



The Extent and Condition of Woody Vegetation Communities in the Ginninderry Conservation Corridor, ACT

Final 01 – August 2022
Prepared for the Ginninderry Conservation Trust

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We acknowledge the Traditional Custodians of the land on which we work. We pay our respects to Elders past and present.

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1 Introduction

Capital Ecology Pty Ltd (Capital Ecology) has been commissioned by the Ginninderry Conservation Trust (GCT) to assess and map the extent and condition of the woody vegetation communities within the ACT portion of the Ginninderry Conservation Corridor (GCC) (total area = 248 ha of 359 ha, refer Figure 1).

The GCC is managed by the GCT for its biodiversity conservation values, and as an offset for the development of the Ginninderry Development Area. The extent and condition of natural grassland communities within both the GCC and the Ginninderry Development Area was mapped by Capital Ecology (2020¹) (Figure 2). As shown in Figure 1 and Figure 2, areas supporting either a woodland or dry sclerophyll forest PCT (248 ha) were excluded from the grassland assessment. Parts of these areas are known to support woodlands which meet the definition for the 'White box - Yellow box - Blakely's red gum grassy woodlands and derived native grasslands' threatened ecological community (TEC) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the ACT *Nature Conservation Act 2014* (NC Act), as well as habitat for threatened flora and fauna species (e.g. Hoary Sunray *Leucochrysum albicans*, Pink-tailed Worm Lizard *Aprasia parapulchella*, Superb Parrot *Polytelis swainsonii*). Box-Gum Grassy Woodland is listed as critically endangered pursuant to the EPBC Act and endangered pursuant to the NC Act.

The objective of this study was to employ a logical and repeatable Geographic Information System (GIS) supported assessment methodology and apply this to produce fine-scale baseline mapping of the current on-ground extent and condition of the woody vegetation communities within the GCC. This methodology was first developed by Capital Ecology and used in 2017 to assess seven grassland sites (Capital Ecology 2018a²) and twelve woodland sites (Capital Ecology 2018b³) in the ACT and nearby NSW, and it has been applied to assess numerous other sites across subsequent years. The mapping presented herein is therefore consistent with that mapped across the sites in 2017 and provides an accurate and reliable foundation for the GCT's ongoing management and future monitoring of the significant biodiversity values within the GCC.

This report is structured in the following manner.

- Section 2 – Methods. Section 2 provides a detailed description of the mapping methodology.
- Section 3 – Results. Section 3 provides the results of the mapping study, presented as text, tables and GIS-prepared figures. A brief discussion is provided describing any interesting observations from the data, or otherwise observed.
- Section 4 – Summary and Conclusion. Section 4 provides an overview of the study and outline of the key conclusions and recommendations.

¹ Capital Ecology (2020). *The Extent and Condition of Natural Temperate Grassland of the South Eastern Highlands in the Ginninderry Project Area*. Final 02 – July 2020. Prepared for The Riverview Group Pty Ltd. Authors: S. Reid, S. Thompson, and R. Speirs. Project no. 2916.

² Capital Ecology (2018a). *2017 Grassland Quality and Extent Mapping*. April 2018. Prepared for Environmental Offsets, ACT Parks and Conservation Service. Authors: S. Reid and R. Speirs. Project no. 2759.

³ Capital Ecology (2018b). *2017 Woodland Quality and Extent Mapping – ACT Government Environmental Offsets*. May 2018. Prepared for Environmental Offsets, ACT Parks and Conservation Service. Authors: S. Reid and R. Speirs. Project no. 2756.

- References – A list of the studies, guidelines, and other documents reviewed and considered during development of the mapping methodology and its on-ground application.
- Appendices – Appendix 1 and Appendix 2 provide the study data presented as summary tables. Appendix 3 provides the Excel Spreadsheets (excel files in separate .zip folder) and Appendix 4 provides the GIS Data (shapefiles in separate .zip folder).

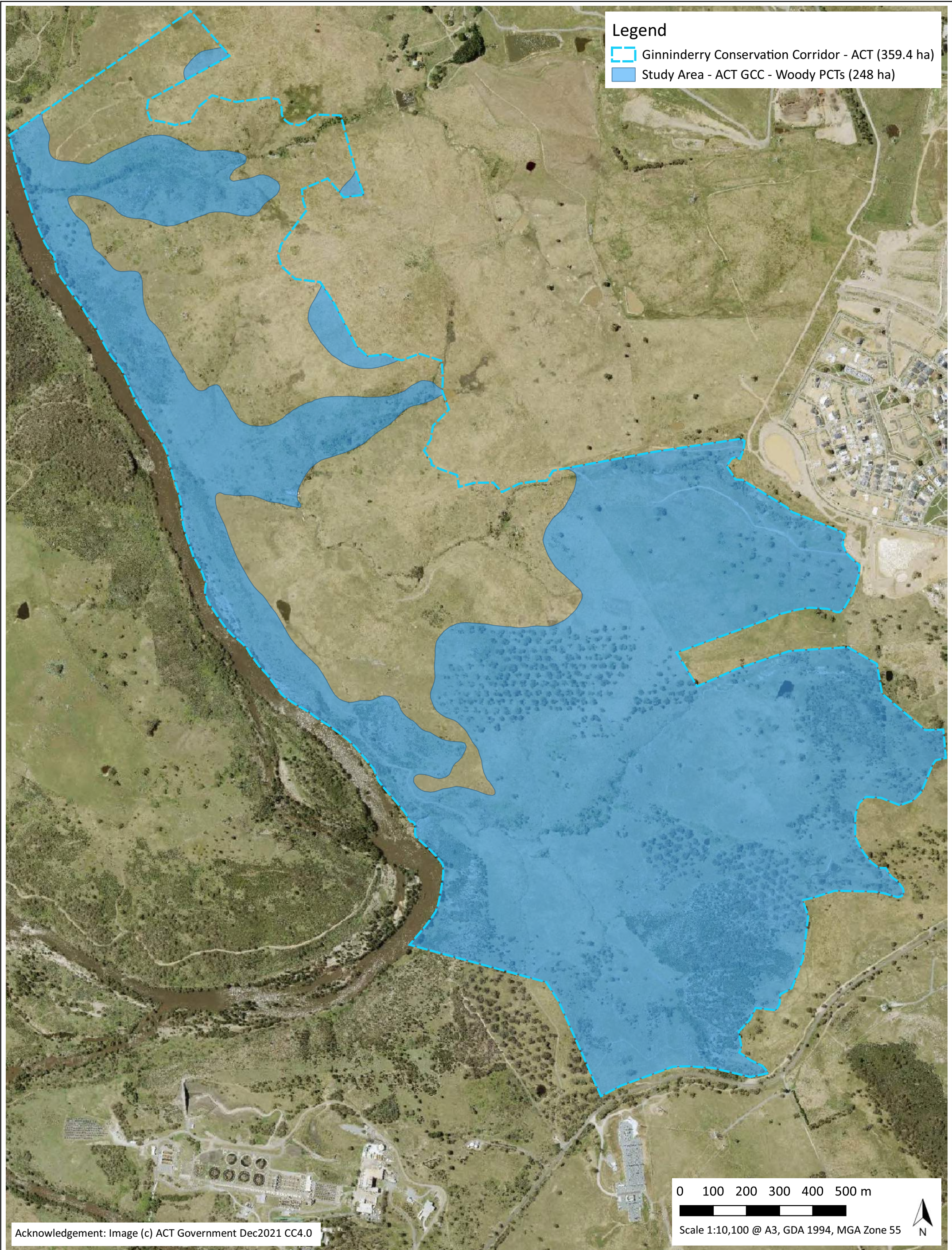


Figure 1. Study Area on Aerial Imagery

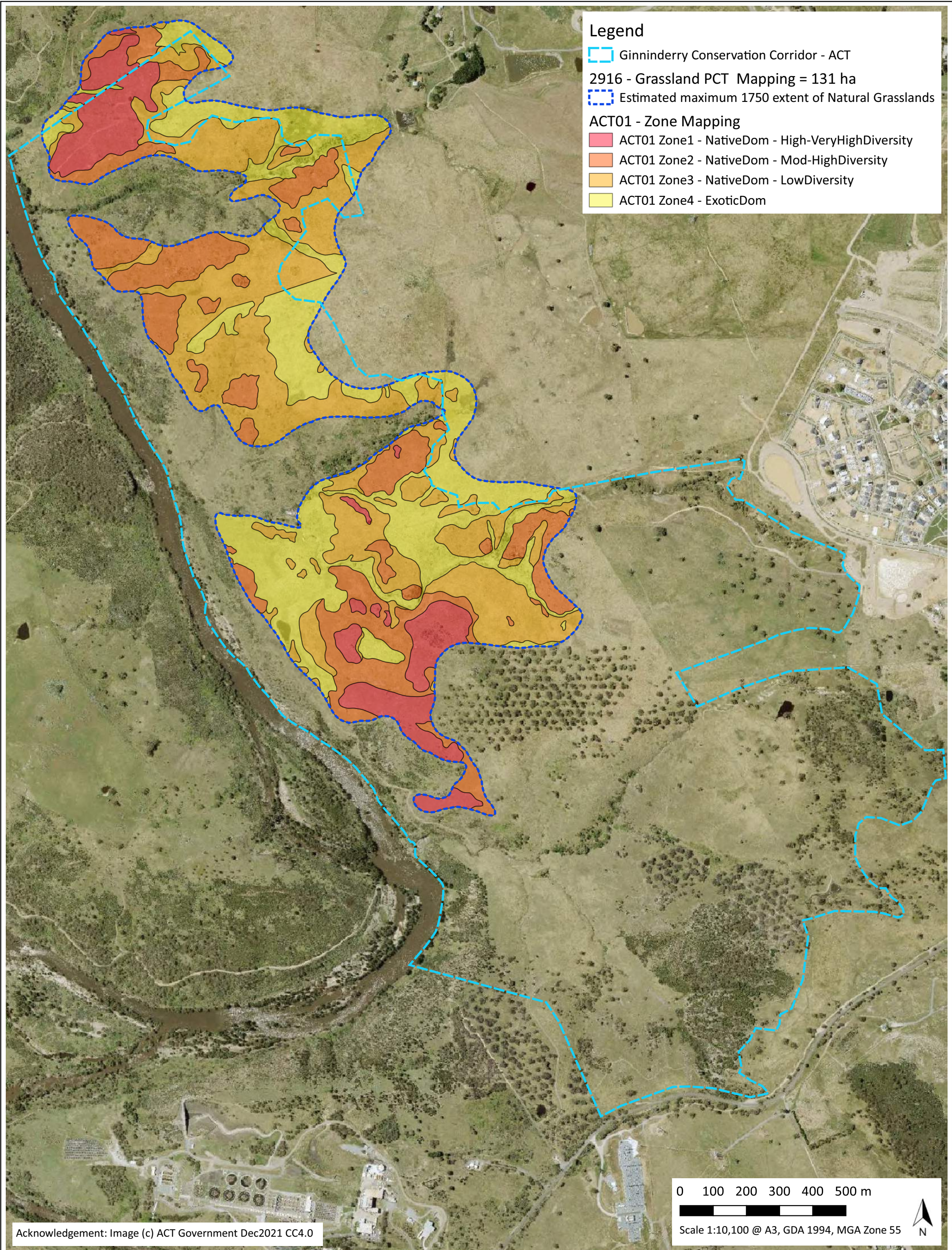


Figure 2. Grassland PCT Mapping (Capital Ecology 2020)

