Canberra Centenary Trail Ecological Assessment

Prepared for
Territory and Municipal Services Directorate, ACT Government

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Abbreviations

ABBREVIATION	DESCRIPTION
CCT	Canberra Centenary Trail
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
GSM	Golden Sun Moth (*Synemon plana*)
NC Act	Nature Conservation Act 1980
NES	Matters of National Environmental Significance
P & D Act	Planning and Development Act 2007
PMST	Protected Matters Search Tool
PTWL	Pink-tailed Worm Lizard
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
TAMSD	Territory and Municipal Services Directorate, ACT Government

1 Introduction

1.1 BACKGROUND

The ACT government is proposing to develop the Canberra Centenary Trail (CCT), a walking and riding trail comprising approximately 155km of track designed to showcase the cultural and natural history highlights of the ACT. The CCT is a Canberra100 project and is due to be delivered in time for the Centenary program of events planned for February/March 2013.

The CCT is designed to be a challenging, interesting, self-guided tour of the ACT taking an estimated 7 days to walk. The trail has been designed so that smaller sections of the track are accessible and can be undertaken by those who do not wish to undertake the full round trip.

The full trail (Figure 1) starts at Parliament House in the Centre of Canberra and then heads north passing through the nature reserves at Mount Majura and Mount Ainsle. The trail follows the northern border of the ACT and New South Wales to the west through Goorooyaroo Nature Reserve and Mulligans Flat Nature Reserve, showcasing the dry sclerophyll and Box-Gum Woodland ecosystems characteristic to the ACT. From the township of Hall, the trail passes south through Belconnen, Black Mountain Nature Reserve and Stromlo down to the Murrumbidgee River near Kambah Pools. The trail follows the Murrumbidgee River east to the Tuggeranong town centre before heading north again through Red Hill and Isaacs Ridge finishing back at Parliament House. The trail has been designed to be close to facilities and urban amenities throughout its length, while highlighting the ACT's natural features.

As part of planning for the development of the CCT, a number of studies have been undertaken including:

- Feasibility studies undertaken by CB Richard Ellis in 2010/2011.
- Ground truthing by Anthony Burton Consulting in 2011.
- Heritage survey by Biosis Research, in prep.
- Canberra Centenary Trail Consultation Report, CB Richard Ellis, 2012

1.1.1 Trail construction

The CCT has been designed to primarily utilise existing trails to minimise the amount of new trail requiring construction along its 155km length. However, some sections of the route require upgrading and some additional sections of new track are required to link existing sections of the trail. The CCT will be 1.2 m wide, situated within a 1.5 m trail corridor, and will be constructed predominantly of local materials. The CCT is comprised of the following elements:

- Existing track – 100.28km;
- New track – 23.18km;
- Upgraded track – 26.09km;
- New track to be completed by a third party – 3.26km;

- Upgraded to track to be completed by a third party – 2.27km;

This ecological assessment report pertains to the construction of the new and upgraded sections of trail required for the CCT but does not include any assessment of impacts resulting from the construction of new or upgraded track by a third party.

The trail will be constructed using a small excavator on rubberised tracks to reduce soil compaction. The proposed works involve the grading and levelling of trails, infilling of holes and trip hazards. The CCT will be constructed primarily of local materials, however, additional materials are proposed to be brought in if required where the local materials are considered unsuitable or in need of extra stabilisation. During the construction of the trail, all areas of the trail can be accessed through existing fire trails, public roads or through the new sections of constructed trail. No additional trails are proposed for machinery access (TAMSD, pers. comm.).

In addition to the trail, the CCT requires the construction of associated infrastructure such as fencing and rest areas. A summary of the additional infrastructure associated with the development of the CCT is provided in Table 1.

Table 1 Associated infrastructure

Infrastructure	Area affected
Fencing	10.9km along the northern-most section of the trail.
Rest nodes	No. of minor rest nodes (seat only) – 12 No. of minor rest nodes (seat & table) – 7 No. of informal rest nodes – 30 Total impact area – 0.02ha
Elm Grove Campsite	0.60 ha
Signage	Not assessed for the purposes of this report.

The trail will be situated within a 20m easement with fencing at margins of the easement where the track crosses private property (10.9km in length). The proposed management of the easement on private land consists of allowing stock access in the rural areas. The construction of new sections of the trail is scheduled to occur in January 2013, with upgraded sections being initiated in late 2012.

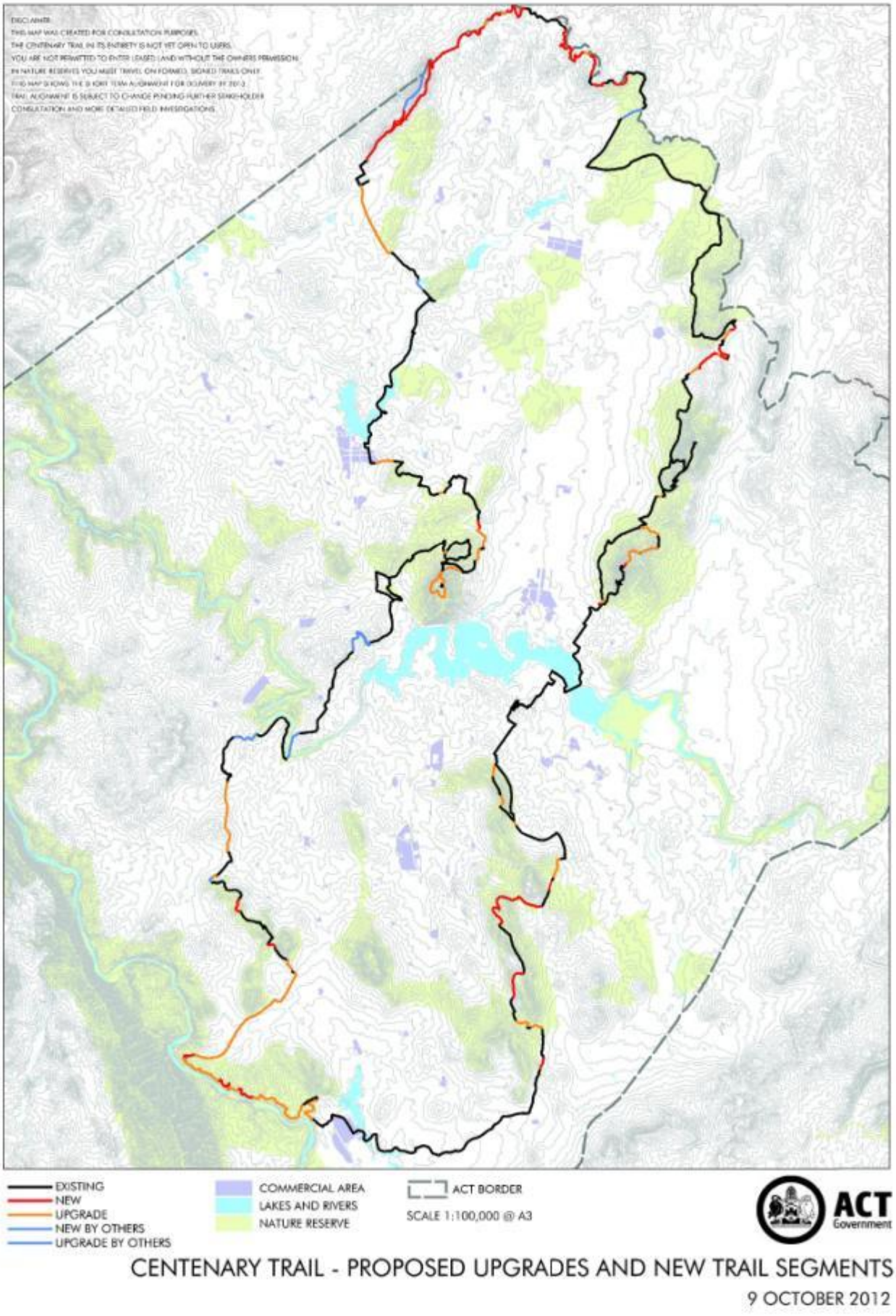


Figure 1 Proposed alignment of the CCT

1.2 LEGISLATIVE CONTEXT

1.2.1 Territory Legislation

The ACT is governed by two main pieces of legislation which are likely to be of relevance to this project. They are the *Australian Capital Territory (Planning and Land Management) Act 1988* and the *Planning and Development Act 2008.*

The Australian Capital Territory (Planning and Land Management) Act 1988 establishes the *National Capital Plan* and the National Capital Authority (NCA) as well as its roles and functions, including powers for granting approval of works in Designated Areas of the National Capital Plan (NCP). This Act requires that any proposal for work in Designated Areas is subject to the requirement to obtain Works Approval from the NCA.

In addition to works in Designated Areas, the NCA also has other functions that relate to the protection of territory values that are unique to the role of the ACT as the National Capital. Of relevance, designated non-urban areas of the ACT including *Broadacre Areas*, *Hills Ridges and Buffers*, *River Corridors*, and *Mountains and Bushland Areas* (which combined form part of the National Capital Open Space System), and *Rural Areas* all have a set of principles, policies, standards and special requirements to guide development. Any proposed development in areas identified as Designated Areas under the Act, need to be consistent with the principles, policies and special requirements for each of those areas as established in the NCP.

Working in parallel to the *Planning and Land Management Act 1988,* the *Planning and Development Act 2007* (P&D Act) was enacted in 2008 as part of a reform of the ACT planning system. The P&D Act establishes, amongst other things, the specific requirements and process for the assessment of development in the ACT. Under the Act, and in accordance with the associated Territory Plan, there are two assessment tracks likely to be of relevance to the CCT, they are the Merit and the Impact track. A proposed development triggers the need for assessment under the Impact track in a number of circumstances. Of relevance to this project, an assessment under the Impact track is triggered if the proposed actions will result in >0.5ha clearance of native vegetation (Schedule 4) or if it is likely to have a significant impact on a matter listed under the *Nature Conservation Act 1980*. If an assessment under the Impact track is triggered, the completion of an EIS is required.

However, in February 2011 the possibility of requesting an Environmental Significance Opinion (ESO) was introduced under the *Planning and Development (Environmental Impact Statements) Amendment Act 2010*. Under the amendment, when a proponent considers a proposal is unlikely to have a significant impact on a matter protected under the Act, they can apply for an ESO. If the ESO application is successful, this indicates that the project is not considered to have a significant impact on a protected matter and precludes the need to undertake an Environmental Impact Statement (EIS).

1.2.2 Commonwealth Legislation

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) establishes a requirement for Australian Government environmental assessment and approval for matters of National Environmental Significance (Matters of NES) protected under the Act. There are eight matters of NES listed under the EPBC Act. Of these, the only matter likely to be relevant to the proposed works associated with the CCT is '*listed threatened species and ecological communities.'*

The Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) is responsible for administering the EPBC Act. Actions that may have a significant impact on a matter of NES must be referred to SEWPaC for assessment and approval under the EPBC Act. The

Australian Government Environment Minister (the Hon. Tony Burke) or SEWPAC (as delegate) then has 20 business days to determine if the action will require further assessment and approval.

2 Methodology

A combination of both desktop and field assessment methodology was utilised for this project. The methodology included the following components:

- Desktop Assessment
  - Likelihood of occurrence assessment
  - Information review
- Field Assessment
  - Vegetation assessment
  - Threatened species assessment

2.1 LIKELIHOOD OF OCCURRENCE ASSESSMENT

SEWPaC has a protected matters search tool (PMST) that assists in identifying Matters of NES that may be in the vicinity of any project. By entering the coordinates for a given project, a report is generated that provides a conservative list of the Matters of NES potentially occurring in the area. A PMST report was generated on 7th June 2012, with a five kilometer buffer around the proposed CCT alignment. The report identified two ecological communities and 27 threatened species. The full list of ecological communities and threatened species identified in the PMST is provided in Appendix A.

The likelihood of presence or absence of species identified through the PMST has been assessed. This assessment is based on the results of the field survey, suitability of habitat on site, professional judgment and local knowledge. The results are presented in Appendix A.

Five terms for the likelihood of occurrence of species are used and are defined as follows:

- "Known" = the species was or has been observed on the site
- "Likely" = a medium to high probability that a species uses the site
- "Potential" = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur
- Unlikely" = a very low to low probability that a species uses the site
- "No" = habitat onsite and in the vicinity is unsuitable for the species.

A preliminary impact assessment has been undertaken for species and communities considered ***known*** or ***likely*** to occur within the CCT alignment and is provided in section 4.2.

In addition to the PMST, the proposed alignment of the CCT was checked against the ACT's database ACTMAPi. The ACTMAPi database predicted the presence of a number of threatened species and one threatened ecological community along or adjacent to the CCT alignment based on known records. These included:

- Box-Gum Woodland
- Small Purple-Pea (*Swainsona recta*)

- Button Wrinklewort (*Rutidosis leptorrhynchoides*)
- Austral Toadflax (*Thesium australe*)
- Tuggeranong Lignum (*Muehlenbeckia tuggeranong*)
- ACT listed Orchid species
- Pink-tailed Worm Lizard (*Aprasia parapulchella*)

2.2 INFORMATION REVIEW

A review of the literature relevant to the project was undertaken. The review included a range of policy statements and action plans as described below.

- Species Profiles and Threats Database (SPRAT), SEWPaC 2012
- EPBC Policy Statement 1.1 – Significant Impact Guidelines
- EPBC Policy Statement 3.5 – White Box-Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Grassland
- ACT Government Database (ACTMAPi)
- Action Plan No. 10, ACT Government
- Survey Guidelines for determining lowland vegetation classification and condition in the ACT, Conservation Planning and Research, 2010

The likelihood of occurrence assessment and the information review highlighted the potential for Box-Gum Woodland to occur within the proposed alignment. To provide background to the community, a brief summary of the policy and planning frameworks relevant to Box-Gum Woodland and Native Vegetation has been provided below.

2.2.1 Box-Gum Woodland

White Box – Yellow Box – Blakely's Red Gum Grassy Woodland (Box-Gum Woodland) is listed as a critically endangered ecological community under the EPBC Act. This ecological community can occur either as woodland or derived grassland from which the trees have been removed. According to the EPBC Act Listing Advice (Threatened Species Scientific Committee, 2006):

> *Box–Gum Grassy Woodlands and Derived Grasslands are characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs, and the dominance, or prior dominance, of White Box, Yellow Box or Blakely's Red Gum trees.*

Sites dominated by other tree species that do not have Yellow Box, White Box or Blakely's Red Gum as dominants or co-dominants are not considered to be part of the ecological community.

Box-Gum Woodland can provide important habitat for a large number of plants and animals, including rare and threatened species. This ecological community was once widespread across eastern Australia but now less than 5 percent remains in good condition of which most occurs in small isolated patches.

Table 2 EPBC Act Box-Gum Woodland Definition

EPBC Act Definition and Mapping of Box-Gum Woodland

A description of Box-Gum Woodland as listed under the EPBC Act is provided in two documents:

- The EPBC Act Listing Advice for Box-Gum Woodland (Threatened Species Scientific Committee, 2006); and
- An EPBC Act Policy Statement for Box-Gum Woodland (DEH, 2006).

The Listing Advice provides the legal definition and criteria for the ecological community, whereas the Policy Statement provides guidance about the ecological community for the public.

It is important to note that the identification and mapping of Box-Gum Woodland in this project is based on the legal determination presented in the Listing Advice. This is due to a fundamental difference between the Listing Advice and the Policy Statement. The Policy Statement requires that criteria relating to the understorey must be applied:

to the 0.1 hectare of your patch that contains the most native species in the ground layer.

This statement does not align with the definition of the ecological community provided in the Listing Advice which applies to the understorey criteria to the whole of a patch. There is no requirement in the legal Listing Advice to focus on the most diverse 0.1 ha area within a patch.

Given this inconsistency, the mapping of EPBC Act Box-Gum Woodland in this project is based on the definition of the ecological community contained within the Listing Advice from the Threatened Species Scientific Committee to the Commonwealth Minister for the Environment and is consistent with the legal instrument for this community as defined under the EPBC Act.

Box-Gum Woodland is also listed as endangered under the NC Act, as *'Yellow Box/Red Gum Grassy Woodland'*. Similar to the Commonwealth listed threatened ecological community (TEC), the NC Act listed TEC comprises a canopy of either Red Gum or Yellow Box with a species-rich understory (Action Plan No. 10, ACT Government). Under the Act, Box-Gum Woodland is defined by the following characteristics

- ≥ 40% crown cover of *Eucalyptus melliodora* (Yellow Box) or *Eucalyptus blakelyi* (Blakely's Red Gum)
- Understory is not exotic pasture
- Remnants are not isolated trees or clumps

2.2.2 Native Vegetation

The NC Act provides for the protection of Native Vegetation which is defined as follows:

Native Vegetation is defined in the NC Act as occurring if:

- Trees or shrubs indigenous to the area have a canopy cover of 10% or greater in any stratum; or
- Native plants indigenous to the area comprise 50% or more of the cover of the groundlayer (grasses, small shrubs, forms, sedges).

Native vegetation, in relation to an area, means any of the following kinds of vegetation indigenous to the area:

a) Trees:

b) Understorey plants;

c) Groundcover consisting of any kind of grass or herbaceous vegetation;

d) Plants occurring in a wetland or stream.

Associated with the Native Vegetation definition is the definition of Clearing Native Vegetation.

Clearing Native Vegetation includes any of the following;

a) Cutting down, felling, thinning, logging or removing native vegetation;

b) Burning native vegetation;

c) Doing anything else that kills or is likely to kill native vegetation.

2.3 VEGETATION ASSESSMENT

The study area was stratified into polygons through interpretation of aerial imagery, data layers and on-ground assessment of vegetation extent and condition. The study area included a 20m corridor around the proposed alignment as indicated in the maps provided in Appendix C. Each section was assessed to determine whether it is native vegetation under the NC Act (as described above). Each polygon was assessed using methodology for grasslands and woodlands based on the *Survey Guidelines for determining lowland vegetation classification and condition in the ACT* (Conservation Planning and Research (CPR), 2010) as follows:

- *Grasslands (<10% canopy cover)*
    - A 20 x 20m quadrat is to be positioned in the area of highest condition and native diversity, and is to be used to assess native species cover and richness using the Braun-Blanquet cover-abundance classification
    - A step-point is to be located in an area representative of the polygon and will record the native: exotic ratio over 100 paces
- *Woodlands or Forest*
    - Random meander transects are to be used to assess native species cover and richness using the Braun-Blanquet cover-abundance classification
    - A step-point is to be located in an area representative of the polygon and will record the native: exotic ratio over 100 paces

During on ground field surveys, only very limited areas of secondary grassland were identified within the alignment. As such, the woodland or forest methodology was predominantly used.

Where a polygon was suspected to delineate a Threatened Ecological Community (TEC), further assessment was applied as needed to determine whether, it met the criteria for listing as a TEC under either Territory or Commonwealth legislation. The two TEC's of concern in the Canberra region are

Box-Gum Woodland and Natural Temperate Grassland (NTG). Determination, if possible given the seasonal constraints, of whether an area meets the criteria for listing as a TEC was undertaken using:

- EPBC Policy Statement for White box – Yellow Box – Blakely's Red Gum Grassy Woodlands and Derived Grasslands; and
- National Recovery Plan for Natural Temperate Grasslands of the Southern Tablelands and the ACT.

2.4 THREATENED SPECIES ASSESSMENT

Potential habitat for threatened species was identified during the field survey. Potential habitat for threatened flora species was assessed and mapped in conjunction with the vegetation assessment within the 20m corridor. Potential habitat for threatened fauna species may include features such as the presence of partially embedded rocks and native tussock grasses. Any rare or threatened species observed during the field surveys were recorded using a GPS.

Maps of threatened species habitat are referenced against the CCT sections map provided in Appendix C.

2.5 CALCULATION OF IMPACTS

The CCT has been designed to utilise existing trails as much as possible (refer to section 1.1.1). In some instances, the existing trails require improvement to meet the standards specified for the CCT. Depending on the extent of upgrade required, the disturbance associated with the upgrade will vary. The methodology for assessing the disturbance resulting from upgraded trails is described in Table 3.

Table 3 Method used to assess the likely impact of upgraded track

Upgraded Sections	Degree of modification	Impact calculated at % of width (1.5m)
Minor Impact	>50% existing	25%
Moderate Impact	25-50% existing	50%
Major Impact	<25% existing	75%

All areas of new track were assumed to result in a 100% loss of ground layer vegetation for the calculation of impacts. The development of the CCT may result in the removal of small shrubs where they pose a constraint to the tracks development, however, it is anticipated that no mature trees will be removed as a result of this project.

2.6 LIMITATIONS

The ecological survey of the CCT was constrained to the June-August period of 2012. The impact of subsequent changes to the alignment after this period has been reviewed based on existing species data and expert knowledge however detailed investigations in those areas outside the original survey have not been completed. This specifically relates to a short section of new trail on the southern slope of One Tree Hill. It is recommended that this, and any other areas impacted through subsequent changes to the alignment are subject to a pre-clearance survey where there is potential for works to impact on threatened species or communities.

In addition, impact areas have been calculated for the trail and rest nodes associated with the trail only. The impacts resulting from the trail have been conservatively calculated assuming a total clearance

width of 1.5 m taking into account the degrees of modification outlined in Table 3. If additional clearance outside the nominated width is required, it is additional to figures provided in this report. Impact areas presented in this report relate to those sections of the trail proposed to be constructed as a component of the CCT. Any sections proposed to be created by other parties through routine maintenance or other initiatives have not been assessed and are not included in this report.

Surveys for Box-Gum Woodland and Natural Temperate Grassland are best conducted in autumn or spring during the period when winter annuals are generally absent (autumn) and/or when the highest floristic diversity is present (spring) (DEH, 2006; CPR, 2010). The surveys conducted for this assessment were outside the optimum period. As such, it should be noted that the species recorded during the surveys may not include all of the species present within the study area due to seasonal variation. This is of particular relevance to annual species, and species that lie dormant at certain times of the year such as orchids, and some native forbs and herbs. Any areas which were not surveyed during the field assessment component of the project were mapped using the ACT Sub-formation Vegetation mapping data supplied by the ACT Government.

3 Results

The field surveys were undertaken between the 20th June and the 31st August 2012. The surveys undertaken were designed to map the vegetation communities within the alignment as well as identify areas of potential habitat for threatened species listed under the NC and EPBC Acts. Individual maps of each section of new or upgraded track showing the mapped vegetation are provided in Appendix C. Impact areas resulting from the CCT have been calculated based on the 1.5m trail corridor.

3.1 VEGETATION ASSESSMENT

The CCT crosses a wide variety of different habitat types along its route. The proposed route traverses a mix of native and exotic communities and plantations. Of conservation value, the trail highlights the Box-Gum Woodland community as well as showcasing the dry sclerophyll forests which are characteristic of the ACT's inner hills. The field surveys recorded 231 flora species across the alignment. A summary of the common native vegetation types which fall within the CCT is provided below. The vegetation across the alignment has been mapped, and provided in Appendix C.

3.1.1 Endangered Ecological Communities

Box-Gum Woodland

Box-Gum Woodland is characterised by the presence of *Eucalyptus blakelyi* (Blakely's Red Gum) and *E. melliodora* (Yellow Box) in the over story and a grassy understory dominated by native tussock grasses, herbs and forbs. The community occurs in a range of conditions within the CCT alignment from good quality remnants dominated by Yellow Box and Blakely's Red Gum with a diverse understory of grass and forb species to degraded patches with higher abundance of exotic species and less forb diversity. High quality examples of the community often occur in Nature Reserves such as Mt Ainsle Nature Reserve, which is traversed by the proposed alignment.

Patches of Box-Gum Woodland are scattered across the alignment, with the largest concentration in the south-eastern portion of the trail around Isaacs Ridge. The impact areas to Box-Gum Woodland associated with new and upgraded track is provided below in Table 4.

Approximately 0.49ha of Box-Gum Woodland likely to be listed under the EPBC Act has the potential to be impacted as a result of the CCT project. Box-Gum Woodland listed under the EPBC Act also meets the criteria for listing under the NC Act as Yellow Box – Red Gum Grassy Woodland.

Table 4 Impacts to Box-Gum Woodland

Impacts to EPBC listed Box-Gum Woodland	New (ha)	Upgraded (ha)	Total (ha)
EPBC listed Box-Gum Woodland (12 or more non-grass native species + 1 important sp.)	0.11	0.10	0.21
Potential EPBC listed Box-Gum Woodland (9 or more non-grass native species)	0.16	0.01	0.17
Box-Gum Woodland, Derived Native Grassland (potential EPBC listed community)	0.11	-	0.11
Total	0.38	0.11	**0.49**

Figure 2 Box-Gum Woodland, Isaacs Ridge

3.1.2 Other common vegetation communities

Red Stringybark – Scribbly Gum Tableland Forest

Red Stringybark – Scribbly Gum Tableland Forest (RSSGTF) is characterised by the presence of *Eucalyptus macrorhyncha* (Red Stringybark) and *Eucalyptus rossii* (Scribbly Gum). The community predominantly occurs on hill slopes within the ACT. The community often has a well developed shrub layer dominated by a mix of Acacia and heath species.

This community also occurs as secondary grassland, where the canopy layer has been removed for grazing. These areas are typically dominated by tussock grasses such as *Aristida ramosa* (Wiregrass) and *Austrodanthonia* spp (Wallaby Grasses).

Within the CCT alignment this community predominantly occurs on hills and ridges with poor soils such as Mt Ainslie, Black Mountain and areas of Mulligans Flat and adjacent Gungahlin.

Approximately 1.03 ha of this community, as well as approximately 0.69 ha of RSSGTF Derived Native Grassland has the potential to be impacted by the development of the CCT.

Drooping She-oak Tablelands Woodland

Drooping She-oak Tablelands Woodland (DSTW) is characterised by the presence of *Allocasuarina verticillata* (Drooping She-Oak). This species can occur with other dry sclerophyll species such as Scribbly Gum and Yellow Box; however, it can also occur as almost pure stands with a very limited understory.

This community was only recorded on Mt Ainslie on the mid and upper slopes, particularly towards the summit. At this location, the community was comprised predominantly of pure stands of Drooping She-oak with occasional scattered Eucalypts. Approximately 0.11ha of this community has the potential to be impacted by the construction of the CCT.

Broad-leaved Peppermint - Apple Box Tableland Woodland

This community is dominated by a mix of *Eucalyptus dives* (Broad-leaved Peppermint) and *Eucalyptus bridgesiana* (Apple Box), although pure stands of Apple Box also feature as a component of this community.

This community was predominantly present alongside areas of Box-Gum Woodland in the southern extent of the CCT around Kambah Pools and Isaacs Ridge. Approximately of 0.57 ha of this community occurs within the proposed alignment.

3.1.3 Native Vegetation

The NC Act provides for the protection of Native Vegetation within the ACT. Native Vegetation as defined under the Act includes trees or shrubs indigenous to the area, which have a canopy cover of 10% or a native understory defined by >50% cover of native species (refer to Section 2.2.2). Approximately 3.19 ha of Native Vegetation will be impacted by the development of the CCT project. The clearance of Native Vegetation (refer to Section 2.2.2), has legislative considerations which are required to be addressed. Section 4.3 addresses these considerations further.

3.2 THREATENED SPECIES ASSESSMENT

The surveys for the CCT project were completed in June to August 2012. The surveys identified areas of potential habitat for listed species based on field observations, previous records (Eco Logical Australia, 2010) and the ACTMAPi database.

The field surveys of the CCT route recorded a small number of species listed under the NC Act, as well as potential habitat for species listed under both the NC Act and the EPBC Act.

3.2.1 Flora

EPBC Act listed Flora

The desktop assessment identified a number of threatened flora species as having the potential to occur within the alignment of the CCT (Section 2.2). It should be noted that targeted surveys were not possible for the majority of these species given the seasonal constraints associated with the project.

The seven EPBC listed flora species identified below have the potential to occur within the proposed alignment are:

- Small Purple Pea (*Swainsona recta*)
- Button Wrinklewort (*Rutidosis leptorrhynchoides*)
- Austral Toadflax (*Thesium australe*)
- Tuggeranong Lignum (*Muehlenbeckia tuggeranong*)
- Pale Pomaderris (*Pomaderris pallida*)
- Hoary Sunray (*Leucochrysum albicans var. tricolor*)
- Canberra Spider Orchid (*Arachnorchis actensis*)

The above listed species were all considered ‘likely’ to occur within the CCT alignment following the likelihood of occurrence assessment due to the availability of suitable habitat. The field surveys recorded the presence of the Hoary Sunray (*Leucochrysum albicans var. tricolor*) listed under the EPBC

Act. The surveys recorded the species to the north of the Hughie Edwards rest area along the proposed alignment of the CCT (Figure 3). Approximately 30 individuals were observed during the survey, however, as the survey was outside of the flowering season of the species, there is the potential that the population is more extensive than recorded. The current CCT alignment passes directly through the population and would result in the removal of an estimated 25-50% of the population.

In addition, a single individual considered likely to be *Leucochrysum albicans var. tricolor* was recorded within Goorooyaroo nature reserve adjacent to a section of existing track. No impact to this individual is expected as a result of the development of the CCT.

No flora species listed under the NC Act were observed during the field surveys. However, it should be noted that a previous record does exist for the Small Purple-Pea and the Button Wrinkle-Wort (Figure 4 & Figure 5) within or adjacent to the proposed alignment of the CCT at Isaacs Ridge (ACTMAPi Database). Previous surveys by Eco Logical Australia recorded the presence of *Thesium australe* habitat and the presence of *Pomaderris pallida* (Pale Pomaderris) in the region of the CCT at Kambah Pools (Figure 6 & Figure 7).

The Pale Pomaderris and the Tuggeranong Lignum are both conspicuous perennial shrub species and are the only species of those listed above that could be reliably detected at the time of survey. Neither species was detected within the alignment of the CCT during the 2012 surveys. Following field surveys, it is considered that no potential habitat for Tuggeranong Lignum occurs within the alignment given its preference for the flood terraces of the Murrumbidgee River (SEWPaC, 2012a), which are located down slope of the proposed alignment. This species is no longer considered likely to occur within the alignment.

NC Act listed Flora

The desktop assessment identified three species and one group of flora species protected under the NC Act as likely to occur within the proposed alignment. These are:

- Small Purple Pea (*Swainsona recta*)
- Button Wrinklewort (*Rutidosis leptorrhynchoides*)
- Tuggeranong Lignum (*Muehlenbeckia tuggeranong*)
- Orchid species

It should be noted aside from the Tuggeranong Lignum, surveys were not conducted during a suitable season to detect the above listed species. However, suitable habitat was recorded in the alignment for the Small Purple Pea and Button Wrinkle-Wort in the form of Box-Gum Woodland and Broad-leaved Peppermint – Apple Box Tablelands Woodland. Potential habitat also exists throughout high quality areas of the alignment for a range of orchid species. The 2012 field surveys recorded two species of orchid (*Pterostylis* sp. and *Acianthus* sp.*)* were observed adjacent to the alignment of the CCT on Black Mountain on a section of existing track. All orchid species are listed as protected plants under the NC Act. It should be noted that most orchid species are normally inconspicuous at the time of survey with a large number of species flowering in early spring.

Microseris lanceolata (Yam daisy) was also recorded adjacent to the alignment, which is a rare species in the ACT, but is not listed under the NC Act. This species is unlikely to pose a constraint to the CCT project.

