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Key to FotPIN Planting Areas 1-7 Noted on Map – extract from Draft FoTPIN Revegetation Plan (undated, provided Feb 2011)

(1) Forest Block - Dungowan St to current Red Stringybark forest

Current forest and understory to be extended northwards to fill the triangle formed by the converging Hawker? and Boundary? tracks.

(2) Kama paddock

(i) Extension of current SW corner of Red Stringybark forest to fill the rocky slopes to the south and link to the existing box woodland regrowth. Extension to include understory shrubs (bursaria and cassinia)

(ii) Creation of a new dry sclerophyll forest running from the box woodland regrowth in the NW of the Kama paddock roughly SE down to the regrowth in the SE section of the paddock. The new forest to also to extend down the west-facing rocky slopes, but excluding grassy plots being used in the Native Grass Restoration project.

(3) Central paddock

Extension of the current box woodland on the eastern slope of the Pinnacle further uphill and around to the southern and western slopes, possibly as far as the Summit path to link to the Hawker paddock woodlands. Use of shrubs to help contain and transform grassy habitat currently heavily used by rabbits.

(4) Dam paddock

(i) Enhance and expand the existing treed areas uphill and to the east of the dam, linking to other treed areas north near the creek line. Plantings to complement species currently thriving in that environment (E. rossii, E. macrorhyncha, etc.).

(ii) Extend plantings down the creek line below the dam towards the southern boundary and beyond. Possible introduction of Allocasuarina verticillata groves in this area to attract Glossy Black and other Cockatoos. Groves to extend down into the Bottom Pinnacle where feasible.

(5) Southern paddock

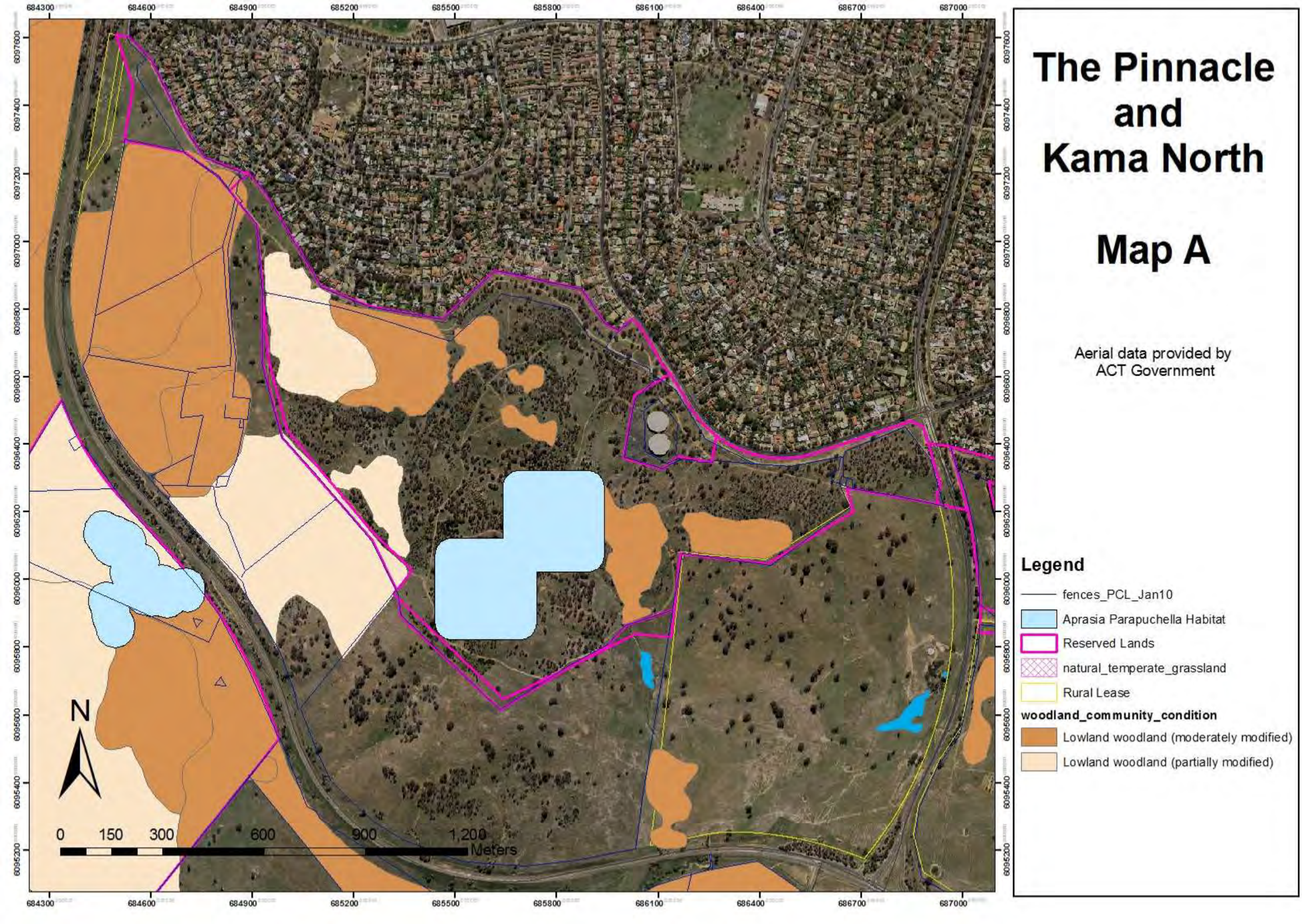
Extend the existing plantings in the southern half of the paddock (mixed acacia and eucalypt spp and acacia monoculture plantings along the southern boundary) to cover the currently open summit and thereby link the plantings on the east and west sides of the hill. Species used should blend with the existing plantings but should also favour the use of E. macrorhyncha to form the basis of a new dry sclerophyll forest extending down into the Bottom Pinnacle, re-establishing the forest that probably existed prior to clearing.

