



Thurgoona Wirlinga Precinct – Biodiversity Assessment (Stage 1)

FINAL REPORT

Prepared for AlburyCity

6 December 2024

Biosis offices

New South Wales

Albury

Phone: (02) 6069 9200

Email: albury@biosis.com.au

Gosford

Phone: (02) 9101 8700

Email: gosford@biosis.com.au

Newcastle

Phone: (02) 4911 4040

Email: newcastle@biosis.com.au

Sydney

Phone: (02) 9101 8700

Email: sydney@biosis.com.au

Western Sydney

Phone: (02) 9101 8700

Email: sydney@biosis.com.au

Wollongong

Phone: (02) 4201 1090

Email: wollongong@biosis.com.au

Victoria

Ballarat

Phone: (03) 5304 4250

Email: ballarat@biosis.com.au

Melbourne

Phone: (03) 8686 4800

Email: melbourne@biosis.com.au

Wangaratta

Phone: (03) 5718 6900

Email: wangaratta@biosis.com.au



Document information

Report to:	Albury City Council
Prepared by:	Dimity Webster and Ewan Kelly
Accredited Assessor:	Mitch Palmer (BAAS17051)
Biosis project no.:	38717
File name:	38717.thurgoona.wirlinga.precint.plan.ba.fin03.20241204
Citation:	Biosis 2023. Thurgoona Wirlinga Precinct Biodiversity Assessment (Stage 1). Report prepared for Albury City. Webster, D and Kelly, E. Biosis Pty Ltd., Albury, NSW. Project no. 38717.

Document control

Version	Internal reviewer	Date issued
Draft version 01	Matt Looby	3/11/2023
Final version 01	Ewan Kelly	20/12/2023
Final version 02	Ewan Kelly	15/11/2024
Final version 03	Dimity Webster (minor edits)	05/12/2024

Acknowledgements

Biosis acknowledges the contribution of the following people and organisations in undertaking this study:

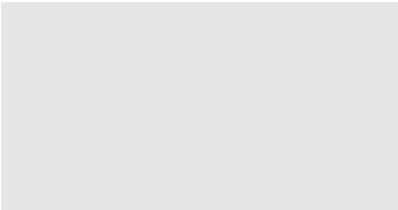
- AlburyCity Planning and Environment Teams.
- Department of Climate Change, Energy, the Environment and Water for access to the Protected Matters Search Tool of the Australian Government.
- NSW Department of Planning and Environment for access to the BioNet Atlas of NSW Wildlife.
- NSW Department of Primary Industries for access to indicative mapping of freshwater threatened species and fish populations.
- Australian Museum (FrogID & Sloanes Champions), for providing Sloanes Froglet data.
- NSW Department of Planning and Environment, for providing Sloanes Froglet Data.

Biosis staff involved in this project were:

- Ecology: Dimity Webster, Jessica Chapman, Ewan Kelly, Danielle Eastick, Wyn Russell, Shannon Braun, Joshua Orchard, Claire Tingate.
- Mapping: Jennifer Townsend, James Shepard, Olivia Williams.



An initiative funded by the NSW
Government through the NSW Regional
Housing Strategic Planning Fund



© Biosis Pty Ltd
This document is subject to copyright and may only be used for the purposes in respect of which it was commissioned and in accordance with the Terms of Engagement of the commission. Unauthorised use of this document in any form whatsoever is prohibited.

Disclaimer:
Biosis Pty Ltd has completed this assessment in accordance with the relevant federal, state and local legislation and current industry best practice. The company accepts no liability for any damages or loss incurred as a result of reliance placed upon the report content or for any purpose other than that for which it was intended.

Contents

Contents.....	iv
Tables	vi
Figures.....	vii
Glossary.....	viii
Summary	x
1. Introduction	13
1.1. Project background	13
1.2. Location of the Thurgoona Wirringa PSP.....	13
1.3. Purpose of this assessment	13
2. Methods	17
2.1. Personnel.....	17
2.2. Background research.....	18
2.2.1. Literature and database review.....	18
2.2.2. Vegetation stratification	19
2.2.3. Opportunities and constraints assessment.....	19
2.2.4. Identification of candidate and ecosystem species	19
2.2.5. Likelihood of occurrence.....	20
2.3. Vegetation assessment	20
2.3.1. Field verification	21
2.3.2. Excluded land	22
2.4. Threatened species survey.....	22
2.4.1. Targeted fauna	22
Weather conditions.....	24
2.5. Limitations.....	29
3. Landscape context	32
4. Results	43
4.1. Opportunities and constraints assessment	43
4.2. Aquatic habitats	43
4.3. Native vegetation.....	47
4.3.1. Overview	47
4.4. Non-native vegetation	64
4.4.1. Priority weeds.....	64
4.5. Threatened BC Act listed entities	72
4.5.1. Threatened ecological communities	72
4.6. Biodiversity Assessment Method identified predicted credit species	73
4.6.1. Predicted Species (Ecosystem credit species)	73
4.6.2. Species Credit Species (Candidate).....	75
4.6.3. Threatened flora	78

4.6.4. Threatened fauna	80
4.7. Serious and Irreversible Impact (SAIL) entities.....	88
5. Matters of National Environmental Significance	90
5.1.1. Threatened Ecological Communities.....	90
5.1.2. Threatened species	91
5.1.3. Migratory species.....	91
5.1.4. Wetlands of international importance.....	92
5.1.5. Commonwealth land	92
6. Avoidance hierarchy	93
6.1. Desktop and field-based constraints hierarchy.....	93
6.2. Field based targeted surveys	103
7. Conclusion and recommendations	104
7.1. Summary of biodiversity values	104
7.2. Biodiversity opportunities	106
7.2.1. Existing habitats and connectivity.....	107
7.2.2. Thurgoona drainage strategy	110
7.2.3. Opportunity for urban connectivity and services.....	116
References.....	118
APPENDICES.....	120
Appendix 1. AlburyCity – Investigation Area.....	121
Appendix 2. Department Consultation	122
Appendix 3. Survey methods	123
Appendix 3.1. Nomenclature	123
Appendix 3.2. Permits and licences	123
Appendix 3.3. Limitations.....	123
Appendix 4. Constraints Assessment	124
Appendix 5. BAM Candidate predicted and PMST species assessment	159
Appendix 5.1. Threatened Ecological Communities	159
Appendix 5.2. Threatened flora	160
Appendix 5.3. Threatened fauna.....	162
Appendix 6. Flora.....	171
Appendix 7. Fauna.....	177

Tables

Table 1	Project staff and roles	17
Table 2	Weather observations during targeted flora and fauna surveys, 2023 (Albury, NSW*)	25
Table 3	Targeted species survey effort summary	26
Table 4	Lot boundaries not assessed within investigation area	29
Table 5	Landscape context summary	32
Table 6	Aquatic habitats	44
Table 7	PCT 5 River Red-gum herbaceous-grassy very tall open forest wetland	48
Table 8	PCT 266 White Box grassy woodland	50
Table 9	PCT 269 White Box - Blakely's Red Gum - Red Box - Red Stringybark shrubby woodland	53
Table 10	PCT 276 Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion	55
Table 11	PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	57
Table 12	PCT 278 Riparian Blakely's Red Gum – box – shrub – sedge – grass tall open forest of the central NSW South Western Slopes Bioregion	59
Table 13	PCT 360 gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion	61
Table 14	Summary of BC Act TECs within the investigation area	72
Table 15	Ecosystem credit species (predicted species)	73
Table 16	Excluded candidate species	75
Table 17	Candidate - species credit species	77
Table 18	Habitat features with potential to support threatened species credit species	80
Table 19	Summary of survey method and results	82
Table 20	Summary of EPBC Act TECs within the investigation area	90
Table 21	MNES threatened species	91
Table 22	constraints assessment hierarchy	94
Table 23	Plant Community Type summary	104
Table 24	Threatened Ecological Community summary	105
Table 25	Summary of candidate species affected within the investigation area	105

Appendix Tables

Table A 1:	Threatened Ecological Communities	159
Table A 2:	Threatened flora assessment	160
Table A 3:	Threatened fauna assessment	162
Table A 4:	Flora species recorded in the investigation area	171
Table A 5:	Fauna species recorded in the investigation area	177

Figures

Figure 1	Location.....	15
Figure 2	Investigation area	16
Figure 3	Survey limitations access.....	30
Figure 4	Targeted surveys	31
Figure 5	IBRA Landscape context	35
Figure 6	Connectivity	41
Figure 7	Aquatic habitat	42
Figure 8	Vegetation within the investigation area.....	66
Figure 9	Targeted Flora – Amphibromus fluitans.....	79
Figure 10	Masked owl survey results	84
Figure 11	Sloane’s Froglet survey results.....	85
Figure 12	Squirrel Glider survey results.....	86
Figure 13	Woodland bird survey results	87
Figure 14	SAll entities	89
Figure 15	Constraints assessment results overview	97
Figure 16	Woodland patches greater than 0.5 ha	108
Figure 17	Land sharing versus land sparing (Page 1379 (Soga, M et al. 2014)).....	109
Figure 18	Thurgoona drainage strategy and Sloane’s froglet presence.....	113
Figure 19	Thurgoona drainage strategy recommendation 1	114
Figure 20	Thurgoona drainage strategy recommendation option 2	115
Figure 21	Low constraint urban connectivity.....	117

Glossary

Assessment Area	All land within 500 m of a linear development or 1500 m of a site-based development
BAM	NSW Biodiversity Assessment Method
BAM-C	BAM Calculator
BC Act	<i>Biodiversity Conservation Act 2016</i>
BCAR	Biodiversity Certification Assessment Report
BDAR	Biodiversity Development Assessment Report
BSSAR	Biodiversity Stewardship Site Assessment Report
Biosecurity Act	<i>Biosecurity Act 2015</i>
BOS	Biodiversity Offsets Scheme
BCS	NSW DCCEEW Biodiversity Conservation and Science group
CEEC	Critically Endangered Ecological Community
DA	Development Application
Cwth DCCEEW	Australian Government Department of Climate Change, Energy, the Environment and Water
DBH	Diameter at Breast Height
DPE	NSW Department Planning and Environment
DPI	NSW Department of Primary Industries
Ecosystem credits	A measurement of the value of EECs, CEECs and threatened species habitat for species that can be reliably predicted to occur with PCT. Ecosystem credits measure the loss in biodiversity values at a development
Ecosystem credit species	Threatened species whose occurrence can generally be predicted by vegetation surrogates and/or landscape features, or that have a low probability of detection using targeted surveys. A targeted survey is not required to identify or confirm the presence of ecosystem credit species.
EEC	Endangered Ecological Community
EP&A Act	<i>NSW Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Commonwealth Environment Protection and Biodiversity Conservation Act 1999</i>
GIS	Geographic Information System
IBRA	Interim Biogeographic Regionalisation of Australia
LEP	Local Environmental Plan
LGA	Local Government Area
Locality	Area located within 10 km radius from the investigation area
LPI	NSW Land and Property Information
MNES	Matters of National Environmental Significance protected by a provision of Part 3 of the EPBC Act
NPW Act	<i>National Parks and Wildlife Act 1974</i>

NSW DCCEEW	NSW government Department of Climate Change, Energy, the Environment and Water
PCT	Plant Community Type
PSP	Precinct Structure Plan
SAII	Serious and Irreversible Impact
Species credits	A class of biodiversity credits required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates
Species credit species	Threatened species for which vegetation surrogates and/or landscape features cannot reliably predict the likelihood of their occurrence or components of their habitat. A targeted survey or an expert report is required to confirm the presence of these species on the investigation area. Alternatively, the proponent may elect to assume the species is present for development/clearing projects only.
Investigation area	The areas within or the combined areas of the development site, and any indirect and prescribed impacts.
TEC	Threatened Ecological Community
TBDC	Threatened Biodiversity Data Collection
TPZ	Tree Protection Zone
VEC	Vulnerable Ecological Community

Summary

The Thurgoona Wirlinga Precinct (Figure 1 and Figure 2) is identified as Albury's key growth area, with significant population growth expected over the next 60 years. The Thurgoona Wirlinga Precinct Structure Plan (PSP) was established in 2012 as a response to this growth forecast (AlburyCity 2013).

A review of the Thurgoona Wirlinga Precinct Structure Plan and its association with biodiversity within the investigation area was commenced by AlburyCity in early 2023 with a view to re-assess the biodiversity features, values and constraints within the PSP area. This assessment will allow for recommendations regarding preservation of the environment, alongside opportunities for development, including sustainable city design.

This biodiversity assessment report has been prepared to address Stage 1 of the Biodiversity Assessment Method (BAM) and provide an assessment of the biodiversity values within the investigation area in the context of protected entities listed under the *Biodiversity Conservation Act 2016* (BC Act) and any Matters of National Environmental Significance (MNES) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

A secondary purpose of this assessment is to provide recommendations on the location, extent and type of ecological opportunities and constraints within the investigation area to feed back into the structure plan process. This will allow for the design and implementation of a structure plan that responds to the environmental values present within the investigation area and allow for urban growth in an environmentally responsive nature.

Recommendations regarding the following key issues within the investigation area have been provided within Section 7 of this report:

- The existing Thurgoona Wirlinga Drainage Strategy.
- Opportunities for conservation and enhancement of biodiversity features.

It is important to note that this report cannot be used as a replacement for site specific ecological assessment requirements under relevant legislation and approvals pathways.

Significant biodiversity values were recorded within the investigation area, Including:

- Plant Community Types (PCTs):
 - PCT 5 River Red-gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.
 - PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion.
 - PCT 269 White Box - Blakely's Red Gum - Red Box - Red Stringybark shrubby woodland on shallow soils on metamorphic hills in the Albury region of the NSW South Western Slopes Bioregion.
 - PCT 276 Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion.

- PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion.
- PCT 278 Riparian Blakely's Red Gum – box – shrub – sedge – grass tall open forest of the central NSW South Western Slopes Bioregion.
- PCT 360 gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion.
- Planted native vegetation.
- Scattered trees and hollow bearing trees.
- Threatened Ecological Communities:
 - *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions* (BC Act Box-Gum Woodland).
 - White Box – Yellow Box – Blakely's Red-gum Grassy Woodlands and Derived Native Grasslands (EPBC Act Box-Gum Woodlands).
 - Seasonal herbaceous (freshwater) wetlands of the Temperate Lowland Plains (Seasonal Herbaceous (freshwater) Wetlands) (EPBC Act).
- Habitat features including hollow-bearing trees and fallen timber occurred throughout the investigation area. One small area of rocky habitat was identified.

Key hydrological features occur within the investigation area including:

- Seven Mile Creek.
- Eight Mile Creek.
- Nine Mile Creek.
- Woolshed Creek.
- More than 50 undefined/unnamed watercourses, farm dams and tributaries.
- Gilgai wetlands.

A total of six threatened fauna species were identified within the investigation area, these were:

- Scarlet Robin *Petroica boodang*.
- Flame Robin *Petroica phoenicea*.
- Squirrel Glider *Petaurus norfolcensis*.
- Masked Owl *Tyto novaehollandiae*.
- Sloane's Froglet *Crinia sloanei*.
- Grey-headed Flying-fox *Pteropus poliocephalus*.

A known population of the threatened plant species Floating Swamp Wallaby Grass *Amphibromus fluitans* occurs within the investigation area and adjoining areas outside the investigation area. The threatened bird species Regent Honeyeater *Anthochaera phrygia* has also mapped areas of Important Habitat within the investigation area. A range of migratory species, including Latham's Snipe, are also known to utilise the investigation area on a seasonal basis.

The following threatened species, identified as species credit species, were not surveyed for during this assessment due to timing constraints, the relative abundance or known habitat requirements of the target species. They are identified within this report as 'assumed present', further investigation during the appropriate survey periods outlined within the Threatened Biodiversity Data Collection (TBDC) are recommended in future assessments associated with any development works within the investigation area:

- Floating Swamp Wallaby Grass *Amphibromus fluitans*.
- Gang-gang Cockatoo *Callocephalon fimbriatum*.
- Eastern Pygmy Possum *Cercartetus nanus*.
- Southern Myotis *Myotis macropus*.

An assessment of the NSW DPI indicative distributions of threatened freshwater species identified two fish species with the potential to occur within the investigation area, these are:

- Flathead Galaxias *Galaxias rostratus*.
- Southern Pygmy Perch *Nannoperca australis*.

Two key forms of habitat connectivity have been identified within the investigation area, these are woodland connectivity corridors and aquatic connectivity. Some areas of woodland and aquatic connectivity corridors overlap forming riparian areas. Figure 6 outlines the key major and minor connectivity corridors within the investigation area.

Four Serious and Irreversible Impact (SAIL) entities were identified as having SAIL mapped land or habitat within the investigation area, these are, Regent Honeyeater *Anthochaera phrygia*, Box-Gum Woodland, Swift Parrot *Lathamus discolor* and Sloane's Froglet *Crinia sloanei*.

In the broader landscape, both major and minor corridors within the investigation area link to major areas of connectivity such as the Murray River floodplain and riparian corridor. Areas of habitat connectivity allow for the movement of fauna, and the continuation of geneflow and seed distribution for flora species. Maintaining connectivity within the investigation area and broader landscape is a key aspect for consideration in future precinct level planning.

Woodland connectivity

Woodland connectivity is formed throughout the investigation area in the form of wooded riparian watercourses, roadside vegetation and/or remnant and planted vegetation. These woodland vegetation areas link to form major connectivity corridors leading to core areas of biodiversity value such as Bells Travelling Stock Reserve.

Aquatic connectivity

Aquatic connectivity corridors are generally formed by vegetated creek lines, however, within the context of the investigation area, smaller aquatic features such as gilgai mosaics and undefined non-perennial watercourses have been considered. These less notable features are an important aspect for consideration, especially in respect to future developments, where opportunities exist to buffer and enhance these corridors to improve and preserve connectivity of both major and minor aquatic corridors.

1. Introduction

1.1. Project background

The Thurgoona Wirlinga area is identified as Albury's key growth zone, with significant population expansion expected over the next 60 years. The Thurgoona Wirlinga Precinct Structure Plan (PSP) was established in 2012 as a response to this growth forecast. The entire precinct area covers approximately 4,500 hectares and is expected to accommodate up to 50,000 people by 2060.

Albury City Local Government Area (LGA) is currently subject to a biodiversity certification order, established in 2010, that has enabled development in identified growth zones to proceed without individual development consideration of threatened species or communities listed under the *Biodiversity Conservation Act 2016* (BC Act). The original biodiversity certification order was gazetted to expire on 25 February 2021, the Department of Planning and Environment (DPE) granted an extension to the biodiversity certification order with a new gazetted expiration date of 19 February 2026. Since 2010 significant changes have occurred in New South Wales (NSW) biodiversity legislation and in the listing of threatened species in the Albury LGA. Principal amongst these changes was the introduction of the Biodiversity Assessment Methodology (BAM) in 2016.

A review of the Thurgoona Wirlinga Precinct Structure Plan and its association with Albury Biodiversity Certification is being undertaken by Albury City Council (AlburyCity) to respond to updated planning policies, growth in the LGA and community and stakeholder expectations. AlburyCity commenced this review in early 2023 with a view to re-assess biodiversity features, values and constraints within the PSP area.

Albury City Council has engaged Biosis to deliver Stage 1 of the BAM within the Thurgoona Wirlinga PSP area to support preparation of the updated Thurgoona Wirlinga PSP.

1.2. Location of the Thurgoona Wirlinga PSP

Albury is located on the Murray River approximately 580 kilometres south of Sydney and 300 kilometres north-east of Melbourne (Figure 1).

The Thurgoona Wirlinga PSP area of investigation covers a portion of the precinct area and includes approximately 2,700 hectares. The investigation area excludes areas identified on the Biodiversity Assessment – Investigation Area Map (provided by AlburyCity, refer to Appendix 1). The assessment is required on all other land within the Thurgoona Wirlinga Precinct boundary, this area is referred to as the investigation area (Figure 2).

1.3. Purpose of this assessment

This biodiversity assessment report has been prepared to address Stage 1 of the BAM and provide an assessment of the biodiversity values within the investigation area in the context of protected entities listed under the BC Act and any Matters of National Environmental Significance (MNES) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

A secondary purpose of this assessment is to provide recommendations on the location, extent and type of opportunities and constraints within the investigation area to feed back into the structure plan process. This will allow for the design and implementation of a plan that responds to the environmental values present within the investigation area and allow for urban growth in an environmentally responsive nature.

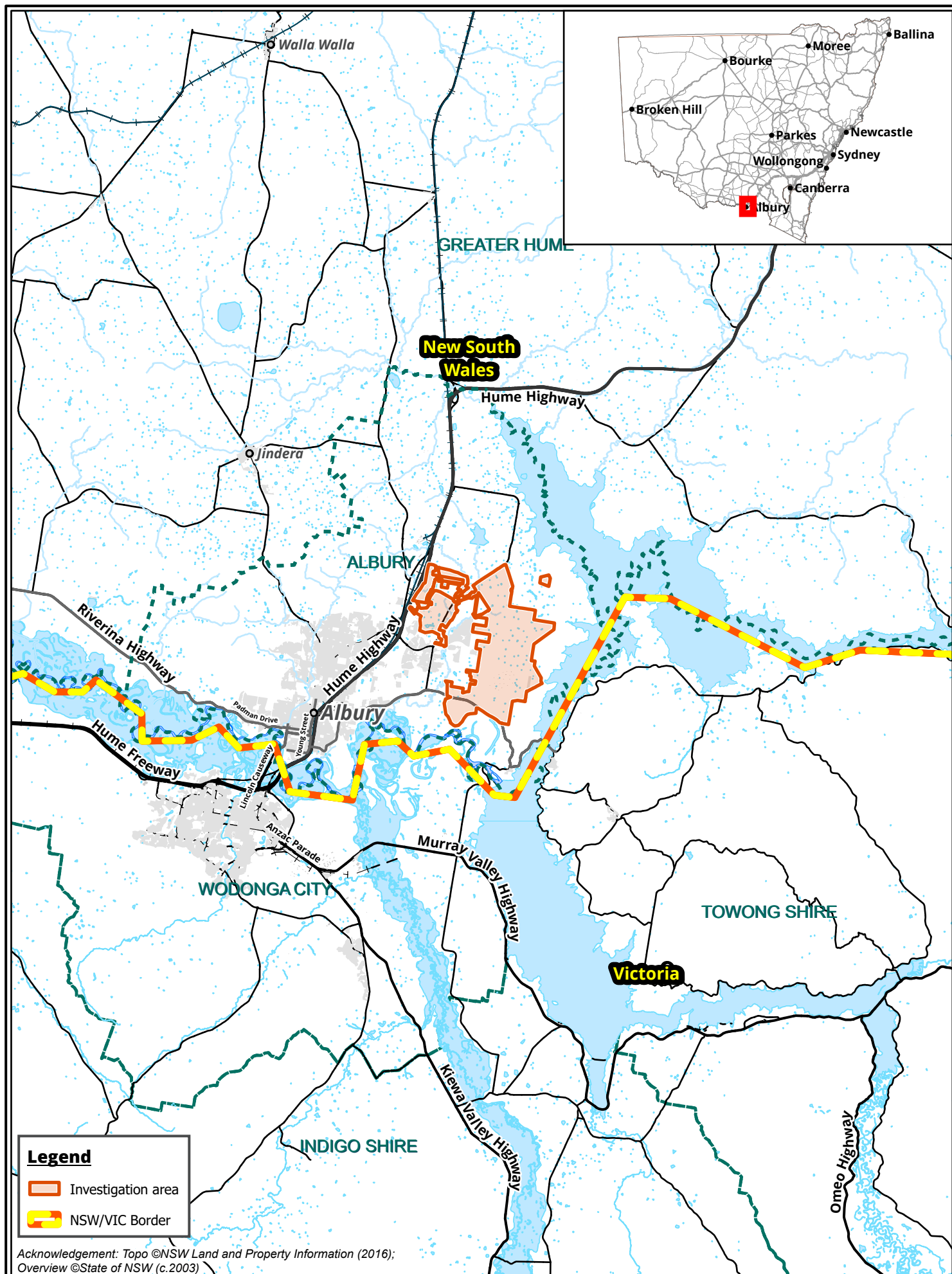
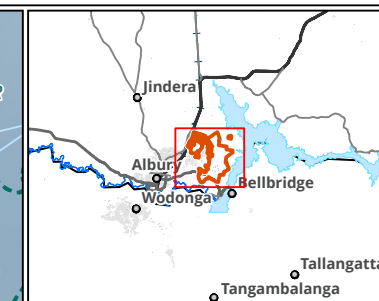
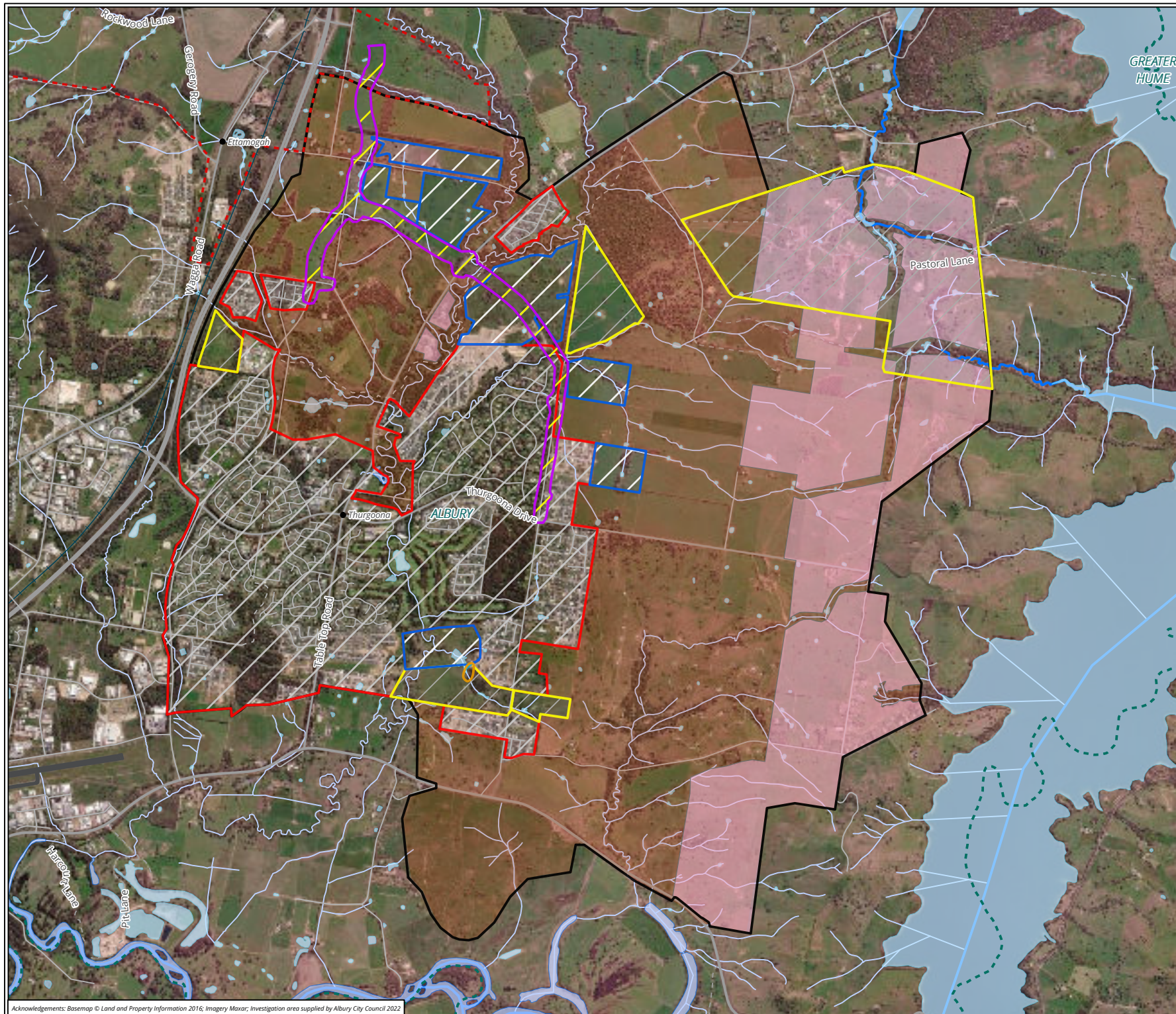


Figure 1 Location of the study area



Legend

Biosis investigation area

Albury City Council - Investigation area

Thurgoona Wirlinga Area

Existing Urban Area

Approved DA

Under Assessment

R5 Zones (10ha min lot size)

BDAR - Albury RJP

BDAR - Link Road

BDAR - Woolpoint

Figure 2.1 Investigation area

0 300 600 900 1,200 1,500

Metres

Scale: 1:34,000 @ A3

Coordinate System: GDA2020 MGA Zone 55



Matter: 38717,
Date: 13 November 2024,
Prepared by: HL, Checked by: DB, EK, RG, Last edited by: owilliams
Layout: 38717_F2_InvestigationArea
Project: P:\38700s\38717\Mapping\38717_Albury_BA.aprx

2. Methods

The following methods have been used in the preparation of this biodiversity assessment report.

2.1. Personnel

Personnel, roles and relevant experience are outlined below in Table 1.

Table 1 Project staff and roles

Name/Title	Role in Project
Ewan Kelly <i>Senior Ecologist, Team Leader – Botany</i>	- Project director. - Technical input. - Report review.
Mitchell Palmer <i>Manager – Ecology and GIS (NSW)</i> Renewable Energy Market lead Australia and New Zealand BAAS17051	- BAM Accredited Assessor. - Technical advice.
Mathew Looby <i>Principal Ecologist, General Manager – Business and Technical Development</i>	Quality assurance.
Dimity Webster <i>Senior Ecologist</i> BAASS23038	- Project manager. - Lead author. - Field logistics. - Field surveys. - BAM Accredited Assessor.
Jessica Chapman <i>Ecologist</i>	Field surveys.
Danielle Eastick <i>Zoologist</i>	Field surveys.
Wyn Russell <i>Zoologist</i>	Field surveys.
Shannon Braun <i>Zoologist</i>	Field surveys.
Claire Tingate <i>Zoologist</i>	Field surveys.
Joshua Orchard <i>Graduate Ecologist</i>	Field surveys.
James Shepherd <i>Principal GIS Consultant</i>	- GIS management. - Technical input.
Jennifer Townsend <i>GIS Consultant</i>	Lead GIS consultant.
Astrid Mackegard <i>GIS Consultant</i>	GIS consultant.
Oliva Williams <i>GIS Consultant</i>	GIS consultant.

2.2. Background research

2.2.1. Literature and database review

The aim of the background research was to determine the potential presence of native vegetation communities, threatened ecological communities, threatened flora and fauna populations, and Matters of National Environmental Significance (MNES) such as migratory birds.

Prior to completing the constraints assessment, information provided by AlburyCity as well as other key information was reviewed, including:

- Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search Tool for matters protected by the EPBC Act.
- NSW Department of Planning and Environment (DPE) BioNet Atlas of NSW Wildlife, for items listed under the BC Act.
- The NSW Department of Primary Industries (DPI) Spatial Data Portal for FM Act listed threatened species, populations and communities.
- NSW DPI *Biosecurity Act 2015* for priority listed weeds for the Murray Local Land Services (LLS) area.
- EES Vegetation Information System (VIS) mapping.
- State Vegetation Type mapping for the Riverina (VIS ID 4469).
- AlburyCity – Environmental and Conservation Land Zoning.
- Biosis scattered tree data and AlburyCity significant tree data.
- DPE Sloane's Froglet population and habitat data (provided to Biosis by David Hunter, DPE).
- Australian Museum FrogID and Sloane's Champion's population data (provided to Biosis by the Australian Museum).
- NSW DPE Biodiversity Value Mapped (BV) mapped land.
- Scattered Tree LiDAR data held by Biosis.
- Regional Natural Environment Strategy 2020 -2023 (AlburyCity, City of Wodonga).

The following reports were also reviewed:

- Thurgoona – Wirlinga Precinct Structure Plan (RPS 2013).
- Survey of Gilgai Wetlands, North Albury, Ettamogah and Thurgoona (Ecology Australia 2014).
- Thurgoona – Wirlinga Squirrel Glider Monitoring Program – Winter 2018 (DM Ecological 2018).
- Long-term monitoring plan of Squirrel Glider populations in Thurgoona-Wirlinga: Final Report, Australian Research Centre for Urban Ecology (ARCUE).
- Knight (2013). The distribution of Sloane's Froglet, *Crinia sloanei*, in southern NSW and northern Victoria: a review of historical distribution records and results from surveys undertaken from 2010 to 2013.
- Biosis 2023. Thurgoona Link Road: Biodiversity Development Assessment. Report for Albury City Council. Authors: Mendham, S. Cerato, S. Palmer, M. Webster, D. Biosis Pty Ltd, Albury. Project no. 38864.

- AECOM (2015). Lot 11 DP 1139652, Kerr Road, Thurgoona, NSW, Targeted Survey for Sloane's Froglet *Crinia sloanei*.
- Hamilton Environmental Services (2022). Test of Significance – Williams Road, Tabletop.

2.2.2. Vegetation stratification

A preliminary approach to stratify and analyse the likely vegetation communities present within the investigation area was completed. Existing State Vegetation Type mapping for the Riverina (VIS ID 4469) was assessed. Aerial imagery was also analysed to identify areas of disturbance, such as cropped paddocks and developed areas and to amend boundaries of mapped woodland areas. This analysis included areas preliminarily stratified as 'planted native'. This stratification provided a baseline of vegetation communities and vegetation structures for field planning and to inform a preliminary constraints and opportunities assessment.

2.2.3. Opportunities and constraints assessment

An opportunities and constraints assessment was undertaken within the investigation area to identify data gaps and key environmental opportunities and constraints. To aid in this identification, a desktop biodiversity constraints model was constructed to identify areas containing high, moderate and low biodiversity constraint.

The objective of this constraints model was to complete a preliminary identification of areas within the PSP boundary, that are likely to contain high, moderate, and low biodiversity constraints to guide the field assessment and masterplan process. This assessment was completed by conducting a high-level assessment of ecological spatial data within the PSP boundary, followed by an in-field assessment to ground-truth collated data (refer to Appendix 4). The ecological constraints within the investigation area were assigned as constraint classes with differing constraints levels to form a hierarchy. Each constraint class was then layered to create an overlapping constraints hierarchy. Each category was assessed to determine if sub-constraints could be extracted to isolate influencing factors to aid the analysis. Each constraint/sub-constraint combination was categorised as high or moderate and given a brief justification, this hierarchy is outlined in (Appendix 4).

The hierarchy details how the constraints were layered. Low constraint areas were deliberately assigned a null value, to aid in identifying where an on-ground assessment is required to ground-truth the null result. Following finalisation of field assessment data, areas of 'low' constraint will be extracted. The constraints model is shown in Appendix 4.

The model was ground truthed through field assessment, refer to Section 2.3.1, as has been used as a basis for the avoidance of key biodiversity features within the PSP area. This process was also used to inform targeted survey design.

2.2.4. Identification of candidate and ecosystem species

Under the BAM 2020, the BAM Calculator is utilised to determine both Predicted Ecosystem Credit Species and Candidate Species Credit Species.

Ecosystem Species are a list of predicted species (ecosystem credit species) expected to occur within the investigation area and was generated as per Section 5 of the BAM (DPIE 2020).

Candidate species are species credit species that are threatened species for which vegetation surrogates and/or landscape features cannot reliably predict the likelihood of their occurrence, or components of their habitat. These candidate species are identified as species credit species in the NSW BioNet TBDC. A targeted survey or an expert report is required to confirm the presence of these species in the investigation area, or alternatively the species can be assumed to be present (DPIE 2020).

Following advice from DPE (Appendix 2), AlburyCity Council has opted to assess the project against Stage 1 of the BAM, as such, the BAM-C was utilised to identify ecosystem species, and candidate species requiring targeted survey to confirm presence within the investigation area. The decision to assess the project under Stage 1 of the BAM will allow AlburyCity to make informed decisions regarding the future development of the PSP area with respect to threatened species and their habitats.

Candidate and ecosystem species have been discussed in detail within section 4.6 and 4.6.2.

2.2.5. Likelihood of occurrence

Likelihood of occurrence indicates the potential for a species or ecological community to occur regularly within the investigation area. It is based on expert opinion, information in relevant biodiversity databases and reports, and an assessment of the habitats on site. Likelihood of occurrence is ranked as negligible, low, medium, high or recorded. The rationale for the rank assigned is provided for each species in Appendix 6 and 7. Those species for which there is little or no suitable habitat within the investigation area are assigned a likelihood of low or negligible and are not considered further.

Only those species listed under the EPBC Act or the BC Act (hereafter referred to as 'threatened species') are assessed to determine their likelihood of occurrence. Threatened species which have at least a medium likelihood of occurrence are given further consideration in this report. The need for targeted survey for these species is also considered.

2.3. Vegetation assessment

Following completion of the desktop analysis and stratification of native vegetation, refer to section 2.2.2, a vegetation assessment was undertaken by Dimity Webster (Senior Ecologist) and Jessica Chapman (Ecologist) of Biosis from 9 June 2023, 12 – 14 June 2023, 16 June 2023, 19 June 2023 and 13 – 14 July 2023. The field investigation involved the assessment of areas identified in the desktop constraints review as either being data deficient or containing high or moderate ecological constraint. The field investigation included:

- Ground-truthing of existing vegetation mapping, including confirmation or correction of Plant Community Type (PCT), assignment of condition and determination of the presence of any Threatened Ecological Communities (TEC) listed under the EPBC Act or BC Act.
- Mapping of any unidentified constraints, such as Gilgai areas or areas of unmapped native vegetation, unmapped farm dams and drainage lines.
- Ground-truthing of constraints mapping such as correcting boundaries of mapped features due to changes in the landscape or condition of identified constraint and correction of mapping anomalies.
- Habitat assessment in line with Section 6 of the Biodiversity Assessment Method (BAM) to determine the potential for threatened species identified under the BAM as 'ecosystem credit species' and 'species credit species' to occur.

- Mapping of habitat feature where possible such as hollow-bearing trees, scattered trees, fallen timber, rocky habitat. Noting that, not all features such as hollow-bearing trees within the investigation area were mapped at this stage of field investigations.
- General assessment of creek lines.
- Confirmation of Category 1 Exempt areas mapped under the draft native vegetation regulatory map.

Field assessment methods were undertaken in accordance with the licensing and constraints listed within Appendix 3.

2.3.1. Field verification

Vegetation communities

A systematic and comprehensive survey design was utilised covering all areas of the investigation area, excluding residential areas, lots too small to be subdivided or where access was not permitted. Where access was not permitted or survey was not undertaken, all constraints identified at the desktop modelling stage were assumed present.

A rapid assessment method was completed throughout the survey area to ground truth and stratify vegetation to PCTs by recording the dominant and key plant species, noting soil type and characteristics, landform and landscape setting. Boundaries between vegetation communities were delineated. Rapid assessment of identified areas of PCT associated with TECs was completed against the relevant key diagnostic characteristics and condition thresholds for listing under state and/or federal legislation.

Existing spatial data was utilised for vegetation mapping within all areas that were excluded from survey.

Planted vegetation

Planted vegetation was assessed to determine if a PCT could be assigned, or if remnant vegetation was present allowing for classification to PCT level. Where this could not be completed due to a lack of species indigenous to the Riverina and/or NSW, the vegetation as assigned the nomenclature 'Planted Native'.

Scattered trees

The BAM 2020 defines a scattered tree as species listed in a tree growth form group that:

- Have a percent foliage cover that is less than 25% of the benchmark for tree cover for the most likely plant community type and are on category 2 – regulated land and surrounded by category 1 – exempt land on the NVR map under the LLS act, or
- Have a Diameter at Breast Height (DBH) greater than or equal to five centimetres and are located more than 50 metres away from any living tree that is greater than or equal to five centimetres DBH, and the land between the scattered trees is comprised of vegetation that are all ground cover species on the widely cultivated native species list, or exotic species or human-made surfaces or bare ground, or
- Are three or fewer trees that have a DBH of greater than or equal to five centimetres and are within a distance of 50 metres of each other, that in turn, are greater than 50 metres away from the nearest living tree that is greater than or equal to five centimetres DBH, and the land between the scattered trees is comprised of vegetation that are all ground cover species on the widely cultivated native species list, or exotic species or human-made surfaces or bare ground.

At this stage of the assessment, all isolated trees within the areas surveyed were assessed to confirm presence of scattered trees against the BAM and classified to species level.

2.3.2. Excluded land

Assessment of non-native vegetation or areas exempt from further assessment was undertaken in accordance with BC Act s6.8(3), which states that any assessment relating to biodiversity is to exclude the clearing of native vegetation and loss of habitat on Category 1- Exempt Land (within the meaning of Part 5A of the *Local Land Services Act 2013* (LLS Act)). In accordance with section 1.5 of the BAM, biodiversity values that do not need to be assessed include: (d) biodiversity values associated with the assessment of the impacts of any clearing of native vegetation and loss of habitat on Category 1-Exempt Land (within the meaning of Part 5A of the LLS Act), other than the additional biodiversity impacts in accordance with clause 6.1 of the BC Regulation.

The entire investigation area falls within an area identified under the draft Native Vegetation Regulation (NVR) map released by DPE as 'land excluded from the LLS Act'. Section 60A of the LLS Act identifies land where the regulatory framework for native vegetation clearing in rural areas does not apply. Sections of the Albury LGA are excluded from the LLS Act due to the existing biodiversity certification order. Within areas subject to a current biodiversity certification order, the BOS does not apply.

As this assessment is intended to inform future pathways such as precinct level certification (beyond the life of the current certification order), no areas of biodiversity certified land were excluded from this assessment.

2.4. Threatened species survey

This section outlines the targeted threatened species survey effort. Survey methods have followed relevant survey guidelines and are targeted to the species identified as potentially occurring within the investigation area. Survey methods are detailed below and depicted within Figure 4.

2.4.1. Targeted fauna

Targeted fauna surveys were completed in accordance with the following NSW DPE guidelines:

- Koala (*Phascolarctos cinereus*): Biodiversity Assessment Method Survey Guide (2022).
- NSW Survey Guide for Threatened Frogs (2020).
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) (2004).

Data provided by DPE, Charles Sturt University and community groups ('Sloane's Champions', the FrogID App) was used to assist in determining survey effort. This data was utilised to determine which species have confirmed breeding habitat within the PSP area.

Weather data including air temperature, wind speed, relative humidity, rain and cloud cover was collected at the start and end of each survey period (see Table 2).

The following targeted survey methods were used:

- Spotlighting.
- Call Playback.
- Active Search – Stick nest assessment.

- Active Search – Diurnal bird survey.
- Spot Assessment Technique (SAT).

Table 3 summarises targeted survey effort including dates and survey days completed for each candidate species assessed.

A habitat assessment was completed prior to commencing targeted fauna surveys to identify suitable survey locations and plan survey effort.

The habitat assessment focussed on the presence of the following features within the investigation area:

- Habitat trees including large and/or hollow-bearing trees, stick nests, availability of flowering shrubs and canopy/understorey feed tree species.
- Soil type and presence of cliffs, overhangs and other rocky areas.
- Condition and type of native vegetation and the presence of exotic species.
- Presence and condition of pools and waterways.
- Quantity of ground litter and woody debris.
- Searches for indirect evidence of fauna (i.e. feathers, tracks and scats).
- General degradation of the site as a result of past and current disturbances such as vegetation clearing and industrial land management practices.
- Topography and landscape morphology.
- Presence of flying-fox camps.

Habitat assessment – Grey-headed Flying Fox

A habitat assessment to confirm the presence of breeding camps for Grey-headed Flying Fox *Pteropus poliocephalus*, was completed in July 2023. All waterways within the investigation area were walked on foot during this assessment to locate any un-recorded or temporary camps.

Spotlighting

Spotlighting was used to target arboreal nocturnal mammals and nocturnal aerial species. Spotlighting was completed in August and September 2023. Spotlight transects were completed in areas of suitable habitat for target species and evenly spaced within the investigation area to capture a broad habitat range and area. Transects were approximately 1 kilometre long and took one hour to complete. Where habitat patches were less than 1 kilometre in length, the entire habitat area was surveyed. Where transects were less than 1 kilometre in length, a minimum of 30 minutes were spent surveying. All transects were walked by two personnel approximately 100 metres apart.

In linear habitat patches such as road reserves the transects were driven at less than 5 kilometres per hour. Some driven transects were longer than 1 kilometre, with additional time spent proportionally.

Spotlighting was completed using high powered LED Lenser H14 R.2 headlamps and OLIGHT Javelot Pro handheld spotlights. All species sighted were identified to species level and their locations recorded.

Nocturnal Call Playback

Call playback was completed for nocturnal avian and amphibian species throughout August and September 2023. For avian species call playback points were evenly spaced throughout the investigation area and/or in areas of suitable habitat. All call playback points were between 2 and 4 kilometres apart. Call playback was completed using a high-powered Bluetooth speaker. Spotlighting for a minimum 10-minute period was completed following completion of call playback. Call playback was completed using high powered Bluetooth speakers (Ultimate ears speaker UE Boom 3).

Call playback for amphibian species were completed in 500 metre walked transects with call playback points approximately every 50 metres along watercourses and drainage lines. Call playback was completed at isolated dams for a period of 10 minutes. Call playback was completed using a high-powered Bluetooth speaker.

Stick Nest Assessment

Stick nest assessments were completed for raptor species in September 2023. Stick nest searches were completed by completing active searches in suitable habitat for large stick nests. Point surveys were used to survey for individual raptor species. Raptor surveys were completed using binoculars with a clear visible distance up to 200 meters.

Diurnal Bird Surveys

Diurnal bird surveys were completed in September 2023 for woodland bird species. Surveys were completed via point and transect surveys within suitable woodland habitats. Binoculars were used up to a 200-metre radius for identified of all woodland bird species.

Spot Assessment Technique

Spot Assessment Technique (SAT) surveys were completed for Koala. Two personnel walked minimum 500 metre transects in areas of suitable habitat, due to the project size this method was used to provide a wider coverage than the 250-metre grid spacing technique recommended within the Koala (*Phascolarctos cinereus*): Biodiversity Assessment Method Survey Guide (2022). Surveys were completed over five days in September.

An average of 20-30 trees per each 500-metre transect were inspected for presence of scats with a search effort of approximately two minutes per tree, with the area searched extending at least one metre from the base of each tree. Some areas and patches of woodland were less than 500 metres in length, where this occurred, the entire habitat area was searched.

Weather conditions

Targeted threatened species surveys of the investigation area were undertaken throughout July – September 2023. Weather observations for each survey date are shown in Table 2.

Table 2 Weather observations during targeted flora and fauna surveys, 2023 (Albury, NSW*)

Survey undertaken	Survey date	Start of survey (6pm)					End of survey (10:30 – 11:30pm)				
		Air Temp(°C)	Wind (km/h)	Humidity (%)	Rain (mm)	Cloud cover (%)	Air Temp(°C)	Wind (km/h)	Humidity (%)	Rain (mm)	Cloud cover (%)
Nocturnal Call Playback: • Sloane's Froglet	31 July 2023	12.6	7	72	0	95	11.8	11	73	0	95
	1 August 2023	12.2	13	75	0	80	6.4	0	94	0	70
	2 August 2023	12.2	0	73	0	40	5.8	4	97	0	30
	3 August 2023	14.1	6	71	0	50	8.5	0	92	0	40
	7 August 2023	9.2	0	84	0	0	5.8	6	92	0	0
	8 August 2023	10.3	0	81	0	0	5.6	6	95	0	0
	9 August 2023	14	11	63	0	50	14	11	63	0	10
	10 August 2023	11.9	15	71	6.6	75	11.9	15	71	0	40
Nocturnal call playback: • Masked Owl • Powerful Owl • Bush Stone-Curlew Spotlighting: • Squirrel Glider • Koala	21 August 2023	12.9	7	79	0	62.5	10	6	91	0	75
	22 August 2023	10.2	19	85	4	100	9.5	0	93	4.6	25
	23 August 2023	11.6	9	65	0	0	4.7	0	95	0	0
	24 August 2023	12.5	7	68	0	15	4.9	0	95	0	25
Nocturnal call playback: • Masked Owl • Barking Owl • Bush Stone-Curlew Spotlighting: • Koala	28 August 2023	16.4	6	63	0	15	7.5	0	95	0	40
	29 August 2023	16.7	4	66	0	100	11.3	0	93	0	90
	30st August 2023	12.3	13	87	5.4	75	9.3	2	97	5.6	50
	31 August 2023	13.2	13	71	0	25	9.6	13	88	0	15
Survey undertaken	Survey date	Start of survey (7:15 am)					End of survey (6pm)				
		Air Temp(°C)	Wind (km/h)	Humidity (%)	Rain (mm)	Cloud cover (%)	Air Temp(°C)	Wind (km/h)	Humidity (%)	Rain (mm)	Cloud cover (%)
Stick nest searches: • Little Eagle • Square-tailed Kite • White-bellied Sea-eagle	11 September	21.2	1.1	44.4	0	15	14.6	7	0	0	15
	12 th September	9.6	1.5	69.9	0	75	16.8	13	0	0	25
	13 th September	11.6	0.0	72.8	0	100	19.6	6.0	56	0	50
Woodland Birds: • Superb Parrot • Glossy Black-Cockatoo Spot Assessment Technique: • Koala	14 September	12.1	1.1	72.6	0	0	22.2	3.2	54	0	40
	15 September	14.3	0.0	71.9	0	15	16.6	2.1	76.9	0	15

*Information from the Australia Government Bureau of Meteorology website. (Albury Airport AWS: 072160)

Table 3 Targeted species survey effort summary

Species	Listing status		Survey Month (TBDC)	Potential Habitat	Biosis Survey Method
	BC Act	EPBC Act			
Sloane's Froglet <i>Crinia sloanei</i>	E	E	Jul – Aug	All areas of aquatic habitat, including PCT 360, gilgai formations, watercourses, drainage lines and dams.	Along watercourses and drainage lines: 500m walked transects, call playback every 50m. One minute listening, One minute call playback, two minutes listening. At individual dams: Five minutes listening, two minutes call playback, three minutes listening. Four nights at each survey location (31 July – 3 August, 7 August – 10 August).
Squirrel Glider <i>Petaurus norfolcensis</i>	V	-	Jan – Dec	Eucalyptus woodland with HBTs including planted native, PCT 5, PCT 266, PCT 269, PCT 276, PCT 277 and PCT 278.	Transects one km in length: one hour walked or driven spotlighting. Transects < one km in length: 30 minutes walked transect. Two nights surveys at each transect (21 – 24 August).
Koala <i>Phascolarctos cinereus</i>	E	E	Jan - Dec	Eucalyptus woodland including planted native, PCT 5, PCT 266, PCT 269, PCT 276, PCT 277 and PCT 278.	Transects one km in length: One hour walked or driven spotting. Transects < one km in length: Two nights surveys at each transect (21 – 24 August, 28 – 31 August). Transects at least 500 m in length. SAT of approximately 200 trees per transect. Five days across the entire investigation area (11 – 15 September).

Species	Listing status		Survey Month (TBDC)	Potential Habitat	Biosis Survey Method
	BC Act	EPBC Act			
Barking Owl <i>Ninox connivens</i>	V	-	May – Dec	Eucalyptus woodland with HBTs including planted native, PCT 5, PCT 266, PCT 269, PCT 276, PCT 277 and PCT 278 and PCT 360.	Five – 10-minute listening period. Five minutes call playback 10 minutes spotlighting. Repeated for four nights at each survey point (28 – 31 August).
Masked Owl <i>Tyto novaehollandiae</i>	V	-	May – Aug	Eucalyptus woodland with HBTs including planted native, PCT 5, PCT 266, PCT 269, PCT 276, PCT 277 and PCT 278 and PCT 360.	Five – 10-minute listening period. Five minutes call playback 10 minutes spotlighting. Repeated for eight nights at each point (21 – 24 August, 28 – 31 August).
Powerful Owl <i>Ninox strenua</i>	V	-	May – Aug	Eucalyptus woodland with HBTs including planted native, PCT 5, PCT 266, PCT 269, PCT 276, PCT 277 and PCT 278 and PCT 360.	Five – 10-minute listening period. Five minutes call playback 10 minutes spotlighting. Repeated for four nights at each point (21 – 24 August).
Bush Stone-Curlew <i>Burhinus gallarius</i>	V	-	Year round	Eucalyptus woodland, especially areas with fallen timber, including planted native, PCT 5, PCT 266, PCT 269, PCT 276, PCT 277 and PCT 278 and PCT 360.	30 Seconds call playback. Four minutes 30 seconds listening. Repeated three times, maximum of 15 minutes at each survey point. Repeated for eight nights at each point (21 – 24 August, 28 – 31 August).
Superb Parrot <i>Polytelis swainsonii</i>	V	V	Sep – Nov	Eucalyptus woodland with HBTs including planted native, PCT 5, PCT 266, PCT 269, PCT 276, PCT 277 and PCT 278 and PCT 360.	Walked transects approximately 500 m 10-minute raptor surveys in areas overlooking or within scattered trees. Four days across investigation area (11 – 15 September).

Species	Listing status		Survey Month (TBDC)	Potential Habitat	Biosis Survey Method
	BC Act	EPBC Act			
Little Eagle <i>Hieraetus morphnoides</i>	V	-	Aug – Oct	Eucalyptus woodland including planted native, PCT 5, PCT 266, PCT 269, PCT 276, PCT 277 and PCT 278 and PCT 360.	Walked transects approximately 500 m 10 minute raptor surveys in areas overlooking or within scattered trees. Four days across investigation area (11 – 15 September).
White-bellied Sea-eagle <i>Haliaeetus leucogaster</i>	V	-	Jul– Dec	Eucalyptus woodland including planted native, PCT 5, PCT 266, PCT 269, PCT 276, PCT 277 and PCT 278 and PCT 360.	Walked transects approximately 500 m 10-minute raptor surveys in areas overlooking or within scattered trees. Four days across investigation area (11 – 15 September).
Square-tailed Kite <i>Lophoictinia isura</i>	V	-	Sep - Jan	Eucalyptus woodland including planted native, PCT 5, PCT 266, PCT 269, PCT 276, PCT 277 and PCT 278 and PCT 360.	Walked transects approximately 500 m 10-minute raptor surveys in areas overlooking or within scattered trees. Four days across investigation area (11 – 15 September).
Grey-headed Flying Fox <i>Pteropus poliocephalus</i>	V	V	Oct – Dec	Eucalyptus woodland including planted native along riparian areas foraging habitat includes all eucalypt woodland including PCT 5, PCT 266, PCT 269, PCT 276, PCT 277 and PCT 278 and PCT 360.	Walked habitat assessment. Seven days across all areas of suitable habitat within the investigation area (9 June 2023, 12 – 14 June 2023, 16 June 2023, 19 June 2023, 13 – 14 July 2023).

2.5. Limitations

A number of areas could not be surveyed due to access restrictions. Where access could not occur, target threatened species or communities have been assumed present where they have been recorded previously in the PSP area and habitat is likely to be present in the investigation area.

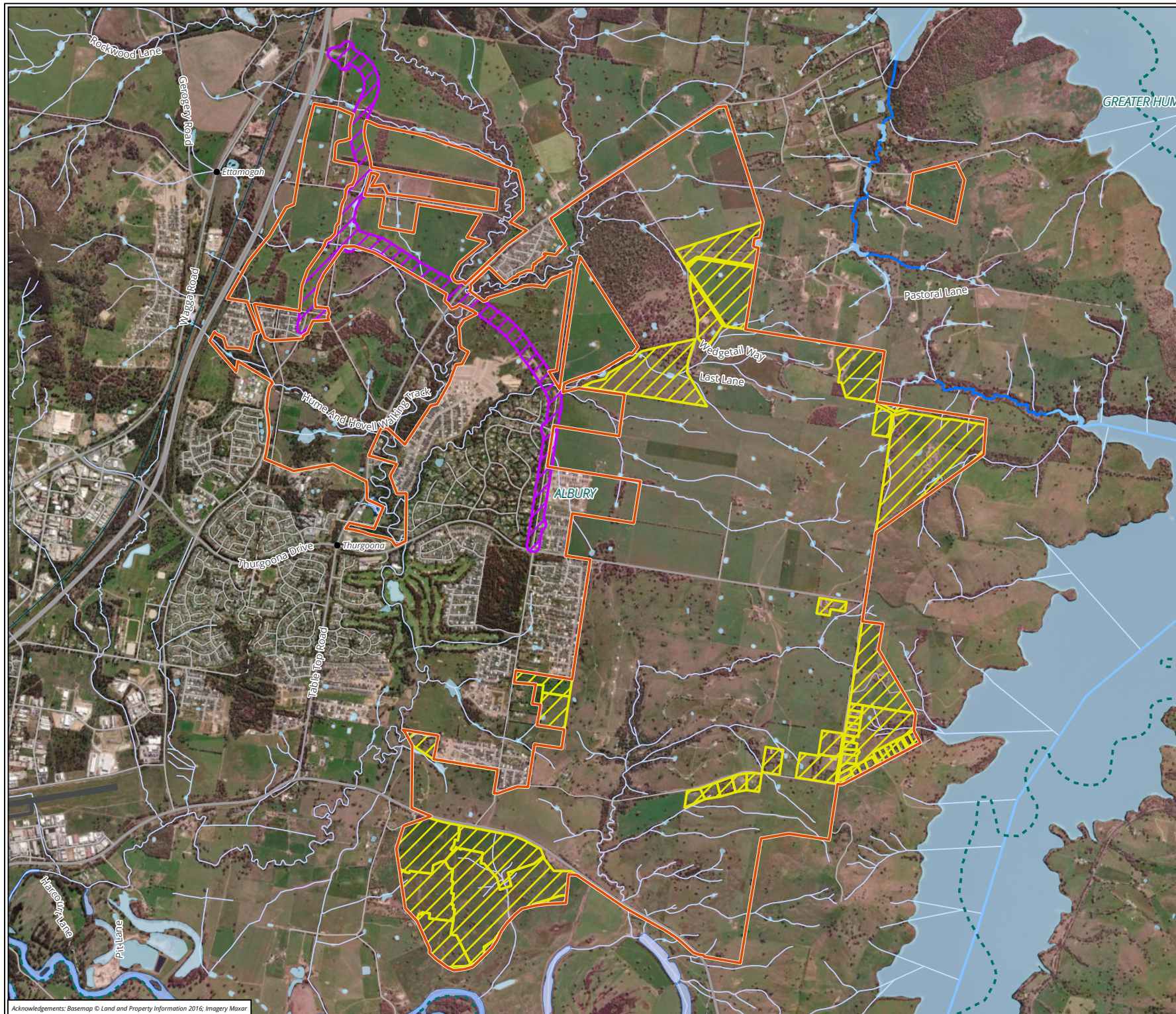
Due to the large investigation area, some modification to the NSW survey guideline methodologies were made. This was primarily done to achieve adequate coverage and replication of surveys. This is a standard approach for large survey sites. Full survey details are listed within section 2.4.