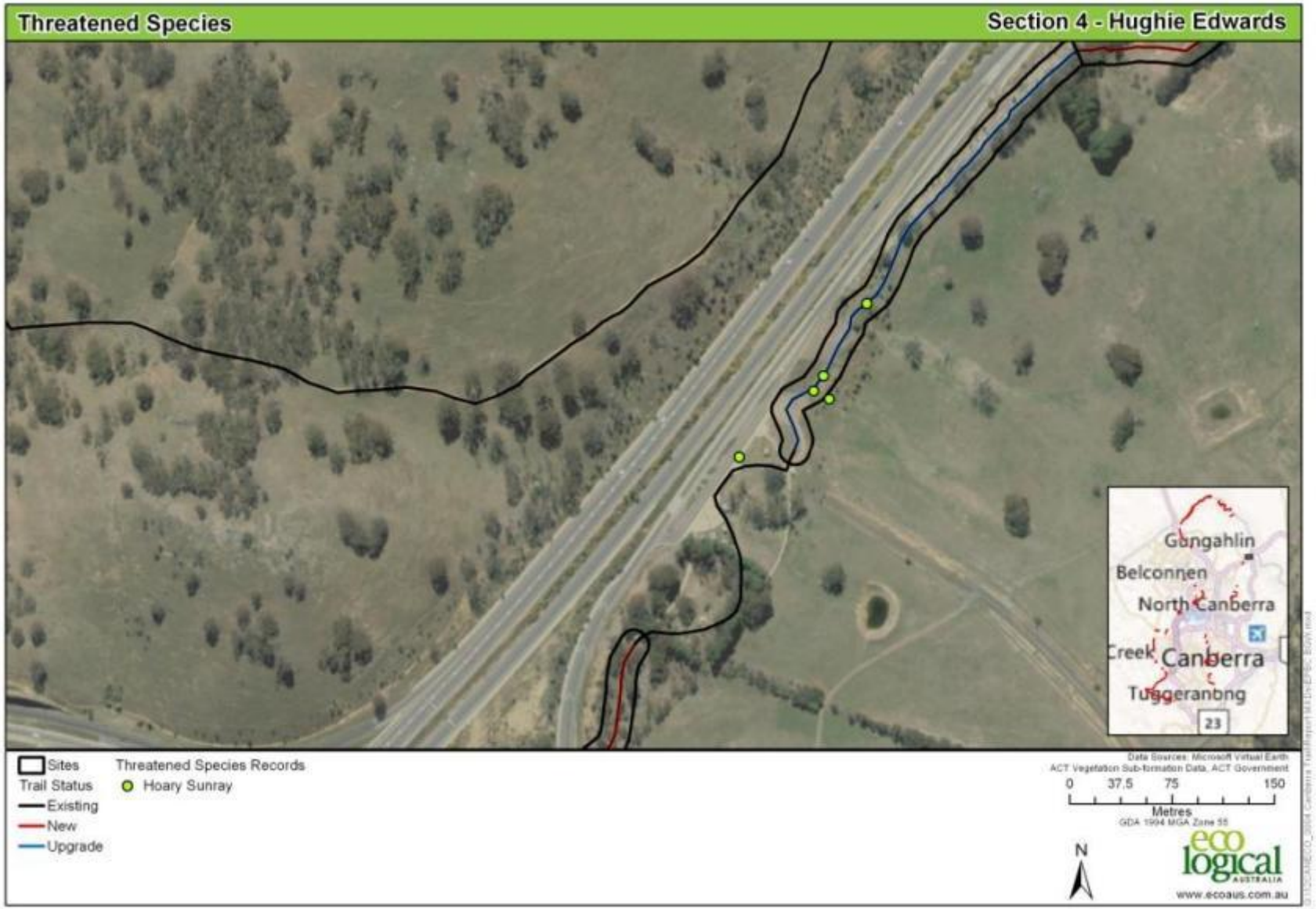


Figure 3 Distribution of Hoary Sunray, Hughie Edwards rest area

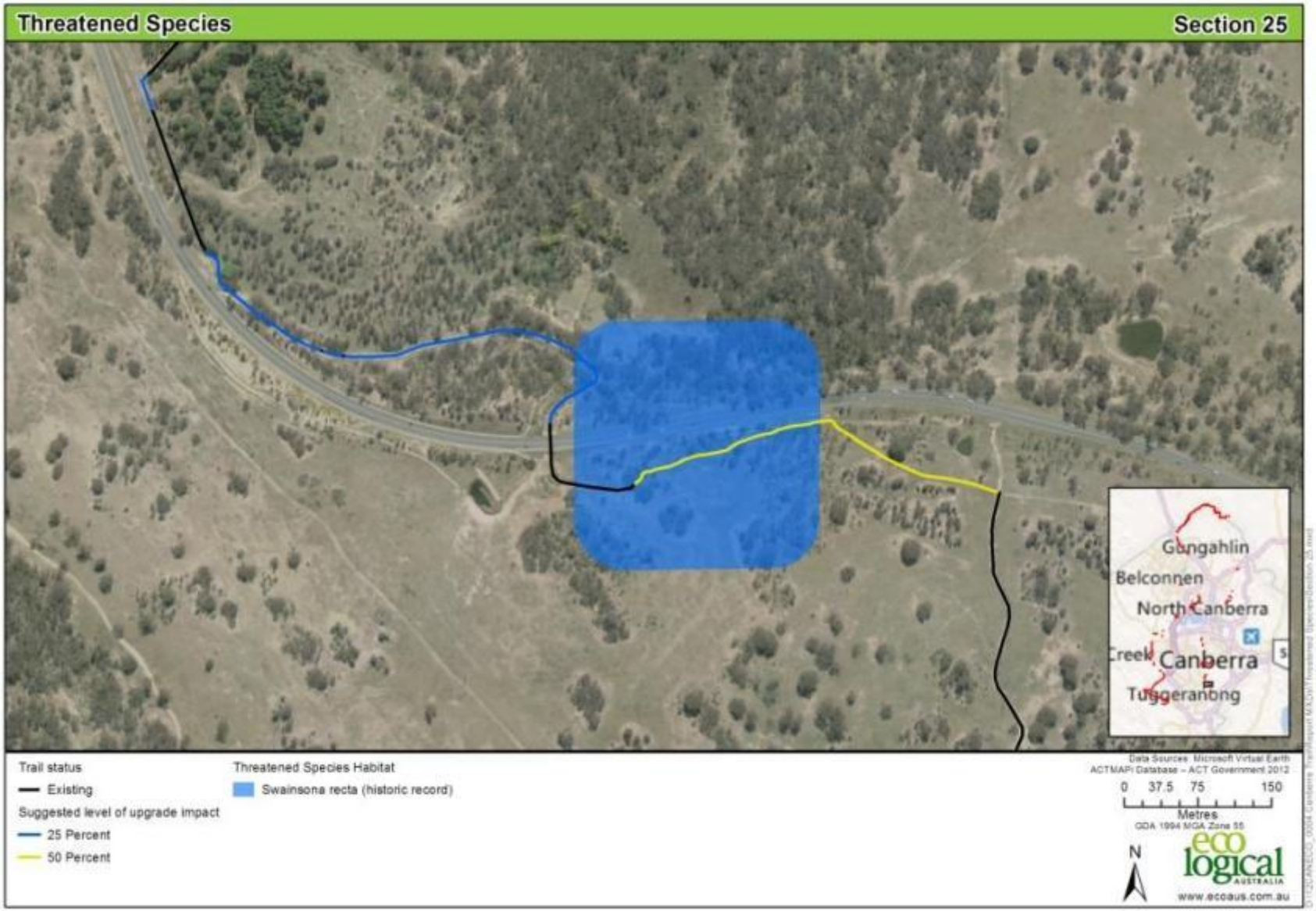


Figure 4 Small Purple Pea historic record - Long Gully Road (Source: ACTMAPi Database)

Figure 5 Button Wrinkle-wort historic record Source: (ACTMAPi Database)

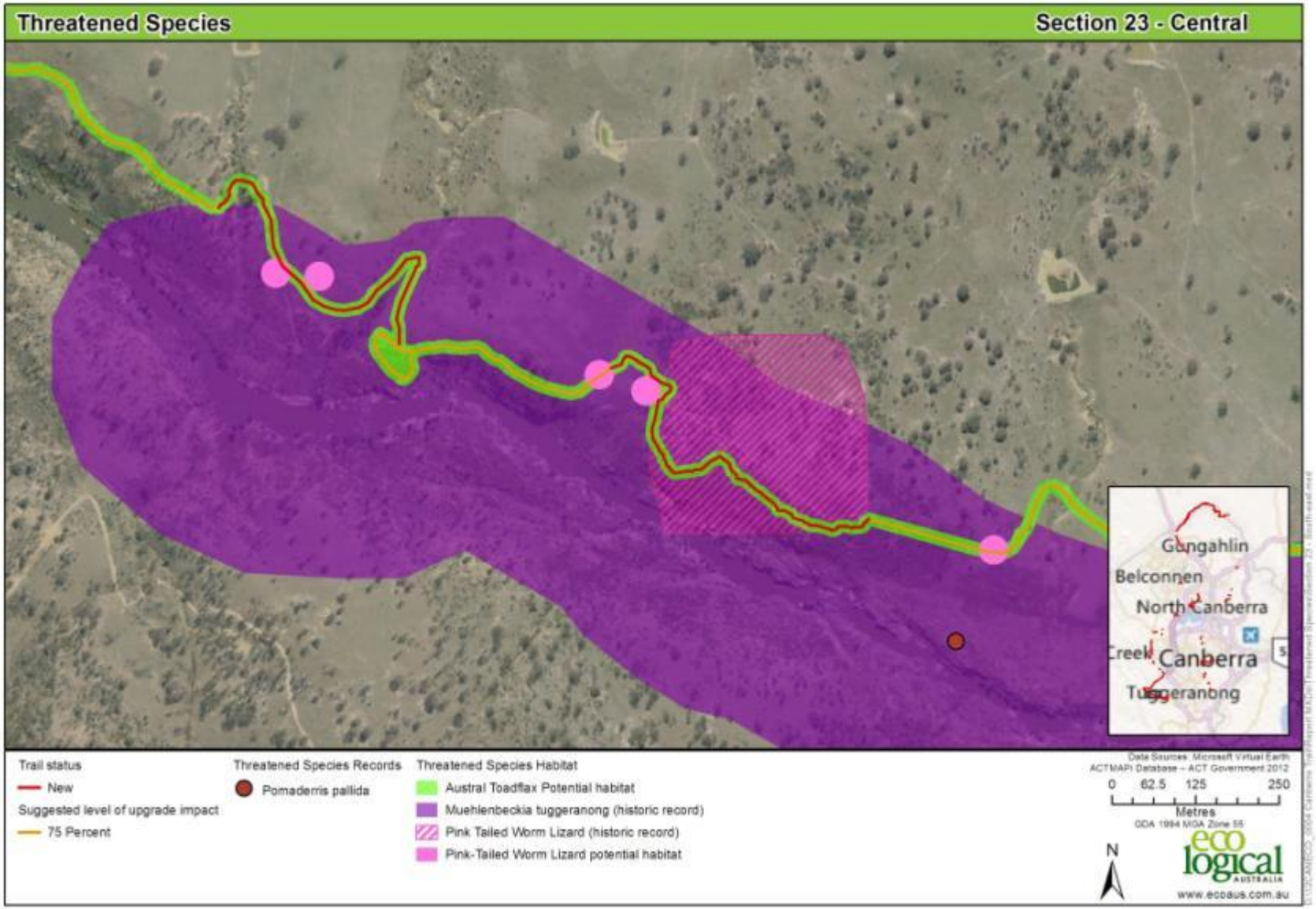


Figure 6 Tuggeranong Lignum buffered historic record & *Pomaderris pallida* buffered historic record (map 1 of 2) – Source: ACTMAPi Database

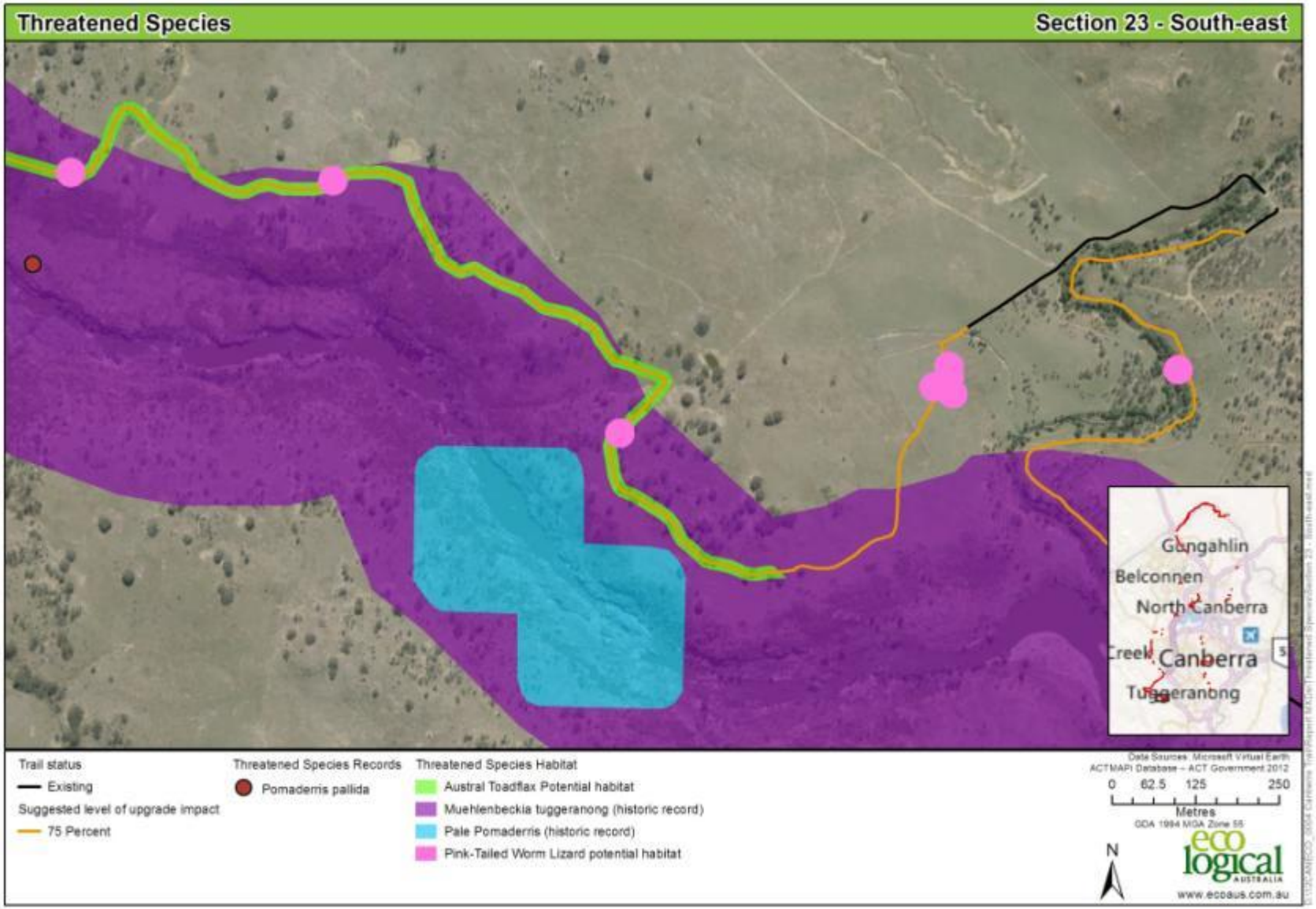


Figure 7 Tuggeranong Lignum buffered historic record & *Pomaderris pallida* buffered historic record (map 1 of 2) – Source: ACTMAPi Database

3.2.2 Fauna

The desktop review process identified two fauna species protected under the EPBC and NC Acts as 'likely' to occur within the alignment. They are:

- Pink tailed Worm Lizard (Aprasia parapulchella)
- Golden Sun Moth (Synemon plana)

The ecological surveys recorded 41 species of birds and six species of mammal along the CCT alignment. The surveys did not record any individuals of fauna species listed under the EPBC Act, however, potential habitat for both the Pink Tailed Worm Lizard and the Golden Sun Moth was observed within or adjacent to the alignment.

The NC Act also provides for the protection of threatened fauna species in the ACT. Both the Pink-tailed Worm Lizard and the Golden Sun Moth are listed under the Act. In addition, two bird species, *Climacteris picumnus* (Brown Tree creeper) and *Daphoenositta chrysoptera* (Varied Sitella), both listed as vulnerable under the NC Act, were observed along the CCT route.

Pink-tailed Worm Lizard

No individuals of the Pink-tailed Worm Lizard (PTWL) were observed within the alignment; however, targeted surveys were not undertaken. Targeted surveys involving rock rolling of between 150-200 rocks per site are best conducted in spring and summer to have the best chance of detecting the species (SEWPaC, 2011) Potential Habitat for the species was identified at a number of locations across the alignment around Isaacs Ridge and along the Murrumbidgee River corridor (Figure 6*,* Figure 7 *&* Figure 8). Potential habitat for the PTWL consists of small shallowly embedded rocks within a grassy ecosystem. The species prefers sunny aspects as they utilise the rocks for thermoregulation (SEWPaC, 2012b).

Golden Sun Moth

The species is primarily restricted to areas of grassland dominated by native tussock grasses. The species is only present in its above ground (moth) form for a limited period between December and February. As surveys were conducted during June/July, no individuals of the Golden Sun Moth (GSM) were observed on site.

The CCT alignment utilises an existing fire trail which crosses an area of known habitat for the GSM (Eco Logical, 2011). The area of known habitat comprises native tussock grasses including *Austrodanthonia carphoides* (Short Wallaby Grass) and is located along the ridge top at Mulligans Flat Nature Reserve, see Figure 9, . Similarly, a population of GSM were recorded at One Tree Hill (Eco Logical Australia 2011) adjacent to the alignment of the CCT along an existing fire trail. Upgrade of the trail along One Tree Hill is proposed to be undertaken by a third party, and as such an assessment of impact has not been included in this report. No works are proposed to be undertaken in these areas as a result of the CCT.

It is noted that the Commonwealth has published a set of Significant Impact Guidelines for the species (EPBC Policy Statement 3.12), which states the impact threshold considered to constitute a significant impact. Based on the guidelines, the following are considered to constitute a significant impact under the EPBC Act:

- Any impact within a patch <10 ha constitutes a significant impact.
- Any impact >0.5 ha in a large patch >10 ha

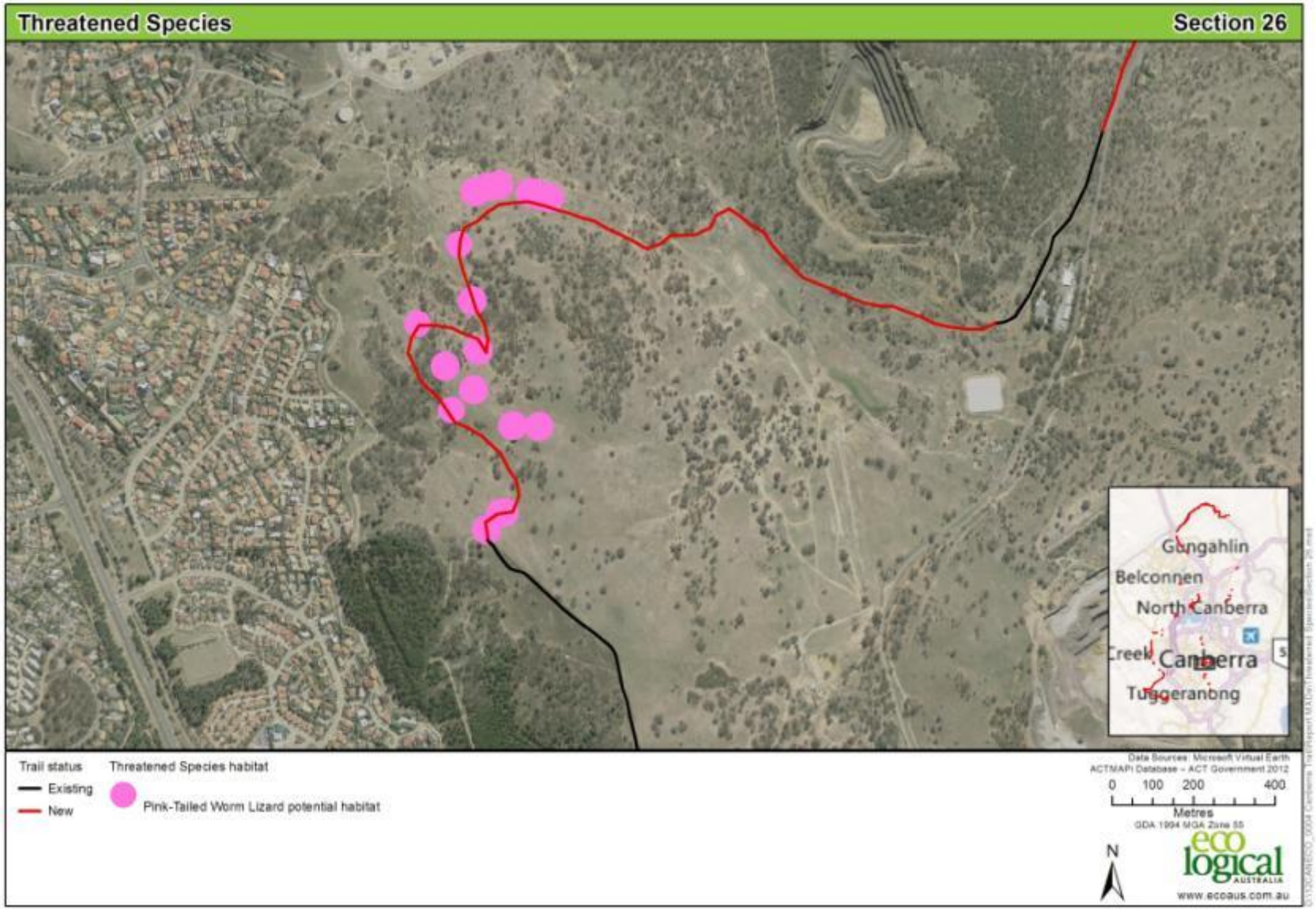


Figure 8 Potential Pink-tailed Worm Lizard Habitat

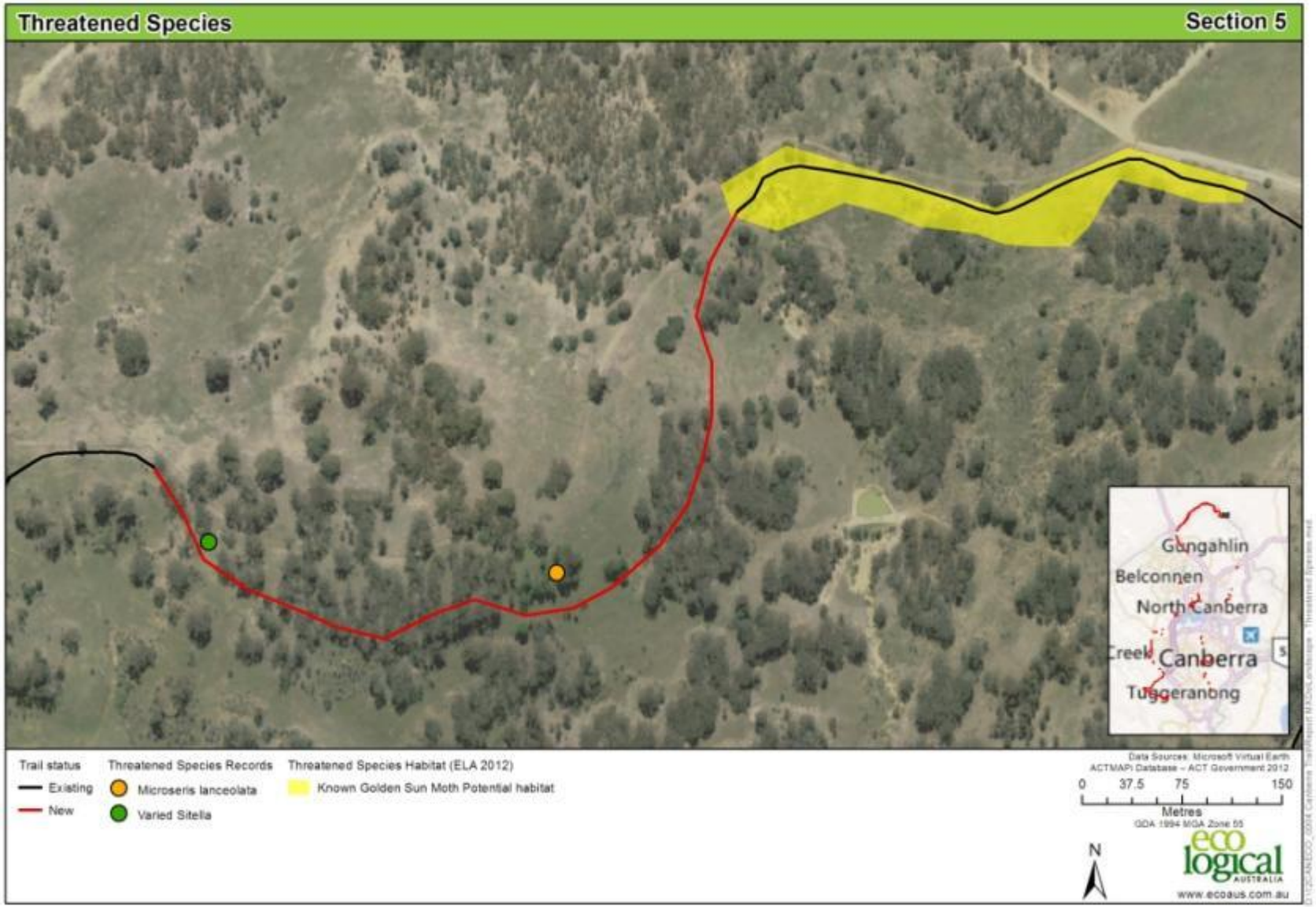
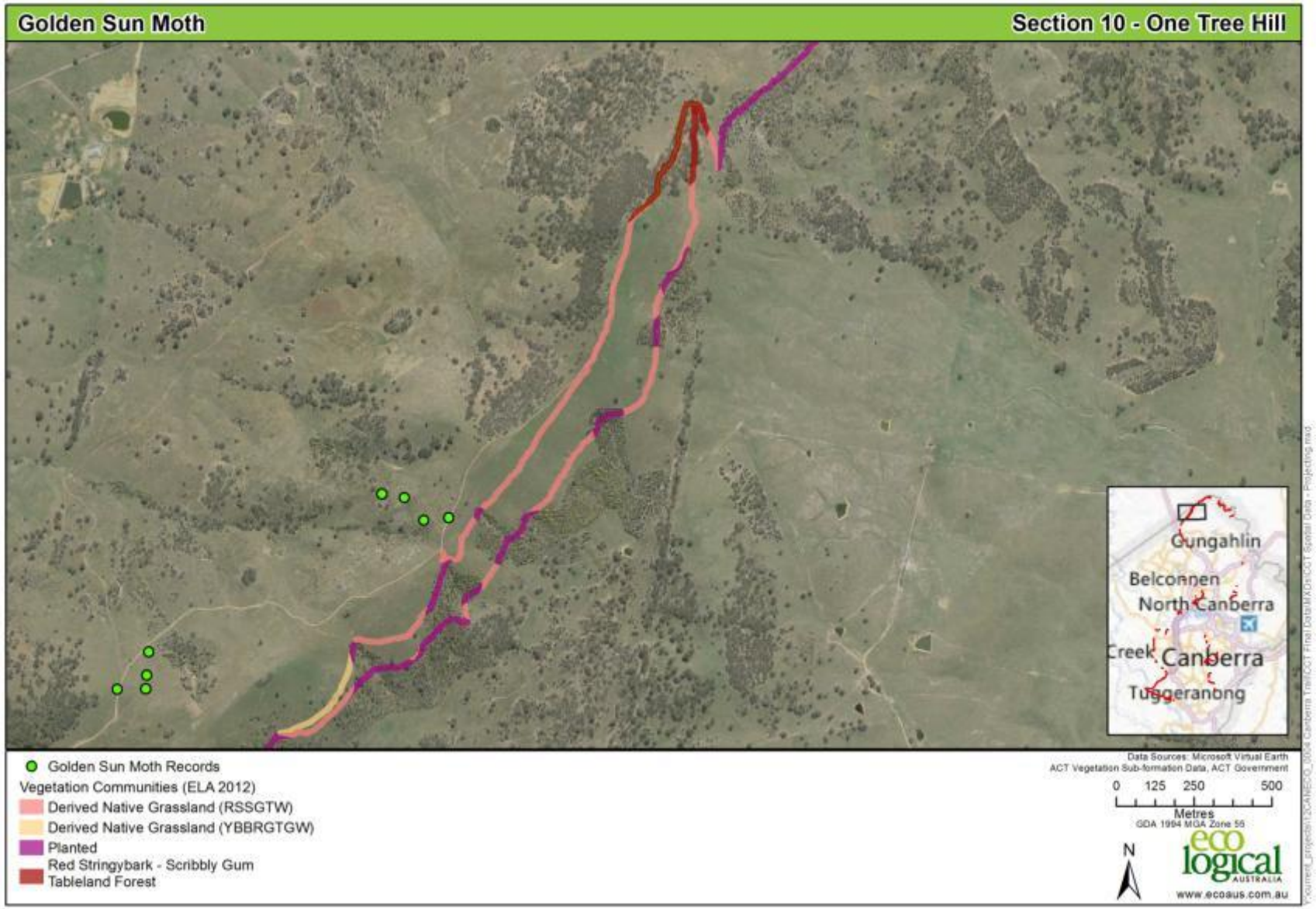


Figure 9 Known Golden Sun Moth Habitat


Golden Sun Moth
Section 10 - One Tree Hill
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Golden Sun Moth Records
Vegetation Communities (ELA 2012)
Derived Native Grassland (RSSGTW)
Derived Native Grassland (YBBRGTGW)
Planted
Red Stringybark - Scribbly Gum Tableland Forest
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 125 250 500
Metres
GDA 1994 MGA Zone 55
N
eco logical AUSTRALIA
www.ecoaus.com.au

4 Assessment of impacts

4.1 IMPACTS ASSOCIATED WITH THE CCT

Following field assessment, it was confirmed that the proposed CCT route is composed predominantly of existing trails. The New and Upgraded tracks associated with the CCT project have a total impact area of 5.03 ha, based on the clearance of a 1.5 m wide trail corridor. A large portion of this impact (3.19 ha) is to area covered by native vegetation communities including forests, woodlands and derived grasslands

The impacts presented in this report relate to the impact resulting from the 1.5 m corridor only, and do not take into account any impacts associated with infrastructure, stockpiles or other works not discussed in this report. This report also does not include any assessment of impacts associated with works undertaken in association with other projects, such as the works at Stromlo or upgrades to fire trails proposed by TAMSD. Finally, this report also does not take into account any impact that may result from the management of the trail.

4.2 COMMONWEALTH LEGISLATIVE CONSIDERATIONS

The CCT project has the potential to impact on a number of matters protected under the EPBC Act, including one TEC, five listed flora species and two listed fauna species.

The following section provides a detailed impact assessment for these key matters of NES. Based on this assessment, it is recommended that the project be referred to the Commonwealth for assessment, and approval if required. Further discussion is provided below in relation to the matters impacted.

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

Box-Gum woodland is listed as a critically endangered ecological community under the Commonwealth EPBC Act (Section 2.2.1). The field surveys undertaken between June and August 2012 identified the potential presence of the EPBC listed Box-Gum Woodland community within the CCT alignment. It should be noted that the optimum time for assessing Box-Gum Woodland is spring or autumn. Surveys were undertaken outside this period as such a precautionary approach has been taken. Where surveys recorded vegetation considered likely to meet the EPBC listing criteria for the community (i.e. 9 or more non-grass native species), these sections were mapped as potential EPBC Box-Gum Woodland.

The development of the CCT is likely to impact 0.49 ha of Box-Gum Woodland comprised of known/ potential EPBC Box-Gum Woodland and Derived Grassland (Table 4). This is based on the impacts associated with the development of a 1.5 m wide trail corridor in accordance with the methodology discussed above (Table 3).

Table 5 Regional context of impacts to Box-Gum Woodland

EPBC Act Listed Ecological Community	ACT Extent (ha) (2004)	Impact Area (ha)	Proportion of ACT extent impacted
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	10,865	0.49	<0.01%

In understanding the nature of this impact, it is relevant to note that it does not comprise one consolidated patch of the listed community, but is comprised of small, linear impacts to a number of generally contiguous areas of vegetation. Despite this, the listing of Box-Gum Woodland as a Critically Endangered matter of NES means that impacts to this community are taken very seriously by the Commonwealth.

The sections of trail which are likely to impact EPBC listed Box-Gum Woodland are shown below in Figure 11 to Figure 20. It should be noted that vegetation dominated by Yellow Box and Blakely's Red Gum occurs on additional sections of the alignment; however these sections do not meet the criteria for listing under the EPBC Act. Maps of these sections are shown in Appendix C.

The Commonwealth thresholds for what is considered a significant impact under the EPBC Act differ depending on the matter impacted, the type of impact and the area in which the impact is occurring. The implementation of strong mitigation and management measures for the CCT project will be a key element considered by SEWPaC when assessing the referral. Based on Eco Logical Australia's understanding, the design and conceptualisation phase of the project selected the proposed route to avoid, where possible, sensitive environmental matters including Box-Gum Woodland. However, not all areas of Box-Gum Woodland could be successfully avoided. In these remaining areas, it is recommended that the CCT project utilise a range of mitigation measures including clean vehicle policies, rehabilitation works and best practice trail construction techniques to minimise impacts to the Box-Gum Woodland TEC.

Given that the CCT is likely to impact on Box-Gum Woodland, which is a Matter of NES protected under the EPBC Act, it is recommended that the CCT project be referred to the commonwealth for their consideration.