2 Methods

2.1 Four-step temperate vegetation mapping method

The four-step method employed for this study was developed by Capital Ecology and has been trialled and improved during its subsequent application at numerous sites across the Southern Tablelands of NSW and the ACT. The method was employed to map the natural grassland at East Jerrabomberra and AMTECH offset reserves in spring 2016, together with the woodland and derived grassland at Mulangarri and Gungaderra offset reserves (Capital Ecology 2017⁴). The method was then used in 2017 to assess seven grassland sites (Capital Ecology 2018a) and twelve woodland sites (Capital Ecology 2018b), and it has been applied by Capital Ecology to assess numerous other sites across subsequent years. The four-step method can be used to assess and map each of the Plant Community Types (PCTs) occurring in the lowland areas of the Southern Tablelands of NSW and the ACT (noting that its suitability in NSW is now limited as substantial sites are generally mapped applying the NSW Biodiversity Assessment Method⁵). As detailed below, the four-step method draws upon elements of the relevant contemporary Commonwealth Government (Commonwealth of Australia 2006⁶, Commonwealth of Australia 2016⁷), ACT Government (ACT Government 2015a⁸, ACT Government 2015b⁹; ACT Government 2015c¹⁰), and NSW Government (NSW Government 2014¹¹, NSW Government 2020) vegetation mapping guidelines, together with other technical guidelines, notably Rehwinkel (2015¹²). Each step of the four-step method has a specific purpose and must achieve a specific outcome which generally becomes the foundation for the subsequent step.

Repeatability is a key element of vegetation mapping methodologies when applied to offset sites which are to be periodically monitored. Accordingly, the four-step method is described in full below. While the methodology is similar for grassland and woodland mapping, any differences in methodology between grassland and woodland mapping are detailed below.

⁴ Capital Ecology (2017). *ACT Environmental Offsets – 2016 Grassland Mapping Report*. Prepared for ACT Government Parks and Conservation Service.

⁵ NSW Government (2020). *Biodiversity Assessment Method*. Department of Planning, Industry and Environment.

⁶ Commonwealth of Australia (2006). *Policy Statement 3.5: White Box – Yellow Box – Blakely’s Red Gum grassy woodlands and derived native grasslands*. Commonwealth Department of Environment and Heritage.

⁷ Commonwealth of Australia (2016). *Approved conservation advice for the Natural Temperate Grassland of the South Eastern Highlands (NTG–SEH) ecological community*.

⁸ ACT Government (2015a). *Monitoring Guidelines for Natural Temperate Grasslands*. Conservation Research, October 2015.

⁹ ACT Government (2015b). *Monitoring Guidelines for Box-Gum Woodlands*. Conservation Research, October 2015.

¹⁰ ACT Government (2015c). *ACT Environmental Offsets Calculator Assessment Methodology*. Environment and Planning. May 2015.

¹¹ NSW Government (2014). *BioBanking Assessment Methodology 2014*. NSW Government Office of Environment and Heritage.

¹² Rehwinkel (2015). *A Revised Floristic Value Scoring Method to assess grassland condition, an addendum to Friends of Grasslands Forum Proceedings* (30 October – 1 November 2014).

2.1.1 Step 1. Plant Community Type (PCT) mapping

Purpose = to identify and delineate the boundaries of each PCT within the site.

Outcome = GIS mapping of PCT boundaries.

The on-ground boundaries of each of the PCTs (as defined in ACT Government 2015d¹³) present within the site were accurately mapped using either hand-held GPS or by marking boundaries directly onto high resolution orthorectified aerial photograph field maps (displaying the most recent ACT Government's aerial imagery available under CC.4.0) with one metre contours. PCT boundary delineation was undertaken by walking or driving (as deemed most suitable), carefully determining and recording the boundary alignment.

The vegetation across the GCC has undergone various types and degrees of modification over the last 150 years. This modification often removes or disguises the elements which would have once clearly defined the PCT boundaries (noting that ecotones are usually gradual transitions between vegetation communities, often in excess of 50 m in width). As such, the PCT boundary delineation involved carefully reading the landscape, considering numerous less conspicuous landscape elements, such as the:

- presence, species, growth form and density of remnant canopy trees and/or stags or stumps of these;
- presence and species of midstorey shrubs and trees;
- floristic composition of the groundstorey; and
- the landscape position and other geographical features (elevation, aspect, soils, apparent hydrology etc.).

Step 1 is critical to the accurate mapping of temperate vegetation communities and was completed and mapped in GIS prior to moving on to Step 2.

Note: The portions of the GCC identified as supporting a natural grassland PCT (PCT-ACT01) have been mapped applying this method and are presented in Capital Ecology (2020).

2.1.2 Step 2. Vegetation zone definition and mapping

Purpose = to identify and delineate the boundaries of each vegetation zone within the site.

Outcome = GIS mapping of vegetation zone boundaries.

The mapped PCTs were further divided into vegetation zones based on the structure, floristic composition and overall quality ('intactness') of the vegetation. As described above for Step 1, each patch of each discernible (generally homogenous) vegetation zone was accurately mapped using either hand-held GPS or by marking boundaries directly onto recent high resolution orthorectified aerial photograph field maps with one metre contours. There was no minimum patch size unless the total area for a zone within the GCC was < 0.1 ha. Vegetation zone boundary delineation was undertaken by walking or driving (as deemed most suitable), carefully determining and recording the boundary alignment.

¹³ ACT Government (2015d). *ACT Vegetation Types Database – Attachment to the ACT Environmental Offsets Calculator Assessment Methodology*. 18 May 2015.

Table 1 outlines the vegetation zones which were defined for PCTs: 'ACT16 *Eucalyptus melliodora* – *E. blakelyi* Tableland Grassy Woodland', 'ACT22 *Casuarina cunninghamiana* – Tableland Riparian Woodland', 'ACT23 *Callitris endlicheri* – Dry Woodland – Open Forest', and 'ACT25 *Eucalyptus macrorhyncha* Tableland Grass/Shrub Forest'.

Step 2 was completed and mapped in draft form in GIS prior to moving on to Step 3. GIS mapping of vegetation zones allows for accurate calculations of the total area of each vegetation zone within the GCC.

Table 1. Vegetation zones for PCT-ACT16, ACT22, ACT23, and ACT25.

PCT	Groundstorey Dominance (perennial) Native or Exotic	Mature characteristic canopy sp./spp. Present or Absent	Regeneration of characteristic canopy sp./spp. Present or Absent	Native Forb Diversity Low, Mod-High Low = < 12 sp. (disturbance tolerant spp. only) Mod-High = ≥12 sp.; incl. ≥ 1 important sp.; +/- disturbance sensitive spp.	Vegetation Zone ID Colour as per mapping				
					PCT16 Eucalyptus melliodora – E. blakelyi Tableland Grassy Woodland	PCT22 Casuarina cunninghamiana – Tableland Riparian Woodland	PCT23 Callitris endlicheri – Dry Woodland – Open Forest	PCT25 E. macrorhyncha Tableland Grass – Shrub Forest	
ACT16 Eucalyptus melliodora – E. blakelyi Tableland Grassy Woodland ACT22 Casuarina cunninghamiana – Tableland Riparian Woodland ACT23 Callitris endlicheri – Dry Woodland – Open Forest ACT25 E. macrorhyncha Tableland Grass – Shrub Forest	Native	Present	Present	Mod-High	16.1 (EPBC BGW)	22.1 (not present)	23.1	25.1	
				Low	16.2 (EPBC BGW)	22.2 (not present)	23.2 (not present)	25.2	
		Absent	Present	Mod-High	16.3 (EPBC BGW)	22.3 (not present)	23.3	25.3	
			Absent	Mod-High	16.4 (EPBC BGW)	22.4 (not present)	23.4	25.4	
	Exotic	Present	Present	Low	16.5	22.5	23.5 (not present)	25.5	
				Low	16.6 (NC BGW)	22.6	23.6 (not present)	25.6 (not present)	
		Absent	Present	Absent	Low	16.7 (NC BGW) (not present)	22.7 (not present)	23.7 (not present)	25.7 (not present)
			Absent	Absent	Low	16.8	22.8 (not present)	23.8 (not present)	25.8

2.1.3 Step 3. Data collection (plot-transects) – Woodland and Dry Sclerophyll Forest PCTs

Purpose = to record the floristic composition and structure of each vegetation zone.

Outcome = recorded floristic composition and structure data.

Step 3 for woodland and dry sclerophyll forest PCTs was developed based on the methodology provided in Chapter 3 of the *ACT Environmental Offsets Calculator Assessment Methodology* (ACT Government 2015c).

A series of vegetation assessment plot-transects were completed to adequately sample each vegetation zone, the required number of which was as stipulated in Table 2 of ACT Government (2015c) (extract provided below). Generally, a woodland or dry sclerophyll forest vegetation zone is only considered to be in ‘low condition’ if it lacks the characteristic canopy, lacks regeneration of the canopy, and has an exotic dominant groundstorey (i.e. it is exotic pasture).

Extract from *ACT Environmental Offsets Calculator Assessment Methodology* (ACT Government 2015c).