Roadside surveys were completed along Kywanna Road, Wedgetail Way, Table Top Road, Williams Road, Davey Road, Wignell Road, Etamogah Road, Elizabeth Mitchell Drive, Kerr Road, Thurgoona Drive, Dairy Lane, Pipit Lane, Hawksview Road, Knoble Road, Birdwood Lane and the Riverina Highway.

Lot boundaries within the investigation area that were not assessed are summarised within Table 4.

Table 4 Lot boundaries not assessed within investigation area

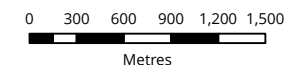
Lot	DP	Lot	DP
30	1273509	26	241721
1, 2, 3, 4, 5, 6	1238061	10	525248
1,2,3,4,5	1013331	81, 82	564503
12	711969	1	578143
1,2	1093495	35, 36, 37	260102
20	542993	11	526382
21, 22, 23, 24	241721	12, 13, 14, 15, 16, 17, 18	238222
38	777149	39	777149
9	1057228	101, 103	1220373
1	1007790	1	1129143
2	1033551	2	1169239
12	1057228	2	848283



Legend

- Investigation area
- Thurgoona Link Road BDAR
- Survey limitation - No access

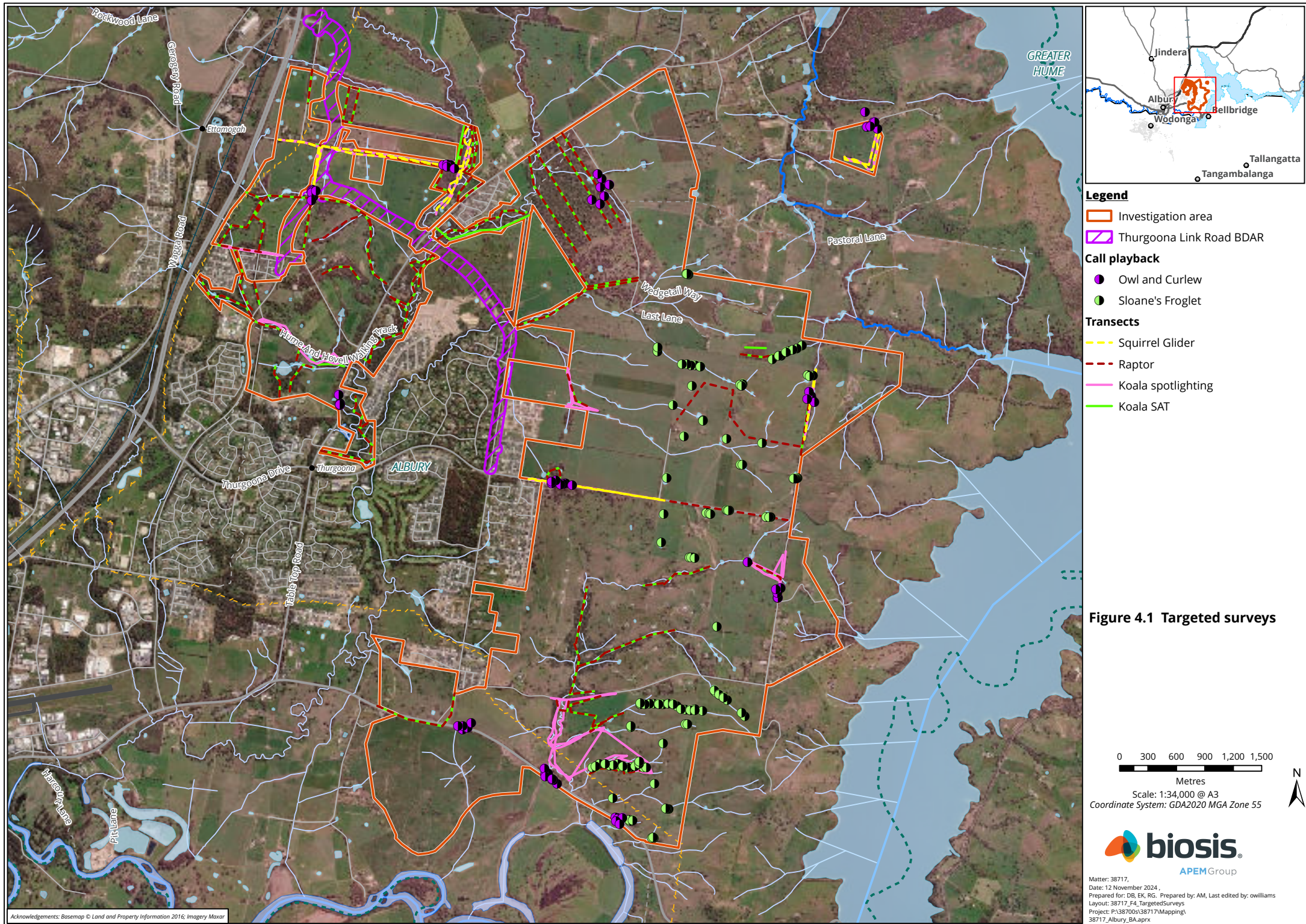
Figure 3 Survey access limitations



Scale: 1:34,000 @ A3
Coordinate System: GDA2020 MGA Zone 55



Matter: 38717,
Date: 14 November 2024,
Prepared by: OW, Checked by: DB, Last edited by: owilliams
Layout: 38717_F3_SurveyAccessLimitations
Project: P\38700s\38717\Mapping\
38717_Albury_BA.aprx



3. Landscape context

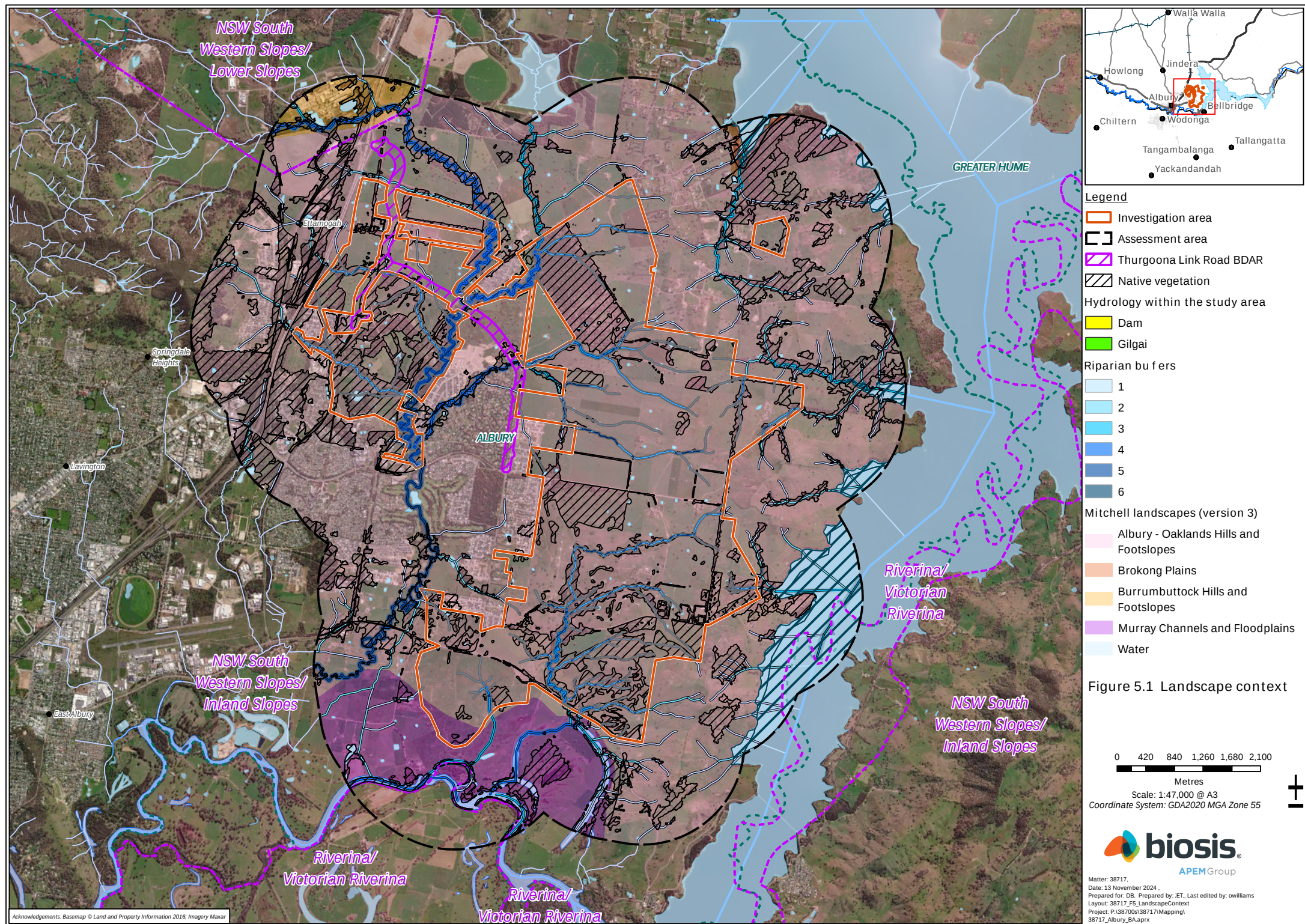
The PSP investigation area is approximately 2,700 hectares in size. An assessment of the landscape context of the investigation area was undertaken in accordance with Chapter 4 and Appendix 3 of the BAM. A summary of the landscape context for the investigation area is summarised below within Table 5 below.

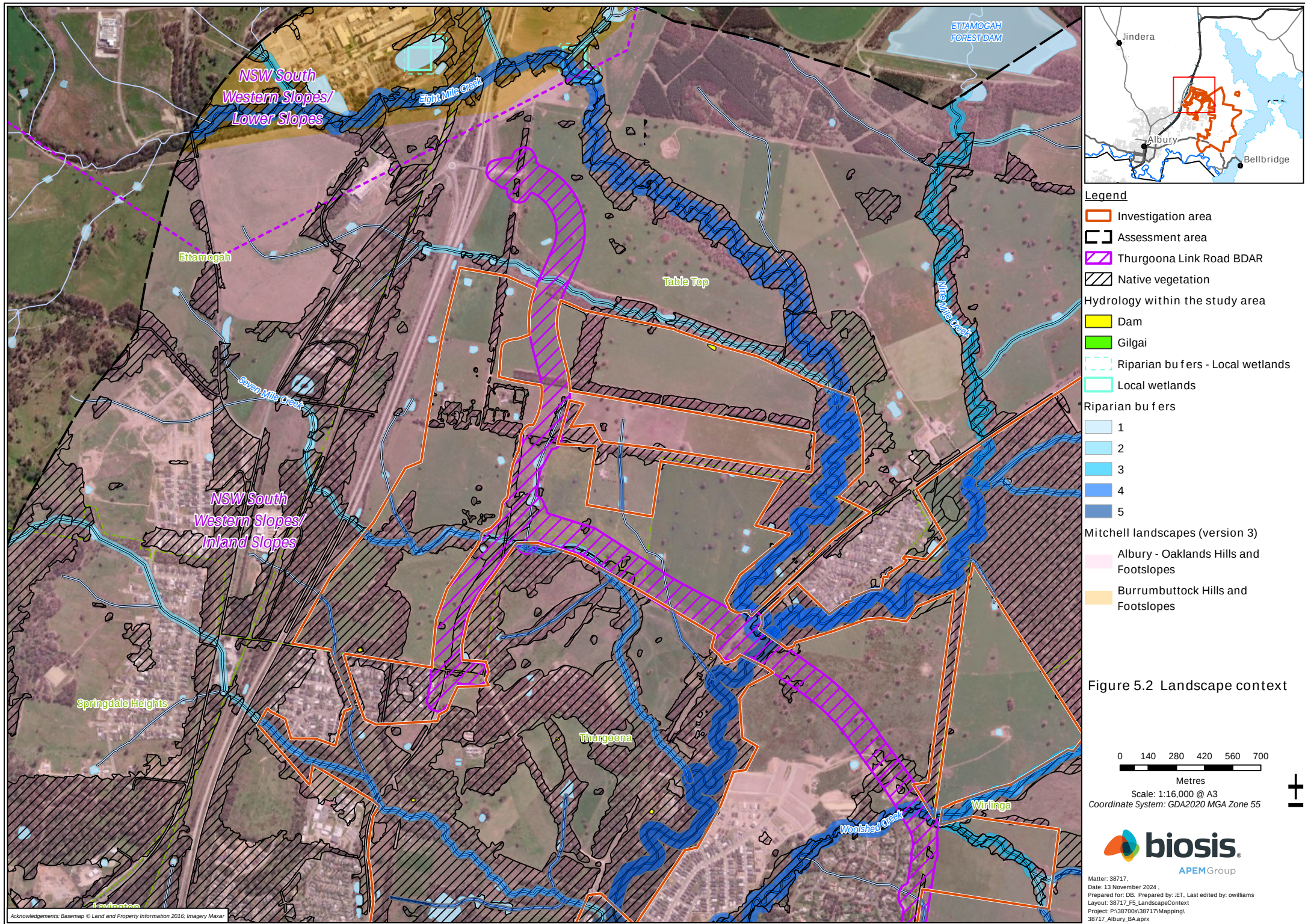
Table 5 Landscape context summary

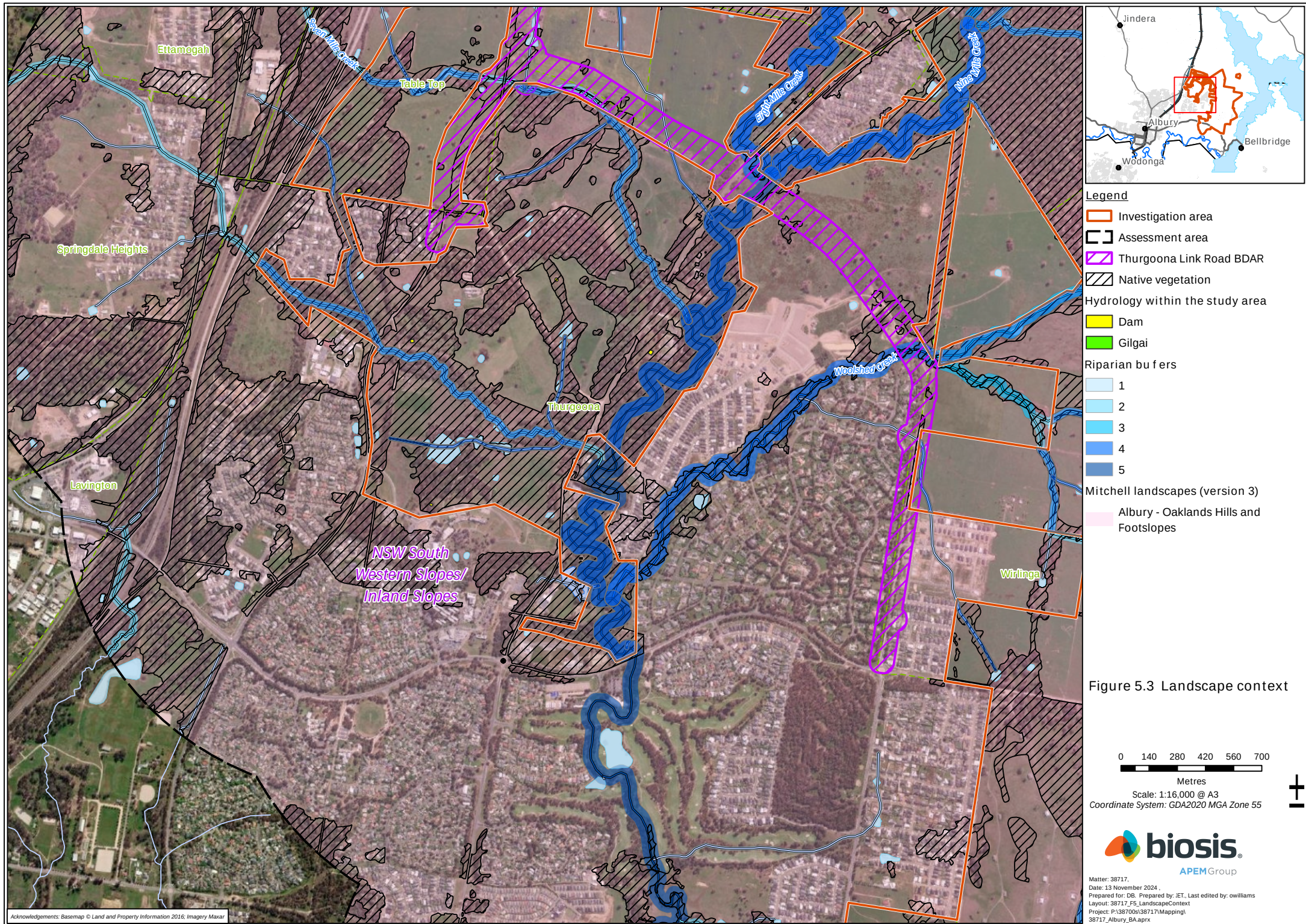
Landscape feature	Investigation area
IBRA bioregions and subregions (Figure 5)	The assessment area occurs within the NSW South Western Slopes Interim Biogeographic Regionalisation for Australia (IBRA bioregion) and the Lower Slopes IBRA subregion (Department of Planning, Industry and Environment 2016).
Rivers streams and hydrology (Figure 7)	The investigation area is located within the Murray Local Land Services (LLS) region and the Murray catchment. The closest major water body is the Hume Reservoir located from 200 metres to 8 kilometres east of the investigation area. The following streams occur within the investigation area: • Seven Mile Creek • Eight Mile Creek • Nine Mile Creek • Woolshed Creek. • More than 50 undefined/unnamed watercourses, dams and tributaries. Eight Mile Creek and its tributary Nine Mile Creek are the only mapped waterways within the investigation area with fish community status of both waterways being graded as Very Poor fish habitat Fairfull (2013). Within the investigation area, Seven Mile Creek, Eight Mile Creek, Nine Mile Creek, Woolshed Creek and a number of unnamed watercourses are identified as Key Fish Habitat (DPI 2024). A number of farm dams are located within or adjacent to the investigation area. These dams represent permanent or semi-permanently flooded freshwater habitat within the investigation area. However, it should be noted that farm dams are not considered key fish habitat, unless they are also suitable habitat for listed threatened species (Fairfull 2013). The investigation area is mapped on the Groundwater Dependent Ecosystems (GDE) Atlas as containing both Aquatic and Terrestrial GDEs (BOM 2023).
Wetlands (Figure 7)	The investigation area contains natural wetlands in the form of a gilgai wetland mosaic. The gilgai mosaics occur intermittently throughout the investigation area, generally in areas of lower elevation. Gilgai are seasonal wetlands and are generally modified due to ongoing grazing and trampling from cattle and sheep. Several areas of gilgai, including an area in the south within Lot 83//DP1160137 contain high quality gilgai examples.

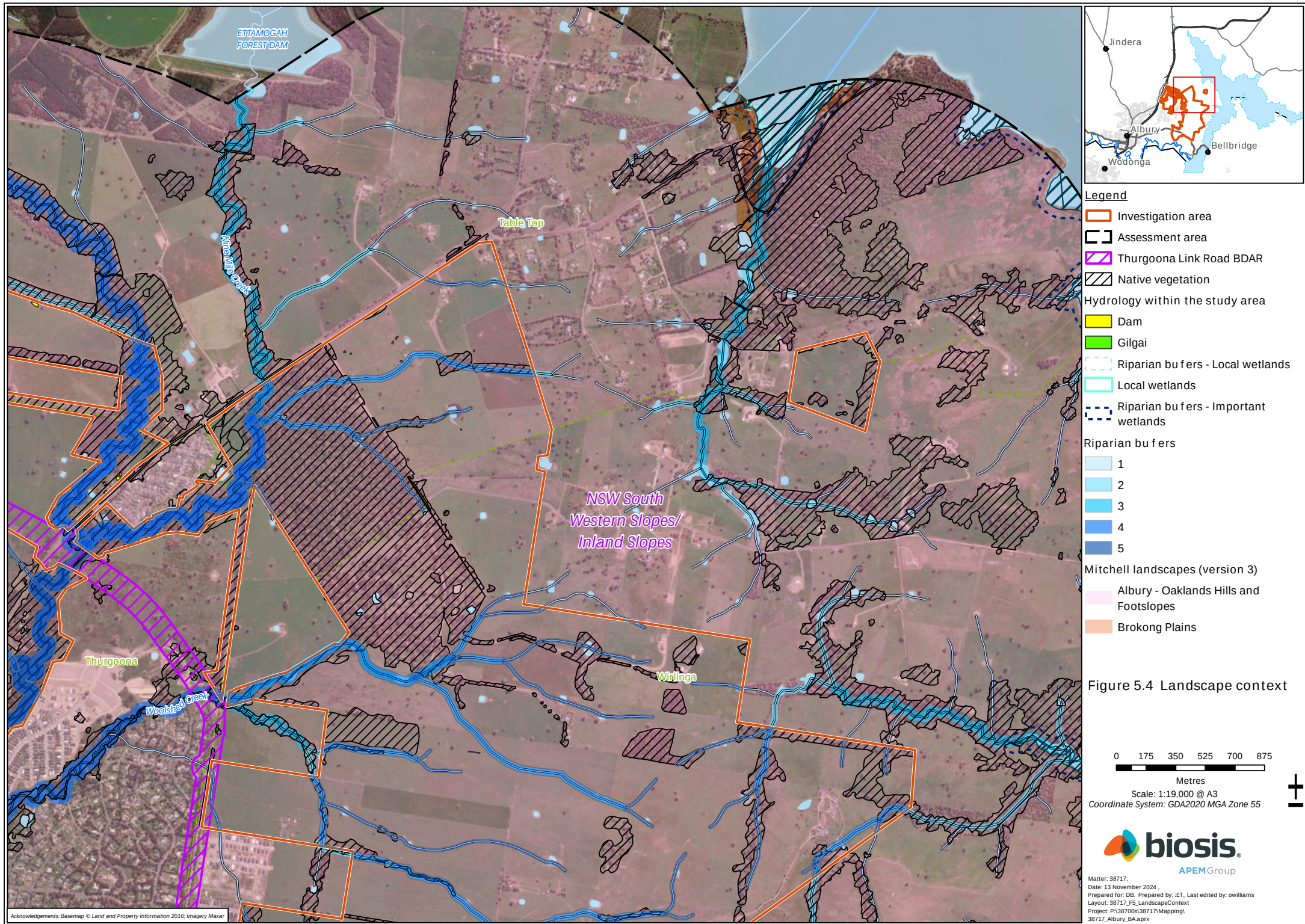
Landscape feature	Investigation area
	Gilgai mosaics form part of the EPBC Act Threatened Ecological Community Seasonal Herbaceous (Freshwater) Wetlands. The closest “Important Wetland” to the investigation area is Lake Hume (Hume Reservoir), which is situated approximately 200 metres to 8 kilometres east of the investigation area (Cth DCCEEW 2005). The closest Ramsar wetland is located approximately 140 kilometres west of the investigation area. NSW DPE state mapped wetlands are located along the Murray River and Hume Reservoir.
Connectivity (Figure 6)	The investigation area does not form part of any recognised biodiversity corridors, flyways or significant habitat connectivity features within NSW. The investigation area is located in a landscape grading from peri-urban to agricultural, situated on the northern and eastern edge of the Albury urban area. Roads and developed areas act as hostile barriers to dispersal for a number of plant and animal species. Agricultural lands have been predominantly cleared for pasture development, they are interspersed with riparian zones and road reserves that contain habitat corridors. Existing habitat corridors within the investigation area have often been supplemented with native vegetation plantings. Key corridors include: • North and south corridors leading from Bells Travelling Stock Reserve (TSR) south to the Murray River. • North, west, east and south in the broader landscape, large areas of woodland, forest and waterways are present including Nail Can Hill, Norris Ridge, Table Top Range, Eastern Hill, the Murray River, Wonga Wetlands and the Hamilton Valley hills including Hamilton Hill, One Tree hill and Red Hill. Riparian watercourses form a key basis of habitat connectivity throughout the investigation area. At a smaller scale, throughout the investigation area, the gilgai mosaics and creek lines form a network creating habitat connectivity. This aquatic habitat connectivity is an important feature and is sensitive to seasonal changes.
Geological features of significance	There were no recorded karst, caves, crevices, cliffs or other areas of geological significance within the investigation area or within the 500-metre buffer area surrounding the investigation area. The closest area of geological significance is the Bethanga Historic Area, which is located approximately 7 kilometres south-east of the investigation area
Areas of outstanding biodiversity value (AOBV)	No AOBVs have been declared within the investigation area.

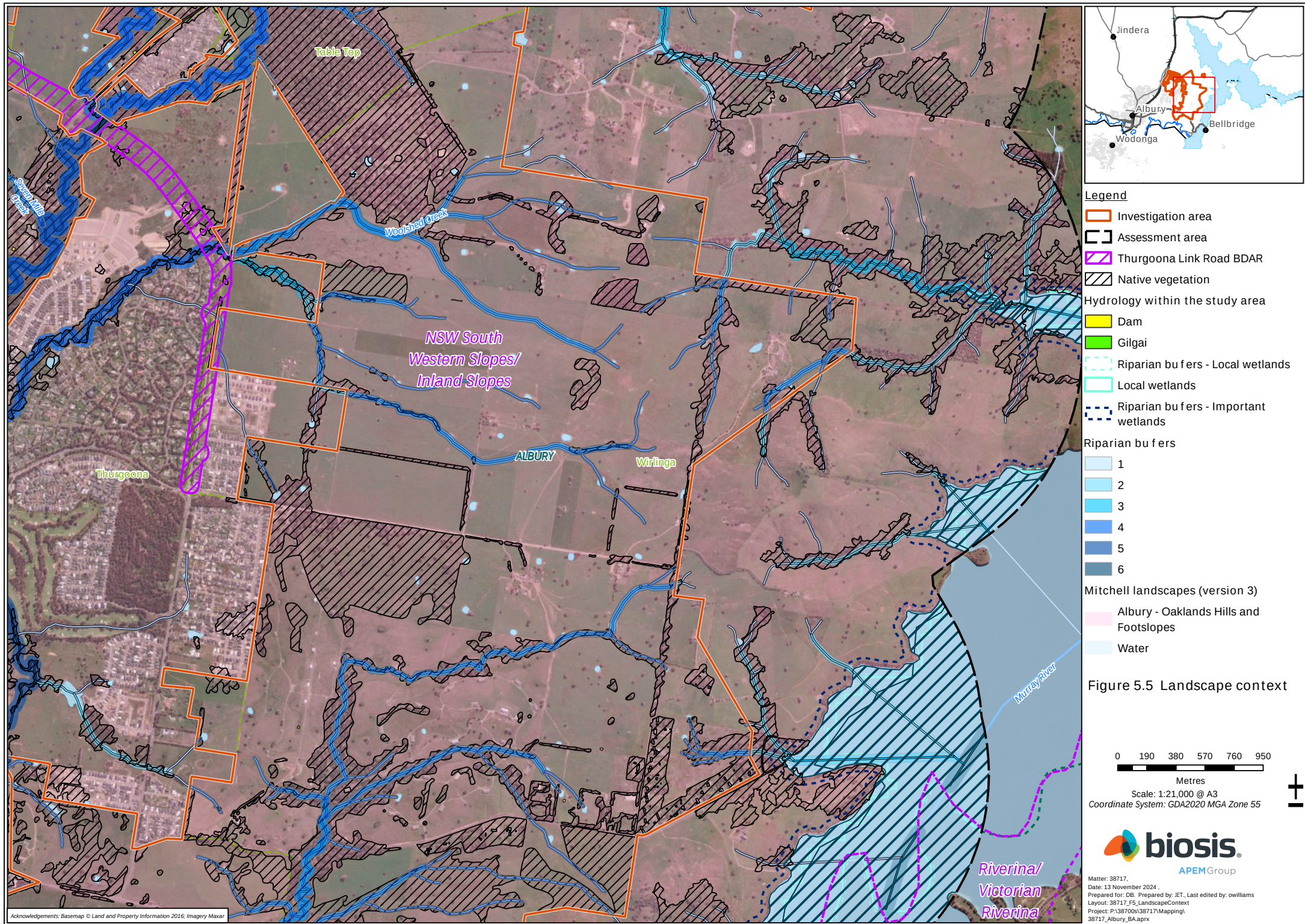
Landscape feature	Investigation area
NSW (Mitchell Landscape) (Figure 5)	The investigation area occurs within the Albury – Oaklands Hills and Foot slopes Mitchell landscape (Mitchell 2002).
Additional landscape features	Several watercourses within the investigation area are designated on the Biodiversity Values Map (DPIE 2021) as “Biodiverse Riparian Land”. Areas of known Box-Gum Woodland are mapped as Threatened species or communities with potential for serious and irreversible impacts (DPIE 2021).
Native vegetation extent (Figure 5)	An assessment area comprised of a 1500 metre buffer from the investigation area was determined to contain approximately 23.88% native vegetation.

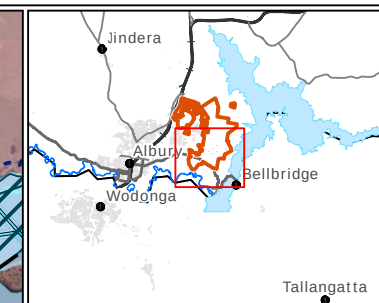
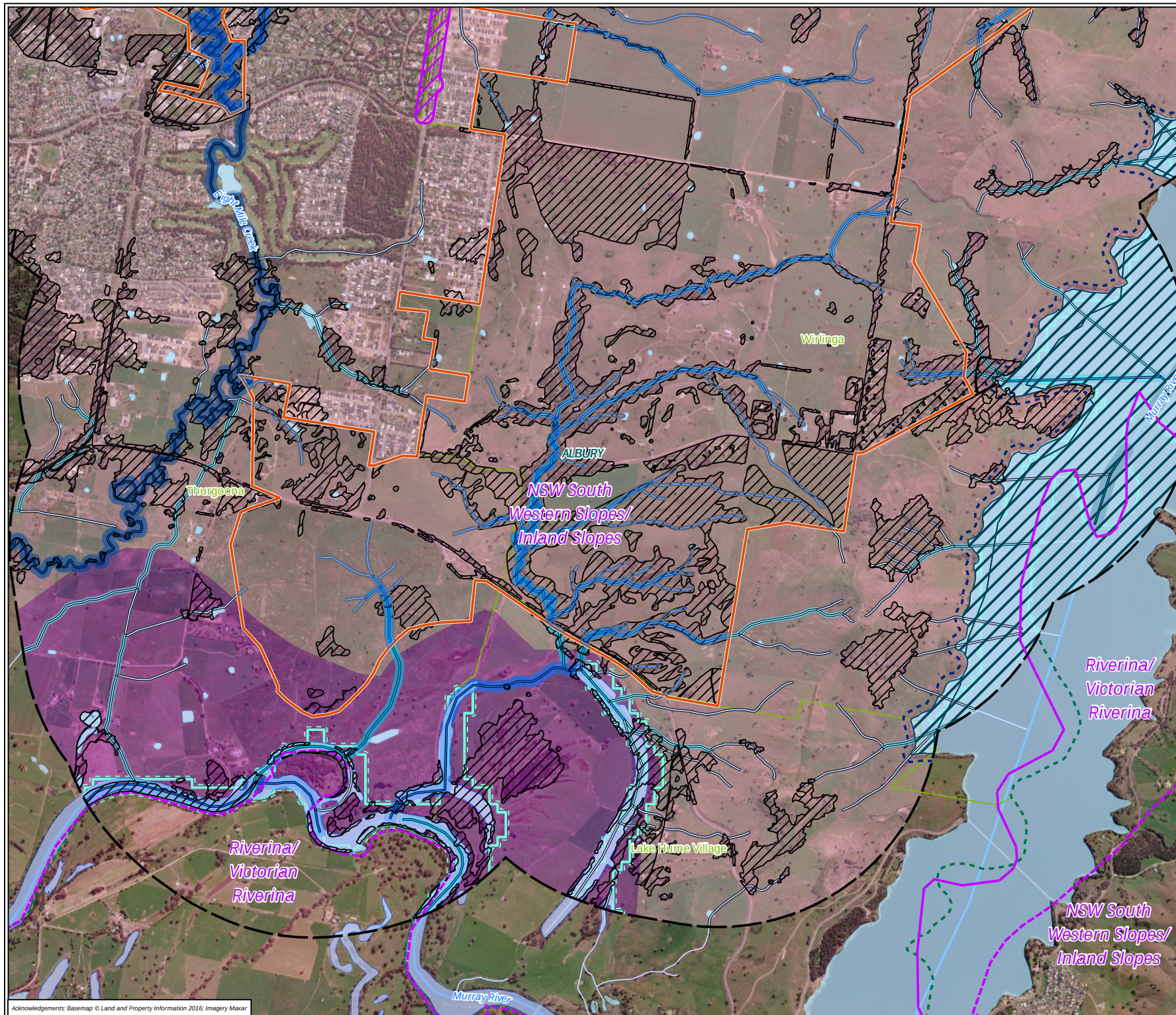












Legend

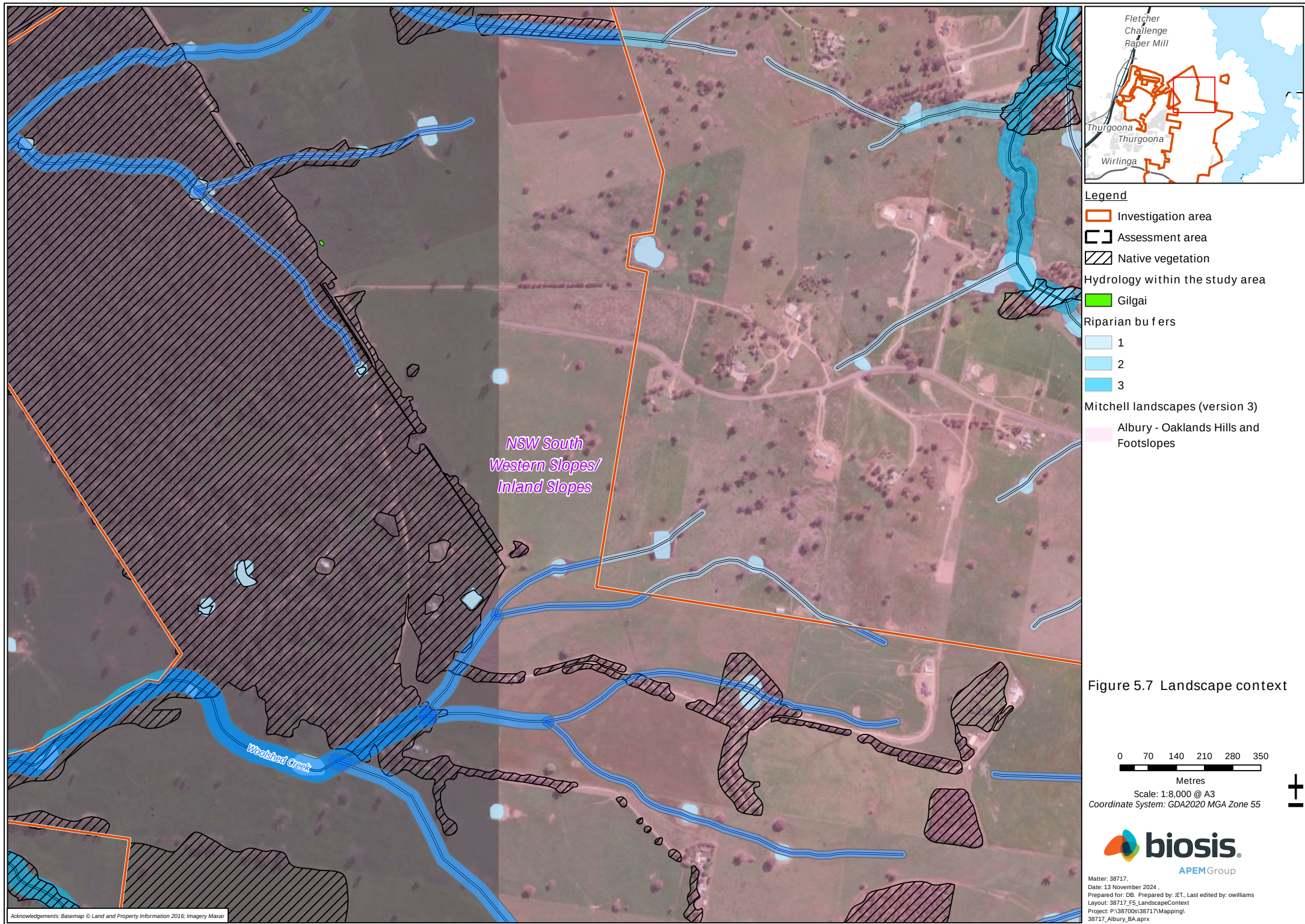
- Investigation area
- Assessment area
- Thurgoona Link Road BDAR
- Native vegetation
- Hydrology within the study area**
- Dam
- Riparian buffers - Local wetlands
- Local wetlands
- Riparian buffers - Important wetlands
- Riparian buffers**
- 1
- 2
- 3
- 4
- 5
- 6
- Mitchell landscapes (version 3)**
- Albury - Oaklands Hills and Footslopes
- Murray Channels and Floodplains
- Water

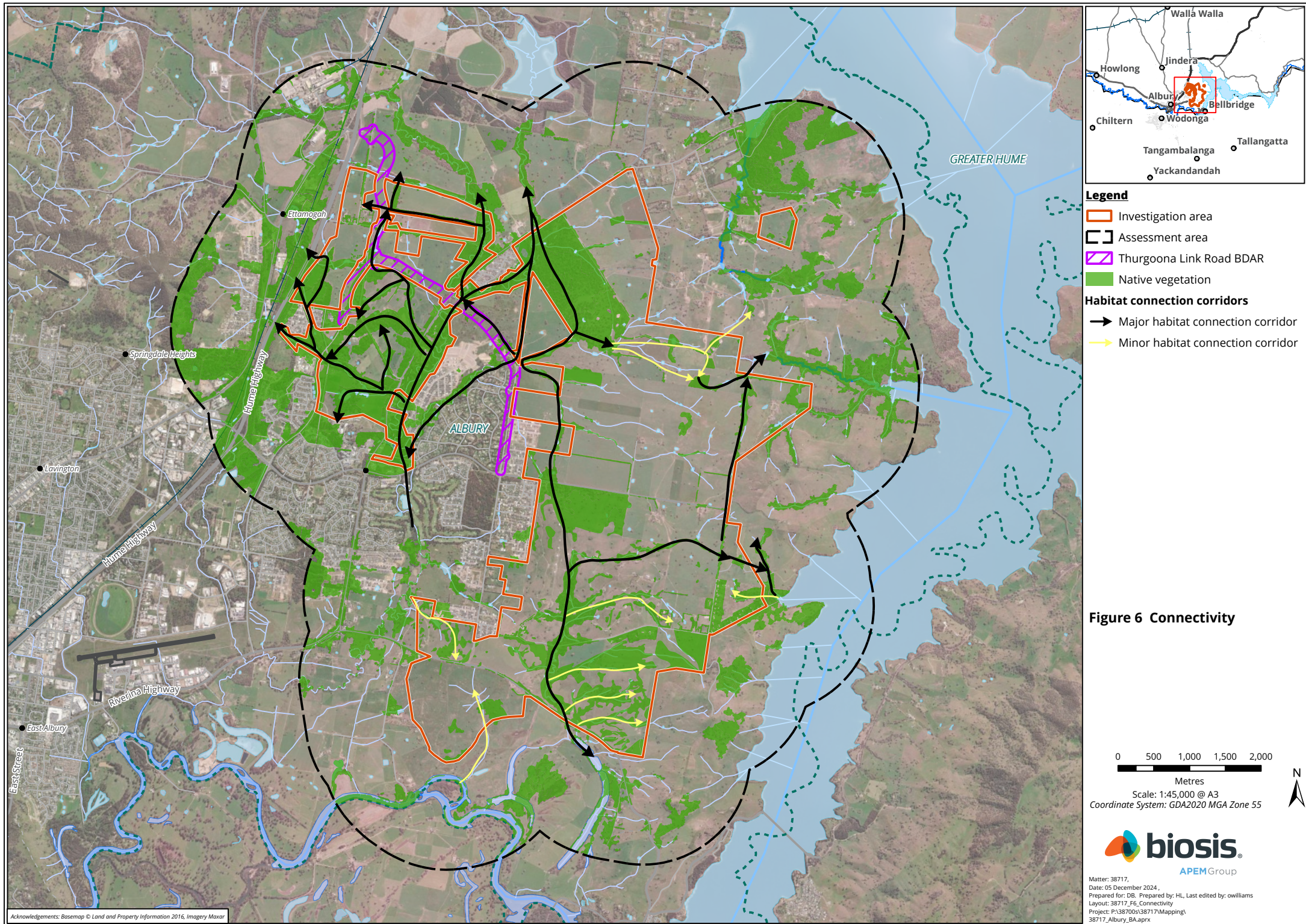
Figure 5.6 Landscape context

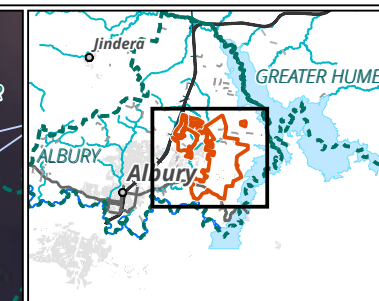
0 210 420 630 840 1,050
Metres
Scale: 1:24,000 @ A3
Coordinate System: GDA2020 MGA Zone 55



Matter: 38717,
Date: 13 November 2024.
Prepared for: DB. Prepared by: JET. Last edited by: owilliams
Layout: 38717_F5_LandscapeContext
Project: P138700s38717(Mapping)
38717_Albury_BA.aprx







Legend

- Investigation area
- Thurgoona Link Road BDAR
- Unmapped dams and gilgai's (Biosis 2023)
- Unmapped hydroline (Biosis 2023)

Strahler Order

- 1 - 10m buffer
- 2 - 20m buffer
- 3 - 30m buffer
- 4 - 40m buffer
- 5 - 40m buffer

Figure 7.1 Aquatic habitat

0 300 600 900 1,200 1,500
Metres
Scale: 1:34,000 @ A3
Coordinate System: GDA2020 MGA Zone 55



Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_P7_AquaticHabitat
Project: P:\387000\38717\Mapping\
38717_Albury_BA.aprx

4. Results

4.1. Opportunities and constraints assessment

The results of the opportunities and constraints assessment aided in identification of both micro and macro constraint areas. The assessment provided a breakdown of both woodland and hydrological corridor pathways in the landscape and the species that may utilise these resources. Previous assessments and associated ecological zoning within the LGA have largely focused on the presence of woodlands or riparian areas. A key opportunity to link hydrological non-riparian features was identified through ecological assessment of the PSP and the subsequent updates to the masterplan.

The ecological data collected during this assessment will also be used to inform the precinct level structure planning process. Analysis of low constraint areas and gaps between habitat corridors will allow for east-west and north-south infrastructure linkages to connect proposed expansion areas.

For the purpose of the constraints assessment, the current biodiversity certification was not considered. This was completed to avoid marking areas of biodiversity value as 'low' constraint due to the current biodiversity certification order in place within the Albury LGA.

The opportunities and constraints assessment, including breakdown of the hierarchy and constraints mapping is provided within Appendix 4. A detailed analysis of the opportunities and constraints assessment has not been provided in this report as the intended focus is Stage 1 of the BAM. However, the results of the assessment have informed survey methods and recommendations contained elsewhere in this report.

4.2. Aquatic habitats

Aquatic habitat occurs within the investigation area in the form of farm dams, gilgai mosaics, creeks and drainage lines. Each of these habitats contain varying forms of aquatic features and are described in detail below (Table 6) and mapped within Figure 7.

Table 6 Aquatic habitats

Aquatic habitat	Description	Threatened species habitat
Farm dam	Farm dams occur throughout the investigation area. Farm dams within the investigation area represent permanent freshwater habitat. Dams are generally isolated or located within drainage lines, modified to capture water from natural drainage systems within the landscape. Aquatic habitat within these areas varied based on the location, size and fringing aquatic vegetation present. Many dams are surrounded by exotic vegetation with some fringing native vegetation present. Farm dams provide an important year-round water source and breeding habitat for common fauna species such as water birds, the Common Snake-necked Turtle <i>Chelodina longicollis</i> and a number of frog species including Beeping Froglet <i>Crinia parinsignifera</i> and Clicking Froglet <i>Crinia signifera</i> . A juvenile (shell width/length <10 cm) <i>C. longicollis</i> was identified within one of the farm dams within the investigation area. <i>Crinia parinsignifera</i> and <i>C. signifera</i> were identified at most water sources within the investigation area.	The shallow vegetated edges of farm dams are a known breeding habitat for the threatened Sloane's Froglet <i>Crinia sloanei</i>. This species was identified at a number of farm dams within the investigation area, refer to Figure 7. Although some farm dams are not ideal breeding habitat for this species, generally due to the steep banks and water depths above 30 cm, they do provide an important feature within the landscape connecting areas of gilgai mosaic and wetland habitats that are key features for the recovery of this species. Farm dams also provide a summer refugia habitat when ephemeral resources such as flooded paddocks, Gilgai's and some drainage features have dried out. Farm dams also provide habitat for some migratory species including Latham's Snipe <i>Gallinago hardwickii</i> and potential habitat for River Swamp Wallaby Grass <i>Amphibromus fluitans</i>.
Creeks	Four creeks occur within the investigation area, each of these creeks are identified under the NSW DPI Strahler Stream Order (SSO) classification. SSO is a hierarchy system used to describe the location of a stream in a catchment, this system is based on a confluence of joining streams to create the hierarchy. The first stream in a catchment is labelled as SSO 1, where two streams of the same hierarchy join, they create the next order stream, SSO 2 through to SSO 9 (DPE 2022). Therefore, most unnamed/undefined non-perennial drainage lines are generally SSO 1 and SSO 2, forming at the start of catchment systems eventually feeding into the Murray River (SSO 9). Creek lines within the investigation area form key areas of habitat connectivity between the investigation area and the broader landscape. These riparian areas are a key biodiversity resources supporting and	Two threatened fish are indicated as having the potential to occur within the investigation area under the NSW DPE Threatened Fish Indicative Mapping (DPI 2023a). Aquatic assessment to confirm the presence of these species was not conducted as part of this assessment. Four creeks occur within the investigation area: - Seven Mile Creek - SSO 2, KFH: Present, mapped indicative occurrence of Southern Pygmy Perch. - Eight Mile Creek

Aquatic habitat	Description	Threatened species habitat
	providing breeding and foraging habitat for a number of threatened and non-threatened fauna species. Many areas of these creek lines form pools or connect wetland and gilgai habitat within the landscape.	– SSO 4 and 5, KFH: Present, mapped indicative occurrence of Flathead Galaxias and Southern Pygmy Perch, very poor mapped fish community condition. • Nine Mile Creek – SSO 3, KFH: Present, mapped indicative occurrence of Southern Pygmy perch. • Woolshed Creek – SSO 3 and 4, KFH: Present, mapped indicative occurrence of Southern Pygmy perch.
Drainage lines	Within the investigation area more than 50 unnamed/undefined non-perennial watercourses are present. The majority of these watercourses form part of a SSO catchment hierarchy feeding into larger systems within the investigation area and river systems within the broader landscape. Drainage lines are generally SSO 1 and SSO 2, occurring in agricultural land. As such, they have been subject to modification through clearing and grazing. Several drainage lines contained regenerating native riparian vegetation, however most contain little to no native vegetation, as such, erosion was typically present on the bed and banks. Erosion was often increased from the presence of livestock.	Although disturbed, several of these drainage lines are important catchment features, and as such are mapped as KFH and/or indicated as potentially supporting the threatened fish species Flathead Galaxias and Southern Pygmy Perch. Several areas of pooled water within these drainage systems are identified as containing breeding Sloane's Froglet. Ephemeral drainage lines and wet areas are critical habitat for Sloane's Froglet during the winter breeding season and also provide habitat for Latham's Snipe. Although the biodiversity values associated with disturbed drainage lines are moderate in low in comparison to the defined creeks, these areas still form an important network of catchment and drainage systems within the landscape. Many of these drainage lines form minor corridors connecting isolated patches of woodland and gilgai and/or wetlands mosaics within the landscape. Refer to Figure 7.
Gilgai mosaics	Gilgai are ephemeral depressions formed in the landscape in areas of cracking clay soils subject to wet/dry periods, often occurring in association with the outer edges of wetland formations. Gilgai's generally occur in a	Sloane's Froglet is known to rely on gilgai mosaics for breeding. This landform also for part of the TEC Seasonal Herbaceous Wetlands (freshwater) of the Temperate Lowland Plains.

Aquatic habitat	Description	Threatened species habitat
	mosaic formation, with several depressions forming larger complexes. Gilgai depressions can be from one to ten metre squared and are dependent on rainfall to fill during wet periods. These formations are sensitive to disturbance, with grazing identified as a key threat within the investigation area. Grazing within gilgai mosaics has led to a reduction of native vegetation diversity, erosion of the depression banks, plugging from hard hooved livestock and siltation reducing depth of depressions. These impacts lead to a reduction in the biodiversity value associated with this important landform within the Albury LGA.	Gilgai formations also provide suitable habitat for River Swamp Wallaby-grass (Endangered, EPBC Act) and Latham's Snipe.

4.3. Native vegetation

This section has been prepared to address Section 5 of the BAM. This section maps and identifies all native and non-native vegetation types within the investigation area and outlines if any recorded vegetation types correspond to threatened ecological communities listed under the BC Act.

Approximately 844.54 hectares of native vegetation attributed to PCTs are present within the investigation area.

4.3.1. Overview

Seven PCTs were recorded in the investigation area in a range of condition states. Native vegetation occurred as remnant, regenerating, derived and planted zones within the investigation area.

The following PCTs are assessed as present investigation area:

- *PCT 5 River Red-gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.*
- *PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion.*
- *PCT 269 White Box - Blakely's Red Gum - Red Box - Red Stringybark shrubby woodland on shallow soils on metamorphic hills in the Albury region of the NSW South Western Slopes Bioregion.*
- *PCT 276 Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion.*
- *PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion.*
- *PCT 278 Riparian Blakely's Red Gum – box – shrub – sedge – grass tall open forest of the central NSW South Western Slopes Bioregion.*
- *PCT 360 gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion.*

Table 7 to Table 13 provide the list of PCTs identified as occurring within the assessment area. PCTs recorded within the investigation area are shown on Figure 8.

Table 7 PCT 5 River Red-gum herbaceous-grassy very tall open forest wetland
PCT 5: River Red-gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion

Common name	PCT 5 River Red-gum herbaceous-grassy very tall open forest wetland
Vegetation formation	Forested Wetlands
Vegetation class	Inland Riverine Forests
Extent within investigation area	22.66 hectares
Condition	This community occurred in moderate condition, with a remnant and regenerating canopy. A planted shrub layer is often present in environmental zoned areas. Ground cover is generally exotic with a low density of native species present.
Description	PCT 5 within the investigation area is as an open woodland to 20 metres tall with an open to shrubby midstorey and grassy understorey. Characteristic tree species include River Red-gum <i>Eucalyptus camaldulensis</i> as the dominant canopy species, with a shrubby to open understorey that includes River Bottlebrush <i>Callistemon sieberi</i> and Silver Wattle <i>Acacia dealbata</i> . The understorey in low condition areas consists of a sparse range of native grass, sedge and herb species including Common Reed <i>Phragmites australis</i> , Tall Sedge <i>Carex appressa</i> , Lesser Joyweed <i>Alternanthera denticulata</i> and Prostrate Knotweed <i>Persicaria prostrata</i> . The community contains a relatively high weed cover in the ground layer due to its landscape position on low-lying, fertile water retentive soils and waterways. Common perennial exotic species recorded included Toowoomba Canary-grass <i>Phalaris aquatica</i> and Paspalum <i>Paspalum dilatatum</i> .
Justification of PCT	The investigation area is within the South Western Slopes IBRA bioregion. The vegetation occurs as an open woodland with a sparse midstorey and predominantly grassy understorey. Occurred on silty-sandy loam-clay soils on levees, waterways or other raised landform elements connecting to rivers and wetlands. The BioNet PCT Identification tool identified PCT 5 from the species recorded at the investigation area.
TEC Status	NSW BC Act: Not listed or associated with any TECs under the BC Act. Commonwealth EPBC Act: Not listed or associated with any TECs under the BC Act. .
Estimate of percent cleared value of PCT (BioNet)	40 % cleared (OEH 2017).

PCT 5: River Red-gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion

PCT 5 – Moderate Condition

Image detail:

Direction – East

**Location – Albury Tafe (Seven
Mile Creek)**

Date – 12 July 2023



Table 8 PCT 266 White Box grassy woodland

PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	
Common name	PCT 266 White Box grassy woodland
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodlands
Extent within investigation area	151.19 hectares
Condition	This community occurs as both moderate condition woodland and low condition derived grassland. Areas of woodland contain a remnant canopy, generally with little to no regeneration. Areas of derived grassland were generally dominated by native grassland species with no canopy or canopy regeneration present and a low overall species richness.
Description	Woodland In woodland areas this community occurs as remnant and planted woodland with trees to 25 metres high dominated by White Box <i>Eucalyptus albens</i> often as the only tree species. Planted areas are dense with no other species present, or contain a mixture of native tree and shrub species, often not associated with this PCT. <i>Eucalyptus bridgesiana</i>, <i>Eucalyptus blakelyi</i> or <i>Eucalyptus melliodora</i> are sometimes present as minor components of the canopy. In areas of remnant woodland the shrub layer is generally sparse to absent, with little to no regeneration of the canopy due to impacts of grazing. In areas of planted woodland, the shrub layer is often thick, generally with a mixture of Wattle (<i>Acacia</i> sp.) species. The ground layer is generally comprised of exotic grass species and subject to grazing. Grass species generally contain exotic annuals such as Ryegrass <i>Lolium</i> sp. Derived Grassland The ground cover in areas of derived grassland is generally mid-dense to dense native cover, generally dominated by Red-leg Grass <i>Bothriochloa macra</i>. Few native species are present due to the grazed nature of these areas. Areas of derived grassland generally contain shallow soils leading towards rocky hill tops with poor water retention and low soil fertility despite historic grazing, as such, a low presence of exotic species occurred. Both woodland and derived grassland mainly occur on hillslopes in low hill or hill landform patterns.
Justification of PCT	The investigation area is within the South Western Slopes IBRA bioregion. The community occurs as a tall open woodland, planted woodland or derived grassland with a dominance of White Box or grassland areas that were once dominated by White Box. This community occurred on hills, low hills, hillcrests and hillslopes. The BioNet PCT Identification tool identified PCT 266 from the species recorded at the investigation area.
TEC Status	NSW BC Act: All PCT 266 within the investigation area was determined to meet the criteria for <i>White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions</i> (Box-Gum Woodlands) Critically Endangered Ecological Community (CEEC) for both areas of woodland (including planted areas) and derived grassland. Commonwealth EPBC Act: Some areas of higher quality PCT 266, present in the investigation area, are consistent with the CEEC Box-Gum Woodlands listed under the EPBC Act. This is due

PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

to remnant patches having a shrub cover of less than 30%, being part of a patch that is at least 2 ha in size, containing 20 or more mature trees per hectare, and have a predominantly native understorey.

Further information on TECS is provided in Section 4.5.1 below.

Estimate of percent cleared value of PCT (BioNet)

94 % cleared (OEH 2017).