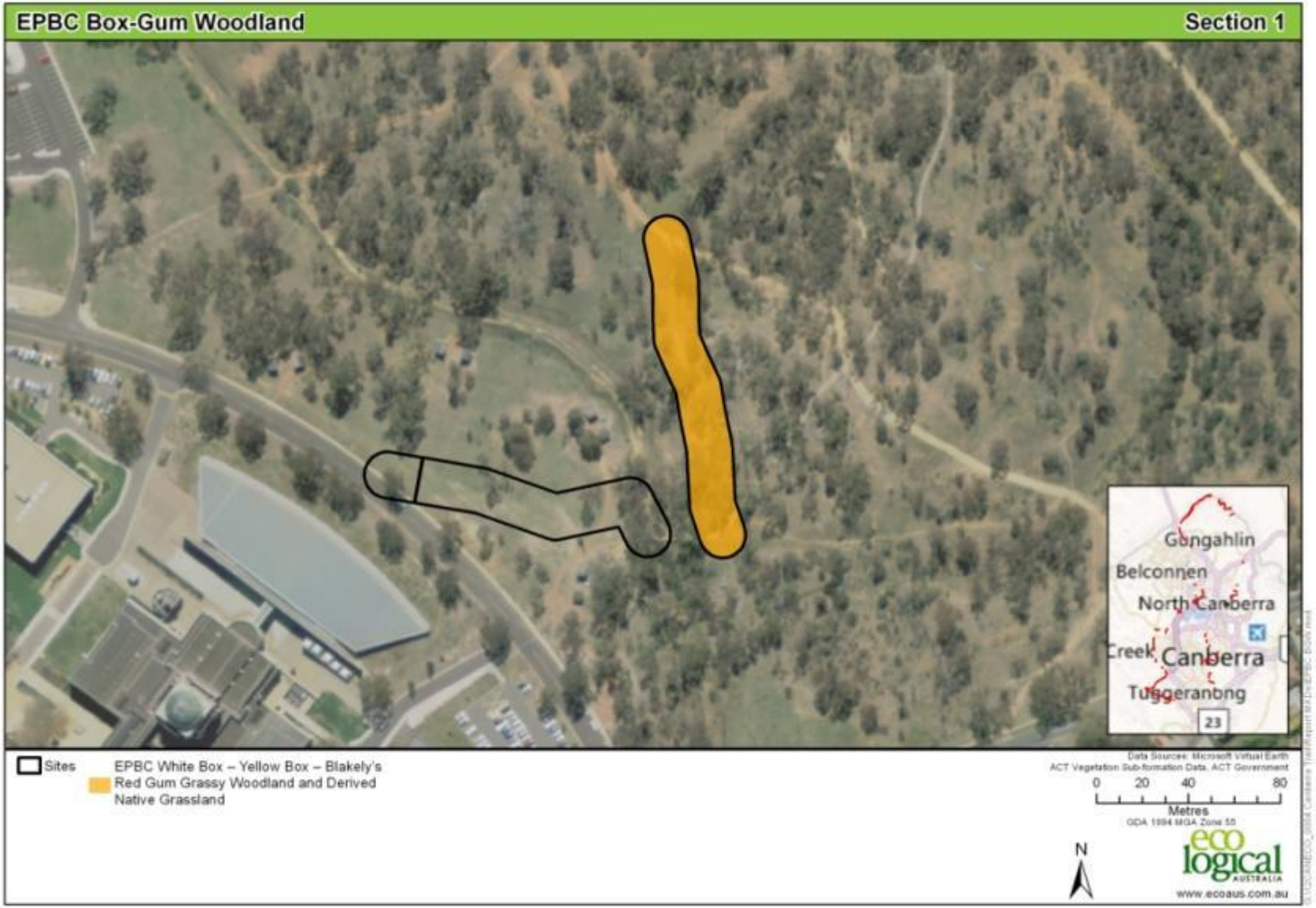


Figure 11 EPBC Box-Gum Woodland likely to be impacted, Campbell, Section 1

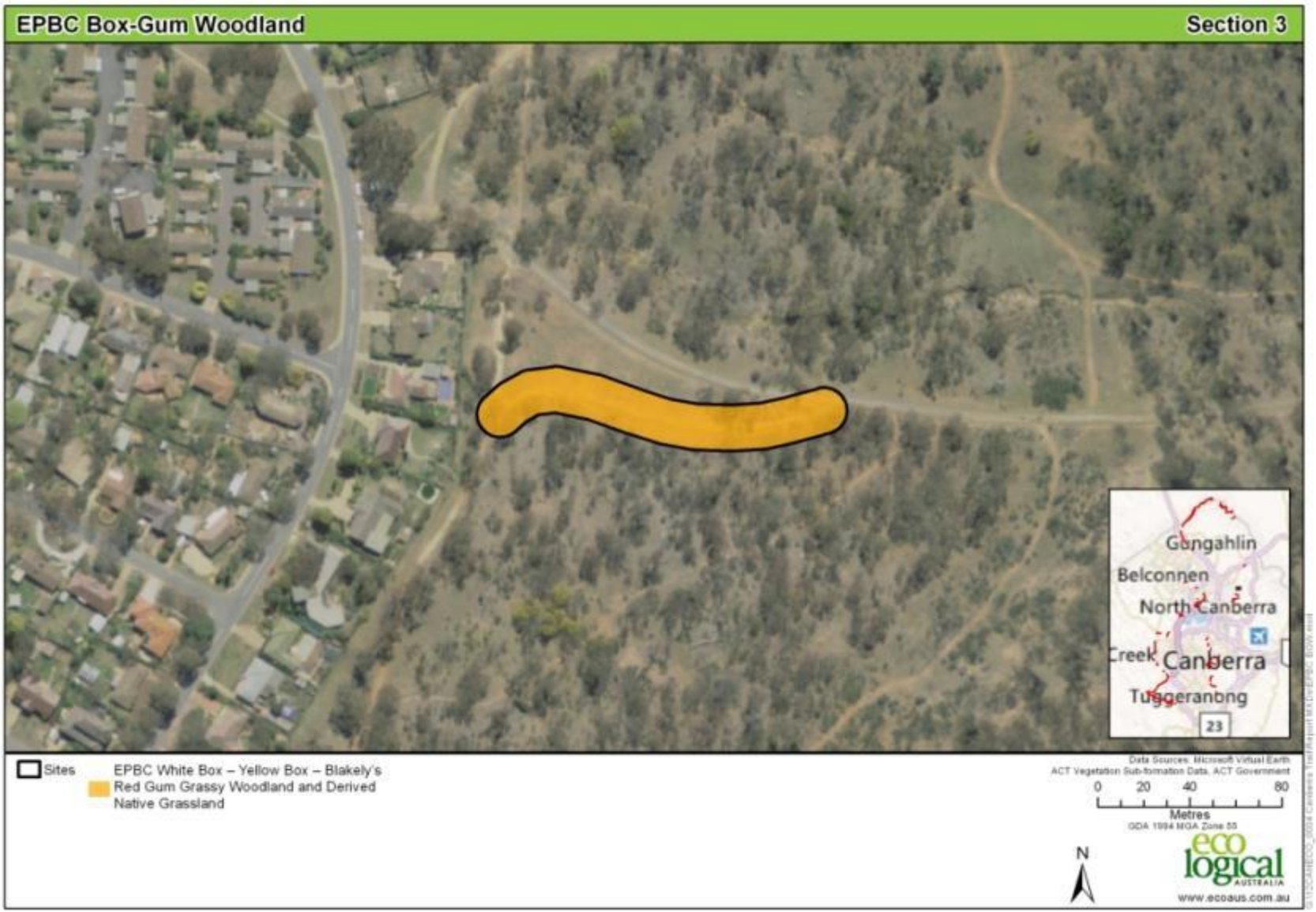


Figure 12 EPBC listed Box-Gum Woodland likely to be impacted, Hackett, Section 3

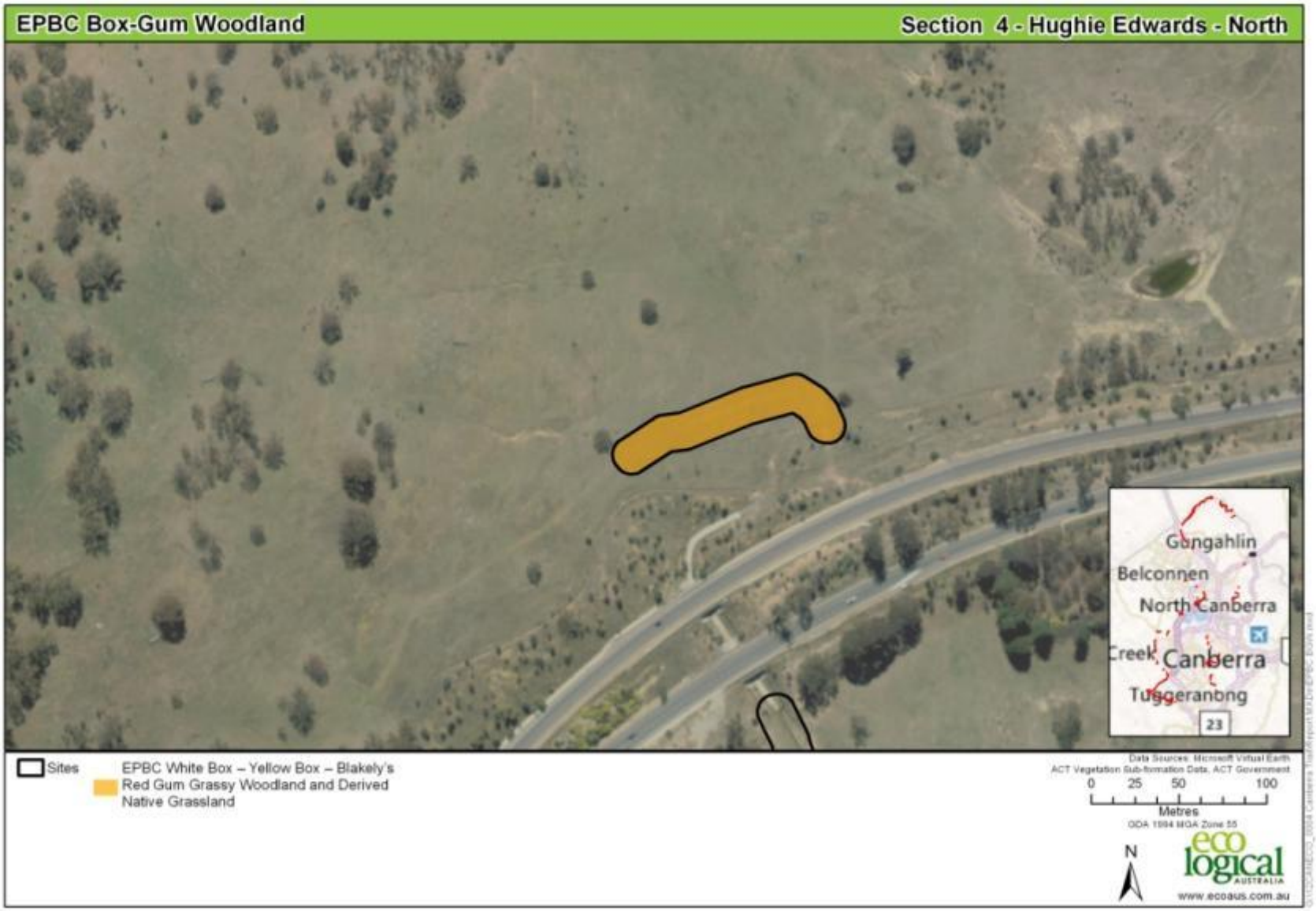


Figure 13 EPBC Box-Gum Woodland likely to be impacted, Goorooyaroo Nature Reserve

Figure 14 EPBC Box-Gum Woodland likely to be impacted, Hughie Edwards Rest area, Section 4.

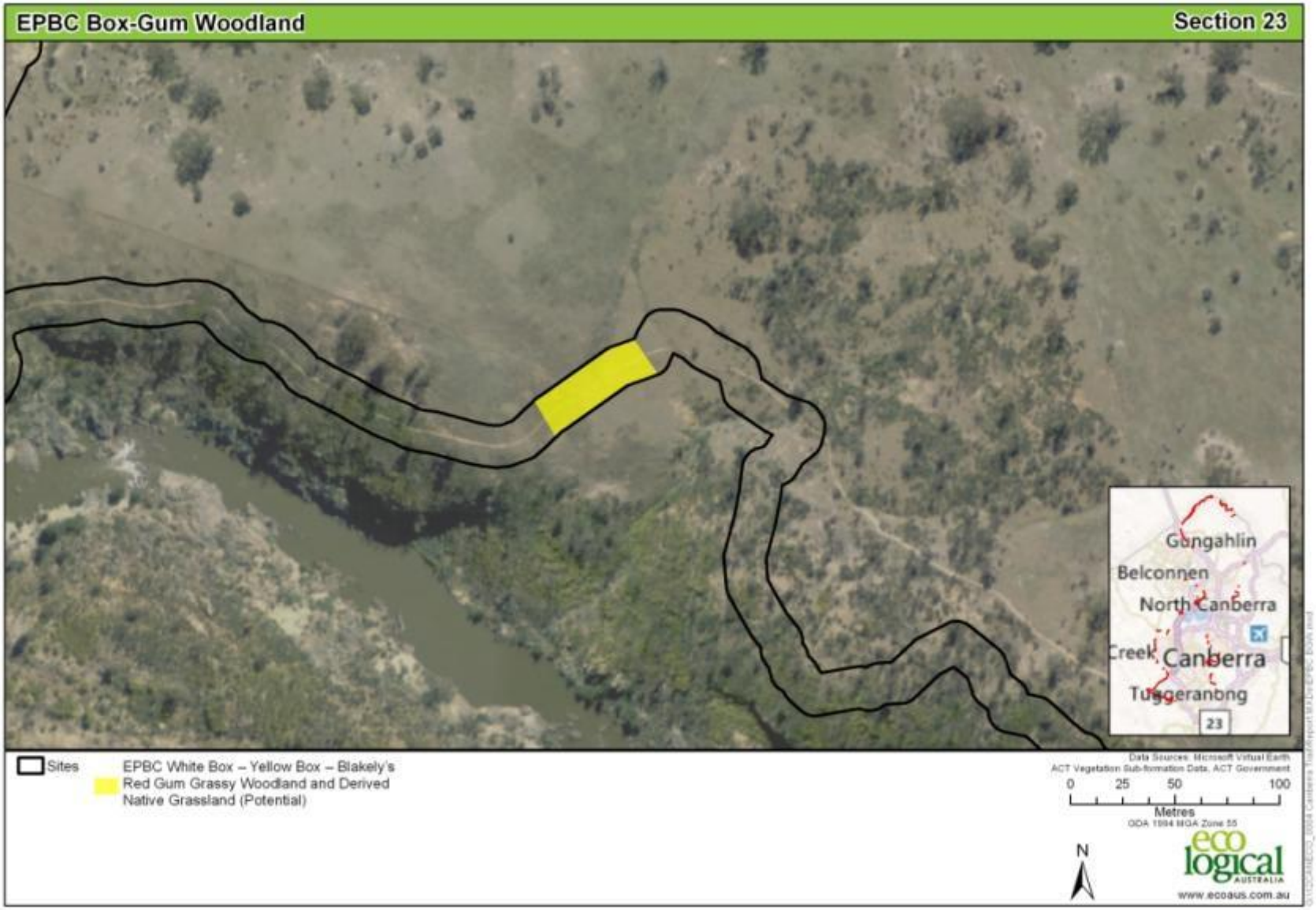


Figure 15 EPBC Box-Gum Woodland likely to be impacted, Murrumbidgee River Corridor, Section 23

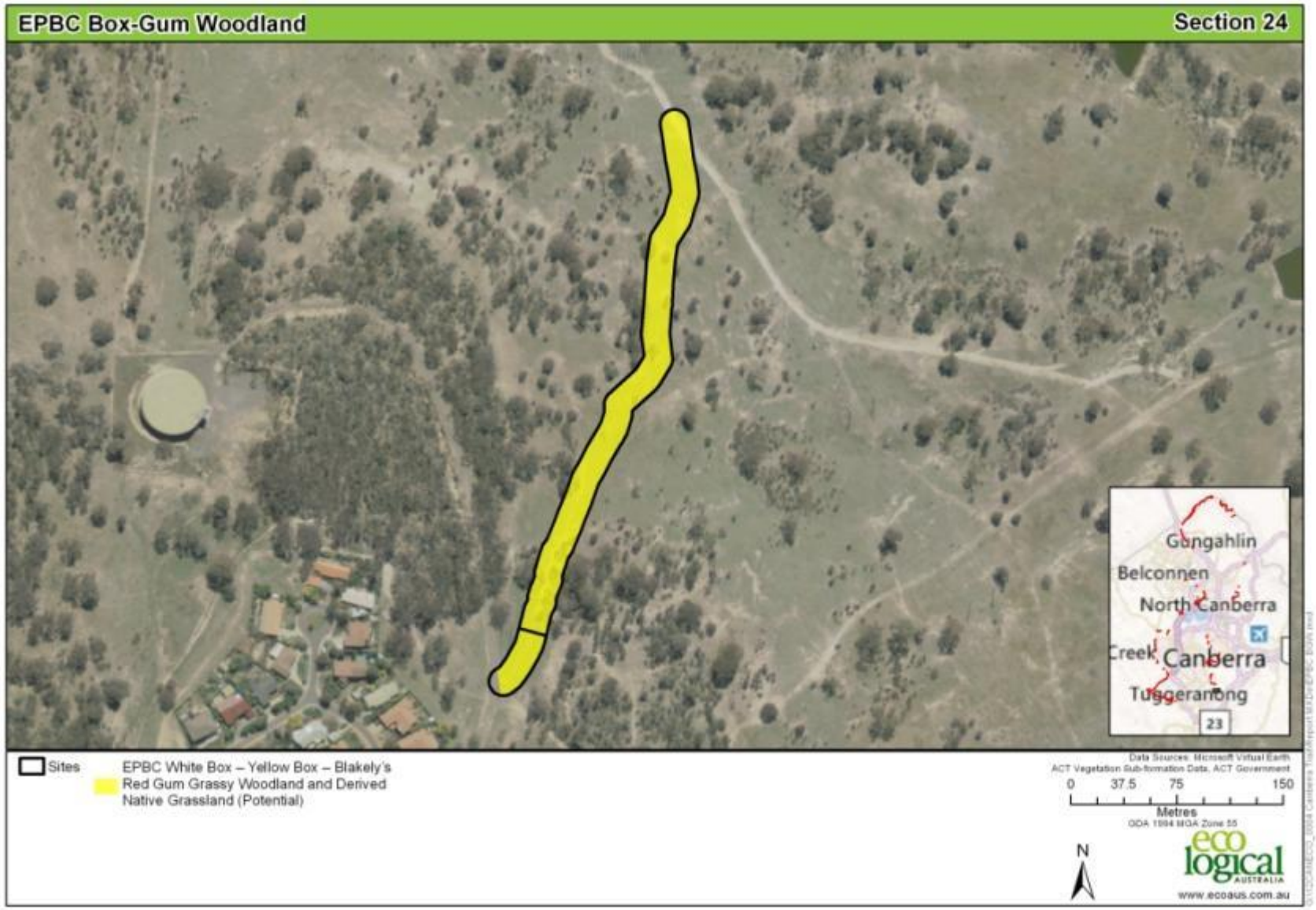


Figure 16 EPBC Box-Gum Woodland likely to be impacted, Section 24.

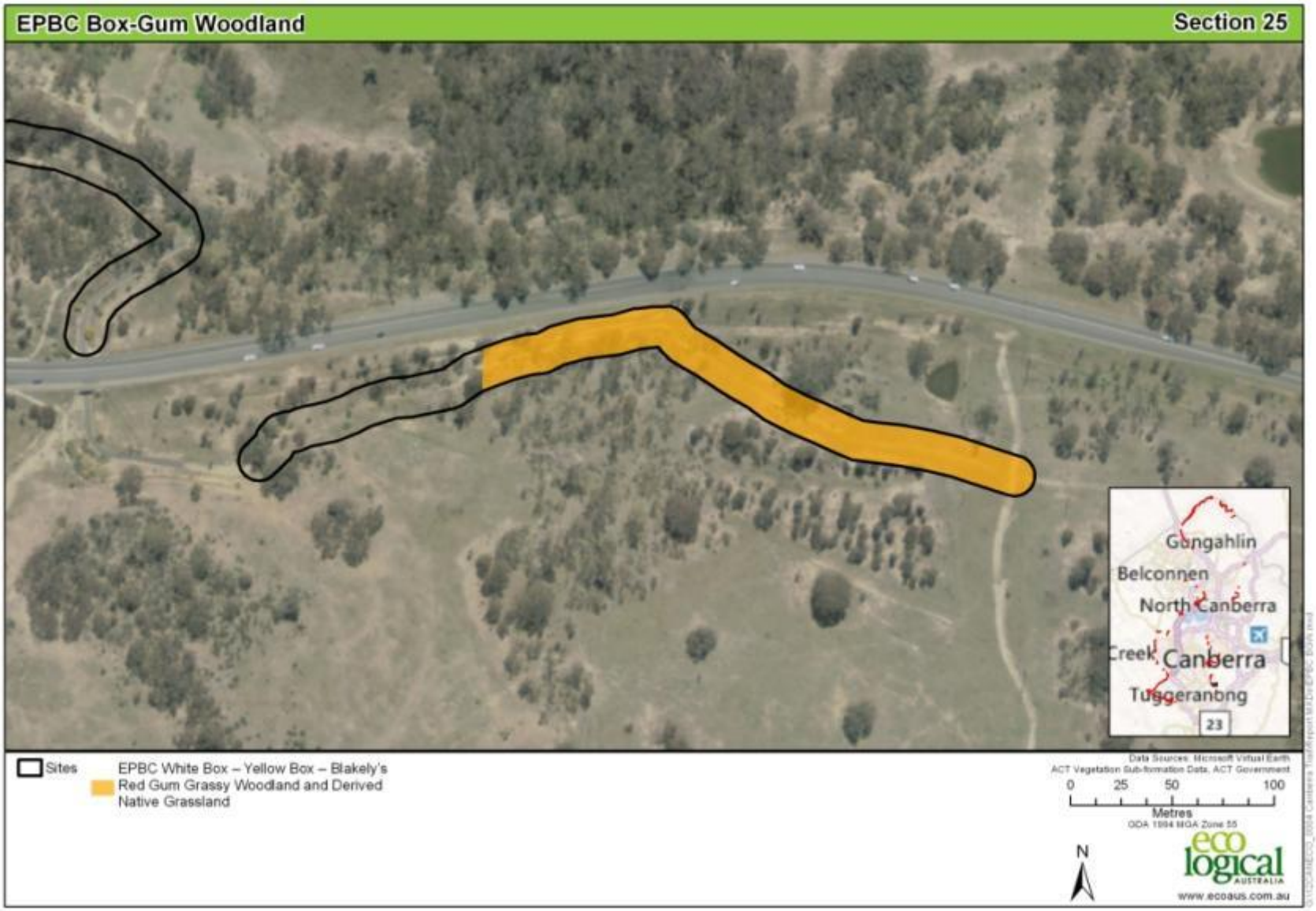


Figure 17 EPBC listed Box-Gum Woodland likely to be impacted, Long Gully Road, Section 25

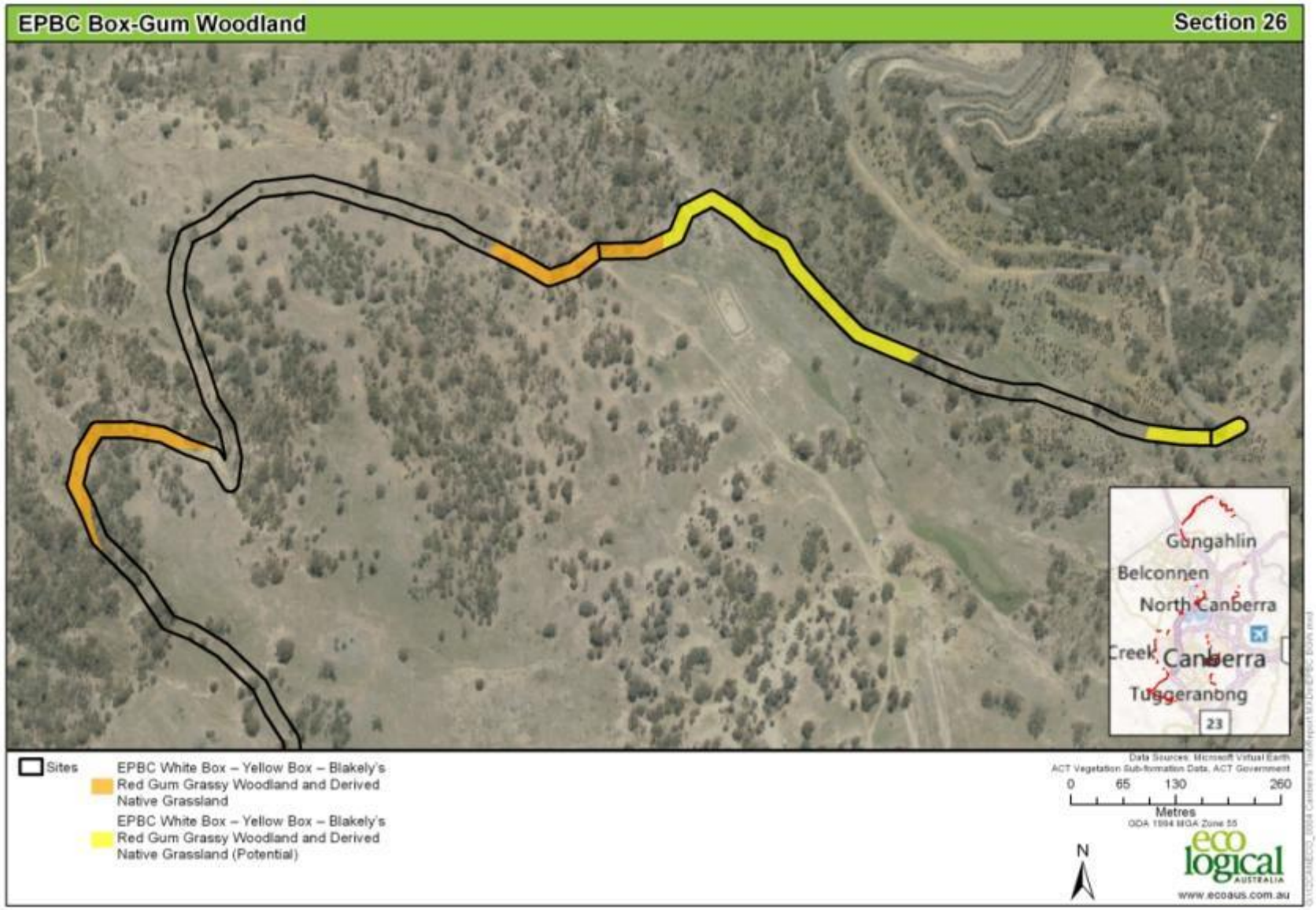


Figure 18 EPBC listed Box-Gum Woodland likely to be impacted, Isaacs Ridge, Section 26

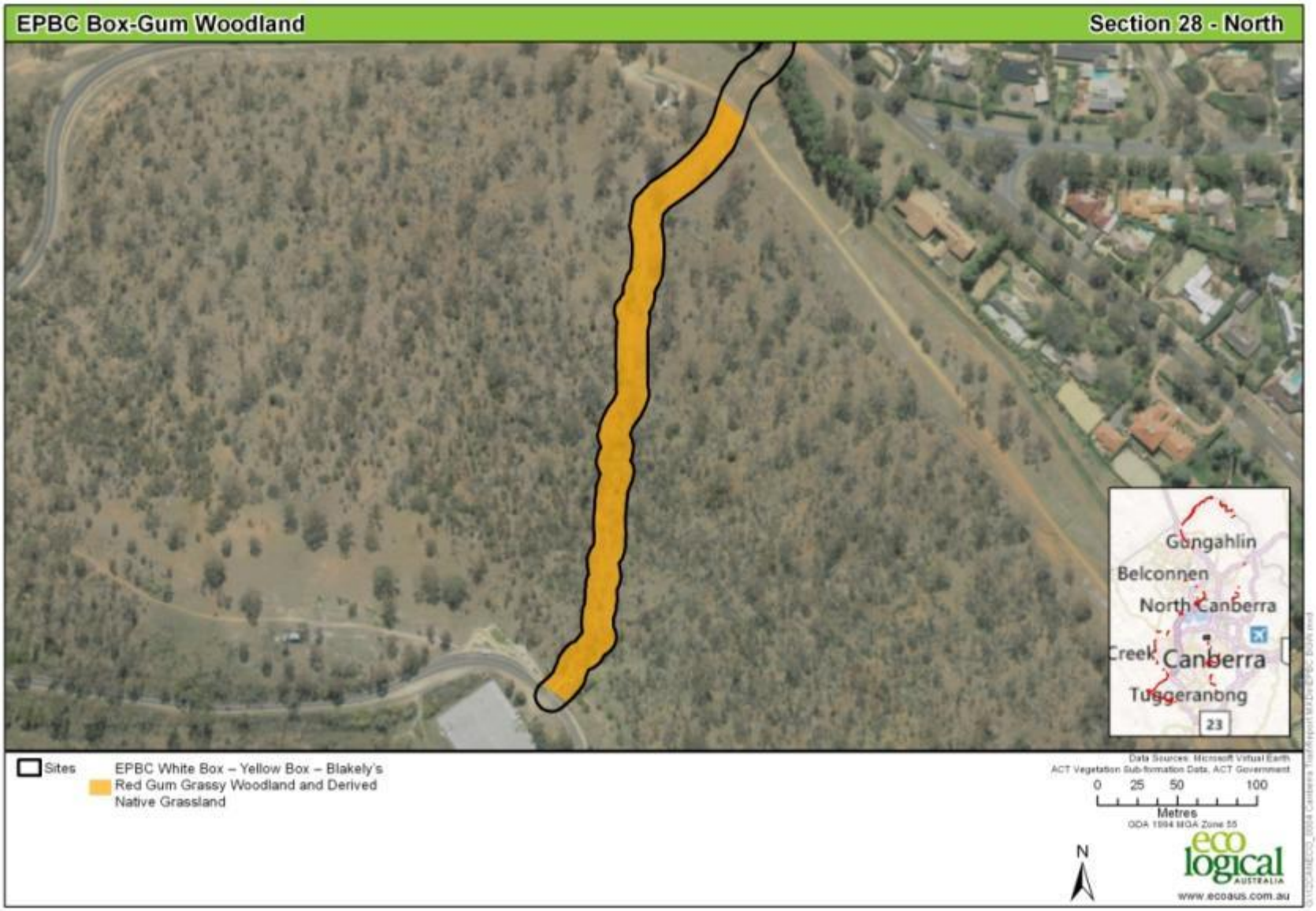


Figure 19 EPBC listed Box-Gum Woodland likely to be impacted, Red Hill, Section 28

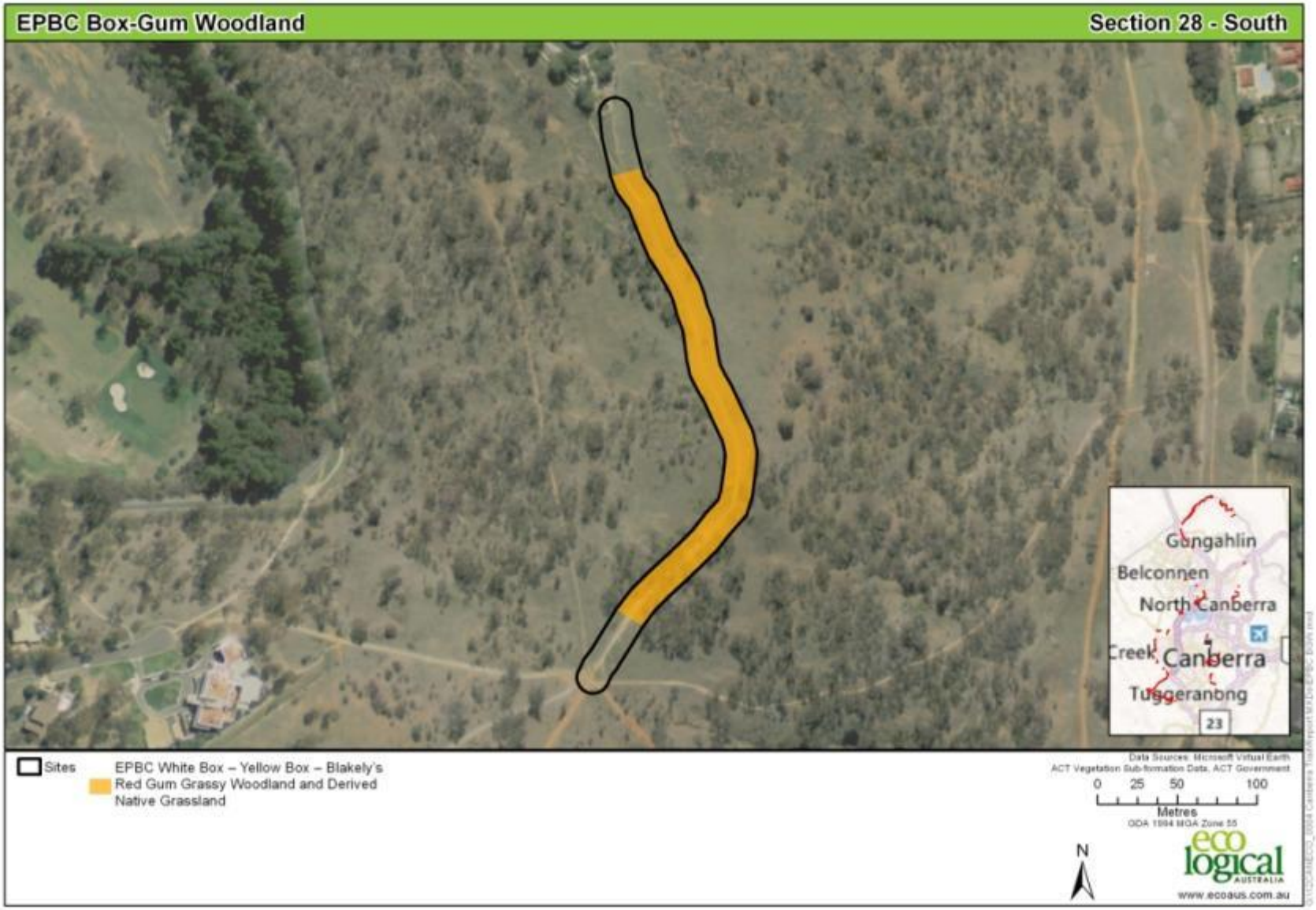


Figure 20 EPBC listed Box-Gum Woodland likely to be impacted, Section 28

4.2.2 Small Purple Pea (*Swainsona recta*)

The Small Purple Pea (*Swainsona recta*) is a small plant tending to 20cm high. The species has suffered a large decline in range and is now predominantly known from the Queanbeyan-Canberra area of the Southern Tablelands in open woodland with a native tussock grass understory (ACT Government, 2004). The largest ACT population is on Mount Taylor where 94 plants over 0.03 ha were recorded in 1996. A second population of 12 plants occurs on three undeveloped house blocks in Kambah, and a single plant has been recorded on the edge of Long Gully Road (ACT Government, 2004).