(6) Weetangera paddock

Use of the principles employed in the Bradley method to encourage natural propagation of native species and expansion of the existing plantings. Possible inclusion of shrub plantings to help suppress weed species.

(7) Bottom Pinnacle

Establish new plantings that link and expand the existing pockets of remnant vegetation. West and south-facing slopes to be planted with known endemic dry sclerophyll species (E. macrorhyncha, E. rossii, E. bridgesiana, bursaria spp), with faster growing acacia spp and shrubs to be planted in gully areas for erosion control. Additional plantings of box woodland species (E. blakelyi, E. melliodora, E. rossii, etc.) running east-west in open areas between existing remnants, linking the Bottom Pinnacle and North Kama remnants and ultimately forming a continuous woodland habitat from the Pinnacle NR to South Kama south of William Hovell Drive.



The Pinnacle and Kama North

Map A

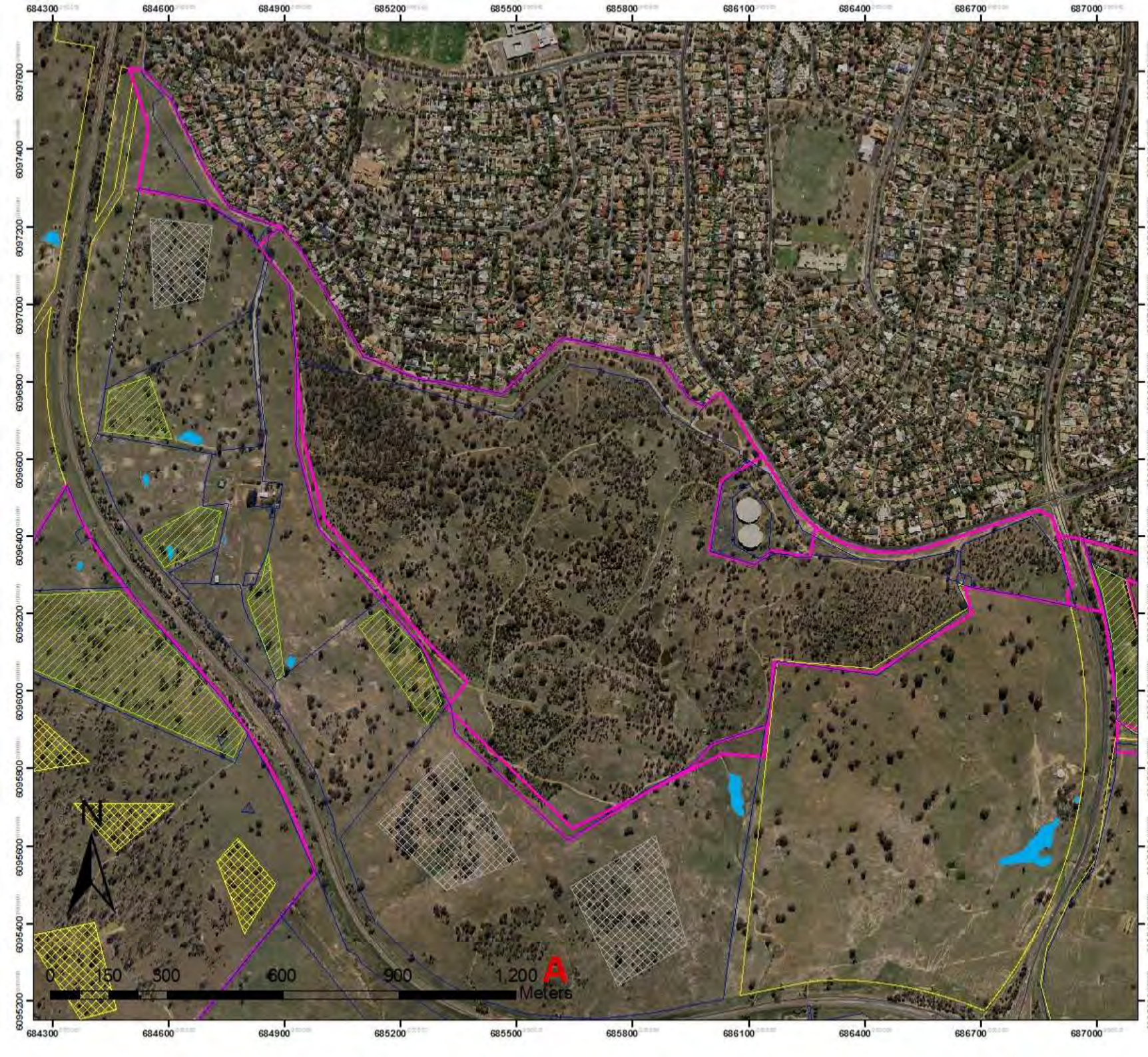
Aerial data provided by ACT Government

Legend

- fences_PCL_Jan10
- Aprasia Parapuchella Habitat
- Reserved Lands
- natural_temperate_grassland
- Rural Lease

woodland_community_condition

- Lowland woodland (moderately modified)
- Lowland woodland (partially modified)



The Pinnacle and Kama North

Map B

Aerial data provided by ACT Government

Legend

- fences_PCL_Jan10
- Enhancement Planting_2
- Tubestock Planting_2
- Woody Debris and Planting_2
- Reserved Lands
- Rural Lease

Attachment D - Kama Nature Reserve