PCT 266 Remnant Woodland
Image detail:

Direction – North

Location – Lot 2 DP 833381

Date – 13 July 2023


PCT 266 Planted Woodland
Image detail:

Direction – East

Location – Lot 22 DP 1191688

Date – 14 July 2023



PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

PCT 266 Derived Grassland

Image detail:

Direction – South

Location – Lot 6 DP 1013331

Date – 14 July 2023



Table 9 PCT 269 White Box - Blakely's Red Gum - Red Box - Red Stringybark shrubby woodland
PCT 269 White Box - Blakely's Red Gum - Red Box - Red Stringybark shrubby woodland on shallow soils on metamorphic hills in the Albury region of the NSW South Western Slopes Bioregion

Common name	PCT 269 White Box – Blakely's Red Gum – Red Box – Red Stringybark shrubby Woodland
Vegetation formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation class	Upper Riverina Dry Sclerophyll Forests
Extent within investigation area	0.39 hectares
Condition	This community was recorded in a moderate condition class in one small pocket in the investigation area. The area where this community occurred likely formed a larger patch on the hillcrest however only a minor extent within the road reserve remains.
Description	This community occurs as a mid-high woodland dominated White Box <i>Eucalyptus albens</i>, Blakely's Red Gum <i>Eucalyptus blakelyi</i>, Red Box <i>Eucalyptus polyanthemos</i> and Red Stringybark <i>Eucalyptus macrorhyncha</i>. A sparse shrub layer is present, with <i>Acacia paradoxa</i>, <i>Acacia implexa</i> and <i>Acacia verniciflua</i>. The ground cover is sparse due to the dominance of shrubs and shallow soils. Occurs on skeletal clay - loam soils on stony hill slope derived from metamorphic rocks such as schist and gneiss on hills in and around the Albury. A highly restricted Community within the Albury LGA.
Justification of PCT	The investigation area is within the South Western Slopes IBRA bioregion. This community occurred on the crest of a small hill, and was dominated by White Box, Blakely's Red Gum, Red Box and Red Stringybark before grading into PCT 266 and PCT 277. The BioNet PCT Identification tool identified PCT 269 from the species recorded in the investigation area.
TEC Status	NSW BC Act: Due to the co-dominance of Red Box and Red Stringybark within this PCT, it is not listed as associated with any TECs under the BC Act, including Box-Gum Woodland. Commonwealth EPBC Act: Due to the co-dominance of Red Box and Red Stringybark within this PCT, it is not listed as associated with any TECs under the EPBC Act, including Box-Gum Woodland.
Estimate of percent cleared value of PCT (BioNet)	78 % cleared (OEH 2017).

PCT 269 White Box - Blakely's Red Gum - Red Box - Red Stringybark shrubby woodland on shallow soils on metamorphic hills in the Albury region of the NSW South Western Slopes Bioregion

PCT 269 – Moderate

Image detail:

Direction – North

Location – Williams Road,
northern road reserve

Date – 12 July 2023



Table 10 PCT 276 Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion

PCT 276 – Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion

Common name	PCT 276 Yellow Box grassy tall woodland
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodlands
Extent within investigation area	18.42 hectares
Condition	This community occurs in one location within the investigation area in high condition, with a remnant and regenerating canopy, sparse shrub cover and predominantly native ground layer.
Description	This community occurs as a tall grassy woodland dominated by Yellow Box <i>Eucalyptus melliodora</i> generally without other tree species, or where present a very low density of Red Box <i>Eucalyptus polyanthemos</i> and isolated Blakey's Red-gum <i>Eucalyptus blakelyi</i> where the edges of this PCT grade into PCT 360. The shrub layer is sparse to absent and where present includes <i>Acacia decora</i> . The ground cover is generally dense and dominated by grasses including <i>Bothriochloa macra</i> , <i>Austrostipa bigeniculata</i> , <i>Elymus scaber</i> var. <i>scaber</i> and <i>Chloris truncata</i> . Forbs included <i>Sida corrugate</i> , <i>Glycine clandestina</i> , <i>Oxalis perennans</i> and <i>Vittadinia cuneata</i> . Occurs on alluvial or aeolian (parna) clay soils on flats on a floodplains area associated with creek lines.
Justification of PCT	The investigation area is within the South Western Slopes IBRA bioregion. Occurs as tall grassy woodland on aeolian (parna) clay soils in a floodplain area associated with creek lines. Canopy is dominated by Yellow Box. The BioNet PCT Identification tool identified PCT 276 from the species recorded at the investigation area.
TEC Status	NSW BC Act: All PCT 276 within the investigation area was determined to meet the criteria for Box-Gum Woodlands CEEC. Commonwealth EPBC Act: This PCT occurs in high condition within the investigation area and is consistent with the CEEC Box-Gum Woodlands listed under the EPBC Act. This is due to the remnant patch having a shrub cover of less than 30%, being part of a patch that is at least 2 ha in size, containing 20 or more mature trees per hectare, and having a predominantly native understorey. Further information on TECS is provided in Section 4.5.1 below.
Estimate of percent cleared value of PCT (BioNet)	90 % cleared (OEH 2017).

PCT 276 – Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion

PCT 276 –High condition

Image detail:

Direction – North

Location – Wirlinga Training

Area

Date – 09 June 2023



Table 11 PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	
Common name	PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodlands
Extent within investigation area	279.83 hectares
Condition	This community is recorded in a planted and remnant woodland (moderate and high) condition state. Areas of remnant woodland generally contain a mature canopy, with areas subject to low or no grazing containing a regenerating canopy layer. Some areas contain a low level of remnant canopy trees with supplementary plantings present of canopy and shrub species.
Description	Remnant Woodland Areas of remnant PCT 277 typically occur as an open woodland to 25 metres high with a patchy to sparse shrub layer. The community contains a canopy dominated by Blakely's Red-gum <i>Eucalyptus blakelyi</i> with lower densities of Yellow Box <i>Eucalyptus melliodora</i>. White Box <i>Eucalyptus albens</i>, Apple Box <i>Eucalyptus bridgesiana</i> and Red Box <i>Eucalyptus polyanthemos</i> occur at low densities where areas of this PCT grade into PCT 266, 278 and/or 276. The midstorey is generally sparse to absent but where present contains a mixture of shrub species found commonly throughout the investigation area. Some areas of this PCT contain a high shrub cover where supplementary plantings have occurred. Supplementary plantings include Varnish Wattle <i>Acacia verniciflua</i>, Silver Wattle <i>Acacia dealbata</i> and Sticky Hop Bush <i>Dodonaea viscosa</i>. Remnant areas generally contain a ground stratum dominated by exotic perennial and annual species including Paspalum <i>Paspalum dilatatum</i>, Soft Brome <i>Bromus hordeaceus</i>, Annual Velt-grass <i>Ehrharta longifolia</i>, Great Brome <i>Bromus diandrus</i> and Ryegrass <i>Lolium</i> sp. Native species occur at low densities and include a range of grasses and herbs such as Rough Spear-grass <i>Austrostipa scabra</i>, Weeping Love-grass <i>Eragrostis parviflora</i>, Copper-awned Wallaby-grass <i>Rytidosperma fulvum</i>, Red-leg Grass <i>Bothriochloa macra</i>, Windmill Grass <i>Chloris truncata</i>, Wattle Mat-rush <i>Lomandra filiformis</i> and Common Wallaby-grass <i>Rytidosperma caespitosa</i>. Planted Woodland Areas of planted PCT 277 are generally dominated by Blakely's Red-gum, often with a very low density of remnant trees. Plantings are dense and contain a mixture of species including River Red-gum <i>Eucalyptus camaldulensis</i>, White Box, Yellow Box and non-indigenous species such as Spotted Gum <i>Corymbia maculata</i>. Some areas of planted vegetation contain dense shrub cover dominated by Varnish Wattle <i>Acacia verniciflua</i>, Silver Wattle <i>Acacia dealbata</i>, Sticky Hop Bush <i>Dodonaea viscosa</i>, Sweet Bursaria <i>Bursaria spinosa</i> and Hickory Wattle <i>Acacia implexa</i>. Ground cover is generally sparse due to the density of planted shrub and canopy species, however native grasses including Rough Spear-grass <i>Austrostipa scabra</i> and Common Wallaby-grass <i>Rytidosperma caespitosa</i> are often present.
Justification of PCT	The investigation area is within the South Western Slopes IBRA bioregion. Occurs as a tall open woodland dominated by Blakely's Red Gum. The community occurs in an area where rainfall is 400-1200 mm per annum. The investigation area occurs between 170 and 1200 m elevation. The BioNet PCT Identification tool identified PCT 277 from the species recorded at the investigation area.
TEC Status	NSW BC Act: All PCT 277 within the investigation area was determined to meet the criteria for Box-Gum Woodlands CEEC.

PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

Commonwealth EPBC Act: Higher quality examples of PCT 277 are investigation area consistent with the CEEC Box Gum Grassy Woodlands listed under the EPBC Act. This is due to the remnant patch having a shrub cover of less than 30%, being part of a patch that is at least 2 ha in size, containing 20 or more mature trees per hectare, and having a predominantly native understorey. Further information on TECS is provided in Section 4.5.1 below.

Estimate of percent cleared value of PCT (BioNet)

94 % cleared (OEH 2017).

PCT 277 – Remnant Woodland
Image detail:

Direction – East

Location – Bells Travelling Stock Reserve

Date – 16 June 2023


PCT 277 – Planted
Image detail:

Direction – West

Location – Lot 22 DP 1191688

Date – 12 July 2023

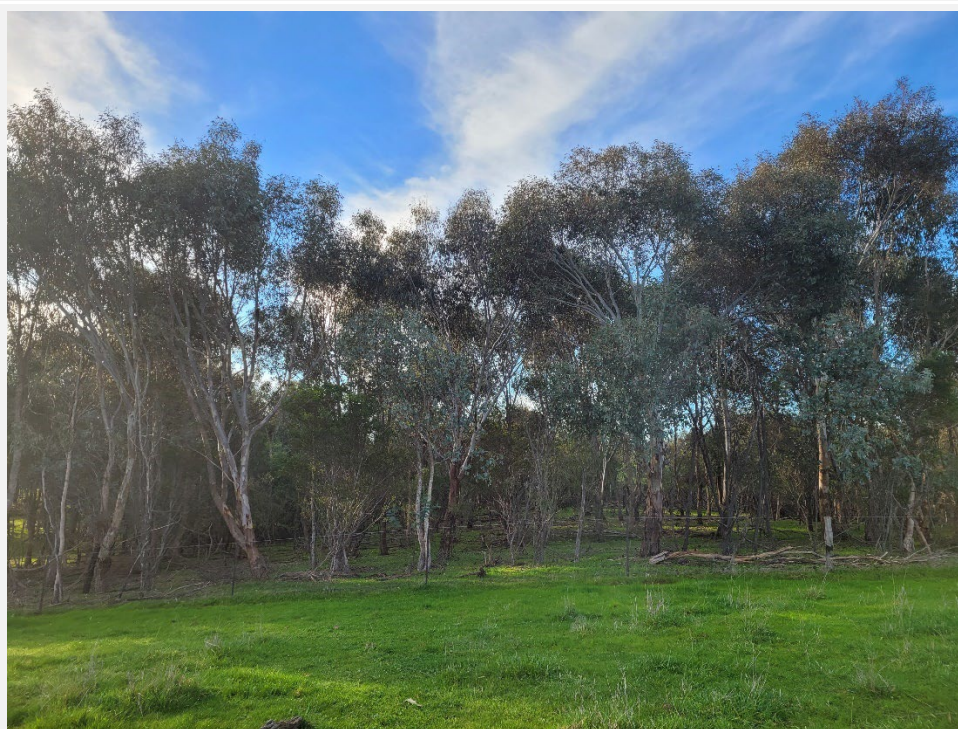


Table 12 PCT 278 Riparian Blakely's Red Gum – box – shrub – sedge – grass tall open forest of the central NSW South Western Slopes Bioregion

PCT 278: Riparian Blakely's Red Gum – box – shrub – sedge – grass tall open forest of the central NSW South Western Slopes Bioregion	
Common name	PCT 278 Riparian Blakely's Red Gum – box – shrub – sedge – grass tall open forest
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodlands
Extent within investigation area	313.97 hectares
Condition	PCT 278 is recorded in two distinct condition states, remnant woodland and derived grassland/sedgeland. A higher cover and diversity of native species is present in the remnant woodland areas, some areas of woodland were supplemented with native plantings. Areas of derived grassland are generally in a low condition state.
Description	Remnant Woodland The community occurs as woodland in riparian areas and around dams or impoundments and is dominated by Blakely's Red-gum <i>Eucalyptus blakelyi</i>. Low densities of Yellow Box <i>Eucalyptus melliodora</i>, Apple Box <i>Eucalyptus bridgesiana</i> and Bundy <i>Eucalyptus goniocalyx</i> are present. A shrub layer is generally absent, except in isolated areas where supplementary plantings have occurred, generally containing Varnish Wattle <i>Acacia verniciflua</i>, Silver Wattle <i>Acacia dealbata</i> and Sticky Hop Bush <i>Dodonaea viscosa</i>. Ground stratum is generally dominated by herbaceous sedge, rushes, herbs and grasses including <i>Juncus flavidus</i>, <i>Carex appressa</i> and <i>Poa labillardierei</i>, Native Mint <i>Mentha australis</i>, Knob Sedge <i>Carex inversa</i>, Sneezeweed <i>Centipeda cunninghamii</i> and Swamp Dock <i>Rumex brownii</i>. Areas of remnant woodland are generally subject to grazing and contain exotic ground cover species including <i>Paspalum dilatatum</i>, Great Brome <i>Bromus diandrus</i> and Ryegrass <i>Lolium</i> sp. Native species occurred at low densities in these areas. Derived grassland/sedgeland Areas of derived grassland/sedgeland occur predominately in creek lines and drainage lines lacking a canopy. These areas are generally connected directly to areas of remnant woodland. These areas are dominated by grassland or sedgeland species including Weeping Grass <i>Microlaena stipoides</i>, rushes <i>Juncus flavidus</i>, Native Sedge <i>Carex appressa</i> and <i>Poa labillardierei</i>. Other smaller aquatic species occur including Native Mint <i>Mentha Australis</i>, Knob Sedge <i>Carex inversa</i>, Sneezeweed <i>Centipeda cunninghamii</i> and Swamp Dock <i>Rumex brownii</i>.
Justification of PCT	The investigation area is within the South Western Slopes IBRA bioregion. The community occurs as a tall riparian woodland or derived grassland/sedgeland with a sparse distribution of shrubs and a ground layer dominated by sedges and rushes. Dominance of Blakely's Red-gum with a herbaceous ground layer. The community occurs in an area where rainfall is 400-1200 mm per annum. The investigation area occurs between 170 and 1200 m elevation. The BioNet PCT Identification tool identified PCT 278 from the species recorded at the investigation area.
TEC Status	NSW BC Act: All PCT 278 within the investigation area was determined to meet the criteria for Box-Gum Woodlands CEEC. Commonwealth EPBC Act: Higher quality examples of PCT 278, present in the investigation area, are also consistent with the CEEC Box-Gum Woodlands listed under the EPBC Act. This is due to the remnant patch having a shrub cover of less than 30%, being part of a patch that is

PCT 278: Riparian Blakely's Red Gum – box – shrub – sedge – grass tall open forest of the central NSW South Western Slopes Bioregion

at least 2 ha in size, containing 20 or more mature trees per hectare, and having a predominantly native understorey.
 Further information on TECS is provided in Section 4.5.1 below.

Estimate of percent cleared value of PCT (BioNet)

80 % cleared (OEH 2017).

PCT 278 – Remnant Woodland.
Image detail:

Direction – North

Location – Wirlinga Training Area

Date – 09 June 2023


PCT 278 – Derived Grassland and sedgeland
Image detail:

Direction – East

Location – Lot 8 DP 825239

Date – 14 July 2023



Table 13 PCT 360 gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion

PCT 360: Gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion	
Common name	Gilgai wetland mosaic
Vegetation formation	Freshwater Wetlands
Vegetation class	Inland Floodplain Swamps
Extent within investigation area	58.07 hectares
Condition	PCT 360 observed in the investigation area is in low, moderate and high condition. Low and moderate condition areas are generally subject to grazing, contain a high cover of exotic grasses between Gilgai's and plugging within gilgai depressions. Only one area was considered high condition, this occurred within a fenced reserve.
Description	The community occurs in the investigation area as both a treeless gilgai wetland mosaic and gilgai mosaic with a low density of trees. In both mosaic's the gilgai depressions are between 1m² – 10m² and were made up of a range of water dependent or tolerant grasses, sedges, herbs and rushes including Yellow Rush <i>Juncus flavidus</i>, <i>Carex tereticaulis</i>, Tall Sedge <i>Carex appressa</i>, Common Spike-sedge <i>Eleocharis acuta</i>, Blown Grass <i>Lachnagrostis filiformis</i>, Brown-backed Wallaby-grass <i>Rytidosperma duttonianum</i>, Reed Bent-grass <i>Deyeuxia quadriseta</i>, Swamp Dock <i>Rumex brownii</i>, Creeping Knotweed <i>Persicaria prostrata</i>, Spike Rush <i>Eleocharis acuta</i>, Swamp Wallaby Grass <i>Amphibromus nervosus</i>, Milfoil <i>Myriophyllum crispatum</i> and in deeper pooled areas Red Water Fern <i>Azolla rubra</i>. On the edges of Gilgai's some areas not subject to grazing contain native Rushes <i>Juncus flavidus</i> and Tall Sedge <i>Carex appressa</i>. Many gilgai depressions are subject to grazing and contain a low density of native species, however the gilgai landform is present. Some areas contain a low density of scattered Blakley's Red-gum <i>Eucalyptus blakelyi</i>. Due to significant degradation from cattle, the community has a moderate to high cover of weeds. In areas where the soils are heavier and wetter there is a lower concentration of weed cover. However, the high elevated banks that are drier contain a higher exotic cover and abundance. Dominant exotic species include Canary-Grass <i>Phalaris aquatica</i>, <i>Paspalum Paspalum dilatatum</i> and other annual pasture species.
Justification of PCT	The investigation area is within the South Western Slopes IBRA bioregion. Investigation area occurs on gilgai soil in the Albury-Holbrook region. The community occurs as a treeless freshwater wetland in gilgai depressions that are not associated with ground water from watercourses or floodplain areas. Dominance of wetland grasses and forbs with an absence or rarity of shrubs present. Occurring on flat plains grading into slopes below 500 m above sea level. The BioNet PCT Identification tool identified PCT 360 from the species recorded at the investigation area.
TEC Status	NSW BC Act: This community does not have a listing status under the BC Act. Commonwealth EPBC Act: All PCT 360 within investigation area is consistent with the CEEC Seasonal Herbaceous (freshwater) Wetlands listed under the EPBC Act. This is due to the patch containing no more than 10% projective foliage cover of woody species, containing greater than 50 % cover of native wetland species (or a precautionary approach of assuming with the removal of grazing these areas would regenerate to contain more than 50% cover of native wetland species) that are characteristic of the community and that the gilgai formations fit with the fine-scale cluster of wetlands category (where the total area of the cluster polygon is more than 5 ha and the collective area of wetlands within the cluster is more than 0.5 ha). This PCT is sensitive and subject to seasonal conditions, and current grazing regimes, where

PCT 360: Gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion

	condition thresholds for EPBC Act listing were borderline due to heavy grazing at the current time of survey, a precautionary approach of assuming the EPBC Act community was present, where, through the rotation of livestock, and seasonal conditions this PCT has the potential to regenerate from the soil seed bank (Biosis 2022). Further information on TECS is provided in Section 4.5.1 below.
Estimate of percent cleared value of PCT (BioNet)	90 % cleared (OEH 2017).
PCT 360 – High Image detail: Direction – North Location – Lot 83 DP 1160137 Date – 12 July 2023	
PCT 360 – Moderate Image detail: Direction – North Location – Lot 10 DP 1246346 Date – 14 July 2023	

PCT 360: Gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion

PCT 360 - Low

Image detail:

Direction – East

Location – Lot 34 DP 753356

Date – 13 July 2023



Scattered trees

Scattered trees occur throughout the investigation area. Scattered trees generally occur within areas of agricultural land subject to historic grazing and clearing. The majority of scattered trees are species indigenous to the Albury LGA and consisted of remnant Eucalypts with a DBH greater than 50 centimetres. These remnant trees generally contain tree hollows, an important biodiversity resource.

A number of scattered trees are planted native species indigenous to the Albury LGA and are therefore considered native. Any planted native trees not indigenous to NSW or the Riverina such as Lemon Scented Gum *Corymbia citriodora* were not included as a scattered tree. No exotic (non-native) species were included as scattered trees. Refer to Figure 8.

Planted native vegetation

Planted native vegetation for the purpose of this report is defined as vegetation plantings of species that are not considered indigenous to NSW or the Riverina, such as Lemon Scented Gum *Corymbia citriodora*, Argyle Apple *Eucalyptus cinerea* and Spotted Gum *Eucalyptus maculata*. Planted native vegetation generally occurs in rows or patches along fence lines in agricultural areas, along roadsides and near residential dwellings. However, several areas, including the Albury TAFE contain large areas of planted native vegetation.

These areas, although not capable of being assigned a PCT, can still form breeding and foraging habitat for native species, especially threatened birds and arboreal mammals. Refer to Figure 8.

4.4. Non-native vegetation

Non-native vegetation predominately occurs as cleared and semi-cleared agricultural land with a mixture of annual and perennial exotic grass species subject to sheep and/or cattle grazing. Some areas contain agricultural crops including oilseeds and cereal production. Exotic trees occur intermittently throughout the investigation area.

Many areas of native PCTs contained exotic vegetation as a component of the community structure. Full list of non-native species is located within Appendix 6.

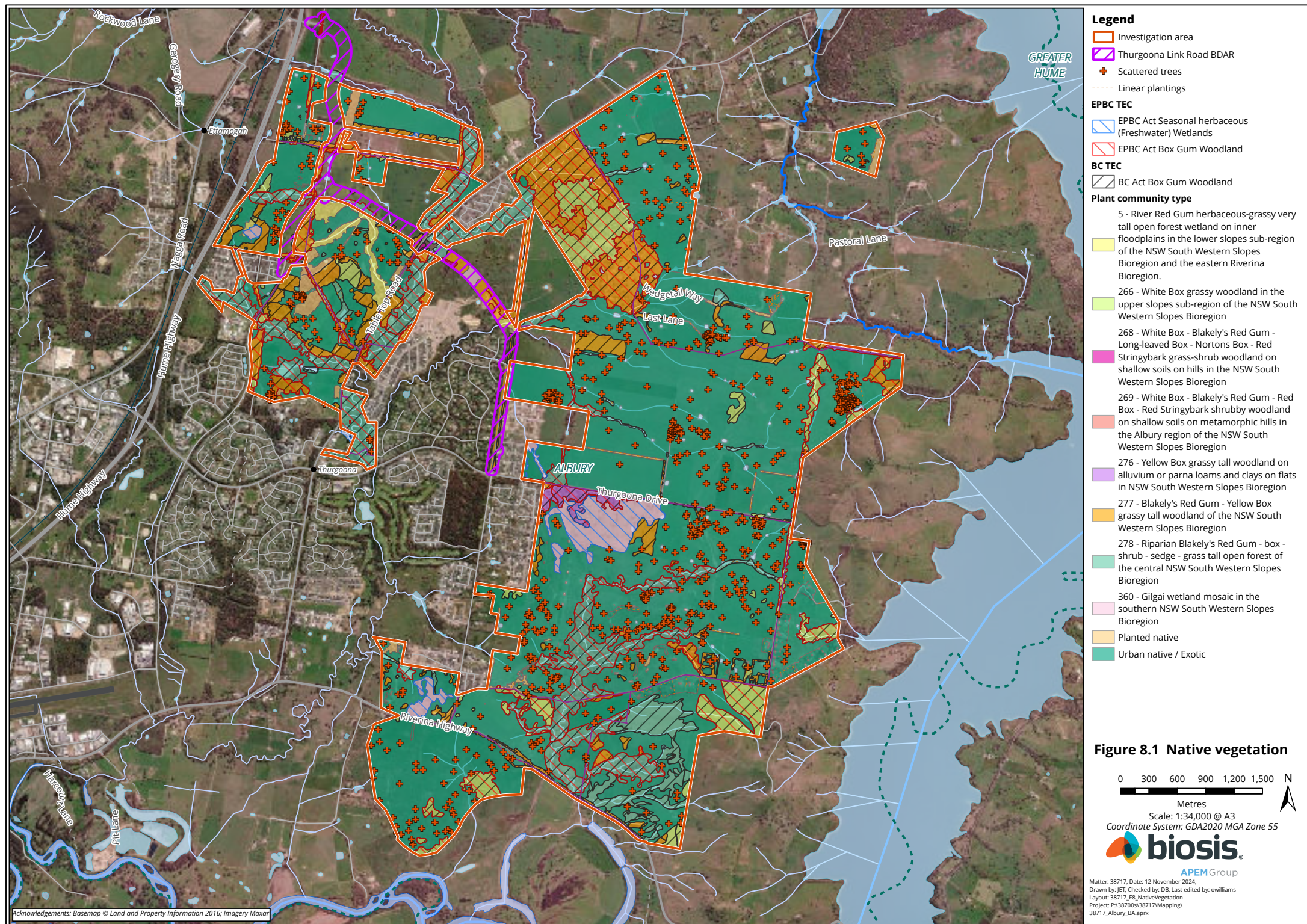
4.4.1. Priority weeds

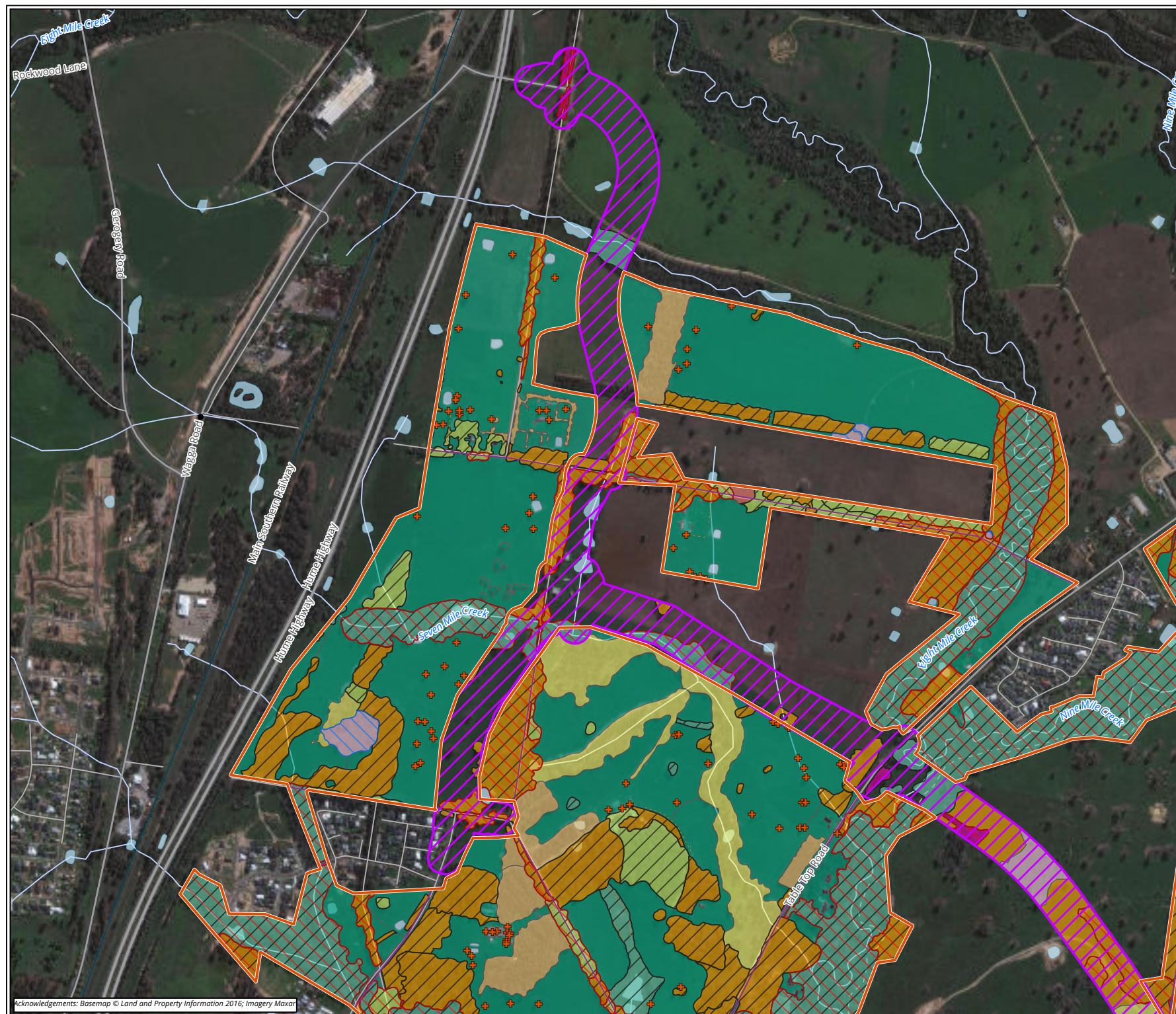
Where identified during the field assessment Priority Weeds for the Murray LLS as defined by (DPI 2023b) were marked using a GPS. Priority Weeds identified were:

- Blackberry *Rubus fruticosus*.
- African Boxthorn *Lycium ferocissimum*.
- Bridal Creeper *Asparagus asparagoides*.
- Khaki Weed *Alternanthera pungens*.

Only areas not subject to treatment were marked. Most areas where Blackberry was identified contain obvious signs of chemical and manual removal.

Additional to this, African Boxthorn, Blackberry and Bridal Creeper are identified as Weeds of National Significance under the National Weeds Strategy, regarded as the worst weeds in Australia because of their invasiveness, potential for spread, and economic and environmental impacts (DPI 2023b).





Legend

- Investigation area
- Thurgoona Link Road BDAR
- + Scattered trees
- Linear plantings

EPBC TEC

- EPBC Act Seasonal herbaceous (Freshwater) Wetlands
- EPBC Act Box Gum Woodland

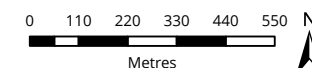
BC TEC

- BC Act Box Gum Woodland

Plant community type

- 5 - River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.
- 266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- 268 - White Box - Blakely's Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion
- 269 - White Box - Blakely's Red Gum - Red Box - Red Stringybark shrubby woodland on shallow soils on metamorphic hills in the Albury region of the NSW South Western Slopes Bioregion
- 277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion
- 278 - Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest of the central NSW South Western Slopes Bioregion
- 360 - Gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion
- Planted native
- Urban native / Exotic

Figure 8.2 Native vegetation



Scale: 1:12,000 @ A3
Coordinate System: GDA2020 MGA Zone 55

biosis
APM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_P8_NativeVegetation
Project: P\38700\38717\Mapping\38717_Albury_BA.aprx



Legend

Investigation area

Thurgoona Link Road BDAR

Scattered trees

Linear plantings

EPBC TEC

EPBC Act Seasonal herbaceous (Freshwater) Wetlands

EPBC Act Box Gum Woodland

BC TEC

BC Act Box Gum Woodland

Plant community type

5 - River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.

266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

268 - White Box - Blakely's Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion

277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

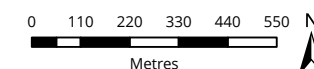
278 - Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest of the central NSW South Western Slopes Bioregion

360 - Gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion

Planted native

Urban native / Exotic

Figure 8.3 Native vegetation



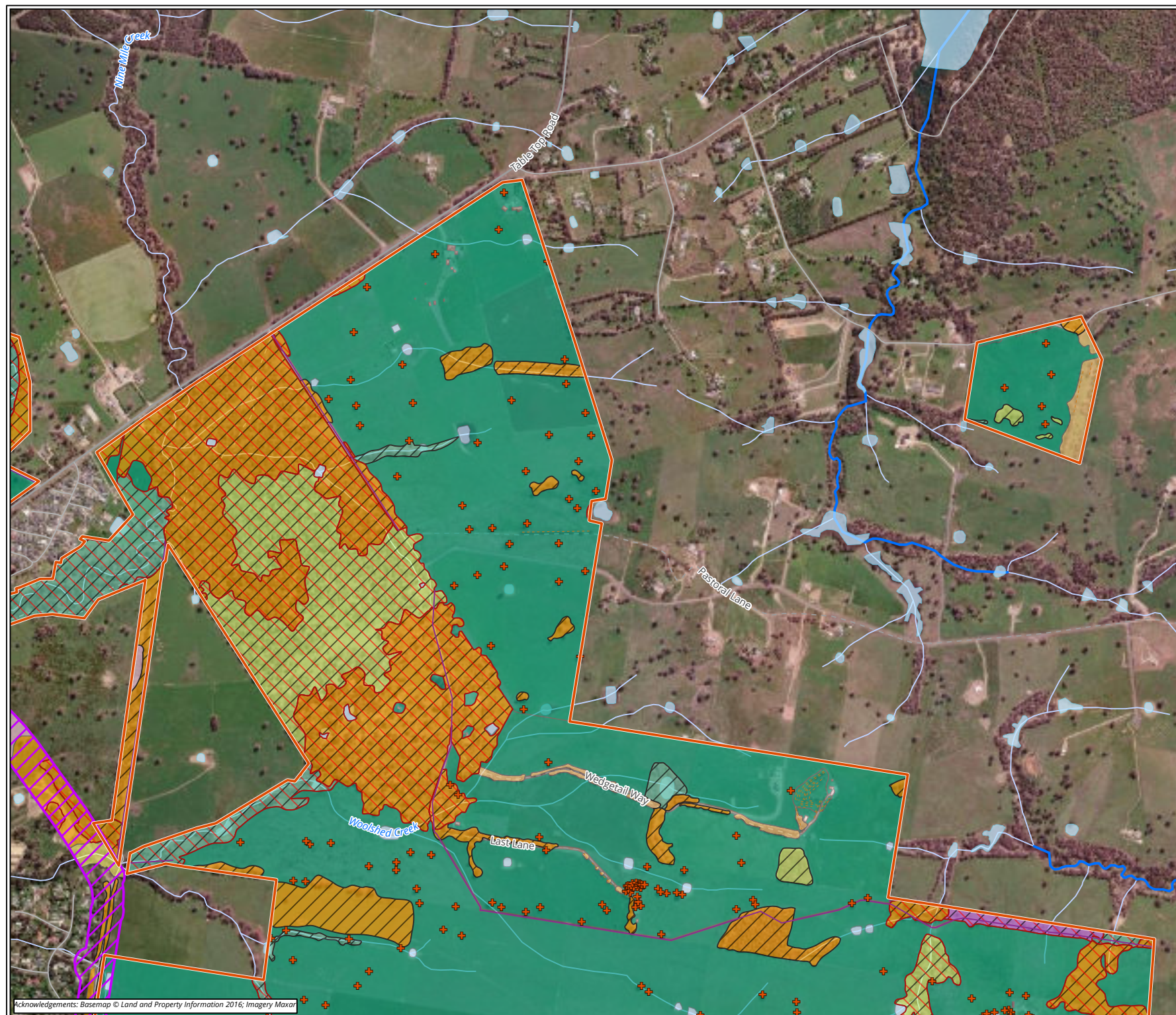
Scale: 1:12,000 @ A3

Coordinate System: GDA2020 MGA Zone 55

biosis

APeM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F8_NativeVegetation
Project: P:\38700\38717\Mapping\38717_Albury_BA.aprx



Legend

- Investigation area
- Thurgoona Link Road BDAR
- + Scattered trees
- Linear plantings

EPBC TEC

- EPBC Act Seasonal herbaceous (Freshwater) Wetlands
- EPBC Act Box Gum Woodland

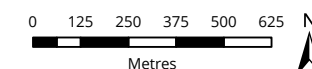
BC TEC

- BC Act Box Gum Woodland

Plant community type

- 5 - River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.
- 266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- 276 - Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion
- 277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion
- 278 - Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest of the central NSW South Western Slopes Bioregion
- 360 - Gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion
- Planted native
- Urban native / Exotic

Figure 8.4 Native vegetation

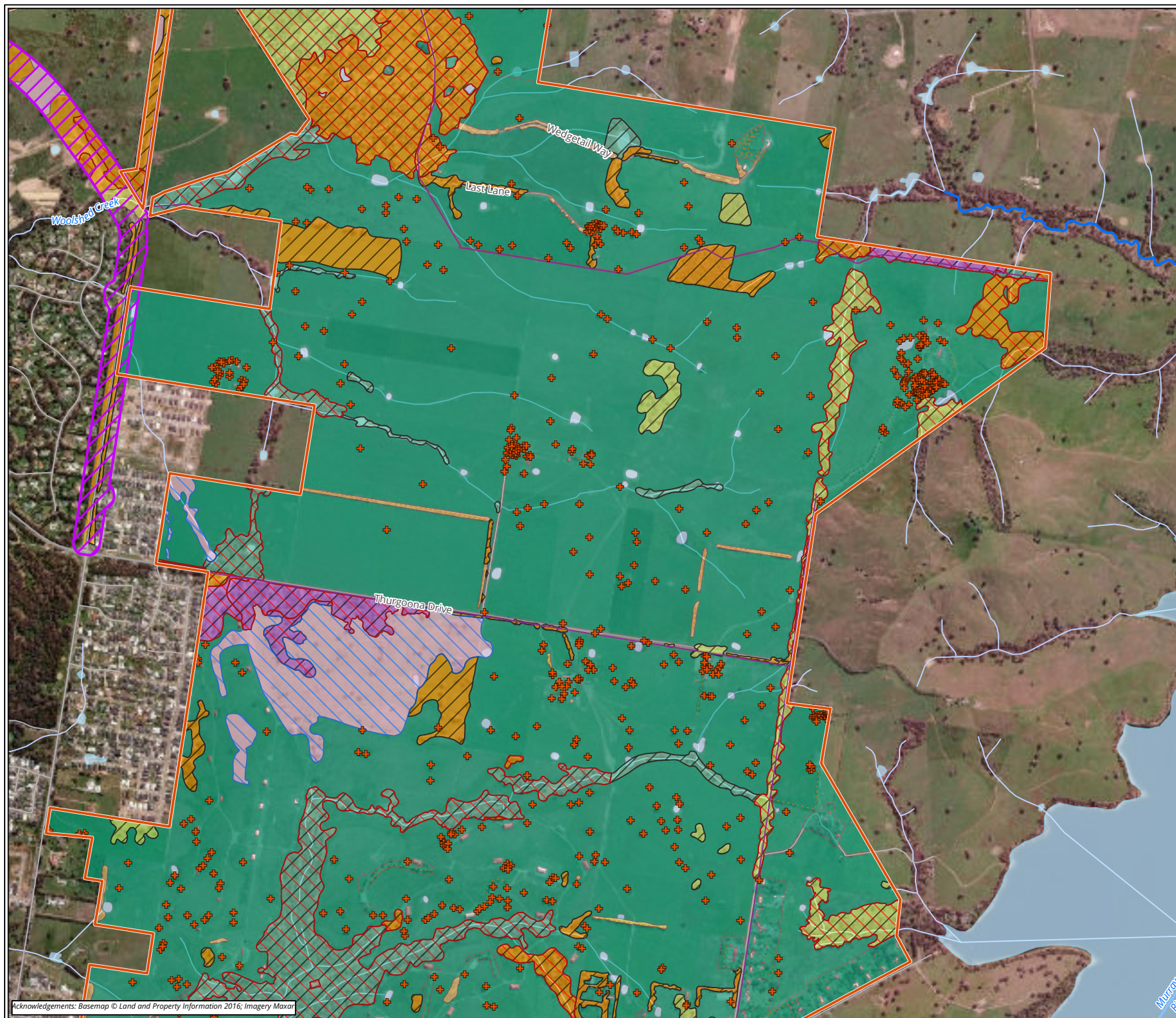


Scale: 1:14,000 @ A3
Coordinate System: GDA2020 MGA Zone 55



APEMGroup

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F8_NativeVegetation
Project: P:\38700\38717\Mapping\38717_Albury_BA.aprx



Legend

- Investigation area
- Thurgoona Link Road BDAR
- + Scattered trees
- Linear plantings

EPBC TEC

- EPBC Act Seasonal herbaceous (Freshwater) Wetlands
- EPBC Act Box Gum Woodland

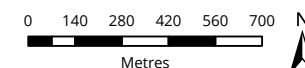
BC TEC

- BC Act Box Gum Woodland

Plant community type

- 5 - River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.
- 266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- 276 - Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion
- 277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion
- 278 - Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest of the central NSW South Western Slopes Bioregion
- 360 - Gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion
- Planted native
- Urban native / Exotic

Figure 8.5 Native vegetation

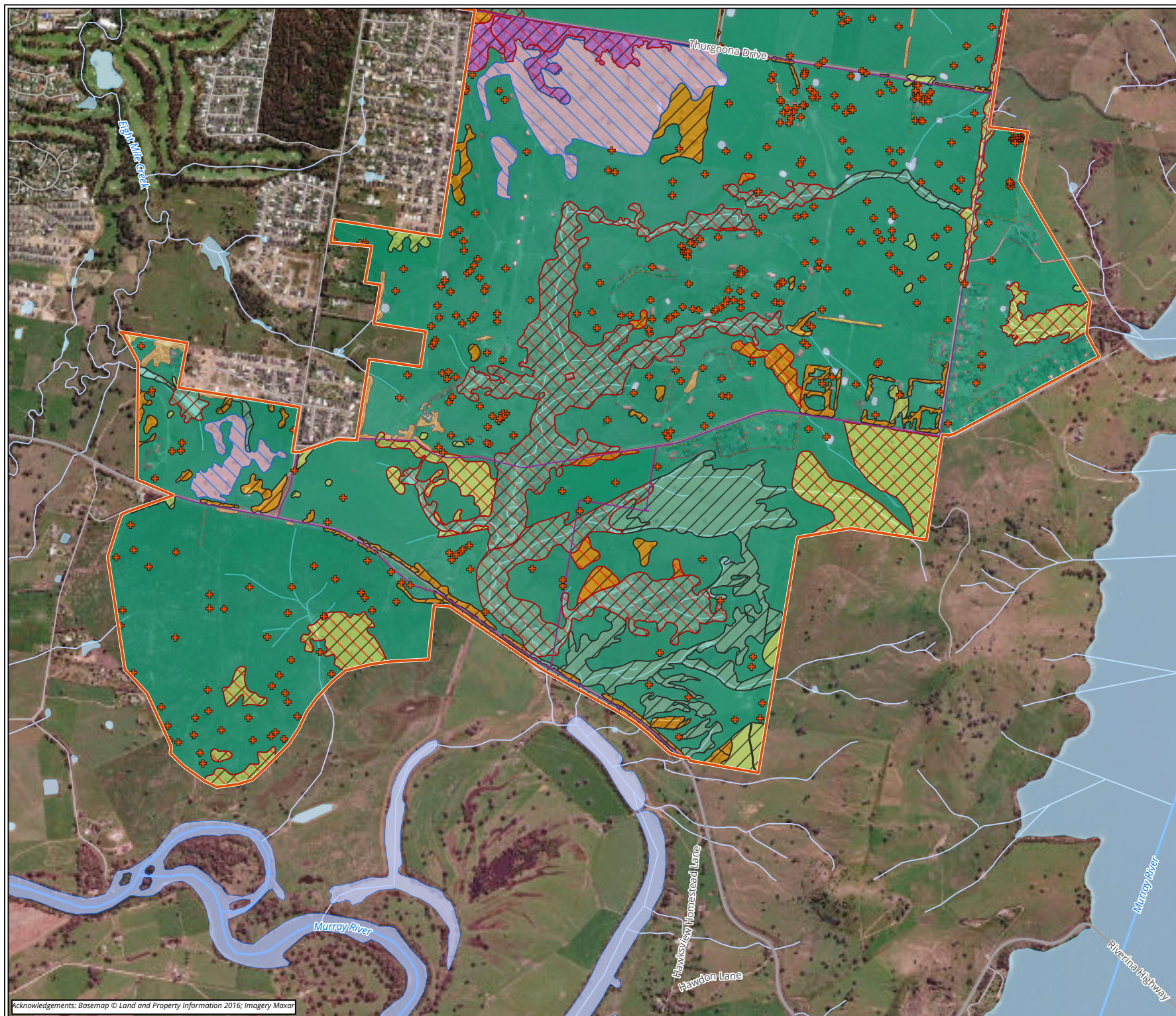


Scale: 1:16,000 @ A3
Coordinate System: GDA2020 MGA Zone 55

biosis

APEM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_P8_NativeVegetation
Project: P\38700\38717\Mapping\38717_Albury_BA.aprx



Legend

- Investigation area
- Thurgoona Link Road BDAR
- + Scattered trees
- Linear plantings

EPBC TEC

- EPBC Act Seasonal herbaceous (Freshwater) Wetlands
- EPBC Act Box Gum Woodland

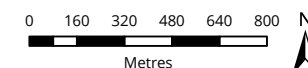
BC TEC

- BC Act Box Gum Woodland

Plant community type

- 5 - River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.
- 266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- 276 - Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion
- 277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion
- 278 - Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest of the central NSW South Western Slopes Bioregion
- 360 - Gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion
- Planted native
- Urban native / Exotic

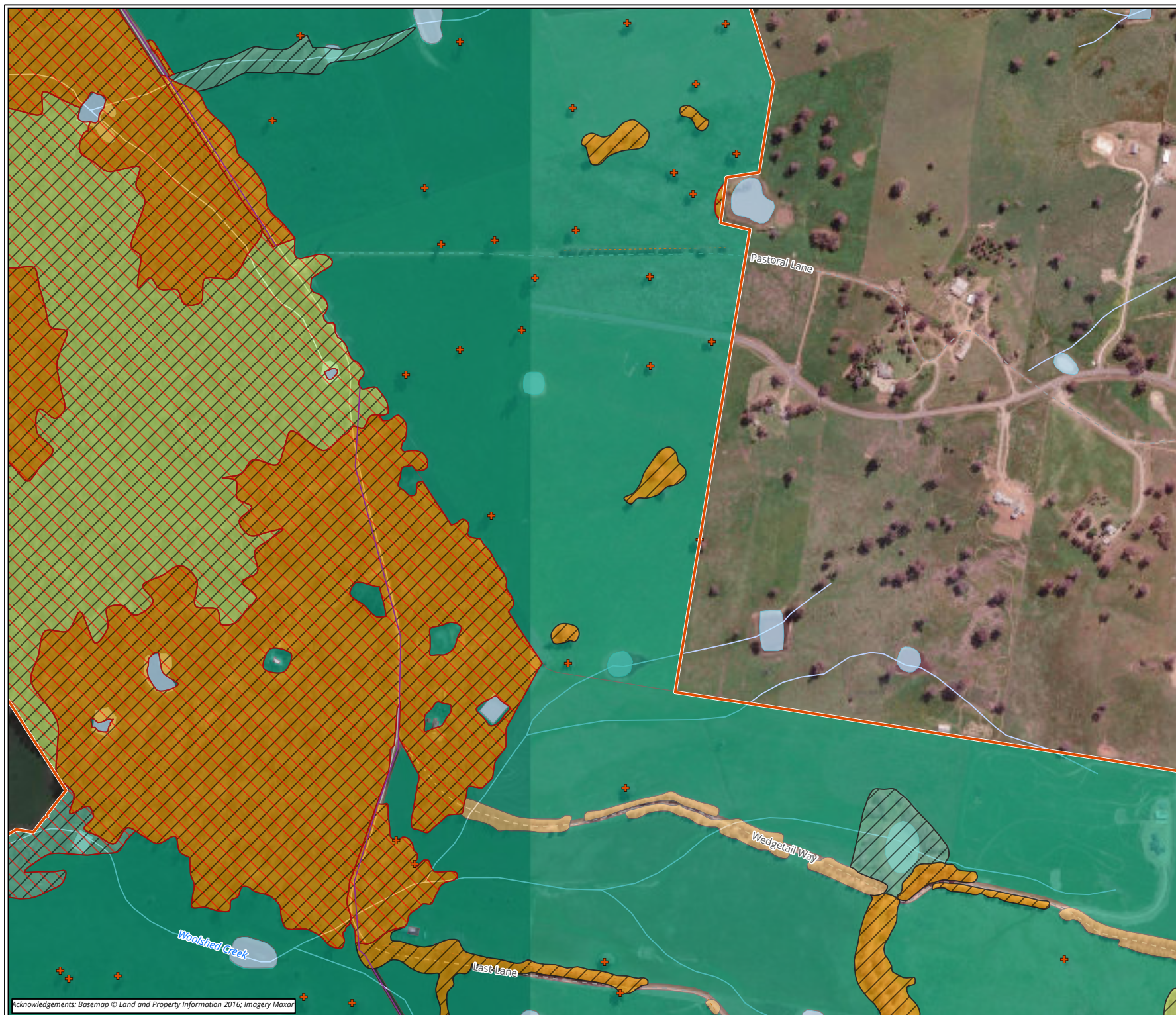
Figure 8.6 Native vegetation



Scale: 1:18,000 @ A3
Coordinate System: GDA2020 MGA Zone 55

biosis
APeM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_P8_NativeVegetation
Project: P\38700\38717\Mapping\38717_Albury_BA.aprx



Legend

- Investigation area
- Thurgoona Link Road BDAR
- Scattered trees
- Linear plantings

EPBC TEC

- EPBC Act Seasonal herbaceous (Freshwater) Wetlands
- EPBC Act Box Gum Woodland

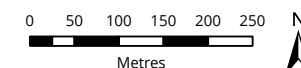
BC TEC

- BC Act Box Gum Woodland

Plant community type

- 266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- 277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion
- 278 - Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest of the central NSW South Western Slopes Bioregion
- Planted native
- Urban native / Exotic

Figure 8.7 Native vegetation



Scale: 1:6,000 @ A3
Coordinate System: GDA2020 MGA Zone 55

biosis
APEM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F8_NativeVegetation
Project: P:\38700\38717\Mapping\38717_Albury_BA.aprx

4.5. Threatened BC Act listed entities

4.5.1. Threatened ecological communities

Prior to the field investigation, eight threatened ecological communities were identified by database searches as potentially occurring in the broader landscape, these are listed in Appendix 5. Under Stage 1 Section 4 of the BAM 2020 all areas of threatened ecological community are required to be mapped and assessed.

Native vegetation within the investigation area met the final determination of one ecological community listed under the BC Act:

- White Box – Yellow Box – Blakley’s Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions (BC Act Box-Gum Woodland).

Within the investigation area, all areas of the following PCTs are associated with and form part of the Critically Endangered Ecological Box-Gum Woodland community listed under the BC Act:

- PCT 266 White Box grassy woodland.
- PCT 276 Yellow Box grassy tall woodland.
- PCT 277 Blakely’s Red Gum – Yellow Box grassy tall woodland.
- PCT 278 Riparian Blakely’s Red Gum – box – shrub – sedge – grass tall open forest.

Within the investigation area, all areas of the associated PCTs listed above were found to meet the condition thresholds for listing of this TEC due to their floristic composition, location within the NSW South Western Slopes IBRA bioregion and location within the landscape. The NSW Scientific Committee Final Determination of this TEC provides a clear definition of the community, stating that disturbed remnants are also considered to form part of this community where the soil seed bank is still intact and would respond to assisted natural regeneration with appropriate management (DPE 2002).

Figure 8 depicts BC Act listed Box-Gum Woodland. Table 14 below summarises the BC Act TECs identified within the investigation area.

Table 14 Summary of BC Act TECs within the investigation area

BC Act TEC	BC Act Listing	Area (Ha)
White Box Yellow Box Blakely’s Red Gum Woodland (BC Act Box-Gum Woodlands)	CEEC	763.41

4.6. Biodiversity Assessment Method identified predicted credit species

4.6.1. Predicted Species (Ecosystem credit species)

A list of predicted species (ecosystem credit species) expected to occur within the investigation area was generated as per Section 5 of the BAM. Impacts to these species require assessment, however targeted survey are not required as these species are assumed to occur, based on the occurrence of the PCTs, habitat constraints, native vegetation cover in the landscape and systematic patch sizes. Under Stage 2 of the BAM 2020, habitat associated with these species proposed to be impacted by developments that have triggered the BOS will incur offset obligations.

These species are identified as ecosystem credit species in the Threatened Biodiversity Data Collection (TBDC). Table 15 lists the ecosystem credit species that could not be discounted from using the investigation area on occasion.

It is important to note that some species are 'dual credit species', whereby they are listed as both a predicted species (ecosystem credit species) and species credit species (candidate species). One predicted species, Spot-tailed Quoll *Dasyurus maculatus*, has been excluded/removed from the predicted species list. Although a single record of this species is present within the LGA, a known population does not occur. This species has been excluded where habitat present is not likely to support breeding or foraging for this species.

Table 15 Ecosystem credit species (predicted species)

Species name	Common name
<i>Botaurus poiciloptilus</i>	Australasian Bittern
<i>Rostratula australis</i>	Australian Painted Snipe
<i>Ninox connivens</i>	Barking Owl
<i>Falco subniger</i>	Black Falcon
<i>Melithreptus gularis</i>	Black-chinned Honeyeater (eastern subspecies)
<i>Grus rubicunda</i>	Brolga
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)
<i>Stagonopleura guttata</i>	Diamond Firetail
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat
<i>Artamus cyanopterus</i>	Dusky Woodswallow
<i>Petroica phoenicea</i>	Flame Robin
<i>Stictonetta naevosa</i>	Freckled Duck
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo
<i>Pachycephala inornata</i>	Gilbert's Whistler
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler (eastern subspecies)
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox

Species name	Common name
<i>Melanodryas cucullata</i>	Hooded Robin (south-eastern form)
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat
<i>Hieraaetus morphnoides</i>	Little Eagle
<i>Glossopsitta pusilla</i>	Little Lorikeet
<i>Chalinolobus picatus</i>	Little Pied Bat
<i>Anseranas semipalmata</i>	Magpie Goose
<i>Tyto novaehollandiae</i>	Masked Owl
<i>Grantiella picta</i>	Painted Honeyeater
<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet
<i>Ninox strenua</i>	Powerful Owl
<i>Anthochaera phrygia</i>	Regent Honeyeater
<i>Petroica boodang</i>	Scarlet Robin
<i>Chthonicola sagittata</i>	Speckled Warbler
<i>Circus assimilis</i>	Spotted Harrier
<i>Lophoictinia isura</i>	Square-tailed Kite
<i>Polytelis swainsonii</i>	Superb Parrot
<i>Lathamus discolor</i>	Swift Parrot
<i>Neophema pulchella</i>	Turquoise Parrot
<i>Daphoenositta chrysoptera</i>	Varied Sittella
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle
<i>Epthianura albifrons</i>	White-fronted Chat
<i>Hirundapus caudactus</i>	White-throated Needletail
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat

4.6.2. Species Credit Species (Candidate)

Species credit species are threatened species for which vegetation surrogates and/or landscape features cannot reliably predict the likelihood of their occurrence, or components of their habitat. These species are identified as species credit species in the TBDC. A targeted survey or an expert report is required to confirm the presence of these species in the investigation area, or alternatively the species can be assumed to be present (DPIE 2020).

The list of species credit species predicted to occur within the investigation area is provided in Appendix 5. The potential for a species to occur within the investigation area was assessed in accordance with Section 5.2 of the BAM.

Species excluded from the candidate species list

Twenty-two species credit species have been excluded from occurring within the investigation area based on a lack of suitable habitat, lack of required microhabitat features, geographic constraint or vagrancy, refer to Table 17. Species that have been justifiably excluded from the candidate species list under the BAM 2020 do not require further assessment or targeted surveys. Candidate species that were excluded are summarised below in Table 16. Justification of exclusions are discussed in further detail within Appendix 5.

Table 16 Excluded candidate species

Species name	Common name	Survey period	Conclusion
Flora			
<i>Acacia ausfeldii</i>	Ausfeld's Wattle	August – October	Excluded (Habitat degraded)
<i>Ammobium craspedioides</i>	Yass Daisy	September – November	Excluded (Habitat degraded)
<i>Caladenia concolor</i>	Crimson Spider Orchid	September	Excluded (Habitat degraded)
<i>Cullen parvum</i>	Small Scurf-pea	January, December	Excluded (Habitat degraded)
<i>Euphrasia arguta</i>	Euphrasia arguta	January – March, November – December	Excluded (Habitat degraded)
<i>Grevillea wilkinsonii</i>	Tumut Grevillea	October	Excluded (Habitat degraded)
<i>Pilularia novae-hollandiae</i>	Austral Pilwort	October – November	Excluded (Habitat degraded)
<i>Prasophyllum petilum</i>	Tarengo Leek Orchid	September – December	Excluded (Habitat degraded)
<i>Prasophyllum</i> sp. <i>Wybong</i>	<i>Prasophyllum</i> sp. <i>Wybong</i>	September – October	Excluded (Habitat degraded)
<i>Swainsona recta</i>	Small Purple-pea	September – November	Excluded (Habitat degraded)
<i>Swainsona sericea</i>	Silky Swainson-pea	September – November	Excluded (Habitat degraded)

Species name	Common name	Survey period	Conclusion
Fauna			
<i>Aprasia parapulchella</i>	Pink-tailed Legless Lizard	September – November	Excluded (Habitat degraded)
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	January, November – December	Excluded (Habitat constraints)
<i>Delma impar</i>	Striped Legless Lizard	September – December	Excluded (Habitat degraded, Geographic limitations)
<i>Litoria booroolongensis</i>	Booroolong Frog	October – December	Excluded (Species is vagrant)
<i>Litoria raniformis</i>	Southern Bell Frog	January, October – December	Excluded (Species is vagrant)
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	January – February, December	Excluded (Habitat constraints)
<i>Petrogale penicillata</i>	Brush-tailed Rock Wallaby	January – December	Excluded (Habitat constraints)
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	January – June, December	Excluded (Geographic limitations)
<i>Pteropus poliocephalus</i>	Grey-headed Flying Fox	October – December	Excluded (habitat constraints)
Invertebrates			
<i>Keyacris scurra</i>	Key's Matchstick Grasshopper	March – May, August – December	Excluded (Species is vagrant)
<i>Synemon plana</i>	Golden Sun Moth	November – December	Excluded (Geographic limitations)

Candidate species requiring further assessment

The remaining candidate (a total of 16 species) credit species are considered to potentially occur within the investigation area, and thus require further assessment and/or targeted threatened species surveys. Under the TBDC each candidate species is assigned a specific survey period in which surveys must be completed to confirm presence. It is important to note that due to time limitations and constraints, not all candidate species requiring further assessment were subject to targeted surveys. Therefore, where species could not be surveyed within the time constraints of this assessment, they have been noted as 'assumed presence'.