The existing record of the Small Purple Pea (ACTMAPi Database) along Long Gully Road is located close to the alignment of the CCT (Figure 4). Since it was first recorded, follow up surveys have been conducted in the area of the single record along Long Gully Road, but have been unable to locate the individual (TAMS, 2005).

The surveys for the CCT project did not record the presence of the Small Purple Pea within the proposed alignment. However, potential habitat for the species in the form of Box-Gum Woodland and Broad-leaved Peppermint – Apple Box Tableland Woodland does exist along the alignment, including in the area of Long Gully Road. It should be noted that the surveys conducted for the CCT project were undertaken outside the optimum season for this species. As such, a failure to detect the species should not be taken as total absence from the site.

As an endangered species, direct impacts to any known populations of the Small Purple Pea would be a concern for SEWPaC. Given that surveys were undertaken outside the recommended season, it is recommended that pre-clearance surveys are undertaken prior to the development of the CCT during an appropriate season. If the species is detected during these surveys, every effort should be made to micro-align the CCT to avoid direct impacts. If these measures can be adopted as part of the project, significant impacts to this species are considered unlikely. However, on the basis that the species has been recorded adjacent to the proposed alignment, and that suitable habitat occurs within the alignment, it is recommended that the CCT project be referred to the Commonwealth for assessment.

4.2.3 Button Wrinklewort (*Rutidosis leptorrhynchoides*)

The Button Wrinklewort is a small perennial daisy to 35 cm tall producing yellow-orange flower heads during the summer months. The species is listed as Endangered under the EPBC Act.

There are around 16 known populations of the species spread from Michelago to Goulburn and Canberra. (SEWPaC, 2012c). In the ACT, the species occurs in box-gum woodland, derived grassland and in areas of natural temperate grassland (SEWPaC, 2012c)

The CCT crosses an area which is adjacent to an existing record of the species around Isaac Ridge in Southern Canberra. No individuals of the species were recorded during the field surveys for this section of the CCT undertaken in June/July 2012. However, it should be noted that the surveys conducted for the CCT project were undertaken outside the optimum season for this species (TAMS, 2006), as such, a failure to detect the species should not be taken as total absence from the site.

Given that surveys were undertaken outside the recommended survey season, it is recommended that pre-clearance surveys are undertaken during the appropriate season prior to the development of the CCT. If the species is detected during these surveys, every effort should be made to micro-align the CCT to avoid direct impacts. If these measures can be adopted as part of the project, significant impacts to this species are considered unlikely. However, on the basis that the species has been recorded adjacent to the proposed alignment, and that suitable habitat occurs within the alignment, it is recommended that the CCT project be referred to the Commonwealth for assessment.

4.2.4 Tuggeranong Lignum (*Muehlenbeckia tuggeranong*)

The Tuggeranong Lignum is a sprawling shrub growing to around 80 cm in length (SEWPaC, 2012). This species is known only from flood terraces of the Murrumbidgee River, predominantly around Pine Island in the Murrumbidgee Corridor Nature Reserve (SEWPaC, 2012).

Following field surveys it is considered that no potential habitat exists within the CCT alignment as the flood terraces of the Murrumbidgee River occur down slope of the proposed works, and are unsuitable for the construction of a walking trail.

4.2.5 Austral Toadflax (*Thesium australe*)

Austral Toadflax is a small herb up to 40 cm tall with pale green to yellow-green leaves (ACT Government, 2004). The species is found in small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands (ACT Government, 2004). The species is listed as Vulnerable under the EPBC Act (SEWPaC, 2012e).

Austral Toadflax is a semi-parasitic species and occurs in grassland or grassy woodland and often in damp situations in association with Kangaroo Grass (*Themeda australis*) (ACT Government, 2004).

Field surveys undertaken in June and July 2012 identified the presence of suitable habitat for the Austral Toadflax within the alignment of the CCT characterized by >70% cover of Kangaroo Grass (Figure 6 *&* Figure 7). The area of potential habitat is located at Kambah Pools, where the species has been previously recorded (ACTMAPi Database).

No individuals of Austral Toadflax were recorded during the 2012 surveys, however, it should be noted that the surveys conducted for the CCT project were undertaken outside the optimum season for this species, and as such, a failure to detect the species should not be taken as total absence from the site. The development of the CCT will result in the removal of 0.57 ha of potential habitat for the species.

Given that the field surveys were undertaken outside the recommended season, it is recommended that pre-clearance surveys are undertaken prior to the development of the CCT during an appropriate season. If the species is detected during these surveys, every effort should be made to micro-align the CCT to avoid direct impacts. If these measures can be adopted as part of the project, significant impacts to this species are considered unlikely.

Given that the species has previously been recorded in the area of the proposed works, and that suitable habitat exists within the alignment, it is recommended that the project be referred to the Commonwealth for assessment.

4.2.6 Hoary Sunray (*Leucochrysum albicans var. tricolor*)

The Hoary Sunray is a small paper daisy endemic to south-eastern Australia, where it occurs in New South Wales, the Australian Capital Territory, Victoria and Tasmania. It is listed as Endangered under the EPBC Act. The species occurs in grasslands, grassy areas in woodlands and dry open forests, as well as modified habitats as it requires bare soil for germination. The species is commonly associated with Kangaroo Grass and *Austrodanthonia spp* (wallaby grasses) in areas dominated by Yellow Box, Blakely's Red Gum. In the ACT, the species is known from a number of areas including Mount Majura, Mount Ainsle, Mulligans Flat Nature Reserve, Campbell Park and the Federal Highway Road Easement (ACT Government, 2004).

The surveys for the CCT project recorded the presence of the Hoary Sunray within the proposed alignment adjacent to the Hughie Edwards Rest area. A population of approximately 30 individuals was recorded to the north of the rest area along the proposed route of the CCT. Potential habitat for the

species in the form of Box-Gum Woodland also exists within the remainder of the alignment. It should be noted that the surveys conducted for the CCT project were undertaken outside the optimum season for this species. As such, a failure to detect the species should not be taken as total absence from the site.

As an endangered species, direct impacts to any known populations of the Hoary Sunray would be a concern for SEWPaC. Given that surveys undertaken in June and July, are outside the recommended survey season (spring and summer), it is recommended that pre-clearance surveys be undertaken prior to the development of the CCT during an appropriate season. If the species is detected during these surveys, every effort should be made to micro-align the CCT to avoid direct impacts. In addition, it is recommended that the CCT be micro-aligned to avoid direct impacts to the known population of the species at Hughie Edwards rest area. If these measures can be adopted as part of the project, significant impacts to this species are considered unlikely.

However, given that the species has been recorded within the proposed alignment, it is recommended that the project be referred to the commonwealth for assessment.

4.2.7 Canberra Spider Orchid (*Arachnorchis actensis*)

The Canberra Spider Orchid is a small species growing to 9cm tall endemic to the ACT. The species is characterised by green coloured flowers with deep crimson lines (SEWPaC, 2012). The species is only known three populations totaling around 250 plants. The species exists along the western slopes of Mount Majura and Mount Ainsle in the ACT, as well as within the Majura Firing Range to the north (Frawley, 2010). The species is listed as Critically Endangered under the EPBC Act and Endangered under the NC Act.

The surveys for the CCT project did not record the presence of the Canberra Spider Orchid within the proposed alignment. However, potential habitat for the species in the form of Box-Gum Woodland and dry schlerophyll forest does exist within the alignment. It should be noted that the surveys conducted for the CCT project were undertaken outside the optimum season for this species, which flowers between September and November. As such, a failure to detect the species should not be taken as total absence from the site. The field surveys for the CCT recorded the presence of potential habitat for the species along the lower slopes of Mount Majura, Mount Ainsle and in Campbell park.

As a critically endangered species, direct impacts to any known populations of the species would be a concern for SEWPaC. Given that surveys undertaken in June and July are outside the recommended survey season (spring), it is recommended that pre-clearance surveys be undertaken prior to the development of the CCT during an appropriate season. If the species is detected during these surveys, every effort should be made to micro-align the CCT to avoid direct impacts. If these measures can be adopted as part of the project, significant impacts to this species are considered unlikely.

4.2.8 Golden Sun Moth (*Synemon plana*)

The Golden Sun Moth (GSM) is a medium-sized day-flying moth native to temperate grasslands and open grass woodlands dominated by Wallaby grass species. The GSM occurs in scattered small populations through Victoria, New South Wales and the ACT. The Species is listed as Critically Endangered under the EPBC Act.

The field surveys undertaken in June/July 2012 identified an area of known GSM habitat within the alignment. The GSM has been previously recorded within the study area (Eco Logical Australia, 2011). along an existing fire trail located within Mulligan's flat Nature Reserve (Figure 9), as well as along the ridgeline at One Tree Hill. Both the track through Mulligans Flat and the track through One Tree Hill are existing. No works or upgrading of the track will be undertaken in this area as a result of the CCT. The

usage of the track by pedestrians and cyclists may result in a very localised disturbance to GSM, however, it is not considered likely that the disturbance caused by occasional cyclists and bushwalkers will be sufficient to cause a significant impact to the species.

4.2.9 Pink Tailed Worm Lizard (*Aprasia parapulchella*)

The PTWL is a reptile that can grow to 14 cm. The species is characterised by its lack of fore or hind limbs and a pinkish tail. The species is listed as Vulnerable under the EPBC Act.

This species is known to occur in the Canberra region, particularly along the Murrumbidgee and Molonglo River corridors (SEWPaC, 2012a). The Pink-Tailed Worm Lizard is a fossorial species which inhabits ant burrows beneath partially embedded rocks (Osborne and Jones, 1995). Potential habitat for this species is composed of intact open grassland and woodland sites, often with a cover of Kangaroo Grass (*Themeda australis*) and abundant partially embedded rocks.

The field surveys undertaken in June/July 2012 recorded the presence of potential habitat in the form of rocky outcrops associated with native grass species within the alignment at Isaacs ridge (Figure 6, Figure 7, & Figure 8). In its current form, the CCT crosses a number of small areas of potential habitat and may result in the removal of small rocks which have the potential to provide habitat for the species. No individuals of the species were recorded within the proposed alignment; however, targeted surveys were not undertaken. It should be noted that the optimum time for survey is during spring and summer.

Given that potential habitat for the species has been recorded, it is recommended that the CCT be micro-aligned to avoid any impact to these areas. If any impact to potential habitat is likely, it is recommended that pre-clearance surveys be undertaken during a suitable season prior to the development of the CCT. If the species is detected during these surveys, every effort should be made to micro-align the CCT to avoid direct impacts. If re-alignment is not possible, any PTWL found within the proposed footprint should be relocated to adjacent suitable habitat. If these measures can be adopted as part of the project, significant impacts to this species are considered unlikely.

4.3 TERRITORY LEGISLATIVE CONSIDERATIONS

As previously discussed (Section 1.2.1), the ACT's legislative framework is structured around the following pieces of legislation:

- Planning and Land Management Act; and
- Planning & Development Act (P & D Act)

The CCT project will be required to obtain approval through the NCA, under the Planning and Land Management Act for works undertaken within areas nominated as Designated lands under the National Capital Plan (NCP). Of relevance to the CCT project, Canberra's open spaces including the Hills and Ridges, Mountains and Bushland Areas form part of the National Capital Open Space System, which are declared designated lands under the NCP. In addition, the project will require a separate approval under the P & D Act for lands under the control of the territory.

Under the P & D Act, the development will be required to be assessed under either the Merit Track or the Impact Track. Based on the ecological assessment conducted, it is considered likely that the CCT project will be required to be assessed under the Impact Track, as it has the potential to impact 0.49 ha of Box-Gum Woodland which meets the criteria for listing as an endangered ecological community under the NC Act, as well as being a feature of National Conservation Significance. As stated, field surveys were undertaken outside of the optimum period for most of the NC Act listed flora species considered likely to occur along the proposed alignment. It is recommended that pre-clearance surveys be undertaken for NC Act listed flora species, including orchid species, prior to the development of the CCT. If micro-alignment of the CCT is undertaken to avoid any species of conservation significance detected during the pre-clearance surveys, it is considered unlikely that the development of the CCT will have a significant impact on matters protected under the NC Act.

It should be noted that under the P & D Act, the Impact Track establishes the need to prepare an Environmental Impact Statement (EIS) if a significant impact is considered likely. However, as described in Section 1.2.1, an Environmental Significance Opinion (ESO) can be sought to determine if the impacts to matters protected under the NC Act as a result of the CCT project are considered significant by the Conservator. The application for an ESO must consider, amongst other things, whether the development will impact on lands of natural conservation value including lands important in presenting unusual species richness, or the presence of rare, uncommon or listed species.

The CCT project is likely to remove 0.49 ha of Box-Gum Woodland and has the potential to impact on a number of species listed under both the NC and the EPBC Act. There are not clear significant impact guidelines or thresholds relating to these matters under the NC Act, as such, it is considered worthwhile submitting an ESO application. It is recommended that prior to the submission of an ESO application, a detailed description of the project and any proposed mitigation measures and management plans be developed to support the application.

5 Summary & Recommendations

The CCT project has been proposed by the ACT government in celebration of the Canberra Centenary in 2013. The CCT is proposed to be a 1.2 m wide trail constructed of local materials, situated within a 1.5 m trail corridor. The route crosses a wide range of environments across the ACT. In many places, the proposed route follows already existing tracks. In some places these tracks require upgrading or new tracks require construction to link sections of the trail. Across the route, the condition of the trails requiring upgrade varies considerably. In areas where the trail requires upgrading or new trail to be installed, it has the potential to impact on the environment. The trail crosses a number of areas of ecological sensitivity, such as Box-Gum Woodland and areas of habitat for threatened species.

In its current form, the CCT project is likely to result in the removal of 0.49 ha of Box-Gum Woodland and impact a population of the Hoary Sunray both listed under the EPBC Act. The CCT project also has the potential to impact on other threatened species listed under the EPBC and NC Acts. On this basis, it is recommended that the CCT project be referred to the Commonwealth for assessment.

Key to the successful development of the project will be the development of a strong set of mitigation and management measures to reduce the impacts of the project to environmentally sensitive areas. The following mitigation measures have been drafted for consideration. It is recommended that these measures are implemented to ensure that impacts resulting from the trail have been reduced as much as possible. It is also important that a strong set of mitigation measures be provided with the referral and with an ESO application.

In order to reduce the impact of the CCT to threatened species and ecological communities identified as potentially occurring within the CCT alignment the following mitigation measures have been proposed.

- Undertake pre-clearance surveys in areas of threatened flora and fauna habitat during the appropriate season for the following species:
    - Small Purple-Pea, Button Wrinklewort, Austral Toadflax, Hoary Sunray, Pink-tailed Worm Lizard, and Canberra Spider Orchid
- It is recommended that the trail be micro-aligned to avoid all rocky outcrops along the length of the CCT to ensure that no potential habitat for the PTWL is impacted by the CCT. Major realignment is not necessary, instead skirting to avoid these features is recommended. If a rocky outcrop is to be impacted by the CCT pre-clearance surveys for the PTWL should be undertaken.
    - Specifically, it is recommended that the trail be re-aligned along the existing Murrumbidgee Discovery Trail where it is likely to impact on potential PTWL habitat (see Figure 6).
    - Where re-alignment is not possible, any individuals found during pre-clearance surveys should be relocated to adjacent suitable habitat.
- Review the alignment and avoid, where possible constructing new tracks or utilising tracks requiring major works within areas of ecological sensitivity such as areas of Box-Gum Woodland or potential habitat for threatened species.

- Develop and implement construction and operation management plans that detail the mitigation and management measures required for the trail including:
    - Weed control works
    - Sediment and erosion control works
    - Track maintenance
    - Mapping of ecological sensitive areas and specific requirements for construction and operation within these areas
    - Grazing control plans
    - Fire hazard reduction activities
- Avoid placing infrastructure associated with the development of the CCT (Table 1) in areas of ecological sensitivity, such as threatened species habitat or Box-Gum Woodland.

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Appendix A: Likelihood Assessment

THREATENED ECOLOGICAL COMMUNITY	EPBC ACT STATUS	LIKLIHOOD OF OCCURENCE
Natural Temperate Grasslands of the Southern Tablelands of NSW and the Australian Capital Territory	Endangered	Likely
White Box- Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Known

BIRDS			
LATIN NAME	COMMON NAME	EPBC CONSERVATION STATUS	LIKLIHOOD OF OCCURENCE
Anthochaera phrygia	Regent Honeyeater	Endangered	Potential
Lathamus discolor	Swift Parrot	Endangered, Listed marine	Potential
Leipoa ocellata	Malleefowl	Vulnerable	No
Polytelis swainsonii	Superb Parrot	Vulnerable	Potential
Rostratula australis	Australian Painted Snipe	Vulnerable	Unlikely

FISH			
LATIN NAME	COMMON NAME	EPBC CONSERVATION STATUS	LIKLIHOOD OF OCCURENCE
Maccullochella peelii	Murray Cod	Vulnerable	No
Macquaria australasica	Macquarie Perch	Endangered	No

FROGS			
LATIN NAME	COMMON NAME	EPBC CONSERVATION STATUS	LIKLIHOOD OF OCCURENCE
Litoria booroolongensis	Booroolong Frog	Endangered	No
Litoria castanea	Yellow-spotted Bell Frog	Endangered	No
Litoria raniformis	Growling Grass Frog	Vulnerable	Unlikely

MAMMALS			
LATIN NAME	COMMON NAME	EPBC CONSERVATION STATUS	LIKLIHOOD OF OCCURENCE
Dasyurus maculatus maculatus	Spotted-tailed Quoll	Endangered	Unlikely
Petrogale penicillata	Brush-tailed Rock Wallaby	Vulnerable	No
Phascolarctos cinereus	Koala	Vulnerable	No

INVERTEBRATES			
LATIN NAME	COMMON NAME	EPBC CONSERVATION	LIKLIHOOD OF

		STATUS	OCCURENCE
Synemon plana	Golden Sun Moth	Critically Endangered	Known
Perunga ochracea	Perunga Grasshopper	Not listed	Potential

FLORA			
LATIN NAME	**COMMON NAME**	**EPBC CONSERVATION STATUS**	**LIKLIHOOD OF OCCURENCE**
Caladenia actensis	Canberra Spider Orchid	Critically Endangered	Likely
Lepidium ginninderrense	Ginninderra Peppercress	Vulnerable	Unlikely
Leucochrysum albicans var. *tricolor*	Hoary Sunray	Endangered	Likely
Muehlenbeckia tuggeranong	Tuggeranong Lignum	Endangered	Likely
Pelargonium sp. *striatellum*	Omeo Stork's-bill	Endangered	Unlikely
Pomaderris pallida	Pale Pomaderris	Vulnerable	Likely
Prasophyllum petilum	Tarango Leek Orchid	Endangered	Unlikely
Rutidosis leptorrhynchoides	Button Wrinklewort	Endangered	Likely
Swainsona recta	Small Purple-Pea	Endangered	Likely
Thesium australe	Austral Toadflax	Vulnerable	Likely

REPTILES			
LATIN NAME	**COMMON NAME**	**EPBC CONSERVATION STATUS**	**LIKLIHOOD OF OCCURENCE**
Aprasia parapulchella	Pink-tailed Worm Lizard	Vulnerable	Likely
Delma impar	Striped Legless Lizard	Vulnerable	Potential
Tympanocryptis pinguicolla	Grassland Earless Dragon	Endangered	Unlikely

MIGARTORY AND MARINE SPECIES			
LATIN NAME	**COMMON NAME**	**EPBC CONSERVATION STATUS**	**LIKLIHOOD OF OCCURENCE**
Apus pacificus	Fork-tailed Swift	Listed marine, Migratory	Likely
Ardea alba	Great Egret	Listed marine, Migratory	Likely
Ardea ibis	Cattle Egret	Listed marine, Migratory	Likely
Gallinago hardwickii	Latham's Snipe	Listed marine, Migratory	Unlikely
Haliaeetus leucogaster	White-bellied Sea-Eagle	Listed marine, Migratory	Unlikely
Hirundapus caudacutus	White-throated Needletail	Listed marine, Migratory	Potential
Merops ornatus	Rainbow Bee-eater	Listed marine, Migratory	Potential
Monarcha melanopsis	Black-faced Monarch	Listed marine, Migratory	Potential
Myiagra cyanoleuca	Satin Flycatcher	Listed marine, Migratory	Potential
Rhipidura rufifrons	Rufous Fantail	Listed marine, Migratory	Potential
Rostratula benghalensis	Painted Snipe	Listed marine, Migratory	Unlikely

Appendix B - Flora and Fauna results

Species	Mt Ainsle (S1)	Mt Ainsle (S2)	Mt Ainsle (S3)	Mt Ainsle (L1)	Mt Ainsle (L2)	Mt Majura	Black Mountain (S1)	Black Mountain (S2)	Black Mountain (Dryandra st)	Gossan Hill, Belconnen	Cooleman Ridge	Mt Arawang 1	Mt Arawang 2	Mulligans 1	Mulligans 2	Mulligans 3	Isaacs Ridge 1	Isaacs Ridge 2	Isaacs Ridge 3	Isaacs Ridge 4	Isaacs Ridge 5	Isaacs Ridge 6	Isaacs Ridge 7	Isaacs Ridge 8	Isaacs Ridge 9	Isaacs Ridge 10	Isaacs Ridge 11	Kambah Pools 1	Kambah Pools 2	Kambah Pools 3	Kambah Pools 4	Elm Grove Campsite	Water Tower Reserve, A	Bolton C, D	Bolton D	Bolton E	Pattison, F	Pattison, G	Carmody, H	Victoria st, I	Baldy's Hill Option
Acetosella vulgaris											1		1	+	1	1		+						1			1			1		2		1	1	2			2	
Aira sp.																																2	2	1	1		1		1	
Anagalis arvensis	+	r					r												+		+							+						1	1	+				
Arctotheca calendula		+					+			2	1					1															+									
Avena sp.											1		+																	+						1		1	
Briza maxima									1																							1	2	1						
Briza minor																																								+
Bromus sp.						1					3	2	2												1			1		1	2		1					1	
Capsella bursa pastoris											+																												
Carthamus lanatus (Saffron thistle)																+						1						+							1	1				
Centaurium sp.				+										+	1		1	1	1			1				1		1	1											
Chondrilla juncea	1	+		+																																			
Cirsium vulgare (Spear thistle)	r	r				1	r						+		1	1	1	1	1	1	+		1	1				1	1	1	4					1	1		1		
Conyza sp.			r	r		1			1		1		1	+	1	1	1	1	1		+	1		1	+	1	1	1	1	1	1		1				1		1	1	
Cotoneaster sp.																																1								
Cynodon dactylon						2				1	2												1							1	2							1	
Cynosurus echinatus															+	+								1															
Cyperus eragrostis							r				1									+			1	1			+			+									
Dactylis glomerata											2		2																					2	1			3	
Echium plantagineum		r				r				+	1		1		1	1	1	1	1	1	+		1			1	1		1	1									
Echium vulgare																			+															1					
Elusine tristachya										3	1																												
Eragrostis curvula										+	2						1											+	1	1	2								
Erodium cicutarium		r	+		+											1								+	+														
Foeniculum vulgare						+																																	
Galium sp.																				+																			
Hirschfeldia incana	+	+				+					1		1						+		+			+	1														
Holcus lanatus																	1						1			1						1		1		1	2	
Hordeum sp.																																			1		1	1	
Hypericum perforatum									r		1	2	1				+	+	1	1	1	1	3	1	+	1		1	1	1	1								+

Species	Mt Ainsle (S1)	Mt Ainsle (S2)	Mt Ainsle (S3)	Mt Ainsle (L1)	Mt Ainsle (L2)	Mt Majura	Black Mountain (S1)	Black Mountain (S2)	Black Mountain (Dryandra st)	Gossan Hill, Belconnen	Cooleman Ridge	Mt Arawang 1	Mt Arawang 2	Mulligans 1	Mulligans 2	Mulligans 3	Isaacs Ridge 1	Isaacs Ridge 2	Isaacs Ridge 3	Isaacs Ridge 4	Isaacs Ridge 5	Isaacs Ridge 6	Isaacs Ridge 7	Isaacs Ridge 8	Isaacs Ridge 9	Isaacs Ridge 10	Isaacs Ridge 11	Kambah Pools 1	Kambah Pools 2	Kambah Pools 3	Kambah Pools 4	Elm Grove Campsite	Water Tower Reserve; A	Bolton C, D	Bolton D	Bolton E	Pattison, F	Pattison, G	Carmody, H	Victoria st, I	Baldy's Hill Option
Hypochaeris radicata		+	1	+	+	+		r	1		1		+	1		1	1	1	1		1	1	+	1	1	1	1	1	1			1	2	2	2	1					1
Lactuca serriola						+							+																											
Lepidium sp.											+																													
Ligustrum sp.																			r																					
Lolium rigidum												1					+							1	1		+				1		1							
Marrubium vulgare	1	r																														+				1	+			
Modiola caroliniana										+																					1									
Nassella trichotoma														r	+	1																1				1	1			
Onopordum acanthium (Scotch)													+			+																1								
Paronychia brasiliana													+									r		r			+												
Paspalum dilatatum						+			1	3	1														r	1					1		2						2	
Petrorhagia nanteuilii															1			1	1		1	1			1		1							1				1	1	
Phalaris aquatica		+				5				+	2	4	3							2			2	1			2	1	1	3	2		1				1	1	+
Plantago lanceolata			r	+		+			r	1	1	2	2				1		2	2	1	1	1	1	1	1		1		1	1		2	2			1		3	
Poa annua																																	1	1				1			
Polygonum aviculare											+																													
Pyracantha sp.			r			r	r															+	r	+							+		+						
Romulea rosea																																		1		1	1			1	
Rosa rubiginosa			r								+	r			r		+		r	1	1	1		1	r	+		+					1	+		1		1	+		
Rubus fruticosus						+			r			r							r					r	r			1		1			+							
Rumex crispus						r																	1								+									
Salvia verbenaca			+				r				+	1	1									r			r					+									
Setaria sp.									+		1																													
Solanum nigrans	+	r											+									r																	
Sonchus sp. (Sow thistle)											r	r											r	r	+							1					1		
Stellaria media																1																							
Taraxacum officinale																															+		1			1	1		1	
Tolpis umbellata				r																																			
Trifolium sp.					+					1	1	1	1	1	1	1			1	1	1	1	1	1	1	1	2	1		1	1		2	2		2	2	1	4	3	
Verbascum thapsus	1	+									1	+	1			1		+	+			1		1	r		1	1	+	1						1				
Vulpia sp.		1																										+						3	1	1		1		1	
Native Species																																								
Acacia baileyana		r		r	+	+	r		+		1						1	+						1								1								

Species	Mt Ainsle (S1)	Mt Ainsle (S2)	Mt Ainsle (S3)	Mt Ainsle (L1)	Mt Ainsle (L2)	Mt Majura	Black Mountain (S1)	Black Mountain (S2)	Black Mountain (Dryandra st)	Gossan Hill, Belconnen	Cooleman Ridge	Mt Arawang 1	Mt Arawang 2	Mulligans 1	Mulligans 2	Mulligans 3	Isaacs Ridge 1	Isaacs Ridge 2	Isaacs Ridge 3	Isaacs Ridge 4	Isaacs Ridge 5	Isaacs Ridge 6	Isaacs Ridge 7	Isaacs Ridge 8	Isaacs Ridge 9	Isaacs Ridge 10	Isaacs Ridge 11	Kambah Pools 1	Kambah Pools 2	Kambah Pools 3	Kambah Pools 4	Elm Grove Campsite	Water Tower Reserve, A	Bolton C, D	Bolton D	Bolton E	Pattison, F	Pattison, G	Carmody, H	Victoria st, I	Baldy's Hill Option
Acacia dealbata					r	+							1	r	1							r		+	+	+	+											1		
Acacia decurrens											+																													
Acacia genistifolia							1	1	+	+																														
Acacia implexa	r	r	r	+	+								+	+			1	1	+		r	+			1															
Acacia mearnsii	2	+		+	+	+	+	+	+	r									r														+						1	2
Acacia melanoxylon																																	+	1	1				1	
Acacia paradoxa				3																																			
Acacia pravissima	1																																	3	2	1		2	1		3
Acacia rubida							+		1																+			1		1						1	1	1	1	
Acacia sp.											+						1										1					2		2						
Acaena ovina													+																							2	1	1	1	+
Acaena novae-zelandiae																																	1		2					
Acaena sp.														+		+	1	1		?	+	1		1	+	1		1		+			1							
Acianthus sp.								O																																
Acrotriche serrulata																	+											+											
Ajuga australis																		+																	1			1		
Allocasuarina verticillata	2	4		2		+													r			+			1														
Allocasuarina cunninghamiana																																+							
Amyema sp.					r	+									r						+					+													
Aristida ramosa				1	2					r				1	1		+	1	1			1		1							2	2			1				3
Asperula conferta				+											1							+			+	+		1						1	1			1		
Astrotricha ledifolia																																						1		
Austrodanthonia caespitosa					1	+												1							2														
Austrodanthonia racemosa															2		2	2	2					2	1		2												
Austrodanthonia sp.		3	2				1	1	2	r	1	1	1	1		2				2	2	2	1			2		2	1		2	2	2		1	1	2	1	1		
Austrostipa bigeniculata											1		2		1	+	1				1			1	2	1	1	1						2						
Austrostipa densiflora	2	2		2			+									1	1					1																	
Austrostipa scabra	2			2	2	1					1	2	2	3	3	4	2	1	1			2		2	2	2	2		2	1	2	1	1		2	1	1	1		2
Bossiaea prostrata														1	+																								
Bothriochloa macra					2					+	1	1	2	1	2				2	2	2	2	2	2	2	2	2	2	1	1	2		2		2	1	1	2	2		
Brachychiton populneus	r	r		r																					r														
Brachyloma daphnoides				1				+	1																+									1		1			r
Brachycome rigidula																																	1	1		1				

Species	Mt Ainsle (S1)	Mt Ainsle (S2)	Mt Ainsle (S3)	Mt Ainsle (L1)	Mt Ainsle (L2)	Mt Majura	Black Mountain (S1)	Black Mountain (S2)	Black Mountain (Dryandra st)	Gossan Hill, Belconnen	Cooleman Ridge	Mt Arawang 1	Mt Arawang 2	Mulligans 1	Mulligans 2	Mulligans 3	Isaacs Ridge 1	Isaacs Ridge 2	Isaacs Ridge 3	Isaacs Ridge 4	Isaacs Ridge 5	Isaacs Ridge 6	Isaacs Ridge 7	Isaacs Ridge 8	Isaacs Ridge 9	Isaacs Ridge 10	Isaacs Ridge 11	Kambah Pools 1	Kambah Pools 2	Kambah Pools 3	Kambah Pools 4	Elm Grove Campsite	Water Tower Reserve; A	Bolton C, D	Bolton D	Bolton E	Pattison, F	Pattison, G	Carmody, H	Victoria st, I	Baldy's Hill Option
Bursaria spinosa				+														1				+					+	1	1											
Callitris endlicheri																															1									
Carduus sp.																				r																				
Carex appressa																				2			2					+					1		1					
Carex inversa																+					1	+						1					1							r
Casuarina cunninghamiana																												+		2										
Cassinia aculeata																																	+								
Cassinia longifolia		1		1		1	2	+	2						r			+										1												r
Cassinia quinquefaria												r	r					r							1			1												
Cheilanthes austrotenuifolia																																	+								
Cheilanthes distans																						r																			
Cheilanthes sieberi	1	1		1	1		+			r				r	+		+	1	+				1		+		1	+						1	1			1			r
Chloris truncata						+				r	1																				1		2			1		1		1	
Chrysocephalum apiculatum				+	1				r										r			1		+	1	1	+	1			+									
Chrysocephalum semipapposum		r	+	+	1		1								+				1			1			1			1	1											
Clematis microphylla		+																										r	r											
Convolvulus erubescens		r																r							+											1			1		
Coronidium oxylepis							1	1	r																																
Cotula australis	1	r									r									r																				
Cryptandra amara				+															1			+						1							1		1	1	1		1	
Cymbonotus lawsonianus			+	+										1	1	1		+				1						1	+			r								
Cynoglossum sp.																		+				+			+															
Daucus glochidiatus				+	+		+																																	
Daviesia sp.														r																										
Desmodium varians		r																																						
Dianella revoluta		r		1			2	+																				r	+					+						
Dichelachne micrantha																	+																							
Dichondra repens																					+																			
Dillwynia sericea														+																										
Dillwynia sp.				+																																				
Dodonaea viscosa				r			+		+										+									1												
Drosera sp.																																r								
Einadia nutans	+	1		r		r	r																																	

