PRACTICAL ECOLOGY
ecological restoration & consulting

Biodiversity Assessment

PART 2 – Field surveys

Hepburn 4 Township Structure Plans



FINAL

Report prepared for Hepburn Shire Council

November 2023

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FINAL *Hepburn 4 Township Structure Plan – Biodiversity Assessment*
PART2 – Field surveys

November 2023

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EXECUTIVE SUMMARY

Practical Ecology Pty Ltd was commissioned by Hepburn Shire Council to undertake a biodiversity assessment of four townships, Clunes, Trentham, Daylesford-Hepburn Springs and Glenlyon, to inform structure planning for Hepburn's five major towns. Creswick was subject to an earlier assessment by Practical ecology in 2022 with its findings documented in a separate report. The assessment involved a detailed desktop analysis followed by ground-truthing from roadsides and public land, to identify ecological values across defined Investigation Areas. Mapping was produced of patches of native vegetation across the Investigation Areas with their type (Ecological Vegetation Class) and an indication of quality (see Maps K and L, in Appendix 1-4) provided.

Where treeless vegetation was on private land and not visible "over-the-fence" it was often not possible to reliably assess if indigenous grassland was present due to the difficulty in differentiating it from exotic grasses and pasture in aerial imagery. Despite this the survey was considered an adequate representation of site condition and sufficient to determine areas of high biodiversity values and potential impacts associated with future rezoning and development, as well as to guide land management across the site.

The Investigation Areas consisted primarily of private land zoned as Township Zone, Neighbourhood Residential Zone, Low Density Residential Zone and Rural Living Zone, which, its understood, were chosen as they are anticipated to have the highest pressure for future development and subdivision.

Key biodiversity features and areas of high ecological value are summarised further below for each of the four townships. It is strongly recommended that any rezoning or redevelopment ensures that the high value areas summarised below are protected and enhanced, and that connectivity between them is improved where possible. There are a number of opportunities for enhanced connectivity across the landscape as discussed in the relevant individual township sections of this report (Sections 4.1.6, 4.2.6, 4.3.6, and 4.4.6).

As indicated in the township summaries further below, some of the mapped vegetation likely represents threatened ecological communities listed under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or *Flora and Fauna Guarantee Act 1988* (FFG Act), as well as supporting listed species under both of these Acts (See Section 3.2). The development of habitat areas representative of EPBC listed ecological communities or likely to support listed species, may require a referral and offsetting under the EPBC Act. Any unavoidable vegetation losses must also be offset under Clause 52.17 of the *Planning and Environment Act 1987*, which can include species-specific offsets, where listed species' habitats are impacted. Offsets for listed communities and species are typically both difficult to source and expensive. Hence consideration of this at early planning stages is strongly recommended to avoid impacts to and protect these ecological values in future rezoning or development. This is particularly relevant to Clunes where Plains Grassy Woodland and Grassy Woodland has been extensively mapped, which may represent EPBC and FFG Act listed communities and support threatened species. Vegetation within Glenlyon may also be representative of listed ecological communities.

Investigation Areas which support less depleted ecological communities, not listed under the FFG and EPBC Act, are generally lower cost per unit of offset. However, if extensive areas are impacted, their development would likely have significant ecological impacts and offset costs. This is particularly relevant across Investigation Areas in Daylesford – Hepburn Springs, and Trentham, which support large contiguous areas of less depleted native vegetation. While less depleted, these areas may still play an important role in supporting threatened species with further targeted surveys necessary regarding these (See Section Table 61).

It is also noted that the development of Township Areas adjacent or near large areas of mapped vegetation, particularly woodland and forest, are likely to be constrained by bushfire risk. It is understood that Terramatrix has undertaken an assessment of bushfire risk across the township Investigation Areas. It is important that the Terramatrix Strategic Bushfire Planning Assessment is considered alongside this ecological assessment to inform future development, avoid potential future conflict, and the need to remove or modify high-value vegetation to provide sufficient defendable space and fire protection to property or infrastructure, as is required to be considered under 13.02-1s.

For areas where rezoning does occur, increased development and densification will decrease the amount of permeable space across the Investigation Areas. An integrated approach to storm water, waste water, ground water and potable water is recommended to maintain a more natural water cycle and protect the area's waterways (Section 6.5).

Carefully planned lighting, especially for developments adjacent high ecological values and wildlife corridors is also strongly recommended to minimise light pollution impacts to native wildlife (Section 6.6)

Recognition and protection of culturally significant Flora and Fauna is of utmost importance. Unfortunately, collaboration with the Dja Dja Wurrong, the traditional owners of the land, was not possible within the timeframes of this project. However, it is hoped that the ecological values documented in this report can be useful for future engagement with the Dja Dja Wurrung. Some culturally significant plants and animals were identified during the field survey and desktop analysis. For example, Kangaroo Grass *Themeda triandra*, one of the culturally significant plants documented in Section 3.4, was commonly observed in areas of mapped grassland and grassy woodland across the township investigation areas, particularly in Clunes and Glenlyon. Many of the grassland patches also supported culturally significant herbs such as as Bulbine Lilies *Bulbine bulbosa* and Chocolate and Vanilla -lilies *Arthropodium* spp. Moderate-high quality areas of woodland and forest were typically observed to support Mat-rushes *lomandra spp*. , Black-anther Flax-lily *Dianella admixta*, Wattles *Acacia spp.* Victorian Biodiversity Atlas (VBA) records also indicate recent Brolga observations at Middle and Merin Merin Swamps in Clunes.

Overall, while there are large amounts of ecologically significant areas throughout the four townships, with careful consideration of these and bushfire planning constraints, it does appear possible to minimise the impacts of future development through careful strategic planning as discussed through the body of this report.

Ecological values for each of the townships are summarised below.

Clunes

- Of the1840 ha in the Clunes investigation areas, 509 ha (28%) was assessed as containing native vegetation including 127.1 ha of high-quality vegetation. This is likely an under-estimation, particularly of treeless - grassland vegetation.
- The mapped vegetation consisted of ten different Ecological Vegetation Classes (EVCs).
- 157 scattered trees were identified outside these patches and provide important habitat and connectivity for aerial species.
- Important patches of high-quality vegetation within the Investigation Areas warranting additional protections include:
  - Vegetation along the Creswick and Kilkenny Creeks, which are important wildlife corridors for both terrestrial, semi-aquatic and aquatic fauna. There is significant opportunity to enhance these riparian corridors.
  - Mapped vegetation at the northern ends of investigation zones (Cl3a and Cl2a) adjacent to the Dunach Nature Reserve and Middle Swamp (a hot spot for fauna records). These contain good quality vegetation and are important for connectivity.
  - Woodland to the west of the township area near the Cemetery and Clunes Bushland Reserve. This is of high quality with records of threatened species such as the Brown Treecreeper ad Swift Parrot, and may represent threatened ecological communities. This vegetation also contributes important connectivity between Dunach Nature Reserve and woodland to the south.
  - Mapped vegetation along the Ballarat-Maryborough Rd, Railway Line and Golf Course Road, which provides one of the best vegetated linkages between Dunach Nature Reserve and woodland to the south. This linkage includes the woodland discussed in the previous bullet point.
  - Large areas of derived grasslands[1] within Cl2b, Cl3b and Cl3c, including Clunes Common Nature Conservation Reserve. These have good connectivity and records show the presence of the EPBC Act-listed Golden Sun Moths *Synemon Plana*.
  - Scattered patches of vegetation mapped through Investigation Area Cl2a, which provides a stepping stone corridor of habitat for more mobile species such birds.
- Two EPBC Act listed communities were considered <u>likely to be present</u> within areas of mapped as EVC 55 - Plains Grassy Woodland and EVC175:
  - *Grassy Eucalypt Woodland of the Victorian Volcanic Plain*
  - *Grey Box (Eucalyptus microcarpa) Grassy Woodlands*

[1] A derived grassland, is formed when the woody species (trees and/or shrubs) that historically would have been present have been removed, leaving only the native herbaceous ground layer in-tact.

- One EPBC Act listed community, that *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland,* was considered possibly present in woodland areas that could not be assessed on foot, especially adjacent to Dunach Nature Reserve.

- One FFG Act listed community, *Victorian Temperate Woodland Bird Community*, was considered highly likely to occur.

- One FFG Act listed community, *Grey Box – Buloke Grassy Woodland Community*, was considered possibly present in areas mapped as patches of EVC 55 – Plains Grassy Woodland and 175 Grassy Woodland.

- Threatened flora under the EPBC and FFG Act

  The following were deemed to have at least a Moderate likelihood of occurring (or were recorded during the survey):

  - Cut-leaf Burr-daisy *Calotis anthemoides*,
  - Australian Anchor Plant *Discaria pubescens*,
  - Plains Yam-daisy Microseris scapigera s.s.,
  - Spiny Rice-flower Pimelea spinescens subsp. Spinescens
  - Scented Bush-pea, Pultenaea graveolens.