The candidate species credit species considered as part of this assessment, and their associated method of assessment are listed in Table 17.

This assessment has not included the completion of Vegetation Integrity (VI) Plots to produce the species credit species list, benchmark VI data was used for each PCT identified within the investigation area.

Table 17 Candidate - species credit species

Species name	Common name	Survey period	Presence conclusion
Flora			
<i>Amphibromus fluitans</i>	Floating Swamp Wallaby Grass	January – March, December	Yes (Assumed Present)
Fauna			
<i>Anthochaera phrygia</i>	Regent Honeyeater	Important Habitat Map	Yes (Important Habitat Map)
<i>Burhinus grallarius</i>	Bush Stone-curlew	January – December	No (Surveyed)
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	January, October – December	Yes (Assumed present)
<i>Calyptorhynchus lathami</i>	Glossy Black Cockatoo	January – September	No (Surveyed)
<i>Cercartetus nanus</i>	Eastern Pygmy Possum	January – March, October – December	Yes (Assumed present)
<i>Crinia sloanei</i>	Sloane's Froglet	July – August	Yes (Surveyed)
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	July – December	No (Surveyed)
<i>Hieraaetus morphnoides</i>	Little Eagle	August – October	No (Surveyed)
<i>Lathamus discolor</i>	Swift Parrot	Important Habitat Map	Yes (Important Habitat Map)
<i>Lophoictinia isura</i>	Square-tailed Kite	January, September – December	No (Surveyed)
<i>Myotis macropus</i>	Southern Myotis	January – March, October – December	Yes (Assumed present)
<i>Ninox connivens</i>	Barking Owl	May – December	No (Surveyed)
<i>Ninox strenua</i>	Powerful Owl	May – August	No (Surveyed)
<i>Petaurus norfolcensis</i>	Squirrel Glider	January – December	Yes (Surveyed)
<i>Phascolarctos cinereus</i>	Koala	January – December	No (Surveyed)
<i>Polytelis swainsonii</i>	Superb Parrot	September – November	No (Surveyed)
<i>Tyto novaehollandiae</i>	Masked Owl	May – August	Yes (Surveyed)

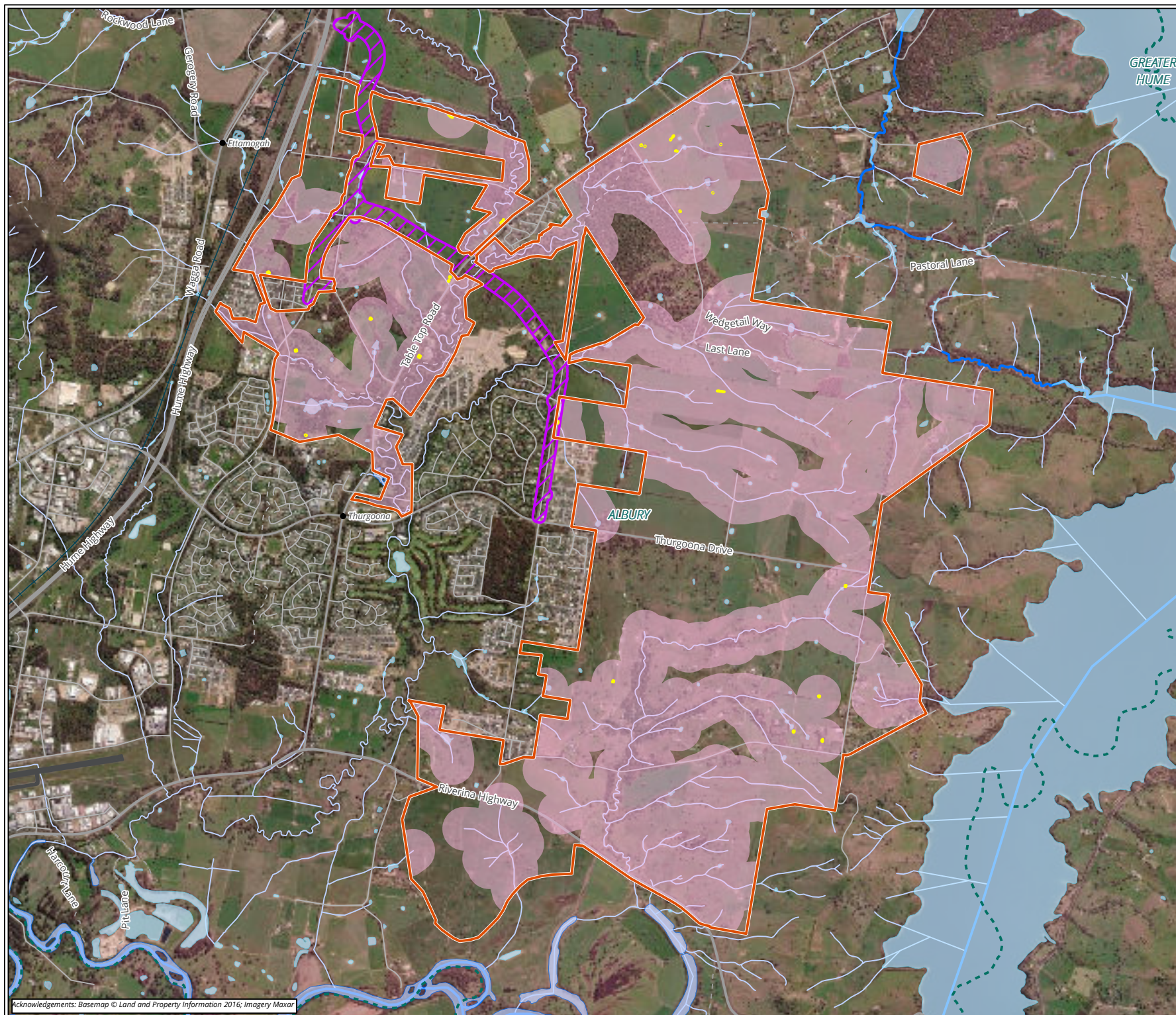
It is important to note that the following raptor species, White-bellied Sea-eagle, Little Eagle and Square-tailed Kite, are detailed as 'No' for presence, where no breeding sites (stick nests) were identified at the time of survey. These species, however, may still forage within the investigation area and/or construct nests in future breeding seasons. These species have been recorded within the Atlas of Living Australia within the Albury region and are known to occur more broadly within the LGA and surrounding areas (ALA 2024).

4.6.3. Threatened flora

One threatened flora species, Floating Swamp Wallaby Grass, was determined to require surveys. This species is known to occur within the Albury LGA, with records from the NSW BioNet present within the investigation area.

Due to the timing constraints of this assessment and the risk of this species being present and dormant in surveyed areas, targeted surveys were not completed in the optimal survey period required for this species. To avoid underrepresenting this species potential habitat within the investigation area, all areas of suitable aquatic habitat were buffered by 200 metres to identify suitable habitat areas. While the entirety of this buffer area is unlikely to provide suitable habitat, this buffer highlights suitable habitat areas and avoids the risk of under representing potential habitat within the investigation area.

All other flora species identified within Table 17 and Appendix 5 were determined unlikely to occur and as such, were excluded from the species credit species list.



Legend

- Investigation area
- Thurgoona Link Road BDAR
- 200m River Swamp Wallaby Grass potential habitat buffer
- Unmapped dams and gilgai's (Biosis 2023)

Figure 9.1 Targeted flora - River Swamp Wallaby Grass

0 300 600 900 1,200 1,500 N
Metres

Scale: 1:34,000 @ A3
Coordinate System: GDA2020 MGA Zone 55

biosis

APEM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_P9_RiverSwampWallabyGrass
Project: P\38700\38717\IMapping\38717_Albury_BA.aprx

4.6.4. Threatened fauna

Habitat assessment

A fauna habitat assessment was undertaken to determine the presence of microhabitats and other critical habitat components (habitat constraints). Several habitat features with potential to support threatened species credit species were identified during these habitat assessments. These features have been summarised in Table 18. Parts of the investigation area could not be accessed, as such, any future assessments may require targeted surveys to confirm presence of candidate species. Where areas of land could not be accessed, available spatial data alongside a high-level desktop assessment was completed to create areas of assumed presence for threatened species. For example, this included assuming presence of Sloane's Froglet within all identified aquatic areas. In the case of Lot 30 DP1273509, a parcel of land directly east of Bells TSR, the entire area was mapped as assumed Sloane's Froglet presence. An assessment of aerial imagery indicates the potential for unmapped gilgai formations and depressions in the landscape that have the potential to support this species. Ground-truthing of habitat would be required in order to confirm the presence and suitability of these features.

Table 18 **Habitat features with potential to support threatened species credit species**

Habitat feature	Presence within the development footprint
Hollow-bearing trees	Habitat trees supporting hollows of a variety of size classes from small (<50 mm diameter) through to extra-large (> 400 mm diameter) were present across the investigation area. These trees have the potential to provide breeding resources for a range of native fauna species including threatened Gang-gang Cockatoo, Owls (Barking Owl, Masked Owl), mammals (Squirrel Glider) and microbats.
Feed tree species	A variety of tree species identified as known Grey-headed Flying Fox, Swift Parrot, Superb Parrot and Regent Honeyeater feed trees were identified during the assessment. Trees and shrubs providing food resources for smaller mammals such as Squirrel Glider were also recorded.
Major and minor watercourses and waterbodies (i.e. dams, Gilgai formations)	There are a number of watercourses which intersect the development footprint, including the Seven Mile, Eight Mile, Nine Mile and Woolshed Creeks, as well as several smaller unnamed tributaries. The banks of these watercourses and the supporting vegetation along these systems provide potential habitat for amphibians including Sloane's Froglet. Artificial waterbodies (i.e., farm dams) within the investigation area and development footprint were also identified as potential habitat for threatened amphibians. Gilgai mosaics occurred intermittently throughout the investigation area and are an important habitat feature for the Sloane's Froglet and Latham's Snipe. Riparian areas also have the potential to support threatened fauna species in a fragmented landscape. Large old trees, more likely to support tree hollows, are more common in riparian corridors.
Woody debris and leaf litter	Woody debris and leaf litter was prevalent in the higher quality remnant vegetation patches across investigation area and development footprint, providing potential habitat for threatened reptiles and amphibians.
Rocky habitat	A very small areas of rocky habitat occurred in the south-west corner of the investigation area, this habitat was the very edge of a larger rocky hilltop leading west of the investigation area. The small pocket of habitat present within the investigation area was degraded from grazing pressures.

Field capture of detailed fauna habitat information allowed for confirmation of presence of habitat features and microhabitats for a range of candidate threatened species across surveyed portions of the investigation area. Fauna habitat assessments were captured using ArcGIS polygons or survey points/transects attributed with specific habitat criteria that allowed for planning of further targeted survey for select species, or the exclusion of candidate species from the investigation area.

Targeted fauna surveys

Nocturnal surveys were completed for nocturnal birds, frogs, mammals and woodland/diurnal birds in accordance with relevant guidelines, refer to Section 4.6.4 for survey methods.

Sloane's Froglet and Squirrel Glider populations are well known from the Albury LGA, and to avoid duplicating survey effort, gap analysis was undertaken prior to the survey period. Analysis of the following data sources was used to determine areas of known occurrence:

- DPE Sloane's Froglet Records.
- Australian Museum Frog ID (Sloane's Champions) Records.
- NSW BioNet Atlas Records.

All areas of suitable habitat where existing records were present were mapped as 'confirmed presence'. All areas containing suitable habitat that were hydrologically connected to areas of confirmed presence were mapped as 'assumed presence'. All remaining suitable habitat areas where records were not present were surveyed to confirm presence of this species.

Regent Honeyeater and Swift Parrot has identified Important Habitat mapped within the investigation area, all areas of mapped important habitat are considered confirmed presence for this species.

Two incidental records of threatened fauna species occurred during the woodland bird survey effort, these were:

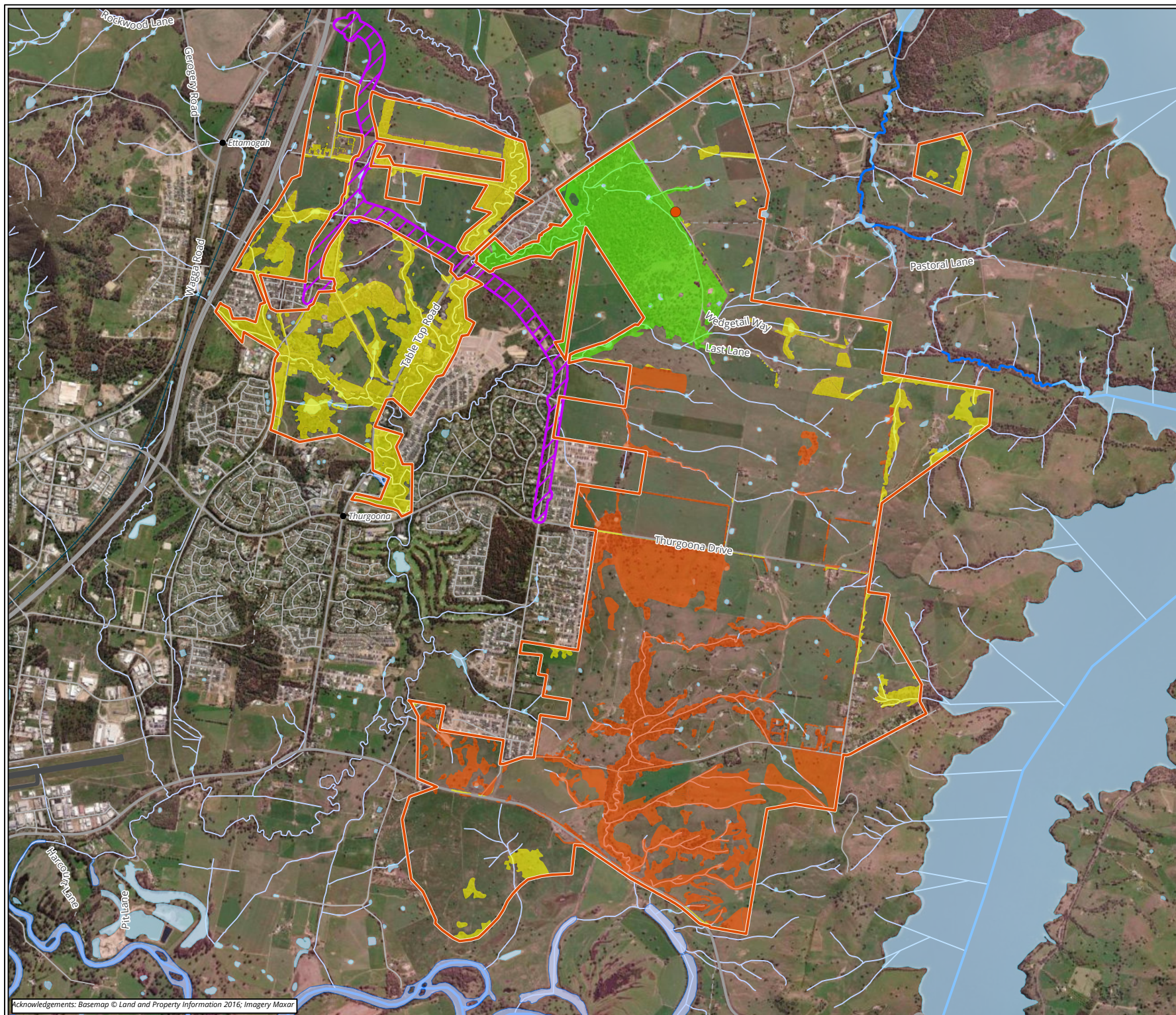
- Scarlet Robin *Petroica boodang*.
- Flame Robin *Petroica phoenicea*.

All other species identified were locally common species with known local populations. A summary of the targeted survey effort is detailed below within Table 19.

Table 19 Summary of survey method and results

Species	Existing threatened species records within investigation area	Method	Results
Nocturnal birds			
Bush Stone-Curlew	No records present under the NSW DPE (BioNet).	Nocturnal Call Playback	Not identified.
Powerful Owl	No records present under the NSW DPE (BioNet).	Nocturnal Call Playback	Not identified.
Barking Owl	No records present under the NSW DPE (BioNet).	Nocturnal Call Playback	Not identified.
Masked Owl	No records present under the NSW DPE (BioNet).	Nocturnal Call Playback	Identified. Refer to Figure 10.
Frogs			
Sloane's Froglet	Yes. Records present from NSW DPE (BioNet), Australian Museum (Frog ID) and existing records held by Biosis.	Nocturnal Call Playback	Identified. Refer to Figure 11
Mammals			
Grey-headed Flying Fox	Yes. Records present from NSW DPE (BioNet) – foraging records only no camps identified.	Habitat assessment and active search for camps.	Camps not identified but individuals known to forage within investigation area.
Squirrel Glider	Yes. Records present from NSW DPE (BioNet).	Spotlighting	Identified. Refer to Figure 12.
Koala	Yes. Records present from NSW DPE (BioNet).	Spotlighting. Spot Assessment Technique.	Not identified.

Species	Existing threatened species records within investigation area	Method	Results
Woodland and diurnal Birds			
Superb Parrot	Yes. Records present from NSW DPE (BioNet).	Active search – diurnal bird survey.	Not identified. Refer to Figure 13
Glossy Black-Cockatoo	No records present under the NSW DPE (BioNet).	Active search – diurnal bird survey.	
Little Eagle	No records present under the NSW DPE (BioNet).	Active search – diurnal bird survey. Active search – stick nest assessment.	
Square-tailed Kite	No records present under the NSW DPE (BioNet).	Active search – diurnal bird survey.	
White-bellied Sea-Eagle	Yes. Records present from NSW DPE (BioNet).	Active search – stick nest assessment.	



Legend

- Investigation area
- Thurgoona Link Road BDAR
- Masked owl record

Masked Owl survey results

- Confirmed presence
- Assumed presence
- Not identified during survey effort

Figure 10.1 Masked Owl survey results

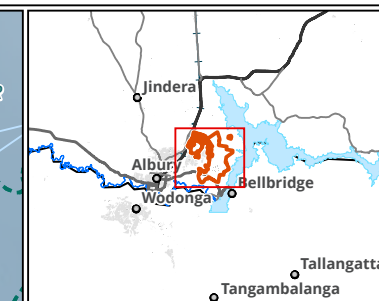
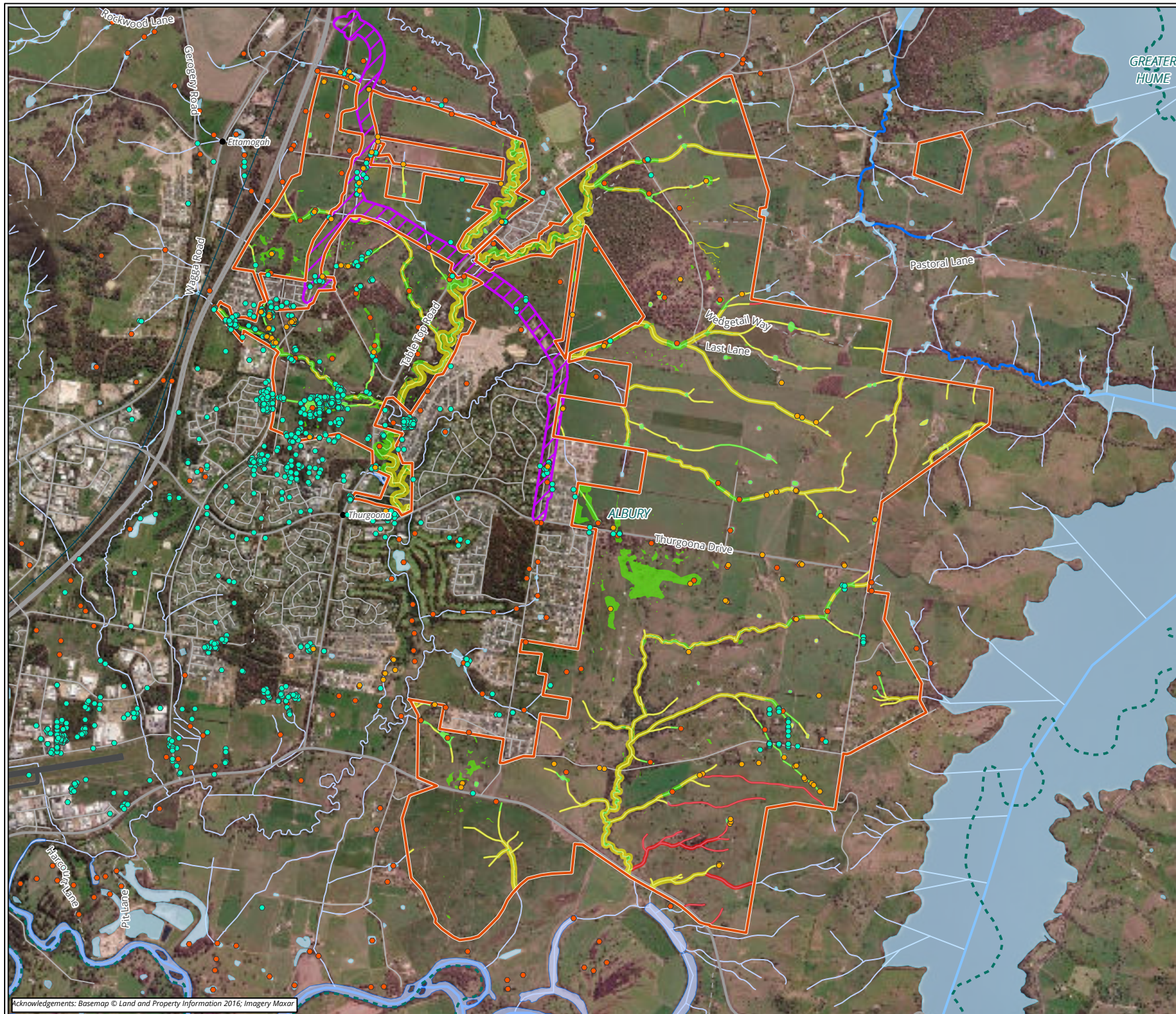
0 310 620 930 1,240 1,550 N
Metres

Scale: 1:34,000 @ A3
Coordinate System: GDA2020 MGA Zone 55



APeM Group

Matter: 38717, Date: 13 November 2024,
Drawn by: AM, Checked by: DB, Last edited by: owilliams
Layout: 38717_F10_MaskedOwlSurvey
Project: P:\38700s\38717\Mapping\38717_Albury_BA_9_21.aprx



Legend

- Investigation area
- Thurgoona Link Road BDAR

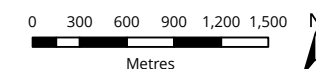
Sloane's froglet records

- Sloane's froglet (Biosis)
- Sloane's froglet (Australian Museum)
- Sloane's Froglet (DPE)

Sloane's Froglet survey results

- Assumed presence
- Confirmed presence
- Not identified during survey effort

Figure 11.1 Sloane's Froglet survey results

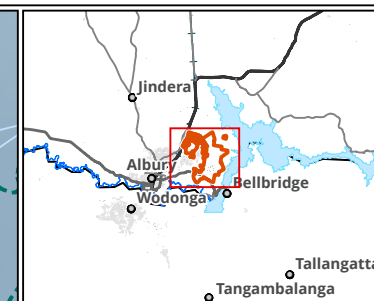
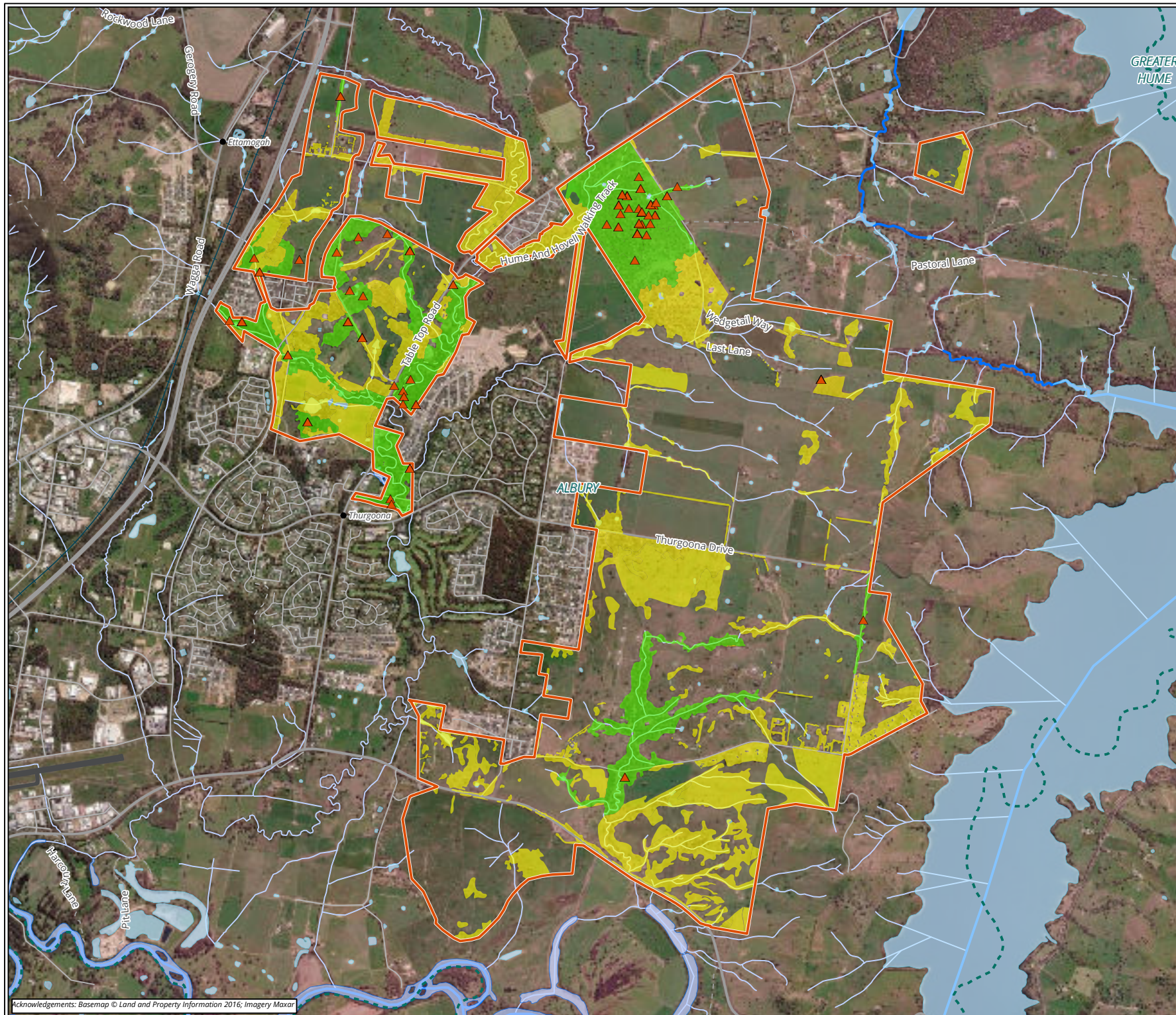


Scale: 1:34,000 @ A3
Coordinate System: GDA2020 MGA Zone 55



APeM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: AM, Checked by: DB, Last edited by: owilliams
Layout: 38717_F11_SloanesFroglet
Project: P:\38700a\38717\Mapping\
38717_Albury_BA.aprx



Legend

Investigation area

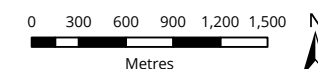
▲ Squirrel Glider record

Squirrel Glider survey results

Assumed presence

Confirmed presence

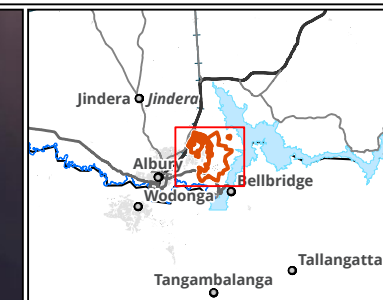
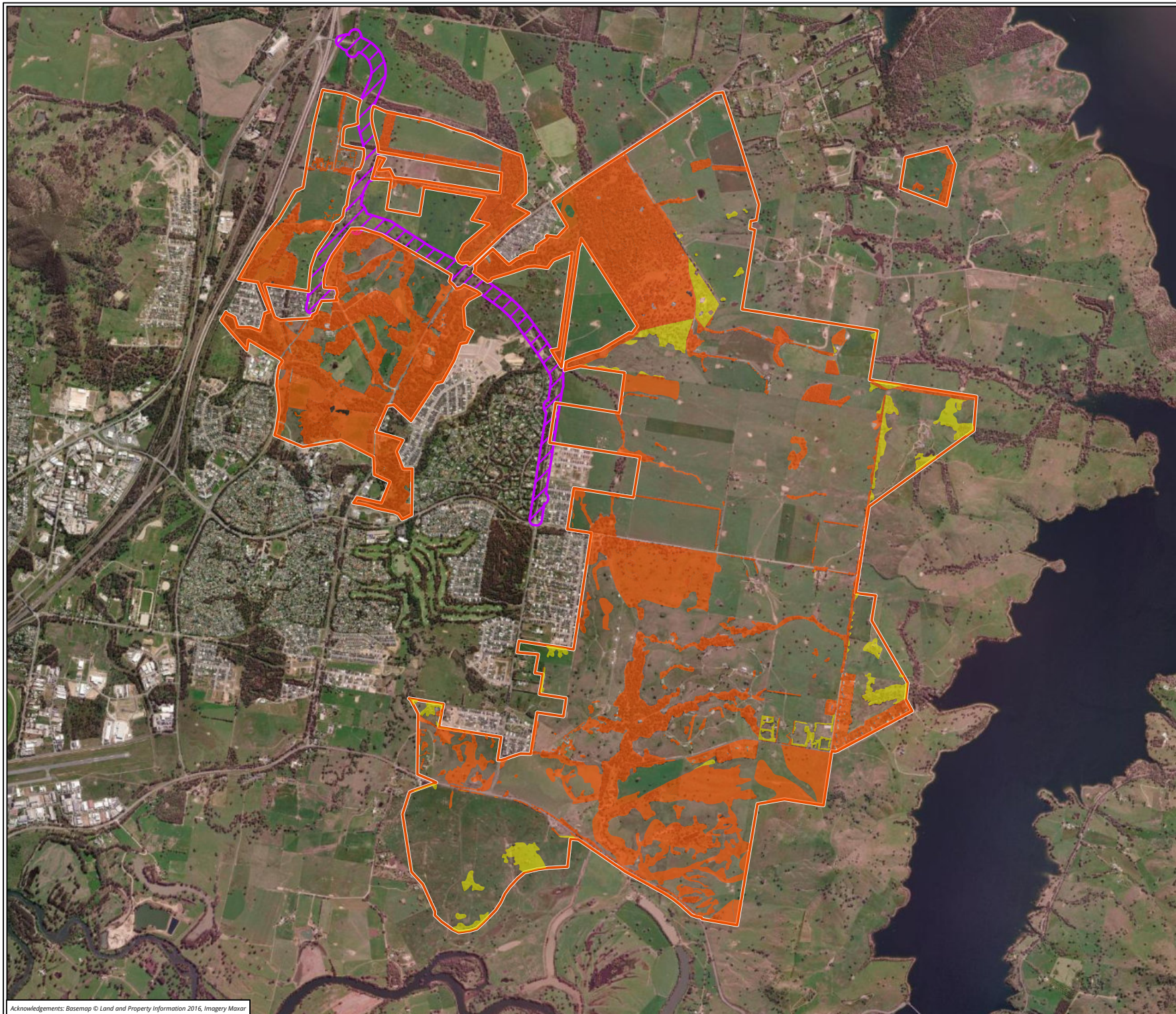
Figure 12.1 Squirrel Glider survey results



Scale: 1:34,000 @ A3
Coordinate System: GDA2020 MGA Zone 55



Matter: 38717, Date: 12 November 2024,
Drawn by: AM, Checked by: DB, Last edited by: owilliams
Layout: 38717_F12_SquirrelGlider
Project: P:\38700s\38717\Mapping\
38717_Albury_BA.aprx



Legend

Investigation area

Woodland birds survey results (Superb Parrot, Glossy Black Cockatoo, Little Eagle, Square-tailed Kite and White-bellied Sea-Eagle)

Not identified during survey effort

Assumed presence

Figure 13 Targeted survey results - Woodland birds

0 300 600 900 1,200 1,500
Metres

Scale: 1:35,000 @ A3

Coordinate System: GDA2020 MGA Zone 55



Matter: 38717,
Date: 14 November 2024,
Prepared for: DB, Prepared by: JET, Last edited by: owilliams
Layout: 38717_F13_Woodlandbirds
Project: P\38700s\38717\Mapping\38717_Albury_BA_9_21.aprx

4.7. Serious and Irreversible Impact (SAIL) entities

Box-Gum Woodland (PCT 266, 269, 276, 277, and PCT 278) is listed as a CEEC under EPBC Act and BC Act. The BC Act CEEC is listed in the BioNet TBDC as an entity potentially subject to Serious and Irreversible Impact (SAIL) in NSW. The CEEC is considered an entity at risk of SAIL based on the following principles (DPIE 2019):

- Principle 1: an ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline.
- Principle 2: an ecological community that is observed, inferred or reasonably suspected to be severely degraded or disturbed.

The Regent Honeyeater is listed in the BioNet TBDC as an entity potentially subject to SAIL in NSW. The species is considered an entity at risk of SAIL based on the following principles (DPIE 2019):

- Principle 1: A population reduction of greater than or equal to 80% in 10 years or three generations.
- Principle 2: Less than 50 individuals or less than 250 individuals where threats are known.

Swift Parrot is listed in the BioNet TBDC as an entity potentially subject to SAIL in NSW. The species is considered an entity at risk of SAIL based on the following principles (DPIE 2019):

- Principle 1: A population reduction of greater than or equal to 80% in 10 years or three generations.

Sloane's Froglet was listed under the TBDC as an entity potentially subject to SAIL in October 2024. This is an important update to note for developers and Council regarding development approvals and the assessment, avoid and minimise processes surrounding SAIL entities. The species is considered an entity at risk of SAIL based on the following principle:

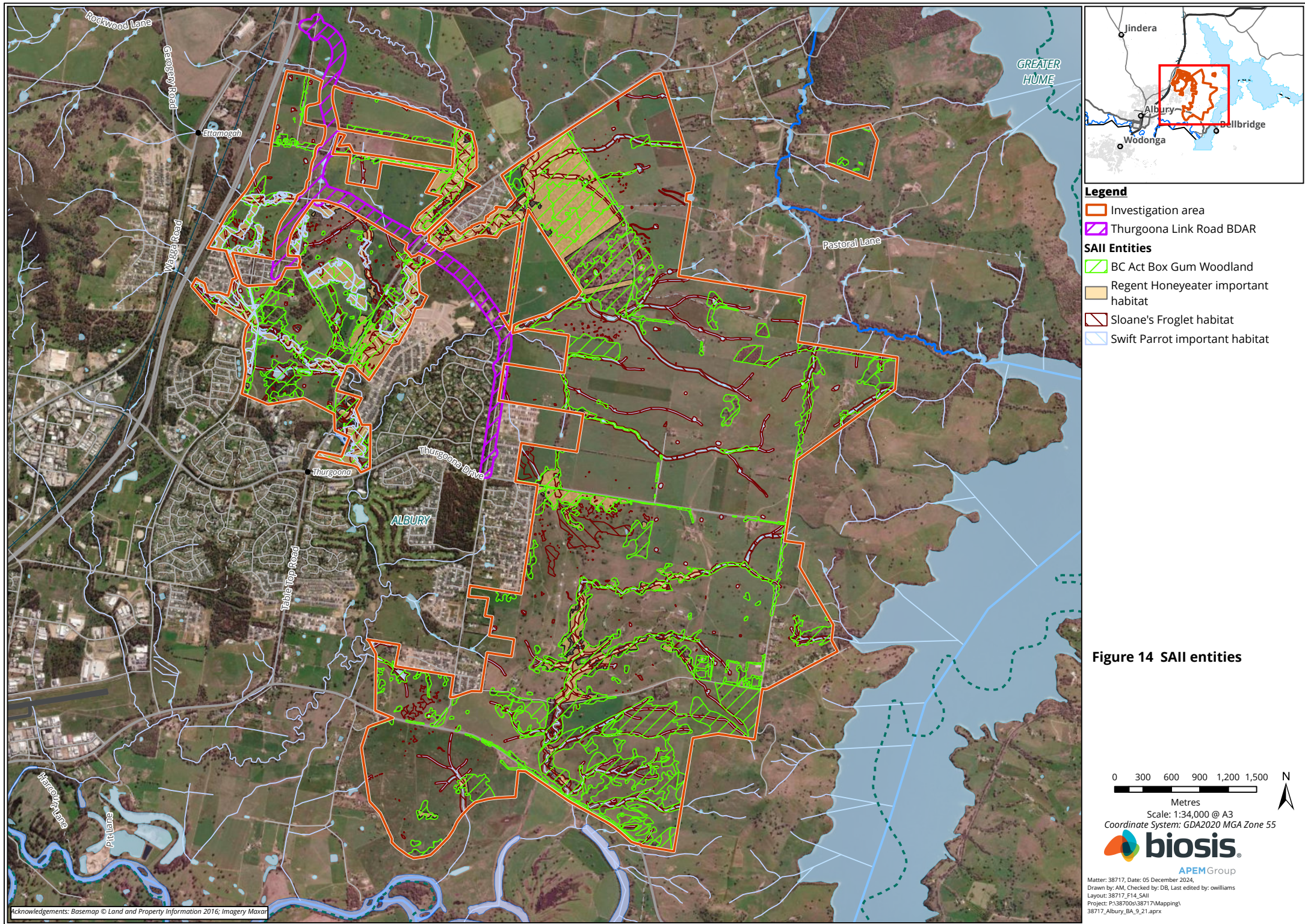
- Principle 3: It is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution.

Refer to Figure 14 for SAIL entities within the investigation area.

For developments assessed under Part 4 (that are not State Significant Development or State Significant Infrastructure) the approval authority must not grant approval for the development if they determine the proposal is likely to result in a SAIL.

For developments assessed under Part 4 that are SSD, SSI or for Biodiversity Certification the approval authority can approve a proposal which is likely to result in a SAIL, however, the approval authority must assess that the impacts on the SAIL entity do not require further avoid and/or minimise measures before approval is to be granted.

Further information can be found in the Guidance to assist a decision-maker to determine a serious and irreversible impact (DPIE 2019).



5. Matters of National Environmental Significance

5.1.1. Threatened Ecological Communities

Two EPBC Act listed TECs were identified within the investigation area, these are:

- White Box – Yellow Box – Blakely's Red-gum Grassy Woodlands and Derived Native Grasslands (EPBC Act Box-Gum Woodlands).
- Seasonal herbaceous (freshwater) wetlands of the Temperate Lowland Plains (Seasonal Herbaceous (freshwater) Wetlands).

Within the investigation area the following PCTs are associated with the Critically Endangered Ecological Box-Gum Woodland community listed under the EPBC Act:

- PCT 266 White Box grassy woodland.
- PCT 276 Yellow Box grassy tall woodland.
- PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland.
- PCT 278 Riparian Blakely's Red Gum – box – shrub – sedge – grass tall open forest.

Not all areas of the above listed PCTs met the condition thresholds for listing under the EPBC Act. In-field rapid assessment was utilised to determine specific areas that met the condition thresholds. These areas are displayed within Figure 8.

Although not identified by database searches, landforms consistent with the Seasonal Herbaceous (freshwater) Wetlands CEEC were also identified within the investigation area. All areas of PCT 360 gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion, including disturbed areas where a precautionary approach was taken assuming that with the removal of grazing, these areas would naturally regenerate, were considered to align with the CEEC.

A summary of EPBC Act listed TECs within the investigation area is provided in Table 20.

Table 20 Summary of EPBC Act TECs within the investigation area

EPBC Act TEC	EPBC Act Listing	Area (Ha)
<i>White Box – Yellow Box – Blakely's Red-gum Grassy Woodlands and Derived Native Grasslands (EPBC Act Box-Gum Woodlands).</i>	CEEC	551.66
<i>Seasonal herbaceous (freshwater) wetlands of the Temperate Lowland Plains (Seasonal Herbaceous (freshwater) Wetlands)</i>	CEEC	58.07

5.1.2. Threatened species

Results of the background assessment and targeted surveys identified the following EPBC Act listed species within the investigation area (Table 21).

Table 21 MNES threatened species

Scientific Name	Common Name	EPBC Act Listing	Habitat within investigation area
Fauna			
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	Mapped Important Habitat
<i>Lathamus discolor</i>	Swift Parrot	E	Mapped Important Habitat
<i>Crinia sloanei</i>	Sloane's Froglet	E	Identified during targeted surveys, known population present in LGA and investigation area.
<i>Phascolarctos cinereus</i>	Koala	E	Two isolated records from 2019, not identified during targeted surveys.
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	E	Assessment completed outside of survey period. Assumed present.
<i>Polytelis swainsonii</i>	Superb Parrot	V	One isolated record 8 km from investigation area from 2023. Not identified during targeted surveys.
<i>Pteropus poliocephalus</i>	Grey-headed Flying Fox	V	Known camps present along the Murray River. Habitat assessment and active search found no breeding camps in the investigation area. Only foraging habitat present.
Flora			
<i>Amphibromus fluitans</i>	River Swamp Wallaby Grass	V	Existing records present within investigation area, known population within the investigation area.

CE = Critically Endangered, E = Endangered, V = Vulnerable

5.1.3. Migratory species

Migratory species are protected under the EPBC Act, as such migratory species are considered a Matter of National Environmental Significance (MNES). The following migratory listed species were identified by the PMST tool as having the potential to occur within the investigation area:

- White-throated Needletail *Hirundapus caudacutus*
- Yellow Wagtail *Motacillia flava*
- Satin Flycatcher *Myiagra cyanoleuca*
- Rufous Fantail *Rhipidura rufifrons*
- Common Sandpiper *Actitis hypoleucos*

- Sharp-tailed Sandpiper *Calidris acuminata*
- Curlew Sandpiper *Calidris ferruginea*
- Pectoral Sandpiper *Calidris melanotos*
- Latham's Snipe *Gallinago hardwickii*
- Eastern Curlew *Numenius madagascariensis*
- Common Greenshank *Tringa nebularia*.

Of these species, Latham's Snipe and Common Greenshank are recorded regularly in wetlands and Gilgai habitat within the investigation area. White-throated Needletail would utilise the airspace above the investigation area on occasion but being an almost exclusively aerial species would be unlikely to be present in terrestrial vegetation.

5.1.4. Wetlands of international importance

No wetlands of international importance are present within the investigation area. Background research identified the following wetlands of international importance:

- Banrock Station Wetland complex – 600-700 kilometres upstream.
- Barmah Forest – 100-150 kilometres upstream.
- Gunbower Forest – 200-300 kilometres upstream.
- Hattah-Kulkyne Lakes – 400-500 kilometres upstream.
- NSW Central Murray State Forests – 100-150 kilometres upstream.
- Riverland – 500-600 kilometres upstream.
- The Coorong, and Lakes Alexandrina and Albert Wetland – 600-700 kilometres upstream.

5.1.5. Commonwealth land

The EPBC Act protects world heritage areas and national heritage places and the environment when actions are taken on commonwealth land. No national heritage areas or places occur within or directly adjacent to the investigation area.

Several parcels of crown land occur within the investigation area, in general these areas are managed on behalf of crown lands by the AlburyCity.

6. Avoidance hierarchy

6.1. Desktop and field-based constraints hierarchy

The ecological constraints model completed as part of the constraint's hierarchy is an important step in allowing AlburyCity to identify existing records of threatened species, areas of high biodiversity value, woodland and hydrological connectivity corridors and opportunities for sustainable development.

The assessment identifies areas of previously unmapped biodiversity constraints and allows for a clear visualisation of developable (low constraint) areas. This allows for assessment of opportunities for development in low constraint areas, notably within the north of Thurgoona and throughout Wirlinga. A key consideration in designing a structure plan that responds to these environmental constraints is allowing for the allocation of key services, infrastructure and roads that allow for a cohesive and sustainable urban design.

This model forms the first step in planning for growth in the Thurgoona - Wirlinga area in an environmentally adaptive manner. It allows for the visual identification of areas likely to contain key environmental values and how these values might be protected and enhanced while providing an avenue for development and expansion of the key growth area. It should be noted that not all areas identified as high constraint will be able to be retained in the structure plan process, just as not all areas identified as low constraint would be developed. This model allows for the PSP wide planning process to be completed in an ecologically responsive manner. Detailed refinement of boundaries and planning for future access, drainage, infrastructure and passive recreation areas will be completed during the structure plan and detailed ecological work to come.

The constraints can be used as a planning tool for AlburyCity to assist developers in detailed design for infrastructure placement and environmental considerations. Providing direction and solutions for preservation of the environment, such as locations of recreational areas and open space parklands to 'buffer' areas of identified high and moderate constraint and/or include existing features such as hollow-bearing trees, scattered trees and Gilgai formations into green space or passive recreation.

This data forms a baseline for the building blocks of the structure plan process, allowing for progression to implementation of Stage 1 of the BAM. These building blocks will aid in the recommendations regarding developments and avoidance scenarios and inform a list of candidate species for assessment.

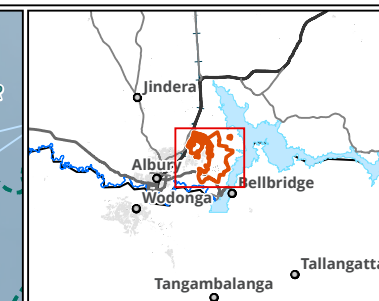
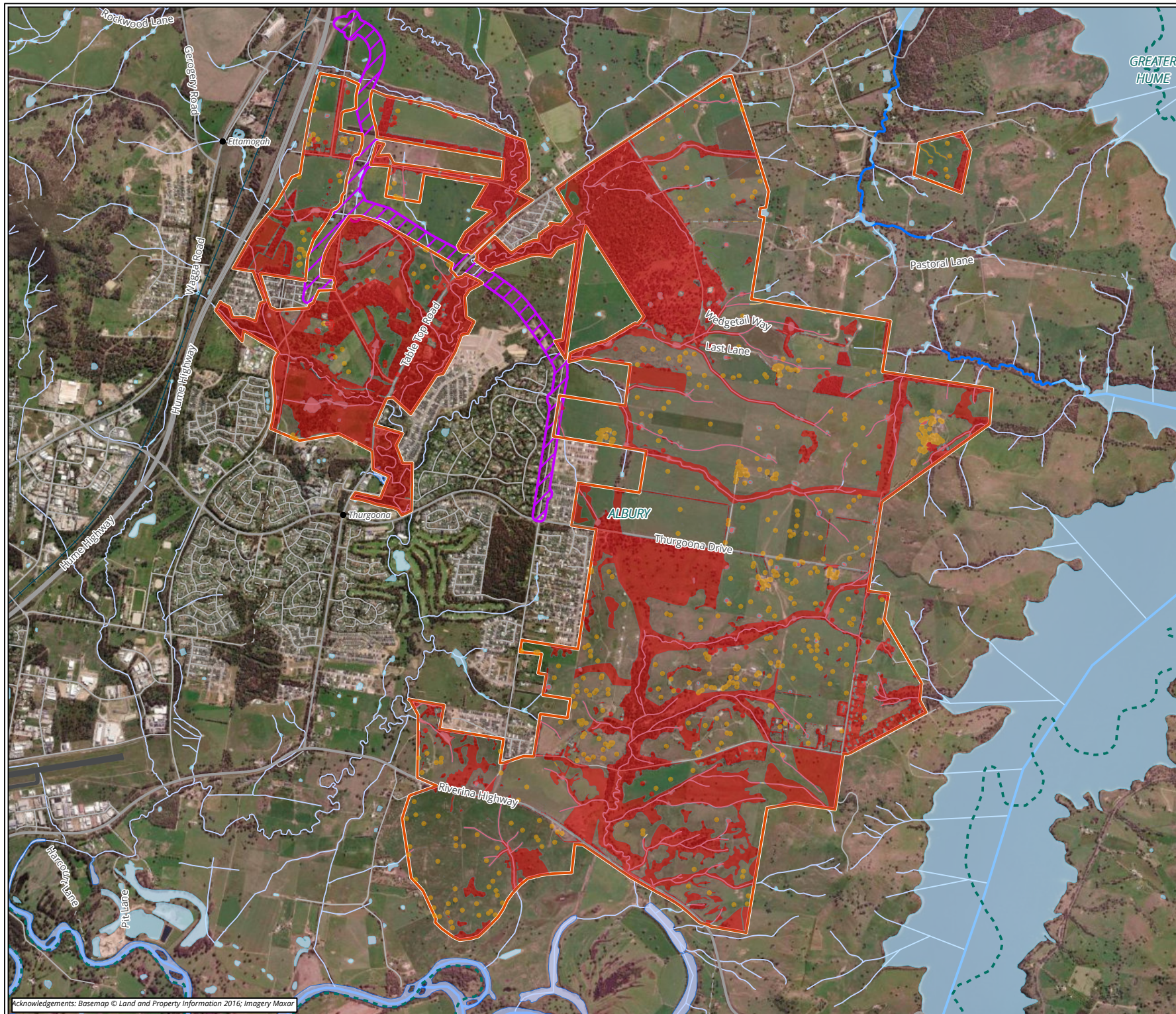
The results of the final constraints assessment are summarised below in Table 22 and depicted within Figure 15. The preliminary desktop constraints assessment is located within Appendix 4. Following the completion of data ground-truthing and targeted surveys the majority of areas identified within the desktop assessment as moderate constraint were determined to be areas of high constraint. Note that constraints have not been modelled for existing BDAR areas, including the Thurgoona Link Road. Significant ecological values are present in these areas and they should be viewed as excluded, rather than low constraint.

Table 22 constraints assessment hierarchy

Major constraint group	Constraint	Sub-constraint	Sub-Sub Constraint	Constraint Hierarchy	Justification	GIS mapping
Threatened species	Threatened Species Records <10 years old	Sedentary species	Flora	High	High probability of species presence, species is sedentary and not likely to have moved or occurs as an isolated sedentary population.	All native veg or habitat features within 100m buffer from record location.
			Known fauna with populations present, e.g., Sloane's Froglet	High	High probability of species presence with breeding or foraging habitat present, species is sedentary and not likely to have moved.	
		Mobile species	Fauna records identified as an isolated occurrence or vagrant, e.g.,	Moderate	Low probability of species presence with low probability of breeding habitat present but cannot be ruled out due to the presence of isolated or vagrant records.	
			Fauna species identified as mobile, e.g., avian species and arboreal species such as Squirrel Glider	Moderate	Species likely and capable of moving between habitat within the investigation area where connectivity is present.	All associated habitat of threatened species recorded.
			Threatened species record overlapping with other constraint e.g., woodland, wetland	High	Species record in identified habitat (e.g., woodland patch, or wetland patch) is likely to contain a population.	All associated habitat of threatened species recorded in overlapping area.
	Threatened Species Records > 10 years old	Sedentary species	Flora	Moderate	No records within the last 10 years. Species are less likely to be present or have a viable population present.	All native veg within 100m buffer from record location.
			Fauna	Moderate		
		Mobile species	Fauna species identified as mobile	Moderate		
			Threatened species record overlapping with other constraint e.g., woodland, wetland	Moderate	Moderate probability of species presence with breeding or foraging habitat present	All associated habitat of threatened species recorded.
			All areas of mapped Key Fish Habitat under the NSW DPI	High	Likely to contain threatened fish or freshwater species populations, or form part of an important water catchment network.	DPI Key Fish Habitat spatial data.
Native vegetation	Freshwater aquatic species	All watercourses (using associated SSO buffer) indicated under the DPI as containing a threatened freshwater species		High		DPI threatened freshwater species indicative mapping spatial data.
		All areas of mapped PCT that are associated with a TEC, including areas of planted vegetation that met the appropriate floristic structure to be categorised as a PCT.		High	TECs are listed under BC Act and/or EPBC Act. Overlapping constraint, where all areas of TEC are overlapping with areas of mapped associated vegetation.	PCTs associated with TECs based on BioNet Vegetation information System
	Native vegetation	All areas of mapped PCT not associated with a TEC including areas of planted vegetation that met the appropriate floristic structure to be categorised as a PCT.		Moderate	Likely to provide habitat for some threatened species. Requires credit retirement.	PCTs associated with TECs based on BioNet Vegetation information System
		All area of remnant native vegetation within C zoned land proposed to be retained or added by ACC.		High	Likely to contain hollows and important breeding habitat for threatened species. Likely to provide offset allocation under existing BioCert	Areas identified as PCT under the SVM Riverina and ground-truthed in field.

Major constraint group	Constraint	Sub-constraint	Sub-Sub Constraint	Constraint Hierarchy	Justification	GIS mapping
Hydrology	Wetlands (Albury and DPE spatial data).	Remnant Native Vegetation outside of C (environmental) zoned land	Patch size greater than .5ha and located within 100m of C zone	High	Proximity to C zone provides connectivity, and/or large enough to host threatened species population. Credit retirement required.	Areas identified as PCT under the SVM Riverina and ground-truthed in field.
			Patch size less than 0.5ha and located within 100m of C zone	Moderate	Proximity to C zone provides connectivity, and/or large enough to host threatened species population. Credit retirement required	Areas identified as PCT under the SVM Riverina and ground-truthed in field.
			Patch located more than 100m from C zone	Moderate	May not be close enough to C zone to provide connectivity, but may not be large enough to host threatened species population, likely to host common fauna species not effected by edge effect	Areas identified as PCT under the SVM Riverina and ground-truthed in field.
			Planted Native Vegetation not able to be stratified into a PCT due to the lack of species indigenous to the Riverina, such as Lemon Scented Gum (<i>Corymbia citriodora</i>) and Argle Apple (<i>Eucalyptus cinerea</i>).	Moderate	Not likely to hold same level of constraint to remnant depending on planted species and age of planting, species may not be indigenous to region, or less likely to have formed important structures. May not be correct mixture of species, or species that are not indigenous to the Riverina or NSW and therefore, may not represent TECs or preferred breeding and foraging habitat for fauna species. Often contain disturbed and cleared understory from historic clearing.	Use historic imagery and satellite imagery and field investigation to assess main areas of planted vegetation, or any vegetation in obvious planted lines.
		Scattered Trees	Within 40m of C zoned land proposed to be retained or added by ACC or woodland patch	High	Important biodiversity resource for species moving across landscape, often contain hollows, likely to form part of a contiguous habitat structure used by mobile species to move between areas such as C zones.	AlburyCity sensitive tree data and scattered tree data. NSW Woody vegetation layer.
			Greater than 40m of C zoned land proposed to be retained or added by ACC or woodland patch	Moderate	Important biodiversity resource for species moving across landscape, often contain hollows, however less likely to form part of a contiguous landscape used to move been areas of intact woodland.	Preliminary 2 metre buffer ran on all data points.
		Mapped vegetation within 100m of a watercourse (SSO 2 or higher).	All native vegetation within 100m of a water with a patch size greater than .5 ha.	High	Likely to form part of a connective corridor across the landscape.	All mapped PCTs within a 100m buffer of waterways allocated as SSO or higher.
					Likely to support breeding habitat for Sloane's Froglet and Floating Swamp Wallaby Grass. Can form part of the seasonal herbaceous wetlands TEC.	Spatial data provided by AlburyCity and David Hunter (DPE).
	Dams/waterbodies	Containing threatened species record.		High	Likely to be utilised by threatened species, such as Sloane's Froglet or Floating Swamp Wallaby Grass.	All areas of mapped waterbody.