Table 2 sets out the minimum number of plots/transects that are required in each vegetation zone. If the condition of the vegetation is more variable across the zone, more transects and plots may be needed than the number in **Table 2**, particularly where the area of the vegetation zone is large.

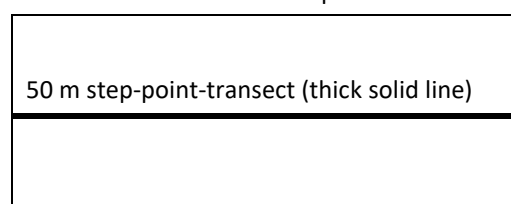
Table 2: Minimum number of transects/plots required per zone area

Vegetation zone area (ha)	Minimum number of transects/plots
0 – 4	1 transect/plot per 2 ha (or part thereof) or 1 transect/plot if vegetation is in low condition.
> 4 – 20	3 transects/plots or 2 transects/plots if vegetation is in low condition.
> 20 – 50	4 transects/plots or 3 transects/plots if vegetation is in low condition.
> 50 – 100	5 transects/plots or 3 transects/plots if vegetation is in low condition.
> 100 – 250	6 transects/plots or 4 transects/plots if vegetation is in low condition.
> 250 – 1000	7 transects/plots or 5 transects/plots if vegetation is in low condition. More transects/plots may be needed if the condition of the vegetation is variable across the zone.
> 1000	8 transects/plots or 5 transects/plots if vegetation is in low condition. More transects/plots may be needed if the condition of the vegetation is variable across the zone.

As illustrated in Diagram 2, the dimensions of each plot-transect were 50 x 20 m (1,000 m², 0.1 ha), the centreline of which is the 50 m step-point transect. Plot-transects were completed in locations deemed via observation during Steps 1 and 2 to be representative of the vegetation zone.

Diagram 1. Vegetation survey plot-transect

Outer line forms 50 x 20 m plot



Each plot-transect was allocated a four-part identification code as per the below example.

- i. Site = Ginninderry → Code Part 1 = **GD**
- ii. PCT = ACT16 → Code Part 2 = **16**
- iii. Vegetation zone = 6 → Code Part 3 = **6**
- iv. Plot-transect number = 2 → Code Part 4 = **2**



- Plot-transect identification code = **GD_16.6.2.**

The location of each plot-transect is displayed on the vegetation mapping, and GPS coordinates (GDA94 Zone 55) and all GIS shapefiles (GDA94 Zone 55) of the start and end points (recorded with a handheld GPS unit) are provided in Appendices 1 to 4.

The following floristic survey data were collected from the 50 x 20 m plot-transect.

1. At each 1 m point along the 50 m step-point transect the ground layer was allocated to one of the following options:
 - Cryptogams (Moss/Lichen)
 - Bare Earth
 - Rocks
 - Litter/Dead Vegetation
 - Annual Exotic Grass
 - Perennial Exotic Grass
 - Exotic Broadleaf
 - Perennial Native Grass
 - Other native
2. An estimate was made of the total percent crown cover for the plot and within each stratum, and the dominant species were identified.
3. Every vascular plant species observed in the 1,000 m² plot was recorded.
4. The presence of natural regeneration of the dominant overstorey eucalypts of at least 15 cm circumference at 130 cm above the ground was recorded.
5. A count was taken of the number of trees in the 1,000 m² plot that have a circumference of at least 125 cm at 130 cm above the ground.

Table 2 provides the survey dates and number of plot-transects per vegetation zone (total for study = 46 plot-transects).

Table 2. Survey dates and plot-transect numbers per vegetation zone

Site	Survey Dates	Number of Plot-Transects									
		PCT	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Total
Ginninderry Conservation Corridor	22/11/2021	16	3	4	3	3	3	2	-	2	20
	23/11/2021	22	-	-	-	-	1	2	-	-	3
	29/11/2021	23	2	-	3	1	-	-	-	-	6
		25	3	2	4	3	3	-	-	2	17

2.1.4 Step 4. Threatened Ecological Community (TEC) determination

Purpose = to determine the areas of the site which support EPBC Act BGW.

Outcome = data supported GIS mapping of the EPBC Act BGW within each site.

The data recorded during Step 3 for each of the native dominant vegetation zones of PCT-ACT16 was analysed to determine whether the vegetation zone meets the listing criteria for the EPBC Act critically endangered ecological community 'White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland' (EPBC Act BGW). Table 3 presents a flowchart of the key elements of the EPBC Act listing criteria for EPBC Act BGW, drawn from the flowchart provided in Commonwealth of Australia (2006).

Table 3. Summary of assessment of vegetation zone characteristics against the listing criteria for EPBC Act Box-Gum Grassy Woodland

Criterion		Assessment Results							
		ACT16-Zone1	ACT16-Zone2	ACT16-Zone3	ACT16-Zone4	ACT16-Zone5	ACT16-Zone6	ACT16-Zone7	ACT16-Zone8
1.	<i>Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum?</i>	Yes – Yellow Box and/or Blakely's Red Gum are/were dominant or co-dominant throughout PCT ACT16.							
2.	<i>Does the patch have a predominantly native understorey?</i>	Yes					No		
3.	<i>Is the patch 0.1 ha (1000 m²) or greater in size with 12 or more native understorey species present (excluding grasses)? There must be at least one important species.</i>	Yes	No	Yes	Yes	No	N/A – refer response to Criterion 2		
	<i>Or</i>								
	<i>Is the patch 2 ha or greater in size with an average of 20 or more mature trees per hectare, or is there natural regeneration of the dominant overstorey eucalypts?</i>	Yes	Yes	Yes (regeneration only)	No	No			
	<i>Does the patch meet the criteria for the listed TEC?</i>	Yes	Yes	Yes	Yes	No	No		
	<i>EPBC Act BGW - Form</i>	Structural Woodland	Structural Woodland	Derived Grassland	Derived Grassland	N/A	N/A		

Consideration of ACT Nature Conservation Act 2014 Box-Gum Grassy Woodland listing

In addition to the EPBC Act listing, it is relevant to note that Yellow Box – Blakely’s Red Gum Grassy Woodland is also listed as ‘endangered’ pursuant to the ACT *Nature Conservation Act 2014* (NC Act). Remnants of the Yellow Box – Blakely’s Red Gum Grassy Woodland endangered community consistent with the NC Act listed community were defined in the *ACT Native Woodland Conservation Strategy and Action Plans* (ACT Government 2019¹⁴). The key defining characteristics are:

- *a discontinuous stratum of trees of medium height (10-35 m) with canopies that are separated and with 4-30% foliage cover;*
- *dominated by Yellow Box (*Eucalyptus melliodora*) and/or Blakely’s Red Gum (*Eucalyptus blakelyi*). Apple Box (*Eucalyptus bridgesiana*) and Candlebark (*Eucalyptus rubida*) are the most common co-dominant trees;*
- *remnants of the community in good condition have a ground cover dominated (50% or more of the perennial species) by native grasses and forbs;*
- *the ground cover of remnants in lower condition may not be dominated by native species, yet retain a canopy of mature trees (20 or more per hectare on average) and/or support natural regeneration;*
- *a patch size of at least 0.1 ha.*

Polygons within which most or all of the trees have been cleared (described as secondary grassland) also constitute the NC Act listed community, provided:

- *Yellow Box and/or Blakely’s Red Gum are estimated to have previously been the dominant or co-dominant species;*
- *a relatively diverse native understorey is present; and*
- *the patch size is at least 0.1 ha.*

The NC Act definition is considerably broader than the EPBC Act definition. Whilst part of the focus of this project was to assess and map the areas of the Ginninderry Conservation Corridor which support potential EPBC Act BGW, the NC Act definition was also considered in the definition of vegetation zones. In this regard, scenarios which would satisfy the NC Act definition but not the EPBC Act definition would be substantial patches (i.e. not an isolated tree or clump) with:

- *an exotic dominant or low diversity native groundstorey; AND*
- *the characteristic canopy of Yellow Box and/or Blakely’s Red Gum (>20 trees per hectare); AND/OR*
- *natural regeneration of the canopy.*

This scenario is consistent with PCT-ACT16 Zones 6 and 7, of which only Zone 6 was identified as present in the GCC.

¹⁴ ACT Government (2019). *ACT Native Woodland Conservation Strategy and Action Plans*. Environment, Planning and Sustainable Development, Canberra.

3 Results

As shown in Figure 3, the Ginninderry Conservation Corridor was found to support the following four woodland or dry forest PCTs.

- **140.2** ha of **ACT16** *Eucalyptus melliodora* – *E. blakelyi* Tableland Grassy Woodland.
- **11.1** ha of **ACT22** *Casuarina cunninghamiana* – Tableland Riparian Woodland.
- **17.3** ha of **ACT23** *Callitris endlicheri* – Dry Woodland – Open Forest.
- **79.3** ha of **ACT25** *Eucalyptus macrorhyncha* Tableland Grass/Shrub Forest.

These four PCTs are classified into 18 vegetation zones, as shown on Figure 4.

ACT16 occurs largely in the southern part of the GCC. This PCT was split into seven zones, ranging from largely intact Box-Gum Grassy Woodland with a moderate to high diversity native understorey (Zone 1), through to largely cleared areas of low diversity native (Zone 5) or exotic (Zone 6, 8) pasture. Parts of Zones 2, 3 and 6 have been planted with a mix of local and non-local trees and shrubs.

ACT22 occurs on the banks of the Murrumbidgee River, and largely consists of mature River She-Oaks *Casuarina cunninghamii* with an exotic dominant understorey (Zone 6), with a small patch of derived grassland with a low diversity native understorey (Zone 5).

ACT23 occurs in several patches in the south of the GCC, on steep slopes with dense growth of Black Cypress Pine *Callitris endlicheri* and Burgan *Kunzea ericoides*. While one patch represents the mature community (Zone 1), the majority of this PCT consists of dense regeneration (Zone 3), and some areas have been cleared but maintain a native understorey (Zone 4).

ACT25 consists of dry sclerophyll forest dominated by Red Stringybark *E. macrorhyncha*. This PCT occurs in several patches throughout the GCC, on hilltops, slopes and incised drainage lines, and is classified into six zones from intact dry forest (Zone 1) to cleared exotic pasture (Zone 8).