- Listed fauna under the EPBC and FFG Act

  The following were deemed to have at least a Moderate likelihood of occurring (or were recorded during the survey):

  - Brolga *Antigone rubicunda,*
  - Hardhead *Aythya australis*,
  - Brown Treecreeper *Climacteris picumnus,*
  - Latham's Snipe *Gallinago hardwickii*,
  - Painted Honeyeater *Grantiella picta*,
  - Little Eagle *Hieraaetus morphnoides*,
  - Swift Parrot *Lathamus discolor*,
  - Hooded Robin *Melanodryas cucullata,*
  - Platypus *Ornithorhynchus anatinus*,
  - Speckled Warbler *Pyrrholaemus sagittatus*,
  - Australasian Shoveler *Spatula rhynchotis,*
  - Diamond Firetail, *Stagonopleura guttata*,
  - Golden Sun Moth *Synemon plana*

Daylesford – Hepburn Springs

- Of the 1364.4 ha in the Daylesford–Hepburn Springs Investigation Areas, 386.6 ha (28.3%) was assessed as containing native vegetation including 136.3 ha assessed as high quality.
- The mapped vegetation consisted of ten different Ecological Vegetation Classes (EVCs).
- 349 scattered trees were identified outside these vegetation patches and provide important habitat and connectivity for aerial species.
- Important patches of high-quality vegetation within the Investigation Areas warranting additional protections include:
  - Areas to the north and west of Hepburn Springs (H3a and H3b) which support high-quality vegetation, provide connectivity, and may support threatened species.
  - Areas adjacent and contiguous with riparian reserves (e.g. Jubilee Lake, Blind Creek, Spring Creek, Doctor's Gully, Blacksmith Gully, Sailors Falls, Stony Creek, Blind Creek). The riparian corridors form priority habitat corridors through the township).
  - Areas adjacent and contiguous with the Wombat State Forest and Hepburn Regional Park.
  - Vegetation located within Shanahans Lane (D5a), Muskvale, which supported the FFG listed species Creeping Grevillea *Grevillea repens*.
  - Vegetation patches to the south-east of Investigation Area D1c that forms an integral part of a priority corridor between Hepburn Regional Park to the west and Doctor's Gully
  - Vegetation within D2b which is an integral part of a priority corridor (west-east) linking Stony Creek and Blind Creek.
  - Vegetation patches that contribute to the priority corridors identified in Section 4.2.6.
- It was considered unlikely to highly unlikely the Investigation Areas supported ecological communities listed under the Environmental Protection and Biodiversity Conservation (EPBC) Act.
- It was considered possible that the Flora and Fauna Guarantee (FFG) Act listed community, *Victorian Temperate Woodland Bird Community* occurs within the Investigation Areas.
- Threatened flora under the EPBC and FFG Act

  The following were deemed to have at least a Moderate likelihood of occurring (or were recorded during the survey):
  - Wiry Bossiaea *Bossiaea cordigera*,
  - River Leafless Bossiaea *Bossiaea riparia*,
  - Wombat Bossiaea *Bossiaea vombata*
  - Matted Flax-lily *Dianella amoena*,
  - Spotted Hyacinth Orchid *Dipodium pardalinum*
  - Brooker's Gum *Eucalyptus brookeriana*,
  - Fryers Range Scentbark *Eucalyptus conferta*,

- Yarra Gum *Eucalyptus yarraensis*,
- Creeping Grevillea *Grevillea repens,*
- Rough Hovea *Hovea asperifolia subsp. Spinosissima*,
- Wombat Bushpea *Pultenaea reflexa*

- Listed fauna under the EPBC and FFG Act

  The following were deemed to have at least a Moderate likelihood of occurring (or were recorded during the survey):

  - Australian Reed Warbler *Acrocephalus australis*,
  - Gang-gang Cockatoo Callocephalon fimbriatum,
  - Brown Treecreeper (south-eastern ssp.) *Climacteris picumnus,*
  - Blue-winged Parrot *Neophema chrysostoma*,
  - Brush-tailed Phascogale *Phascogale tapoatafa,*
  - Rufous Fantail Rhipidura rufifrons,
  - Golden Sun Moth *Synemon plana*

Glenlyon

- Of the 226 ha in the Glenlyon Investigation Areas, 17.2 ha (8%) was assessed as native vegetation none of which was high quality and 13.2 ha was moderate quality.

- The mapped vegetation consisted of four Ecological Vegetation Classes (EVCs)

- 20 scattered trees were identified outside these patches and provide important habitat and connectivity for aerial species.

- Patches worthy of retention and enhancement were identified along roadsides to the south of the township and adjacent the Loddon River (Gl3). Both the roadside and Loddon River formed important wildlife corridors through the township.

- It was considered possible that areas of the following EPBC Act-listed communities are present:

  - *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia* – within Investigation Area Gl3
  - *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland* – within Investigation Area Gl3
  - *Grassy Eucalypt Woodland of the Victorian Volcanic Plain* – Investigation Area Gl1 & 2.
  - *Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains* – wetland in Gl1

- It was considered possible that areas of the following FFG Act-listed communities are present:

  - *Western Basalt Plains (River Red Gum) Grassy Woodland* (within Investigation Areas Gl1 & 2)
  - *Grey Box – Buloke Grassy Woodland Community* (within Investigation Area Gl3)

- Threatened flora under the EPBC and FFG Act

  The following were deemed to have at least a Moderate likelihood of occurring (or were recorded during the survey):

  - Matted Flax-lily *Dianella amoena*
  - Brooker's Gum *Eucalyptus brookeriana*,
  - Fryerstown Grevillea *Grevillea obtecta*,
  - Scented Bushpea *Pultenaea graveolens*,
  - Wombat Bushpea *Pultenaea reflexa*.

- Listed fauna under the EPBC and FFG Act

  The following were deemed to have at least a Moderate likelihood of occurring (or were recorded during the survey):

  - Australian Reed Warbler *Acrocephalus australis,*
  - Fork-tailed Swift *Apus pacificus,*
  - Gang-gang Cockatoo *Callocephalon fimbriatum,*
  - Growling Grass Frog *Litoria raniformis*
  - Blue-winged Parrot *Neophema chrysostoma*,
  - Brown Toadlet *Pseudophryne bibronii*
  - Golden Sun Moth, *Synemon plana*

Trentham

- Of the 511.5 ha within the Trentham Investigation Areas, 109.3ha (21%) was assessed as native vegetation including 44 ha of high-quality vegetation.

- The mapped vegetation consisted of four Ecological Vegetation Classes (EVCs)

- 29 scattered trees were identified outside these patches and provide important habitat and connectivity for aerial species.

- Important patches of high-quality vegetation within the Investigation Areas warranting additional protections include:

  - Vegetation along the southern and western edges of the Investigation Areas adjacent to the Wombat State Forest.

  - Road reserve corridors with remnant vegetation including Beatties Rd - Mullens road, Kyneton-Trentham Road and Feelays Lane.

  - Vegetation along the Coliban River, and the other creeks and identified habitat corridors which provide important connectivity through the township and between parts of Wombat State Forest.

- There is significant opportunity to enhance connectivity through the township through restoration and revegetation works along the smaller creeks (incl. Stony and Trent Creek) and the Domino Trail.

- It was considered very unlikely that the Investigation Areas included any ecological communities that that are listed under the EPBC Act.

- It was considered unlikely that Flora and Fauna Guarantee (FFG) Act-listed communities were present.

- Threatened flora under the EPBC and FFG Act

  The following were deemed to have at least a Moderate likelihood of occurring (or were recorded during the survey):

  - Dwarf Silver Wattle *Acacia nano-dealbata*,
  - Wiry Bossiaea Bossiaea cordigera,
  - Spotted Hyacinth Orchid *Dipodium pardalinum*,
  - Brooker's Gum Eucalyptus brookeriana,
  - Yarra Gum Eucalyptus yarraensis,
  - Hairy Beard-heath Leucopogon microphyllus var. pilibundus,
  - Basalt Peppercress Lepidium hyssopifolium s.s.,
  - Penny-leaf Flat-pea *Platylobium rotundum*,
  - Wombat Bushpea Pultenaea reflexa

- Listed fauna under the EPBC and FFG Act

  The following were deemed to have at least a Moderate likelihood of occurring (or were recorded during the survey):

  - Grey Goshawk Accipiter novaehollandiae,
  - Gang-gang Cockatoo Callocephalon fimbriatum,
  - White-throated Needletail *Hirundapus caudacutus*,
  - Growling Grass Frog *Litoria raniformis*,
  - Blue-winged Parrot *Neophema chrysostoma*,
  - Satin Flycatcher *Myiagra cyanoleuca*,
  - Powerful Owl *Ninox strenua*,
  - Greater Glider *Petauroides volans*
  - Brush-tailed Phascogale *Phascogale tapoatafa*,
  - Rufous Fantail Rhipidura rufifrons
  - Brown Toadlet Pseudophryne bibronii and
  - Golden Sun Moth *Synemon plana*

Contents

1. INTRODUCTION 16

1.1 Scope of works 16

1.1.1 Phase 2 & 3 Scope Detail 17

1.2 Investigation Areas 18

1.2.1 Environmental Overlays 19

1.2.2 Bioregions 21

1.2.3 Catchment Management Authority 23

1.2.4 Waterways 23

1.2.5 Ground Water Dependant Ecosystems and Springs 23

1.2.6 Land-use history 25

2. METHODS 26

2.1 Background and Database Reviews 26

2.2 Field surveys 27

2.2.1 Limitations of field survey 28

2.3 Categorisation and Classification of Native Vegetation 29

2.4 Ecological Vegetation Classes 30

2.5 Vegetation Quality 30

2.6 Threatened Ecological Communities 31

2.7 Vegetation Mapping 32

2.8 Potentially occurring rare or threatened species 33

2.9 Permits 34

3. RESULTS – SUMMARY 35

3.1 Existing Site Conditions 35

3.1.1 Ecological Vegetation Communities 35

3.1.2 Native Vegetation Quality 38

3.1.3 Scattered Trees 38

3.1.4 Planted Native Vegetation 39

3.1.5 Exotic patches and trees 40

3.1.6 Wetlands and Waterbodies 41

3.2 Threatened Ecological Communities 42

3.2.1 EPBC Act Listed Communities 42

3.2.2 FFG Act Listed Communities 44

3.3 Listed Flora and Fauna Species 47

3.4 Culturally Significant Flora and Fauna 49

3.5 Erosion 55

3.6 Location Categories and Strategic Biodiversity Scores 55

3.6.1 DEECA Location Categories 55

3.6.2 DEECA Strategic Biodiversity Scores 57

4. RESULTS –INDIVIDUAL TOWNSHIPS 58

4.1 Clunes 58

4.1.1 Native Vegetation: EVCs and Quality 58

4.1.2 Scattered Trees 60
4.1.3 Threatened Ecological Communities 61
4.1.4 Flora 63
4.1.5 Fauna 65
4.1.6 Connectivity Considerations 68
4.1.7 Priority Areas for Retention 70
4.2 Daylesford–Hepburn Springs 72
4.2.1 Native Vegetation: EVCs and Quality 73
4.2.2 Scattered Trees 75
4.2.3 Threatened Ecological Communities 75
4.2.4 Flora 77
4.2.5 Fauna 80
4.2.6 Connectivity Considerations 82
4.2.7 Priority Areas for Retention 84
4.3 Glenlyon 85
4.3.1 Native Vegetation: EVCs and Quality 85
4.3.2 Scattered Trees 87
4.3.3 Threatened Ecological Communities 87
4.3.4 Flora 89
4.3.5 Fauna 91
4.3.6 Connectivity Considerations 93
4.3.7 Priority Areas for Retention 95
4.4 Trentham 95
4.4.1 Native Vegetation: EVCs and Quality 96
4.4.2 Scattered Trees 97
4.4.3 Threatened Ecological Communities 97
4.4.4 Flora 99
4.4.5 Fauna 101
4.4.6 Connectivity Considerations 104
4.4.7 Priority Areas for Retention 106
5. RELEVANT POLICY AND LEGISLATION 108
6. CONCLUSION AND RECOMMENDATIONS 120
6.1 Erosion and Salinity 125
6.2 Weed Management 125
6.3 Further surveys 125
6.4 Culturally Significant Flora and Fauna 128
6.5 Water Sensitive Urban Design (WSUD) 128
6.6 Lighting 128
7. REFERENCES 130