Major constraint group	Constraint	Sub-constraint	Sub-Sub Constraint	Constraint Hierarchy	Justification	GIS mapping
Land zoning	Waterways	Does not contain threatened species record.		Moderate	Likely to support breeding habitat for Sloane's Froglet and Floating Swamp Wallaby Grass, but no currently known occurrence present.	
		Waterways - SSO 1		Moderate	Generally degraded in agricultural landscapes, usually lacking native vegetation with erosion present, main ecological value pertains to starting of waterway/catchment.	DPI SSO layer plus a 10m buffer
		Waterways - SSO 2		High		DPI SSO layer plus a 20m buffer
		Waterways - SSO 3		High	Habitat connectivity, often supporting riparian vegetation, potential to support or form part of threatened fish, or key fish habitat.	DPI SSO layer plus a 30m buffer
		Waterways - SSO 4 or higher		High		DPI SSO layer plus a 40m buffer
	Environmental and Conservation Land Zoning (C zones) proposed to be retained or added by ACC			High	Generally, hosts most of the remnant woodland within the investigation area, usually contains stronghold populations for threatened species. Used to offset existing development.	AlburyCity C zone layer
Biodiversity Value Mapped Land	Serious and Irreversible Impact (SII) mapped land and all other areas of BV mapped land.			High	Mapped SII land, potential to support the Regent Honeyeater, Swift Parrot, Sloane's Froglet and Box-Gum Woodland. These areas are a major constraint to part 4 developments.	BV Value SII mapped land
Important Habitat Mapping	Threatened species (Regent Honeyeater and Swift Parrot) important habitat mapping			High	Mapped important habitat for the threatened Regent Honeyeater and Swift Parrot. Major constraint for part 4 developments.	Supplied by DPE.



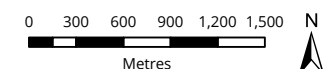
Legend

- Investigation area
- Thurgoona Link Road BDAR

Constraints

- Moderate
- High

Figure 15.1 Final constraints hierarchy

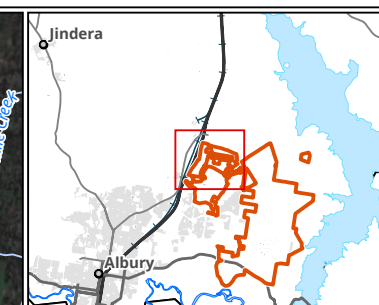


Scale: 1:34,000 @ A3
Coordinate System: GDA2020 MGA Zone 55



APEM Group

Matter: 38717, Date: 18 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F15_Constraints
Project: P:\38700\38717\Mapping\38717_Albury_BA_9_21.aprx



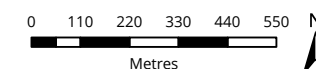
Legend

- Investigation area
- Thurgoona Link Road BDAR

Constraints

- Moderate
- High

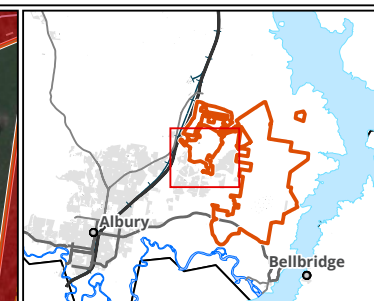
Figure 15.2 Final constraints hierarchy



Scale: 1:12,000 @ A3
Coordinate System: GDA2020 MGA Zone 55



Matter: 38717, Date: 18 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_P15_Constraints
Project: P:\38700s\38717\Mapping\38717_Albury_BA_9_21.aprx



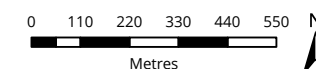
Legend

- Investigation area
- Thurgoona Link Road BDAR

Constraints

- Moderate
- High

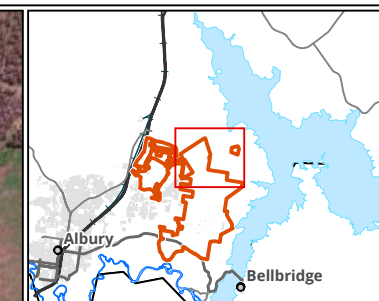
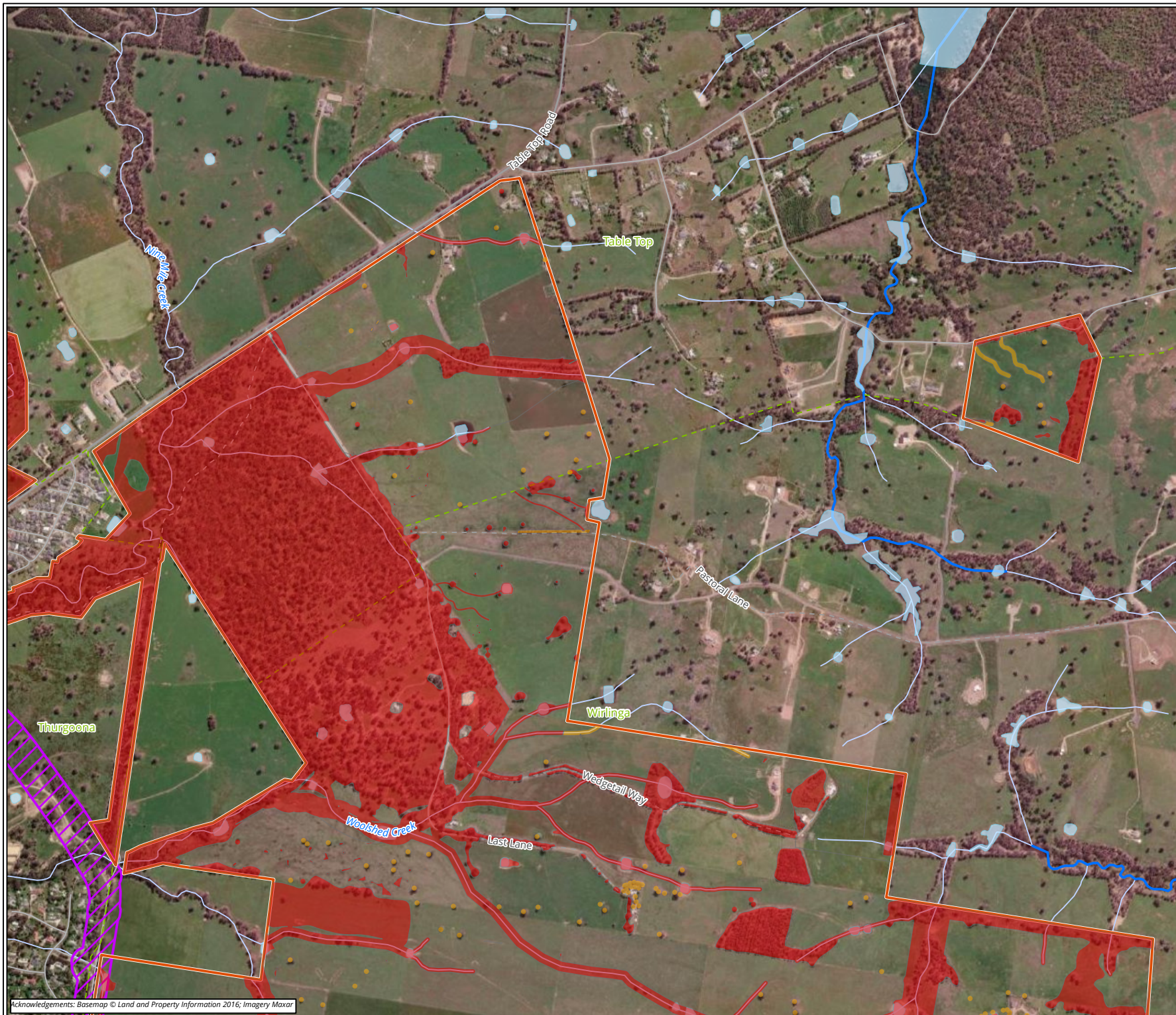
Figure 15.3 Final constraints hierarchy



Scale: 1:12,000 @ A3
Coordinate System: GDA2020 MGA Zone 55



Matter: 38717, Date: 18 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_P15_Constraints
Project: P:\387000\38717\Mapping\38717_Albury_BA_9_21.aprx



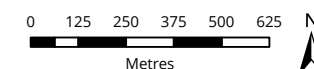
Legend

- Investigation area
- Thurgoona Link Road BDAR

Constraints

- Moderate
- High

Figure 15.4 Final constraints hierarchy

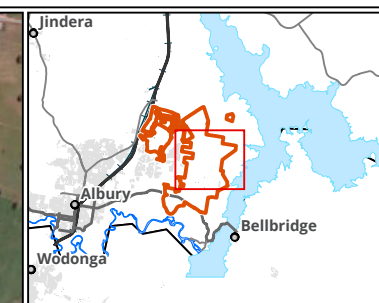
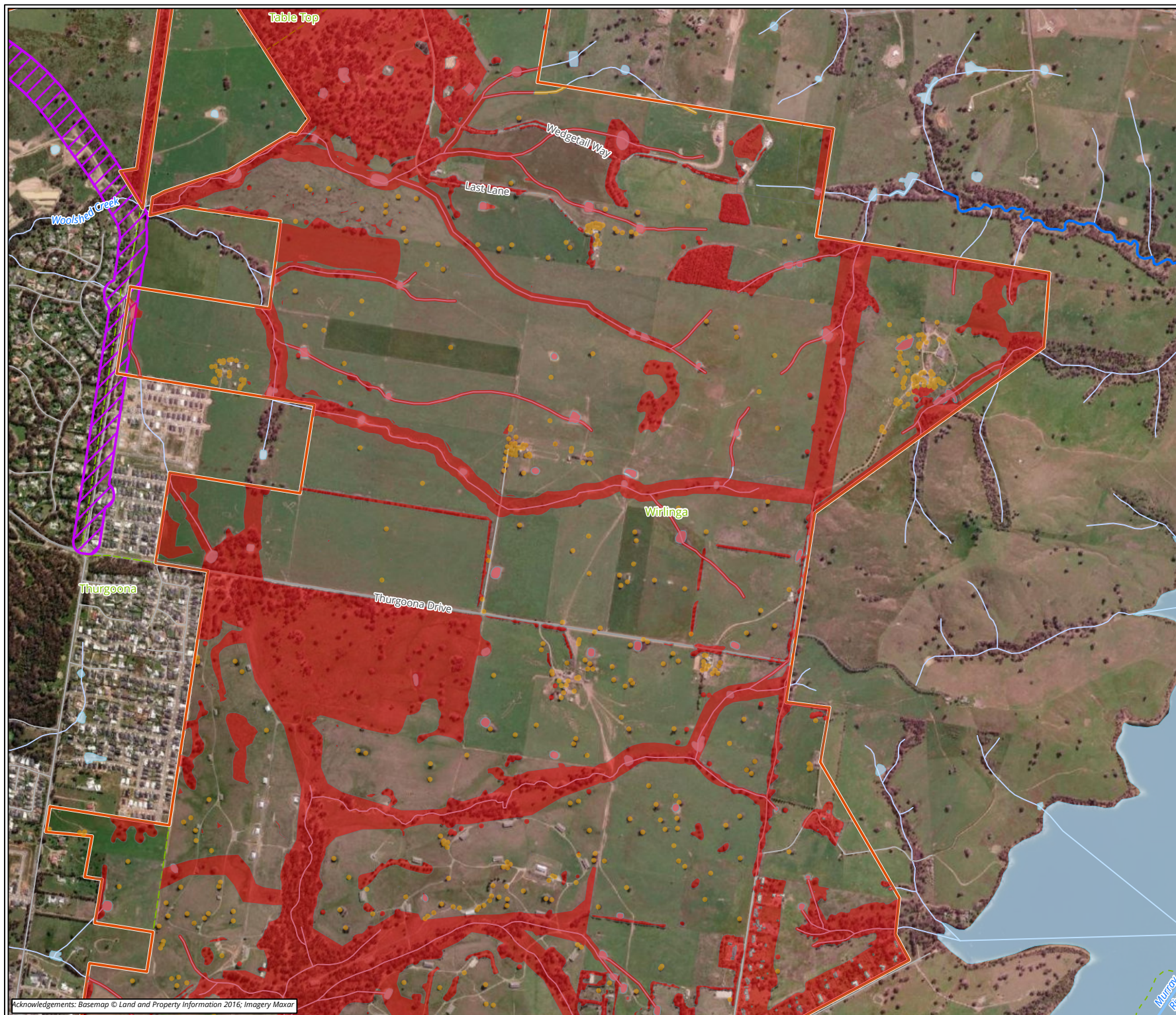


Scale: 1:14,000 @ A3
Coordinate System: GDA2020 MGA Zone 55



APEM Group

Matter: 38717, Date: 18 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F15_Constraints
Project: P:\387000\38717\Mapping\38717_Albury_BA_9_21.aprx



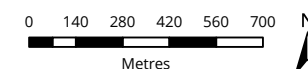
Legend

- Investigation area
- Thurgoona Link Road BDAR

Constraints

- Moderate
- High

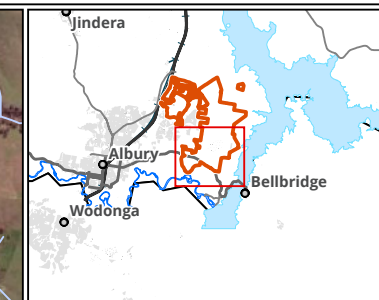
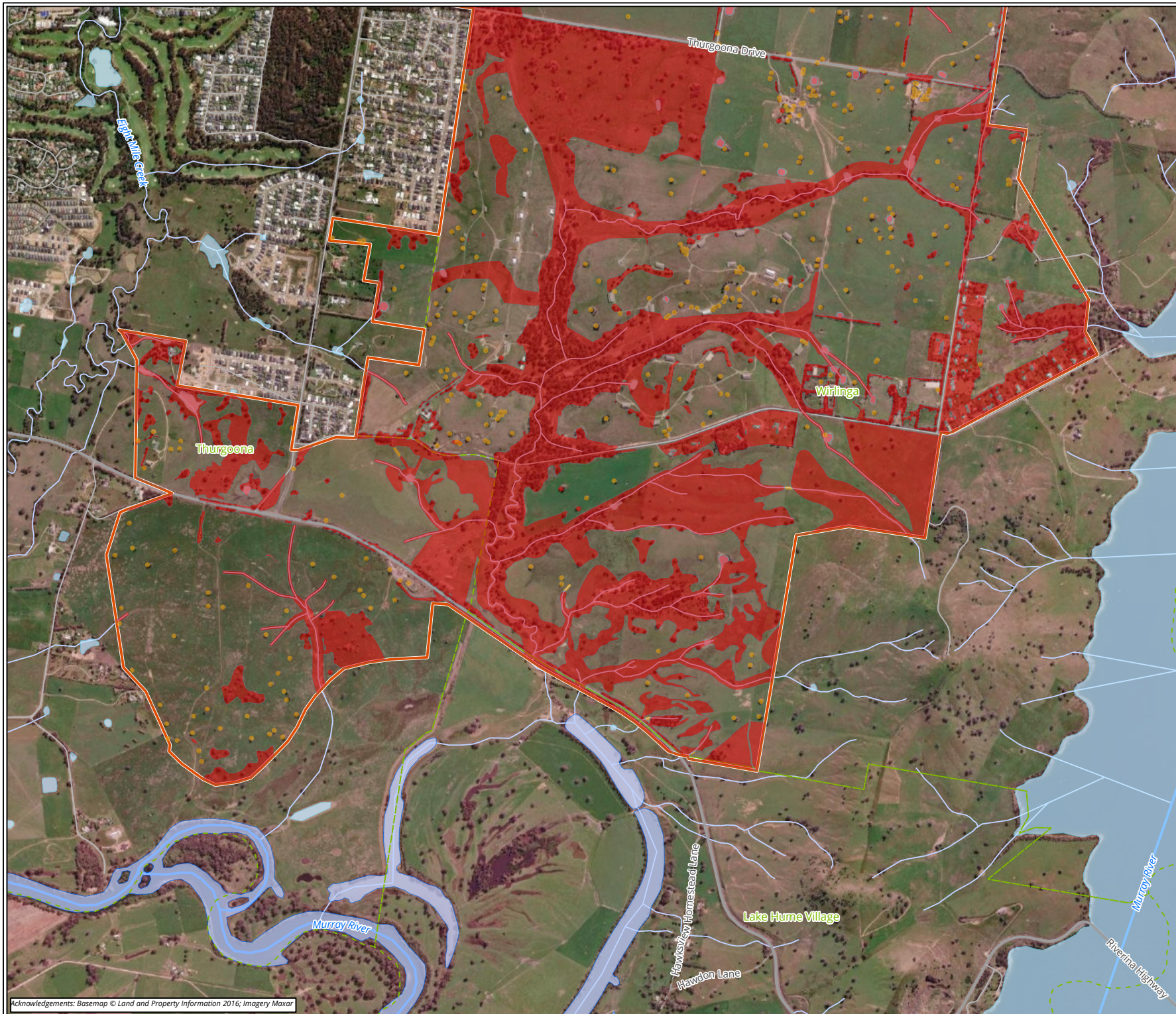
Figure 15.5 Final constraints hierarchy



Scale: 1:16,000 @ A3
Coordinate System: GDA2020 MGA Zone 55

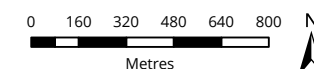


Matter: 38717, Date: 18 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_P15_Constraints
Project: P:\387000\38717\Mapping\38717_Albury_BA_9_21.aprx



- Legend**
- Investigation area
 - Thurgoona Link Road BDAR
- Constraints**
- Moderate
 - High

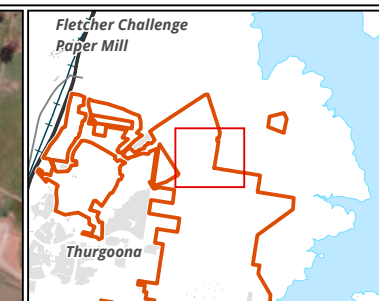
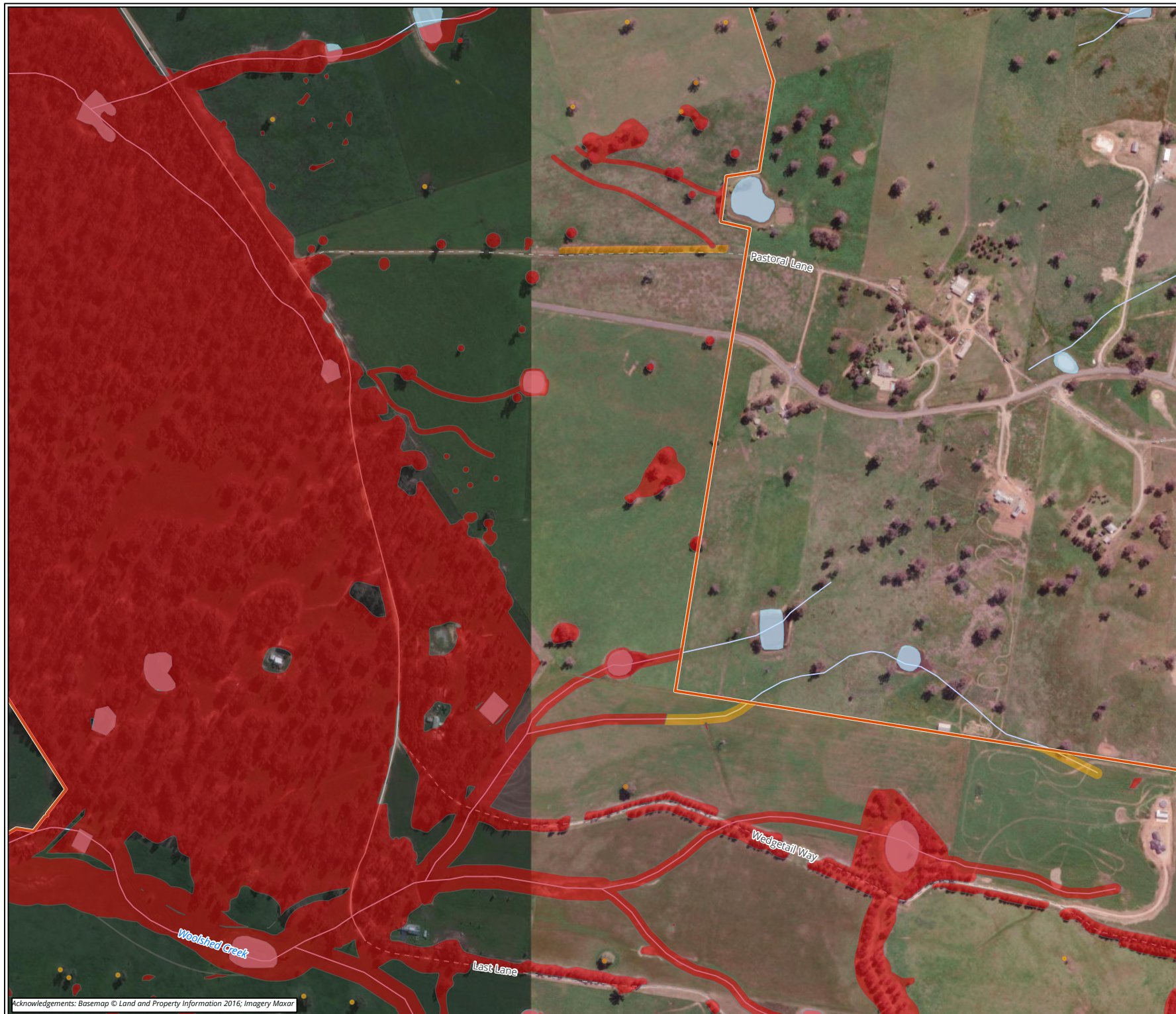
Figure 15.6 Final constraints hierarchy



Scale: 1:18,000 @ A3
Coordinate System: GDA2020 MGA Zone 55



Matter: 38717, Date: 18 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_P15_Constraints
Project: P:\387000\38717\Mapping\38717_Albury_BA_9_21.aprx



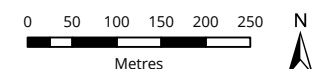
Legend

- Investigation area
- Thurgoona Link Road BDAR

Constraints

- Moderate
- High

Figure 15.7 Final constraints hierarchy



Scale: 1:6,000 @ A3
Coordinate System: GDA2020 MGA Zone 55

biosis
APEM Group

Matter: 38717, Date: 18 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F15_Constraints
Project: P:\387000\38717\Mapping\38717_Albury_BA_9_21.aprx

6.2. Field based targeted surveys

Targeted surveys for threatened fauna species were completed to further inform avoidance hierarchy, structure plan layout and planning for future offsetting scenarios. This step allows for refining of the constraint's hierarchy, confirming presence of species with known populations in the investigation area, identification of habitat extent and corridors, and identification of areas for enhancement.

Confirmation of presence of threatened species is an important step, allowing for targeted consideration and approaching surrounding key areas of threatened species habitat to be retained and protected through the masterplan process. This step also allows for in depth consideration of habitat connectivity needs for species with niche habitat requirements.

7. Conclusion and recommendations

7.1. Summary of biodiversity values

In total 844.54 hectares of native vegetation were recorded within the investigation area, corresponding to seven PCTs, these are summarised below within Table 23.

Table 23 Plant Community Type summary

PCT	Hectares in Investigation area
PCT 5 River Red-gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.	22.66
PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion.	151.19
PCT 269 White Box - Blakely's Red Gum - Red Box - Red Stringybark shrubby woodland on shallow soils on metamorphic hills in the Albury region of the NSW South Western Slopes Bioregion.	0.39
PCT 276 Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion.	18.42
PCT 277 Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion.	279.83
PCT 278 Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest of the central NSW South Western Slopes Bioregion.	313.97
PCT 360 gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion.	58.07

Two threatened ecological communities listed under the EPBC Act and/or BC Act occur within the investigation area (Table 24):

- Box-Gum Woodland:
 - White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions (BC Act Box-Gum Woodland).
 - White Box – Yellow Box – Blakely's Red-gum Grassy Woodlands and Derived Native Grasslands (EPBC Act Box-Gum Woodlands).
- Seasonal herbaceous (freshwater) wetlands of the Temperate Lowland Plains (Seasonal Herbaceous (freshwater) Wetlands).

Table 24 **Threatened Ecological Community summary**

TEC	Listing		Hectares	Associated PCTs
	BC Act	EPBC Act		
White Box Yellow Box Blakely's Red Gum Woodland (BC Act Box-Gum Woodlands)	CEEC	-	763.41	• PCT 266 • PCT 276 • PCT 277 • PCT 278
White Box – Yellow Box – Blakely's Red-gum Grassy Woodlands and Derived Native Grasslands (EPBC Act Box-Gum Woodlands).	-	CEEC	551.66	• PCT 266 • PCT 276 • PCT 277 • PCT 278
Seasonal herbaceous (freshwater) wetlands of the Temperate Lowland Plains (Seasonal Herbaceous (freshwater) Wetlands)	-	CEEC	58.07	• PCT 360

Six threatened flora and fauna species listed under the EPBC Act and BC Act were recorded within the investigation area:

- Fauna:
 - Scarlet Robin *Petroica boodang*
 - Flame Robin *Petroica phoenicea*
 - Squirrel Glider *Petaurus norfolcensis*
 - Masked Owl *Tyto novaehollandiae*
 - Sloane's Froglet *Crinia sloanei*.
 - Grey-headed Flying-fox *Pteropus poliocephalus*.
- Flora:
 - Floating Swamp Wallaby Grass *Amphibromus fluitans*.

A total of 40 threatened flora and fauna species listed under the EPBC Act and BC Act are predicted to occur within the investigation area, refer to Section 4.6.1. A total of nine candidate species listed under the BC Act are considered likely to be affected within the PSP investigation area, these are outlined below within Table 25.

Table 25 **Summary of candidate species affected within the investigation area**

Species name	Common name	Survey period	Presence conclusion
Flora			
<i>Amphibromus fluitans</i>	Floating Swamp Wallaby Grass	January – March, December	Yes (Assumed Present)
Fauna			
<i>Anthochaera phrygia</i>	Regent Honeyeater	Important Habitat Map	Yes (Important Habitat Map)
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	January, October – December	Yes (Assumed present)

Species name	Common name	Survey period	Presence conclusion
<i>Cercartetus nanus</i>	Eastern Pygmy Possum	January – March, October – December	Yes (Assumed present)
<i>Crinia sloanei</i>	Sloane's Froglet	July – August	Yes (Surveyed)
<i>Lathamus discolor</i>	Swift Parrot	Important Habitat Map	Yes (Important Habitat Map)
<i>Myotis macropus</i>	Southern Myotis	January – March, October – December	Yes (Assumed present)
<i>Petaurus norfolcensis</i>	Squirrel Glider	January – December	Yes (Surveyed)
<i>Tyto novaehollandiae</i>	Masked Owl	May – August	Yes (Surveyed)

7.2. Biodiversity opportunities

The Thurgoona – Wirringa PSP investigation area represents a unique suite of habitat niches set within an expanding peri-urban setting. The presence of distinct woodland and hydrological habitats and landforms provides unique habitat opportunities for a range of species with relatively distinct or defined habitat requirements. While the presence of these species and habitats within a defined growth area represents a challenge for urban development, undertaking a precinct level assessment to inform a structure plan process allows for the opportunity for adaptive growth that can highlight and enhance the unique environmental values present within the PSP area.

Key considerations for biodiversity protection and enhancement include:

- Incorporating existing hydrological features into open space planning and green zone development.
- Planning for enhancement and protection of hydrological features to maintain and enhance longitudinal connectivity.
- Incorporating stormwater runoff and retention areas into the PSP wide drainage strategy to provide multiple aquatic habitat types (niches) within the retained hydrological features.
- Ensuring hydrological corridors are planted/enhanced with suitable native species that are climate change resilient and also provide appropriate habitat for migratory species, semi-aquatic and true aquatic species.
- Incorporating existing woodland habitat corridors into green space and planning for habitat linkages within the developable land, with appropriate buffers.
- Maintaining and enhancing habitat linkages between roadsides and major habitat areas within the PSP area.
- Incorporating isolated paddock/habitat trees into open space where possible and allowing appropriate tree protection and retention zones.
- Identification of low constraint areas where key infrastructure such as services, roads and footpaths might be located to allow for appropriate urban growth while minimising disturbance to riparian or woodland areas.

7.2.1. Existing habitats and connectivity

A number of key existing habitats and connectivity features occur within the investigation area. This assessment has defined areas of high ecological value and outlined key areas of habitat and connectivity within the investigation area. The review and upgrade of the existing structure plan against these findings allows for the design and implementation of a revised structure plan that responds to the environmental values present within the investigation area and allows for urban growth in an environmentally responsive nature. Opportunities for key areas of habitat and connectivity are discussed below.

Aquatic habitats

Three key aquatic features occur within the investigation area, these are farm dams, creeks and watercourses (drainage lines) and gilgai formations. Potential for expansion and connectivity on a landscape scale for gilgai habitat is discussed below within Section 7.2.2.

The constraints assessment identified all areas of aquatic habitat as high and moderate constraint. These areas form key habitat connectivity within the landscape, especially for aquatic dependent species. An opportunity exists to utilise these features as strategic connectivity and habitat features during the masterplan review.

Watercourses should be used for consideration of maintaining key north-south and east-west connectivity for fauna species within the landscape. Environmental corridors should consider existing aquatic features adjacent to waterways including farm dams and gilgai formations to buffer and create strong corridors capable of supporting a diverse array of species and species movement within the landscape.

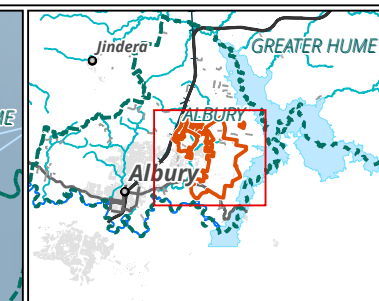
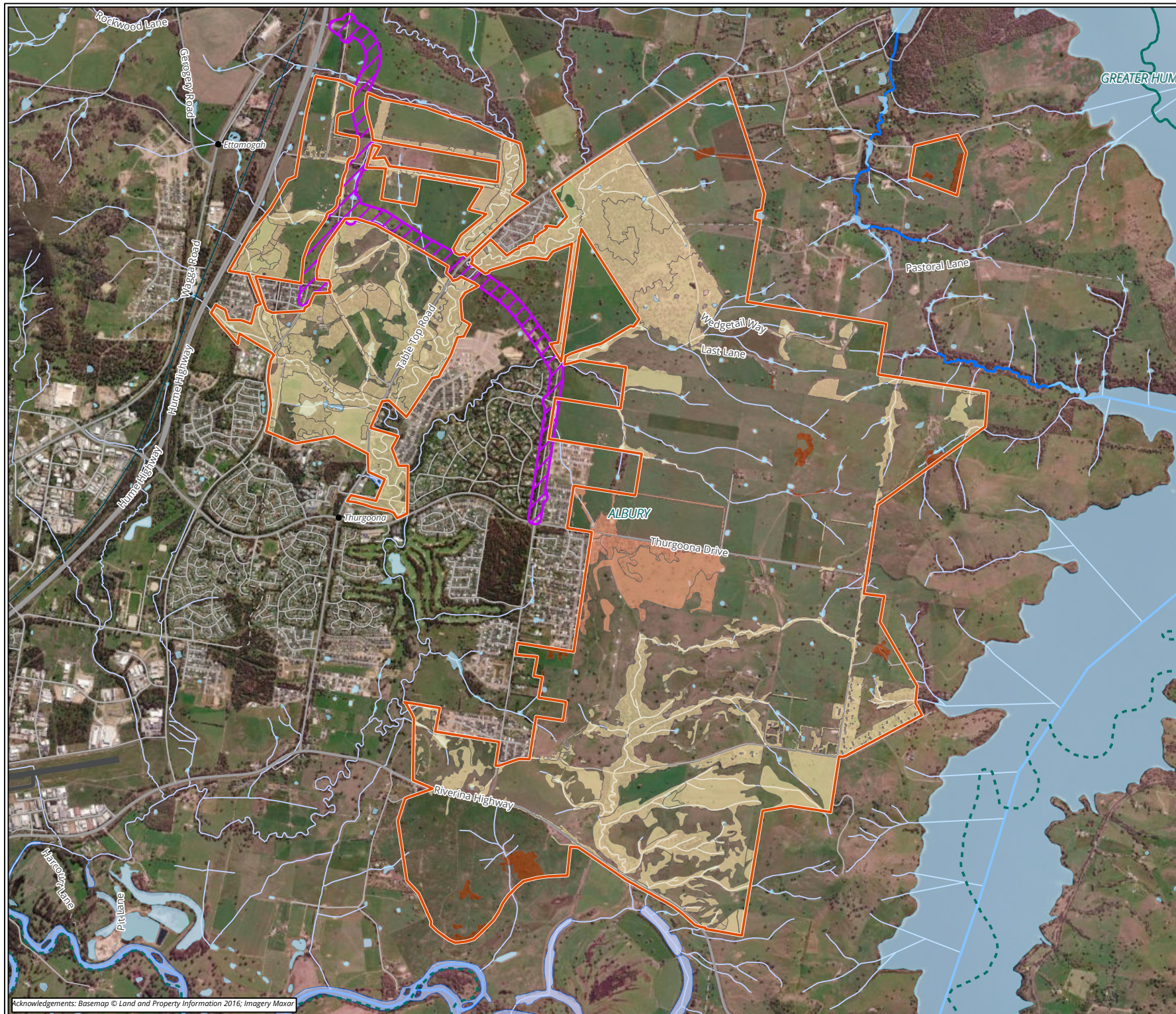
Woodland habitat

Woodland patches, particularly woodlands over 0.5 hectares in size are a key habitat feature, providing refuge and breeding habitat for fauna species. These areas should be prioritised for retention and management within the structure plan to ensure they are not isolated by development and infrastructure. Provision of connectivity to these areas and other key habitat features should be considered.

Opportunities exist to incorporate existing woodland patches into natural and open space parklands to preserve their longevity. Connectivity to woodland patches can be maintained through environmental/conservation corridors, aquatic habitat and both land sharing and land sparing urban design.

Land sharing and land sparing are urban development designs representing alternative ends of a gradient, conceptualising the trade-off between residential populated areas and biodiversity. Land sharing allows for larger lot sizes, encouraging native friendly gardening to allow mobile fauna species such as birds to maintain connectivity to remnant and planted blocks of woodland vegetation. Land sparing allows for smaller residential lots, providing space for environmental corridors connecting areas of key habitat (Soga, M *et al.* 2014), refer to Figure 17.

A study completed in 2018 on the compact cities' concepts of land sharing and land sparing found human population density was a strong driver for species richness and populations. Alongside this, a general trend was found showing common adaptable species were more likely to be found in land sharing areas, with less adaptable or sensitive species more likely to be found in land sparing areas. Urban landscapes can be used to offer and provide differing habitats to ensure a diversity of species and populations are maintained throughout the landscape (Geschke *et al.* 2018).



Legend

- Investigation area
- Thurgoona Link Road BDAR

Patch size (ha)

- 0.5-25
- 25-100
- 100+

Figure 16 Woodland patches

0 300 600 900 1,200 1,500

Metres

Scale: 1:34,000 @ A3

Coordinate System: GDA2020 MGA Zone 55



APEMGroup

Matter: 38717, Date: 12 November 2024,
 Drawn by: JET, Checked by: DB, Last edited by: owilliams
 Layout: 38717_F16_Patches
 Project: P:\38700\38717\Mapping\
 38717_Albury_BA.aprx

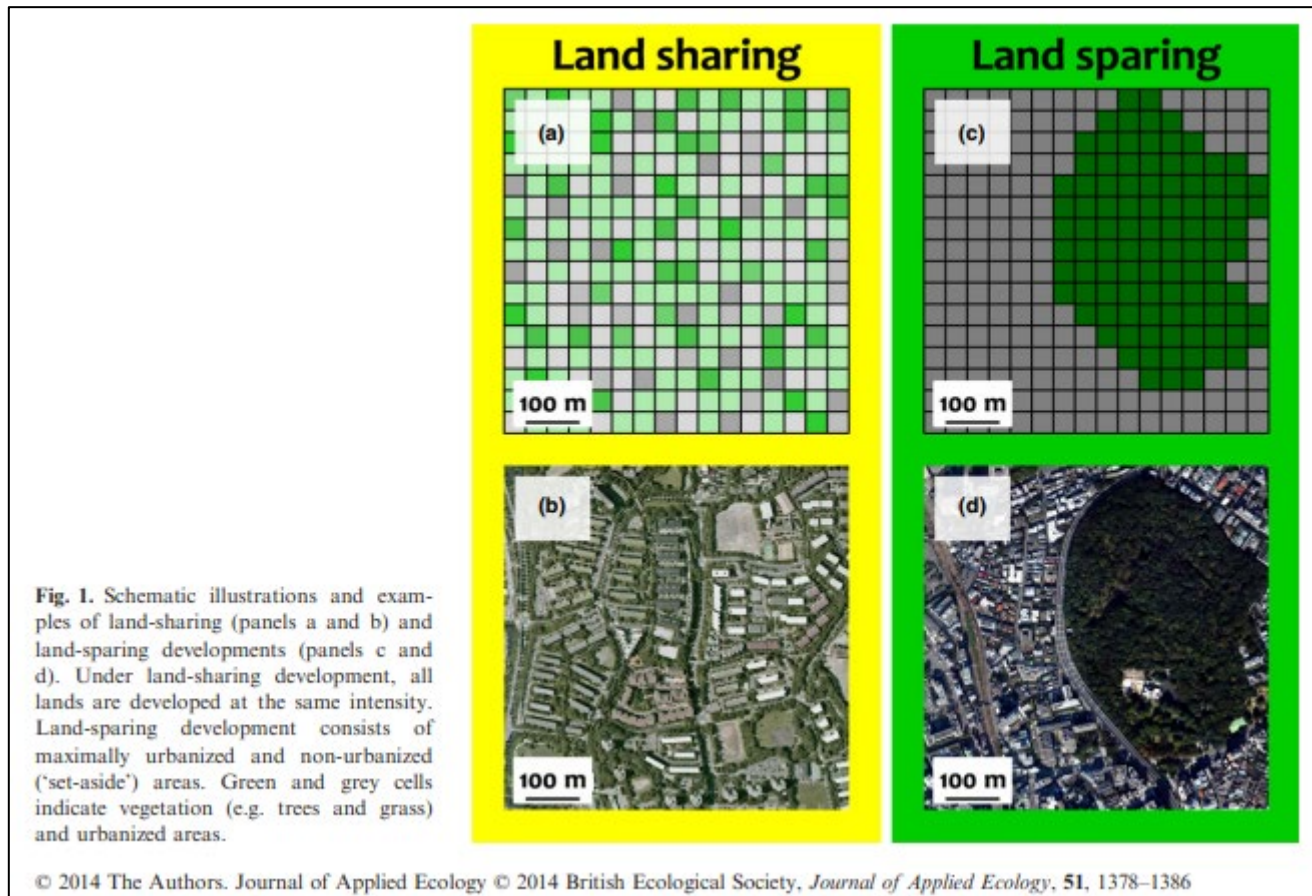


Figure 17 Land sharing versus land sparing (Page 1379 (Soga, M et al. 2014))

Roadsides

Within urban, developed and agricultural landscapes, vegetation roadside corridors form a strong network of habitat connectivity throughout Australia. Roadside connectivity is important for seed dispersal, gene flow and movement of many fauna species. Although roadside connectivity leads to collision risk for many fauna species, they still form a key feature within the investigation area.

Key aspects should be considered when reviewing the structure plan, including size of roadside corridors and species planted within roadsides. Large roadside verges provide stronger habitat connectivity, aid in reducing edge effect and allow for safer movement of fauna species. Additional to this, the opportunity exists within the investigation area to implement native roadside plantings indigenous to the Albury area. This will allow for the creation of new connectivity pathways and may aid in maintaining connection to existing areas of habitat. Native species should be prioritised over exotic tree species, or native species not indigenous to NSW or the Riverina.

There is no best 'practice guidelines' for implementation of roadside conservation in urban landscapes within Australia. It is recommended that a Roadside Conservation Plan is created for areas of new development within the Albury LGA. This plan would include thorough research of development control plans, include design recommendations (including width of verges), analyse and list appropriate species for roadside plants and include recommendations on fauna sensitive roadside planning, such as rope bridges for arboreal mammals.

It is recommended that an update to the AlburyCity Engineering Guidelines would be undertaken to specifically include breaks in kerb and guttering or rolled curves and preferred public/roadside planting guidance (Murray Catchment Management Committee et al. 1998 p122).

Scattered trees

Scattered trees within the investigation area predominantly occur within cleared agricultural landscapes. Scattered trees form an important part of the landscape, creating a mosaic of contiguous habitat in otherwise heavily disturbed areas. Although reduced in their ability to support many fauna species or maintain gene flow and seed dispersal they are an important feature for many fauna species, including raptors and microbats.

Where possible, scattered trees should be considered for inclusion in proposed recreational areas such as open space parkland or as buffers to existing or proposed areas of habitat refuge, roadsides and corridors.

7.2.2. Thurgoona drainage strategy

The purpose of the Thurgoona Wirlinga Drainage Strategy (AlburyCity 2020) is to '*drive and facilitate stormwater management on a catchment-by-catchment basis; by consolidating drainage assets.*'. The strategy was created to provide council and developers with an overarching strategy that defines concept locations and sizes of wetland/retarding basin assets. The strategy identified 30 new wetland/retarding basin locations to be constructed across the Thurgoona - Wirlinga area with the purpose of:

- Mitigating potential flooding impacts.
- Achieving the best stormwater treatment objectives.
- Catering habitat for the Sloane's Froglet.

The drainage strategy gave consideration to incorporating the *Sloane's Froglet Stormwater Wetland Design Guidelines* (ACC & OEH 2017) and *Sloane's Froglet Local Area Management Plan (LAMP)*. This assessment included an assessment of flow paths and catchments.

The aim of the proposed wetland/retarding basins was to form from a strategic network of large habitat bodies across Thurgoona and Wirlinga. An assessment against this strategic network and the hydrology features identified, especially with respect to the Sloane's Froglet was completed using data gathered during this biodiversity assessment process. Several retarding basins constructed to the *Sloane's Froglet Stormwater Wetland Design Guidelines* have been completed within the Thurgoona – Wirlinga area and have been demonstrated to contain breeding populations of Sloane's Froglet.

Research on Sloane's Froglet has identified its use of wetland complexes forming metapopulations, where species are known to have life cycles and habitat requirements that depend on the linking of complementary habitats at multiple spatial scales (Knight 2015).

AlburyCity engaged Spiire to work with DPE to produce the 'Sloane's Froglet Stormwater Wetland Design Guidelines' (ACC & OEH 2017). These guidelines are essential for maintaining meta-populations of Sloane's Froglet in a developing landscape. All developments within the Albury LGA are required to include detention basins in-line with the design guidelines to ensure habitat for the Sloane's Froglet is incorporated into development design.

AlburyCity undertook consultation with DPE regarding the existing drainage basin. This consultation noted that the existing Sloane's Froglet Stormwater Wetland Design Guidelines are essential for maintaining meta-populations Appendix 2.

The construction of retention basins to a standard that is shown to support Sloane's Froglet populations and allows for enhancement of existing habitat is a positive development outcome. However, the presence of these basins (beyond those stipulated in the drainage strategy) is largely dictated on the individual development basis. While the creation of larger retention basins is a positive step in preserving Sloane's Froglet in the PSP area, to create true meta-populations, the aquatic linkages between retention basins must be retained as suitable dispersal habitat (i.e., not concreted, piped or diverted) and a series of seasonal and/or smaller scale basins should be created linking these larger habitat resources.

The retention of existing aquatic linkages between retention basins and the construction of a series of small and/or seasonal basins is the preferred approach. This approach is the most likely pathway forward to ensure the long-term survival of this species within the investigation area. Large non seasonal retention basins are less suitable as they do not reflect the natural preferred breeding habitat of this species.

These areas of aquatic linkage and small-scale basins should be constructed and placed adjacent to existing waterway systems as this species relies on ephemeral and wetland conditions for breeding. No areas of constructed Sloane's Froglet habitat should be placed within existing waterways.

An opportunity is present through the structure plan process to develop a strategic approach to the construction of these basins and to provide habitat linkages between these habitat features, see Figure 18, for existing drainage basins and known and presumed habitat. It is essential that a large network of occupied and connected basins are spread across the investigation area to maintain a functioning meta-population of Sloane's Froglet, this is critical for the long-term persistence of the species Appendix 2.

Two options are recommended for further investigation:

- 1: Maintain the existing basin plan implementation with the addition of a secondary network of smaller wetland/retarding basins throughout the Thurgoona - Wirringa drainage area that mimic gilgai landforms and allowed for the protection of overflow/flooded habitat could provide added connectivity and subsequently gene-flow between populations. The secondary network would link larger basin areas.
- 2: Implementation of a new basin design with a large network of small basins spread throughout the investigation area. This design would break the existing 'large' basins into a series of three or more smaller wetland/basins, alternating and spaced adjacent to key watercourse movement lines..

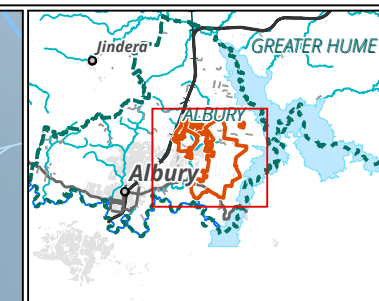
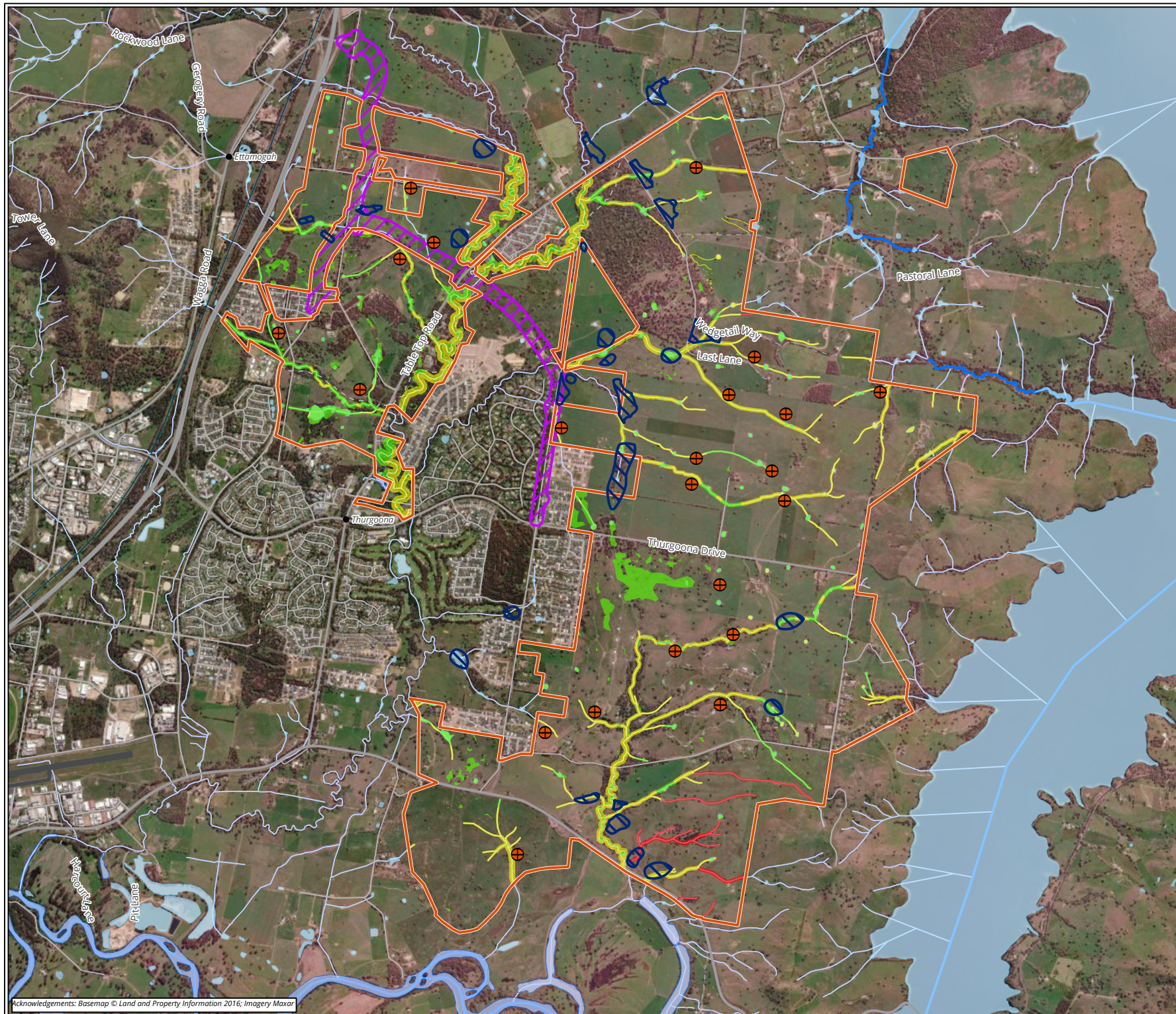
Both of these options should also incorporate the surrounding lands and aquatic linkages to ensure that longitudinal aquatic linkages are maintained and enhanced as suitable habitat and should incorporate the existing Sloane's Froglet Stormwater Wetland Design Guideline's.

It is essential that with the implementation of Sloane's Froglet Stormwater Wetland's through new developments and supported by the broader drainage strategy that monitoring, and maintenance of the created wetlands occurs. It is recommended that a management plan be developed including annual monitoring of created habitats through implementation of the Sloane's Froglet Stormwater Wetland Design Guideline's and Thurgoona Drainage Strategy. This management plan could be included as part of or an addendum to the AlburyCity Natural Area Management Strategy, or as a stand-alone management plan. This plan would be updated annually and should include:

- Location of current wetlands requiring survey.

- A monitoring plan for established wetlands from both stormwater development and the drainage strategy, including:
 - Clear delineation of roles and responsibilities for monitoring and maintenance.
 - Monitoring requirements and methods.
 - Triggers for action such as:
 - Typha encroachment.
 - Siltation.
 - Maintenance needs.
 - Revegetation.
 - Erosion control.
 - Weed control.
 - Methods to remediate action triggers.
 - Timeframes in which methods must be implemented.
- Annual monitoring report documenting:
 - Wetlands surveyed.
 - Presence of Sloane's Froglet
 - Triggers identified.
 - Methods implemented for remediation.
 - Result/success of previous years methods implemented for remediation.
 - Recommendations for method modification where success was not achieved.

By enhancing these linkages with Sloane's Froglet as the 'flagship' species, additional habitat benefits would be created for threatened species such as Latham's Snipe and for River-swamp Wallaby-grass as well as a range of local wetland dependent species. Protecting and enhancing these habitat linkages through open space planning could also provide additional opportunities for passive recreation, open spaces and connectivity between developed areas, enhancing liveability metrics. Consideration should be placed on the total 'green area' expected for individual development, whereby, a design may have reduced open space requirements due to the implantation of larger areas of habitat linkage.