Figure 4 shows the extent of the PCTs and zones for the whole GCC, while Figures 5 and 6 show the northern and southern portions and the locations of the plot-transects. Table 4 provides a summary of all zones, and Appendix 1 provides a more detailed summary and representative photograph for each vegetation zone. The start/end locations of the plot-transects are provided in Appendix 3.

PCT-ACT16 Zones 1, 2, 3 and 4 meet the listing criteria for EPBC Act BGW (Total 59.3 ha) (Figure 7). In addition to these, PCT-ACT16 Zone 6 meets the listing criteria for NC Act BGW (Total 73.3 ha) (see Section 2.1.4).

Across all vegetation plots 198 species were recorded, including 122 native plant species and 76 exotic species. Native non-grass understorey species richness ranged from 0 native species (GD_22.6.1) to 32 native species (GD_25.1.3). 'Important species' richness ranged from 0 to 13 (GD_25.1.3). No threatened or rare flora species were recorded.

Significant weeds include African Lovegrass *Eragrostis curvula*, Blackberry *Rubus fruticosus*, Chilean Needlegrass *Nassella neesiana*, and Serrated Tussock *Nassella trichotoma*. Other pest plants include Patterson's Curse *Echium plantagineum*, St John's Wort *Hypericum perforatum*, Briar Rose *Rosa rubiginosa*, Saffron Thistle *Carthamus lanatus*, Scotch Thistle *Onopordum acnathium*, Hawthorn *Crataegus monogyna*, Tree of Heaven *Ailanthus altissima*, and Bathurst Burr *Xanthium spinosum*.

Appendix 1 provides summaries of the plot-transect results for each zone and includes calculated averages \pm standard deviation. Detailed summaries of the floristic diversity (plot) and structure (step-point transect) data for each plot-transect are provided in Appendix 2, and raw data are provided in Appendix 3 (attached Excel spreadsheet).

Table 4. Summary of Plot-Transect Results for 18 Vegetation Zones

PCT	Zone	Area	No. of plots	Description	EPBC Act or NC Act listed?	Overstorey Species	No. of Trees > 125 cm DBH per 0.2 ha plot	Overstorey regeneration	Average Perennial Groundlayer (% native)	Understorey (averages)	Average exotic species richness
ACT16	1	10.6	3	Yellow Box- Red Gum Woodland Native dominant understorey – Canopy – Regeneration – Mod-High diversity	EPBC + NC	<i>E. blakelyi</i> <i>E. melliodora</i> <i>Callitris endlicheri</i>	2	Yes	57%	24.3 total native species 19.3 native non-grass species 6 important species	31
	2	31.9	4	Yellow Box- Red Gum Woodland Native dominant understorey – Canopy – Regeneration – Low diversity	EPBC + NC	<i>E. blakelyi</i> <i>E. melliodora</i> <i>E. dives</i>	2	Yes	39%	18 total native species 13.5 native non-grass species 2 important species	29.3
	3	7.8	3	Yellow Box- Red Gum Woodland Native dominant understorey – Regeneration – Mod-High diversity	EPBC + NC	<i>E. blakelyi</i> <i>E. melliodora</i>	1	Yes	65%	20 total native species 15 native non-grass species 5.3 important species	19.3
	4	9.0	3	Yellow Box- Red Gum Woodland – Derived Grassland Native dominant understorey – Mod-High diversity	EPBC + NC	-	0	No	66%	24 total native species 17 native non-grass species 7 important species	21.7
	5	47.1	3	Yellow Box- Red Gum Woodland – Native Pasture Native dominant understorey – Low diversity	-	-	0	No	40%	9 total native species 5.3 native non-grass species 1.3 important species	18.6
	6	14.0	2	Yellow Box- Red Gum Woodland Exotic dominant understorey – Canopy – Regeneration – Low diversity	NC	<i>E. blakelyi</i> <i>E. melliodora</i>	2	No	13%	5.5 total native species 2.5 native non-grass species 0 important species	17.5
	8	19.7	2	Yellow Box- Red Gum Woodland – Exotic Pasture Exotic dominant understorey – Low diversity	-	-	0	No	0%	4 total native species 3 native non-grass species 0 important species	12.5
ACT22	5	0.5	1	River She-oak Riparian Woodland – Native pasture Native dominant understorey – Low diversity	-	-	0	No	81%	18 total native species 12 native non-grass species 6 important species	17
	6	10.6	2	River She-oak Riparian Woodland Exotic dominant understorey – Canopy – Regeneration – Low diversity	-	<i>Casuarina cunninghamii</i>	2.5	Yes	21%	1.5 total native species 1 native non-grass species 0 important species	20.5
ACT23	1	4.0	2	Black Cypress Pine Open Forest Native dominant understorey – Canopy – Regeneration – Mod-High diversity	-	<i>Callitris endlicheri</i> <i>E. macrorhyncha</i>	0.5	Yes	78%	21 total native species 17.5 native non-grass species 7 important species	11.5

PCT	Zone	Area	No. of plots	Description	EPBC Act or NC Act listed?	Overstorey Species	No. of Trees > 125 cm DBH per 0.2 ha plot	Overstorey regeneration	Average Perennial Groundlayer (% native)	Understorey (averages)	Average exotic species richness
	3	11.7	3	Black Cypress Pine Open Forest Native dominant understorey – Regeneration – Mod-High diversity	-	<i>Callitris endlicheri</i> <i>E. blakelyi</i> <i>E. macrorhyncha</i>	0	Yes	73%	25.3 total native species 19.7 native non-grass species 8 important species	13
	4	1.6	1	Black Cypress Pine Open Forest – Derived Grassland Native dominant understorey – Mod-High diversity	-	-	0	No	52%	20 total native species 15 native non-grass species 6 important species	15
ACT25	1	11.2	3	Red Stringybark Dry Sclerophyll Forest Native dominant understorey – Canopy – Regeneration – Mod-High diversity	-	<i>E. macrorhyncha</i> <i>Callitris endlicheri</i> <i>E. blakelyi</i>	0.3	Yes	79%	27 total native species 22.7 native non-grass species 7.7 important species	18
	2	3.1	2	Red Stringybark Dry Sclerophyll Forest Native dominant understorey – Canopy – Regeneration – Low diversity	-	<i>E. macrorhyncha</i>	0.5	Yes	51%	20 total native species 14 native non-grass species 7 important species	21.5
	3	22.6	4	Red Stringybark Dry Sclerophyll Forest Native dominant understorey – Regeneration – Mod-High diversity	-	<i>E. macrorhyncha</i> <i>Callitris endlicheri</i>	0	Yes	71%	29 total native species 21.8 native non-grass species 9.3 important species	17.3
	4	8.2	3	Red Stringybark Dry Sclerophyll Forest – Derived Grassland Native dominant understorey – Mod-High diversity	-	-	0	No	61%	26.3 total native species 20 native non-grass species 7 important species	18.7
	5	26.6	3	Red Stringybark Dry Sclerophyll Forest – Native Pasture Native dominant understorey – Low diversity	-	-	0	No	45%	10.3 total native species 6 native non-grass species 1 important species	17.7
	8	7.6	2	Red Stringybark Dry Sclerophyll Forest – Exotic Pasture Exotic dominant understorey – Low diversity	-	-	0	No	18%	7 total native species 5.5 native non-grass species 0.5 important species	19.5

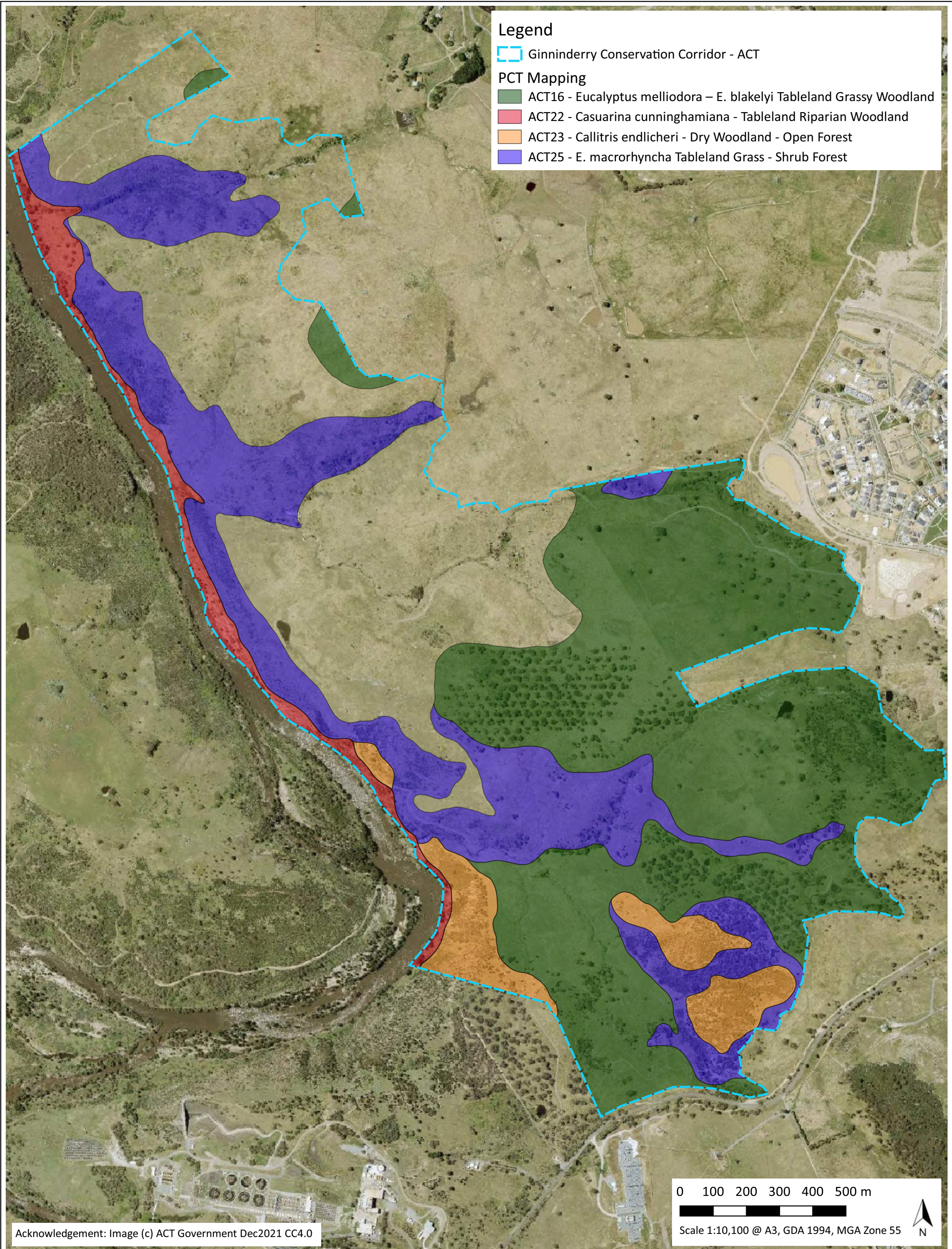


Figure 3. PCT Mapping (Woody PCTs)