APPENDICES

Appendix 1. Maps– Clunes 133
Appendix 2. Maps– Daylesford–Hepburn Springs 134
Appendix 3. Maps–Glenlyon 135
Appendix 4. Maps– Trentham 136
Appendix 5. On–site Flora List 137
Appendix 6. Potentially occurring threatened flora species 145
Appendix 7. Potentially occurring threatened fauna species 160

Appendix 8. Potentially occurring threatened fauna species – Species Notes 181

TABLES

Overview Tables

Table 1. Environmental Overlays across the four Townships. 20
Table 2. Bioregions across the four Townships. 22
Table 3. Databases and resources reviewed for biodiversity values assessment 26
Table 4. Description of the condition categories assigned to patches of indigenous vegetation. 31
Table 5. Criteria for potential occurrence of significant species 33
Table 6. EVCs within the Investigation Areas based on Field surveys of DEECA modelling (DELWP 2022c). 36
Table 7. Summary of quality of vegetation patches by township 38
Table 8. Summary of Scattered Tree Observations. 39
Table 9. EPBC Act communities expected to occur across Townships based on PMST reports. 42
Table 10. Description of EPBC Act listed communities likely to occur on site. 43
Table 11. FFG Act communities expected to occur across Townships. 45
Table 12. Description of FFG Act listed communities likely to occur on site. 45
Table 13. FFG Act and EPBC Act listed species with moderate or higher likelihood of occurrence 48
Table 14. Table that lists some of the culturally important flora and fauna for the Dja Dja Wurrung. Information drawn from (Haw and Munro 2010; NCCMA 2022). 50
Table 15. Determining the Assessment Pathway 56

Clunes

Table 16. Clunes Investigation Areas 58
Table 17. Native Vegetation Patches within Clunes Investigation Areas. 60
Table 18. EPBC Act listed communities likely to occur 61
Table 19. FFG Act listed communities likely to occur 62
Table 20. Summary of plant taxa recorded 63
Table 21. Significant Flora species with at least a moderate likelihood of presence in the Investigation Area. 64
Table 22. Declared noxious weeds observed during field surveys. 64
Table 23. Incidental fauna list recorded during field surveys. 65
Table 24. Significant fauna records from VBA (post 1980) located within Investigation Areas 66
Table 25. Significant fauna species with at least a moderate likelihood of occurrence 67

Daylesford–Hepburn Springs

Table 26. Daylesford–Hepburn Springs Investigation Areas 72
Table 27. Native Vegetation Patches within Daylesford–Hepburn Springs Investigation Areas. 74
Table 28. EPBC Act listed community likely to occur 75
Table 29. FFG Act listed community likely to occur 77
Table 30. Summary of plant taxa recorded 77
Table 31. Significant Flora species recorded within the Investigation Area 79
Table 32. Significant Flora species with at least a moderate likelihood of presence 79
Table 33. Declared noxious weeds observed during field surveys. 80

Table 34. Incidental fauna list recorded during field surveys 80
Table 35. Significant fauna records from VBA (post 1980) located within Investigation Areas 81
Table 36. Significant fauna species with at least a moderate likelihood of occurrence 82

Glenlyon
Table 37. Glenlyon Investigation Areas 85
Table 38. Patches of native vegetation likely to occur throughout the Glenlyon Investigation Areas. 87
Table 39. EPBC Act listed community likely to occur 88
Table 40. FFG Act listed community likely to occur on site 89
Table 41. Summary of plant taxa recorded 90
Table 42. Significant Flora species with at least a moderate likelihood of presence. 91
Table 43. Declared noxious weeds observed during field surveys. 91
Table 44. Incidental fauna list recorded during field surveys. 91
Table 45. Significant fauna records from VBA (post 1980) located within Investigation Areas 92
Table 46. Significant fauna species with at least a moderate likelihood of occurrence 93

Trentham
Table 47. Trentham Investigation Areas 95
Table 48. Native Vegetation Patches within Trentham Investigation Areas. 97
Table 49. EPBC Act listed community likely to occur 98
Table 50. FFG Act listed community likely to occur on site 99
Table 51. Summary of plant taxa recorded 99
Table 52. Significant Flora species recorded within the Investigation Area 100
Table 53. Significant Flora species with at least a moderate likelihood of presence 101

Other Tables
Table 54. Declared noxious weeds observed during the Field Survey. 101
Table 55. Incidental fauna list recorded during site visit 102
Table 56. Significant fauna records from VBA (post 1980) located within Investigation Areas 102
Table 57. Significant fauna species with at least a moderate likelihood of occurrence 103
Table 58. Relevant Policy and Legislation and associated permits and approvals 109
Table 59. Determining the Assessment pathway 117
Table 60. Summary of biodiversity related constraints and opportunities by Investigation Area 121
Table 61. Further Recommended Surveys 126

FIGURES

Figure 1. **Photos showing from left to right: Low, medium and high-quality grasslands** **31**
Figure 2. **Large Scattered Trees were observed throughout the Investigation Areas (Photos shown here are of Scattered Trees in Glenlyon).** **39**
Figure 3. **Areas of planted roadside native vegetation in Clunes along Ballarat-Maryborough Road.** **40**
Figure 4. ***Dianella revoluta* within Daylesford-Hepburn** **54**
Figure 5. **Kangaroos within a grassy field within Daylesford-Hepburn** **54**
Figure 6. **Large remnant River Red Gum observed in Clunes** **54**

Figure 7.	Large waterbody adjacent to Glenlyon Investigation Areas (Glenlyon Recreation Reserve).	54
Figure 8.	*Acacia pycnantha* observed in Clunes	54
Figure 9.	Gully erosion along Woman's Gully in Daylesford–Hepburn Springs	55
Figure 10.	Observations of *Mugadina marshalli* in Clunes (Brian Bainbridge 2023).	68
Figure 11.	Areas along Creswick Creek dominated by exotic vegetation but is still providing habitat value	71
Figure 12.	Drosera sp. located in high quality forest areas.	72
Figure 13.	Vegetation within Dunach Nature Conservation Reserve.	72
Figure 14.	Areas of native vegetation along Racecourse Road connecting to Wombat State Forest	107

1. INTRODUCTION

Practical Ecology Pty Ltd was commissioned by Hepburn Shire Council to undertake biodiversity assessments across specific Investigation Areas associated with four townships within the Hepburn municipality: Clunes, Creswick, Daylesford–Hepburn, Glenlyon and Trentham. The Creswick assessment and reporting was completed in 2022 and is documented in a separate report. This report pertains to the remaining four townships.

It is understood that the Minister for Planning has approved the Hepburn C80Hepb Planning Scheme Amendment. Hepburn Shire Council is therefore now looking to progress township structure plans for selected Townships. This biodiversity assessment has been sought to inform the Structure Plans being prepared for the above–mentioned four Townships, and their associated Investigation Areas, with a view to avoiding potential conflicts between urban development and biodiversity values. This biodiversity assessment therefore aims to identify:

- Biodiversity values within the Investigation Areas identified for each of the Townships.
- Important habitat corridors and opportunities to improve connectivity.
- Biodiversity values of cultural importance to the Dja Dja Wurrung.
- Potential biodiversity related constraints and opportunities.

This current report builds on and updates the results of the preliminary desktop report prepared by Practical Ecology Pty Ltd in April 2023 to incorporate the results of field surveys and further analysis of biodiversity related information.

1.1 Scope of works

The overall scope of works for this biodiversity assessment included three phases:

1. **A Desktop Assessment** of the Investigation Areas identified for the Clunes, Daylesford–Hepburn, Glenlyon and Trentham Townships (See Maps 1a, 2a, 3a and 4a in Appendix 1 to Appendix 4).
2. **Ground Truthing** – Field surveys undertaken from roadsides and public land to verify the findings of the desktop assessment.
3. **Final Report** – A comprehensive report with a series of maps, tables and written assessments. This will incorporate, update and extend the data provided in the preliminary report provided as part of the desktop assessment with information from ground truthing. Mapping is to also be provided in a transferrable GIS format.

As noted above, the preliminary desktop assessment report was completed in April 2023. This current report focuses on updating the preliminary desktop report based on ground truthing as detailed below.