Kama Nature Reserve comprises areas of partially and moderately modified woodland as well as Natural temperate Grassland in the southern section of the reserve, adjoining the Molonglo River. The Brown Treecreeper, a threatened species, has been recorded in the reserve. The restoration recommendations made in Table 1 have taken into consideration the following:

- *Aprasia parapuchella* habitat occurs along the Molonglo River Corridor just south of the reserve and there is also a section just south of William Hovell Drive in the reserve (PCL GIS data 2005). Restoration activities in these areas should be targeted at weed control.

- The Belconnen Hills submission (1.c) notes 'active regeneration' along Deep Creek as an option to improve connectivity to the Molonglo River, however Deep Creek is within the proposed Molonglo Stage 3 development. The proposed residential development area has not been included in this report, however there may be future opportunity through the public consultation system for community groups to comment on proposed park and urban open space areas within the development, and make recommendations about species selection and connectivity options within the development.

- There are two dams in the southern section of the reserve within the Natural Temperate Grassland (NTG). Improving the habitat around these dams would provide linkages from the woodland to the Molonglo River Corridor without major impact of the integrity of the NTG. Fringing vegetation, shrubs, a few Eucalypts, perching points (ie debris in dam) would provide habitat and connectivity and create a wetland environment rather than a farm dam environment. These proposed areas are small (<1ha) and would only require a small planting activity.