Species	Mt Ainsle (S1)	Mt Ainsle (S2)	Mt Ainsle (S3)	Mt Ainsle (L1)	Mt Ainsle (L2)	Mt Majura	Black Mountain (S1)	Black Mountain (S2)	Black Mountain (Dryandra st)	Gossan Hill, Belconnen	Cooleman Ridge	Mt Arawang 1	Mt Arawang 2	Mulligans 1	Mulligans 2	Mulligans 3	Isaacs Ridge 1	Isaacs Ridge 2	Isaacs Ridge 3	Isaacs Ridge 4	Isaacs Ridge 5	Isaacs Ridge 6	Isaacs Ridge 7	Isaacs Ridge 8	Isaacs Ridge 9	Isaacs Ridge 10	Isaacs Ridge 11	Kambah Pools 1	Kambah Pools 2	Kambah Pools 3	Kambah Pools 4	Elm Grove Campsite	Water Tower Reserve; A	Bolton C, D	Bolton D	Bolton E	Pattison, F	Pattison, G	Carmody, H	Victoria st, I	Baldy's Hill Option
Elymus scaber																																						1			
Enneapogon nigricans					r										1																	r									+
Epilobium sp.			r																																						
Eragrostis brownii																				r							r														r
Erodium crinitum																r																									
Eucalyptus blakelyi			+	+	1	+				P+									1	2	1		r	1	1	1		1			+								+	
Eucalyptus bridgesiana			1									+							1	1		1		+		1	1		1	1	1			1	1	+	+	1	2	+	+
Eucalyptus cinerea																																	+	+							
Eucalyptus dives																												1						1	2	1					
Eucalyptus goniocalyx															+	1											1														
Eucalyptus macrorhyncha							2	2						1	2	1															+	2	2	+			+		+	1
Eucalyptus mannifera				+		P+			2	P+														+				+			+									
Eucalyptus melliodora				+	+	P+				P+					+	+			+	+	2	1	r	+	2	+	1	+			+				r					
Eucalyptus nortonii																		1																						
Eucalyptus pauciflora																																			2					
Eucalyptus polyanthemos		1		2		P+						+	+					1				1					1		1		+		+					+		+	
Eucalyptus rossii	+	1					2	3	+							1		1				1						+	1		1	+	2	2		1	+	1	2	+	
Eucalyptus sideroxylon													P1																				+							
Euchiton sp. (native)					+						1			1				1		1	1	1		1				1	1									1		
Exocarpos cupressiformis		+		+			1	+	+									r				r			+														
Galium gaudichaudii																		r																						
Geranium solanderi			1			r							+		+		1		1	1	1	r		1		1	1	1	1				1	1	1	1		1	1	1	r
Geranium retrorsum															r								?					+												
Glycine clandestina																		+			+	+																		
Glycine tabacina																					r				1															
Gonocarpus tetragynus		+		1				+	+	+				1	1	+	+	+				+						1	1			r		1		1			1	r
Goodenia hederacea				1			+	+	r													r																		
Goodenia pinnatifida																																							1		
Grevillea alpina							1	r	+																																
Grevillea juniperina										r																		1	1												
Grevillea rosmarinifolia																			+																					

Species	Mt Ainsle (S1)	Mt Ainsle (S2)	Mt Ainsle (S3)	Mt Ainsle (L1)	Mt Ainsle (L2)	Mt Majura	Black Mountain (S1)	Black Mountain (S2)	Black Mountain (Dryandra st)	Gossan Hill, Belconnen	Cooleman Ridge	Mt Arawang 1	Mt Arawang 2	Mulligans 1	Mulligans 2	Mulligans 3	Isaacs Ridge 1	Isaacs Ridge 2	Isaacs Ridge 3	Isaacs Ridge 4	Isaacs Ridge 5	Isaacs Ridge 6	Isaacs Ridge 7	Isaacs Ridge 8	Isaacs Ridge 9	Isaacs Ridge 10	Isaacs Ridge 11	Kambah Pools 1	Kambah Pools 2	Kambah Pools 3	Kambah Pools 4	Elm Grove Campsite	Water Tower Reserve; A	Bolton C, D	Bolton D	Bolton E	Pattison, F	Pattison, G	Carmody, H	Victoria st, I	Baldy's Hill Option
Hakea decurrens							1	r																																
Haloragis heterophylla														1		1	+			+		+	1	1	1	1		1	1											+
Hardenbergia violacea		r		r		r	1	+	1	+			r									r						+											
Hibbertia obtusifolia				+			r							+		r	+	r	+			+					r	1					1	1	1		1		1		r
Hibbertia riparia																												+												
Hydrocotyle laxiflora	+	1	+	+	+		+	+	+						1	1	1	1	1		1	1		1	1	1			1			1	1	1	2	2	3	1	1		1
Hypericum gramineum																	+	+										1					1							
Isolepis gramminifolia																																			1	1				
Indigofera australis									r																								1						+	1	
Joycea pallida							3	3	3																										3	1		3	2		2
Juncus australis																			1										+											
Juncus sp.				+				r			+					r	r					1	1	1		1	r			1	+									1
Kunzea ericoides																										+		1												
Lepidium sp.										r														r	r															
Lepidosperma laterale	r	r					+	+									+					r																	
Leptorhynchos squamatus																												+											
Leptospermum sp.																		+										+											
Leucopogon attenuatus								+																																
Leucopogon fletcheri														+	1																									
Lissanthe strigosa								+																														1		
Lomandra filiformis		+		1	1		2	1			r		+	1	1	+	1	1				1			1	1	1	1	+			+								r
Lomandra filiformis. Subsp. Coriacea					+										r				r		+	4		+	+	+			r										
Lomandra longifolia							+	+	1									1																		1				
Lomandra multiflora				+			+	+	+				r														r	+	r				1	1		+		1	1		r
Luzula densiflora																																		1						
Melichrus urceolatus				+			r							+	+	r		+				+		+				1				r	1	1	1			2	1		r
Microlaena stipoides	1			+			+						1		1	1	1	2	1	1	1		1	1		2	1	1	1	2			1		1	1	1	1	1	1	+
Microseris lanceolata															r																									
Oreomyrrhis eriopoda																																								r
Oxalis perennans																		+															+				1			
Panicum effusum						+				+		+				1	+			+		1		+			+				+		1	1	1	2	2		2	1	1

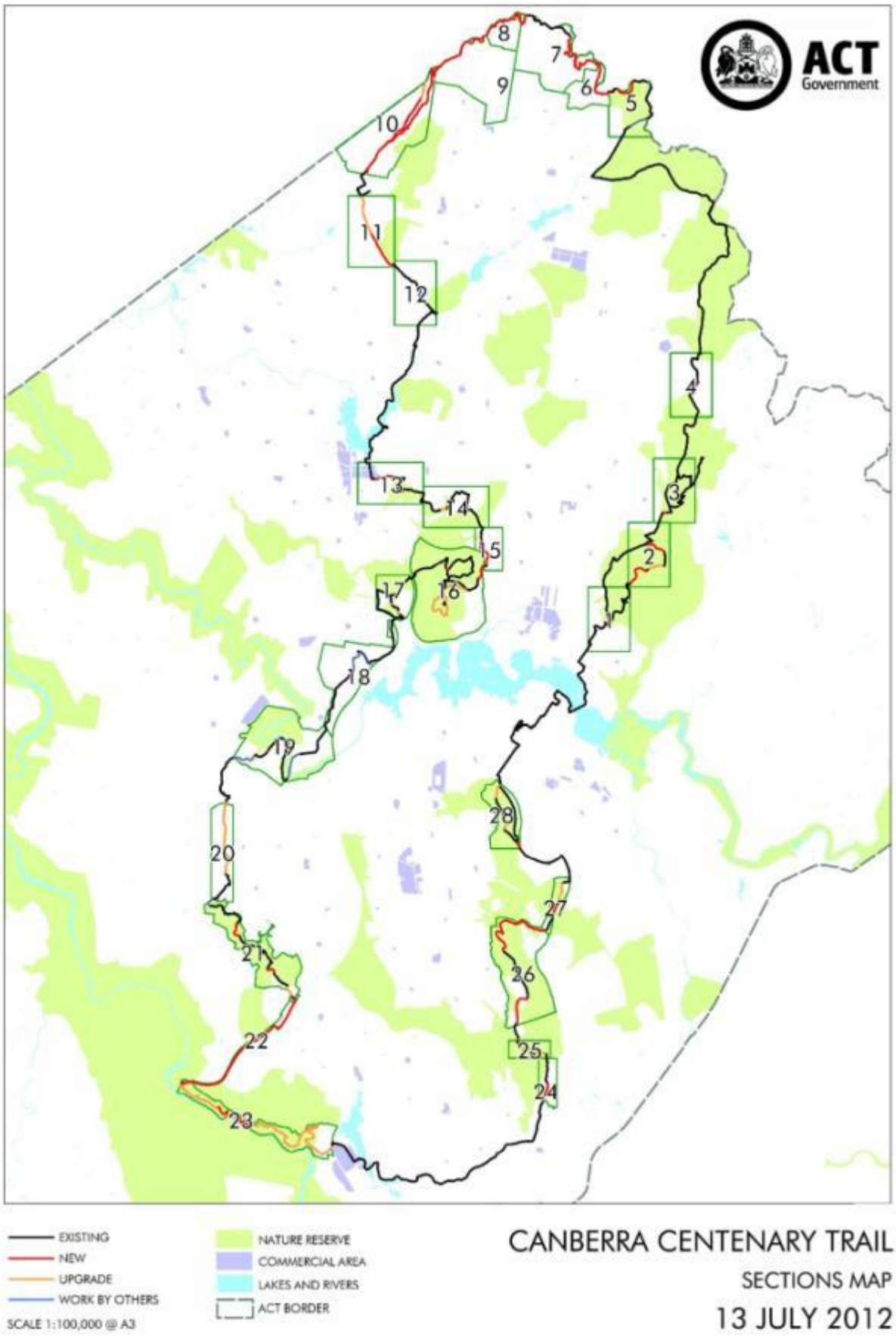
Species	Mt Ainsle (S1)	Mt Ainsle (S2)	Mt Ainsle (S3)	Mt Ainsle (L1)	Mt Ainsle (L2)	Mt Majura	Black Mountain (S1)	Black Mountain (S2)	Black Mountain (Dryandra st)	Gossan Hill, Belconnen	Cooleman Ridge	Mt Arawang 1	Mt Arawang 2	Mulligans 1	Mulligans 2	Mulligans 3	Isaacs Ridge 1	Isaacs Ridge 2	Isaacs Ridge 3	Isaacs Ridge 4	Isaacs Ridge 5	Isaacs Ridge 6	Isaacs Ridge 7	Isaacs Ridge 8	Isaacs Ridge 9	Isaacs Ridge 10	Isaacs Ridge 11	Kambah Pools 1	Kambah Pools 2	Kambah Pools 3	Kambah Pools 4	Elm Grove Campsite	Water Tower Reserve; A	Bolton C, D	Bolton D	Bolton E	Pattison, F	Pattison, G	Carmody, H	Victoria st, I	Baldy's Hill Option
Persicaria decipiens																																1								
Pimelia curviflora															+													+												
Pimelia linifolia									1																1															
Plantago varia															1																	1				1			1	
Poa labillardierei																				+								1		1									
Poa sieberiana			1			+	3				1	+	+		1	1	2	1															1		1	4	1	2	1	1
Pomaderris sp.																												1											
Pseudognaphalium luteoalbum																	+																						
Pterostylis sp.							+																																
Pteridium esculentum																																		1					
Pultenaea procumbens							+	r						1														1											
Rubus parvifolius												+					+	r		+								+	+										
Rumex brownii													+															+								1	1		
Schoenus apogon											1	1	1			1																							
Scleranthus biflorus							r										2	1	1	1	1	1	1			1	1	1	1		1				1		1		1	
Senecio hispidulus																		r																					
Senecio quadridentatus			+										+	+	+	+	1	r			r	+			+			+			r								
Senecio prenanthoides															r																								
Solanum cinereum													r																								1			
Solanum sp.							+																																
Solenogyne dominii			+	+					+					1							1	+										+	2	2	2	2		1	1		+
Solenogyne gunnii																																				1			1	
Sorghum leiocladum																																		1					
Stackhousia monogyna							+																					+											
Stypandra glauca				+						r																													+
Themeda australis						+				+		1			1		1							+		2		4	3	2	2	r	3	2	1	2	2	3	2	1	r
Tricoryne elatior																										r													
Typha sp.																															+								
Velleia paradoxa																																							
Verbena bonariensis																														1									
Veronica calycina																		r							r														
Viola betonicifolia																																							
Viola hederacea																			r																				
Vittadinia cuneata																		+	r						1		r												
Vittadinia muelleri			+	1	1		+	r						1	1	1			+		r	+		+		+	1												

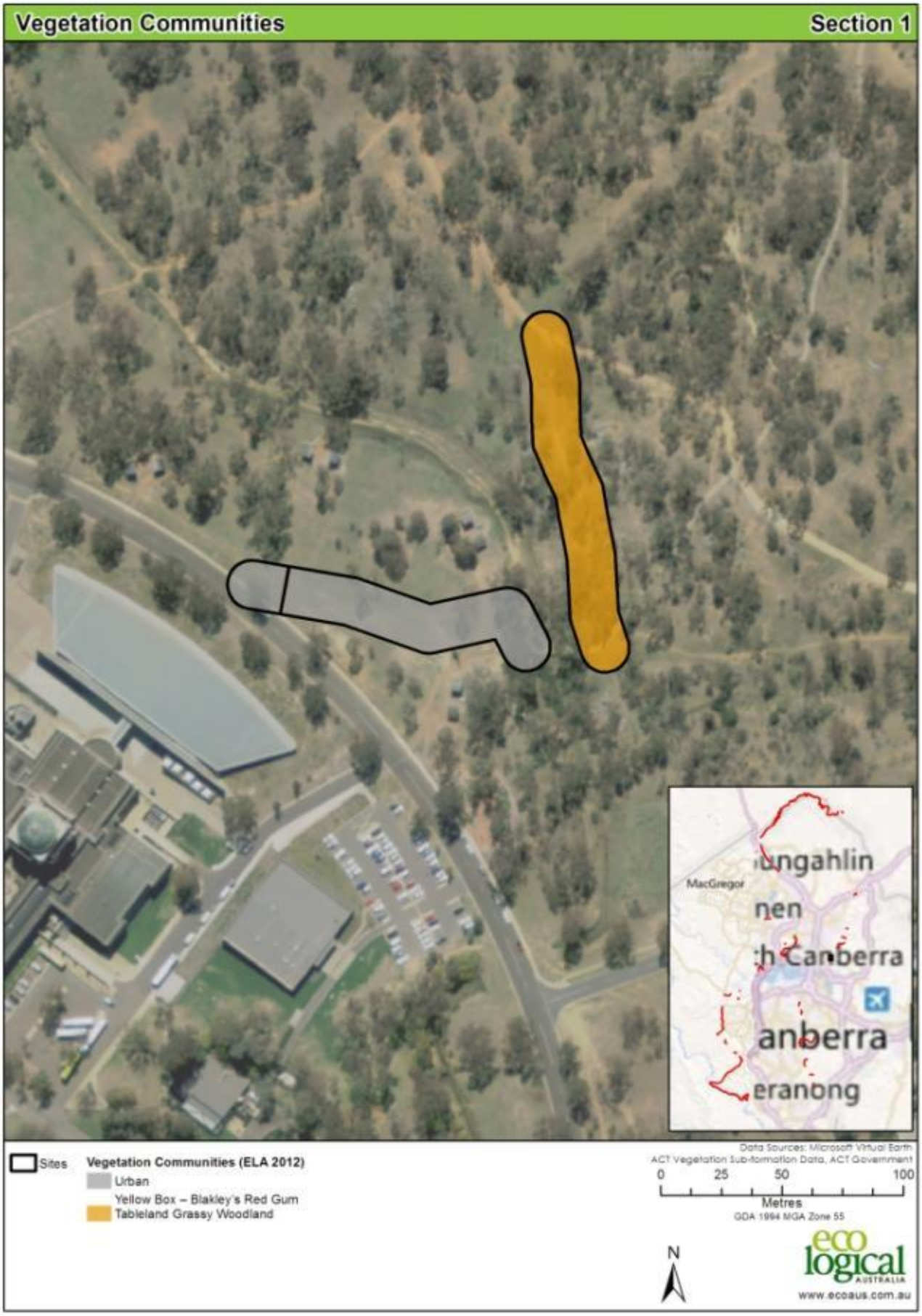
Species	Mt Ainsle (S1)	Mt Ainsle (S2)	Mt Ainsle (S3)	Mt Ainsle (L1)	Mt Ainsle (L2)	Mt Majura	Black Mountain (S1)	Black Mountain (S2)	Black Mountain (Dryandra st)	Gossan Hill, Belconnen	Cooleman Ridge	Mt Arawang 1	Mt Arawang 2	Mulligans 1	Mulligans 2	Mulligans 3	Isaacs Ridge 1	Isaacs Ridge 2	Isaacs Ridge 3	Isaacs Ridge 4	Isaacs Ridge 5	Isaacs Ridge 6	Isaacs Ridge 7	Isaacs Ridge 8	Isaacs Ridge 9	Isaacs Ridge 10	Isaacs Ridge 11	Kambah Pools 1	Kambah Pools 2	Kambah Pools 3	Kambah Pools 4	Elm Grove Campsite	Water Tower Reserve; A	Bolton C, D	Bolton D	Bolton E	Pattison, F	Pattison, G	Carmody, H	Victoria st, I	Baldy's Hill Option
Vittadinia gracilis							r														+	1			1			1			r									
Vittadinia sp.																																			1					+
Wahlenbergia communis																		1																						
Wahlenbergia sp.														+			1				r				+															
Wurmbea dioica																																							
Xerochrysum viscosum		r	+				r		1													r			1		+	1											

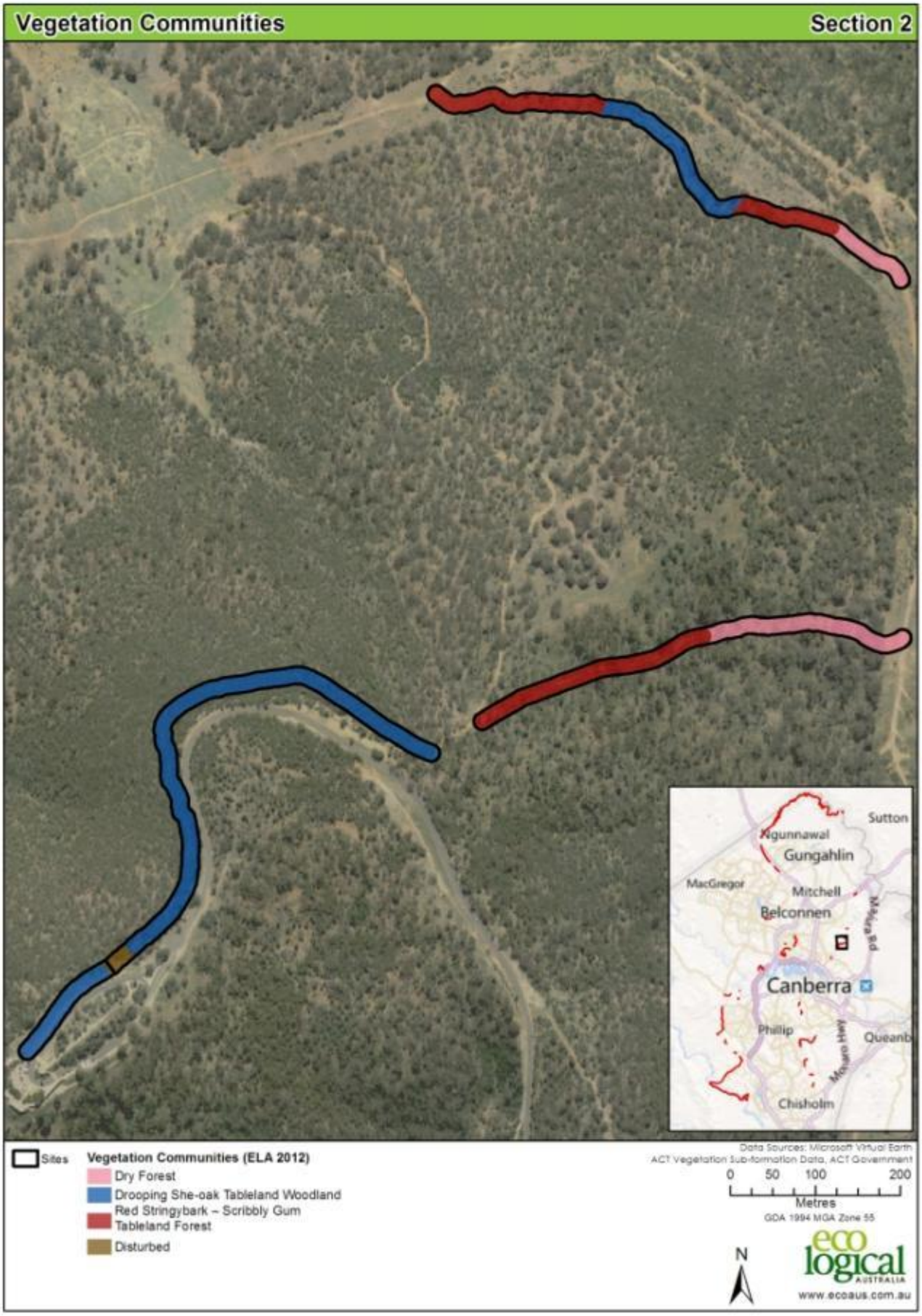
Birds				Mammals	
Common Name	**Latin Name**	**Common Name**	**Latin Name**	**Common Name**	**Latin Name**
Australasian Grebe	*Tachybaptus novaehollandiae*	Quail, Brown	*Coturnix ypsilophora*	Eastern Grey Kangaroo	*Macropus giganteus*
Australian Magpie	*Cracticus tibicen*	Quail, Painted Button	*Turnix varius*	Echidna	*Tachyglossus aculeatus*
Australian Raven	*Corvus coronoides*	Red Rumped Parrot	*Psephotus haematonotus*	European Rabbit	*Oryctolagus cuniculus*
Australian Wood Duck	*Chenonetta jubata*	Red-browed finch	*Neochmia temporalis*	Fox	*Vulpes vulpes*
Black Shouldered Kite	*Elanus axillaris*	Rosella, Crimson	*Platycercus elegans*	Hare	*Lepus capensis*
Crested Pigeon	*Ocyphaps lophotes*	Rosella, Eastern	*Platycercus eximius*	Shingleback Lizard	*Tiliqua rugosa*
Currawong, Pied	*Strepera graculina*	Scarlet Robin	*Petroica boodang*	Swamp Wallaby	*Wallabia bicolor*
Galah	*Eolophus roseicapilla*	Silvereye	*Zosterops lateralis*	Wallaroo	*Macropus robustus*
Gang Gang Cockatoo	*Callocephalon fimbriatum*	Sulfur-crested Cockatoo	*Cacatua galerita*		
Golden Whistler	*Pachycephala pectoralis*	Superb Fairy Wren	*Malurus cyaneus*		
Golden-headed Cisticola	*Cisticola exilis*	Thornbill, Brown	*Acanthiza pusilla*		
Grey Currawong	*Strepera versicolor*	Thornbill, Yellow Rumped	*Acanthiza chrysorrhoa*		
Grey Fantail	*Rhipidura albiscapa*	Treecreeper, Brown	*Climacteris picumnus*		
Grey Shrike-thrush	*Colluricincla harmonica*	Treecreeper, White throated	*Cormobates leucophaea*		
Honeyeater, Brown Headed	*Melithreptus brevirostris*	Weebill	*Smicrornis brevirostris*		
Honeyeater, White-Eared	*Lichenostomus leucotis*	Welcome Swallow	*Hirundo neoxena*		
King Parrot	*Alisterus scapularis*	White- winged Chough	*Corcorax*		
Laughing Kookaburra	*Dacelo novaeguineae*	Willywag Tail	*Rhipidura leucophrys*		
Magpie Lark	*Grallina cyanoleuca*				
Noisy Miner	*Manorina melanocephala*				
Pacific Black Duck	*Anas superciliosa*				
Pardalote, Spotted	*Pardalotus punctatus*				
Pardalote, Striated	*Pardalotus striatus*				

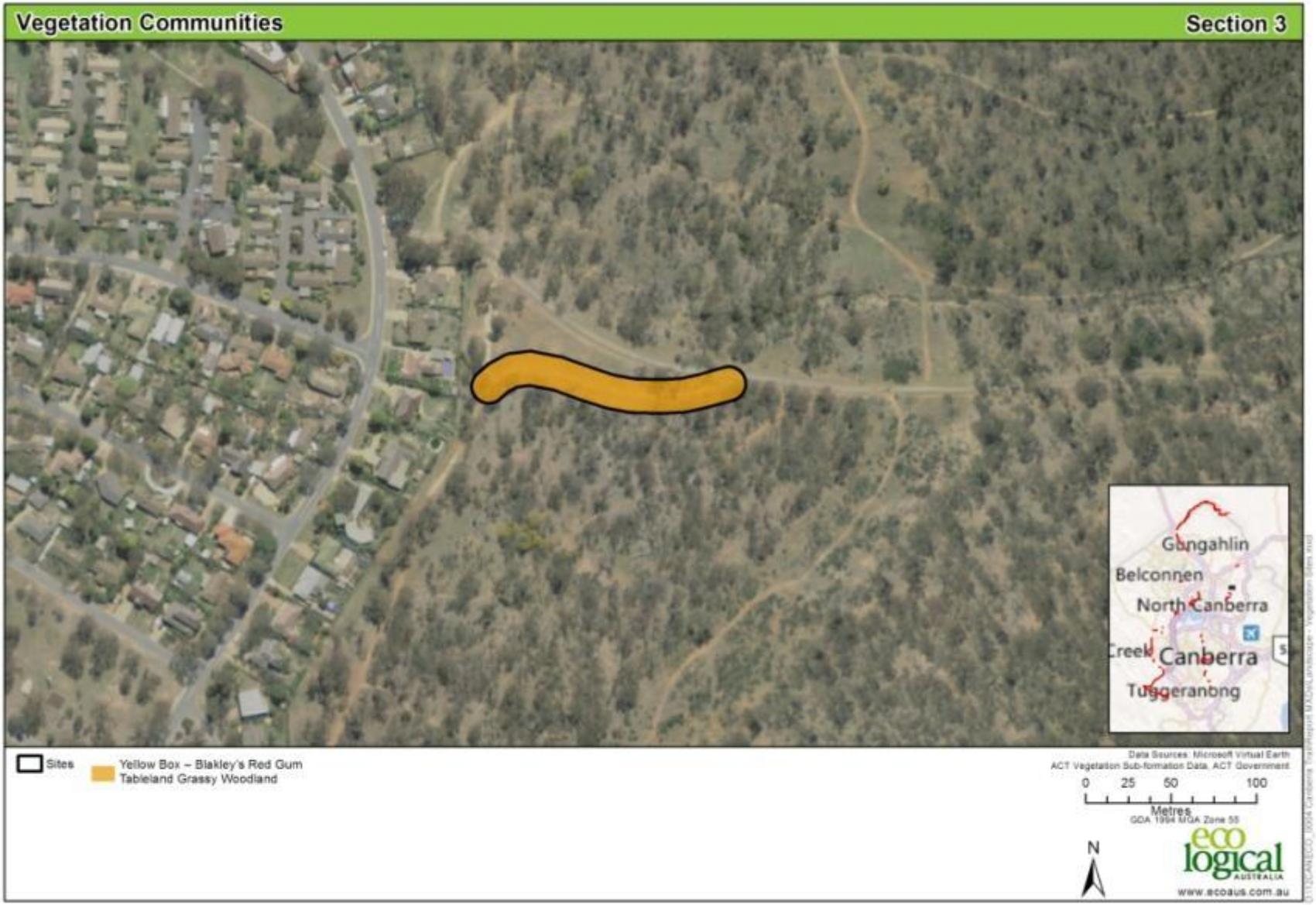
Appendix C – Vegetation mapping

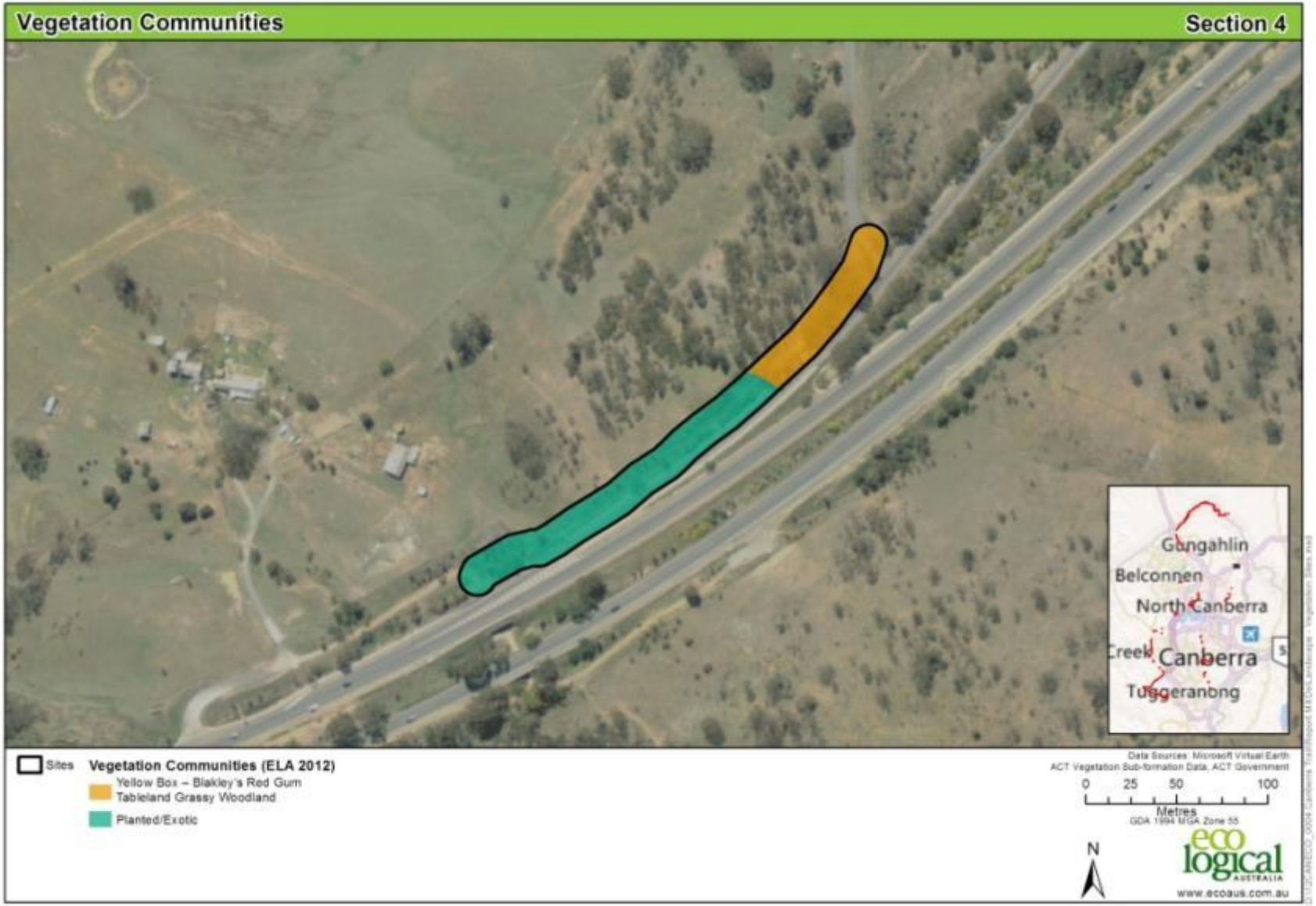
Vegetation maps of the study area are provided below. Please note that the vegetation maps provided in Appendix C have been referenced against the CCT sections map – 13 July 2012.