1.1.1 Phase 2 & 3 Scope Detail

The current report – which represents the final phase of the overall project – aims to:

- Identify the assessment method used across the Investigation Areas associated within each Township assessment (e.g., areas assessed on-ground, 'over-the-fence', or via desktop only).
- Document the findings of the desktop and field surveys assessments by presenting:
    - A list of the main characteristic flora and incidental fauna species recorded across each Township during site visits, with species observations also uploaded to the Victorian Biodiversity Atlas (VBA).
    - Maps of land use as identified via ground truthing and desktop analysis.
    - Maps, tables and data to show the extent and general condition of native vegetation patches and Scattered Trees present within each Investigation Area, as collected during ground truthing and desktop analysis.
    - Information on Ecological Vegetation Classes (EVC) associated with the native vegetation identified.
    - Information on threatened ecological communities and species listed at a State and/or Federal level known to, or likely to, occur within each Investigation Area.
    - Information on the general biodiversity values present within each area, including overall significance and corridor links, inside and outside of each.
    - Areas with observed erosion issues
    - Threats observed to the biodiversity values
- Highlight implications from a planning and approvals perspective associated with impacts on biodiversity values, including native vegetation and habitat for listed species communities known or expected to occur and associated *Flora and Fauna Guarantee Act 1988* (FFG Act) and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approvals that would likely apply if these were impacted.
- Recommendations regarding:
    - Further investigations such as detailed biodiversity assessments and/or targeted surveys for flora and/or fauna species listed under the FFG Act and/or EPBC Act.
    - Available scope to avoid and minimise impacts to native vegetation and habitat.
    - Constraints and opportunities as they relate to the expansion of each Township within the Investigation Areas considered.

- Provide concluding remarks and a summary of the overall outcomes of the project.
- Provide a series of maps to present findings, including:
    - The location of the Investigation Areas.
    - The location of native vegetation patches and their general condition.
    - The location of Scattered Trees.
    - EVCs and potential EPBC Act and/or FFG Act listed communities associated with mapped native vegetation.
    - Rare or threatened flora and fauna records as documented on the VBA.
    - Waterways, wetlands and water bodies (natural and constructed).

1.2 Investigation Areas

The focus of this biodiversity assessment for each Township is based on several Investigation Areas that are largely associated with their current Zoning under the Hepburn Planning Scheme as being most likely to experience development pressure. These Investigation Areas are outlined below and shown on Map 1a, 2a, 3a and 4a in Appendix 1 to Appendix 4).

In summary, the Townships considered and their respective Investigation Areas were based on the following

- Clunes – approximately 2000 ha across three Investigation Areas:
    - Cl1(Core) – Neighbourhood Residential Zone 2
    - Cl2 (Fringe) – Low Density Residential Zone 1
    - Cl3 – Areas of 'Rural Living Zone' that extend beyond the main Investigation Areas to the north-west, north east and south of Clunes.
- Daylesford & Hepburn – approximately 1500 ha with Investigation Areas as follows (Note: 'D' indicates Daylesford and 'H' Hepburn Springs):
    - D1 (Core) – Neighbourhood Residential Zone 1
    - D2 (Fringe) – Low Density Residential Zone 1
    - D3 (Vue) – an estate in development stage
    - D4 (Daylesford Middleton) – a large estate at development stage
    - D5 (RLZ) Two large areas of Rural Living Zone to the south
    - H1 (Core) – Neighbourhood Residential Zone 4

  - H2 (Fringe) – Low Density Residential Zone 1
  - H3 (RLZ) Two large areas Rural Living Zone 1
- Glenlyon – estimated area of ~300 ha with two zones:
  - Gl1 (Core) –Township Zone 1 (with other zoning to the east of the Loddon River)
  - Gl2 (Fringe) – Rural Living Zone 1
- Trentham – approximately 630 ha across four Investigation Areas:
  - T1 (Core)– Neighbourhood Residential Zone 3
  - T2 (Fringe) – Low Density Residential Zone 1
  - T3 (SW fringe) – Low Density Residential Zone 1
  - T4 – An area of Rural Living Zone that extends to the junction of Kyneton–Trentham Rd with Newtons Lane

It is noted here that the broader areas surrounding the Townships and their associated Investigation Areas was also considered with regard to how the biodiversity values in the wider landscape may influence or interact with biodiversity values within the Investigation Areas.

1.2.1 Environmental Overlays

Four overlays related to biodiversity values are present across areas of the Townships. These are summarised in Table 1 and are of key relevance to this report and its contents.

Table 1. Environmental Overlays across the four Townships.

Overlay	Description	Township(s) / Investigation Area(s)
Significant Landscape Overlay (SLO) – Schedule 1	Volcanic Peaks Landscape Area and Ridges and Escarpments Area This overlay aims to: • To maintain the visual significance of the woodlands and grasslands of the peaks and hilltop features of these areas. • To maintain the visual significance of the ridges and escarpments. • To protect these areas from intrusive and dominant development. • To protect significant geological sites from development.	**Clunes** One area within investigation Zone CL3 Other areas scattered in the surrounding landscape – likely old volcanic cones.
Environmental Significance Overlay (ESO) – Schedule 1	Special Water Supply Catchment Protection This overlay seeks "to ensure all development is undertaken in a manner that protects, restores and enhances natural resources and environmental systems and seeks to eliminate detrimental impacts on the quality and quantity of water in the catchment, to ensure the long-term plentiful supply of quality water."	**Clunes** (All) **Daylesford** – Hepburn Springs (All) **Glenlyon** (All) **Trentham** (All)
ESO – Schedule 2	Mineral Springs and Groundwater Protection This overlay seeks to "protect the mineral springs, their aquifers and their environs, private domestic bores and water bores that provide town water supply from the impacts of effluent and drainage."	**Daylesford** – Hepburn Springs (All) **Glenlyon** – two areas just east of the Investigation Areas and Loddon River.
Vegetation Protection Overlay (VPO) – Schedule 1	Remnant Vegetation This overlay aims: • To protect depleted, rare or threatened foothill forest, grassland and grassy woodland vegetation. • To protect Victorian rare or threatened flora and fauna species. • To maintain and enhance roadside vegetation that provides linkages between significant remnant vegetation. • To protect the remnant vegetation and the habitat it provides. • To protect and enhance linkages between remnant vegetation on public and private land.	**Clunes** – Eastern part of Middle Swamp but this is not within the Investigation Areas **Trentham** – An extensive area within the township along Trent Creek and Kyneton-Trentham Road (T1, T2, T4) as well as north near Trentham Falls Road/Coliban River Scenic Reserve (T2).
VPO – Schedule 2	Significant Exotic and Native Vegetation This overlay aims to: • To protect vegetation of special significance, natural beauty, interest, and importance. • To protect vegetation that is significant for its contribution to the townscape, heritage, or landscape character of an area.	**Daylesford** – This applies to a small area of vegetation at the corner of Stanhope St and Stanbridge St, and areas in Victoria Park. **Clunes –** Tree on scenic drive

1.2.2 Bioregions

Bioregions are a landscape-scale approach to classifying the environment using a range of attributes such as climate, geomorphology, geology, soils and vegetation. There are 28 bioregions identified within Victoria (DELWP 2015). All four townships fall within three bioregions. A summary of the bioregions and their locations within each Township is provided in the table below.

Table 2. Bioregions across the four Townships.

Bioregion	Description	Townships & Investigation Areas
Victorian Volcanic Plains (VVP)	This bioregion is characterised by its recent volcanic activity and basalt-derived soils and geology. These deposits formed an extensive flat to undulating basaltic plain with stony rises, old lava flows, numerous volcanic cones and old eruption points and is dotted with shallow lakes both salt and freshwater. Numerous volcanic cones dot the landscape with scoria cones being the most common (e.g. Mt Elephant, Mt Napier and Mt Noorat) although some basalt cones are present (e.g. Mt Cottrell) (DEECA 2023a).	**Clunes** (all except northern tip of Investigation Areas Cl2 and Cl3)
Central Victorian Uplands	The Central Victorian Uplands is dominated by Lower Palaeozoic deposits giving rise to dissected uplands at higher elevations, amongst granitic and sedimentary (with Tertiary colluvial aprons) terrain with metamorphic and old volcanic rocks which have formed steeply sloped peaks and ridges. The less fertile hills support Grassy Dry Forest and Heathy Dry Forest ecosystems. Herb-rich Foothill Forest and Shrubby Foothill Forest ecosystems dominate on the more fertile outwash slopes. The granitic and sedimentary (with Tertiary colluvial aprons) terrain is dominated by Grassy Woodlands much of which has been cleared. Lower lying valleys and plains are dominated by Valley Grassy Forest and Plains Grassy Woodland ecosystems (DEECA 2023a).	**Daylesford** – Hepburn Springs (South) ((D1a (parts), D1b, D2a, D2c, D2f, D2h, D2i, D3, D4, D5a, and D5b (parts)). **Trentham** (All) **Glenlyon** (All)
Goldfields	The Goldfields are dominated by dissected uplands, dissected by low-lying alluvial valleys and basaltic plains, supporting Grassy Woodland, Dry Forests and Box-Ironbark Forests Much of the soil in the Bioregion, particularly within drainage lines, was heavily disturbed by gold mining, and woodland logging has also had a significant impact. The Goldfields bioregion is dominated by dissected uplands (predominantly a northerly aspect) of Lower Palaeozoic deposits (Cambrian, Ordovician, Silurian periods). These are dissected by low-lying alluvial valleys and basaltic plains. Metamorphic rocks have formed steeply sloped peaks and ridges. A variety of relatively poor soils are dominant with yellow, grey and brown texture contrast soils (Chromosols and Sodosols) and minor occurrences of friable earths (Dermosols and Ferrosols). The climate is temperate with uncertain rainfall varying from 400 to 700 mm per annum, usually higher in winter. Maximum temperatures range from 12 to 32 degrees Celsius, daily minima range from 2 – 15 degrees. Box Ironbark Forest, Heathy Dry Forest and Grassy Dry Forest ecosystems dominate the lower slopes or poorer soils. The granitic and sedimentary (with Tertiary colluvial aprons) terrain is dominated by Grassy Woodlands much of which has been cleared. Occasional low-lying corridors of alluvial valleys between the uplands are dominated by Low Rises Grassy Woodland and Alluvial Terraces Herb-rich Woodland ecosystems (DEECA 2023a).	**Clunes** – The northern parts of Cl2a and Cl3a where the land becomes hillier. **Daylesford** – Hepburn Springs (North) (D1a (parts), D1c, D2d-e, D2g, D5b (parts), all of Hepburn Springs (H1-H3)). There is an area of Goldfields just north of **Glenlyon** township

1.2.3 Catchment Management Authority

Under the *Catchment and Land Protection Act 1994* (CaLP Act), Victoria is divided into ten catchment regions with a Catchment Management Authorities (CMA) established for each region (Victorian Water Industry Association Inc 2015). All four townships are located within the North Central CMA.