Legend

- Investigation area
- Thurgoona Link Road BDAR
- Drainage basin
- + Indicative locations of metapopulation wetland complexes

Sloane's Froglet survey results

- Assumed presence
- Confirmed presence
- Not identified during survey effort

Figure 18 Review of Thurgoona Wirlinga Drainage Strategy

0 300 600 900 1,200 1,500
Metres

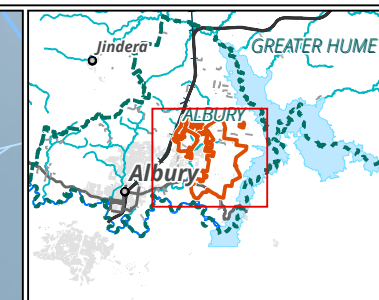
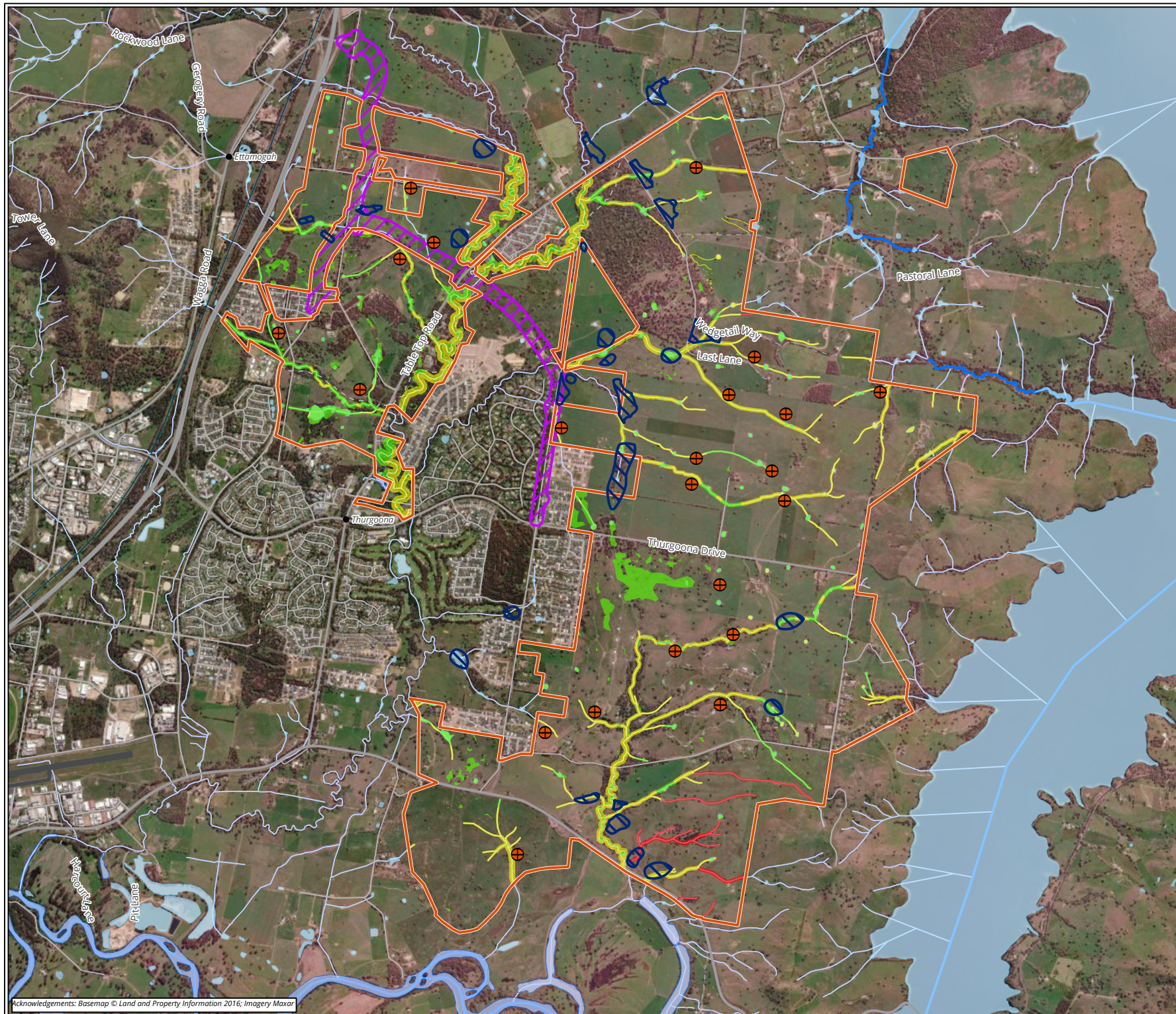
Scale: 1:35,000 @ A3

Coordinate System: GDA2020 MGA Zone 55

biosis

APeM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F18_Drainage
Project: P:\38700\38717\Mapping\38717_Albury_BA.aprx



Legend

- Investigation area
- Thurgoona Link Road BDAR
- Drainage basin
- Indicative locations of metapopulation wetland complexes

Sloane's Froglet survey results

- Assumed presence
- Confirmed presence
- Not identified during survey effort

Figure 19 Review of Thurgoona Wirlinga Drainage Strategy - Recommendation 1

0 300 600 900 1,200 1,500
Metres

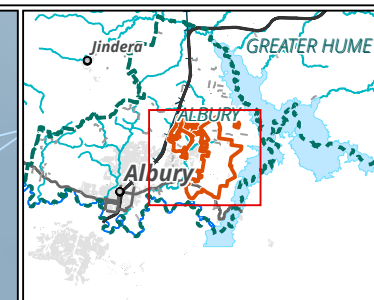
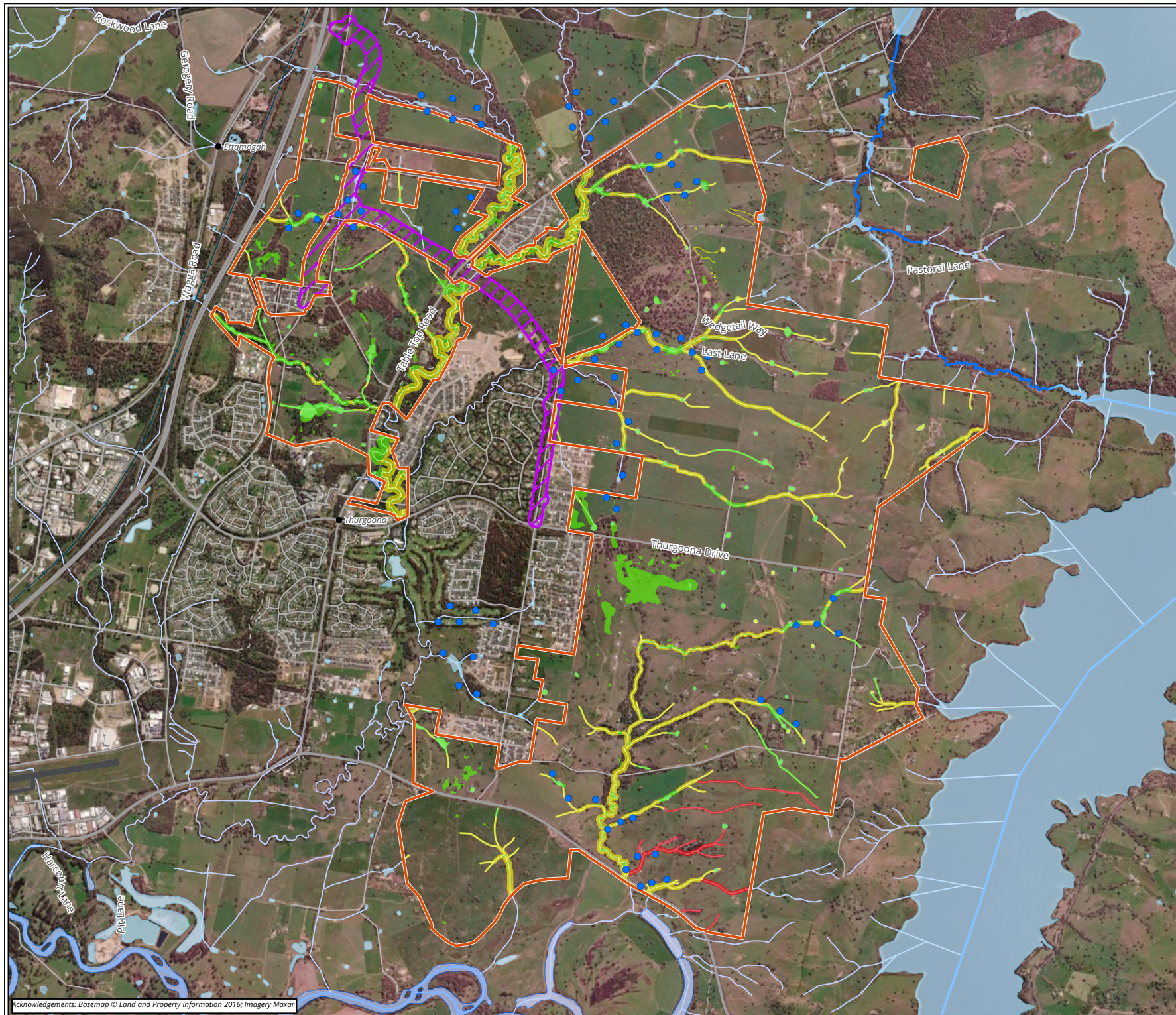
Scale: 1:35,000 @ A3

Coordinate System: GDA2020 MGA Zone 55

biosis

APeM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F19_Drainage1
Project: P:\38700\38717\Mapping\38717_Albury_BA.aprx



Legend

- Investigation area
- Thurgoona Link Road BDAR
- Indicative drainage basin redesign

Sloane's Froglet survey results

- Assumed presence
- Confirmed presence
- Not identified during survey effort

Figure 20 Review of Thurgoona Wirlinga Drainage Strategy - Recommendation 2

0 300 600 900 1,200 1,500
Metres

Scale: 1:34,000 @ A3

Coordinate System: GDA2020 MGA Zone 55

biosis

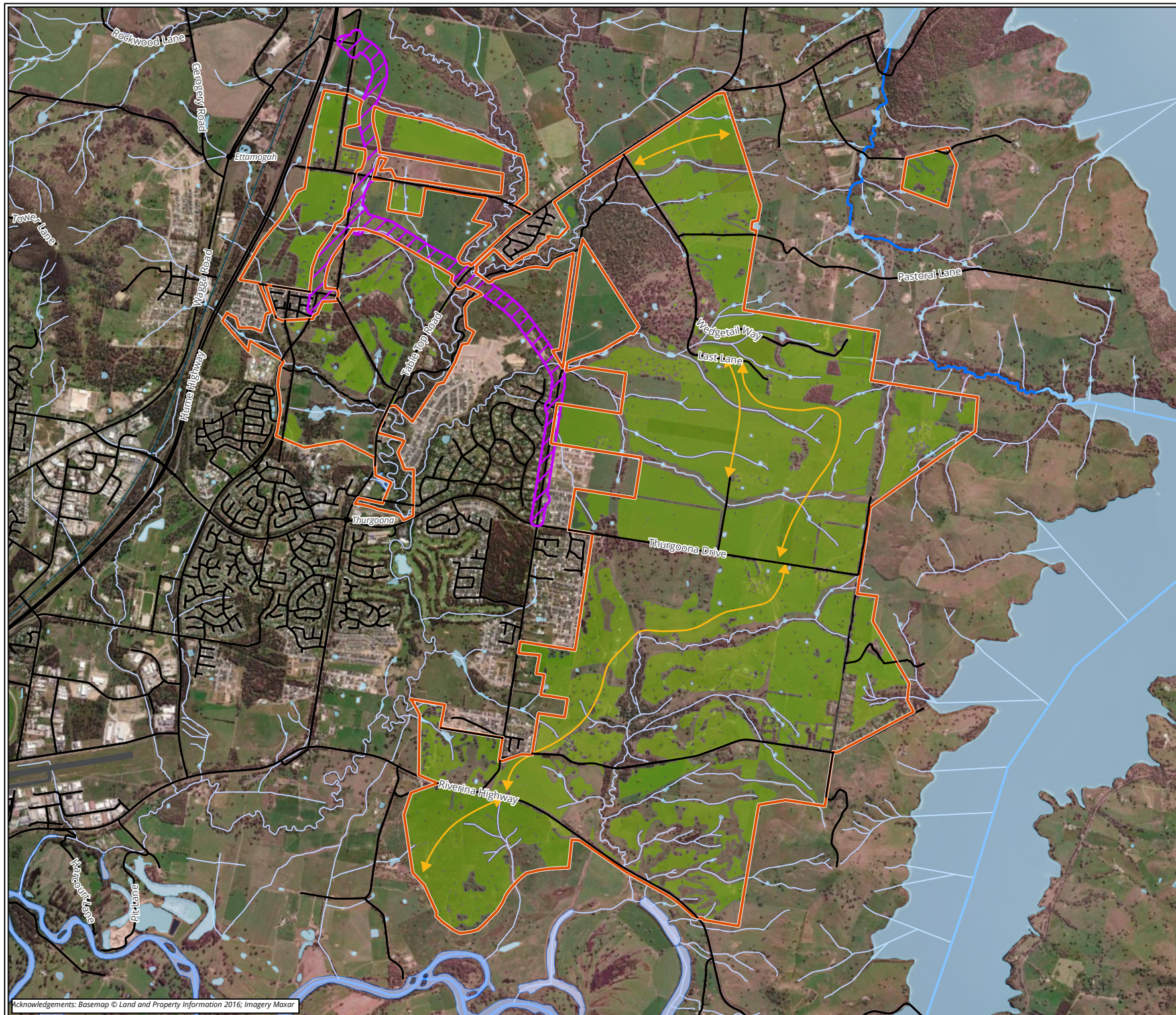
APEM Group

Matter: 38717, Date: 18 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F20_Drainage2
Project: P:\38700s\38717\Mapping\
38717_Albury_BA_9_21.aprx

7.2.3. Opportunity for urban connectivity and services

The constraints assessment highlighted areas that were not identified as containing known ecological constraints. This has allowed for assessment of opportunities for development in low constraint areas, notably within the north of Thurgoona and throughout Wirlinga. A key consideration in designing a structure plan that responds to these environmental constraints is allowing for the allocation of key services, infrastructure and roads that allow for a cohesive and sustainable urban design.

Urban connectivity and services in the form of infrastructure such as roads, sewers and services will be required as part of the structure plan design. Habitat corridors such as watercourses, existing roadside vegetation and areas identified as high constraint may require some disturbance in order to allow for logical and connected urban design. Therefore, an assessment was completed outlining areas of low constraint where key opportunities for urban development and linkage corridors for urban services such as roads should be considered. The outlined linkages connect to existing services and follow low constraint corridors. This assessment is depicted within Figure 21.



Legend

- Investigation area
- Thurgoona Link Road BDAR
- Key service and urban linkages
- Existing lead in roads
- Low constraint

Figure 21 Low constraint and urban connectivity

0 300 600 900 1,200 1,500
Metres

Scale: 1:35,000 @ A3
Coordinate System: GDA2020 MGA Zone 55

biosis
APEM Group

38717, Date: 18 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F21_LowConstraints
Project: P:\38700\38717\Mapping\
38717_Albury_BA_9_21.aprx

References

- ACC & OEH 2017. *Sloane's Froglet Stormwater Wetland Design Guidelines*, Report prepared by Spiire for Albury City Council and the NSW Office of Environment and Heritage, Albury.
- ALA 2024. 'Atlas of Living Australia Spatial Portal', <https://biocache.ala.org.au/explore/your-area>.
- AlburyCity R 2013. *Thurgoona Wirlinga Precinct Structure Plan*, AlburyCity, <https://www.alburycity.nsw.gov.au/strategies-and-plans/thurgoona-wirlinga-precinct-structure-plan>.
- AlburyCity S 2020. *Thurgoona Wirlinga Drainage Strategy*, Report prepared for Albury City council. Author BJM. Spiire. Albury.
- Australian National Botanic Gardens & Australian National Herbarium 2007. *Australian Plant Name Index - APNI, Botanical Databases*, accessed 8 March 2024, <https://www.anbg.gov.au/apni/>.
- BCT 2023. *BCF Charge Report V1 - July 2023*, <https://www.bct.nsw.gov.au/sites/default/files/2023-07/bcf-charge-quotes-to-28022023.PDF>.
- Biosis 2022. *Thurgoona Link Road Biodiversity Development Assessment Report*, Report prepared for Albury City Council. Authors: Mendham, S. Cerato, S and Palmer, M. Biosis Pty Ltd, Albury, NSW. Project no. 32088.
- BOM 2023. *Groundwater Dependent Ecosystems Atlas, Bureau of Meteorology*, accessed 31 October 2019, <http://www.bom.gov.au/water/groundwater/gde/map.shtml>.
- Cth DCCEEW 2005. *Directory of Important Wetlands in Australia, Australian Commonwealth Department of Climate Change, Energy, the Environment and Water*, accessed 26 February 2024, <https://www.dcceew.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands>.
- Department of Planning, Industry and Environment 2016. *South Western Slopes Bioregion, Bioregions*, accessed 16 June 2020, <https://www.environment.nsw.gov.au/bioregions/NSWSouthWesternSlopesBioregion.htm>.
- DPE 2002. *White Box Yellow Box Blakely's Red Gum Woodland - Determination to make a minor amendment to Part 3 of Schedule 1 of the Threatened Species Conservation Act, White Box Yellow Box*, <https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/2011-2012/white-box-yellow-box-blakelys-red-gum-woodland-minor-amendment-determination>.
- DPE 2022. 'Determining Strahler stream order fact sheet',.
- DPE 2023. *Generate credits with a biodiversity stewardship agreement, Biodiversity Offsets Scheme*, <https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/generate-credits-biodiversity-stewardship-agreement>.
- DPI 2023a. 'Fisheries NSW Spatial Data Portal', https://webmap.industry.nsw.gov.au/Html5Viewer/index.html?viewer=Fisheries_Data_Portal.
- DPI 2023b. *Priority weeds for the Murray, NSW Weed Wise*, <https://weeds.dpi.nsw.gov.au/WeedBiosecurities?AreaId=12>.

DPI 2024. 'Key Fish Habitat', accessed 27 November 2020,
<https://www.dpi.nsw.gov.au/fishing/habitat/publications/pubs/key-fish-habitat-maps>.

DPIE 2019. *Guidance to assist a decision-maker to determine a serious and irreversible impact*.

DPIE 2020. *Biodiversity Assessment Method (BAM)*, Department of Planning, Industry & Environment,
<https://www.environment.nsw.gov.au/research-and-publications/publications-search/biodiversity-assessment-method-2020>.

DPIE 2021. 'Biodiversity Values Map NSW',.

DSEWPac 2009. *Census of Australian Vertebrates*, Australian Government Department of Sustainability Environment, Water, Population and Communities, Canberra, ACT.

Geschke A, James S, Bennett AF, & Nimmo DG 2018. 'Compact cities or sprawling suburbs? Optimising the distribution of people in cities to maximise species diversity', *Journal of Applied Ecology*, 55, 5: 2320–31.

Harden GJ (ed.) 1992. *Flora of New South Wales*, NSW University Press, Kensington, NSW.

Harden GJ 1993. *Flora of New South Wales*, NSW University Press, Kensington, NSW.

Harden GJ 2000. *Flora of New South Wales*, Revised Edition, NSW University Press, Kensington, NSW.

Harden GJ 2002. *Flora of New South Wales*, NSW University Press, Kensington, NSW.

Knight AR 2015., *The case for Sloane's Froglet: Generating ecological knowledge with the intent to benefit biodiversity*, School of Environmental Sciences: Charles Sturt University,
https://researchoutput.csu.edu.au/ws/portalfiles/portal/122353673/Alexandra_Knight_thesis.pdf.

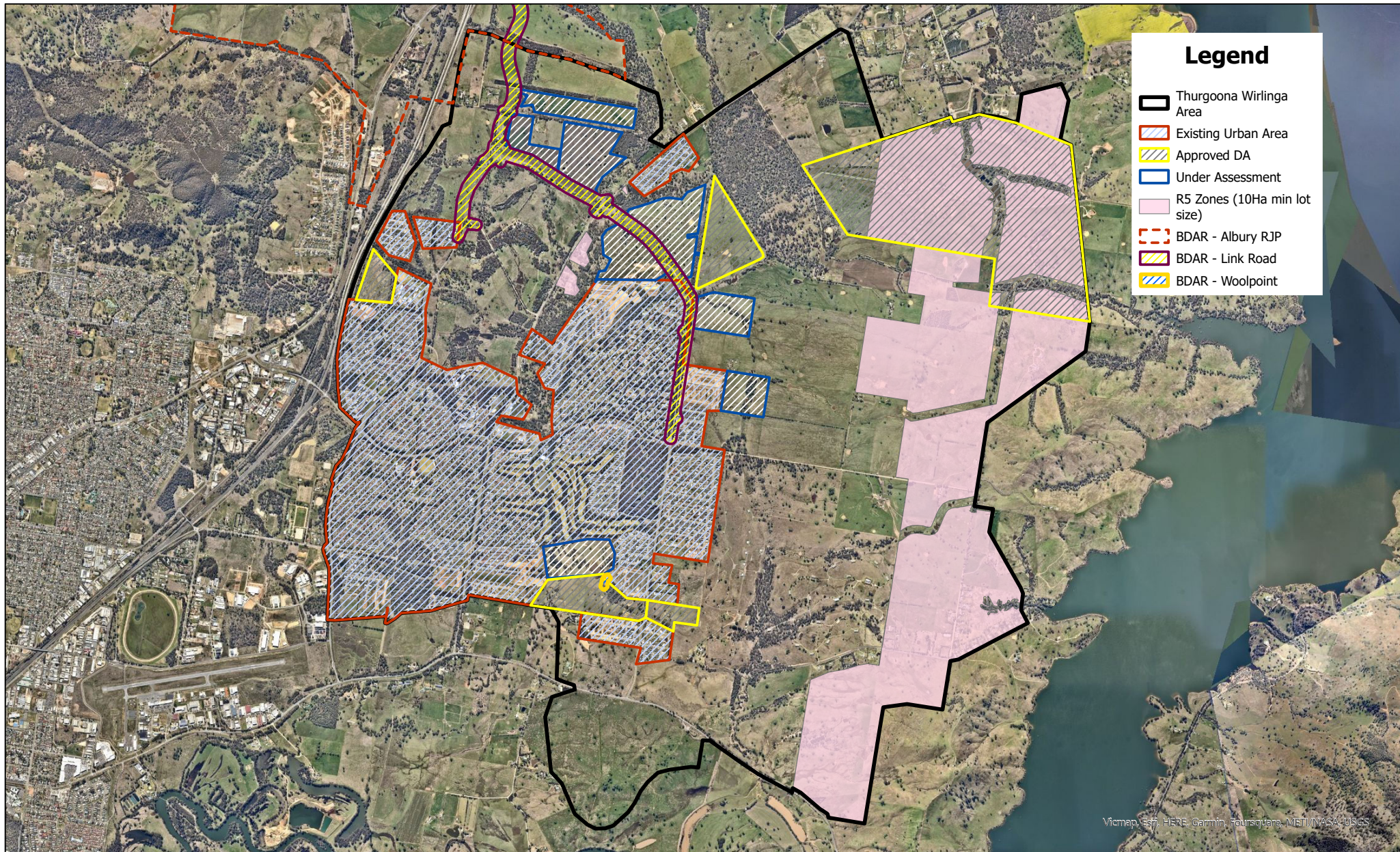
Murray Catchment Management Committee, Department of Land and Water Conservation, F Stelling, & K Walker 1998. 'South Western Slopes Revegetation Guide (south of the Murrumbidgee River)',
<https://holbrooklandcare.org.au/wp-content/uploads/2020/03/SWSR-guide.pdf>.

OEH 2017. 'Ramsar Wetland mapping', New South Wales Government Office of Environment and Heritage.
<http://www.environment.gov.au/cgi-bin/wetlands/ramsardetails.pl?refcode=23>.

Soga, M, Yamaura, Y, Koike, S, & Gaston, K 2014. 'Land sharing vs. land sparing: Does the compact city reconcile urban development and biodiversity conservation?', *Journal of Applied Ecology*, 51, 5: 1378–86.

APPENDICES

Appendix 1. AlburyCity – Investigation Area

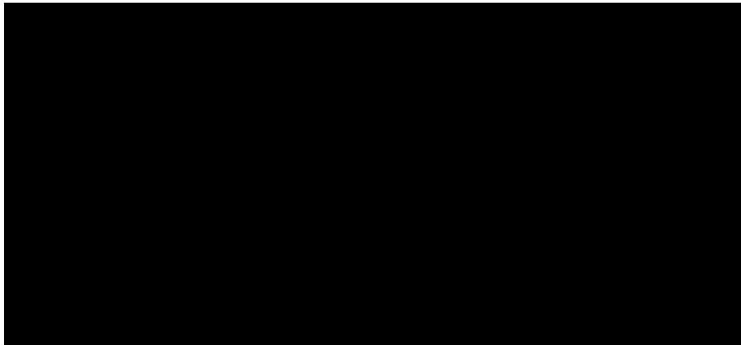


Document Path: G:\2022\GIS\2022 Project\2022 Project.aprx

Appendix 2. Department Consultation

Appendix 4. Constraints Assessment

9 December 2024



Biodiversity constraints assessment for Thurgoona Wirlinga precinct structure plan Stage 1 – Biodiversity Assessment Method

Project no. 39717

Biosis Pty Ltd was commissioned by AlburyCity to complete Stage 1 of the Biodiversity Assessment Method (BAM) for the updated Thurgoona Wirlinga Precinct Structure Plan (PSP). A first step in this process was the identification of ecological constraints and opportunities within the PSP area (Figure 1). To aid in this identification, a biodiversity constraints model was constructed to identify areas containing high and low biodiversity constraint.

The objective of this constraints model is to complete a preliminary identification of areas within the PSP boundary, that are likely to contain high, moderate, and low biodiversity constraints. This assessment was completed by conducting a high-level assessment of ecological based spatial data within the PSP boundary, followed by an in-field assessment to ground-truth collated data.

A constraints hierarchy was created to provide a justification and breakdown of each identified constraint. The constraints hierarchy covers the following broad categories:

- Threatened species and communities' records.
- Native vegetation extent.
- Hydrology.
- Land zoning (current, proposed areas for removal and proposed areas for addition).
- Biodiversity Value Mapped land Regent Honeyeater Important Habitat Mapped Land.

The model will be used as a basis for the avoidance of key biodiversity values within the PSP area. The next steps in the Stage 1 BAM process is the ground truthing of areas identified in the constraints model to confirm the presence of key biodiversity values. This process will then inform targeted surveys and development of an appropriate strategy for the calculation and determination of credit allocation under the BAM when the PSP is enacted.

Background

The Thurgoona Wirlinga precinct is identified as Albury's key growth area, with significant population growth expected over the next 60 years. The Thurgoona Wirlinga Precinct Structure Plan was established in 2012 as a response to this growth forecast. AlburyCity has been covered by a biodiversity certification established in 2010, that has enabled development in identified growth zones to proceed without individual development consideration of threatened species or communities listed under the *Biodiversity Conservation Act 2016* (BC Act).

Since 2010 significant changes have occurred in New South Wales (NSW) biodiversity legislation and in the listing of threatened species, including within the Albury LGA. Principal amongst these changes was the introduction of the Biodiversity Assessment Methodology (BAM) in 2016. A review of the Thurgoona Wirlinga Precinct Structure Plan and the Albury biodiversity certification is being undertaken by AlburyCity with a view to establishing precinct level certification under the BC Act.

Biosis Pty Ltd was commissioned by AlburyCity to complete Stage 1 of the Biodiversity Assessment Method (BAM) to support the updated Thurgoona Wirlinga Precinct Structure Plan (PSP). The Thurgoona Wirlinga area is defined as the study area, is approximately 2674 hectares in size and excludes all areas of existing residential infrastructure, current Development Application (DA) areas, approved DA areas and areas under assessment for development approval.

As a first step towards outlining areas of biodiversity opportunity and constraint within the study area, a desktop biodiversity model was completed. This model will allow AlburyCity to begin an assessment of the existing PSP against areas of high and moderate constraint. This constraints model will provide a preliminary baseline for areas that have a moderate to high biodiversity constraint and conversely provide insight into areas that could be prioritised for development.

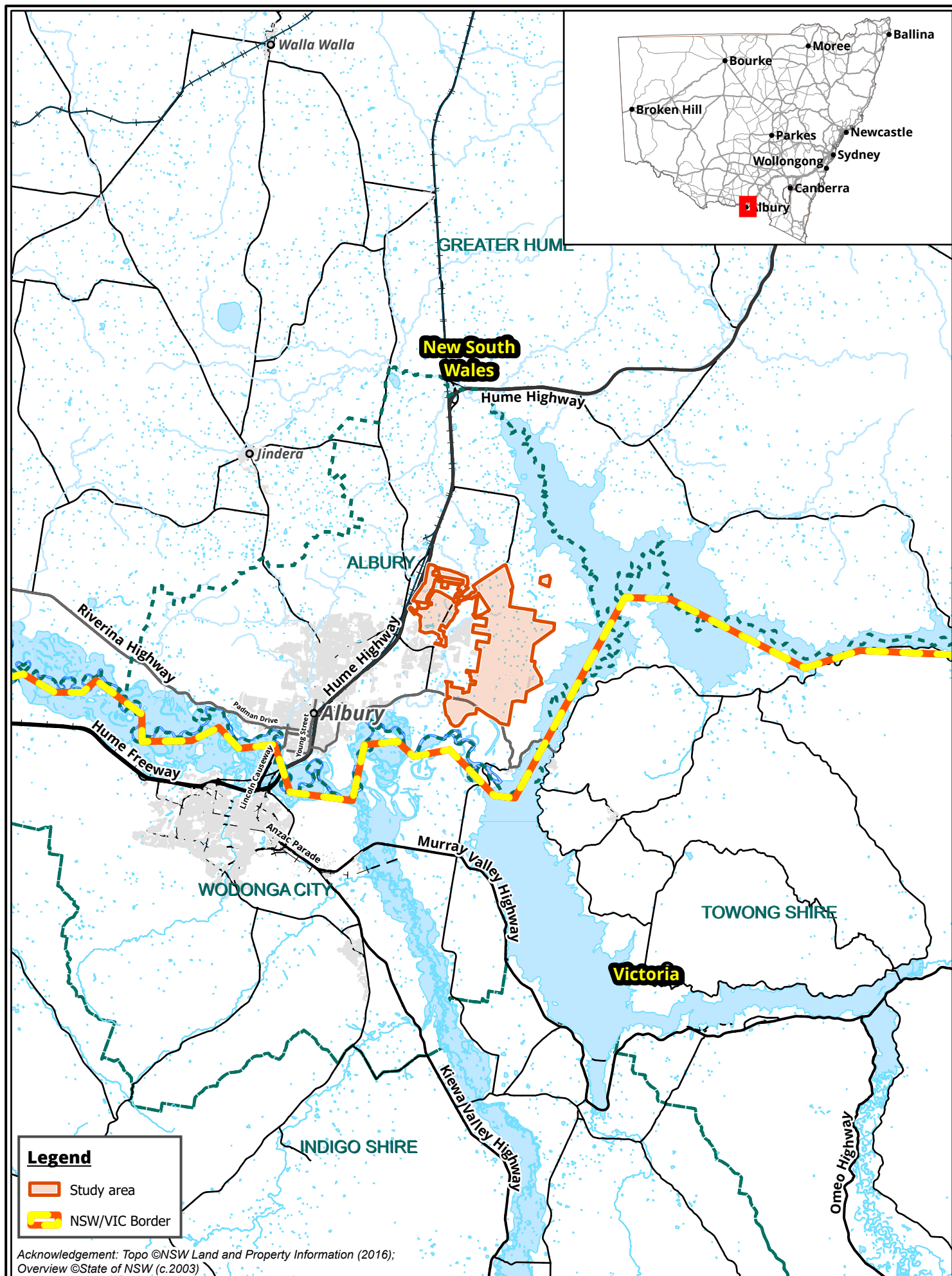


Figure 1 Location of the study area

Method

Background research

The high-level desktop constraint assessment included a review of the following data:

- NSW Department, Planning Environment (DPE) BioNet Atlas of NSW Wildlife threatened species records.
- NSW Department of Primary Industries (DPI) Spatial Data for threatened freshwater species, populations and communities.
- NSW DPE State Vegetation Type Map 2022.
- NSW DPE Vegetation information System Threatened Ecological Community data.
- NSW DPI Strahler Stream Order (SSO).
- NSW DPI Key Fish Habitat.
- AlburyCity – Environmental and Conservation Land Zoning:
 - Current land zoning.
 - Proposed removal and proposed additional Conservation Zones.
- Biosis scattered tree data and AlburyCity significant tree data.
- DPE Sloane's Froglet population and habitat data (provided to Biosis by David Hunter, DPE).
- Australian Museum FrogID and Sloane's Champion's population data (provided to Biosis by the Australian Museum).
- Sloanes Froglet Wetland Mapping (API) (provided by ACC).
- NSW DPE Biodiversity Value Mapped (BV) mapped land.
- Scattered Tree LiDAR data held by Biosis Pty Ltd.
- Constraints assessment

The ecological constraints within the study area were assigned as constraint classes with differing constraints levels to form a hierarchy. Each constraint class was then layered to create an overlapping constraints hierarchy. Each category was assessed to determine if sub-constraints could be extracted to isolate influencing factors to aid the analysis. Each constraint/sub-constraint was categorised as high or moderate and given a brief justification, this hierarchy is outlined in Table 1.

The hierarchy details how the constraints were layered. Low constraint areas were deliberately assigned a null value, to aid in identifying where an on-ground assessment is required to ground-truth the null result. Following finalisation of field assessment data, areas of 'low' constraint will be extracted. The constraints model is shown in Figure 2. .

Lot 30 DP 1273509

Lot 30 DP 1273509 (Lot 30) was added to the study area post completion of targeted field assessment. This area has a high potential occurrence of Sloane's Froglet *Crinia sloanei*, as such a detailed, high-level desktop

assessment was completed to determine areas of potential habitat for this species to be incorporated as high constraint into the constraints model. The assessment included:

- Assessment of mapped waterways and waterbodies.
- Sloanes Froglet Wetland Habitat mapping (API) provided by ACC.
- Assessment of digital elevation to locate potential gilgai formations and unmapped drainage lines.
- Assessment of mapped vegetation communities.
- Assessment of historic imagery through Google Earth and NSW Spatial Data Services.

It is important to note that gilgai formations as small as 1 metre squared can host this species. Small pockets of potential habitat may have been missed through this assessment. An in-field assessment would be required to ground-truth and confirm the high-level desktop assessment.

Initial Field assessment

A field investigation was undertaken by Biosis over June and July 2023 by Dimity Bambrick (Senior Ecologist) and Jessica Chapman (Ecologist). The field investigation involved the assessment of area identified by the desktop review as either being data deficient or containing high ecological constraint. The field investigation included:

- Ground-truthing of existing vegetation mapping, including confirmation or correction of Plant Community Type (PCT), assignment of condition and determination of the presence of any Threatened Ecological Communities (TEC) listed under the EPBC Act or BC Act.
- Mapping of any unidentified constraints, such as gilgai or areas of unmapped native vegetation, unmapped farm dams and drainage lines.
- Ground-truthing of constraints mapping such as correcting boundaries of mapped features due to changes in the landscape or condition of identified constraint and correction of mapping anomalies.
- Habitat assessment in line with Section 6 of the Biodiversity Assessment Method (BAM) to determine the potential for threatened species identified under the BAM as 'ecosystem credit species' and 'species credit species' to occur.
- Mapping of habitat feature where possible such as Hollow-bearing Trees, scattered trees, fallen timber, rocky habitat. Noting that, not all features such as Hollow-bearing Trees within the study area were mapped at this stage of field investigations.
- General assessment of creek lines.
- Confirmation of Category 1 Exempt areas mapped under the draft native vegetation regulatory map.

All areas of the study area were surveyed excluding residential areas, lots too small to be subdivided or where access was not permitted. Where access was not permitted or survey was not undertaken, all areas of constraint identified through the background research were assumed present.

Targeted species field assessment

No threatened flora species were determined likely to occur within the investigation area. Targeted fauna surveys were completed in accordance with the following NSW DPE guidelines:

- Koala (*Phascolarctos cinereus*): Biodiversity Assessment Method Survey Guide (2022).
- NSW Survey Guide for Threatened Frogs (2020).
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) (2004).

Data provided by DPE, Charles Sturt University and community groups ('Sloane's Champions', the FrogID App) was used to assist in determining survey effort. This data was utilised to determine which species have confirmed breeding habitat within the PSP area.

The following targeted survey methods were used:

- Spotlighting.
- Call Playback.

- Active Search – Stick nest assessment.
- Active Search – Diurnal bird survey.
- Spot Assessment Technique (SAT).

A habitat assessment was completed prior to commencing targeted fauna surveys to identify suitable survey locations and plan survey effort.

The habitat assessment focussed on the presence of the following features within the investigation area:

- Habitat trees including large and/or hollow-bearing trees, stick nests, availability of flowering shrubs and canopy/understorey feed tree species.
- Soil type and presence of cliffs, overhangs and other rocky areas.
- Condition and type of native vegetation and the presence of exotic species.
- Presence and condition of pools and waterways.
- Quantity of ground litter and woody debris.
- Searches for indirect evidence of fauna (i.e. feathers, tracks and scats).
- General degradation of the site as a result of past and current disturbances such as vegetation clearing and industrial land management practices.
- Topography and landscape morphology.
- Presence of flying-fox camps.

Full targeted survey detailed are located within section 2.4 of the Thurgoona Wirlinga Precinct –

Biodiversity Assessment (Stage 1) report (Biosis 2024). Detailed mapping was completed following the field assessment:

- Figure 2 Constraints Hierarchy
- Figure 3 Constraints Breakdown: Vegetation
- Figure 4 Constraints Breakdown: Hydrological Features
- Figure 5 Constraints Breakdown: Land Zoning and Biodiversity Value Mapped Land

Table 1 Ecological constraints in the study area

Major constraint group	Constraint	Sub-constraint	Sub-Sub Constraint	Constraint Hierarchy	Justification	GIS mapping
Threatened species	Threatened Species Records <10 years old	Sedentary species	Flora	High	High probability of species presence, species is sedentary and not likely to have moved or occurs as an isolated sedentary population.	All native veg or habitat features within 100m buffer from record location.
			Known fauna with populations present, e.g., Sloane's Froglet	High	High probability of species presence with breeding or foraging habitat present, species is sedentary and not likely to have moved.	
			Fauna records identified as an isolated occurrence or vagrant, e.g.,	Moderate	Low probability of species presence with low probability of breeding habitat present but cannot be ruled out due to the presence of isolated or vagrant records.	
		Mobile species	Fauna species identified as mobile, e.g., avian species and arboreal species such as Squirrel Glider	Moderate	Species likely and capable of moving between habitat within the investigation area where connectivity is present.	All associated habitat of threatened species recorded.
	Threatened Species Records > 10 years old	Threatened species record overlapping with other constraint e.g., woodland, wetland		High	Species record in identified habitat (e.g., woodland patch, or wetland patch) is likely to contain a population.	All associated habitat of threatened species recorded in overlapping area.
		Sedentary species	Flora	Moderate	No records within the last 10 years. Species are less likely to be present or have a viable population present. Moderate probability of species presence with breeding or foraging habitat present	All native veg within 100m buffer from record location.
			Fauna	Moderate		
		Mobile species	Fauna species identified as mobile	Moderate		
			Threatened species record overlapping with other constraint e.g., woodland, wetland			
		Freshwater aquatic species	All areas of mapped Key Fish Habitat under the NSW DPI		High	Likely to contain threatened fish or freshwater species populations, or form part of an important water catchment network.
All watercourses (using associated SSO buffer) indicated under the DPI as containing a threatened freshwater species			High	DPI threatened freshwater species indicative mapping spatial data.		
Threatened Ecological Community	All areas of mapped PCT that are associated with a TEC, including areas of planted vegetation that met the appropriate floristic structure to be categorised as a PCT.		High	TECs are listed under BC Act and/or EPBC Act. Overlapping constraint, where all areas of TEC are overlapping with areas of mapped associated vegetation.	PCTs associated with TECs based on BioNet Vegetation information System	
	Native vegetation		Moderate	Likely to provide habitat for some threatened species. Requires credit retirement.	PCTs associated with TECs based on BioNet Vegetation information System	

Major constraint group	Constraint	Sub-constraint	Sub-Sub Constraint	Constraint Hierarchy	Justification	GIS mapping
		All area of remnant native vegetation within C zoned land proposed to be retained or added by ACC.		High	Likely to contain hollows and important breeding habitat for threatened species. Likely to provide offset allocation under existing BioCert	Areas identified as PCT under the SVM Riverina and ground-truthed in field.
			Patch size greater than .5ha and located within 100m of C zone	High	Proximity to C zone provides connectivity, and/or large enough to host threatened species population. Credit retirement required.	Areas identified as PCT under the SVM Riverina and ground-truthed in field.
		Remnant Native Vegetation outside of C (environmental) zoned land	Patch size less than 0.5ha and located within 100m of C zone	Moderate	Proximity to C zone provides connectivity, and/or large enough to host threatened species population. Credit retirement required	Areas identified as PCT under the SVM Riverina and ground-truthed in field.
			Patch located more than 100m from C zone	Moderate	May not be close enough to C zone to provide connectivity, but may not be large enough to host threatened species population, likely to host common fauna species not effected by edge effect	Areas identified as PCT under the SVM Riverina and ground-truthed in field.
		Planted Native Vegetation not able to be stratified into a PCT due to the lack of species indigenous to the Riverina, such as Lemon Scented Gum (<i>Corymbia citriodora</i>) and Argle Apple (<i>Eucalyptus cinerea</i>).		Moderate	Not likely to hold same level of constraint to remnant depending on planted species and age of planting, species may not be indigenous to region, or less likely to have formed important structures. May not be correct mixture of species, or species that are not indigenous to the Riverina or NSW and therefore, may not represent TECs or preferred breeding and foraging habitat for fauna species. Often contain disturbed and cleared understory from historic clearing.	Use historic imagery and satellite imagery and field investigation to assess main areas of planted vegetation, or any vegetation in obvious planted lines.
			Within 40m of C zoned land proposed to be retained or added by ACC or woodland patch	High	Important biodiversity resource for species moving across landscape, often contain hollows, likely to form part of a contiguous habitat structure used by mobile species to move between areas such as C zones.	AlburyCity sensitive tree data and scattered tree data. NSW Woody vegetation layer.
		Scattered Trees	Greater than 40m of C zoned land proposed to be retained or added by ACC or woodland patch	Moderate	Important biodiversity resource for species moving across landscape, often contain hollows, however less likely to form part of a contiguous landscape used to move been areas of intact woodland.	Preliminary 2 metre buffer ran on all data points.

Major constraint group	Constraint	Sub-constraint	Sub-Sub Constraint	Constraint Hierarchy	Justification	GIS mapping
Hydrology	Wetlands (Albury and DPE spatial data).	Mapped vegetation within 100m of a watercourse (SSO 2 or higher).	All native vegetation within 100m of a water with a patch size greater than .5 ha.	High	Likely to form part of a connective corridor across the landscape.	All mapped PCTs within a 100m buffer of waterways allocated as SSO or higher.
				High	Likely to support breeding habitat for Sloane's Froglet and Floating Swamp Wallaby Grass. Can form part of the seasonal herbaceous wetlands TEC.	Spatial data provided by AlburyCity and David Hunter (DPE).
		Containing threatened species record.		High	Likely to be utilised by threatened species, such as Sloane's Froglet or Floating Swamp Wallaby Grass.	
	Dams/waterbodies					All areas of mapped waterbody.
		Does not contain threatened species record.		Moderate	Likely to support breeding habitat for Sloane's Froglet and Floating Swamp Wallaby Grass, but no currently known occurrence present.	
	Waterways		Waterways - SSO 1	Moderate	Generally degraded in agricultural landscapes, usually lacking native vegetation with erosion present, main ecological value pertains to starting of waterway/catchment.	DPI SSO layer plus a 10m buffer
			Waterways - SSO 2	High		DPI SSO layer plus a 20m buffer
			Waterways - SSO 3	High	Habitat connectivity, often supporting riparian vegetation, potential to support or form part of threatened fish, or key fish habitat.	DPI SSO layer plus a 30m buffer
			Waterways - SSO 4 or higher	High		DPI SSO layer plus a 40m buffer
Land zoning	Environmental and Conservation Land Zoning (C zones) proposed to be retained or added by ACC			High	Generally, hosts most of the remnant woodland within the investigation area, usually contains stronghold populations for threatened species. Used to offset existing development.	AlburyCity C zone layer

Major constraint group	Constraint	Sub-constraint	Sub-Sub Constraint	Constraint Hierarchy	Justification	GIS mapping
Biodiversity Value Mapped Land	Serious and Irreversible Impact (SII) mapped land and all other areas of BV mapped land.			High	Mapped SII land, potential to support the Regent Honeyeater, Swift Parrot, Sloane's Froglet and Box-Gum Woodland. These areas are a major constraint to part 4 developments.	BV Value SII mapped land
Important Habitat Mapping	Threatened species (Regent Honeyeater and Swift Parrot) important habitat mapping			High	Mapped important habitat for the threatened Regent Honeyeater and Swift Parrot. Major constraint for part 4 developments.	Supplied by DPE.

Conclusions and next steps

The ecological constraints model has highlighted a range of ecological opportunities and constraints within the study area. These constraints are generally clustered around existing native vegetation that corresponds to threatened species habitat or the location of threatened ecological communities. Notably high constraint areas also cluster around drainage lines, wetland areas and water bodies likely to contain threatened species habitat. In general, it appears that the southern portion of Thurgoona appears highly constrained with suitable land generally being surrounded by high constraint areas. Opportunities for development in low constraint areas are present in the north of Thurgoona and throughout Wirringa. A key consideration in designing a masterplan that responds to these environmental constraints is allowing for the allocation of key services, infrastructure and roads that allow for a cohesive urban design.

This model forms the first step in planning for growth in the Thurgoona Wirringa area in an environmentally sensitive manner. It also allows us to visually identify areas likely to contain key environmental values and begin to plan how these values might be protected and enhanced while providing an avenue for development and expansion of the key growth area. It should be noted that not all areas identified as high constraint will be able to be retained in the masterplan process, just as not all areas identified as low constraint would be developed. This model allows for the PSP wide planning process to be completed in an ecologically responsive manner. The more detailed refinement of boundaries and planning for future access, drainage, infrastructure and passive recreation areas will be completed during the masterplan and detailed ecological work to come.

The next steps in the Stage 1 process include:

- On-ground assessment to ground-truth the model outputs. This is a key step in confirming that null areas identified in the model contain few ecological values and would be suitable for development.
- Discussion and planning around:
 - Plant Community Types and Threatened Ecological Communities.
 - Habitat features such as Hollow-bearing Trees and Scattered Trees.
 - Threatened species habitat.
 - Riparian and hydrology values.
 - Areas of opportunity such as:
 - Areas that have the potential to be improved, e.g. degraded waterways.
 - Areas that have the potential to provide future access and infrastructure easements between future development, e.g. degraded areas of C (environmental) zoned land.
 - Utilisation of constraints during planning and detailed design of developments, such as subdivisions, to provide direction and solutions for preservation of the environment, such as locations of recreational areas and open space parklands to 'buffer' areas of identified high and moderate constraint and/or include existing features such as hollow-bearing trees, scattered trees and gilgai formations. Identification of opportunities for key services and infrastructure.
- Identification of areas where targeted survey in accordance with the BAM is required.

- Identify areas that could be used in future stewardship arrangements.

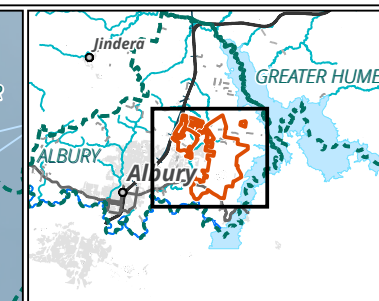
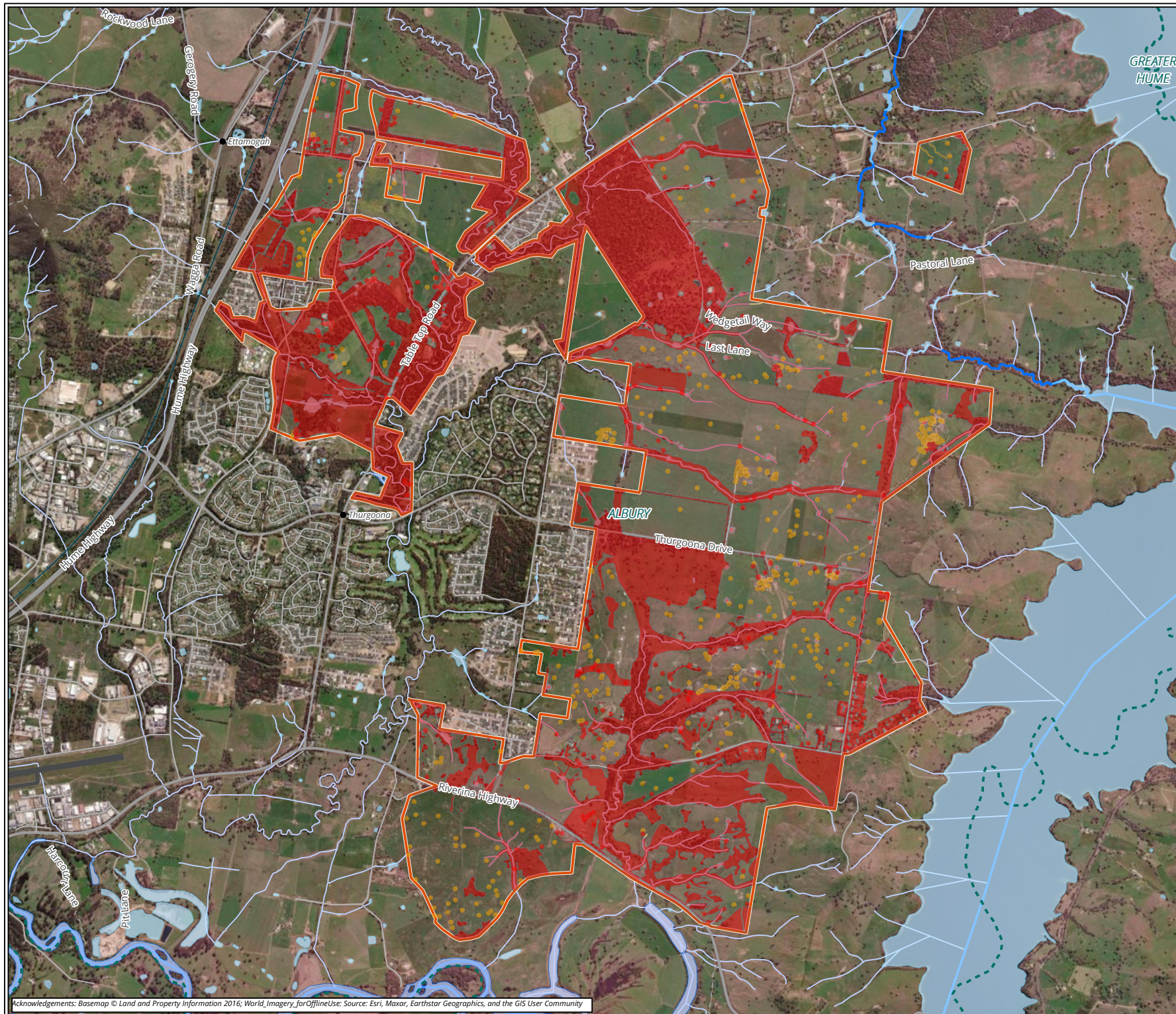
This data forms a baseline for the building blocks of the project, allowing for progression to implementation of Stage 1 of the BAM. These building blocks will aid in the recommendations regarding developments and avoidance scenarios and inform a list of candidate species for assessment.

Please contact me on 0428 210 030 if you would like to discuss further.

Yours sincerely



Ewan Kelly
Team Leader – Botany



Legend

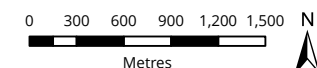
Study area

Constraints

Moderate

High

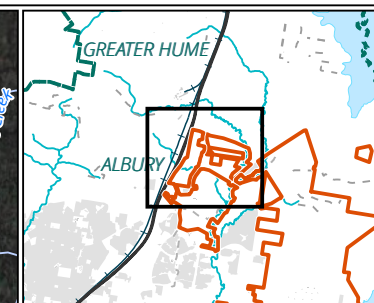
Figure 2.1 Constraints hierarchy



Scale: 1:34,000 @ A3
Coordinate System: GDA2020 MGA Zone 55



Matter: 38717, Date: 05 December 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F2_Constraints
Project: P:\387000\38717\Mapping\
38717_Constraints_Figures.aprx



Legend

Study area

Constraints

Moderate

High

Figure 2.2 Constraints hierarchy

0 100 200 300 400 500
Metres

Scale: 1:12,000 @ A3
Coordinate System: GDA2020 MGA Zone 55

biosis
APEM Group

Matter: 38717, Date: 05 December 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F2_Constraints
Project: P:\387002\38717\Mapping\38717_Constraints_Figures.aprx

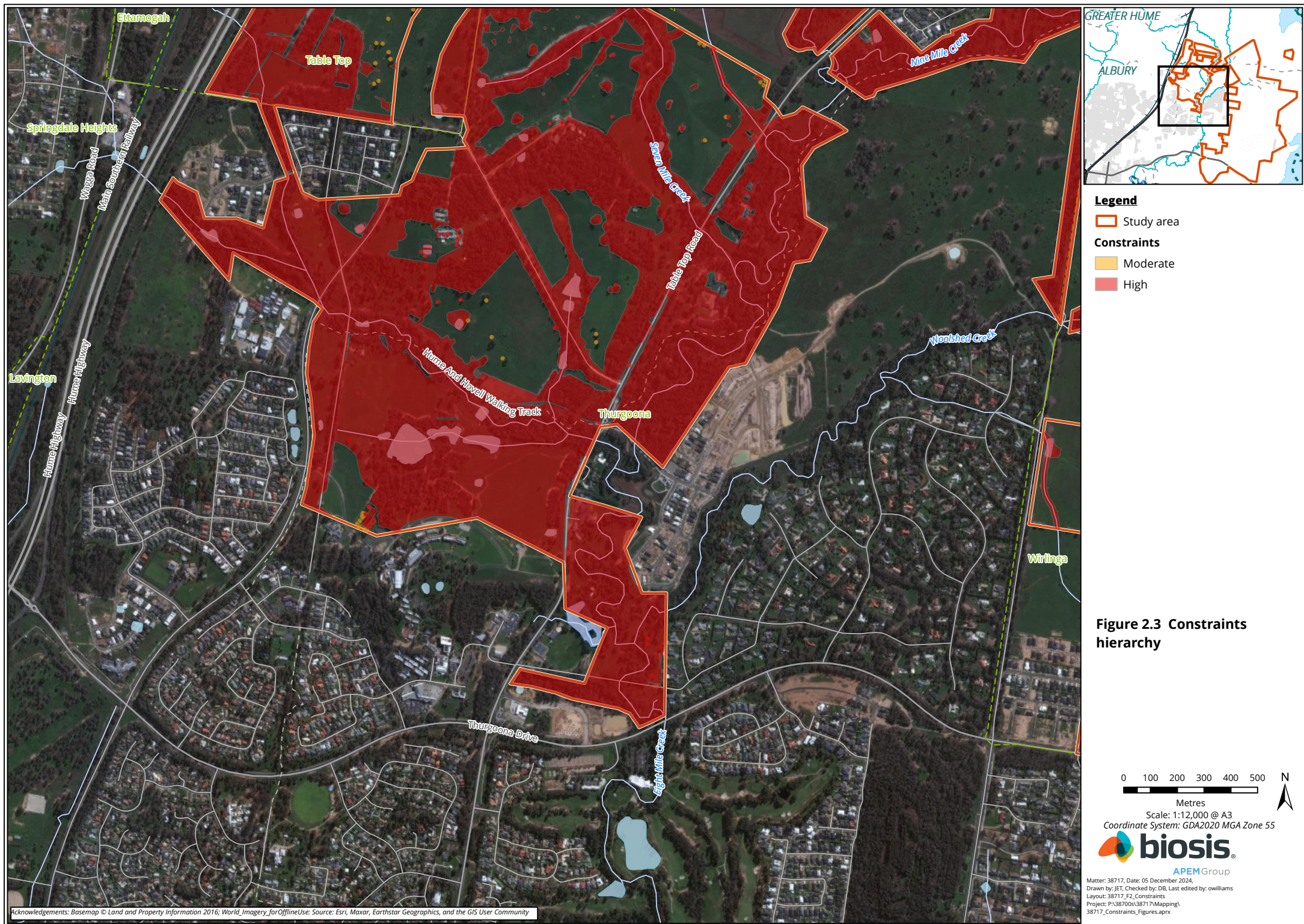
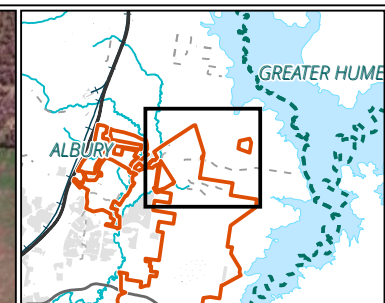
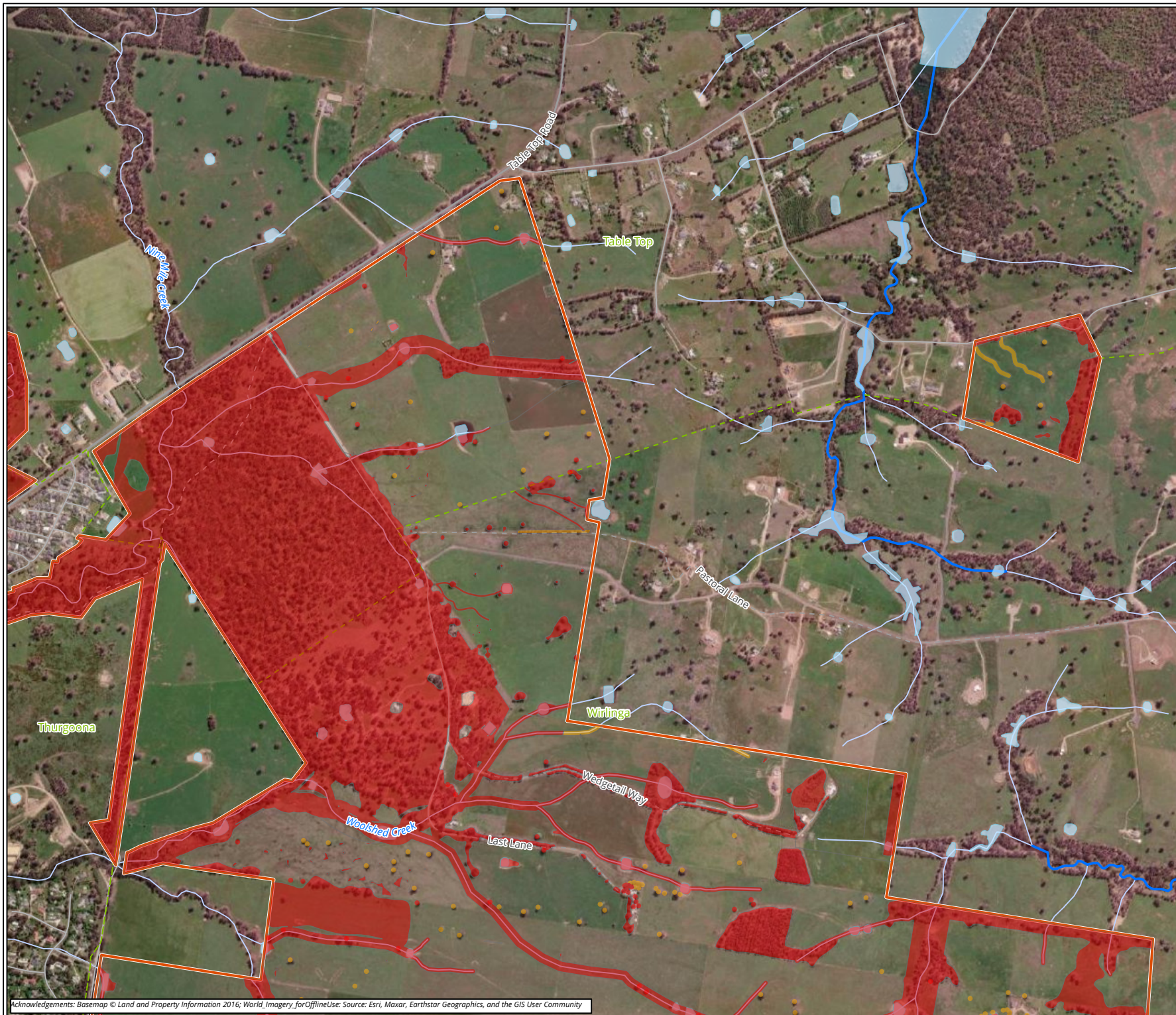


Figure 2.3 Constraints hierarchy



Legend

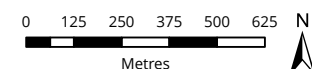
Study area

Constraints

Moderate

High

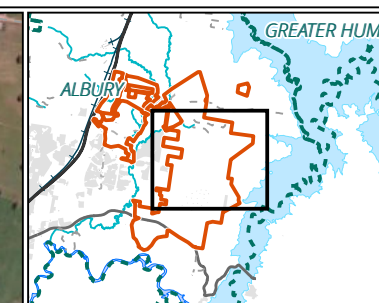
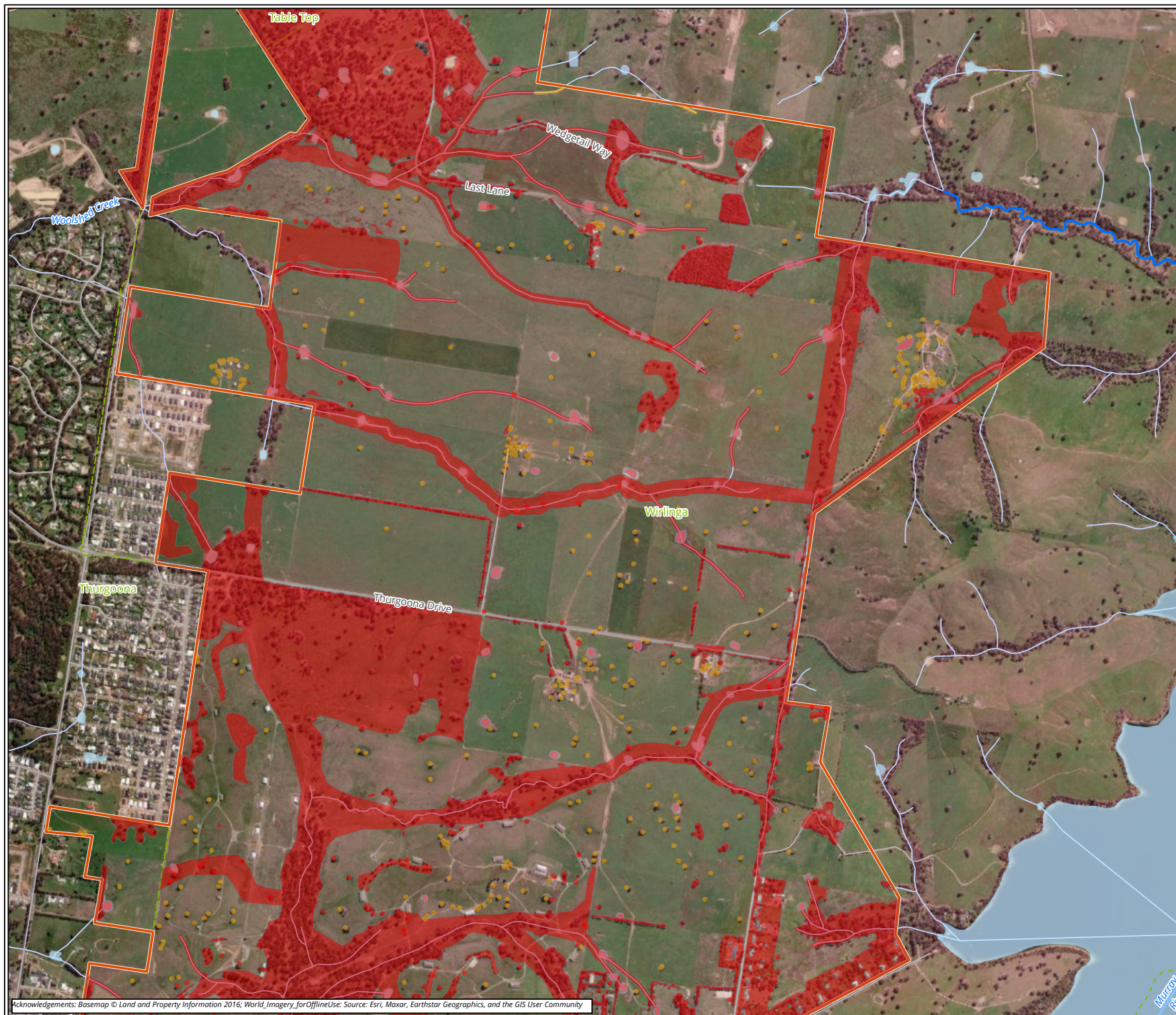
Figure 2.4 Constraints hierarchy