ACT Government
EXISTING
NEW
UPGRADE
WORK BY OTHERS
SCALE 1:100,000 @ A3
NATURE RESERVE
COMMERCIAL AREA
LAKES AND RIVERS
ACT BORDER
CANBERRA CENTENARY TRAIL
SECTIONS MAP
13 JULY 2012


Vegetation Communities
Section 1
MacGregor
Canberra
Sites
Vegetation Communities (ELA 2012)
Urban
Yellow Box – Blakley's Red Gum
Tableland Grassy Woodland
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0
25
50
100
Metres
GDA 1994 MGA Zone 55
N
eco logical AUSTRALIA
www.ecoaus.com.au


Vegetation Communities
Section 2
Sutton
Ngunnawal
Gungahlin
MacGregor
Mitchell
Belconnen
Canberra
Phillip
Chisholm
Sites
Vegetation Communities (ELA 2012)
Dry Forest
Drooping She-oak Tableland Woodland
Red Stringybark – Scribbly Gum Tableland Forest
Disturbed
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 50 100 200
Metres
GDA 1994 MGA Zone 55
N
eco logical AUSTRALIA
www.ecoaus.com.au


Vegetation Communities
Section 3
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Yellow Box – Blakley's Red Gum Tableland Grassy Woodland
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 25 50 100
Metres
GDA 1994 MGA Zone 55
N
eco logical AUSTRALIA
www.ecoaus.com.au


Vegetation Communities
Section 4
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Yellow Box – Blakley's Red Gum Tableland Grassy Woodland
Planted/Exotic
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 25 50 100
Metres
GDA 1994 MGA Zone 55
N
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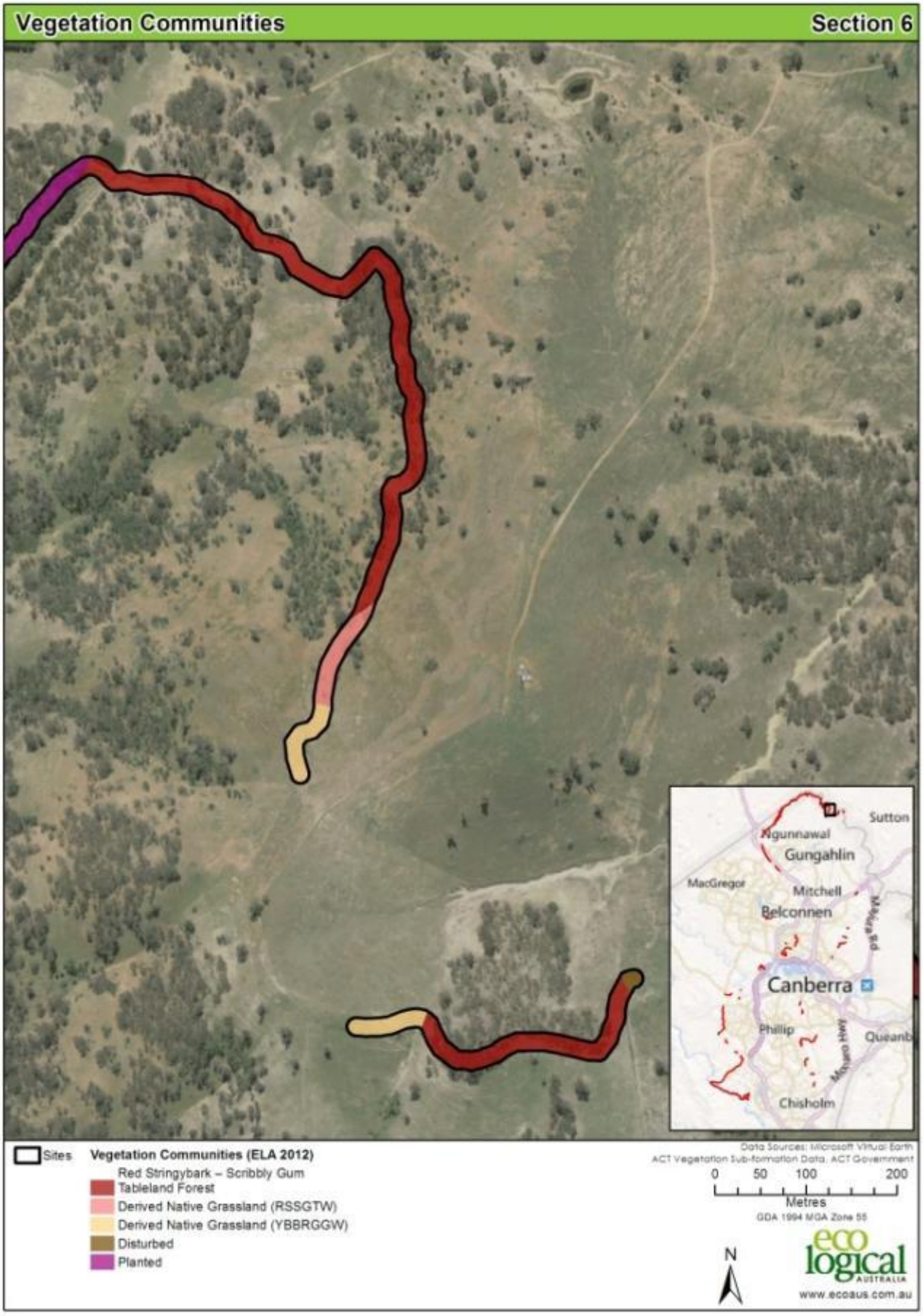
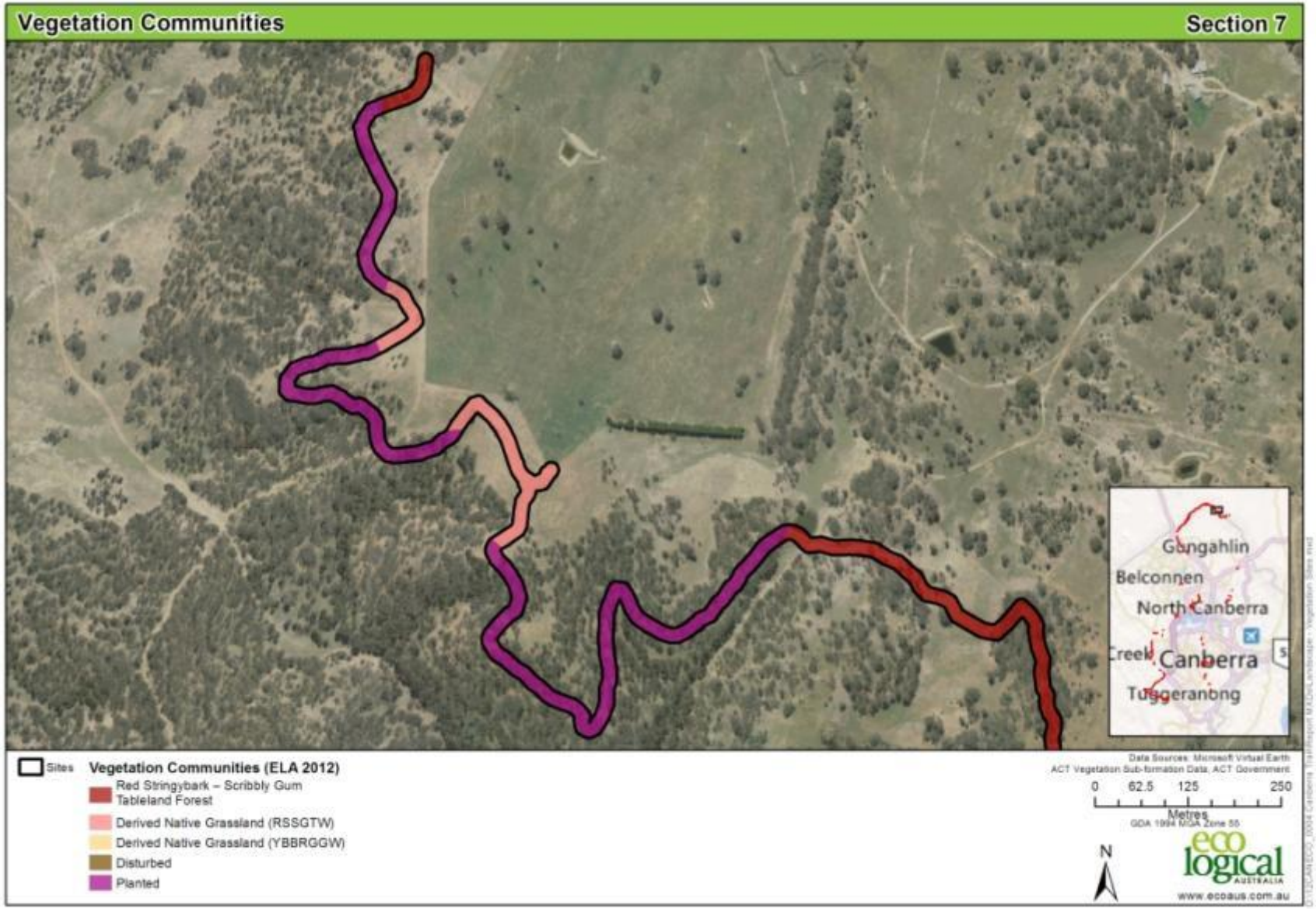
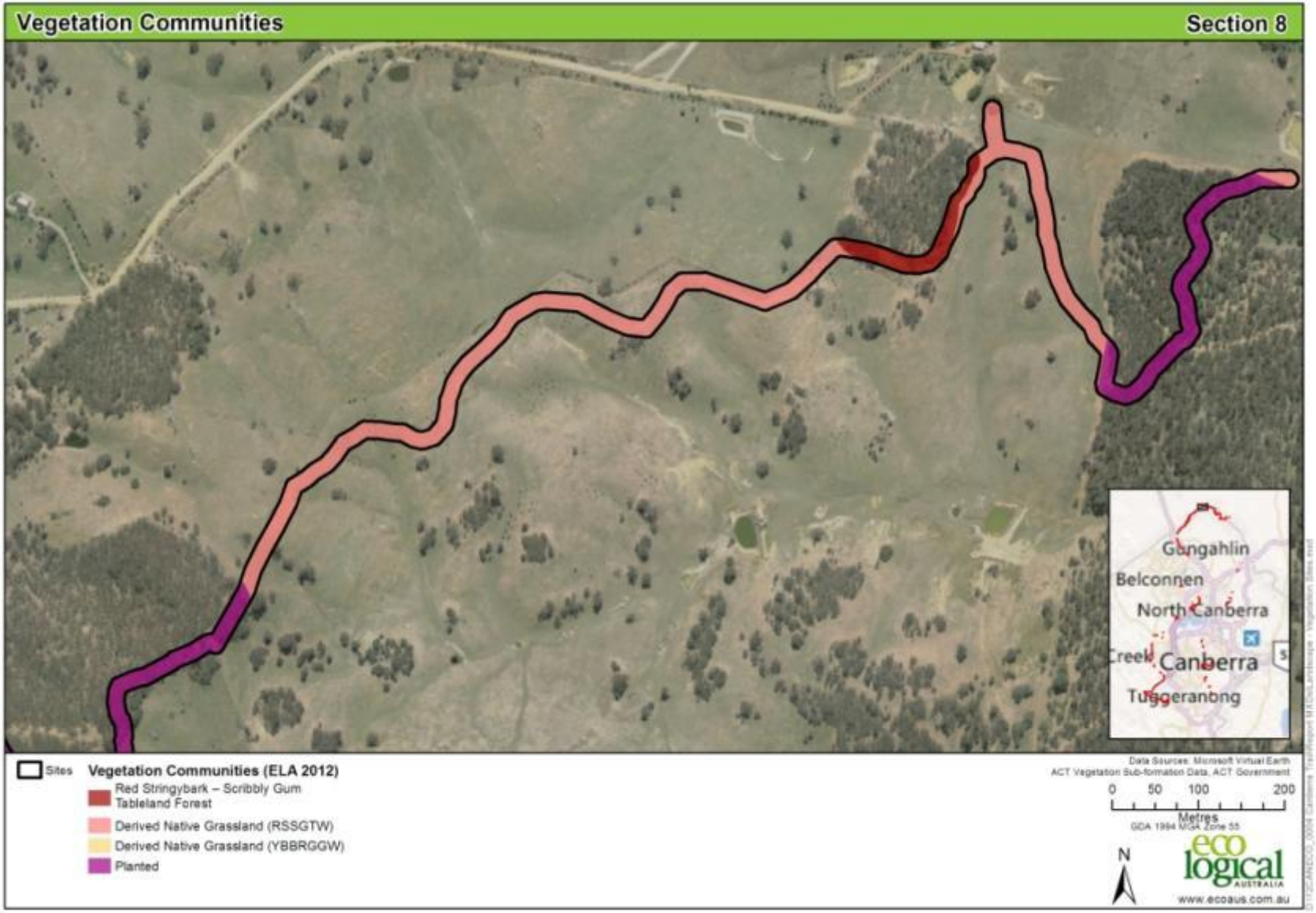
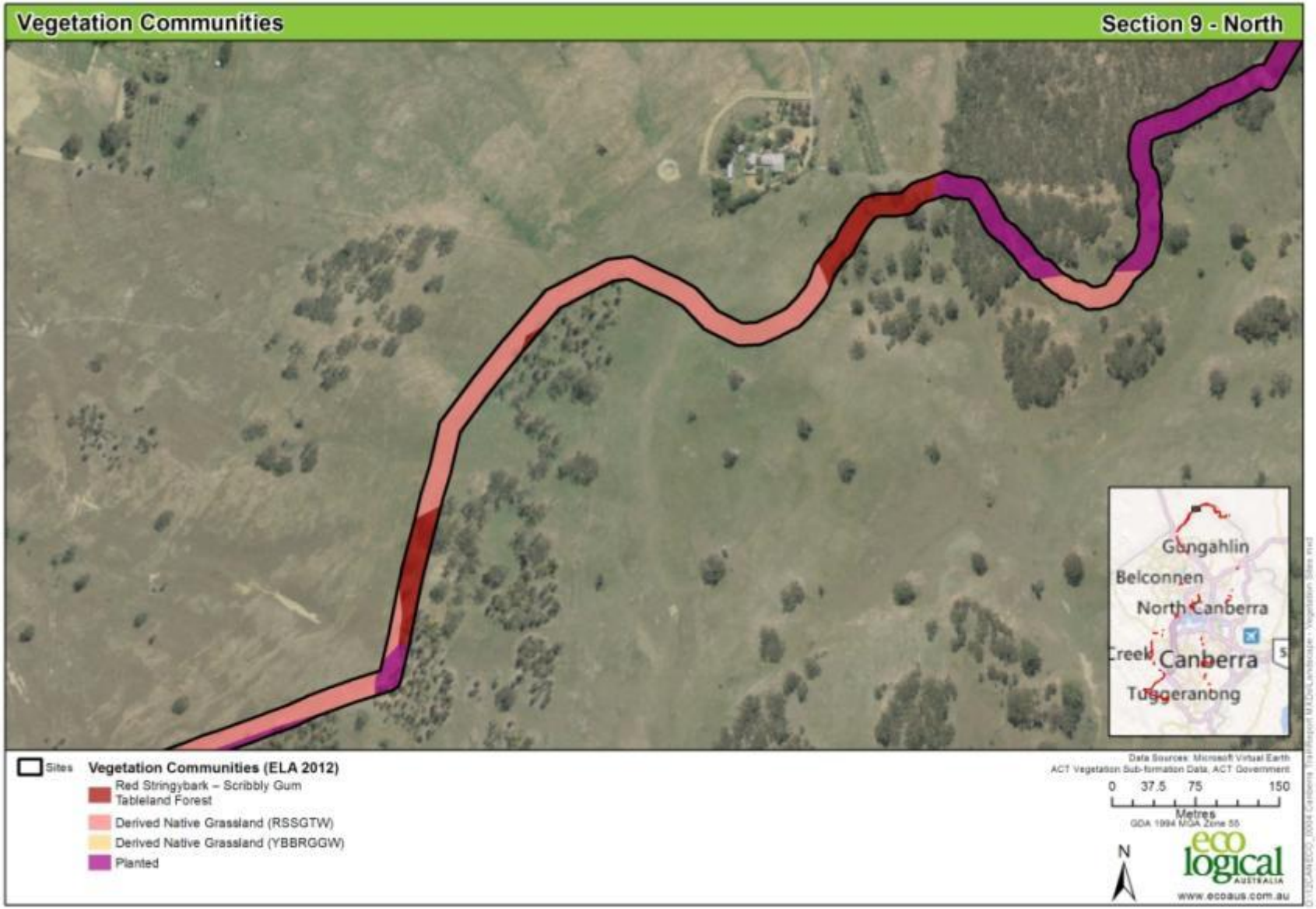
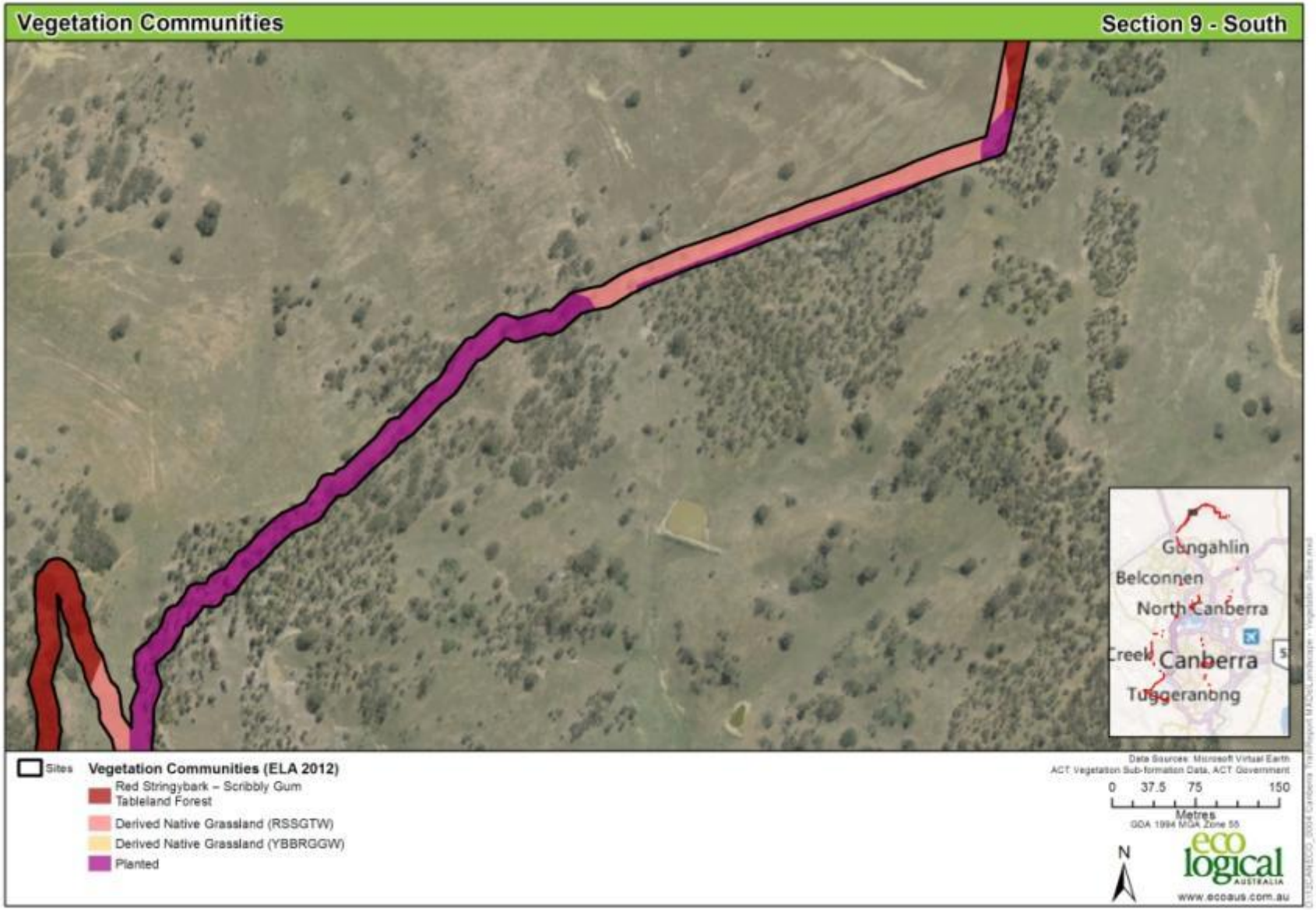
Vegetation Communities
Section 5
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Red Stringybark - Scribbly Gum Tableland Forest
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 37.5 75 150
Metres
GDA 1994 MGA Zone 55
N
eco logical AUSTRALIA
www.ecoaus.com.au


Vegetation Communities
Section 6
Sutton
Ngunnawal
Gungahlin
MacGregor
Mitchell
Belconnen
Canberra
Phillip
Chisholm
Sites
Vegetation Communities (ELA 2012)
Red Stringybark – Scribbly Gum Tableland Forest
Derived Native Grassland (RSSGTW)
Derived Native Grassland (YBBRGGW)
Disturbed
Planted
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 50 100 200
Metres
GDA 1994 MGA Zone 55
N
eco logical AUSTRALIA
www.ecoaus.com.au


Vegetation Communities
Section 7
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Red Stringybark – Scribbly Gum Tableland Forest
Derived Native Grassland (RSSGTW)
Derived Native Grassland (YBBRGGW)
Disturbed
Planted
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data: ACT Government
0 62.5 125 250
Metres
GDA 1994 MGA Zone 55
N
eco logical AUSTRALIA
www.ecoaus.com.au


Vegetation Communities
Section 8
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Red Stringybark – Scribbly Gum Tableland Forest
Derived Native Grassland (RSSGTW)
Derived Native Grassland (YBBRGGW)
Planted
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 50 100 200
Metres
GDA 1994 MGA Zone 55
N
eco logical AUSTRALIA
www.ecoaus.com.au


Vegetation Communities
Section 9 - North
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Red Stringybark – Scribbly Gum Tableland Forest
Derived Native Grassland (RSSGTW)
Derived Native Grassland (YBBRGGW)
Planted
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data: ACT Government
0 37.5 75 150
Metres
GDA 1994 MGA Zone 55
N
eco logical AUSTRALIA
www.ecoaus.com.au