1.2.4 Waterways

Several creeks and rivers flow through the Townships, providing important habitat and wildlife corridors. These are described below and shown on Maps 'e' within Appendices 1.1–4.1 for Clunes, Daylesford, Glenlyon, and Trentham, respectively.

- **Clunes**
    - Several tributaries run into Creswick Creek, Kilkenny Creek and Birch Creek which in turn flow north-eastward into Tullaroop Creek. Other tributaries to the east (Zone Cl3) feed creeks such as One Mile Creek and Cook Creek which join before flowing west-northward.
- **Daylesford – Hepburn Springs**
    - Three creeks, Stony Creek, Blind Creek and Wombat Creek flow northward through Daylesford eventually flowing into Sailors Creek. Both Blind Creek and Wombat Creek flow into Daylesford Lake.
    - Doctors Creek and Spring Creek flow through the Hepburn Springs Township, eventually combining with Sailors Creek to become Larni Barramal Yaluk (formerly Jim Crow Creek) which feeds the Loddon River.
- **Glenlyon**
    - The Loddon River flows northward along the east of the Township and is fed by a number of tributaries from the Great Dividing Range to the east.
- **Trentham**
    - The Coliban River flows along the western part of the Township. Several other creeks (Stony Ck, Trent Ck) also flow northward through Trentham eventually flowing into the Coliban river.

1.2.5 Ground Water Dependant Ecosystems and Springs

Data has been obtained from Data Vic and Hepburn Shire in relation to Groundwater Dependant Ecosystems (GDEs) and Spring locations. This information has been collated by utilising satellite remote sensing data, geological data and groundwater monitoring data in a GIS overlay model.

The continuous presence of groundwater during dry periods creates unique growth patterns and ecosystems, comparted with surrounding areas where ecosystems are reliant on rainfall and overland flows which may be ephemeral in nature. These groundwater-reliant areas are modelled to have consistent growth patterns, and vegetation that is reliant on water being available all year round, dominated by perennial species that have consistent access to adequate soil moisture. These areas have growth patterns similar to verified GDEs. The current mapping does not indicate the degree of groundwater dependence, only locations in the landscape of potential GDEs.

It is important to analyse areas and ecosystems that may be dependent on groundwater when considering redevelopment as the urban water cycle (which will occur in areas on dense development such as General Residential Zone) may alter the existing ground water levels. Urban landscapes with impermeable surfaces such as asphalt and concrete reduce the infiltration levels as storm water and waste water is collected and directed into waterways, reducing natural infiltration and therefore reducing the water table . Reduced water tables are likely to have an impact on GDEs as vegetation may not be able to access a lowered water table and will subsequently experience drought stress, and ultimately may transition to other vegetation types.Locations of GWEs and springs for each township have been described below and shown on Maps 'm' within Appendices 1-4 for Clunes, Daylesford, Glenlyon, and Trentham, respectively.

- Clunes
    - GDEs were seen to be modelled across the investigation areas with higher concentration of mapped areas towards the northern areas of Clunes towards Dunach Nature Conservation Reserve
    - No spring locations have been located within the Clunes Investigation Areas.
- Daylesford – Hepburn Springs
    - Daylesford – Hepburn Springs Investigation areas are abundant with watercourses but GDEs are not extensively modelled within the Investigation Areas. Majority of GDEs were observed to the south of the township within D5.
    - Multiple springs are located within direct vircinity of the investigation areas but few are located within areas. Majority of locations are along Argyle Gully and Stony Creek.
- Glenlyon
    - GDEs were seen to be modelled across the Investigation Areas of Glenlyon. GDEs along the eastern boundary are likely to be related to the Loddon river where as areas to the west are likely to be raised water tables.
    - No springs are predicted to be located within the Glenlyon Township or direct surrounds.
- Trentham
    - GDEs are seen to be extensively modelled across the Trentham Investigation Areas. In particular towards the north stemming off Coliban River and to the

south adjacent to Wombat State Forest. Ground Water Dependant Ecosystems should be further considered if dense development is proposed within these areas.

- No springs are predicted to be located within the Trentham Township or direct surrounds.

1.2.6 Land-use history

The Dja Dja Wurrung people are the original inhabits of most of Hepburn Shire and have cared for Country for countless generations including the use of complex land management and cultivation (Hepburn Shire Council 2018). Dja Dja Wurrung country extends northward from the Great Dividing Range to Boort in the north and includes the Townships of Clunes, Daylesford-Hepburn Springs, Glenlyon and Trentham.

Prior to European settlement, the Hepburn shire and Townships would have supported vast areas of open grassy woodlands and grasslands across the fertile plains with the hilly areas and creeks supporting a mosaic of forest and woodland communities.

Much of the Townships and their surrounding landscape have since undergone significant modification due to early pastoralism, gold mining, forestry, agriculture, and urban development. Dispossession and removal of Dja Dja Wurrung traditional land management occurred simultaneously with the introduction of pastoralism from the 1830s and has had major and ongoing impacts – especially in the native grassland and grassy woodlands of the Shire's west. A further major upheaval occurred in the 1850s gold rush era where much of the landscape was stripped of trees for timber and fire wood, and its creeks and gullies polluted due to the water-intensive gold mining methods such as puddling and hydraulic sluicing (Davies, Lawrence and Turnbull 2015). As early as 1865, residents fought to preserve the mineral springs within Daylesford-Hepburn Springs area from the impacts of mining, and these have become a key feature of this area (Victorian Places 2015).

Agriculture and forestry also followed in many areas. Consequently, many of the historical vegetation communities that once occurred, particularly across the plains and valley floors are either depleted, vulnerable or endangered.

2. METHODS

2.1 Background and Database Reviews

This desktop analysis drew on several resources to develop maps and an understanding of potential biodiversity values and constraints with the four Townships. These are summarised in Table 3 below.

Table 3. Databases and resources reviewed for biodiversity values assessment

Resource	Purpose
Database layers associated with: • property boundaries • land tenure • contours • cadastre, along with zoning and relevant overlay This included: Planning Scheme overlays relevant to biodiversity on VicPlan and Planning Schemes online.	Determination of site boundaries, land tenure, applicable zones and overlays, and other relevant Planning Scheme clauses relevant to biodiversity.
Aerial photography, available via Google Earth and NearMap	To identify the presence of native vegetation and habitat and used as part of preliminary mapping prior to field surveys within each Investigation Area; also considered when determining likelihoods of State and Commonwealth listed communities and species.
NatureKit, DEECA. DEECA's Native Vegetation Information Management (NVIM) system	Access to maps and information relating Victoria's biodiversity, native vegetation, flora and fauna data. Used to determine EVCs, modelled habitat scores, location risk and ascertain biodiversity attributes of each Investigation Area.
Victorian Biodiversity Atlas (VBA)	A web-based information system designed to manage information about flora and wildlife in Victoria. Used to compile a list of significant species records listed at a State and Federal level within and up to 5 kilometres of each Growth Area for determination of likelihoods of occurrence of such species.
Protected Matters Search Tool (PMST), managed by the Commonwealth Department of the Environment and Energy (DOEE 2019)	Used to compile a list of potentially occurring MNES listed under the EPBC Act to within 5 kilometres of the Investigation Areas.
DEECA data sources including: Geomorphology of Victoria (GMU250) (DELWP 2022a) Victorian Wetland Inventory (Current) (DELWP 2018) *Vic*map Hydro 1:25000 (DELWP 2016)	To identify the location of waterways, wetlands and lakes, as well as areas prone to erosion and salinity.

A review of other relevant information was also undertaken to provide an understanding of the biodiversity values present or potentially present in each Investigation Area and the wider locality. Relevant reports and information used as part of this Report, where required, are referenced throughout.

Documents supplied by Hepburn Shire Council included:

- CPG Australia Pty Ltd (2009a) *Hepburn Mineral Springs Reserve – Management Plan*.
- CPG Australia Pty Ltd (2009b) *Jubilee Lake Reserve – Management Plan*.
- CPG Australia Pty Ltd (2009c) *Lake Daylesford Reserve – Management Plan*.
- Just, K. (2016) *Recommendations for management and revegetation of Bath Street Reserve, Trentham*. Rakali Biodiversity Consulting.
- Just, K. (2017) *Flora Survey and Management Recommendations for Stoney Creek Reserve*, Trentham.
- Just, K. (2019) *Flora Survey and Management Recommendations for the Glenlyon Biolink Reserve, Glenlyon*.
- Just, K. (2023*) Flora Survey for the Glenlyon Recreation Reserve, Glenlyon.*
- Stockdale, M. (2017) *Biodiversity assessment for a proposed Walking Trail in Clunes – Draft*. Ökologie Consulting.

2.2 Field surveys

Field surveys were undertaken by Maria Koulaginis, Daniel Miller, Julian Drummond, Amy Hunter, Noemie Seck, and Michelle Savona between the 8th May 2023 and 16th June 2023. Assessments were made from roadsides and public land to verify Desktop Assessment results and associated mapping. While roadside vegetation and vegetation on public land was surveyed by foot where possible, assessment of private properties was made solely by surveying "over-the-fence".

In summary, the field surveys completed involved:

- Verification of EVCs as modelled by the Department of Energy, Environment and Climate Action (DEECA).
- Classification of vegetation as per the *Guidelines for the Removal, Destruction or Lopping of Native Vegetation* (DELWP 2017) into native vegetation patches and Scattered Trees, as discussed in further detail below.
- Assignment of a general quality to identified native vegetation patches, based on the classifications provided below in Table 4 in Section 2.5.
- Documentation of the main characteristic terrestrial vascular plants observed (i.e. not a comprehensive species list).
- Documentation of incidental fauna observed within each Investigation Area.
- Documentation, where possible, of culturally significant flora and fauna values of importance to the Dja Dja Wurrung.
- A review of habitat conditions and the potential for habitat to support local wildlife and significant flora and fauna species.