- GIS data from PCL indicates the two small gullies below these dams have already been fenced. There are scattered trees within one of these areas (northernmost dam), however small clumped plantings within these fenced areas would provide improved connectivity to the river corridor, without substantial impact on the NTG or the creation of 'fire wicks'. As this part of the reserve is noted as having hazard reduction burns as needed, but no noted as having grazing, planting of the wetland areas should not be impacted by stock.

- Natural regeneration of *Eucalyptus blakleyi* is occurring within the central area of the reserve. Grazing is proposed for hazard reduction purposes within the reserve. Species enhancement plantings within this area could be undertaken if stocking could be managed accordingly. Two options are: subdivision fencing to allow for changes to the grazing regime and resting of paddocks where plantings could been undertaken; or placement of clumped woody debris in patches of the woodland with stands of remnant trees and then planting within the woody debris clumps which would provide some protection from stock. The clumped woody debris option has been included in the costing, as this option improves structural and habitat outcomes for species such as the Brown Treecreeper. The areas shown on Map B are suggestions based on the presence of large remnant trees visible on the aerial map, however existing woody debris (and decay class) would need to be assessed. The cost provided in Table 1 is based on the area shown on Map B (approximately 9.5ha).

- Given the potential for grazing (see below), plantings would need to be protected. Planting of appropriate species within the existing fenced area (shown on Map B) in the northern section of the reserve would improve habitat for small birds – which was an action identified in the Implementation Plan. Movement of stock through the two small northern paddocks may be necessary to gain access to the central area of the reserve. A fenced stock laneway through this paddock to access the central area of the reserve would improve stock movement through the proposed planting area, if grazing is to be a regular activity. Part of the proposed planting site is noted as *Aprasia parapuchella* habitat (PCS GIS data 2005) and planting may need to be restricted to the western section of this paddock to preserve this habitat.

- The reserve is noted as habitat for several endangered bird species (ACT Government and COG GIS data 2005).

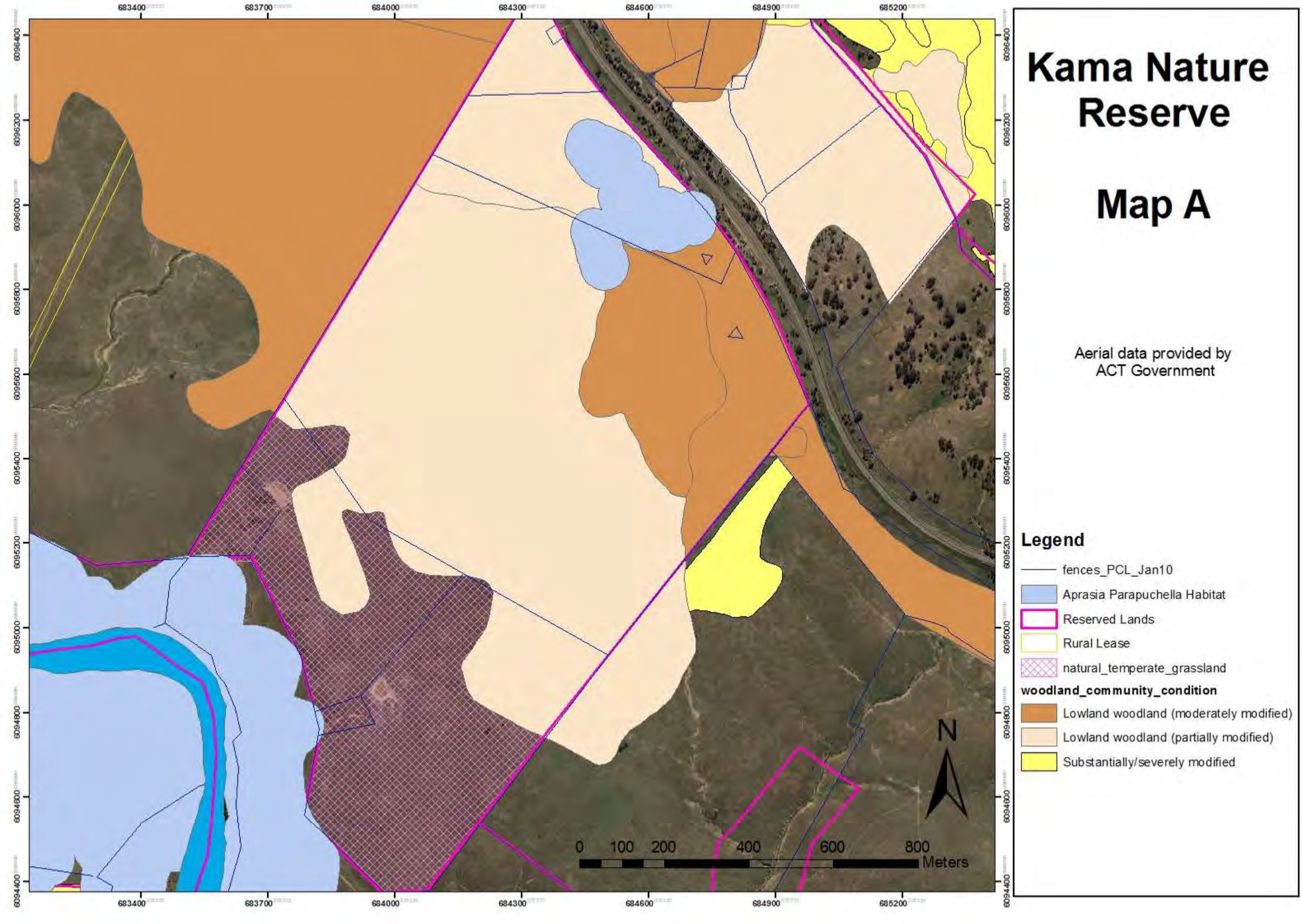
Notes:

Strategic Bushfire Management Plan (SBMP)

- Kama Nature Reserve is identified as Landscape Fire Management Zone (potential for ecological burns as required).

Fire Management Guidelines for Land Management Activities

- The Guidelines identify Kama Nature Reserve as a mix of grazing and hazard reduction burns (southern section).



Kama Nature Reserve

Map A

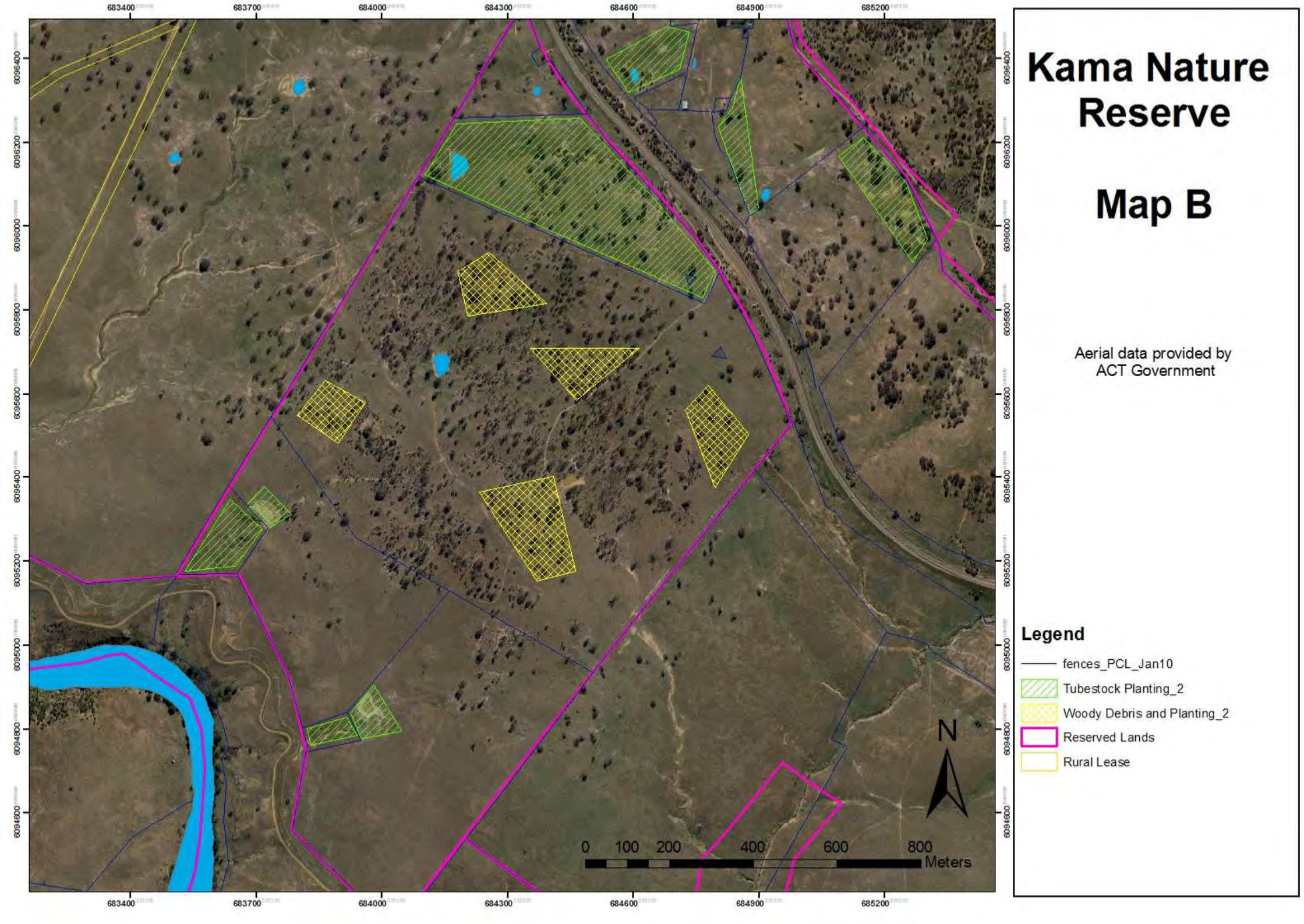
Aerial data provided by ACT Government

Legend

- fences_PCL_Jan10
- Aprasia Parapuchella Habitat
- Reserved Lands
- Rural Lease
- natural_temperate_grassland

woodland_community_condition

- Lowland woodland (moderately modified)
- Lowland woodland (partially modified)
- Substantially/severely modified



Kama Nature Reserve

Map B

Aerial data provided by ACT Government

Legend

- fences_PCL_Jan10
- Tubestock Planting_2
- Woody Debris and Planting_2
- Reserved Lands
- Rural Lease

Attachment E - Lower Molonglo to Murrumbidgee

The areas west of Kama Nature Reserve comprise rural lease land, most of which is Moderately Modified Woodland with some areas of Substantially or Severely Modified Woodland. Refer Map A attached. The rural enterprises in this area include sheep/cattle grazing, vineyard, and horse Agistment. These woodland areas provide connectivity from Belconnen Hills and Kama to the Molonglo and Murrumbidgee River Corridors, including Woodstock Nature Reserve (adjacent to the Lower Molonglo Water Treatment Plant) and remnant woodland south of the Molonglo River on rural leased land.

Consideration has been given to the potential revegetation / enhancement opportunities on rural leased lands and these options may form a part of this plan if rural landowners are keen to participate. Discussions will need to be held with individual rural landowners regarding opportunities which may arise under this project.

The restoration recommendations made in Table 1 have taken into consideration the following:

- One section of Woodstock Nature Reserve area is noted as Special Purpose Reserve (ACT Government GIS layer – reserves). Some sections of this reserve are noted as Moderately Modified Woodland, however some of these sections may be previously remnant enhancement sites – from the aerial images available there is an apparent linear effect. Enhancement plantings to extend and diversify these areas may be desirable – it is unknown whether these areas are fenced or require fencing. These areas are in more gentle sloping, accessible sections. This section of 'Special Purpose Reserve' doesn't appear to be fenced from the adjoining rural lease (PCL GIS fence data 2010). Planting could also be undertaken to improve connectivity between the plantings/remnant and the river corridor – suggested planting sites are indicated on Map B attached. Current land management activities (grazed?) and existing fencing arrangements need to be determined prior to any revegetation activities.