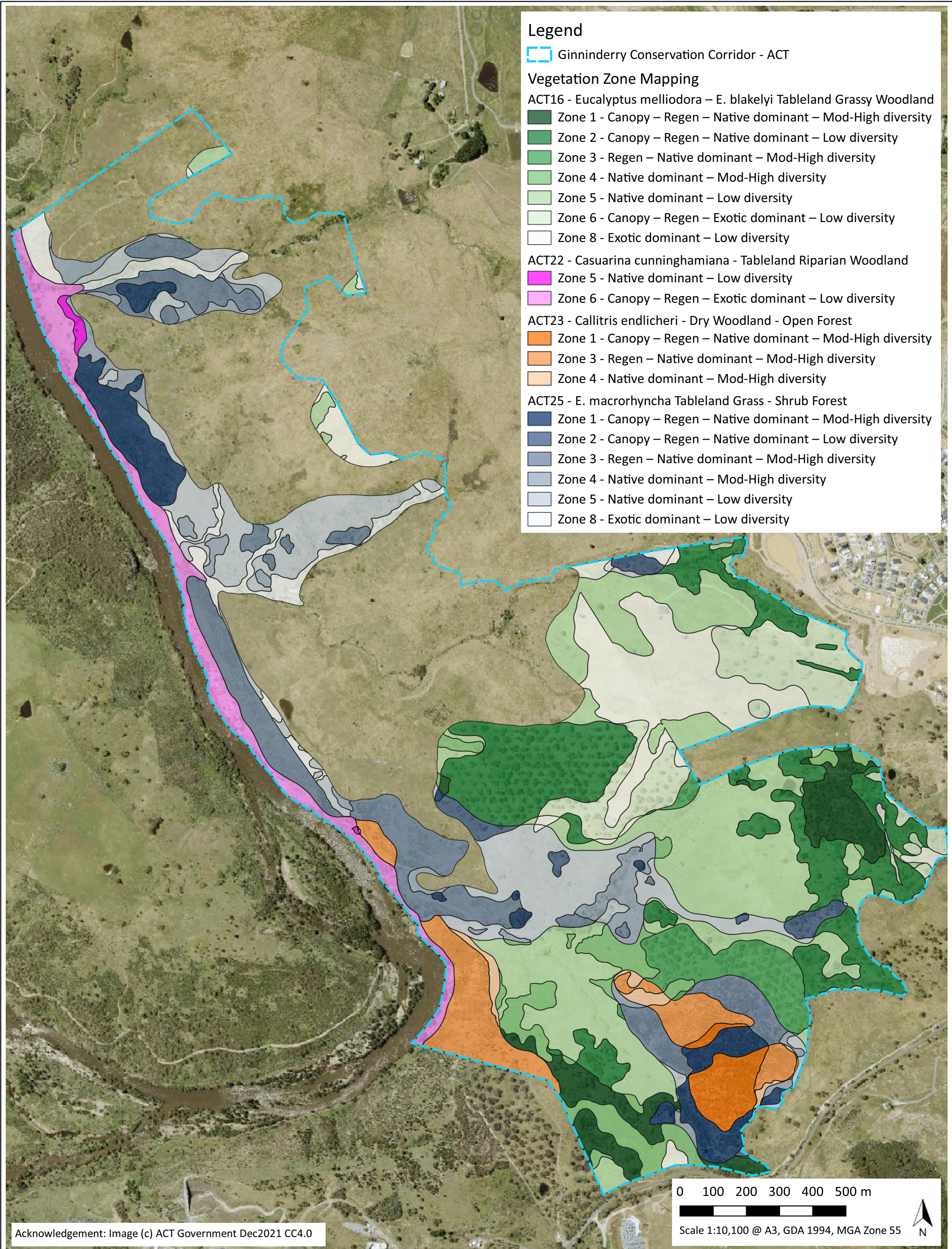


Figure 4. PCT and Vegetation Zone Mapping - Overview

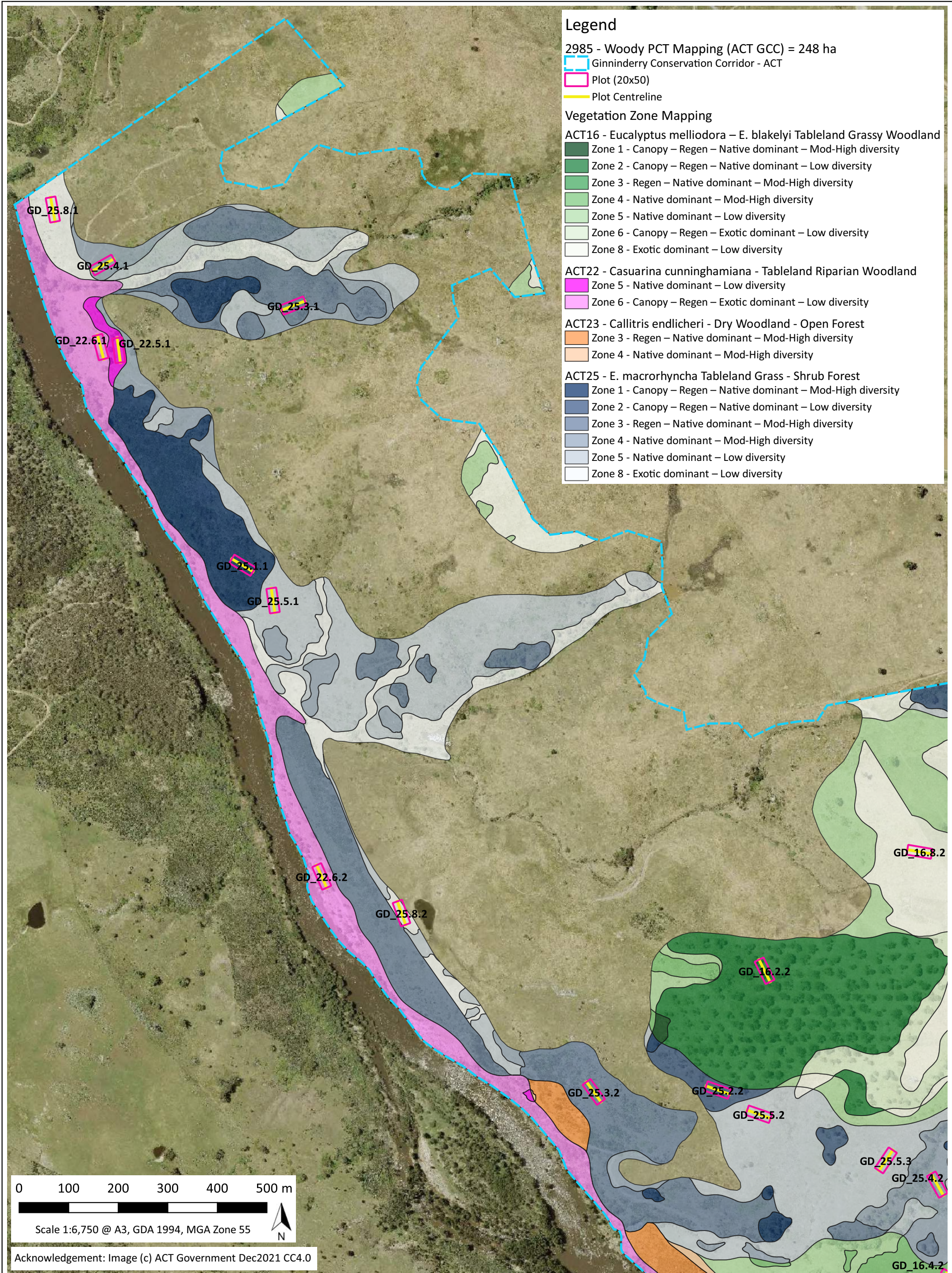


Figure 5. PCT and Zone Mapping (North detail)