- Consideration of potential areas of indigenous vegetation deemed representative of National and State listed biodiversity communities that will require further consideration if impacted by the expansion of each Township.
- Verification of primary land management practices where possible (e.g., cropping, agriculture, forestry, industrial, urban).
- Documentation of potential threats to biodiversity values observed.
- Documentation of wetlands, waterbodies and rocky outcrops with high habitat values.
- Documentation of any observed evidence of salinity (e.g., salt tolerant plants) or erosion issues.

2.2.1 Limitations of field survey

The following considerations should be made regarding the limitations of the field survey:

- It was undertaken in late Autumn and Winter; hence some flora species were not in flower which limited identification to species level.
- It is expected that some other species, particularly orchid, lily and other herbaceous species that can only be observed for a limited period of time may not have been recorded during the field survey.
- Flora surveys were undertaken over a moderate period of time and only the main characteristic species were recorded.
- Some sites were not accessible for surveying. Where possible these sites were assessed by looking over-the-fence. As such there is greater uncertainty regarding the vegetation, and habitat values may have been missed.
- Common indigenous tree species are given in Appendix 5. However, a list of all trees and their type is not provided because it could not be accurately determined for those surveyed over-the-fence or from aerial photographs.
- This was a high-level assessment and the boundary of patches may vary with a more detailed assessment and mapping.

Nonetheless the survey was considered an adequate representation of site condition and sufficient to determine areas of high biodiversity values and potential impacts associated with future rezoning and development, as well as guide land management across the site.

2.3 Categorisation and Classification of Native Vegetation

As part of ground truthing, categorisation and classification of the vegetation built on mapping during the desktop review process and was based on site-based observation within the Investigation Areas. As part of this process, native vegetation was categorised and classified where possible in accordance with the *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017). The following definitions formed the basis of this categorisation process:

- Native Vegetation
    - Native Vegetation as per the Victoria Planning Provisions (Clause 73.01): plants that are indigenous to Victoria, including trees shrubs, herbs and grasses.
- Native Vegetation Patch
    - A patch of native vegetation is either:
        - An area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native.
        - Any area with three or more native canopy trees where the drip line of each tree touches the drip line of at least one other tree, forming a continuous canopy, or
        - Any mapped wetland included in the current wetlands layer available in DEECA's NVIM tool and other DEECA systems.
- Native canopy tree
    - A native canopy tree is a mature tree (i.e. that is able to flower) that is greater than 3m in height and is normally found in the upper layer of the relevant vegetation type.
    - Trees are measured by diameter at breast height (DBH) at 1.3 metres above ground level.
- Scattered Tree
    - A Scattered Tree is a native canopy tree that does not form part of a patch.
    - Scattered Trees have two size classes, Large Trees and Small Trees, i.e. those that have a DBH that is less than the large tree benchmark for the species in the relevant EVC.
    - As in many cases it was not possible to measure Scattered Trees (e.g., when they occurred in private properties), for consistency they were assigned a single category of 'Scattered Tree' and not assigned a size class.
- Large Tree

- A Large Tree is either: a live tree that is equal to or greater than the large tree benchmark for the species in the relevant Biodiversity Vegetation Class (EVC); or a standing dead tree has a DBH measurement of 40 centimetres or greater.

- As it was difficult to determine large tree presence via "over-the-fence" assessments, individual large trees – particularly in patches of native vegetation – were largely not mapped in the field unless they represented a Scattered Tree as above.

2.4 Ecological Vegetation Classes

Ecological Vegetation Classes (EVCs) were attributed to native vegetation identified within each Investigation Area where possible. Victoria has classified its vegetation using a system of broad EVCs that are prescribed on a bioregional basis. EVCs are a method of systematic organisation of plant communities into common types that occur in similar environmental conditions throughout Victoria. Each vegetation type is identified on the basis of its floristic composition (the plant species present), vegetation structure (woodland, grassland, saltmarsh), landform (gully, foothill, plain) and environmental characteristics (soil type, climate). DEECA provides benchmark descriptions for each EVC type to aid in their identification and assessment of vegetation.

Modelled EVC mapping by DEECA was accessed to determine the EVCs likely to occur within the Investigation Areas. EVCs were then identified in the field based on observable attributes including the dominant and characteristic species and their alignment with the EVC benchmark descriptions provided by DEECA.

There were occasions where the vegetation observed during ground-truthing clearly did not represent the 2005 EVC mapping provided by DEECA. As described on the DataVic webpage, the DEECA mapping is based upon "*Landsat Imagery, with many thousands of ground-truthing points, other relevant spatial data and expert validation. The dataset is a good interpretation of native vegetation extent (including aquatic habitat), but must be used with care, given it's modelled nature*." (DEECA 2021). Hence it is not unexpected that discrepancies occur. In this situation, an appropriate EVC was determined based on the observed floristics and site characteristics. Where the ground surveying revealed a different EVC over a significant area to that mapped by DEECA , this has been noted in the relevant individual township sections. Ideally the EVC determined from ground-truthing would be considered when reviewing planning applications or attending panel hearings. This project was overseen by a group of qualified ecologists including Vegetation Quality Assessors with experience in determining EVCs. DEECA would need to be contacted about options to update these discrepancies within their online supplied mapping and tools.

2.5 Vegetation Quality

Patches of indigenous native vegetation representative of an EVC were classified into one of six condition categories as defined below in Table 4.

Table 4. Description of the condition categories assigned to patches of indigenous vegetation.

Quality	Grassland and Derived Grasslands	Woodland and Forest
Low Quality (LQ)	Some small patches of indigenous grasses with low diversity, high weed cover.	Canopy trees but little to no understorey, logs or leaf litter, and/or a high cover of environmental weeds; OR Few canopy trees but more than 25% ground cover of perennial indigenous understorey vegetation.
Moderate Quality (MQ)	Patches are present with high coverage of indigenous grasses, moderate diversity, and moderate weed cover.	Canopy trees and some understorey but limited diversity. There may be some logs and leaf litter. Low-moderate cover of environmental weeds.
High Quality (HQ)	Patches are present with high coverage of indigenous grasses, good diversity, and low weed cover.	Canopy trees with a diverse understorey, and high cover of logs, leaf litter and other habitat components. Low environmental weed cover.
Indicative Low Quality	All indicative qualities have been assessed based on aerial photography and the expected continuation of vegetation quality observed on site.	
Indicative Moderate Quality		
Indicative High Quality		

An example of the variation in quality of grassland and derived grassland based on the quality categories discussed above in Table 4 is presented in Figure 1 below.



Figure 1. Photos showing from left to right: Low, medium and high-quality grasslands

2.6 Threatened Ecological Communities

Threatened ecological communities are listed under the EPBC Act and FFG Act.

To determine if EPBC Act listed communities were likely to occur within the Investigation Areas and immediate surrounds, the Protected Matters Search Tool (PMST) was used to generate a report for a 5km region around each of the four Townships. Under the EPBC Act, key diagnostic criteria and condition thresholds are defined by The Commonwealth Threatened Species Scientific Committee (TSSC). These define a benchmark to compare against and assist in identifying EPBC listed communities.

To this end, the site's identified Habitat Values and Biodiversity Vegetation Classes were assessed against these key diagnostic criteria and relevant condition thresholds of the threatened communities identified by the PMST.

While there are no specific criteria which determine the presence of FFG Act communities, an informal method of comparing site characteristics and floristics with community descriptions in the document: *Characteristics of Threatened Communities – Flora and Fauna Guarantee Act 1988* (DELWP) was undertaken. This document summarises the characteristics of FFG Act threatened communities, to assist with field recognition. An evaluation of the native vegetation patches identified as part of this biodiversity assessment was made against the information in this document.

2.7 Vegetation Mapping

Slightly different mapping methodologies were implemented for grasslands/derived grasslands and woodlands/forests as part of field surveys.

Grasslands and derived grasslands were typically mapped to as far as they were observed from sight. This varied throughout the Investigation Areas but was largely to a distance of ~40 m from the adjacent fence line (i.e. to the distance at which it was possible to identify patches from roadsides). This was applied unless indigenous vegetation was clearly visible further than this distance (e.g., large patches of Kangaroo Grass). Areas further into private properties, where it was not possible to confidently determine the presence or absence of indigenous plants, have been either left as blank in mapping that accompanies this report, or allocated an indicative quality where grassland or derived grassland is still expected to occur based on observations on site in combination with desktop-based information such as aerial photography and modelled mapping by DEECA.

For **woodlands and forests** it was relatively easier to accurately determine their extent from the desktop analysis, and field surveys therefore focused on determining the characteristic flora species, EVC, and an indication of quality. While as mentioned above it was not possible to map grasslands more than ~40 from fence lines, this was made possible for all areas of woodland and forest through reviews of aerial imagery. The qualities assigned was based on observations from the roadside (as with grasslands/derived grasslands), and it is likely that this varies further into private properties where access was not possible. Additionally, treeless areas in amongst woodland and forest areas were not possible to assess for quality where they were not visible from the roadside.

Spatial data collection was carried out using a combination of a handheld GPS enabled device and aerial photography. Determination of vegetation boundaries was undertaken using a combination of GPS data and field surveys with aerial photography. GPS data and mapping should be considered approximate only (e.g., +/- 1-5m).

Please note that mapping was conducted very rapidly, and while considered of sufficient detail and quality to consider the overall distribution and quality of indigenous vegetation across the Investigation Areas, will need to be refined with detailed mapping inside property boundaries if any future development occurs as identified in the scope of works for this project..

2.8 Potentially occurring rare or threatened species

Nationally and state significant flora and fauna are listed under the EPBC Act and the FFG Act, respectively. A 'likelihood of occurrence' assessment was undertaken for all significant flora and fauna species, within a five-kilometre buffer search from the boundaries of each Township, that were either

- Recorded on the Victorian Biodiversity Atlas (VBA) since 1980; and/or
- Potentially occurring based on a report generated by the EPBC Act PMST.