Vegetation Communities
Section 9 - South
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Red Stringybark – Scribbly Gum Tableland Forest
Derived Native Grassland (RSSGTW)
Derived Native Grassland (YBBRGGW)
Planted
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 37.5 75 150
Metres
GDA 1994 MGA Zone 55
N
eco logical AUSTRALIA
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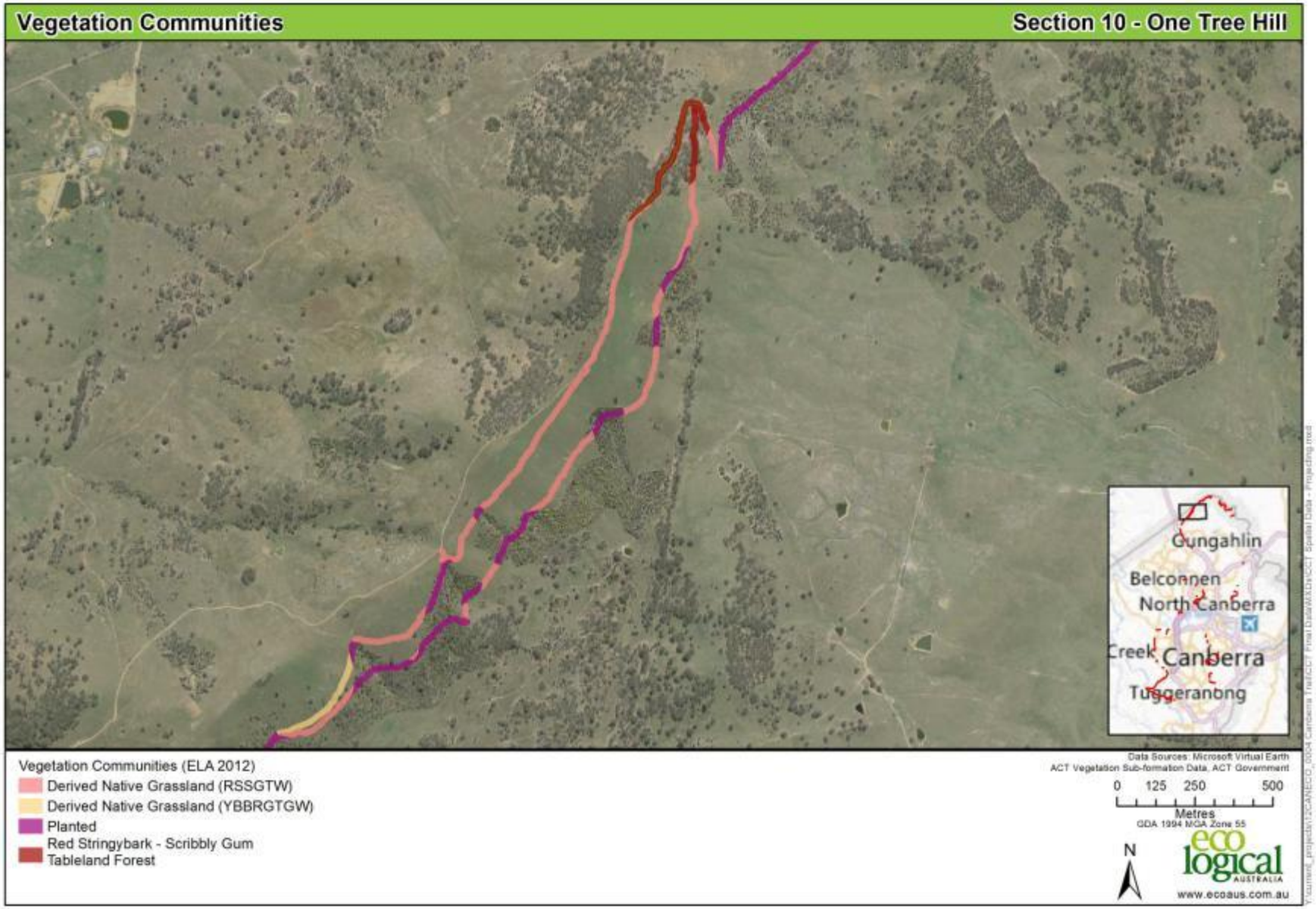
Vegetation Communities
Section 10 - One Tree Hill
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Vegetation Communities (ELA 2012)
Derived Native Grassland (RSSGTW)
Derived Native Grassland (YBBRGTGW)
Planted
Red Stringybark - Scribbly Gum Tableland Forest
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 125 250 500
Metres
GDA 1994 MGA Zone 55
N
eco logical AUSTRALIA
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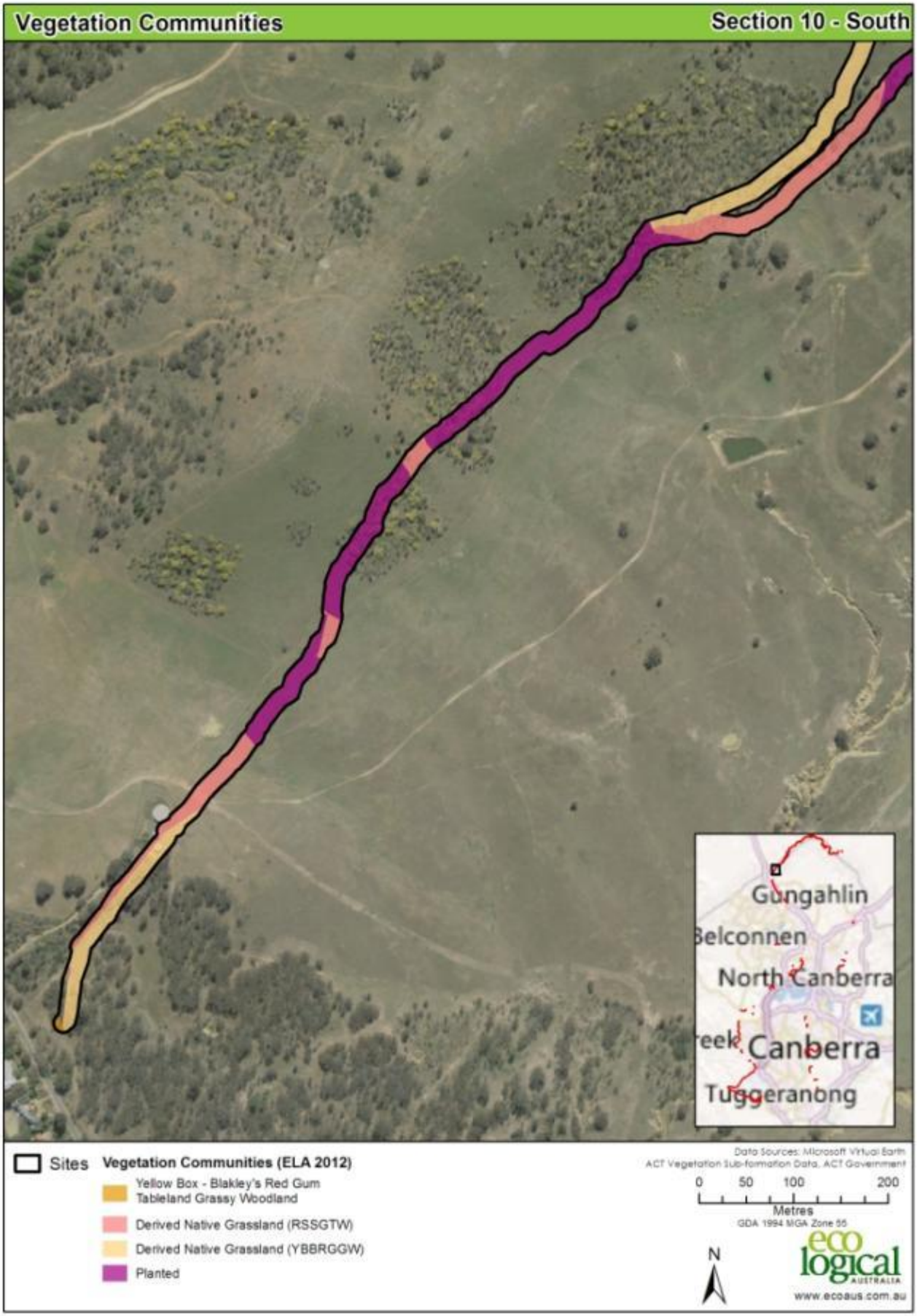
Vegetation Communities
Section 10 - South
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Yellow Box - Blakley's Red Gum Tableland Grassy Woodland
Derived Native Grassland (RSSGTW)
Derived Native Grassland (YBBRGGW)
Planted
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 50 100 200
Metres
GDA 1994 MGA Zone 55
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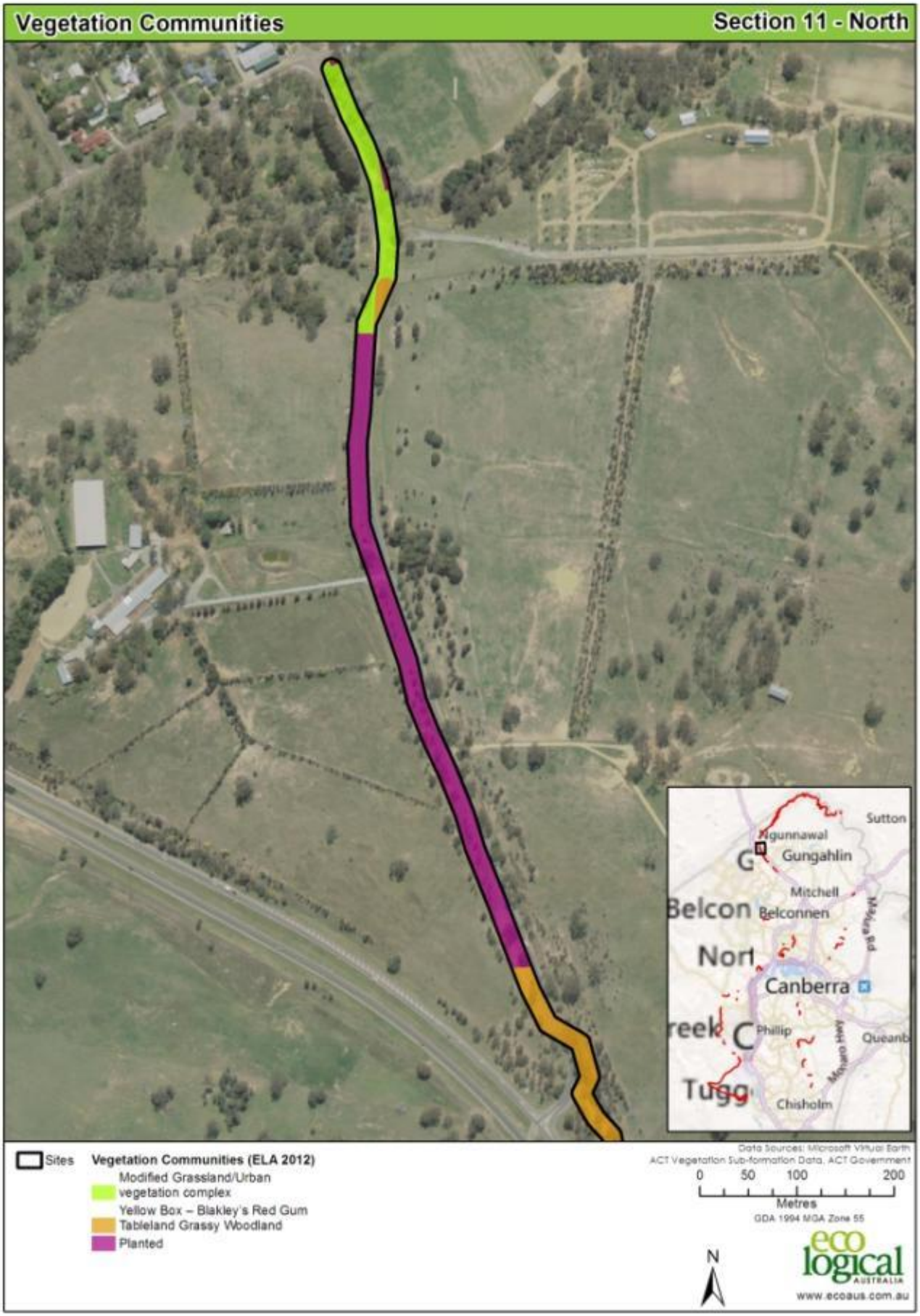
Vegetation Communities
Section 11 - North
Sutton
Gungahlin
Mitchell
Belconnen
Canberra
Phillip
Chisholm
Sites
Vegetation Communities (ELA 2012)
Modified Grassland/Urban vegetation complex
Yellow Box – Blakley's Red Gum Tableland Grassy Woodland
Planted
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 50 100 200
Metres
GDA 1994 MGA Zone 55
N
eco logical AUSTRALIA
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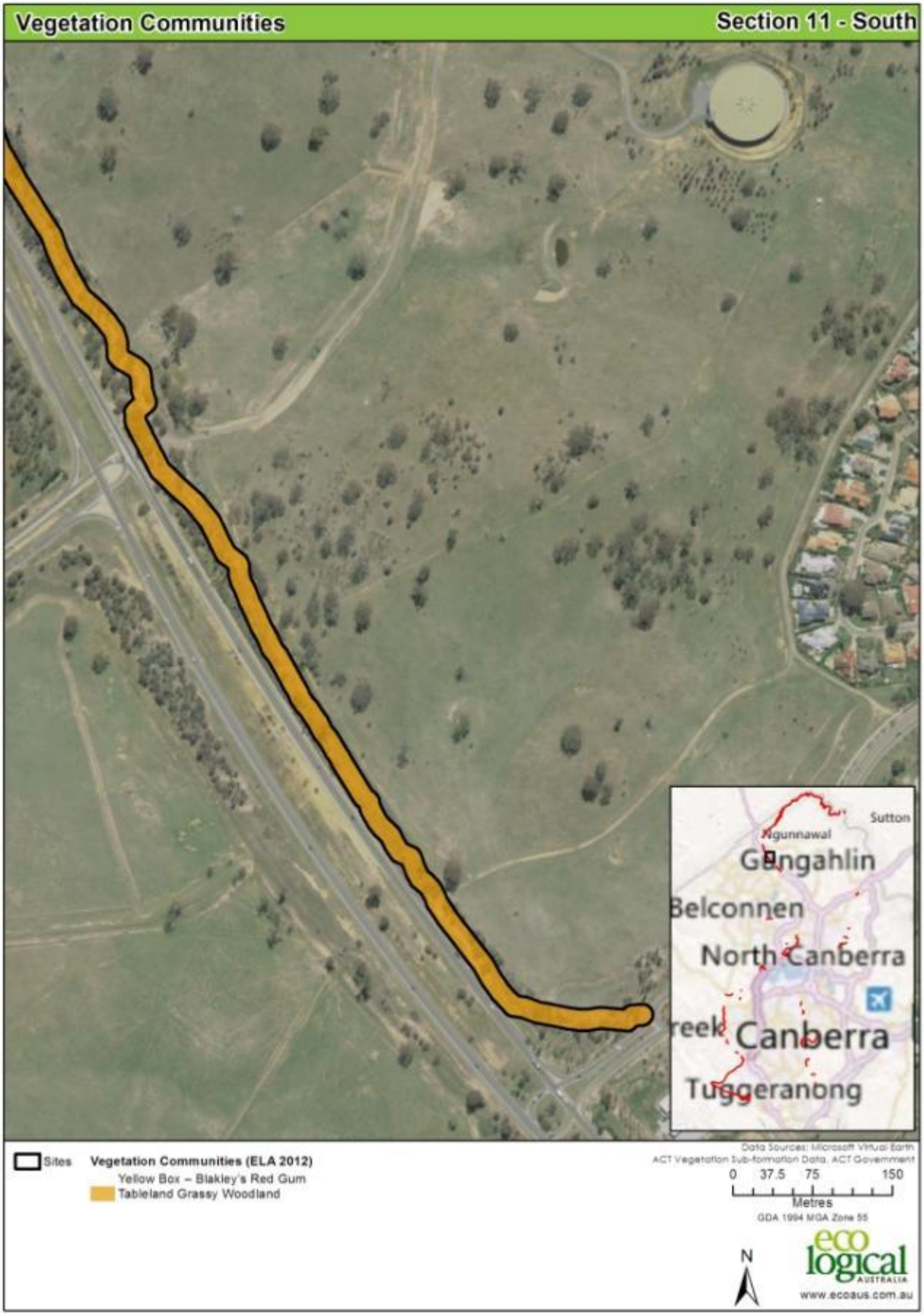
Vegetation Communities
Section 11 - South
Sutton
Ngunnawal
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Yellow Box – Blakley's Red Gum
Tableland Grassy Woodland
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data: ACT Government
0 37.5 75 150
Metres
GDA 1994 MGA Zone 55
N
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Vegetation Communities
Section 13
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Exotic pasture
Disturbed
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 37.5 75 150
Metres
GDA 1994 MGA Zone 55
N
eco logical AUSTRALIA
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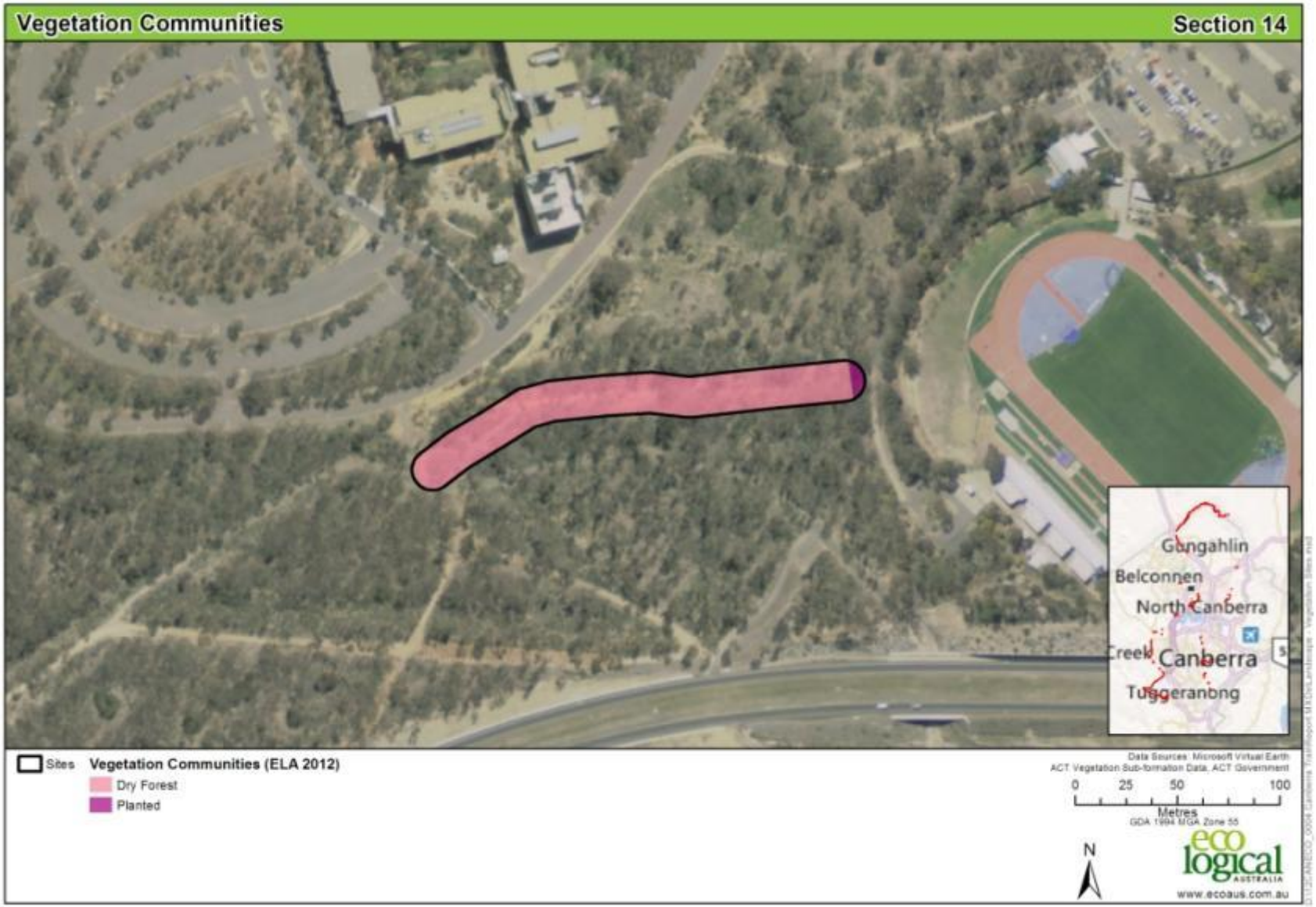
Vegetation Communities
Section 14
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Dry Forest
Planted
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 25 50 100
Metres
GDA 1994 MGA Zone 55
N
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Vegetation Communities
Section 15
Sutton
Ngunnawal
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Red Stringybark – Scribbly Gum Tableland Forest
Disturbed
Cleared
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 37.5 75 150
Metres
GDA 1994 MGA Zone 55
N
eco logical AUSTRALIA
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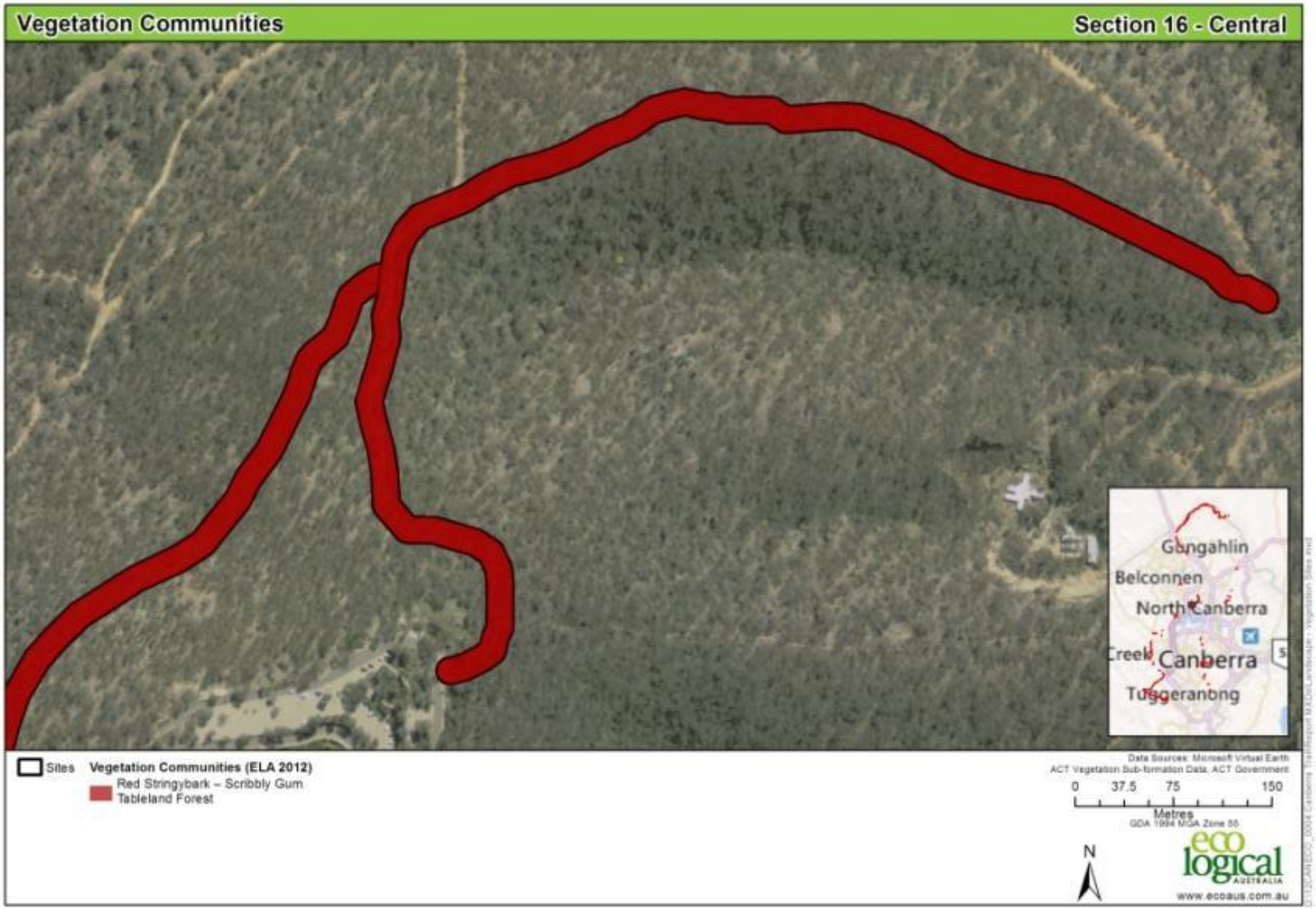
Vegetation Communities
Section 16 - Central
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Red Stringybark – Scribbly Gum Tableland Forest
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data: ACT Government
0 37.5 75 150
Metres
GDA 1994 MGA Zone 55
N
eco logical AUSTRALIA
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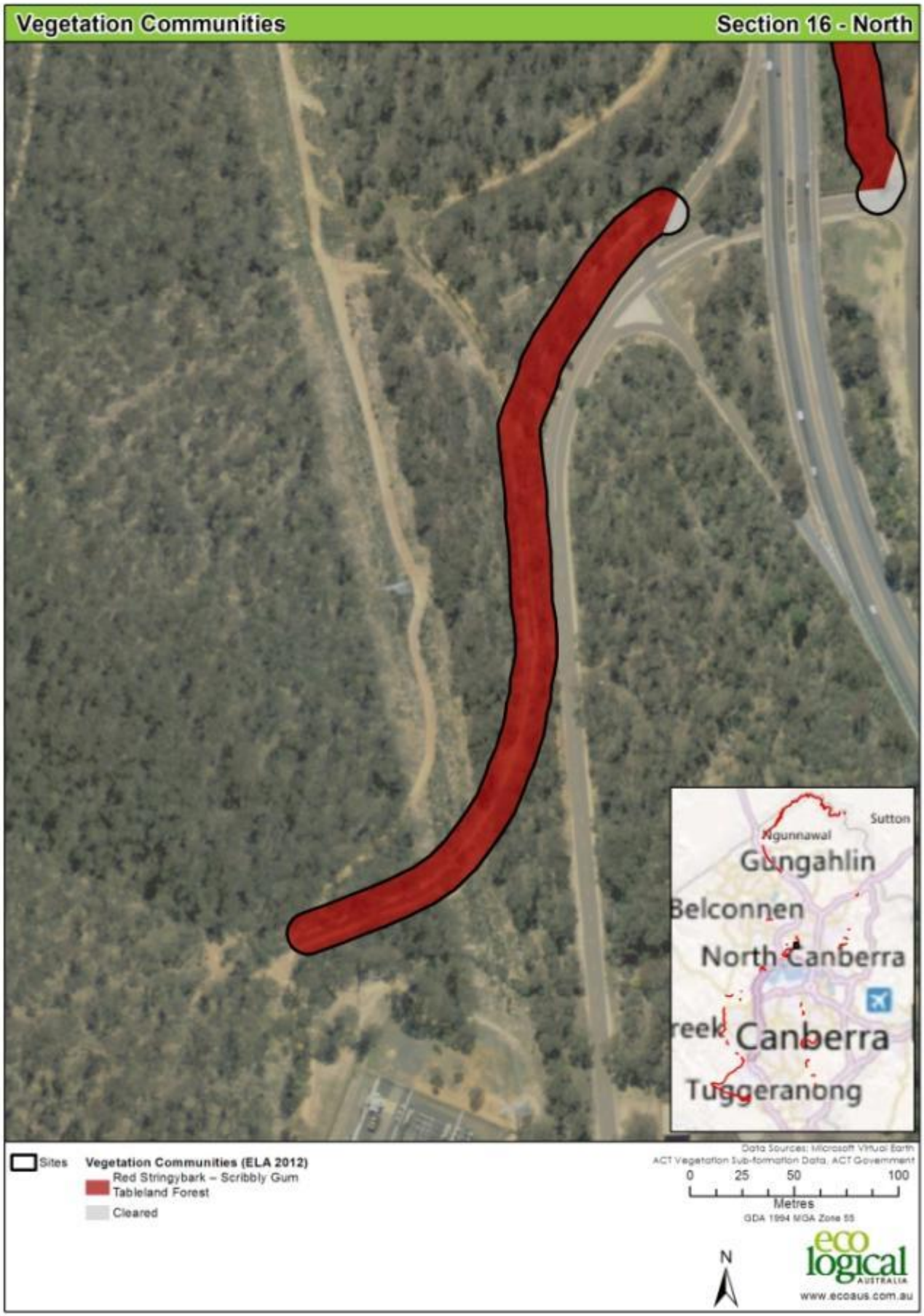
Vegetation Communities
Section 16 - North
Sutton
Ngunnawal
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Red Stringybark – Scribbly Gum Tableland Forest
Cleared
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 25 50 100
Metres
GDA 1994 MGA Zone 55
N
eco logical AUSTRALIA
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Vegetation Communities
Section 16 - North-west
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Red Stringybark – Scribbly Gum Tableland Forest
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 25 50 100
Metres
GDA 1994 MGA Zone 55
N
eco logical AUSTRALIA
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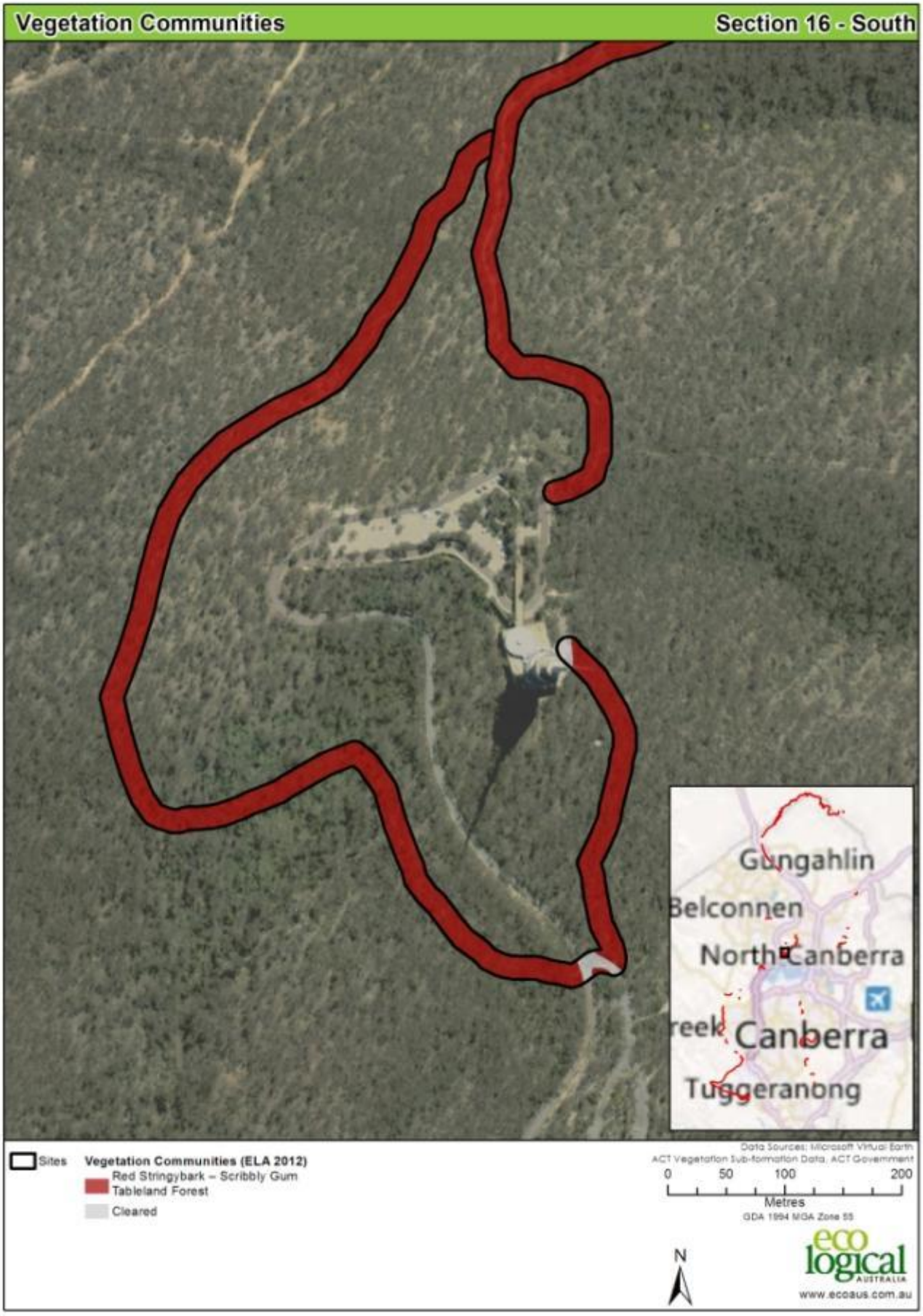
Vegetation Communities
Section 16 - South
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Red Stringybark – Scribbly Gum Tableland Forest
Cleared
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 50 100 200
Metres
GDA 1994 MGA Zone 55
N
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Vegetation Communities
Section 20 - North
Sutton
Ngunnawal
Gungahlin
MacGregor
Mitchell
Belconnen
Canberra
Phillip
Chisholm
Sites
Vegetation Communities (ELA 2012)
Exotic pasture
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 37.5 75 150
Metres
GDA 1994 MGA Zone 55
N
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Vegetation Communities
Section 20 - Central
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Exotic pasture
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 37.5 75 150
Metres
GDA 1994 MGA Zone 55
N
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Vegetation Communities
Section 20 - South
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Exotic pasture
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 37.5 75 150
Metres
GDA 1994 MGA Zone 55
N
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Vegetation Communities
Section 21 - Far South
Sutton
Gungahlin
Mitchell
Belconnen
Canberra
Phillip
Chisholm
Sites
Vegetation Communities (ELA 2012)
Disturbed
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 25 50 100
Metres
GDA 1994 MGA Zone 55
N
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Vegetation Communities
Section 21 - North
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Exotic pasture
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 25 50 100
Metres
GDA 1994 MGA Zone 55
N
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Vegetation Communities
Section 21 - South
Sutton
Ngunnawal
Gungahlin
MacGregor
Mitchell
Belconnen
Majura Rd
Canberra
Phillip
Monaro Hwy
Queanb
Chisholm
Sites
Vegetation Communities (ELA 2012)
Exotic pasture
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 30 60 120
Metres
GDA 1994 MGA Zone 55
N
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Vegetation Communities
Section 22 - Far North
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Disturbed
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 25 50 100
Metres
GDA 1994 MGA Zone 55
N
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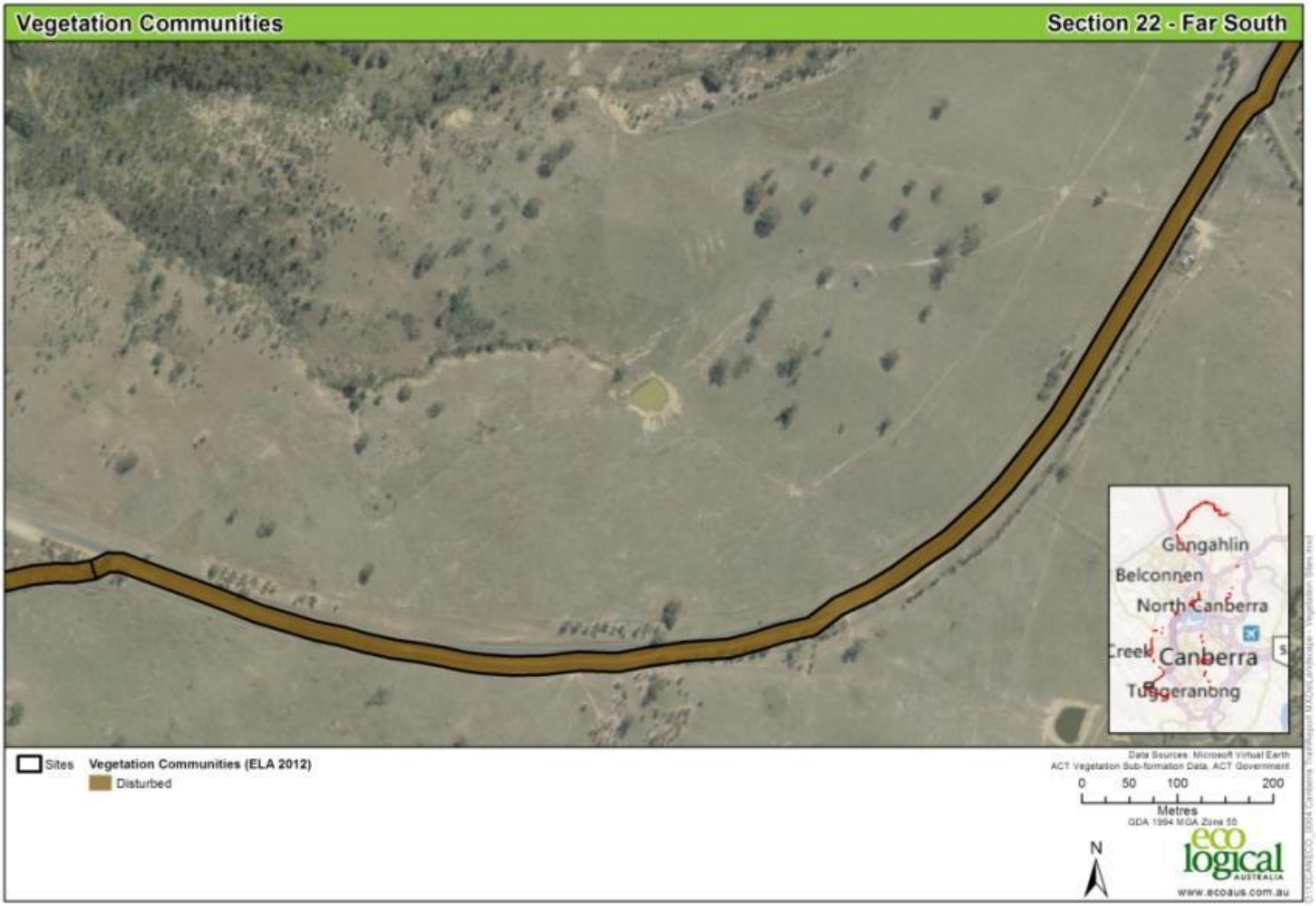