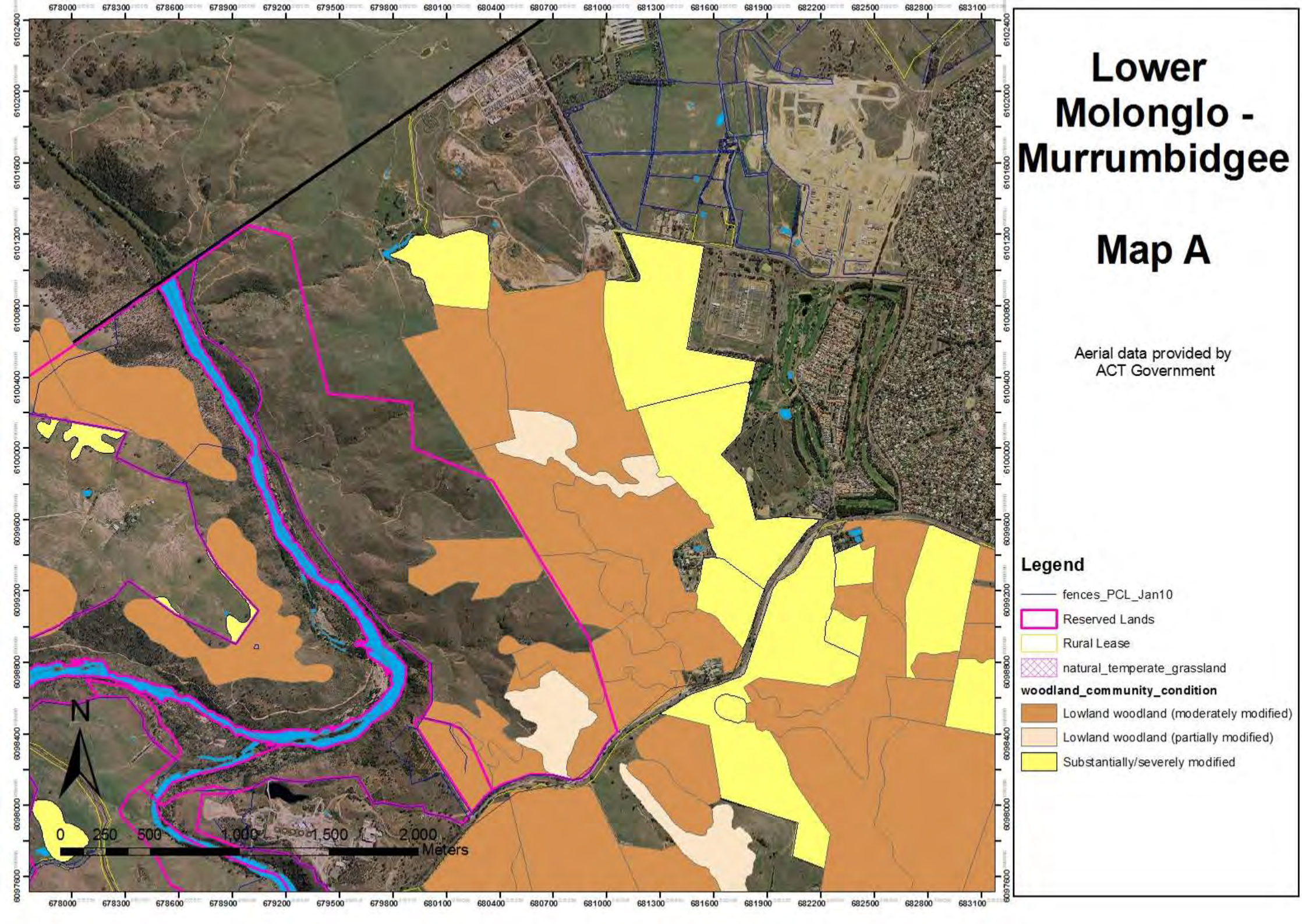
Notes:

Strategic Bushfire Management Plan (SBMP)

- Sections of Woodstock Nature Reserve are identified as Agricultural Fire Management Zone (rural production activities generally result in reduced bushfire risk) or Landscape Fire Management Zone (potential for ecological burns as required).

Fire Management Guidelines for Land Management Activities

- The Guidelines identify the Molonglo River Corridor as grazing zone.