The 'likelihood of occurrence' for each species was assessed as being Nil, Low, Moderate, High or Recorded, based on the criteria listed in Table 5.

In determining likelihood of occurrence and potential use of the Investigation Areas by these national or state significant flora and fauna species, the following factors were considered:

- Previous recordings of species in the local area.
- Date of last record.
- The habitat requirements of individual species.
- The physical attributes of the site, such as topography, geology, soils, aspect and other habitat features such as trees with hollows, the presence of rocks or boulders, logs on the ground.
- The history of land use at the Investigation Area.
- The biodiversity landscape context; i.e., the degree of connectivity, modification and fragmentation across the landscape.

A matrix that describes the justification for the likelihood of occurrence is presented below.

Table 5. Criteria for potential occurrence of significant species

Likelihood of Occurrence	Criteria – one or more of the following conditions applies for threatened fauna species	Criteria – one or more of the following conditions applies for threatened flora species
Nil	Species known to be extinct in local area and/or absent from the site. No suitable habitat is present.	Species known to be extinct in local area and/or absent from the site. No suitable habitat is present.
Low	The species has not been previously recorded within the 5km radius of the Site. Historical records (>15 years ago) of the species within 5km of the Site though no suitable habitat to support the species is present. The Site is beyond the current known geographic range of the species. The species required habitat attributes are not present within the Site. One or more habitat attributes present though no local records and/or lack of required suitable connectivity to the Site.	The species has not been recently recorded within the 5km radius of the Site. The Site is beyond the current known geographic range of the species. The species' required habitat attributes are highly restricted within the Site. The species' habitat would have historically been present, but the site is highly degraded to the point that it is not suitable to support the species.

Likelihood of Occurrence	Criteria – one or more of the following conditions applies for threatened fauna species	Criteria – one or more of the following conditions applies for threatened flora species
Moderate	The species has historically (>15 years ago) been recorded within the Site, or has been recorded more recently (<15 years ago) within the 5km radius of the Site. Multiple records for the species are within the area or in close proximity to the Site. The species required habitat attributes are present within the Site though are in poor or modified condition. Habitat attributes are present and in moderate condition though species is known to be cryptic or undetected resulting in limited records within the Site or surrounding area. One or more of the species required habitat attributes are present resulting in the potential to support the species.	The species has historically been recorded within the Site, though due to past and current land uses may no longer be present. The species has been recorded recently within the 5km radius of the Site. The Site is near the edge of the current known geographic range of the species. The species' required habitat attributes are present within the Site though are in somewhat poor or modified condition.
High	The species has recently (within the last 10 years) been recorded within the Site or in close proximity. The required habitat attributes to the support the species are present within the Site and are in good condition. Species habitat is present in low-moderate condition though there are extensive local records and/or the species if present is unlikely to have been observed onsite. A known population of the species is located in similar habitat conditions in close proximity or connected to the Site. The Site is connected to habitat areas where the species is known to occur and likely to be used as dispersal habitat through the landscape.	The species has recently been recorded within the Site or in close proximity. The Site is within the current known geographic range of the species. The required habitat attributes to the support the species are present within the Site and are in good condition. A known population of the species is located in similar habitat conditions in close proximity or connected to the Site.
Present	The species was recorded within the Site during the site assessment or evidence was provided by the client to support the recent presence of the species.	The species was recorded within the Site during the site assessment.

2.9 Permits

Practical Ecology Pty Ltd staff are covered under *The Wildlife Act 1975* Permit and FFG Act permit (No. 10008906) to take/keep protected flora and hold a Wildlife and Small Institutions Ethics Committee approval (16.18).

3. RESULTS – SUMMARY

Section 3 aims to provide an overview of the biodiversity assessment results, as determined through the desktop review process and field surveys for all Townships and associated Investigation Areas considered as part of this project.

Details on the biodiversity values present within each individual Township and Investigation Area is subsequently provided throughout Section 4.

3.1 Existing Site Conditions

Maps 'L' and 'K' provided for each Township in Appendix 1 to Appendix 4) provide an overview of vegetation extent, type and EVCs present across the Investigation Areas, as determined from the desktop review and subsequent field surveys, respectively. As mentioned in Sections 2.2, the field surveys were undertaken from roadsides and public land with private property assessed over-the-fence.

Details on existing site conditions for each Township can be found in Sections 4.1, 4.2, 4.2.6, and 4.4 below.

3.1.1 Ecological Vegetation Communities

Where possible, EVCs were assigned to vegetation based on observations during the field survey. Consideration was also given to DEECA modelling of the pre-European EVCs (Map 3, Appendix 1) and EVC benchmark descriptions.

Descriptions for each of the EVCs observed across the Townships and associated Investigation Areas are given in Table 6. This table also gives the bioregional conservation status of each EVC.

Further detail on the EVCs identified within each Township, including a general description of characteristic species, see Sections 4.1.1, 4.2.1, 4.3.1, and 4.4.1.

Table 6. EVCs within the Investigation Areas based on Field surveys of DEECA modelling (DELWP 2022c).

B*	EVC No. and Name	BCS^	Benchmark EVC Description	Present in Township?			
				Clunes	Daylesford–Hepburn	Glenlyon	Trentham
Victorian Volcanic Plains (VVP).	EVC 55_61: Plains Grassy Woodland	Endangered	An open, eucalypt woodland to 15 m tall. Occupies poorly drained, fertile soils on flat or gently undulating plains at low elevations. The understorey consists of a few sparse shrubs over a species-rich grassy and herbaceous ground layer. This variant occupies areas receiving approximately 500 – 700 mm annual rainfall. Character Eucalypt species include River Red Gum *Eucalyptus camaldulensis.*	✓	×	×	×
	EVC 61 Box Ironbark Forest	Depleted	Occurs in low rainfall areas (<550mm per annum) on gently undulating rises, low hills and peneplains on infertile, often stony soils derived from a range of geologies. The open overstorey consists of a variety of eucalypts to 20m tall, often including one of the Ironbark species. The mid storey often forms a dense to open small tree or shrub layer over an open ground layer ranging from a sparse to well-developed suite of herbs and grasses. Character Eucalypt species include Red Stringybark, Bundy and Yellow Gum.	✓	×	×	×
	EVC 175 Grassy Woodlands	Endangered	A variable open eucalypt woodland to 15 m tall or occasionally Sheoak/Acacia woodland to 10 m tall over a diverse ground layer of grasses and herbs. The shrub component is usually sparse. It occurs on sites with moderate fertility on gentle slopes or undulating hills on a range of geologies. Character Eucalypt species include, Swamp Gum, Narrow-leaf Peppermint and Manna Gum.	✓	×	×	×
Central Victorian Uplands (CVU) Bioregion	EVC 18 Riparian Forest	Vulnerable	A tall forest to 30 m tall along river banks and associated alluvial terraces with occasional occurrences in the heads of gullies leading into creeks and rivers. Soils are fertile alluvium, regularly inundated and permanently moist. Dominated by tall eucalypts, but also has an open to sparse secondary tree layer of wattles and scattered dense patches of shrubs, ferns, grasses and herbs. Character Eucalypt species include Narrow-leaf Peppermint, Manna Gum and Eurabbie.	×	×	✓	×
	EVC 20 Heathy Dry Forest	Least Concern	Grows on shallow, rocky skeletal soils on a variety of geologies and on a range of landforms from gently undulating hills to exposed aspects on ridge tops and steep slopes at a range of elevations. The overstorey is a low, open eucalypt forest to 20 m tall, poor in form with an open crown cover. The understorey is dominated by a low, sparse to dense layer of ericoid-leaved shrubs including heaths and peas. Graminoids and grasses are frequently present in the ground layer, but do not provide much cover. Character Eucalypt species include: Red Stringybark, Broad-leaved Peppermint, Red Box, Long-leaf Box and Brittle Gum.	×	✓	×	×
	EVC 23: Herb-rich Foothill Forest	Depleted	Occurs on relatively fertile, moderately well-drained soils on an extremely wide range of geological types and in areas of moderate to high rainfall. Occupies easterly and southerly aspects mainly on lower slopes and in gullies. A medium to tall open forest or woodland to 25m tall with a small tree layer over a sparse to dense shrub layer. A high cover and diversity of herbs and grasses in the ground layer characterise this EVC. Character Eucalypt species include: Eurabbie, Messmate Stringybark and Broad-leaved Peppermint.	×	✓	✓	✓
Central Victorian Uplands Bioregion	EVC 45 Shrubby Foothill Forest	Least Concern	Occurs on ridges and mainly on southern and eastern slopes in association with Damp Forest or Wet Forest on moderately fertile soils and at a range of elevations. The overstorey is a medium eucalypt forest to 25 m tall over an understorey characterised by a distinctive middle stratum dominated by a diversity of narrow-leaved shrubs and a paucity of ferns, graminoids and herbs in the ground stratum. Character Eucalypt species include: Messmate Stringybark, Narrow-leaf Peppermint, Broad-leaved Peppermint and Candlebark.	×	✓	×	✓
	EVC 47 Valley Grassy Forest	Vulnerable	Valley Grassy Forest occurs under moderate rainfall regimes of 700–800 mm per annum on fertile well-drained colluvial or alluvial soils on gently undulating lower slopes and valley floors. Open forest to 25 m tall may carry a variety of eucalypts, usually species that prefer more moist or more fertile conditions over a sparse shrub cover. In season, a rich array of herbs, lilies, grasses and sedges dominate the ground layer but at the drier end of the spectrum the ground layer may be sparse and slightly less diverse, but with the moisture-loving species still remaining. Character Eucalypt species include: Yellow Box, Narrow-leaf Peppermint, Messmate Stringybark and Candlebark	×	×	×	✓
	EVC 55 Plains Grassy Woodland	Endangered	An open, eucalypt woodland to 15m tall occurring on a number of geologies and soil types. Occupies poorly drained, fertile soils on flat or gently undulating plains at low elevations. The understorey consists of a few sparse shrubs over a species-rich grassy and herbaceous ground layer. Character Eucalypt species include: Manna Gum and Swamp Gum	×	×	✓	×
	EVC 71 Hills Herb-rich Woodland	Vulnerable	A dry, open eucalypt woodland to 15 m tall often with a sparse shrub layer. The understorey is dominated by a carpet of herbs and grasses. Soils are generally shallow but fertile, and outcropping rock is not uncommon. This seasonally dry environment is favourable for annual herbs, with the fertile nature of the various geologies also supporting perennial herbs. Landform can vary from relatively flat ground to ridge tops on sedimentary sandstones (along seams of mineral-rich sandstone) to undulating, rounded, granite hill landforms.	×	×	✓	×
	EVC 164 Creekline Herb-rich Woodland	Vulnerable	Woodland or open forest to 15 m tall occurring on creek terraces and along shallow drainage lines with ephemeral flows. Soils are mostly alluvial deposits of seasonally wet sands and silts. Characterised by a sparse shrub layer above a grassy/sedgy understorey, often rich in herbs within the inter-tussock spaces. Character Eucalypt species include: Swamp Gum, Manna Gum and Narrow-leaf Peppermint	×	✓	×	✓
	EVC 198 Sedgy Riparian Woodland	Depleted	Eucalypt forest or woodland to 15m tall with sedge-dominated understorey. Occurs on flats along low gradient creeks and drainage lines subject to seasonal inundation and waterlogging in moderately fertile habitats. Character Eucalypt species include: Swamp Gum, Narrow-leaf Peppermint and Messmate Stringybark	×	✓	×	✓