Scale: 1:14,000 @ A3
Coordinate System: GDA2020 MGA Zone 55



Matter: 38717, Date: 05 December 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F2_Constraints
Project: P:\387009\38717\Mapping\38717_Constraints_Figures.aprx



Legend

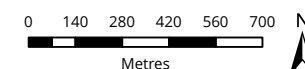
Study area

Constraints

Moderate

High

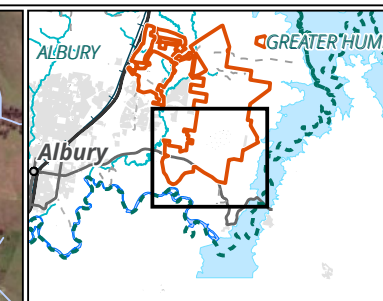
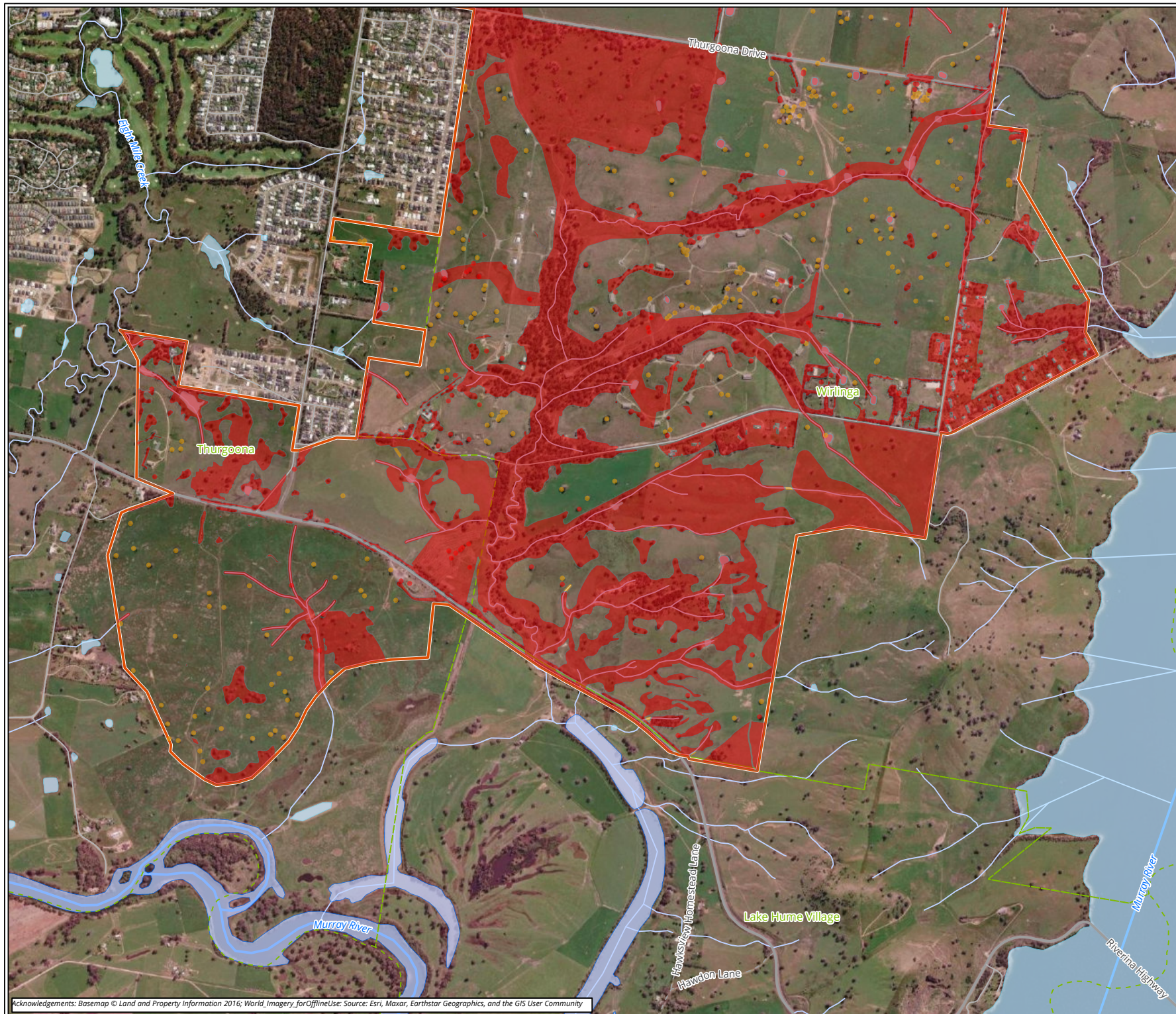
Figure 2.5 Constraints hierarchy



Scale: 1:16,000 @ A3
Coordinate System: GDA2020 MGA Zone 55



Matter: 38717, Date: 05 December 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F2_Constraints
Project: P:\387000\38717\Mapping\
38717_Constraints_Figures.aprx



Legend

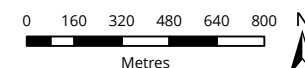
Study area

Constraints

Moderate

High

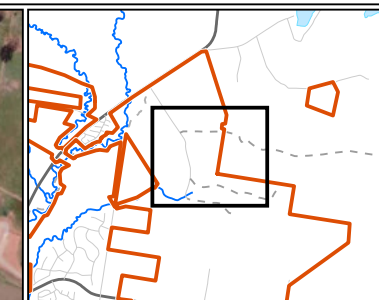
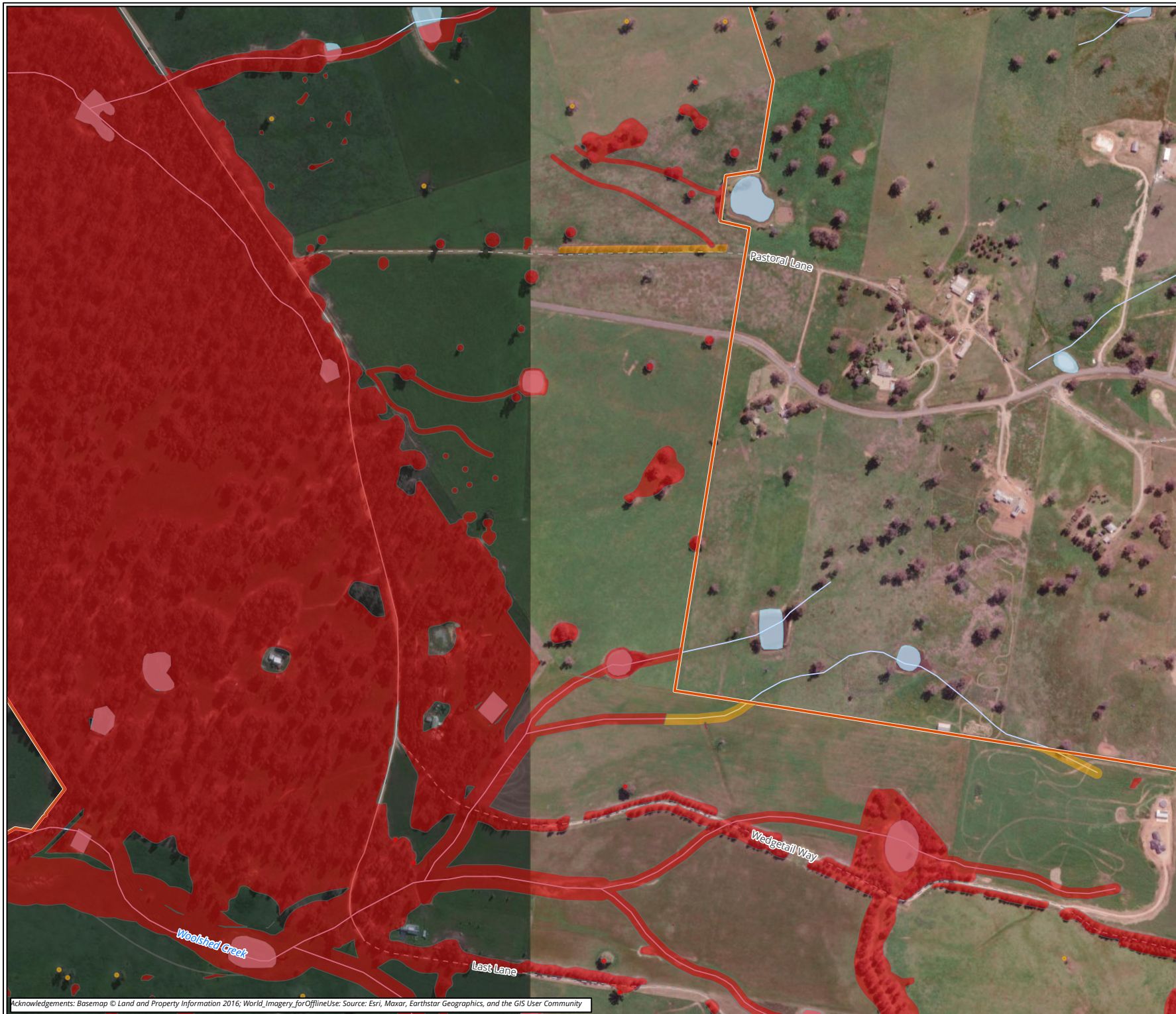
Figure 2.6 Constraints hierarchy



Scale: 1:18,000 @ A3
Coordinate System: GDA2020 MGA Zone 55



Matter: 38717, Date: 05 December 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F2_Constraints
Project: P:\387009\38717\Mapping\
38717_Constraints_Figures.aprx



Legend

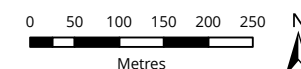
Study area

Constraints

Moderate

High

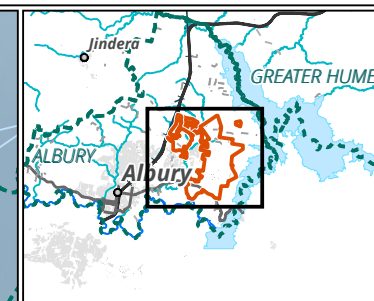
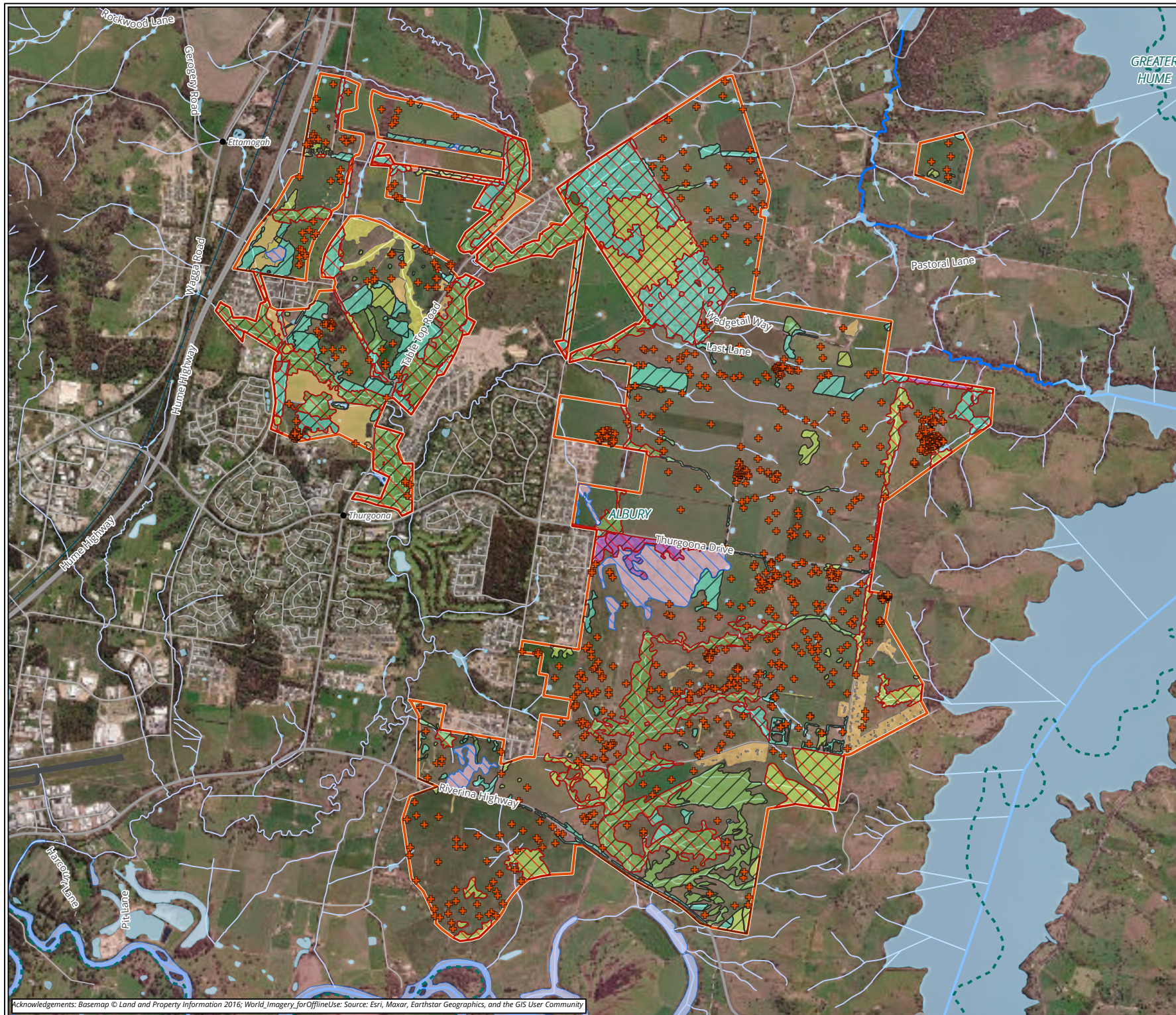
Figure 2.7 Constraints hierarchy



Scale: 1:6,000 @ A3
Coordinate System: GDA2020 MGA Zone 55

biosis
APEM Group

Matter: 38717, Date: 05 December 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F2_Constraints
Project: P:\387000\38717\Mapping\
38717_Constraints_Figures.aprx



Legend

Study area

Scattered trees

Threatened ecological community

EPBC Act Seasonal herbaceous (Freshwater) Wetlands

EPBC Act Box Gum Woodland

BC Act Box-Gum Woodland

Plant community type

Planted native

5 - River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.

266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

269 - White Box - Blakely's Red Gum - Red Box - Red Stringybark shrubby woodland on shallow soils on metamorphic hills in the Albury region of the NSW South Western Slopes Bioregion

276 - Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion

277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

278 - Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest of the central NSW South Western Slopes Bioregion

360 - Gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion

Figure 3.1 Constraints breakdown: Vegetation

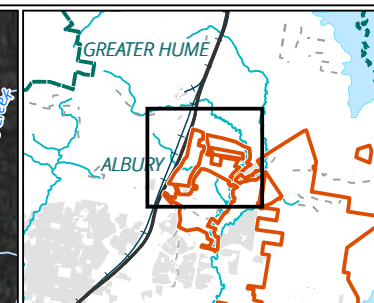
0 300 600 900 1,200 1,500
Metres

Scale: 1:34,000 @ A3

Coordinate System: GDA2020 MGA Zone 55

biosis
APEM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F3_Veg
Project: P:\38717\38717_7\Mapping\38717_Constraints_Figures.aprx



Legend

Study area

Scattered trees

Threatened ecological community

EPBC Act Seasonal herbaceous (Freshwater) Wetlands

EPBC Act Box Gum Woodland

BC Act Box-Gum Woodland

Plant community type

Planted native

5 - River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.

266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

269 - White Box - Blakely's Red Gum - Red Box - Red Stringybark shrubby woodland on shallow soils on metamorphic hills in the Albury region of the NSW South Western Slopes Bioregion

277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

278 - Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest of the central NSW South Western Slopes Bioregion

360 - Gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion

Figure 3.2 Constraints breakdown: Vegetation

0 100 200 300 400 500

Metres

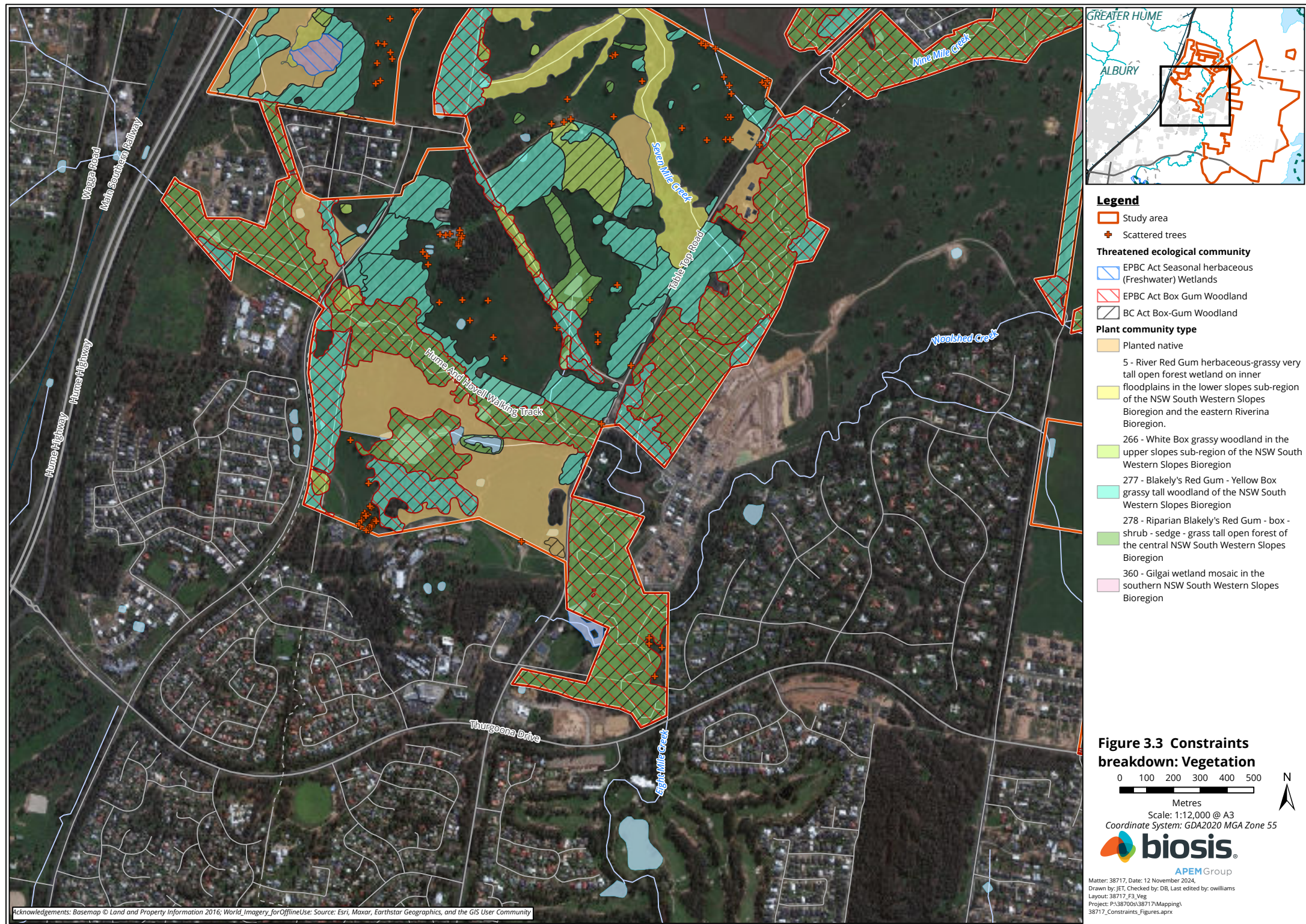
Scale: 1:12,000 @ A3

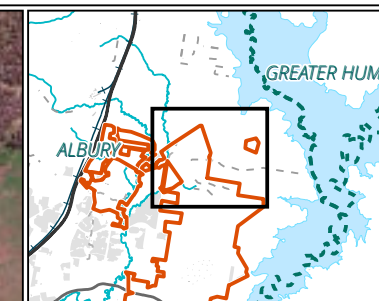
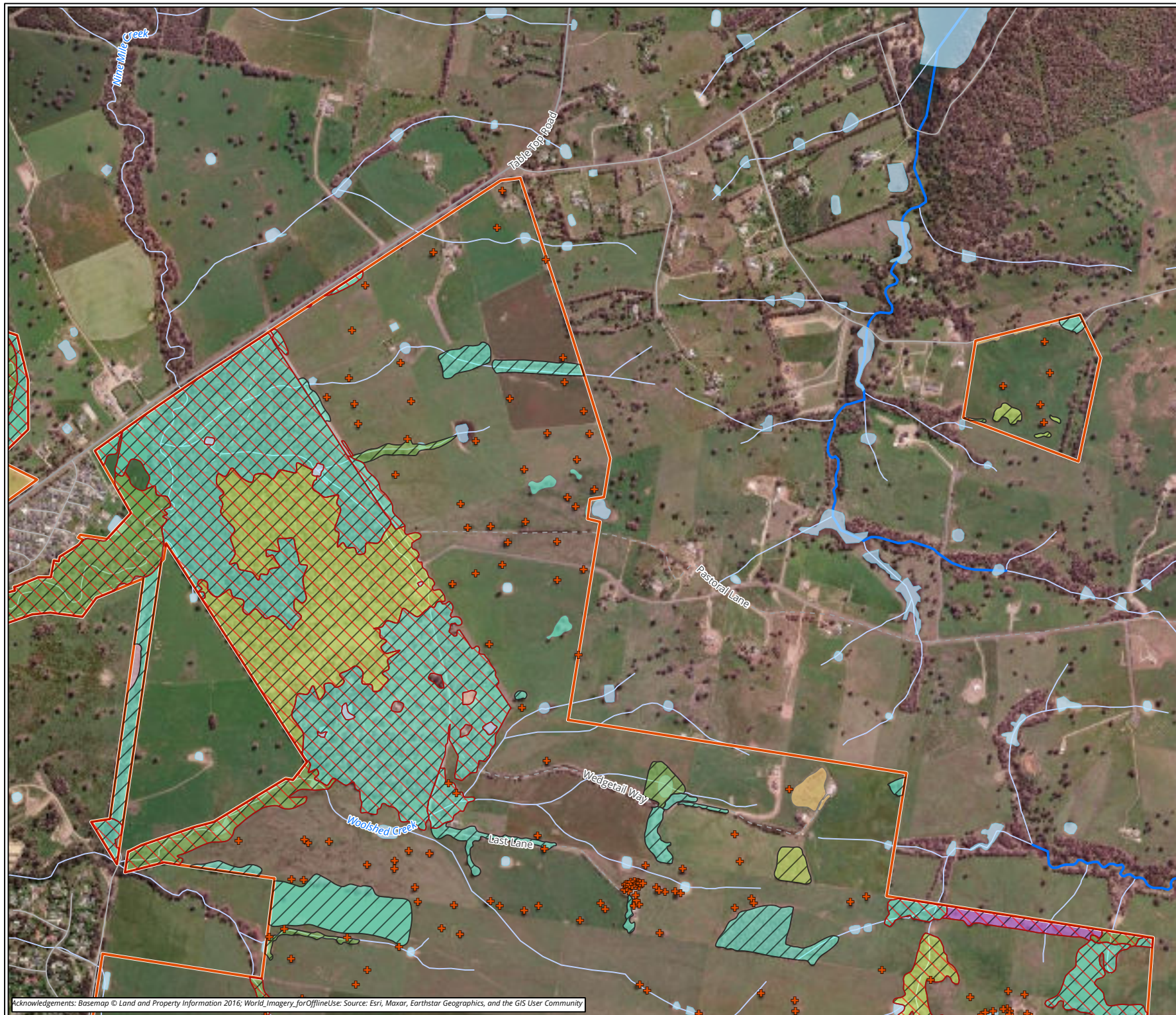
Coordinate System: GDA2020 MGA Zone 55

biosis

APEM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F3_Veg
Project: P:\38700\38717\Mapping\
38717_Constraints_Figures.aprx





Legend

Study area

Scattered trees

Threatened ecological community

EPBC Act Box Gum Woodland

BC Act Box-Gum Woodland

Plant community type

Planted native

266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

276 - Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion

277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

278 - Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest of the central NSW South Western Slopes Bioregion

360 - Gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion

Figure 3.4 Constraints breakdown: Vegetation

0 125 250 375 500 625

Metres

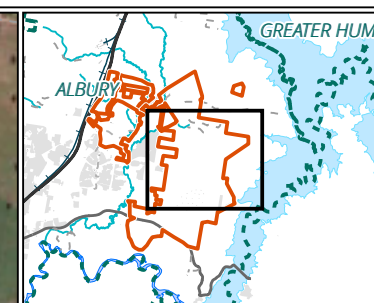
Scale: 1:14,000 @ A3

Coordinate System: GDA2020 MGA Zone 55

biosis

APEM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F3_Veg
Project: P:\38700\38717\Mapping\
38717_Constraints_Figures.aprx



Legend

Study area

Scattered trees

Threatened ecological community

EPBC Act Seasonal herbaceous (Freshwater) Wetlands

EPBC Act Box Gum Woodland

BC Act Box-Gum Woodland

Plant community type

Planted native

5 - River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.

266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

276 - Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion

277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

278 - Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest of the central NSW South Western Slopes Bioregion

360 - Gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion

Figure 3.5 Constraints breakdown: Vegetation

0 140 280 420 560 700

Metres

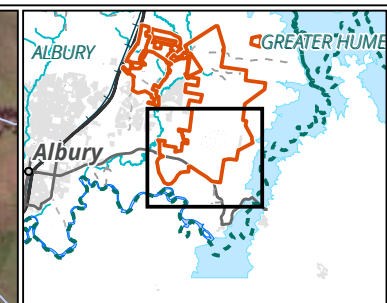
Scale: 1:16,000 @ A3

Coordinate System: GDA2020 MGA Zone 55

biosis

APeM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F3_Veg
Project: P:\38700\38717\Mapping\
38717_Constraints_Figures.aprx



Legend

Study area

Scattered trees

Threatened ecological community

EPBC Act Seasonal herbaceous (Freshwater) Wetlands

EPBC Act Box Gum Woodland

BC Act Box-Gum Woodland

Plant community type

Planted native

5 - River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.

266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

276 - Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion

277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

278 - Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest of the central NSW South Western Slopes Bioregion

360 - Gilgai wetland mosaic in the southern NSW South Western Slopes Bioregion

Figure 3.6 Constraints breakdown: Vegetation

0 160 320 480 640 800

Metres

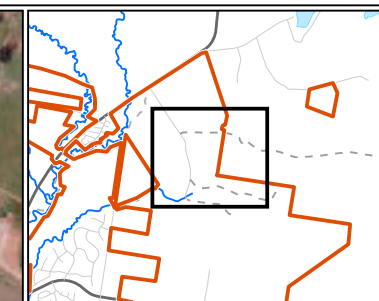
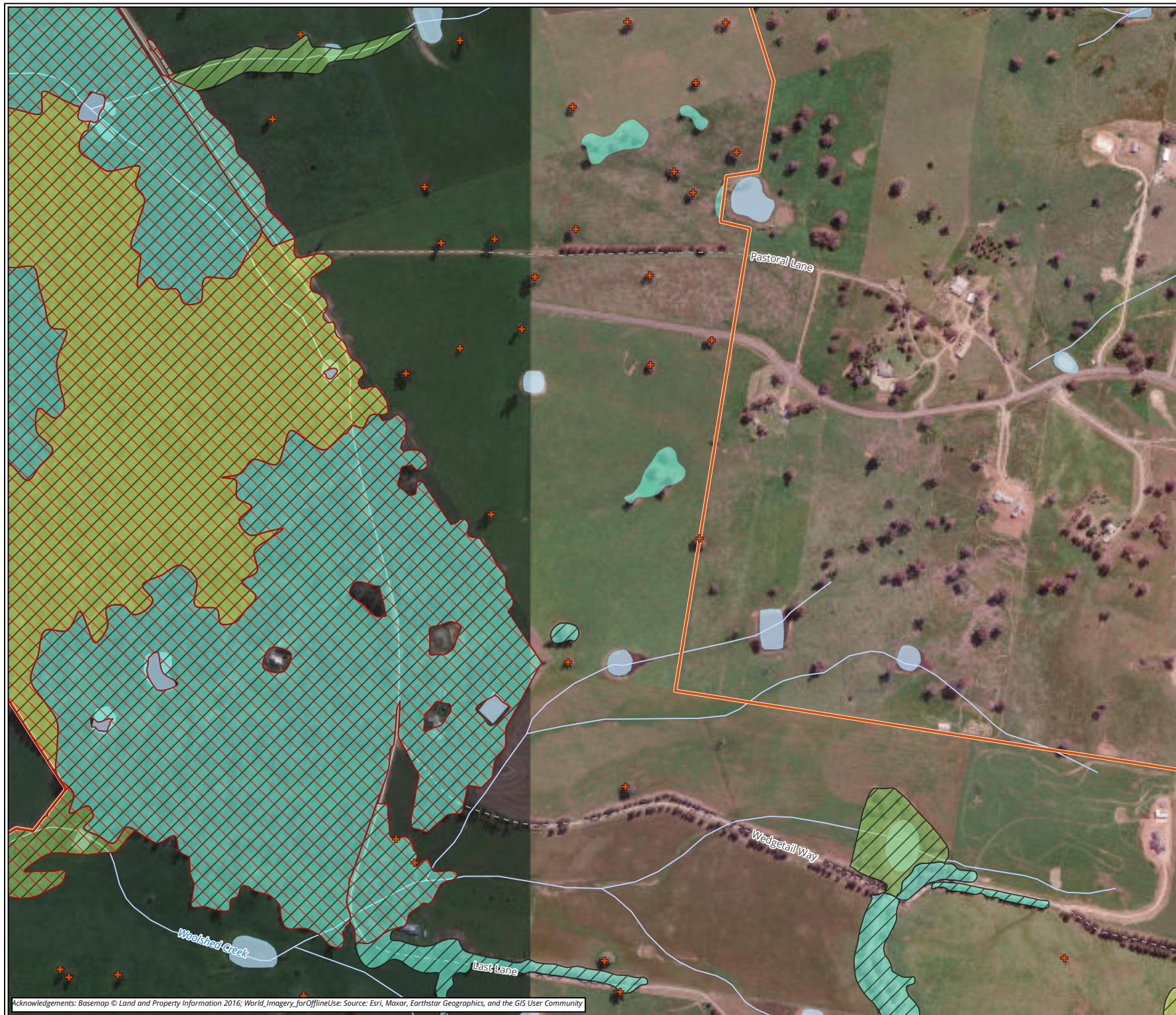
Scale: 1:18,000 @ A3

Coordinate System: GDA2020 MGA Zone 55

biosis

APEM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F3_Veg
Project: P:\38700\38717\Mapping\38717_Constraints_Figures.aprx



Legend

Study area

Scattered trees

Threatened ecological community

EPBC Act Box Gum Woodland

BC Act Box-Gum Woodland

Plant community type

266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

278 - Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest of the central NSW South Western Slopes Bioregion

Figure 3.7 Constraints breakdown: Vegetation

0 50 100 150 200 250

Metres

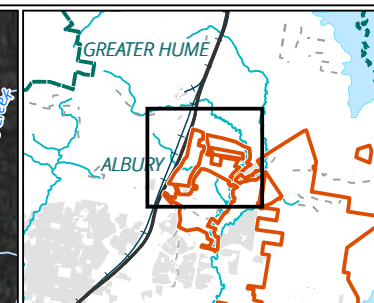
Scale: 1:6,000 @ A3

Coordinate System: GDA2020 MGA Zone 55

biosis

APEM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F3_Veg
Project: P:\387009\38717\Mapping\38717_Constraints_Figures.aprx



Legend

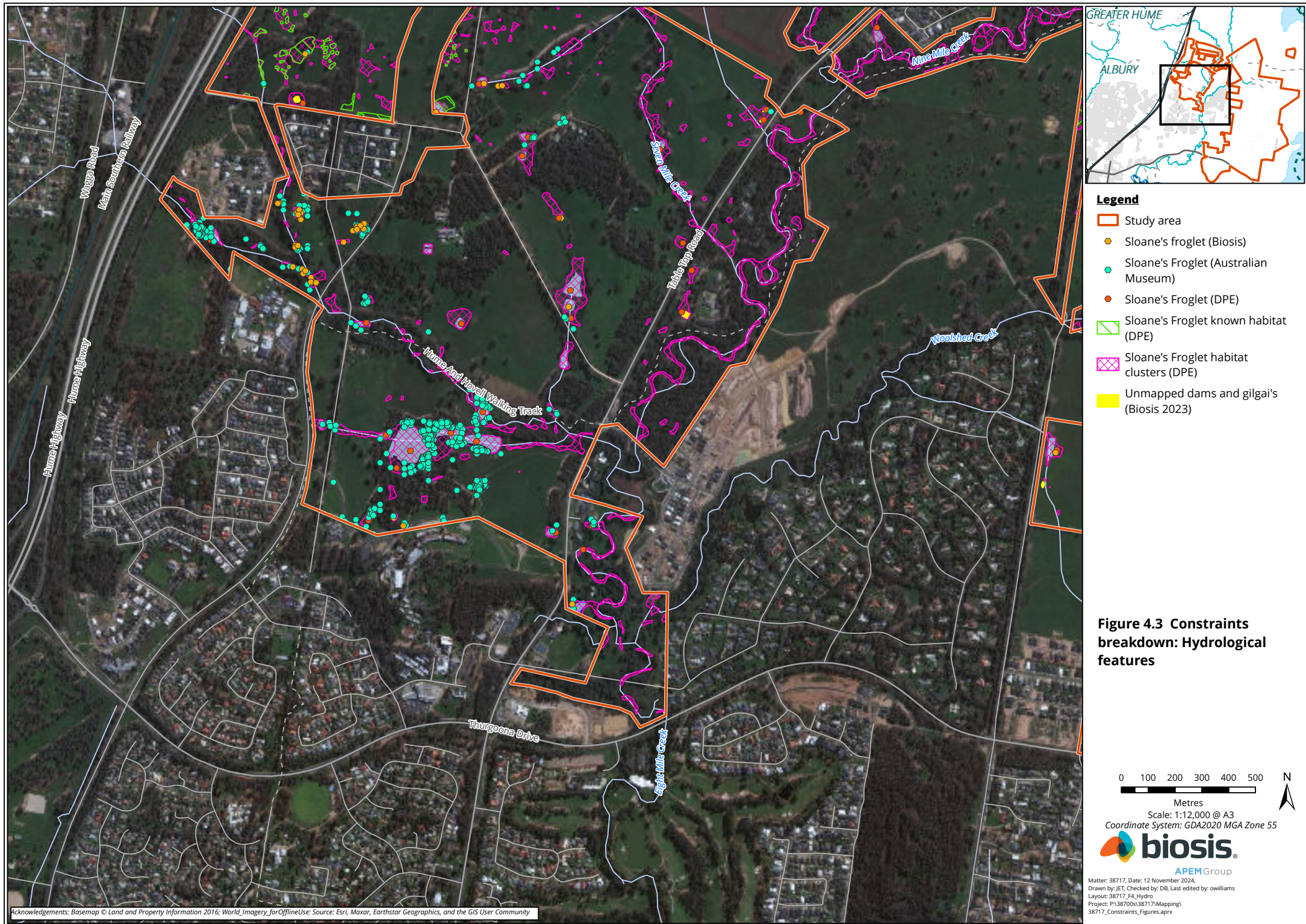
- Study area
- Sloane's froglet (Biosis)
- Sloane's Froglet (Australian Museum)
- Sloane's Froglet (DPE)
- Sloane's Froglet known habitat (DPE)
- Sloane's Froglet habitat clusters (DPE)
- Unmapped dams and gilgai's (Biosis 2023)

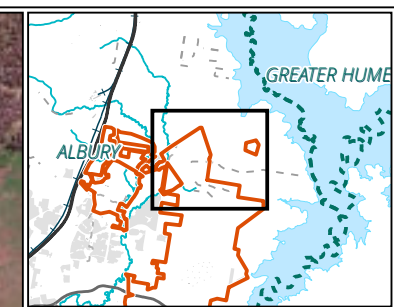
Figure 4.2 Constraints breakdown: Hydrological features

0 100 200 300 400 500
Metres
Scale: 1:12,000 @ A3
Coordinate System: GDA2020 MGA Zone 55

biosis
APEM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F4_Hydro
Project: P:\38700\38717\Mapping\
38717_Constraints_Figures.aprx





Legend

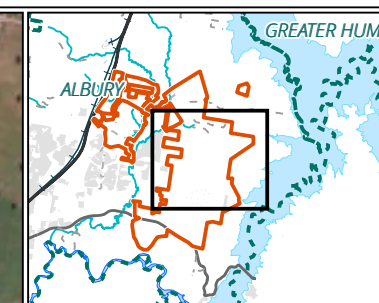
- Study area
- Sloane's froglet (Biosis)
- Sloane's Froglet (Australian Museum)
- Sloane's Froglet (DPE)
- Sloane's Froglet known habitat (DPE)
- Sloane's Froglet habitat clusters (DPE)
- Unmapped dams and gilgai's (Biosis 2023)
- Unmapped hydroline (Biosis 2023)

Figure 4.4 Constraints breakdown: Hydrological features

0 125 250 375 500 625
Metres
Scale: 1:14,000 @ A3
Coordinate System: GDA2020 MGA Zone 55

biosis
APEM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F4_Hydro
Project: P:\38700\38717\Mapping\
38717_Constraints_Figures.aprx



Legend

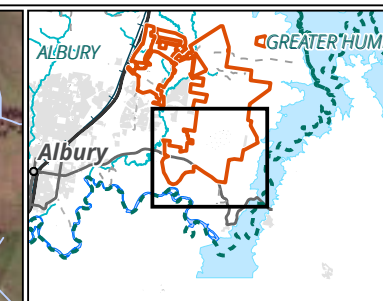
- Study area
- Sloane's froglet (Biosis)
- Sloane's Froglet (Australian Museum)
- Sloane's Froglet (DPE)
- Sloane's Froglet known habitat (DPE)
- Sloane's Froglet habitat clusters (DPE)
- Unmapped dams and gilgai's (Biosis 2023)

Figure 4.5 Constraints breakdown: Hydrological features

0 140 280 420 560 700
Metres
Scale: 1:16,000 @ A3
Coordinate System: GDA2020 MGA Zone 55

biosis
APEM Group

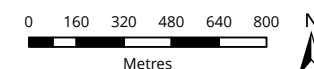
Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F4_Hydro
Project: P:\38700\38717_Mapping\
38717_Constraints_Figures.aprx



Legend

- Study area
- Sloane's froglet (Biosis)
- Sloane's Froglet (Australian Museum)
- Sloane's Froglet (DPE)
- Sloane's Froglet known habitat (DPE)
- Sloane's Froglet habitat clusters (DPE)
- Unmapped dams and gilgai's (Biosis 2023)
- Unmapped hydroline (Biosis 2023)

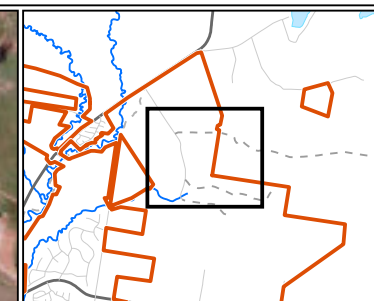
Figure 4.6 Constraints breakdown: Hydrological features



Scale: 1:18,000 @ A3
Coordinate System: GDA2020 MGA Zone 55



Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F4_Hydro
Project: P:\38700\38717\Mapping\38717_Constraints_Figures.aprx



Legend

- Study area
- Sloane's froglet (Biosis)
- Sloane's Froglet (DPE)
- Sloane's Froglet habitat clusters (DPE)
- Unmapped dams and gilgai's (Biosis 2023)

Figure 4.7 Constraints breakdown: Hydrological features

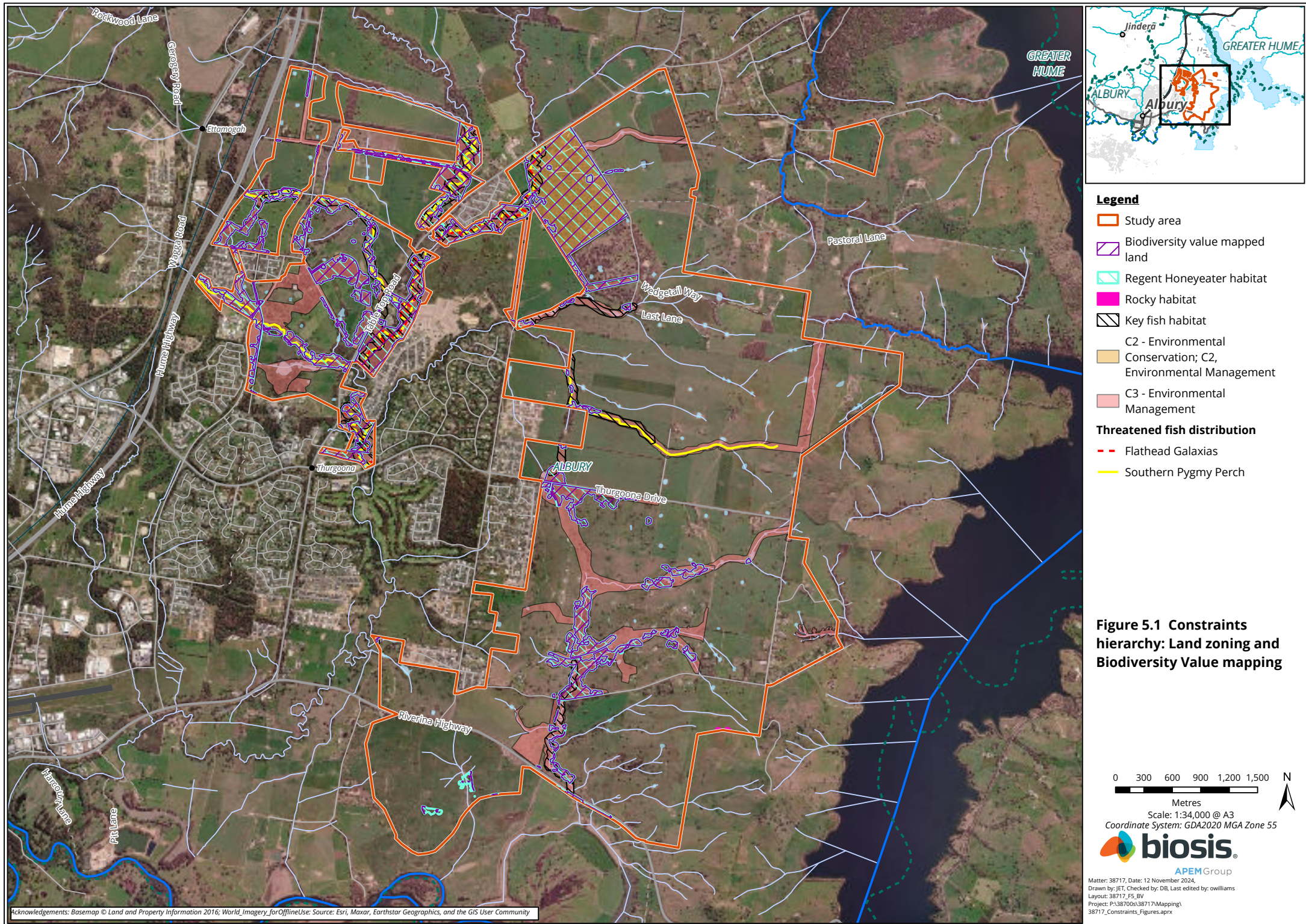
0 50 100 150 200 250
Metres

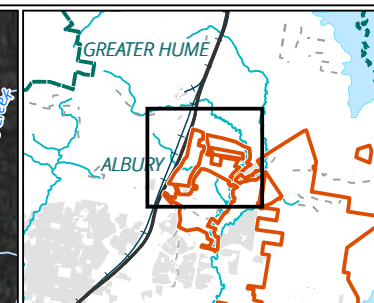
Scale: 1:6,000 @ A3

Coordinate System: GDA2020 MGA Zone 55

biosis
APEM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F4_Hydro
Project: P:\387009\38717\Mapping\
38717_Constraints_Figures.aprx





Legend

- Study area
- Biodiversity value mapped land
- Regent Honeyeater habitat
- Key fish habitat
- C2 - Environmental Conservation; C2, Environmental Management
- C3 - Environmental Management

Threatened fish distribution

- Flathead Galaxias
- Southern Pygmy Perch

Figure 5.2 Constraints hierarchy: Land zoning and Biodiversity Value mapping

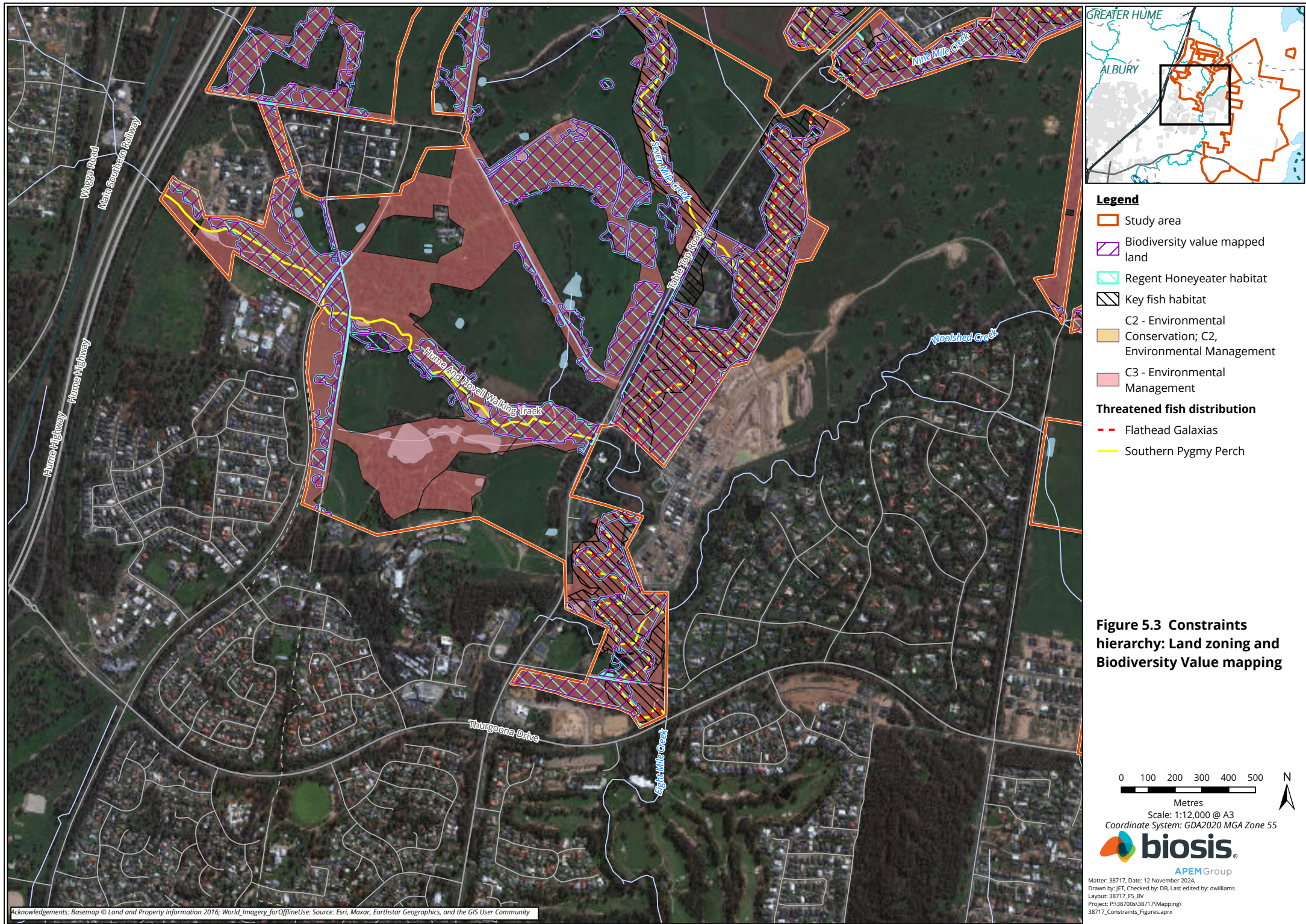
0 100 200 300 400 500
Metres

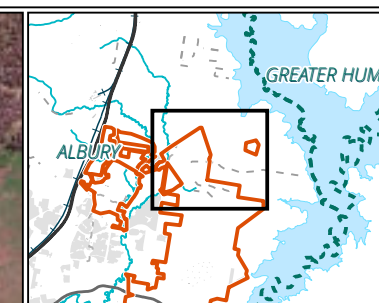
Scale: 1:12,000 @ A3

Coordinate System: GDA2020 MGA Zone 55

biosis
APEM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F5_BV
Project: P:\38700\38717\Mapping\
38717_Constraints_Figures.aprx





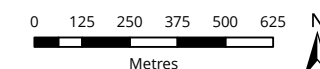
Legend

- Study area
- Biodiversity value mapped land
- Regent Honeyeater habitat
- Key fish habitat
- C2 - Environmental Conservation; C2, Environmental Management
- C3 - Environmental Management

Threatened fish distribution

- Flathead Galaxias
- Southern Pygmy Perch

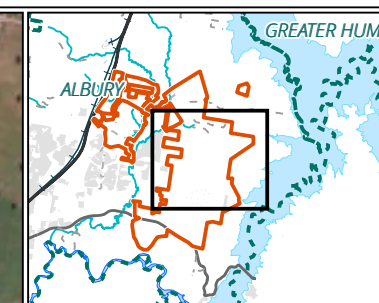
Figure 5.4 Constraints hierarchy: Land zoning and Biodiversity Value mapping



Scale: 1:14,000 @ A3
Coordinate System: GDA2020 MGA Zone 55



Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F5_BV
Project: P:\38700\38717\Mapping\
38717_Constraints_Figures.aprx



Legend

- Study area
- Biodiversity value mapped land
- Regent Honeyeater habitat
- Key fish habitat
- C2 - Environmental Conservation; C2, Environmental Management
- C3 - Environmental Management

Threatened fish distribution

- Southern Pygmy Perch

Figure 5.5 Constraints hierarchy: Land zoning and Biodiversity Value mapping

0 140 280 420 560 700
Metres

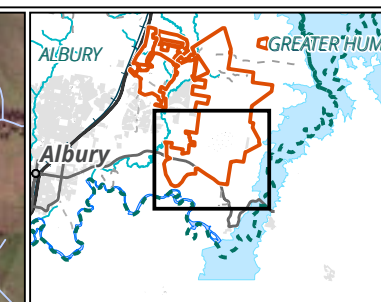
Scale: 1:16,000 @ A3

Coordinate System: GDA2020 MGA Zone 55

biosis

APeM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F5_BV
Project: P:\38700\38717\Mapping\
38717_Constraints_Figures.aprx



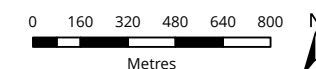
Legend

- Study area
- Biodiversity value mapped land
- Regent Honeyeater habitat
- Rocky habitat
- Key fish habitat
- C2 - Environmental Conservation; C2, Environmental Management
- C3 - Environmental Management

Threatened fish distribution

- Flathead Galaxias
- Southern Pygmy Perch

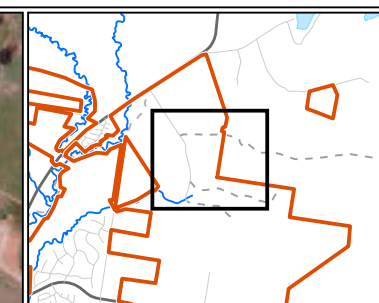
Figure 5.6 Constraints hierarchy: Land zoning and Biodiversity Value mapping



Scale: 1:18,000 @ A3
Coordinate System: GDA2020 MGA Zone 55



Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F5_BV
Project: P:\38700\38717\Mapping\38717_Constraints_Figures.aprx



Legend

- Study area
- Biodiversity value mapped land
- Regent Honeyeater habitat
- Key fish habitat
- C2 - Environmental Conservation; C2, Environmental Management
- C3 - Environmental Management

Figure 5.7 Constraints hierarchy: Land zoning and Biodiversity Value mapping

0 50 100 150 200 250
Metres

Scale: 1:6,000 @ A3

Coordinate System: GDA2020 MGA Zone 55

biosis
APEM Group

Matter: 38717, Date: 12 November 2024,
Drawn by: JET, Checked by: DB, Last edited by: owilliams
Layout: 38717_F5_BV
Project: P:\38700\38717\Mapping\
38717_Constraints_Figures.aprx

Appendix 5. BAM Candidate predicted and PMST species assessment

Appendix 5.1. Threatened Ecological Communities

Table A 1: Threatened Ecological Communities

TEC Name	BC Act Listing	EPBC Act Listing	Present within the investigation area?
Coolac-Tumut Serpentine Shrubby Woodland in the NSW South Western Slopes and South Eastern Highlands Bioregions.	Endangered Ecological Community (EEC)		Not present
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions.	EEC	-	Not present
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia.	-	EEC	Not present
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penepain, Nandewar and Brigalow Belt South Bioregions	EEC	-	Not present
Tablelands Snow Gum, Black Sallee, Candle bark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions	EEC	-	Not present
Weeping Myall Woodlands	-	EEC	Not present
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	-	Critically Endangered Ecological Community (CEEC)	Present (EPBC Act Box-Gum Woodland)
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions	CEEC	-	Present (BC Act Box-Gum Woodland)

Appendix 5.2. Threatened flora

Table A 2: Threatened flora assessment

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in investigation area	BAM Candidate species	Survey required	Survey undertaken?	Potential for impact	Conclusion and rationale
	EPBC	BC								
<i>Amphibromus fluitans</i> Floating Swamp Wallaby-grass	Vulnerable	Vulnerable	Species	Perennial grass growing throughout the Murray Region between Cooks Lagoon and Mathoura, with isolated populations in Upper Lachlan Shire. Grows in permanent swamps and wetlands in Temperate Montane Grasslands, Inland Riverine Forests, Inland Floodplain Shrublands, and Inland Floodplain Swamps. Grows along swamp margins in mud and hard clay soils.	High – recorded (BioNet).	Yes	Yes	No	Yes	Survey requirement outside of project timeframes
<i>Caladenia concolor</i> Crimson Spider Orchid	Vulnerable	Endangered	Species	Small orchid, recorded from two populations at Bethungra and Burrinjuck Nature reserve with the other at Nail Can Hill Crown Reserve near Albury. Grows in regrowth woodland on granite ridge country in Upper Riverina Dry Sclerophyll Forest and Western Slopes Grassy Woodlands. Grows in clay loams and gravel beds.	Unlikely.	No	No	Excluded as candidate species.	No	Species not likely to occur.
<i>Cullen parvum</i> Small Scurf-pea	Not Listed	Endangered	Species	Small shrub recorded from two locations, once in 1884 in Wagga Wagga and the other in 1967 in Jindera near Albury. Found in grassland or understorey in areas that experience between 450 - 700mm of rainfall per year such as Inland Riverine Forests, Riverine Plain Grasslands, Floodplain Transition Woodlands and Western Slopes Grassy Woodlands.	Unlikely.	Yes	No	Excluded as candidate species.	No	Species not likely to occur.
<i>Leucochrysum albicans</i> subsp. <i>tricolor</i> Hoary Sunray	Endangered	Endangered	N/A	Small perennial herb endemic to south-east Australia with small, fragmented populations distributed from Tasmania to New South Wales. Populations within NSW occur throughout the Southern Tablelands and the South Eastern Highlands, Australian Alps and Sydney Basin Bioregions. Grows in disturbed areas and intertussock spaces in grasslands, woodlands and forests. Grows in a variety of soils including clays, clay loams, stony and gravelly.	Unlikely.	Yes	No	No	No	Species not likely to occur.
<i>Pilularia novae-hollandiae</i> Austral Pillwort	Not Listed	Endangered	Species	Semi-aquatic fern with the only extant populations located at Lake Cowal and Oolambeyan National Park. Historical distribution ranged from Sydney, Khancoban, The Riverina near Albury and Urana. Grows in seasonally dry depressions, drainage lines, margins of marshes, shallow swamps and waterways in a variety of communities including Inland Riverine Forests, Inland Floodplain Swamps, Southern Tableland Dry Sclerophyll Forests, Coastal Floodplain Wetlands, Coastal Swamp Forests, Coastal Freshwater Lagoons. Grows in mud amongst grasses and sedges.	Unlikely.	Yes	No	Excluded as candidate species.	No	Species not likely to occur.
<i>Prasophyllum petilum</i> Tarengo Leek Orchid	Endangered	Endangered	Species	Terrestrial orchid restricted to five sites within NSW at Boorowa, Captains Flat, Ilford, a Travelling Stock Route at Delegate and 10 kilometres south-east of Muswellbrook. Found growing in open sites and patchy forest in Natural Temperate Grassland, Box-Gum Woodlands, Temperate Montane Grasslands, Southern Tableland Grassy Woodlands, Subalpine Woodlands, Tableland Clay Grassy Woodlands, Western Slopes Grassy Woodlands. This species is cryptic and most visible when flowering between October and December. Grows in fertile soils.	Unlikely.	Yes	No	Excluded as candidate species.	No	Species not likely to occur.
<i>Prasophyllum validum</i> <i>Prasophyllum validum</i>	Not Listed	Not Listed	Species	The Sturdy Leek-orchid is endemic to south-eastern Australia, found in Victoria and South Australia. It is usually found in dry woodland habitats.	Unlikely.	No	No	No	No	Species not likely to occur.