Vegetation Communities
Section 22 - Far South
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Disturbed
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 50 100 200
Metres
GDA 1994 MGA Zone 55
N
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Vegetation Communities
Section 22 - North
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Exotic pasture
Disturbed
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 50 100 200
Metres
GDA 1994 MGA Zone 55
N
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Vegetation Communities
Section 22 - South
Sutton
Ngunnawal
Gungahlin
MacGregor
Mitchell
Belconnen
Canberra
Phillip
Chisholm
Sites
Vegetation Communities (ELA 2012)
Disturbed
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 50 100 200
Metres
GDA 1994 MGA Zone 55
N
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Vegetation Communities
Section 23 - Central
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Broad-leaved Peppermint - Apple Box Tableland Woodland
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 50 100 200
Metres
GDA 1994 MGA Zone 55
N
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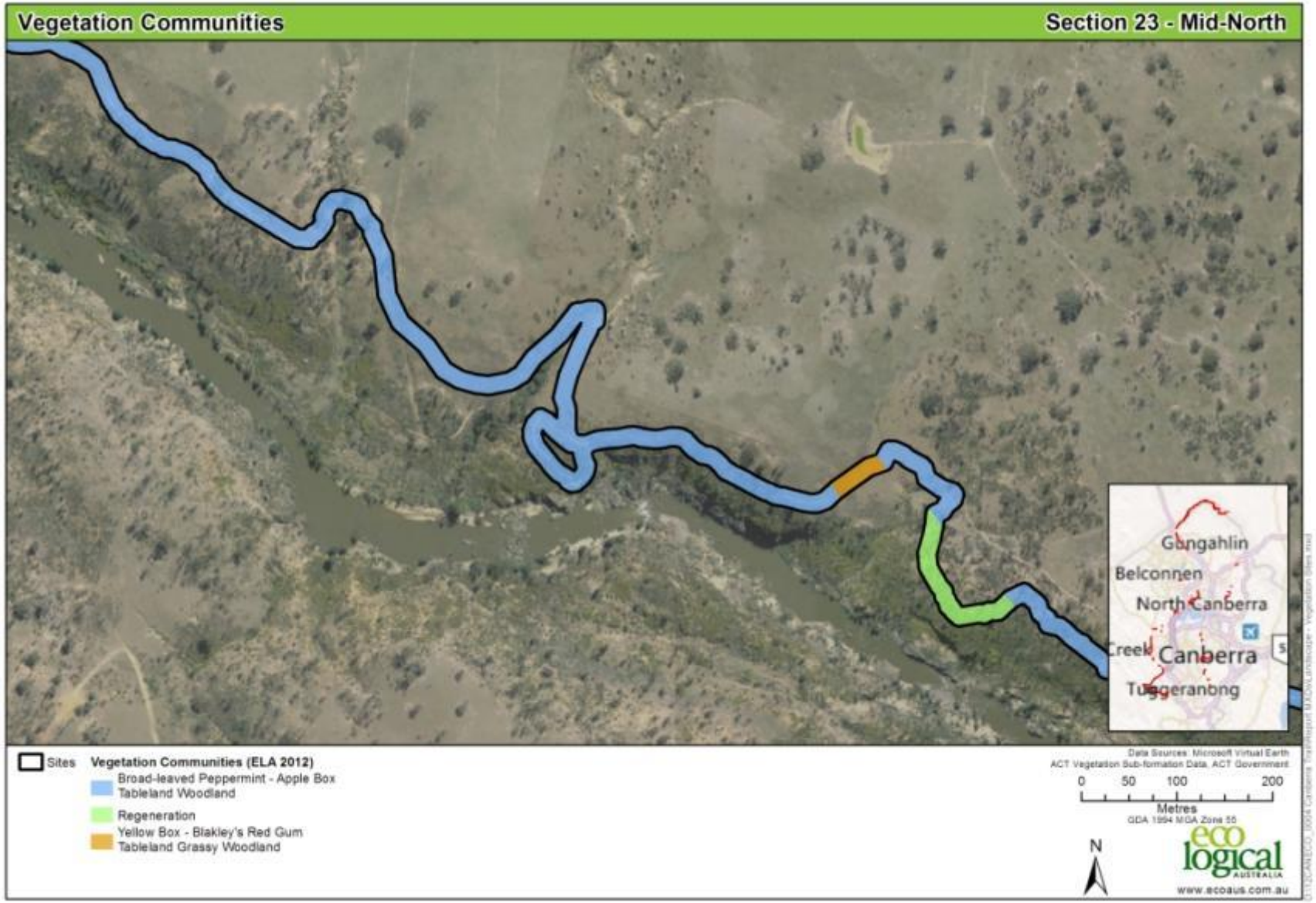
Vegetation Communities
Section 23 - Mid-North
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Broad-leaved Peppermint - Apple Box Tableland Woodland
Regeneration
Yellow Box - Blakley's Red Gum Tableland Grassy Woodland
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 50 100 200
Metres
GDA 1994 MGA Zone 55
N
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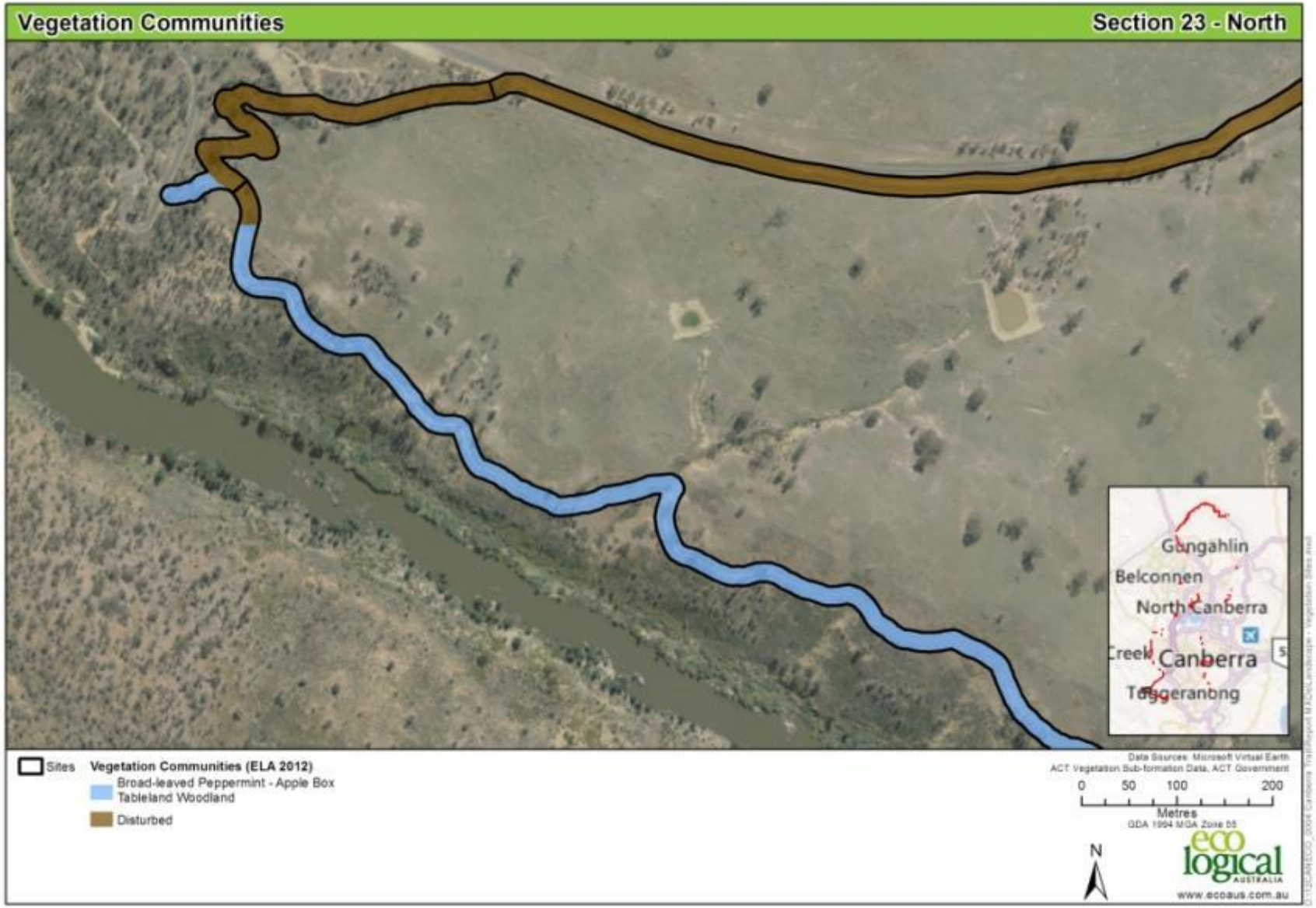
Vegetation Communities
Section 23 - North
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Broad-leaved Peppermint - Apple Box Tableland Woodland
Disturbed
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 50 100 200
Metres
GDA 1994 MGA Zone 55
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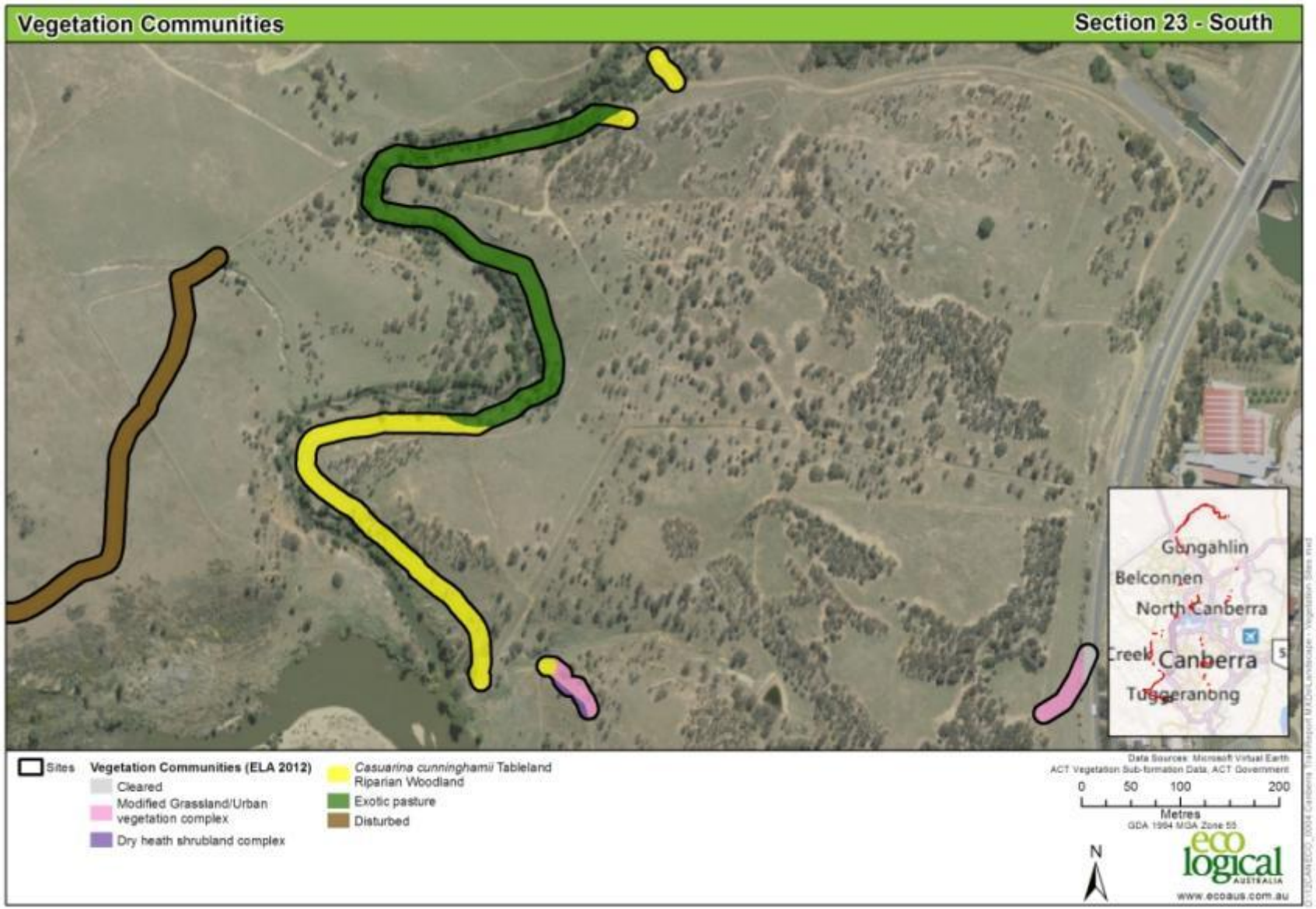
Vegetation Communities
Section 23 - South
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Cleared
Modified Grassland/Urban vegetation complex
Dry heath shrubland complex
Casuarina cunninghamii Tableland Riparian Woodland
Exotic pasture
Disturbed
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
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Metres
GDA 1994 MGA Zone 55
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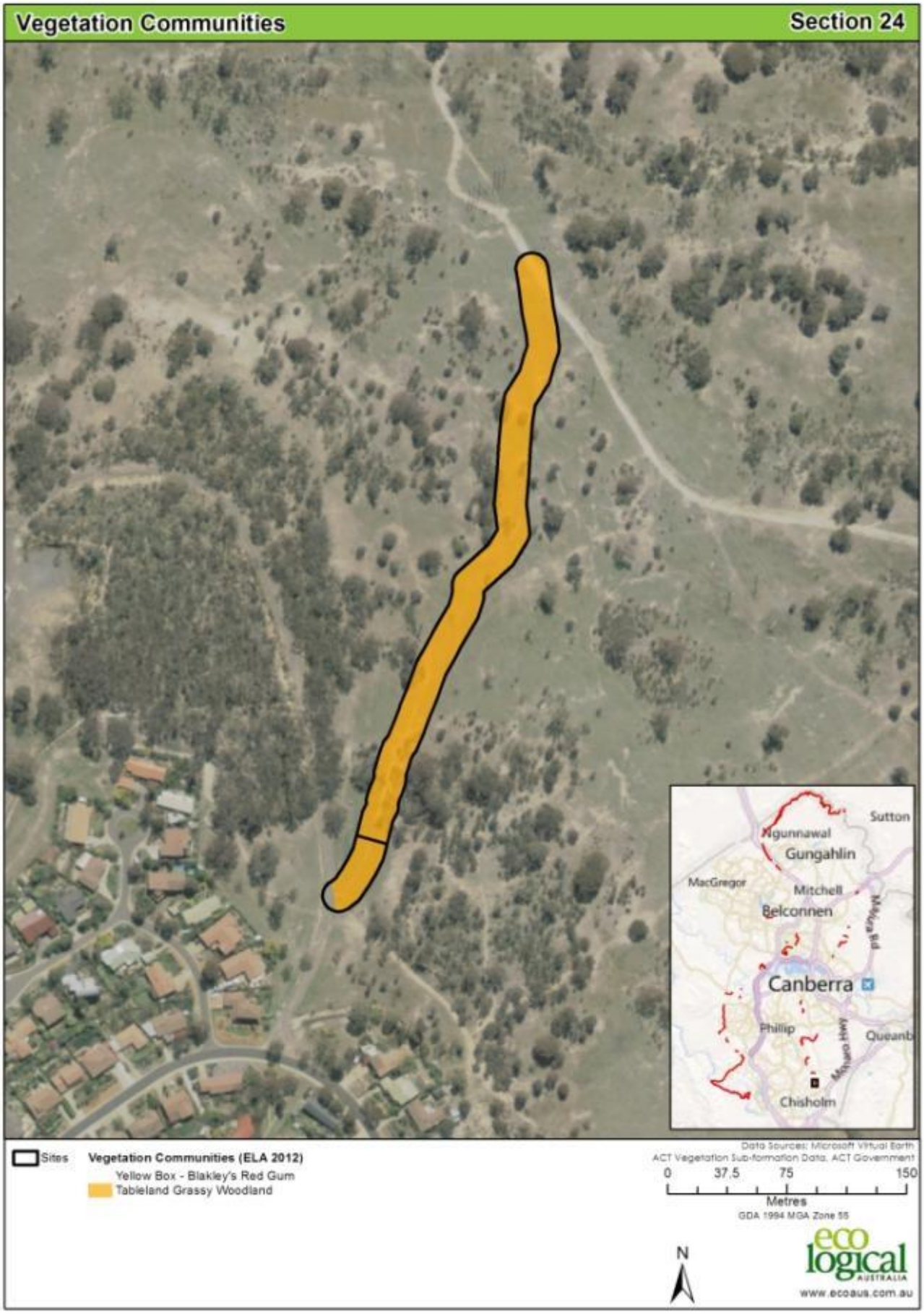
Vegetation Communities
Section 24
Sutton
Ngunnawal
Gungahlin
MacGregor
Mitchell
Belconnen
Majura Pd
Canberra
Phillip
Monaro Hwy
Queanbe
Chisholm
Sites
Vegetation Communities (ELA 2012)
Yellow Box - Blakely's Red Gum Tableland Grassy Woodland
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 37.5 75 150
Metres
GDA 1994 MGA Zone 55
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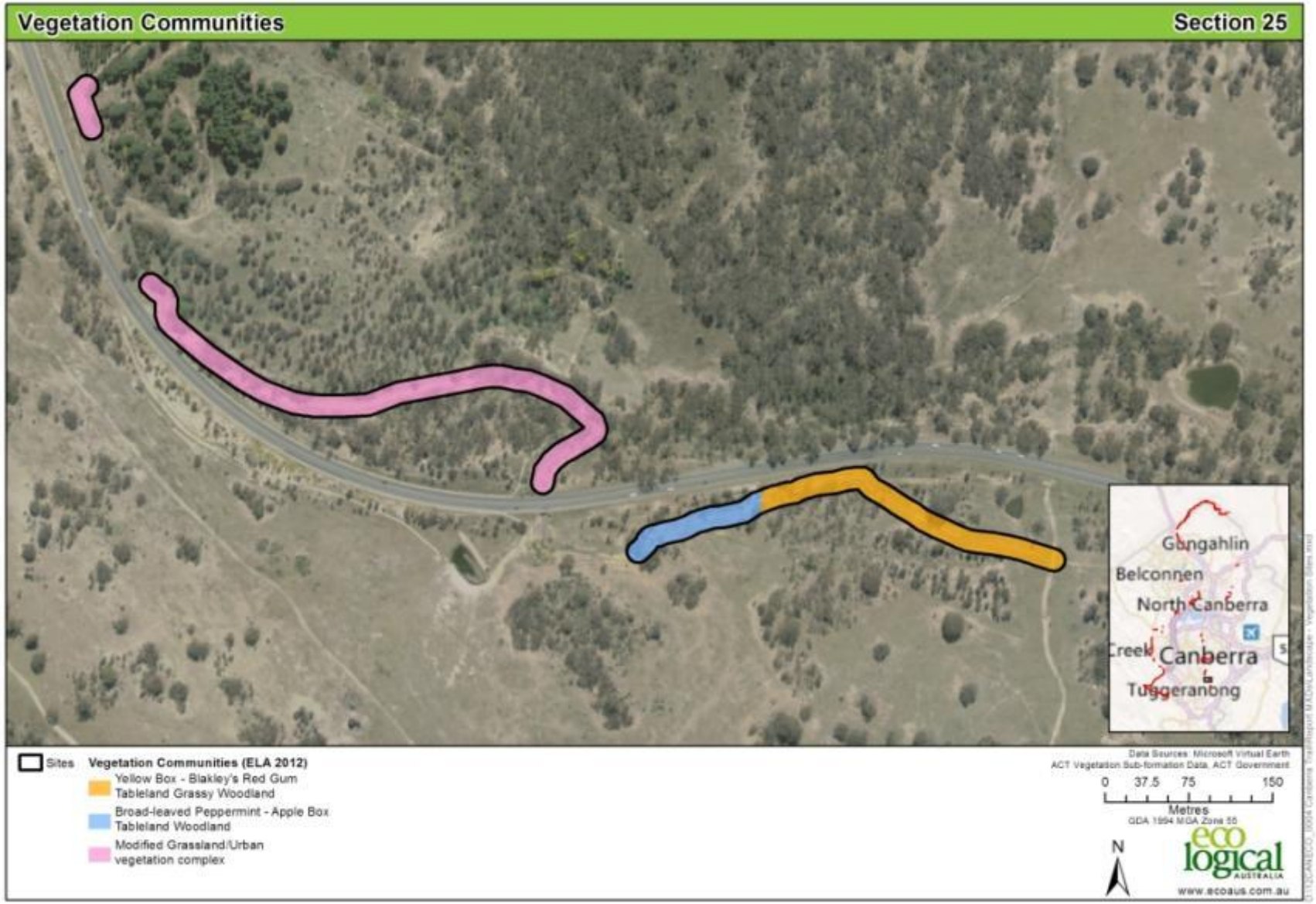
Vegetation Communities
Section 25
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Yellow Box - Blakley's Red Gum Tableland Grassy Woodland
Broad-leaved Peppermint - Apple Box Tableland Woodland
Modified Grassland/Urban vegetation complex
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 37.5 75 150
Metres
GDA 1994 MGA Zone 55
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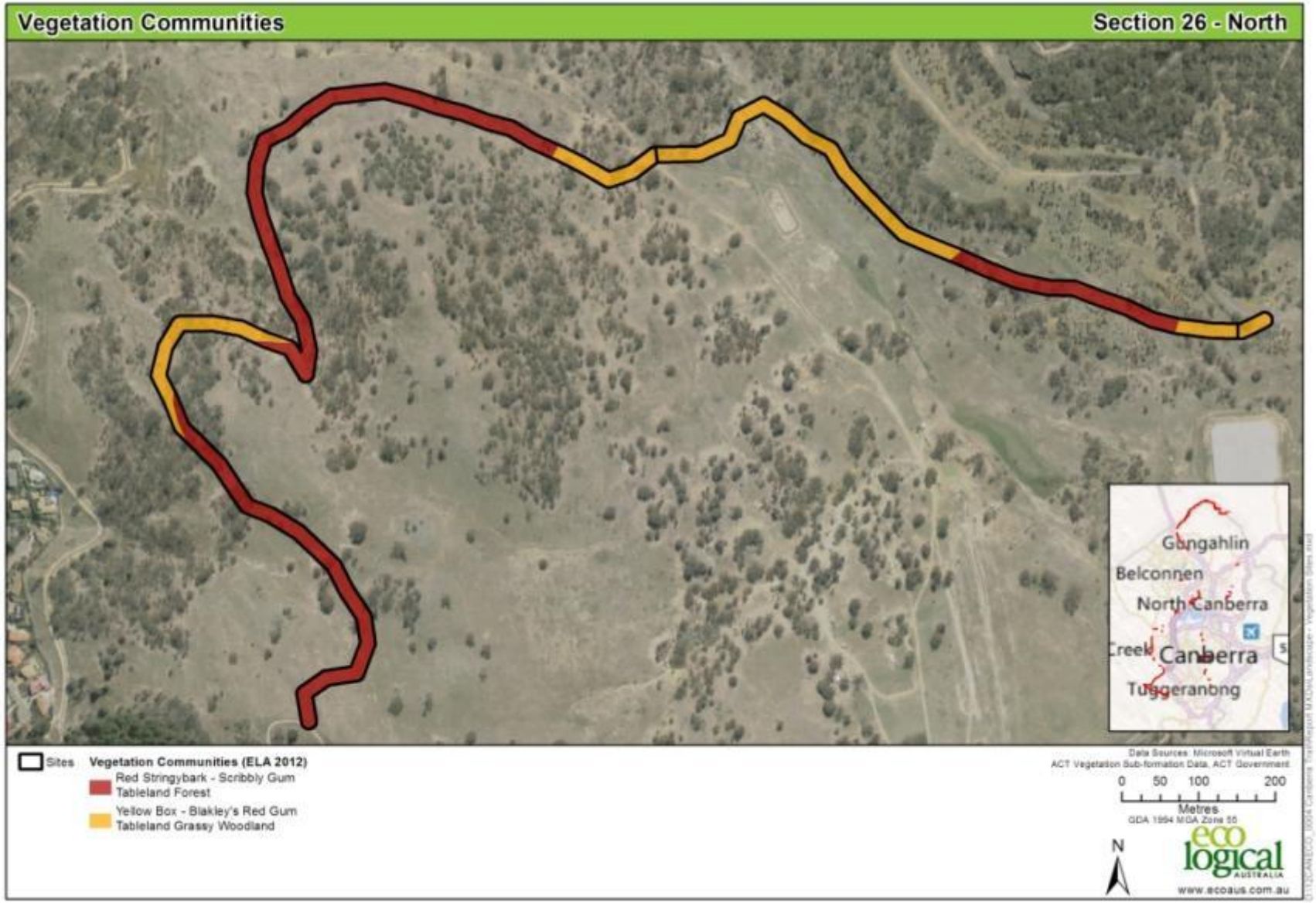
Vegetation Communities
Section 26 - North
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Red Stringybark - Scribbly Gum Tableland Forest
Yellow Box - Blakley's Red Gum Tableland Grassy Woodland
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 50 100 200
Metres
GDA 1994 MGA Zone 55
N
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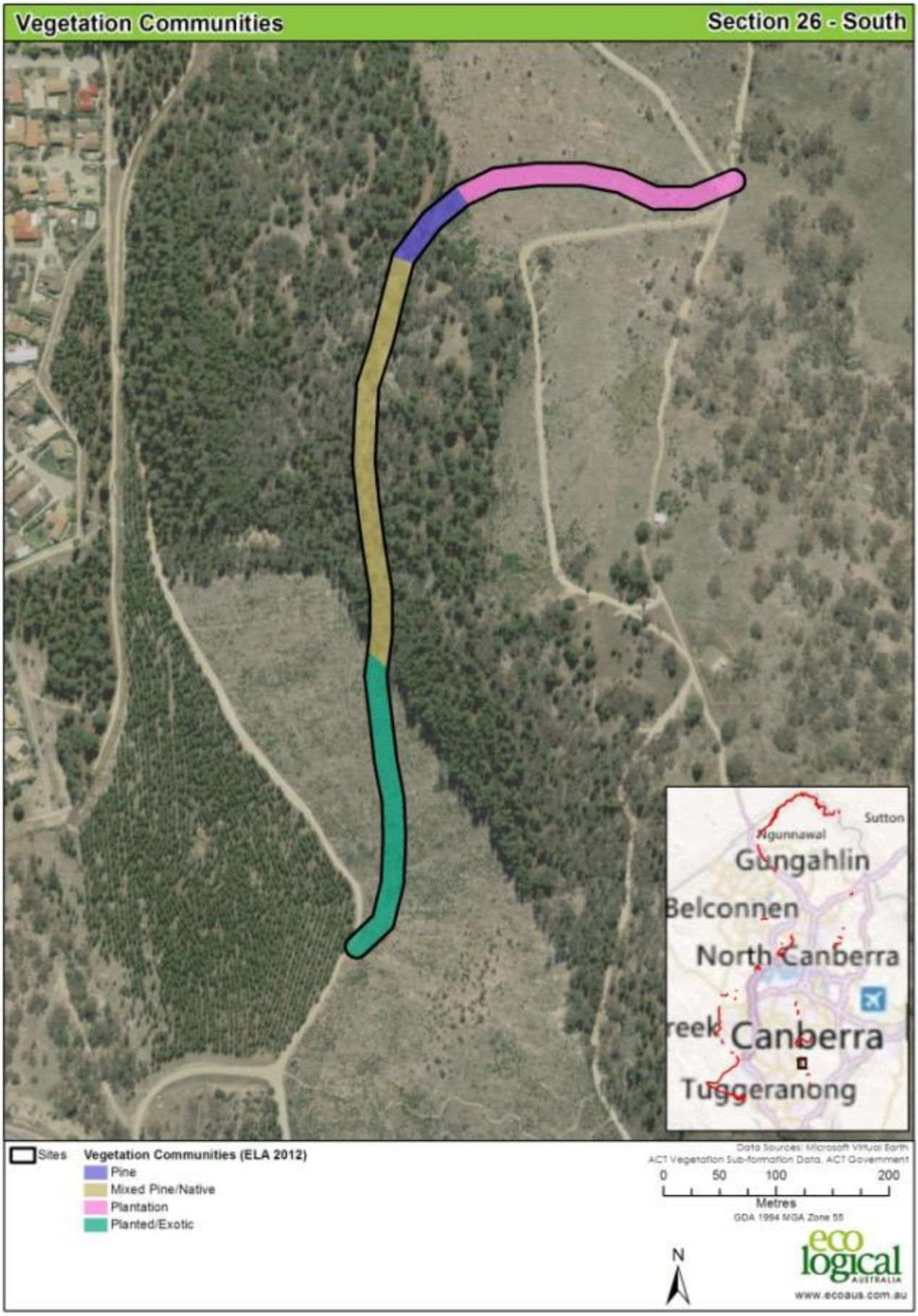
Vegetation Communities
Section 26 - South
Sutton
Gungahlin
Belconnen
North Canberra
Canberra
Tuggeranong
Sites
Vegetation Communities (ELA 2012)
Pine
Mixed Pine/Native
Plantation
Planted/Exotic
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 50 100 200
Metres
GDA 1994 MGA Zone 55
N
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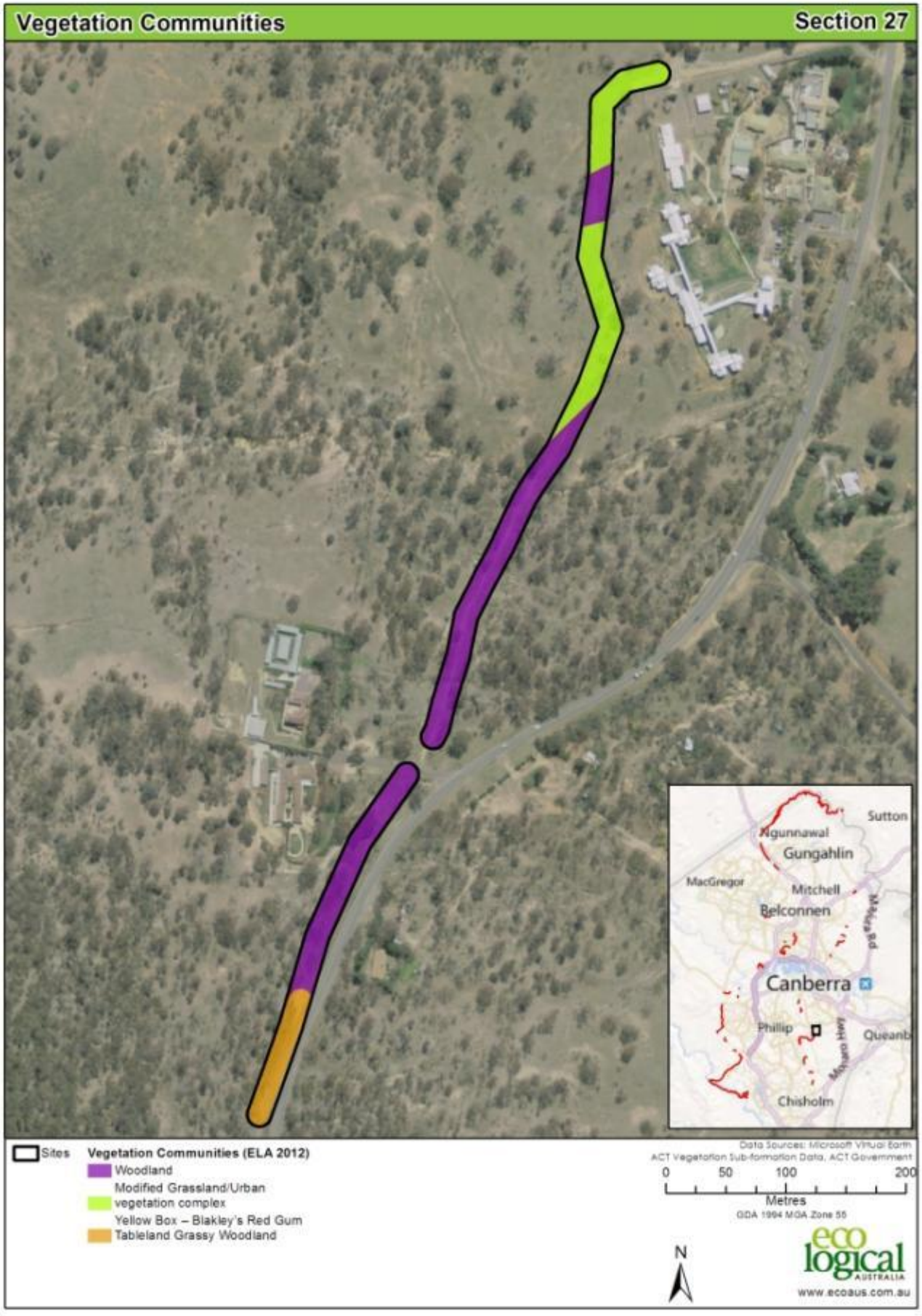
Vegetation Communities
Section 27
Sutton
Gungahlin
MacGregor
Mitchell
Belconnen
Canberra
Phillip
Chisholm
Sites
Vegetation Communities (ELA 2012)
Woodland
Modified Grassland/Urban vegetation complex
Yellow Box – Blakley's Red Gum Tableland Grassy Woodland
Data Sources: Microsoft Virtual Earth, ACT Vegetation Sub-formation Data, ACT Government
0 50 100 200
Metres
GDA 1994 MGA Zone 55
N
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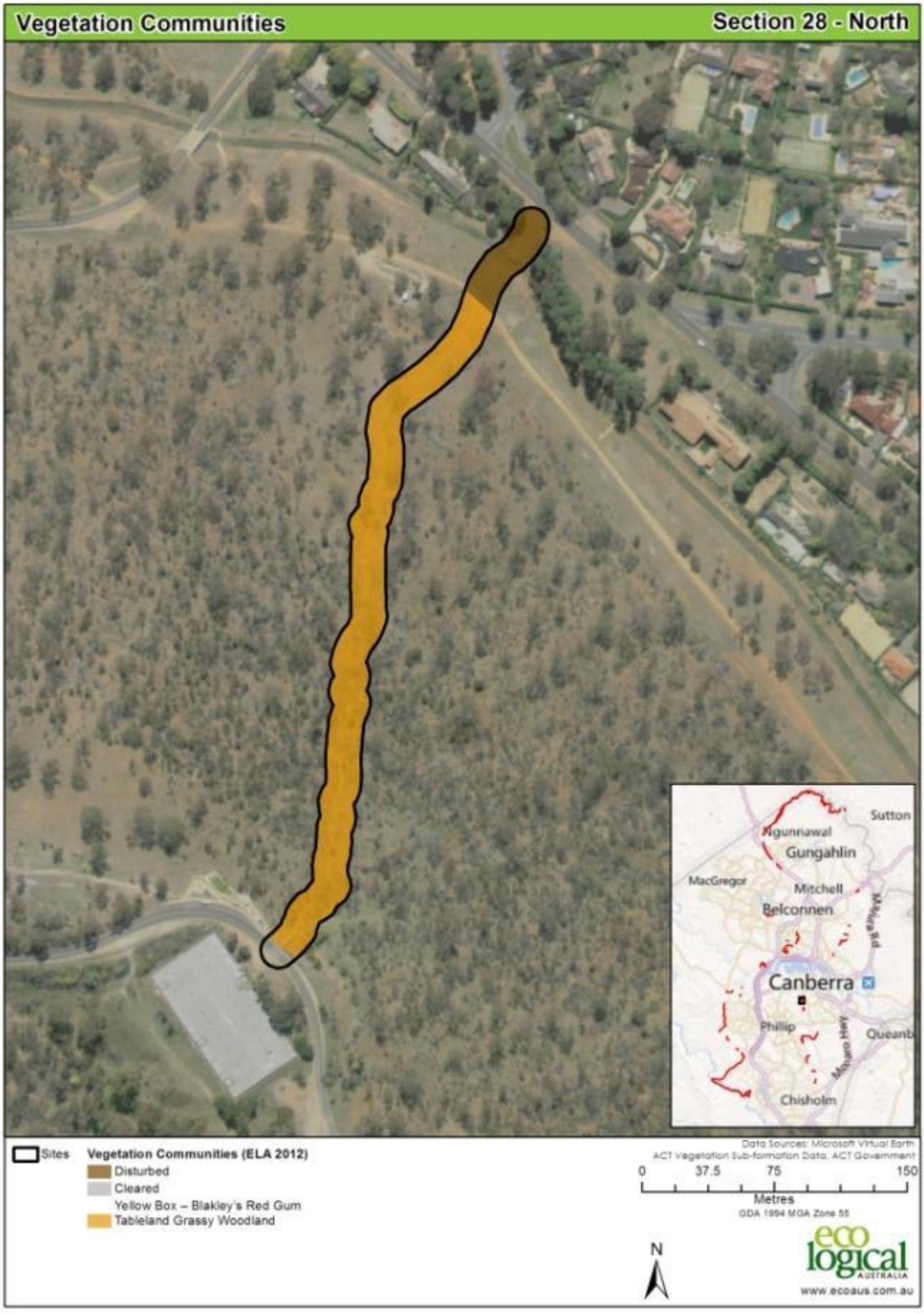
Vegetation Communities
Section 28 - North
Sutton
Ngunnawal
Gungahlin
MacGregor
Mitchell
Belconnen
Majura Pd
Canberra
Phillip
Queanb
Monaro Hwy
Chisholm
Sites
Vegetation Communities (ELA 2012)
Disturbed
Cleared
Yellow Box – Blakley's Red Gum
Tableland Grassy Woodland
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0
37.5
75
150
Metres
GDA 1994 MGA Zone 55
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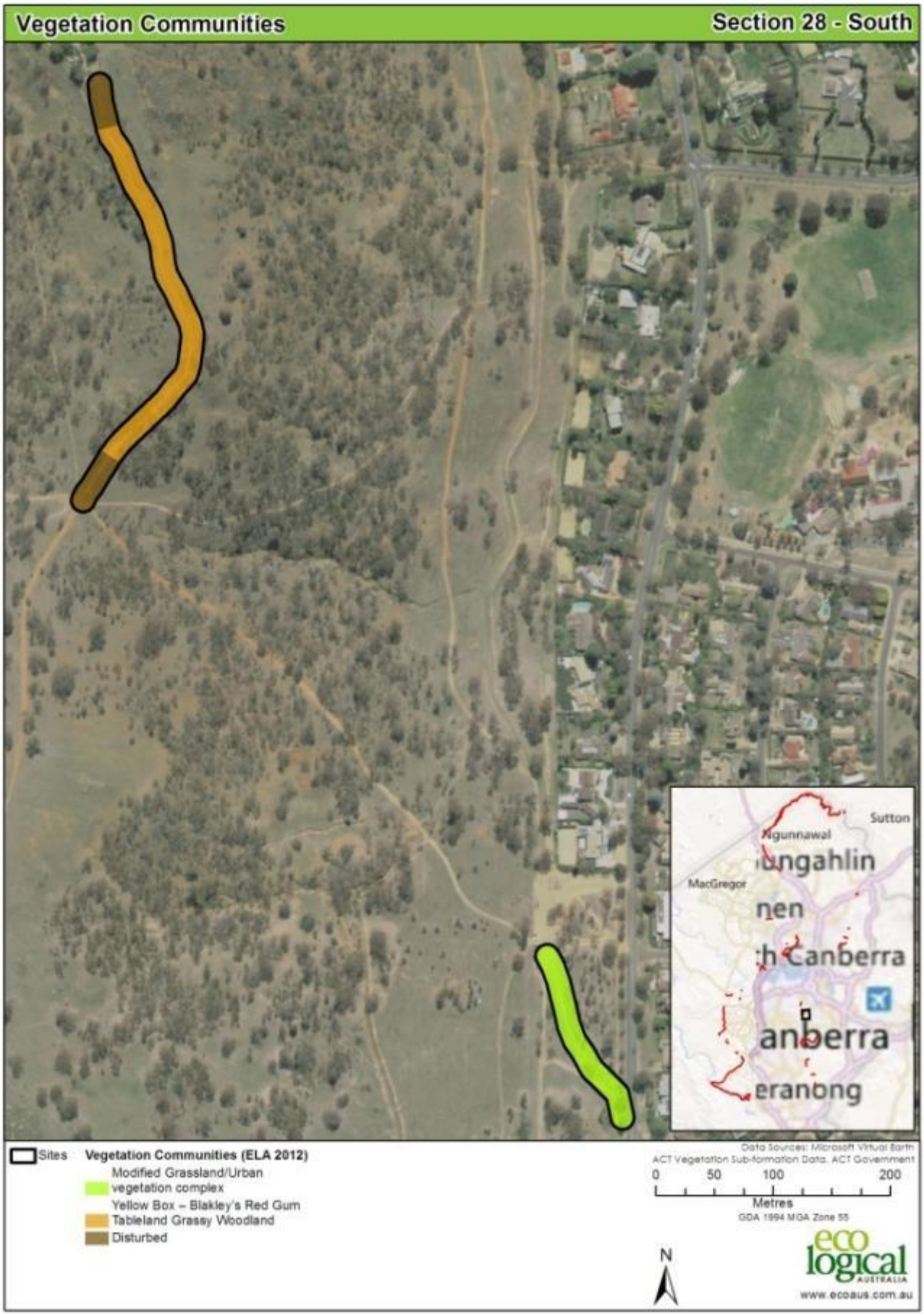
Vegetation Communities
Section 28 - South
Sutton
MacGregor
Canberra
Sites
Vegetation Communities (ELA 2012)
Modified Grassland/Urban vegetation complex
Yellow Box – Blakley's Red Gum Tableland Grassy Woodland
Disturbed
Data Sources: Microsoft Virtual Earth
ACT Vegetation Sub-formation Data, ACT Government
0 50 100 200
Metres
GDA 1994 MGA Zone 55
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F 02 6103 0148

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F 02 4910 0126

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F 02 4476 1161

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Coffs Harbour Jetty NSW 2450
T 02 6651 5484
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92 Taylor Street
Armidale NSW 2350
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F 02 6772 1279

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Mudgee NSW 2850
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F 02 6372 9230

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49 Ord Street
West Perth WA 6005
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F 08 9322 1358

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Austinmer NSW 2515
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Gosford NSW 2250
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F 02 4322 2897

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Cullen Bay NT 0820
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