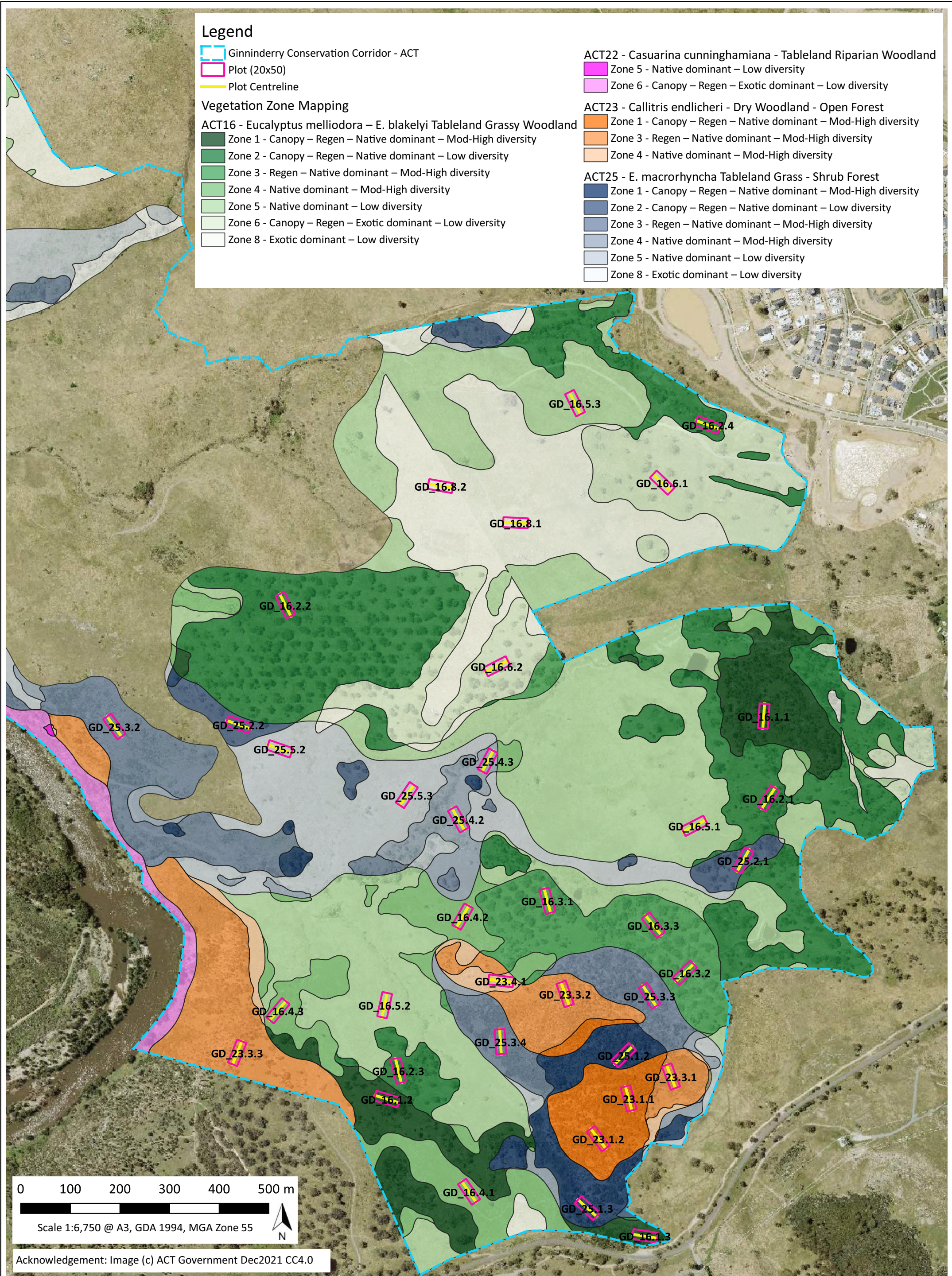


Figure 6. PCT and Zone Mapping (South detail)

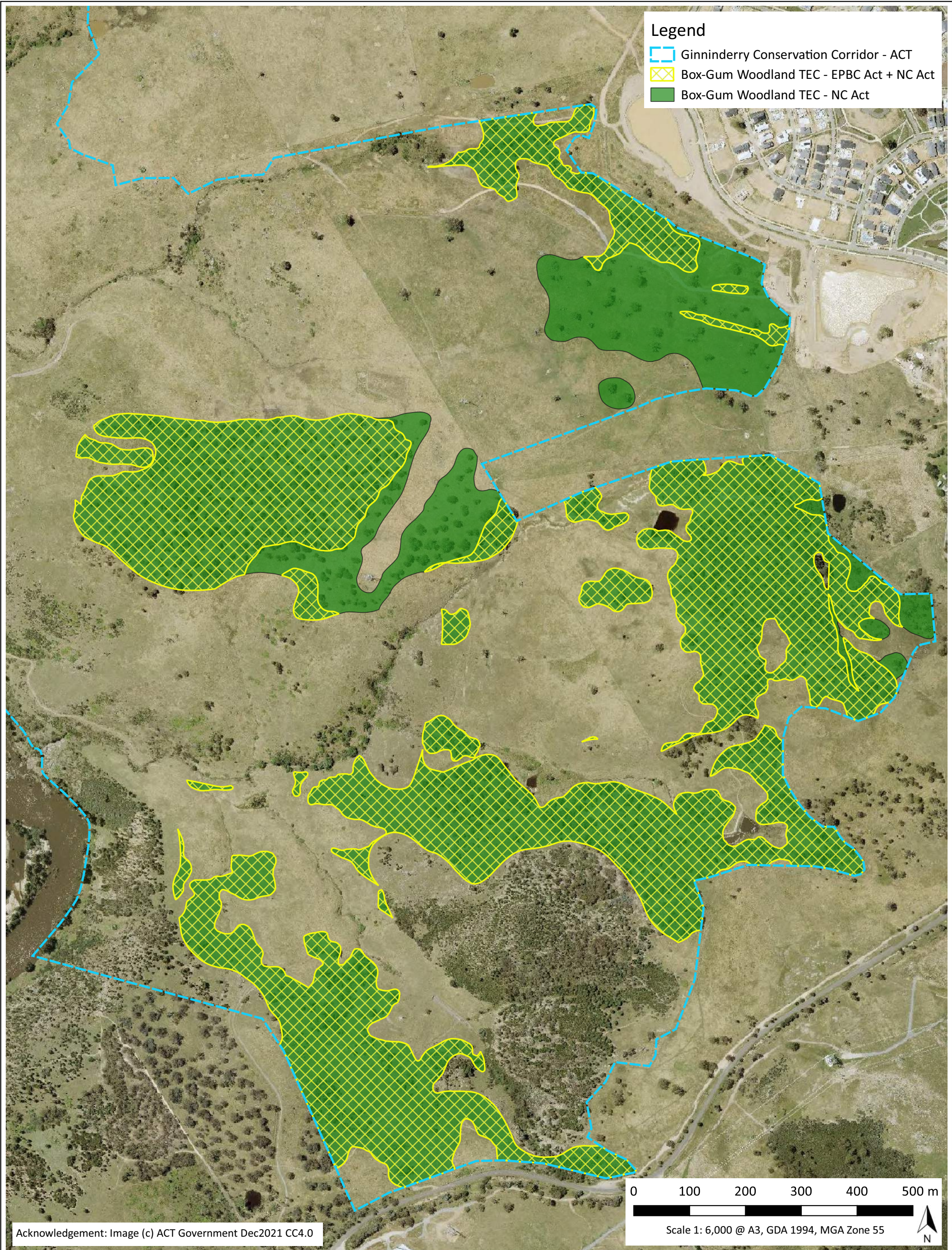


Figure 7. EPBC Act and NC Act listed Box-Gum Grassy Woodland

4 Discussion

Capital Ecology was commissioned by the Ginninderry Conservation Trust to assess and map the extent and condition of the woody vegetation communities throughout the ACT portion of the GCC. This follows on from a previous study by Capital Ecology (2020) which mapped the extent and condition of NTG-SEH in the GCC. The primary aim of this study was to identify areas of EPBC Act and NC Act listed Box-Gum Grassy Woodland TEC in order to meet the conditions of existing planning and environmental approvals and inform measures to protect and manage any listed Box-Gum Grassy Woodland that occurs in the GCC. The results presented in this report provide fine-scale mapping of the woody vegetation and establish an accurate and reliable baseline assessment from which ongoing management and monitoring of the significant biodiversity values of the GCC can be achieved. This report outlines a reliable and repeatable four-step methodology which can be used to determine future changes in woody vegetation community extent and condition.

As detailed in Section 3, the GCC supports the following four woodland or dry forest PCTs.

- **ACT16** *Eucalyptus melliodora* – *E. blakelyi* Tableland Grassy Woodland (140.2 ha).
- **ACT22** *Casuarina cunninghamiana* – Tableland Riparian Woodland (11.1 ha).
- **ACT23** *Callitris endlicheri* – Dry Woodland – Open Forest (17.3 ha).
- **ACT25** *Eucalyptus macrorhyncha* Tableland Grass/Shrub Forest (79.3 ha).

These PCTs were further classified into 18 zones, ranging in condition from high quality Box-Gum Grassy Woodland or Dry Sclerophyll Forest (Zone 1) to exotic pasture (Zone 8).

In total, 59.3 ha of the Ginninderry Conservation Corridor (ACT portion) meets the EPBC Act criteria for Box-Gum Grassy Woodland. An additional 14 ha meets the listing criteria for NC Act Box-Gum Grassy Woodland (total 73.3 ha). All 73.3 ha occurs in the southern part of the GCC, in the lower lying, flat to gently undulating parts of the landscape. These areas support a high diversity of native plant species and provide habitat for a range of threatened fauna.

References

- ACT Government (2015a). *Monitoring Guidelines for Natural Temperate Grasslands*. Conservation Research, October 2015.
- ACT Government (2015b). *Monitoring Guidelines for Box-Gum Woodlands*. Conservation Research, October 2015.
- ACT Government (2015c). *ACT Environmental Offsets Calculator Assessment Methodology*. Environment and Planning. May 2015.
- ACT Government (2015d). *ACT Vegetation Types Database – Attachment to the ACT Environmental Offsets Calculator Assessment Methodology*. 18 May 2015.
- ACT Government (2019). *ACT Native Woodland Conservation Strategy and Action Plans*. Environment, Planning and Sustainable Development, Canberra.
- Capital Ecology (2017). *ACT Environmental Offsets – 2016 Grassland Mapping Report*. Prepared for ACT Government Parks and Conservation Service.
- Capital Ecology (2018a). *2017 Grassland Quality and Extent Mapping*. April 2018. Prepared for Environmental Offsets, ACT Parks and Conservation Service. Authors: S. Reid and R. Speirs. Project no. 2759.
- Capital Ecology (2018b). *2017 Woodland Quality and Extent Mapping – ACT Government Environmental Offsets*. May 2018. Prepared for Environmental Offsets, ACT Parks and Conservation Service. Authors: S. Reid and R. Speirs. Project no. 2756.
- Capital Ecology (2020). *The Extent and Condition of Natural Temperate Grassland of the South Eastern Highlands in the Ginninderry Project Area*. Final 02 – July 2020. Prepared for The Riverview Group Pty Ltd. Authors: S. Reid, S. Thompson, and R. Speirs. Project no. 2916.
- Commonwealth of Australia (2006). *Policy Statement 3.5: White Box – Yellow Box – Blakely’s Red Gum grassy woodlands and derived native grasslands*. Commonwealth Department of Environment and Heritage.
- Commonwealth of Australia (2016). *Approved conservation advice for the Natural Temperate Grassland of the South Eastern Highlands (NTG–SEH) ecological community*.
- NSW Government (2014). *BioBanking Assessment Methodology 2014*. NSW Government Office of Environment and Heritage.
- NSW Government (2020). *Biodiversity Assessment Method*. Department of Planning, Industry and Environment.
- Rehwinkel (2015). *A Revised Floristic Value Scoring Method to assess grassland condition, an addendum to Friends of Grasslands Forum Proceedings* (30 October – 1 November 2014).