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in investigation area	BAM Candidate species	Survey required	Survey undertaken?	Potential for impact	Conclusion and rationale
	EPBC	BC								
<i>Pultenaea humilis</i> Dwarf Bush-pea	Not Listed	Vulnerable	Species	Small, erect to prostrate shrub restricted to three sites within a 6000 square kilometre area in the NSW South Western Slopes Bioregion. Found growing near swamps and isolated heath or forest remnants set amongst cleared agricultural landscapes in Upper Riverina Dry Sclerophyll Forests, Western Slopes Dry Sclerophyll Forests and Western Slopes Grassy Woodlands. Grows in a variety of soils including sand, loam or clay soils on sandstone substrates.	Unlikely.	No	No	No	No	Species not likely to occur.
<i>Senecio garlandii</i> Woolly Ragwort	Not Listed	Vulnerable	Species	Small many branched perennial herb or shrub, distributed between Temora, Bethungra and Albury and possibly Burrinjuck near Yass. Found growing on sheltered slopes of rocky outcrops in Southern Tableland Dry Sclerophyll Forests, Upper Riverina Dry Sclerophyll Forests, Western Slopes Dry Sclerophyll Forests, Western Slopes Grassy Woodlands and Inland Rocky Hill Woodlands.	Unlikely.	No	No	No	No	Species not likely to occur.
<i>Swainsona recta</i> Small Purple-pea	Endangered	Endangered	Species	Small erect perennial herb with a scattered distribution at Carcoar, Culcairn and Wagga Wagga from which it is possibly extinct and from Queanbeyan and Wellington - Mudgee areas where it is still extant. Found growing on stony hillsides and in the grassy understorey of Upper Riverina Dry Sclerophyll Forests, Western Slopes Dry Sclerophyll Forests, Temperate Montane Grasslands, Floodplain Transition Woodlands, Southern Tableland Grassy Woodlands and Western Slopes Grassy Woodlands.	Unlikely.	Yes	No	Excluded as candidate species.	No	Species not likely to occur.
<i>Swainsona sericea</i> Silky Swainson-pea	Not Listed	Vulnerable	Species	Small prostrate or erect perennial herb with a distribution spanning from the Northern Tablelands to the Southern Tablelands and further inland on the slopes and plains with an additional outlying population in the far north-west of NSW. Found growing in a variety of communities including Natural Temperate Grasslands, Snow Gum Eucalyptus pauciflora Woodlands on the Monaro, Box-Gum Woodland, New England Dry Sclerophyll Forests, North-west Slopes Dry Sclerophyll Woodlands, North-west Plain Shrublands, Western Slopes Grasslands, Floodplain Transition Woodlands and Subalpine Woodlands.		Yes	No	Excluded as candidate species.	No	Species not likely to occur.

Appendix 1.3. Threatened fauna

Table A 3: Threatened fauna assessment

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in investigation area	BAM Candidate species	Survey required	Survey undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC								
Birds										
Anseranas semipalmata Magpie Goose	Not Listed	Vulnerable	Ecosystem	Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges. They are often seen walking and grazing on land; feeds on grasses, bulbs and rhizomes. Breeding can occur in both summer and winter dominated rainfall areas and is strongly influenced by water level. Nests are formed in trees over deep water; breeding is unlikely in south-eastern NSW. Often seen in trios or flocks on shallow wetlands, dry ephemeral swamps, wet grasslands and floodplains; roosts in tall vegetation.	Marginal.	No	No	No	No	Minimal habitat present that would support breeding or foraging of this species.
Anthochaera phrygia Regent Honeyeater	Critically Endangered	Critically Endangered	Species/Ecosys tem	Regent Honeyeaters are semi-nomadic, occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests. Nectar and fruit from mistletoes are also eaten. This species usually nests in tall mature eucalypts and sheoaks.	High.	Yes	No	No	Yes	Species presence mapped using Important Habitat Mapping
Artamus cyanopterus cyanopterus Dusky Woodswallow	Not Listed	Vulnerable	Ecosystem	Primarily inhabits dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland.	Moderate.	No	No	No	Yes	Species has foraging and breeding habitat present. Impacts to habitat would require assessment under the BC Act.
Botaurus poiciloptilus Australasian Bittern	Endangered	Endangered	Ecosystem	The Australasian Bittern is distributed across south-eastern Australia. Often found in terrestrial and estuarine wetlands, generally where there is permanent water with tall, dense vegetation including <i>Typha</i> sp. and <i>Eleocharis</i> spp. Typically, this bird forages at night on frogs, fish and invertebrates, and remains inconspicuous during the day. The breeding season extends from October to January with nests being built amongst dense vegetation on a flattened platform of reeds.	Marginal.	No	No	No	No	Minimal habitat present that would support breeding or foraging of this species.
Burhinus grallarius Bush Stone-curlew	Not Listed	Endangered	Species	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. Occurs in lightly timbered open forest and woodland, or partly cleared farmland with remnants of woodland, with a ground cover of short sparse grass and few or no shrubs where fallen branches and leaf litter are present.	Low.	Yes	Yes	Yes	No	Species confirmed absent from site.
Calidris ferruginea Curlew Sandpiper	Critically Endangered	Endangered	Species/Ecosys tem	Inhabits sheltered intertidal mudflats. Also, non-tidal swamps, lagoons and lakes near the coast. Infrequently recorded inland.	Marginal.	No	No	No	Low	Some potential habitat that may support transitional movements of this species.
Callocephalon fimbriatum Gang-gang Cockatoo	Endangered	Vulnerable	Species/Ecosys tem	In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Also occur in subalpine Snow Gum woodland and occasionally in temperate or regenerating forest. In winter,	Moderate.	Yes	Yes	No	Yes	Survey requirement outside of project timeframes.

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in investigation area	BAM Candidate species	Survey required	Survey undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC								
				occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. It requires tree hollows in which to breed.						
<i>Chthonicola sagittata</i> Speckled Warbler	Not Listed	Vulnerable	Ecosystem	<i>Chthonicola sagittata</i> occurs on the hills and tablelands of the Great Dividing Range. Found in eucalypt and cypress woodlands with a grassy understorey, often on ridges or gullies. The species nests on the ground in grass tussocks, dense litter and fallen branches. They forage on the ground for arthropods and seeds.	Moderate.	No	No	No	Yes	Species has foraging and breeding habitat present. Impacts to habitat would require assessment under the BC Act.
<i>Circus assimilis</i> Spotted Harrier	Not Listed	Vulnerable	Ecosystem	The Spotted Harrier is found throughout Australia but rarely in densely forested and wooded habitat of the escarpment and coast. Preferred habitat consists of open and wooded country with grassland nearby for hunting. Habitat types include open grasslands, acacia and mallee remnants, spinifex, open shrublands, saltbush, very open woodlands, crops and similar low vegetation. The Spotted Harrier is more common in drier inland areas, nomadic part migratory and dispersive, with movements linked to the abundance of prey species. Nesting occurs in open or remnant woodland and unlike other harriers, the Spotted Harrier nests in trees.	Moderate.	No	No	No	Yes	Species has foraging and breeding habitat present. Impacts to habitat would require assessment under the BC Act.
<i>Climacteris picumnus victoriae</i> Brown Treecreeper (eastern subspecies)	Not Listed	Vulnerable	Ecosystem	Lives in eucalypt woodlands, especially areas of relatively flat open woodland typically lacking a dense shrub layer, with short grass or bare ground and with fallen logs or dead trees present.	Recorded (BioNet).	No	No	No	Yes	Species has foraging and breeding habitat present. Impacts to habitat would require assessment under the BC Act.
<i>Daphoenositta chrysoptera</i> Varied Sittella	Not Listed	Vulnerable	Ecosystem	The Varied Sittella is a sedentary species which inhabits a wide variety of dry eucalypt forests and woodlands, usually with either shrubby understorey or grassy ground cover or both, in all climatic zones of Australia. Usually inhabit areas with rough-barked trees, such as stringybarks or ironbark's, but also in mallee and acacia woodlands, paperbarks or mature Eucalypts. The Varied Sittella feeds on arthropods gleaned from bark, small branches and twigs. It builds a cup-shaped nest of plant fibres and cobweb in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.	Moderate.	No	No	No	Yes	Species has foraging and breeding habitat present. Impacts to habitat would require assessment under the BC Act.
<i>Epthianura albifrons</i> White-fronted Chat	Not Listed	Vulnerable	Ecosystem	The White-fronted Chat occupies foothills and lowlands below 1000 m above sea level. In NSW it occurs mostly in the southern half of the state, occurring in damp open habitats along the coast, and near waterways in the western part of the state. The White-fronted Chat is found in damp open habitats, particularly wetlands containing saltmarsh areas that are bordered by open grasslands or lightly timbered lands. Along the coastline, they are found in estuarine and marshy grounds with vegetation less than 1 m tall. The species is also observed in open grasslands and sometimes in low shrubs bordering wetland areas. Inland, the species is often observed in open grassy plains, salt lakes and saltpans that are along the margins of rivers and waterways. In Victoria White-fronted Chats have been observed breeding from late July through to early March. Nests are built in low vegetation and in the	Marginal.	No	No	No	Yes	Species has foraging and breeding habitat present. Impacts to habitat would require assessment under the BC Act.

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in investigation area	BAM Candidate species	Survey required	Survey undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC								
<i>Falco subniger</i> Black Falcon	Not Listed	Vulnerable	Ecosystem	Sydney region nests have also been observed in low isolated mangroves. Mainly occur in woodlands and open country where can hunt. Often associated with swamps, rivers and wetlands. Nest in tall trees along watercourses.	Marginal.	No	No	No	Yes	Species has foraging and breeding habitat present. Impacts to habitat would require assessment under the BC Act.
<i>Glossopsitta porphyrocephala</i> Purple-crowned Lorikeet	Not Listed	Vulnerable	Ecosystem	Occurs in dry open woodlands, shrublands and mallee scrub, generally in areas with a flowering vegetation canopy (NPWS 1996, Higgins 1999). This species forage on nectar, pollen and blossoms from eucalypts, Callistemon and Banksias, they may also feed on berries and small insects. They nest away from feeding areas in hollows or dense vegetation approximately 30 to 40 m high often near water (NPWS 1996, Higgins 1999).	Moderate.	No	No	No	Yes	Species has foraging and breeding habitat present. Impacts to habitat would require assessment under the BC Act.
<i>Glossopsitta pusilla</i> Little Lorikeet	Not Listed	Vulnerable	Ecosystem	Distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range in NSW, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. Mostly occur in dry, open eucalypt forests and woodlands. They feed primarily on nectar and pollen in the tree canopy. Nest hollows are located at heights of between 2 m and 15 m, mostly in living, smooth-barked eucalypts. Most breeding records come from the western slopes.	Moderate.	No	No	No	Yes	Species has foraging and breeding habitat present. Impacts to habitat would require assessment under the BC Act.
<i>Grantiella picta</i> Painted Honeyeater	Vulnerable	Vulnerable	Ecosystem	Found mainly in dry open woodlands and forests, where it is strongly associated with mistletoe. Often found on plains with scattered eucalypts and remnant trees on farmlands.	Moderate.	No	No	No	Yes	Species has foraging and breeding habitat present. Impacts to habitat would require assessment under the BC Act.
<i>Grus rubicunda</i> Brolga	Not Listed	Vulnerable	Ecosystem	The Brolga has been recorded on open wetlands, shallow swamps, floodplains, paddocks, farmland and salt flats. This species nest in shallow wetlands where there is shelter such as cane grass, lignum or sedge swamp. They feed in or near water and have often been observed foraging in grassland, dry wetlands and cultivated areas.	Marginal.	No	No	No	No	Minimal habitat present that would support breeding or foraging of this species.
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle	Not Listed	Vulnerable	Species/Ecosystem	A migratory species that is generally sedentary in Australia, although immature individuals and some adults are dispersive. Found in terrestrial and coastal wetlands; favouring deep freshwater swamps, lakes and reservoirs; shallow coastal lagoons and saltmarshes. It hunts over open terrestrial habitats. Feeds on birds, reptiles, fish, mammals, crustaceans and carrion. Roosts and makes nest in trees.	Moderate.	Yes	Yes	Yes	No	Species not identified breeding within the investigation area.
<i>Hieraaetus morphnoides</i> Little Eagle	Not Listed	Vulnerable	Species/Ecosystem	The Little Eagle is most abundant in lightly timbered areas with open areas nearby providing an abundance of prey species. It has often been recorded foraging in grasslands, crops, treeless dune fields, and recently logged areas. The Little Eagle nests in tall living trees within farmland, woodland and forests.	Moderate.	Yes	Yes	Yes	No	Species not identified breeding within the investigation area.
<i>Hirundapus caudacutus</i> White-throated Needletail	Vulnerable	Not Listed	Ecosystem	An aerial species found in feeding concentrations over cities, hilltops and timbered ranges. This species roosts in trees in forests and woodlands and feeds on insects. The White-throated Needletail breeds in forests and sparse hills in Asia.	Moderate.	No	No	No	No	Species unlikely to breed or forage within the investigation area.
<i>Lathamus discolor</i>		Endangered			High.	Yes	No	No	Njo	

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in investigation area	BAM Candidate species	Survey required	Survey undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC								
Swift Parrot	Critically Endangered		Species/Ecosystem	The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW. Favoured feed trees include winter flowering species such as Swamp Mahogany <i>Eucalyptus robusta</i> , Spotted Gum <i>Corymbia maculata</i> , Red Bloodwood <i>C. gummifera</i> , Mugga Ironbark <i>E. sideroxylon</i> , and White Box <i>E. albens</i> . Commonly used lerp infested trees include Grey Box <i>E. microcarpa</i> , Grey Box <i>E. moluccana</i> and Blackbutt <i>E. pilularis</i> . This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability.						Species presence determined using mapped Important Habitat Mapping. No mapped important habitat present.
Lophoictinia isura Square-tailed Kite	Not Listed	Vulnerable	Species/Ecosystem	Typically inhabits coastal forested and wooded lands of tropical and temperate Australia. In NSW it is often associated with ridge and gully forests dominated by <i>Eucalyptus longifolia</i> , <i>Corymbia maculata</i> , <i>E. elata</i> , or <i>E. smithii</i> . Individuals appear to occupy large hunting ranges of more than 100 km ² . They require large living trees for breeding, particularly near water with surrounding woodland /forest close by for foraging habitat. Nest sites are generally located along or near watercourses, in a tree fork or on large horizontal limbs.	Moderate.	Yes	Yes	Yes	No	Species not identified breeding within the investigation area.
Melanodryas cucullata cucullata Hooded Robin (south-eastern form)	Not Listed	Vulnerable	Ecosystem	This species lives in a wide range of temperate woodland habitats, and a range of woodlands and shrublands in semi-arid areas.	Moderate.	No	No	No	Yes	Species has foraging and breeding habitat present. Impacts to habitat would require assessment under the BC Act.
Melithreptus gularis gularis Black-chinned Honeyeater (eastern subspecies)	Not Listed	Vulnerable	Ecosystem	Found mostly in open forests and woodlands dominated by box and ironbark eucalypts. It is rarely recorded east of the Great Dividing Range.	Moderate.	No	No	No	Yes	Species has foraging and breeding habitat present. Impacts to habitat would require assessment under the BC Act.
Neophema chrysostoma Blue-winged Parrot	Vulnerable	Not Listed	N/A	The Blue-winged Parrot is a small parrot found in Tasmania and southeast mainland Australia. Some populations are known to migrate to Tasmania from the mainland during summer months. The species feeds predominantly on the ground, and occurs in savannah woodlands and grasslands.	Marginal.	No	No	No	No	Species unlikely to breed or forage within the investigation area.
Neophema pulchella Turquoise Parrot	Not Listed	Vulnerable	Ecosystem	Occurs in open woodlands and eucalypt forests with a ground cover of grasses and understorey of low shrubs. Generally found in the foothills of the Great Divide, including steep rocky ridges and gullies. Nest in hollow-bearing trees, either dead or alive; also, in hollows in tree stumps. Prefer to breed in open grassy forests and woodlands, and gullies that are moist.	Moderate.	No	No	No	Yes	Species has foraging and breeding habitat present. Impacts to habitat would require assessment under the BC Act.
Ninox connivens Barking Owl	Not Listed	Vulnerable	Species/Ecosystem	Generally found in open forests, woodlands, swamp woodlands, farmlands and dense scrub. Can also be found in the foothills and timber along watercourses in otherwise open country. Territories are typically 2000 ha in NSW habitats. Hunts small arboreal mammals or birds and terrestrial mammals when tree hollows are absent.	Moderate.	Yes	Yes	Yes	No	Species not identified breeding within the investigation area.
Ninox strenua	Not Listed	Vulnerable			Low.	Yes	Yes	Yes	No	

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in investigation area	BAM Candidate species	Survey required	Survey undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC								
Powerful Owl			Species/Ecosystem	The Powerful Owl occupies wet and dry eucalypt forests and rainforests. It may inhabit both un-logged and lightly logged forests as well as undisturbed forests where it usually roosts on the limbs of dense trees in gully areas. Large mature trees with hollows at least 0.5 m deep are required for nesting. Tree hollows are particularly important for the Powerful Owl because a large proportion of the diet is made up of hollow-dependent arboreal marsupials. Nest trees for this species are usually emergent with a diameter at breast height of at least 100 cm. It has a large home range of between 450 and 1450 ha.						Species not identified breeding within the investigation area.
<i>Numenius madagascariensis</i> Eastern Curlew	Critically Endangered	Not Listed	Species/Ecosystem	Occurs in sheltered coasts, especially estuaries, embayments, harbours, inlets and coastal lagoons with large intertidal mudflats or sandflats often with beds of seagrass.	Marginal.	No	No	No	Low	Some potential habitat that may support transitional movements of this species.
<i>Pachycephala inornata</i> Gilbert's Whistler	Not Listed	Vulnerable	Ecosystem	The Gilbert's Whistler is sparsely distributed over much of the arid and semi-arid zone of inland southern Australia. The preferred habitat for this species is mallee often in association with spinifex. It has also been recorded in Belah, Riverine Black Box and Lignum vegetation communities with a mixture of dense shrubs.	Moderate.	No	No	No	Yes	Species has foraging and breeding habitat present. Impacts to habitat would require assessment under the BC Act.
<i>Pedionomus torquatus</i> Plains-wanderer	Critically Endangered	Endangered	Species/Ecosystem	Plains-wanderers live in semi-arid, lowland native grasslands that typically occur on hard red-brown soils. Habitat structure appears to be more important than plant species composition. Preferred habitat typically comprises 50% bare ground, 10% fallen litter, and 40% herbs, forbs and grasses. They have been recorded in some agricultural land including unimproved pasture, and cropping on long rotation.	Unlikely.	No	No	No	No	Species unlikely to occur within investigation area.
<i>Petroica boodang</i> Scarlet Robin	Not Listed	Vulnerable	Ecosystem	The Scarlet Robin inhabits dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. During autumn and winter, it moves to more open and cleared areas. The Scarlet Robin forages amongst logs and woody debris for insects. The nest is an open cup of plant fibres and cobwebs, built in the fork of a tree.	High – Recorded.	No	No	No	Yes	Species known to occur within investigation area. Breeding and foraging habitat present. Impacts to habitat would require assessment under the BC Act.
<i>Petroica phoenicea</i> Flame Robin	Not Listed	Vulnerable	Ecosystem	Flame Robins are found in a broad coastal band from southern Queensland to just west of the South Australian border. The preferred habitat in summer includes moist eucalyptus forests and open woodlands, in winter prefers open woodlands and farmlands. It is considered migratory. Diet consists mainly of invertebrates.	High – Recorded.	No	No	No	Yes	Species known to occur within investigation area. Breeding and foraging habitat present. Impacts to habitat would require assessment under the BC Act.
<i>Polytelis swainsonii</i> Superb Parrot	Vulnerable	Vulnerable	Species/Ecosystem	Found mainly in open, tall riparian River Red Gum forest or woodland. Often found in farmland including grazing land with patches of remnant vegetation. Forages primarily in grassy box woodland, feeding in trees and understorey shrubs and on the ground and their diet consists mainly of grass seeds and herbaceous plants.	Moderate.	Yes	Yes	Yes	No	Species not identified within the investigation area.

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in investigation area	BAM Candidate species	Survey required	Survey undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC								
<i>Pomatostomus temporalis</i> Grey-crowned Babbler (eastern subspecies)	Not Listed	Vulnerable	Ecosystem	The eastern sub-species occurs on the western slopes of the Great Dividing Range, the western plains, woodlands in the Hunter Valley and locations on the north coast of NSW. Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine, open Box Woodlands on alluvial plains and woodlands on fertile soils in coastal regions. Feeds on invertebrates and builds dome-shaped nests.	Moderate.	No	No	No	Yes	Potential breeding and foraging habitat present within the investigation area. Impacts to potential habitat would require assessment under the BC Act.
<i>Rostratula australis</i> Australian Painted Snipe	Endangered	Endangered	Ecosystem	Usually found in shallow inland wetlands including farm dams, lakes, rice crops, swamps and waterlogged grassland. They prefer freshwater wetlands, but have been recorded in brackish waters. Forages on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.	Low.	No	No	No	Low	Some potential habitat that may support transitional movements of this species.
<i>Stagonopleura guttata</i> Diamond Firetail	Not Listed	Vulnerable	Ecosystem	The Diamond Firetail is widely distributed, found in a range of habitat types including open eucalypt forest, mallee and acacia scrubs. Often occur in vegetation along watercourses. Feeds exclusively on the ground on ripe grass and herb seeds, green leaves and insects.	Moderate.	No	No	No	Yes	Species known to occur within investigation area. Breeding and foraging habitat present. Impacts to habitat would require assessment under the BC Act.
<i>Stictonetta naevosa</i> Freckled Duck	Not Listed	Vulnerable	Ecosystem	The Freckled Duck breeds in permanent fresh swamps that are heavily vegetated. Found in fresh or salty permanent open lakes, especially during drought. Often seen in groups on fallen trees and sand spits.	Low.	No	No	No	Low	Some potential habitat that may support transitional movements of this species.
<i>Tyto novaehollandiae</i> Masked Owl	Not Listed	Vulnerable	Species/Ecosystem	The Masked Owl is found in range of wooded habitats that provide tall or dense mature trees with hollows suitable for nesting and roosting. It is mostly seen in open forests and woodlands adjacent to cleared lands. Prey includes hollow-dependent arboreal marsupials and terrestrial mammals.	High – recorded.	Yes	Yes	Yes	Yes	Species identified within the investigation area.
Mammals										
<i>Cercartetus nanus</i> Eastern Pygmy-possum	Not Listed	Vulnerable	Species	Patchily distributed from the coast to the Great Dividing Range, and as far as Pillaga, Dubbo, Parkes and Wagga Wagga on the western slopes. Inhabits rainforest through to sclerophyll forest and tree heath. Banksias and myrtaceous shrubs and trees are a favoured food source. Soft fruits are eaten when flowers are unavailable, and it also feeds on insects. Will often nest in tree hollows, but can also construct its own nest. Because of its small size it can utilise a range of hollow sizes including very small hollows. Individuals will use several different hollows and an individual has been recorded using up to 9 nest sites within a 0.5 ha area over a 5 month period.	Marginal.	Yes	Yes	No	Yes	Species survey requirement outside the timeframe of this assessment.
<i>Chalinolobus picatus</i> Little Pied Bat	Not Listed	Vulnerable	Ecosystem	Occurs in mallee, dry open forest and woodland. This species roost mainly in tree hollows, but may also roost in abandoned buildings. It often occurs in areas of highly ephemeral surface water, and may travel up to 34 km in a night between the roost and water sources.	Moderate.	No	No	No	Yes	Potential breeding and foraging habitat present within the investigation area. Impacts to potential habitat would require assessment under the BC Act.
<i>Dasyurus maculatus</i>	Endangered	Vulnerable	Ecosystem		Marginal.	No	No	No	No	

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in investigation area	BAM Candidate species	Survey required	Survey undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC								
Spotted-tailed Quoll				Occurs along the east coast of Australia and the Great Dividing Range. Uses a range of habitats including sclerophyll forests and woodlands, coastal heathlands and rainforests. Occasional sightings have been made in open country, grazing lands, rocky outcrops and other treeless areas. Habitat requirements include suitable den sites, including hollow logs, rock crevices and caves, an abundance of food and an area of intact vegetation in which to forage. Seventy per cent of the diet is medium-sized mammals, and also feeds on invertebrates, reptiles and birds. Individuals require large areas of relatively intact vegetation through which to forage. The home range of a female is between 180 and 1000 ha, while males have larger home ranges of between 2000 and 5000 ha. Breeding occurs from May to August.						Species unlikely to occur within the investigation area.
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat	Not Listed	Vulnerable	Species/Ecosystem	Occurs from Victoria to Queensland, on both sides of the Great Dividing Range. Forms large maternity roosts (up to 100,000 individuals) in caves and mines in spring and summer. Individuals may fly several hundred kilometres to their wintering sites, where they roost in caves, culverts, buildings, and bridges. They occur in a broad range of habitats including rainforest, wet and dry sclerophyll forest, paperbark forest and open grasslands. Has a fast, direct flight and forages for flying insects (particularly moths) above the tree canopy and along waterways.	Moderate.	Yes	No	Excluded as candidate species.	No	Species not likely to occur.
<i>Myotis macropus</i> Southern Myotis	Not Listed	Vulnerable	Species	Scattered, mainly coastal distribution extending to South Australia along the Murray River. Roosts in caves, mines or tunnels, under bridges, in buildings, tree hollows, and even in dense foliage. Colonies occur close to water bodies, ranging from rainforest streams to large lakes and reservoirs. They catch aquatic insects and small fish with their large hind claws, and also catch flying insects.	Moderate.	Yes	Yes	No	Yes	Survey requirements outside time frames of this assessment.
<i>Nyctophilus corbeni</i> Corben's Long-eared Bat	Vulnerable	Vulnerable	Ecosystem	Restricted to the Murray-Darling basin and western slopes. Found in a range of habitats including tall Eucalypt forests, mallee, open savanna and Black Box woodland, preferring habitats with a distinct canopy and cluttered, dense understorey. Roost in tree hollows and fissures and under exfoliating bark.	Moderate.	No	No	No	Yes	Potential breeding and foraging habitat present within the investigation area. Impacts to potential habitat would require assessment under the BC Act.
<i>Petaurus norfolcensis</i> Squirrel Glider	Not Listed	Vulnerable	Species	Generally occurs in dry sclerophyll forests and woodlands but is absent from dense coastal ranges in the southern part of its range. Requires abundant hollow-bearing trees and a mix of eucalypts, banksias and acacias. Within a suitable vegetation community at least one species should flower heavily in winter and one species of eucalypt should be smooth barked.	High – Recorded.	Yes	Yes	Yes	Yes	Species identified within the investigation area.
<i>Phascolarctos cinereus</i> Koala	Endangered	Endangered	Species	In NSW the Koala mainly occurs on the central and north coasts with some populations in the western region. Koalas feed almost exclusively on eucalypt foliage, and their preferences vary regionally. Primary feed trees include <i>Eucalyptus robusta</i> , <i>E. tereticornis</i> , <i>E. punctata</i> , <i>E. haemostoma</i> and <i>E. signata</i> . They are solitary with varying home ranges.	Marginal.	Yes	Yes	Yes	No	Species not identified within the investigation area.
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox	Vulnerable	Vulnerable	Species/Ecosystem	Occurs along the NSW coast, extending further inland in the north. This species is a canopy-feeding frugivore and nectarivore of rainforests, open forests, woodlands, melaleuca	High – Foraging.	Yes	No	No	Low	Species excluded as candidate species as no breeding camps are present.

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in investigation area	BAM Candidate species	Survey required	Survey undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC								
				swamps and banksia woodlands. Roosts in large colonies, commonly in dense riparian vegetation.						Foraging habitat is still present, impacts to foraging habitat would require assessment under the BC Act.
<i>Saccolaimus flaviventris</i> Yellow-bellied Sheathtail-bat	Not Listed	Vulnerable	Ecosystem	Found throughout NSW in habitats including wet and dry sclerophyll forest, open woodland, acacia shrubland, mallee, grasslands and desert. They roost in tree hollows in colonies and have also been observed roosting in animal burrows, abandoned Sugar Glider nests, cracks in dry clay, hanging from buildings and under slabs of rock. Forages for insects above the canopy in forests.	Moderate.	No	No	No	Yes	Potential breeding and foraging habitat present within the investigation area. Impacts to potential habitat would require assessment under the BC Act.
Amphibians										
<i>Crinia sloanei</i> Sloane's Froglet	Endangered	Vulnerable	Species	Sloane's Froglet is a cryptic species, usually found only after rain. This species has a widely scattered distribution throughout the floodplains of the Murray-Darling Basin in NSW and has been recorded mostly in the Darling Riverine Plains, NSW South Western Slopes, and the Riverina bioregions. It is typically associated with periodically inundated grassland, woodland and disturbed areas.	High – Recorded.	Yes	Yes	Yes	Yes	Species identified within the investigation area.
<i>Litoria raniformis</i> Southern Bell Frog	Vulnerable	Endangered	Species	In NSW the species is known to exist only in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain and around Lake Victoria. Usually found in or around permanent or ephemeral swamps or billabongs with an abundance of bulrushes and other emergent vegetation along floodplains and river valleys. They are also found in irrigated rice crops, particularly where there is no available natural habitat. Outside the breeding season animals disperse away from the water and take shelter beneath ground debris such as fallen timber and bark, rocks, grass clumps and in deep soil cracks.	Marginal.	Yes	No	Excluded as candidate species.	No	Species not likely to occur.
Reptiles										
<i>Aprasia parapulchella</i> Pink-tailed Legless Lizard	Vulnerable	Vulnerable	Species	Fossorial species, which lies beneath surface rocks and occupies ant burrows. It feed on ants, particularly their eggs and larvae. Thought to lay eggs within the ant nests under rocks that it uses as a source of food and shelter. Key habitat features are a cover of native grasses, particularly Kangaroo Grass (<i>Themeda australis</i>), sparse or no tree cover, little or no leaf litter, and scattered small rock with shallow embedment in the soil surface.	Marginal.	Yes	No	Excluded as candidate species.	No	Species not likely to occur.
<i>Delma impar</i> Striped Legless Lizard	Vulnerable	Vulnerable	Species	Generally, occurs in lowland native grasslands occurring on gently undulating plains having soils of basaltic origin. Grasses are dominated by perennial, tussock-forming grasses such as <i>Themeda triandra</i> , <i>Austrostipa</i> spp. and <i>Austrodanthonia</i> sp. Inhabits secondary grasslands only when they occur within 2km of primary grassland.	Marginal.	Yes	No	Excluded as candidate species.	No	Species not likely to occur.
<i>Varanus rosenbergi</i> Rosenberg's Goanna	Not Listed	Vulnerable	Ecosystem	This species is a Hawkesbury/Narrabeen sandstone outcrop specialist. Occurs in coastal heaths, humid woodlands and both wet and dry sclerophyll forests. Termite mounds are a critical habitat component.	Unlikely.	Yes	No	Excluded as candidate species.	No	Species not likely to occur.
Fish										

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in investigation area	BAM Candidate species	Survey required	Survey undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC								
<i>Galaxias rostratus</i> Flathead Galaxias	Critically Endangered	Critically Endangered	N/A	Flathead Galaxias are found in still or slow moving water bodies such as wetlands and lowland streams. The species has been recorded forming shoals. They have been associated with a range of habitats including rock and sandy bottoms and aquatic vegetation. Flathead Galaxias spawn in spring and lay slightly adhesive demersal eggs.	High – indicated as occurring by DPE.	No	No	No	Yes	Species indicated as occurring within investigation area. Impacts to habitat would require assessment under the FM Act and EPBC Act.
<i>Maccullochella macquariensis</i> Trout Cod	Endangered	Endangered	N/A	The Trout Cod is endemic to the southern Murray-Darling river system, including the Murrumbidgee and Murray Rivers, and the Macquarie River in central NSW. Trout cod are often found close to cover and in relatively fast currents, especially in fairly deep water close to the bank, and often congregate around large woody debris (snags). They tend to remain at the one site and have small home ranges.	Unlikely.	No	No	No	No	Species unlikely to occur.
<i>Maccullochella peelii</i> Murray Cod	Vulnerable	Not Listed	N/A	The Murray Cods natural distribution extends throughout the Murray-Darling basin ranging west of the divide from south east Queensland, through NSW into Victoria and South Australia. It is found in the waterways of the Murray-Darling Basin in a wide range of warm water habitats that range from clear, rocky streams to slow flowing turbid rivers, billabongs and large deep holes. Murray Cod is entirely a freshwater species and will not tolerate high salinity levels.	Unlikely.	No	No	No	No	Species unlikely to occur.
<i>Macquaria australasica</i> Macquarie Perch	Endangered	Endangered	N/A	Macquarie Perch are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven catchments. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their tributaries.	Unlikely.	No	No	No	No	Species unlikely to occur.
<i>Nannoperca australis</i> Southern Pygmy Perch (Murray-Darling Basin lineage)	Vulnerable	Endangered	N/A	The Southern Pygmy Perch is a small freshwater fish species, known to occur in the Murray and lower Murrumbidgee River systems. They are found in small systems with slow-flowing water, as well as streams, billabongs, and lakes with an abundance of vegetation. They seldom occur in open water, with a preference for covered habitats.	High – indicated as occurring by DPE.	No	No	No	Yes	Species indicated as occurring within investigation area. Impacts to habitat would require assessment under the FM Act and EPBC Act.
Insects										
<i>Keyacris scurra</i> Key's Matchstick Grasshopper	Not Listed	Endangered	Species	Has been recorded in grassland and open grassy woodland. Its occurrence may be correlated to the presence of <i>Chrysocephalum apiculatum</i> growing between tussocks of Kangaroo Grass <i>Themeda triandra</i> .	Unlikely.	Yes	No	Excluded as candidate species.	No	Species not likely to occur.
<i>Synemon plana</i> Golden Sun Moth	Vulnerable	Vulnerable	Species	The Golden Sun Moth's is found in the area between Queanbeyan, Gunning, Young and Tumut. Occurs in Natural Temperate Grasslands and grassy Box-Gum Woodlands, with ground layer dominated by wallaby grasses of the genus <i>Austrodanthonia</i> .	Unlikely.	Yes	No	Excluded as candidate species.	No	Species not likely to occur.

Appendix 6. Flora

Table A 4: Flora species recorded in the investigation area

Status	Scientific name	Common name
Native Species		
	<i>Acacia acinacea</i>	Gold-dust Wattle
	<i>Acacia dealbata</i>	Silver Wattle
	<i>Acacia deanei</i> subsp. <i>deanei</i>	Deane's Wattle
	<i>Acacia decurrens</i>	Black Wattle
	<i>Acacia genistifolia</i>	Early Wattle
	<i>Acacia implexa</i>	Hickory Wattle
	<i>Acacia mearnsii</i>	Black Wattle
	<i>Acacia paradoxa</i>	Kangaroo Thorn
	<i>Acacia pravissima</i>	Wedge-leaved Wattle
	<i>Acacia verniciflua</i>	Varnish Wattle
	<i>Allocasuarina verticillata</i>	Drooping Sheoak
	<i>Alternanthera denticulata</i>	Lesser Joyweed
	<i>Amphibromus nervosus</i>	Swamp Wallaby Grass
	<i>Amphibromus</i> spp.	
	<i>Amyema miquelii</i>	Box Mistletoe
	<i>Amyema miraculosum</i> subsp. <i>boormanii</i>	
#	<i>Angophora</i> spp.	
	<i>Anthosachne scabra</i>	Wheatgrass, Common Wheatgrass
	<i>Aristida behriana</i>	Bunch Wiregrass
	<i>Aristida ramosa</i>	Purple Wiregrass
	<i>Aristida</i> spp.	A Wiregrass
	<i>Arthropodium</i> spp.	
	<i>Asperula</i> spp.	Woodruff
	<i>Atriplex semibaccata</i>	Creeping Saltbush
	<i>Austrostipa scabra</i>	Speargrass
	<i>Austrostipa</i> spp.	A Speargrass
	<i>Azolla Rubida</i>	Red Water Fern
	<i>Bothriochloa macra</i>	Red Grass
	<i>Bothriochloa</i> spp.	Redgrass, Bluegrass
#	<i>Brachychiton populneus</i>	Kurrajong
	<i>Bulbine bulbosa</i>	Bulbine Lily
	<i>Bursaria spinosa</i>	Native Blackthorn
	<i>Callistemon sieberi</i>	River Bottlebrush
	<i>Callistemon viminalis</i>	Weeping Bottlebrush
	<i>Carex appressa</i>	Tall Sedge
	<i>Carex inversa</i>	Knob Sedge
	<i>Carex tereticaulis</i>	
	<i>Centipeda cunninghamii</i>	Common Sneezeweed

Status	Scientific name	Common name
	<i>Chamaesyce dallachyana</i>	
	<i>Chamaesyce drummondii</i>	Caustic Weed
	<i>Cheilanthes sieberi</i>	Rock Fern
	<i>Cheilanthes</i> spp.	Cloak Fern, Mulga Fern, Rock Fern
	<i>Chloris truncata</i>	Windmill Grass
#	<i>Corymbia maculata</i>	Spotted Gum
	<i>Crassula sieberiana</i>	Australian Stonecrop
	<i>Cynodon dactylon</i>	Common Couch
	<i>Deyeuxia quadriseta</i>	
	<i>Dianella revoluta</i>	Blueberry Lily
	<i>Dianella</i> spp.	
	<i>Digitaria divaricatissima</i>	Umbrella Grass
	<i>Dysphania pumilio</i>	
	<i>Echinochloa colona</i>	Awnless Barnyard Grass
	<i>Einadia nutans</i>	Climbing Saltbush
	<i>Eleocharis acuta</i>	Tall Spike Rush
	<i>Eleocharis plana</i>	Flat Spike-sedge
	<i>Eleocharis</i> spp.	Spike-rush, Spike-sedge
	<i>Enteropogon acicularis</i>	Curly Windmill Grass
	<i>Epilobium billardierianum</i>	
	<i>Eragrostis brownii</i>	Brown's Lovegrass
	<i>Eragrostis parviflora</i>	Weeping Lovegrass
	<i>Eriochloa</i> spp.	A Cupgrass
	<i>Eucalyptus albens</i>	White Box
	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum
	<i>Eucalyptus bridgesiana</i>	Apple Box
	<i>Eucalyptus camaldulensis</i>	River Red Gum
	<i>Eucalyptus globulus</i>	
	<i>Eucalyptus goniocalyx</i>	Bundy
#	<i>Eucalyptus leucoxylon</i> subsp. <i>Leucoxylon</i>	Yellow Gum
	<i>Eucalyptus macrorhyncha</i>	Red Stringybark
	<i>Eucalyptus melliodora</i>	Yellow Box
	<i>Eucalyptus nortonii</i>	Large-flowered Bundy
	<i>Eucalyptus polyanthemus</i>	Red Box
#	<i>Eucalyptus sideroxylon</i>	Mugga Ironbark
#	<i>Eucalyptus viminalis</i>	Ribbon Gum
	<i>Euchiton japonicus</i>	
	<i>Euphorbia</i> spp.	
	<i>Geranium potentilloides</i>	
	<i>Geranium</i> spp.	
	<i>Glycine clandestina</i>	Twining glycine
	<i>Gonocarpus elatus</i>	A Raspwort
	<i>Gonocarpus tetragynus</i>	Poverty Raspwort

Status	Scientific name	Common name
#	<i>Grevillea robusta</i>	Silky Oak
#	<i>Grevillea rosmarinifolia</i>	Rosemary Grevillea
	<i>Hardenbergia violacea</i>	False Sarsaparilla
	<i>Hibbertia obtusifolia</i>	Hoary Guinea Flower
	<i>Hypericum gramineum</i>	Small St John's Wort
	<i>Juncus flavidus</i>	
	<i>Juncus semisolidus</i>	
	<i>Juncus</i> spp.	A Rush
	<i>Juncus usitatus</i>	
	<i>Lachnagrostis filiformis</i>	
	<i>Lomandra filiformis</i>	Wattle Matt-rush
	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
	<i>Lomandra multiflora</i> subsp. <i>multiflora</i>	Many-flowered Mat-rush
	<i>Lythrum hyssopifolia</i>	Hyssop Loosestrife
	<i>Marsilea drummondii</i>	Common Nardoo
#	<i>Melaleuca erubescens</i>	Pink Honeymyrtle
	<i>Melaleuca</i> spp.	
	<i>Mentha australis</i>	River Mint
	<i>Microlaena stipoides</i>	Weeping Grass
	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
	<i>Myriophyllum crispatum</i>	
	<i>Orobanche</i> spp.	
	<i>Oxalis perennans</i>	
	<i>Oxalis</i> spp.	
	<i>Paspalidium jubiflorum</i>	Warrego Grass
	<i>Paspalidium</i> spp.	
	<i>Paspalum distichum</i>	Water Couch
	<i>Persicaria prostrata</i>	Creeping Knotweed
	<i>Phragmites australis</i>	Common Reed
	<i>Portulaca oleracea</i>	Pigweed
	<i>Pseudognaphalium luteoalbum</i>	Jersey Cudweed
	<i>Ranunculus</i> spp.	
	<i>Ranunculus undosus</i>	Swamp Buttercup
	<i>Rumex brownii</i>	Swamp Dock
	<i>Rytidosperma auriculatum</i>	Lobed Wallaby Grass
	<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass
	<i>Rytidosperma carphoides</i>	Short Wallaby Grass
	<i>Rytidosperma duttonianum</i>	Brown-back Wallaby Grass
	<i>Rytidosperma fulvum</i>	Wallaby Grass
	<i>Rytidosperma setaceum</i>	Small-flowered Wallaby-grass
	<i>Rytidosperma</i> spp.	
	<i>Senecio quadridentatus</i>	Cotton Fireweed
	<i>Senecio</i> spp.	Groundsel, Fireweed

Status	Scientific name	Common name
	<i>Setaria</i> spp.	
	<i>Sonchus</i> spp.	Sowthistle
	<i>Sporobolus creber</i>	Slender Rat's Tail Grass
	<i>Themeda triandra</i>	
	<i>Tricoryne elatior</i>	Yellow Autumn-lily
	<i>Triglochin procera</i>	Water Ribbons
	<i>Triglochin</i> spp.	
	<i>Typha orientalis</i>	Broad-leaved Cumbungi
	<i>Veronica</i> spp.	
	<i>Vittadinia cuneata</i>	A Fuzzweed
	<i>Walwhalleya proluta</i>	
	<i>Xerochrysum viscosum</i>	Sticky Everlasting
Exotic species		
	<i>Acer</i> spp.	
	<i>Acacia baileyana</i>	Cootamundra Wattle
	<i>Acacia boormanii</i>	Snowy River Wattle
	<i>Acetosella vulgaris</i>	Sheep Sorrel
	<i>Aira cupaniana</i>	Silvery Hairgrass
	<i>Aira elegantissima</i>	Delicate Hairgrass
	<i>Amaryllis belladonna</i>	Belladonna Lily
	<i>Arctotheca calendula</i>	Capeweed
	<i>Avena barbata</i>	Bearded Oats
	<i>Briza maxima</i>	Quaking Grass
	<i>Briza minor</i>	Shivery Grass
	<i>Bromus catharticus</i>	Praire Grass
	<i>Bromus diandrus</i>	Great Brome
	<i>Bromus hordeaceus</i>	Soft Brome
	<i>Cabomba caroliniana</i>	Cabomba
	<i>Cerastium glomeratum</i>	Mouse-ear Chickweed
	<i>Cerastium vulgare</i>	Mouse-ear Chickweed
	<i>Chloris virgata</i>	Feathertop Rhodes Grass
	<i>Chondrilla juncea</i>	Skeleton Weed
	<i>Cirsium vulgare</i>	Spear Thistle
	<i>Conyza bonariensis</i>	Flaxleaf Fleabane
	<i>Conyza</i> spp.	A Fleabane
#	<i>Corymbia citriodora</i>	Lemon-scented Gum
	<i>Crataegus monogyna</i>	Hawthorn
	<i>Cyperus eragrostis</i>	Umbrella Sedge
	<i>Dactylis glomerata</i>	Cocksfoot
	<i>Digitaria ciliaris</i>	Summer Grass
	<i>Digitaria sanguinalis</i>	Crab Grass
	<i>Echium plantagineum</i>	Patterson's Curse
	<i>Ehrharta erecta</i>	Panic Veldtgrass

Status	Scientific name	Common name
	<i>Ehrharta longiflora</i>	Annual Veldtgrass
	<i>Eleusine indica</i>	Crowsfoot Grass
	<i>Eleusine tristachya</i>	Goose Grass
	<i>Eragrostis cilianensis</i>	Stinkgrass
	<i>Eragrostis curvula</i>	African Lovegrass
	<i>Erodium moschatum</i>	Musky Crowfoot
	<i>Eucalyptus cinerea</i>	Argyle Apple
	<i>Eucalyptus cladocalyx</i>	Sugar Gum
	<i>Euphorbia lathyris</i>	Caper Spurge
	<i>Fraxinus angustifolia</i> subsp. <i>angustifolia</i>	Desert Ash
	<i>Fumaria bastardii</i>	Bastards Fumitory
	<i>Galium aparine</i>	Goosegrass
	<i>Gamochaeta</i> spp.	
	<i>Hordeum</i> spp.	A Barley Grass
	<i>Hypericum perforatum</i>	St. Johns Wort
	<i>Hypericum perforatum</i> subsp. <i>veronense</i>	St John's Wort
	<i>Hypochaeris radicata</i>	Catsear
	<i>Juncus bufonius</i>	Toad Rush
	<i>Juncus tenuis</i>	
	<i>Lactuca serriola</i>	Prickly Lettuce
	<i>Lepidium africanum</i>	Common Peppercross
	<i>Lolium perenne</i>	Perennial Ryegrass
	<i>Lolium rigidum</i>	Wimmera Ryegrass
	<i>Lotus angustissimus</i>	Slender Birds-foot Trefoil
	<i>Lysimachia arvensis</i>	Scarlet Pimpernel
	<i>Malva parviflora</i>	Small-flowered Mallow
	<i>Medicago</i> spp.	A Medic
	<i>Melia azedarach</i>	White Cedar
	<i>Mentha pulegium</i>	Pennyroyal
	<i>Moraea setifolia</i>	Thread Iris
	<i>Nassella neesiana</i>	Chilean Needle Grass
	<i>Oenothera stricta</i> subsp. <i>stricta</i>	
	<i>Olea europaea</i>	Common Olive
	<i>Opuntia stricta</i>	Common Prickly Pear
	<i>Orobanche minor</i>	Broomrape
	<i>Oxalis pes-caprae</i>	Soursob
	<i>Panicum capillare</i>	Witchgrass
	<i>Paspalum dilatatum</i>	Paspalum
	<i>Phalaris aquatica</i>	Phalaris
	<i>Plantago lanceolata</i>	Lamb's Tongues
	<i>Poa annua</i>	Winter Grass
	<i>Poa bulbosa</i>	Bulbous Poa
	<i>Polygonum aviculare</i>	Wireweed

Status	Scientific name	Common name
	<i>Prunus</i> spp.	
	<i>Ranunculus sceleratus</i>	Celery Buttercup
	<i>Romulea rosea</i> var. <i>australis</i>	Onion Grass
	<i>Rosa rubiginosa</i>	Sweet Briar
	<i>Rubus anglocandicans</i>	Blackberry
	<i>Rumex conglomeratus</i>	Clustered Dock
	<i>Rumex crispus</i>	Curled Dock
	<i>Schinus areira</i>	Pepper Tree
	<i>Setaria parviflora</i>	
	<i>Solanum nigrum</i>	Black-berry Nightshade
	<i>Sonchus oleraceus</i>	Common Sowthistle
	<i>Taraxacum officinale</i>	Dandelion
	<i>Trifolium angustifolium</i>	Narrow-leaved Clover
	<i>Trifolium arvense</i>	Haresfoot Clover
	<i>Trifolium dubium</i>	Yellow Suckling Clover
	<i>Trifolium glomeratum</i>	Clustered Clover
	<i>Trifolium ornithopodioides</i>	Birds-foot Trefoil
	<i>Trifolium repens</i>	White Clover
	<i>Trifolium</i> spp.	A Clover
	<i>Trifolium subterraneum</i>	Subterranean Clover
	<i>Typha australis</i>	
	<i>Vachellia farnesiana</i>	Mimosa Bush
	<i>Verbascum thapsus</i> subsp. <i>thapsus</i>	Great Mullein
	<i>Verbascum virgatum</i>	Twiggy Mullein
	<i>Verbena bonariensis</i>	Purpletop
	<i>Vicia sativa</i>	Common vetch
	<i>Vulpia bromoides</i>	Squirrel Tail Fesque
	<i>Xanthium spinosum</i>	Bathurst Burr

Appendix 7. Fauna

Table A 5: Fauna species recorded in the investigation area

Scientific Name	Common Name	EPBC Act status	NSW status
Birds			
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill		
<i>Acanthiza nana</i>	Yellow Thornbill		
<i>Acanthiza reguloides</i>	Buff-rumped Thornbill		
<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk		
<i>Accipiter fasciatus</i>	Brown Goshawk		
<i>Acrocephalus australis</i>	Australian Reed-Warbler		
<i>Alisterus scapularis</i>	Australian King-Parrot		
<i>Anas gracilis</i>	Grey Teal		
<i>Anas superciliosa</i>	Pacific Black Duck		
<i>Anthochaera carunculata</i>	Red Wattlebird		
<i>Anthus novaeseelandiae</i>	Australian Pipit		
<i>Aquila audax</i>	Wedge-tailed Eagle		
<i>Ardea intermedia</i>	Intermediate Egret		
<i>Ardea modesta</i>	Eastern Great Egret		
<i>Aythya australis</i>	Hardhead		
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo		
<i>Cacatua sanguinea</i>	Little Corella		
<i>Caligavis chrysops</i>	Yellow-faced Honeyeater		
<i>Chenonetta jubata</i>	Australian Wood Duck		
<i>Cincloramphus mathewsi</i>	Rufous Songlark		
<i>Colluricincla harmonica</i>	Grey Shrike-thrush		
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike		
<i>Corcorax melanorhamphos</i>	White-winged Chough		
<i>Corvus coronoides</i>	Australian Raven		
<i>Cracticus nigrogularis</i>	Pied Butcherbird		
<i>Cracticus tibicen</i>	Australian Magpie		
<i>Dacelo novaeguineae</i>	Laughing Kookaburra		
<i>Dicaeum hirundinaceum</i>	Mistletoebird		
<i>Egretta novaehollandiae</i>	White-faced Heron		
<i>Elanus axillaris</i>	Black-shouldered Kite		
<i>Elsyornis melanops</i>	Black-fronted Dotterel		
<i>Entomyzon cyanotis</i>	Blue-faced Honeyeater		
<i>Eolophus roseicapillus</i>	Galah		
<i>Eurystomus orientalis</i>	Dollarbird		
<i>Falco berigora</i>	Brown Falcon		

Scientific Name	Common Name	EPBC Act status	NSW status
<i>Falco cenchroides</i>	Nankeen Kestrel		
<i>Falco longipennis</i>	Australian Hobby		
<i>Fulica atra</i>	Eurasian Coot		
<i>Gerygone fusca</i>	Western Gerygone		
<i>Gerygone olivacea</i>	White-throated Gerygone		
<i>Grallina cyanoleuca</i>	Magpie-lark		
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Lalage sueurii</i>	White-winged Triller		
<i>Malurus cyaneus</i>	Superb Fairy-wren		
<i>Manorina melanocephala</i>	Noisy Miner		
<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater		
<i>Merops ornatus</i>	Rainbow Bee-eater		
<i>Microcarbo melanoleucos</i>	Little Pied Cormorant		
<i>Microeca fascians</i>	Jacky Winter		
<i>Milvus migrans</i>	Black Kite		
<i>Neochmia temporalis</i>	Red-browed Finch		
<i>Ocyphaps lophotes</i>	Crested Pigeon		
<i>Pachycephala pectoralis</i>	Golden Whistler		
<i>Pachycephala rufiventris</i>	Rufous Whistler		
<i>Pardalotus punctatus</i>	Spotted Pardalote		
<i>Pardalotus striatus</i>	Striated Pardalote		
<i>Passer domesticus</i>	House Sparrow		
<i>Pelecanus conspicillatus</i>	Australian Pelican		
<i>Petroica boodang</i>	Scarlet Robin		V
<i>Petroica phoenicea</i>	Flame Robin		V
<i>Philemon citreogularis</i>	Little Friarbird		
<i>Philemon corniculatus</i>	Noisy Friarbird		
<i>Platalea flavipes</i>	Yellow-billed Spoonbill		
<i>Platalea regia</i>	Royal Spoonbill		
<i>Platycercus elegans</i>	Crimson Rosella		
<i>Platycercus eximius</i>	Eastern Rosella		
<i>Psephotus haematonotus</i>	Red-rumped Parrot		
<i>Ptilonorhynchus violaceus</i>	Satin Bowerbird		
<i>Ptilotula penicillatus</i>	White-plumed Honeyeater		
<i>Rhipidura albiscapa</i>	Grey Fantail		
<i>Rhipidura leucophrys</i>	Willie Wagtail		
<i>Smicrornis brevirostris</i>	Weebill		
<i>Strepera graculina</i>	Pied Currawong		
<i>Sturnus vulgaris</i>	Common Starling		
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe		
<i>Tadorna tadornoides</i>	Australian Shelduck		

Scientific Name	Common Name	EPBC Act status	NSW status
<i>Threskiornis molucca</i>	Australian White Ibis		
<i>Threskiornis spinicollis</i>	Straw-necked Ibis		
<i>Todiramphus sanctus</i>	Sacred Kingfisher		
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet		
<i>Turdus merula</i>	Eurasian Blackbird		
<i>Tyto novaehollandiae</i>	Masked Owl		V
<i>Vanellus miles</i>	Masked Lapwing		
Mammals			
<i>Felis catus</i>	Cat		
<i>Lepus capensis</i>	Brown Hare		
<i>Macropus giganteus</i>	Eastern Grey Kangaroo		
<i>Oryctolagus cuniculus</i>	Rabbit		
<i>Petaurus norfolcensis</i>	Squirrel Glider		V
<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum		
<i>Trichosurus vulpecula</i>	Common Brushtail Possum		
<i>Vulpes vulpes</i>	Fox		
Reptiles			
<i>Chelodina longicollis</i>	Eastern Snake-necked Turtle		
<i>Emydura macquarii</i>	Macquarie Turtle		
<i>Cryptoblepharus pannosus</i>	Ragged Snake-eyed Skink		
<i>Carlia tetradactyla</i>	Southern Rainbow-skink		
<i>Ctenotus spaldingi</i>	Straight-browed Ctenotus		
Frogs			
<i>Crinia parinsignifera</i>	Eastern Sign-bearing Froglet		
<i>Crinia signifera</i>	Common Eastern Froglet		
<i>Crinia sloanei</i>	Sloane's Froglet	E	E
<i>Limnodynastes tasmaniensis</i>	Spotted Grass Frog		
<i>Litoria paraewingi</i>	Victorian Frog		
<i>Litoria peronii</i>	Peron's Tree Frog		
<i>Neobatrachus sudelli</i>	Sudell's Frog		