Lower Molonglo - Murrumbidgee

Map A

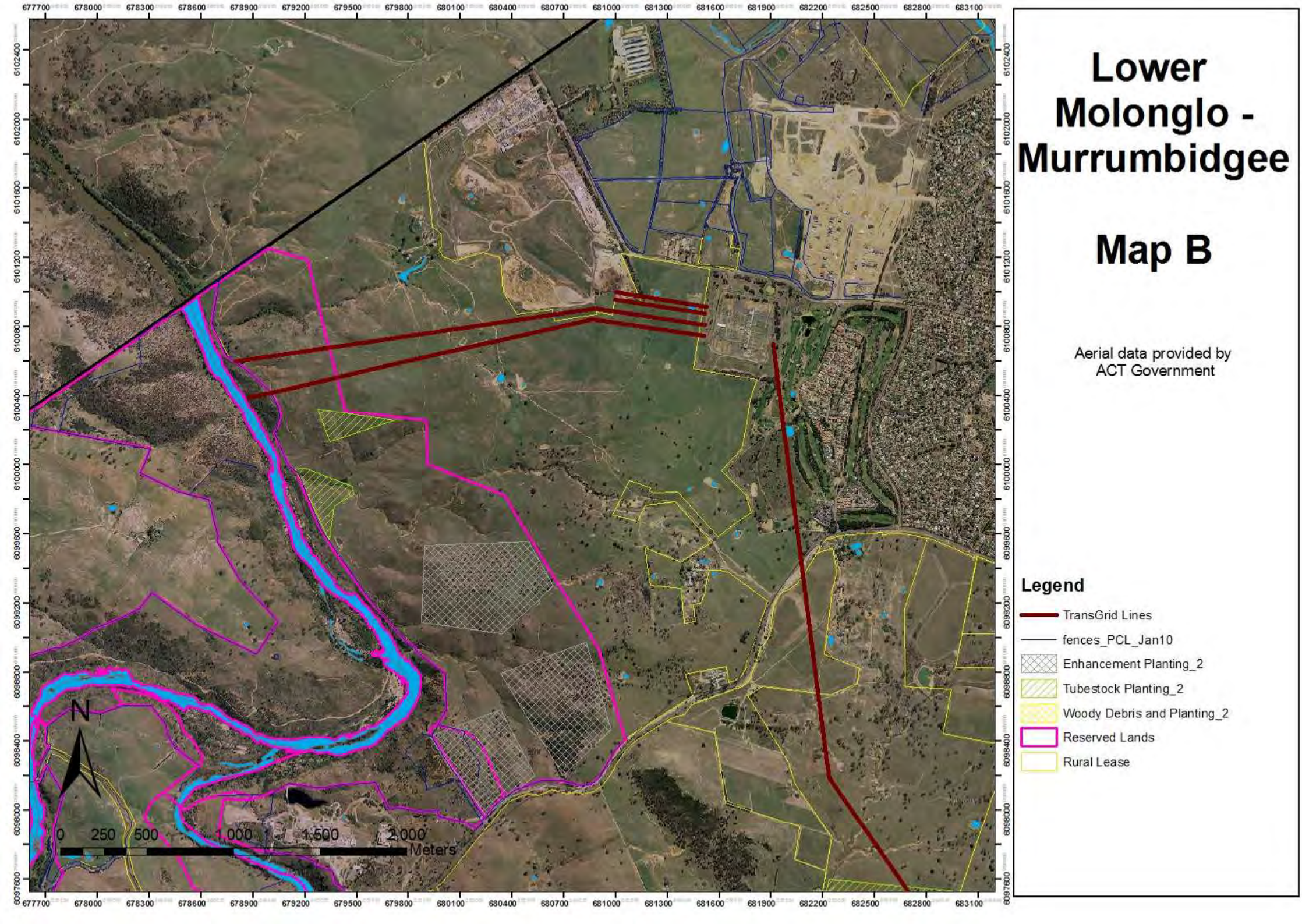
Aerial data provided by ACT Government

Legend

- fences_PCL_Jan10
- Reserved Lands
- Rural Lease
- natural_temperate_grassland

woodland_community_condition

- Lowland woodland (moderately modified)
- Lowland woodland (partially modified)
- Substantially/severely modified



Lower Molonglo - Murrumbidgee

Map B

Aerial data provided by ACT Government

Legend

- TransGrid Lines
- fences_PCL_Jan10
- Enhancement Planting_2
- Tubestock Planting_2
- Woody Debris and Planting_2
- Reserved Lands
- Rural Lease