Appendices

Appendix 1. Vegetation Zone Summary Tables and Photos

ACT16 Zone 1	
Description	<u>Yellow Box – Red Gum Woodland (EPBC Act listed TEC)</u> This zone has an intact canopy of Blakely's Red Gum and Yellow Box, with regeneration of the canopy present. The understorey is dominated by Kangaroo Grass and Weeping Grass, with a moderate to high diversity of native forbs.
Size	10.6 ha (3 plot-transects).
Overstorey Species	<i>E. blakelyi</i> and <i>E. melliodora</i> .
Overstorey Cover	20% - 40%
Overstorey Regeneration	Yes.
No. of Trees > 125 cm DBH per 0.2 ha plot	2 ± 1.7 (range 0 - 3).
Perennial Groundlayer	49% - 63% native.
Understorey	24.3 ± 0.6 (range 24 - 25) total native species, 19.3 ± 1.2 (range 18 – 20) native non-grass species, 6 ± 1 (range 5 - 7) important species.
Exotic Species Richness	31.0 ± 5.6 (range 26 - 37) species.
Significant Weeds	Blackberry (WoNS). Hawthorn, African Lovegrass, Paterson's Curse, St John's Wort, Briar Rose, Saffron Thistle, and Scotch Thistle also present.



ACT16 Zone 2	
Description	<u>Yellow Box – Red Gum Woodland (EPBC Act listed TEC)</u> Intact mature canopy with regeneration present. The understorey is dominated by Wallaby Grass, Weeping Grass and Spear Grass, with a low diversity of native forbs. Parts of this zone have been planted with a mix of local and non-local trees and shrubs.
Size	31.9 ha (4 plot-transects).
Overstorey Species	<i>E. blakelyi</i> and <i>E. melliodora</i> .
Overstorey Cover	15% - 30%
Overstorey Regeneration	Yes.
No. of Trees > 125 cm DBH per 0.2 ha plot	2 ± 1.8 (range 0 - 4).
Perennial Groundlayer	26% - 62% native.
Understorey	18 ± 2.9 (range 15 - 21) total native species, 13.5 ± 3.3 (range 10 - 18) native non-grass species, 2 ± 0.8 (range 1 – 3) important species.
Exotic Species Richness	29.3 ± 2.9 (range 26 - 33) species.
Significant Weeds	Blackberry (WoNS). African Lovegrass, Paterson’s Curse, St John’s Wort, Briar Rose, Saffron Thistle, and Scotch Thistle also present.



ACT16 Zone 3	
Description	<u>Yellow Box – Red Gum Woodland (EPBC Act listed TEC)</u> This zone has been planted with a mix of local and non-local trees and shrubs, notably Cootamundra wattle <i>Acacia baileyana</i> . The overstorey is dominated by regenerating Blakely’s Red Gum and Yellow Box, and the understorey supports a high diversity of native forbs.
Size	7.8 ha (3 plot-transects).
Overstorey Species	<i>E. blakelyi</i> and <i>E. melliodora</i> .
Overstorey Cover	15%
Overstorey Regeneration	Yes.
No. of Trees > 125 cm DBH per 0.2 ha plot	1 ± 1 (range 0 - 2).
Perennial Groundlayer	54% - 71% native.
Understorey	20 ± 1.7 (range 19 - 22) total native species, 15 ± 1 (range 14 - 16) native non-grass species, 5.3 ± 2.3 (range 4 - 8) important species.
Exotic Species Richness	19.3 ± 1.4 (range 16 - 25) species.
Significant Weeds	African Lovegrass, Paterson’s Curse, St John’s Wort, Briar Rose, Saffron Thistle, and Scotch Thistle.



ACT16 Zone 4	
Description	<u>Yellow Box – Red Gum Woodland – Derived Grassland (EPBC Act listed TEC)</u> Areas of historically cleared derived grassland, with a high diversity of native forbs.
Size	9.0 ha (3 plot-transects).
Overstorey Species	n/a
Overstorey Cover	0.
Overstorey Regeneration	No.
No. of Trees > 125 cm DBH per 0.2 ha plot	0.
Perennial Groundlayer	49% - 78% native.
Understorey	24 ± 5.3 (range 20 - 30) total native species, 17 ± 4.4 (range 14 - 22) native non-grass species, 7 ± 1 (range 6 - 8) important species.
Exotic Species Richness	21.7 ± 6.1 (range 15 - 27) species.
Significant Weeds	Blackberry (WoNS). African Lovegrass, Paterson's Curse, St John's Wort, Briar Rose, and Saffron Thistle also present.



ACT16 Zone 5	
Description	<u>Yellow Box – Red Gum Woodland – Native Pasture</u> Historically cleared derived grassland, with a low diversity of native forbs.
Size	47.1 ha (3 plot-transects).
Overstorey Species	n/a
Overstorey Cover	0.
Overstorey Regeneration	No.
No. of Trees > 125 cm DBH per 0.2 ha plot	0.
Perennial Groundlayer	38% - 44% native.
Understorey	9 ± 2.6 (range 4 - 11) total native species, 5.3 ± 2.1 (range 1 - 7) native non-grass species, 1.3 ± 1.5 (range 0 - 3) important species.
Exotic Species Richness	18.7 ± 4 (range 15 - 23) species.
Significant Weeds	Blackberry (WoNS). African Lovegrass, Paterson's Curse, St John's Wort, Briar Rose, and Saffron Thistle also present.



ACT16 Zone 6	
Description	<u>Yellow Box – Red Gum Woodland (NC Act listed TEC)</u> This zone has retained a mature native overstorey, but the understorey is dominated by exotic pasture grasses and weeds. No regeneration of the overstorey is present. This zone does not meet the EPBC Act listing criteria for Box-Gum Grassy Woodland, but does meet the NC Act criteria.
Size	14.0 ha (2 plot-transects).
Overstorey Species	<i>E. blakelyi</i> and <i>E. melliodora</i> .
Overstorey Cover	5% - 10%
Overstorey Regeneration	No.
No. of Trees > 125 cm DBH per 0.2 ha plot	2 ± 1.4 (range 1 - 3).
Perennial Groundlayer	5% - 21% native.
Understorey	5.5 ± 2.1 (range 4 - 7) total native species, 2.5 ± 2.1 (range 1 - 4) native non-grass species, 0 important species.
Exotic Species Richness	17.5 ± 3.5 (range 15 - 20) species.
Significant Weeds	African Lovegrass, St John's Wort, Briar Rose, and Saffron Thistle.



ACT16 Zone 8	
Description	<u>Yellow Box – Red Gum Woodland – Exotic Pasture</u> Historically cleared and dominated by exotic pasture grasses and weeds with a low diversity of native forbs.
Size	19.7 ha (2 plot-transects).
Overstorey Species	n/a
Overstorey Cover	0.
Overstorey Regeneration	No.
No. of Trees > 125 cm DBH per 0.2 ha plot	4 ± 0 (range 0 - 3).
Perennial Groundlayer	0% native.
Understorey	4 ± 1.4 (range 3 - 5) total native species, 3 ± 1.4 (range 2 - 4) native non-grass species, 0 important species.
Exotic Species Richness	12.5 ± 0.7 (range 12 - 13) species.
Significant Weeds	Blackberry (WoNS). Paterson’s Curse, St John’s Wort, and Saffron Thistle also present.



ACT22 Zone 5	
Description	<u>River She-oak Riparian Woodland – Native Pasture</u> This zone exists as a small patch of high diversity derived grassland, upslope from the Murrumbidgee River.
Size	0.5 ha (1 plot-transect).
Overstorey Species	n/a
Overstorey Cover	0.
Overstorey Regeneration	No.
No. of Trees > 125 cm DBH per 0.2 ha plot	0
Perennial Groundlayer	81% native.
Understorey	18 total native species, 12 native non-grass species, 6 important species.
Exotic Species Richness	17 species.
Significant Weeds	Blackberry (WoNS). African Lovegrass and Briar Rose also present.



ACT22 Zone 6	
Description	<u>River She-oak Riparian Woodland</u> This zone occurs along the banks of the Murrumbidgee River, and has an overstorey of mature River She-oaks with an understorey dominated by weeds.
Size	10.6 ha (2 plot-transects).
Overstorey Species	<i>Casuarina cunninghamiana</i> .
Overstorey Cover	5% - 10%
Overstorey Regeneration	Yes.
No. of Trees > 125 cm DBH per 0.2 ha plot	2.5 ± 0.7 (range 0 - 3).
Perennial Groundlayer	14% - 27% native.
Understorey	18 ± 2.1 (range 0 - 3) total native species, 1 ± 1.4 (range 0 - 2) native non-grass species, 0 important species.
Exotic Species Richness	20.5 ± 0.7 (range 20 - 21) species.
Significant Weeds	Blackberry (WoNS). Tree of Heaven, African Lovegrass, Paterson's Curse, Briar Rose, and Scotch Thistle also present.



ACT23 Zone 1	
Description	<u>Black Cypress Open Forest</u> Dry forest dominated by Black Cypress Pine with Red Stringybark as a sub-dominant. Sparse understorey with a high diversity of native forbs.
Size	4.0 ha (2 plot-transects).
Overstorey Species	<i>Callitris endlicheri</i> , <i>E. macrorhyncha</i>
Overstorey Cover	65% - 75%
Overstorey Regeneration	Yes.
No. of Trees > 125 cm DBH per 0.2 ha plot	0.5 ± 0.7 (range 0 – 1).
Perennial Groundlayer	70% - 86% native.
Understorey	21 ± 2.8 (range 19 - 23) total native species, 17.5 ± 2.1 (range 16 - 19) native non-grass species, 7 ± 1.4 (range 6 - 8) important species.
Exotic Species Richness	11.5 ± 4.9 (range 8 - 15) species.
Significant Weeds	St John's Wort, Radiata Pine and Scotch Thistle.



ACT23 Zone 3	
Description	<u>Black Cypress Open Forest</u> This zone contains dense regenerating Black Cypress with scattered Red Stringybarks and a high diversity native understorey.
Size	11.6 ha (3 plot-transects).
Overstorey Species	<i>Callitris endlicheri</i> , <i>E. macrorhyncha</i>
Overstorey Cover	10% - 25%
Overstorey Regeneration	Yes.
No. of Trees > 125 cm DBH per 0.2 ha plot	0.
Perennial Groundlayer	39% - 91% native.
Understorey	25.3 ± 3.8 (range 21 - 28) total native species, 19.7 ± 4 (range 15 - 22) native non-grass species, 8 ± 2 (range 6 - 10) important species.
Exotic Species Richness	13 ± 6.2 (range 6 - 18) species.
Significant Weeds	African Lovegrass, Paterson's Curse, St John's Wort, Saffron Thistle, and Scotch Thistle.



ACT23 Zone 4	
Description	<u>Black Cypress Pine Open Forest – Derived Grassland</u> Historically cleared derived grassland with a high diversity of native forbs.
Size	1.6 ha (1 plot-transects).
Overstorey Species	n/a
Overstorey Cover	0.
Overstorey Regeneration	No.
No. of Trees > 125 cm DBH per 0.2 ha plot	0.
Perennial Groundlayer	52% native.
Understorey	20 total native species, 14 native non-grass species, 7 important species.
Exotic Species Richness	15 species.
Significant Weeds	African Lovegrass and St John’s Wort.



ACT25 Zone 1	
Description	<u>Red Stringybark Dry Sclerophyll Forest</u> Mature canopy of Red Stringybarks with scattered Black Cypress. High diversity shrubby understorey.
Size	11.2 ha (3 plot-transects).
Overstorey Species	<i>E. macrorhyncha</i> , <i>Callitris endlicheri</i>
Overstorey Cover	20% - 65%
Overstorey Regeneration	Yes.
No. of Trees > 125 cm DBH per 0.2 ha plot	0.3 ± 0.6 (range 0 - 1).
Perennial Groundlayer	48% - 100% native.
Understorey	27 ± 10.5 (range 17 - 38) total native species, 22.7 ± 9 (range 14 - 32) native non-grass species, 7.7 ± 5.5 (range 2 - 13) important species.
Exotic Species Richness	18 ± 7.9 (range 9 - 24) species.
Significant Weeds	Blackberry and Chilean Needlegrass (WoNS). Hawthorn, Paterson's Curse, St John's Wort, and Briar Rose also present.



ACT25 Zone 2	
Description	<u>Red Stringybark Dry Sclerophyll Forest</u> Mature canopy of Red Stringybarks with a low diversity native understorey.
Size	3.1 ha (2 plot-transects).
Overstorey Species	<i>E. macrorhyncha</i>
Overstorey Cover	10% - 15%
Overstorey Regeneration	Yes.
No. of Trees > 125 cm DBH per 0.2 ha plot	0.5 ± 0.7 (range 0 - 1).
Perennial Groundlayer	38% - 65% native.
Understorey	20 ± 4.2 (range 17 - 23) total native species, 14 ± 1.4 (range 13 - 15) native non-grass species, 7 ± 1.4 (range 6 - 8) important species.
Exotic Species Richness	21.5 ± 7.8 (range 16 - 27) species.
Significant Weeds	Blackberry and Serrated Tussock (WoNS). Hawthorn, Paterson's Curse, St John's Wort, Briar Rose, Bathurst Burr, Saffron Thistle, and Scotch Thistle also present.



ACT25 Zone 3	
Description	<u>Red Stringybark Dry Sclerophyll Forest</u> Mature canopy absent, some regeneration of the canopy with thick regrowth of Burgan <i>Kunzea ericoides</i> and a high diversity native understorey.
Size	22.6 ha (4 plot-transects).
Overstorey Species	<i>E. macrorhyncha</i> , <i>Callitris endlicheri</i>
Overstorey Cover	0% - 40%
Overstorey Regeneration	Yes.
No. of Trees > 125 cm DBH per 0.2 ha plot	0.
Perennial Groundlayer	40% - 83% native.
Understorey	29 ± 6.3 (range 21 - 35) total native species, 21.8 ± 5.4 (range 14 - 26) native non-grass species, 9.3 ± 1 (range 8 - 10) important species.
Exotic Species Richness	17.3 ± 5 (range 13 - 24) species.
Significant Weeds	Blackberry (WoNS). African Lovegrass, Paterson's Curse, St John's Wort, Briar Rose, and Saffron Thistle also present.



ACT25 Zone 4	
Description	<u>Red Stringybark Dry Sclerophyll Forest – Derived Grassland</u> Historically cleared derived grassland with a high diversity native understorey.
Size	8.2 ha (3 plot-transects).
Overstorey Species	n/a
Overstorey Cover	0.
Overstorey Regeneration	No.
No. of Trees > 125 cm DBH per 0.2 ha plot	0.
Perennial Groundlayer	55% - 69% native.
Understorey	26.3 ± 5.5 (range 20 - 30) total native species, 20 ± 5.2 (range 14 - 23) native non-grass species, 7 ± 2.6 (range 5 - 10) important species.
Exotic Species Richness	18.7 ± 1.5 (range 17 - 20) species.
Significant Weeds	Blackberry (WoNS). African Lovegrass, Paterson's Curse, St John's Wort, Briar Rose, and Saffron Thistle also present.



ACT25 Zone 5	
Description	<u>Red Stringybark Dry Sclerophyll Forest – Native Pasture</u> Historically cleared, understorey dominated by native grasses and a low diversity of native forbs.
Size	26.6 ha (3 plot-transects).
Overstorey Species	n/a
Overstorey Cover	0.
Overstorey Regeneration	No.
No. of Trees > 125 cm DBH per 0.2 ha plot	0.
Perennial Groundlayer	38% - 55% native.
Understorey	10.3 ± 3.1 (range 7 - 13) total native species, 6 ± 2.6 (range 3 - 8) native non-grass species, 1 ± 0 (range 1 - 1) important species.
Exotic Species Richness	17.7 ± 0.6 (range 17 - 18) species.
Significant Weeds	Blackberry (WoNS). African Lovegrass, Paterson's Curse, St John's Wort, Briar Rose, and Saffron Thistle also present.



ACT25 Zone 8	
Description	<u>Red Stringybark Dry Sclerophyll Forest – Exotic Pasture</u> Historically cleared and dominated by exotic pasture grasses and weeds with a low diversity of native forbs.
Size	7.6 ha (2 plot-transects).
Overstorey Species	n/a
Overstorey Cover	0.
Overstorey Regeneration	No.
No. of Trees > 125 cm DBH per 0.2 ha plot	0.
Perennial Groundlayer	0% - 35% native.
Understorey	7 ± 4.2 (range 4 - 10) total native species, 5.5 ± 3.5 (range 3 - 8) native non-grass species, 0.5 ± 0.7 (range 0 - 1) important species.
Exotic Species Richness	19.5 ± 0.7 (range 19 - 20) species.
Significant Weeds	Chilean Needlegrass (WoNS). African Lovegrass, Paterson’s Curse, St John’s Wort, Briar Rose, and Scotch Thistle also present.



Appendix 2. Summary of Plot Results by Zone

Species Richness (average by Zone)

PCT	Zone	Number of Species (average)	Number of Native species (average)	Number of Native non-grass understorey species (average)	Number of Important Native species (average)	Number of Exotic Species (average)	Number of ACT pest plants (average)	Number of WoNS (average)
ACT16	1	58	27	19.33	6	31	6	1
	2	48.25	19	13.5	2	29.25	4.5	0.25
	3	41.67	22.33	15	5.33	19.33	4	0
	4	45.67	24	17	7	21.67	4.33	0.33
	5	27.67	9	5.33	1.33	18.67	4	0.33
	6	24	6.5	2.5	0	17.5	3	0
	8	16.5	4	3	0	12.5	2.5	0.5
ACT22	5	35	18	12	6	17	3	1
	6	22.5	2	1	0	20.5	3.5	0
ACT23	1	34	22.5	17.5	7	11.5	1.5	0
	3	40.33	27.33	19.67	8	13	2.33	0
	4	36	21	15	6	15	2	0
ACT25	1	47	29	22.67	7.67	18	2	0.67
	2	42.5	21	14	7	21.5	6	1
	3	47.5	30.25	21.75	9.25	17.25	3.25	0.5
	4	45.33	26.67	20	7	18.67	4	0.67
	5	28	10.33	6	1	17.67	5	1
	8	27.5	7.5	5.5	0.5	19.5	5	1

Step-Point Transect (average by Zone)

PCT	Zone	Cryptogams	Bare ground	Rock	Litter	Annual Exotic Grass	Perennial Exotic Grass	Exotic Broadleaf	Perennial Native Grass	Other Native	% Native Perennial
ACT16	1	0	0	0	1.33	12	9.33	6.33	14.67	6.33	56.87
	2	0	1	1.5	3	16.5	5.5	12.75	9.5	2.25	38.90
	3	0	5.67	0.67	4.67	3	4.33	8.67	18	5	64.97
	4	0	1.67	0.33	0.67	5.67	6.67	8	21.67	5.67	65.65
	5	0	0	0	2.33	21.33	5.67	10	9.33	1.33	40.19
	6	0	0	0	4	29	1.5	13.5	1.5	0.5	13.21
	8	0	0	0	2	36.5	0.5	11	0	0	0
ACT22	5	0	1	4	4	5	0	7	20	9	80.56
	6	0	6	5	4	9.5	12	8.5	3.5	1.5	20.53
ACT23	1	1.5	7	1.5	18	2	0	5.5	5.5	9	77.71
	3	2.67	14.33	2.67	6.67	1.33	6.67	1.67	6.33	7.67	72.9
	4	0	13	6	1	3	9	4	11	3	51.85
ACT25	1	1	9.33	5.33	7	5	0.67	5.33	5.67	10.67	79.09
	2	0	0	0	2	16.5	6	9.5	12.5	3.5	51.01
	3	0.25	11	5	6.25	6	0.25	6.25	7.25	7.25	71.07
	4	0.67	1.33	0.33	1	6.33	5.67	10	18	6.67	61.33
	5	0	0	1	0.67	15.33	2.67	15.33	11.33	3.67	45.24
	8	0	1.5	1	3	19.5	10	11	1	2.5	17.5

Appendix 3. Excel Spreadsheet (2985_GinninderryGCCACTPlotData_20220311.xlsx)

Appendix 4. GIS Data (shapefiles in separate .zip folder)