B*	EVC No. and Name	BCS^	Benchmark EVC Description	Present in Township?			
				Clunes	Daylesford–Hepburn	Glenlyon	Trentham
Goldfields	EVC 20 Heathy Dry Forest	Least concern	Grows on shallow, rocky skeletal soils on a variety of geologies and on a range of landforms from gently undulating hills to exposed aspects on ridge tops and steep slopes at a range of elevations. The overstorey is a low, open eucalypt forest, poor in form to 20 m tall with an open crown cover. The understorey is dominated by a low, sparse to dense layer of ericoid-leaved shrubs including heaths and peas. Graminoids and grasses are frequently present in the ground layer, but do not provide much cover. Character eucalypt species include: Red Stringybark, Red Box, Red Ironbark and Bundy.	×	✓	×	×
	EVC 23 Herb-rich Foothill Forest	Depleted	Occurs on relatively fertile, moderately well-drained soils on an extremely wide range of geological types and in areas of moderate to high rainfall. Occupies easterly and southerly aspects mainly on lower slopes and in gullies. A medium to tall open forest or woodland to 25 m tall with a small tree layer over a sparse to dense shrub layer. A high cover and diversity of herbs and grasses in the ground layer characterise this EVC. Character eucalypt species include: Messmate Stringybark, Narrow-leaved Peppermint, Manna Gum and Eurabbie.	×	✓	×	×
	EVC 47 Valley Grassy Forest	Vulnerable	Valley Grassy Forest occurs under moderate rainfall regimes of 700–800 mm per annum on fertile well-drained colluvial or alluvial soils on gently undulating lower slopes and valley floors. The tall, open overstorey to 20 m tall may carry a variety of eucalypts, usually species which prefer more moist or more fertile conditions over a sparse shrub cover. In season, a rich array of herbs, lilies, grasses and sedges dominate the ground layer but at the drier end of the spectrum the ground layer may be sparse and slightly less diverse, but with the moisture-loving species still remaining. Character eucalypt species include: Yellow Box, Red Stringybark, Red Box, Candlebark and Bundy.	×	✓	×	×
	EVC 55 Plains Grassy Woodlands	Endangered	An open, eucalypt woodland to 15 m tall occurring on a number of geologies and soil types. Occupies poorly drained, fertile soils on flat or gently undulating plains at low elevations. The understorey consists of a few sparse shrubs over a species-rich grassy and herbaceous ground layer. Character eucalypt species include: Grey Box, Yellow Box, River Red Gum and Buloke.	✓	×	×	×
	EVC 61Box Ironbark Forest	Depleted	Occurs in low rainfall areas on gently undulating rises, low hills and peneplains on infertile, often stony soils derived from a range of geologies. The open overstorey to 20 m tall consists of a variety of eucalypts, often including one of the Ironbark species. The mid storey often forms a dense to open small tree or shrub layer over an open ground layer ranging from a sparse to well-developed suite of herbs and grasses. Character eucalypt species include: Grey Box, Red Ironbark, Red Box and Yellow Gum.	✓	×	×	×
	EVC 164 Creekline Herb-rich Woodland	Endangered	Woodland or open forest to 15 m tall occurring on creek terraces and along shallow drainage lines with ephemeral flows. Soils are mostly alluvial deposits of seasonally wet sands and silts. Characterised by a sparse shrub layer above a grassy/sedgy understorey, often rich in herbs within the inter-tussock spaces. Character eucalypt species include: Swamp Gum, River Red Gum and Scentbark				
	EVC 175_61 *Low Rises* Grassy Woodlands	Vulnerable	A variable open eucalypt woodland to 15 m tall over a diverse ground layer of grasses and herbs. The shrub component is usually diverse but sparse in cover. In the Goldfields bioregion, Grassy Woodland occurs on sedimentary soils on the lowest slopes at the interface between the plains and the infertile woodlands of the sedimentary hills.	✓	×	×	×
	EVC 641 Riparian Woodland	Endangered	Occurs beside permanent streams, typically on narrow alluvial deposits. Woodland to 15 m tall generally dominated by Eucalyptus camaldulensis over a tussock grass-dominated understorey. Tall shrubs may be present and amphibious herbs may occur in occasional ponds and beside creeks. While flooding may be common, sites are rarely inundated for lengthy periods. Character eucalypt species include: River Red Gum	×	✓	×	×

* B: Bioregion; ^ BCS: Bioregional Conservation Status

3.1.2 Native Vegetation Quality

All of the four Townships assessed as part of this study contain at least some native vegetation, as identified though the desktop review and/or ground-truthing. This includes both native vegetation defined as a patch within the *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017a), as well as Scattered Trees.

Note that Large Trees within native vegetation patches are likely to be also present, however for the purposes of this study were not individually recorded. It is assumed however that the DEECA modelled scores used to determine vegetation quality of the patches identified would incorporate the assumption of at least some Large Tree presence.

Table 7 below summarises:

- The size of the Investigation Areas associated with each Township.
- The extent of native vegetation patches of varying quality within each Township.
- Percentage of the Investigation Areas occupied by identified native vegetation patches (exclusive of scattered trees).

Further details on each of these values are presented within Section 4 for each Township.

Table 7. Summary of quality of vegetation patches by township

Township	Size of Township Investigation Areas	Extent of Native Vegetation by Quality			Overall Native Vegetation Extent	
		High	Medium	Low	Total Documented	% Investigation Area as Patches
Clunes	1,840.3ha	127.1 ha	285.5 ha	96.7 ha	509.25 ha	27.7%
Daylesford–Hepburn Springs	1,364.4	136.3 ha	181.5 ha	68.8 ha	386.6 ha	28.3%
Glenlyon	226.2ha	0 ha	13.2 ha	4.0 ha	17.2 ha	8%
Trentham	511.5ha	44 ha	48.3 ha	17 ha	109.3 ha	21%

3.1.3 Scattered Trees

Scattered Trees were present in all of Townships and associated Investigation Areas, both along roadsides and within land parcels amongst otherwise cleared land (Figure 2). While it was beyond the scope and ability of this project to identify the species and size class of all Scattered Trees observed, where indigenous trees were observed through the course of field surveys they were recorded and are shown on mapping prepared that shows native vegetation present across the Investigation Areas (see Maps 'L' and Maps 'K' in Appendix 1– Appendix 4).

Examples of Large Scattered Trees observed within the Investigation Areas are shown in in Figure 2. Such trees – along with Small Scattered Trees also – can provide important nesting sites (both in the canopy foliage, and in hollows in the case of Large Scattered Trees) and refuge for a variety of birds and other species. They also provide shade for species such as Eastern Grey Kangaroo *Macropus giganteus*. This is especially the case in Townships of Clunes and Glenlyon which no longer support woodland ecological communities across much of their extent, but where a number of Scattered Trees remain present along roadsides and in paddock areas.



Figure 2. Large Scattered Trees were observed throughout the Investigation Areas (Photos shown here are of Scattered Trees in Glenlyon).

A summary of the Scattered Trees identified across each of the Townships is provided in Table 8 below. Further detail for each Township is provided below in Section 4.

Table 8. Summary of Scattered Tree Observations.

Township	Number of Scattered Trees Recorded
Clunes	157
Daylesford–Hepburn Springs	349
Glenlyon	20
Trentham	29
Total Scattered Trees Across All Townships	**555**

3.1.4 Planted Native Vegetation

Areas mapped as Planted Native Vegetation represent areas of planted trees and vegetation that are a combination of native and locally indigenous to the area but were clearly not remnant. This formed the dominant treed vegetation within higher density residential areas of each Township. These were often characterised by rows of even-aged trees along property boundaries, fields and roadways (Figure 3). While the Planted Native Vegetation is not remnant, it still provides valuable habitat and landscape connectivity. Figure 3 provides some examples of this type of vegetation. It is also likely that indigenous, remnant scattered trees are present amongst the planted ones but were not identified within the limits of this Investigation.



Figure 3. Areas of planted roadside native vegetation in Clunes along Ballarat-Maryborough Road.

3.1.5 Exotic patches and trees

Mapping of exotic patches and trees was beyond the project scope, and was also not pursued due to both time limitations and its minimal contribution to biodiversity.

Exotic vegetation across the townships was typically dominated by Pine, Cypress and Willow trees but also included other non-native species. These can provide some limited habitat value, such as aiding landscape connectivity, and providing nesting and feeding sites for some indigenous fauna species. For example, Gang Gang Cockatoos *Callocephalon fimbriatum*, a threatened species under the EPBC Act, feed on the seeds of both indigenous and introduced trees and shrubs. In this circumstance an assessment of the ecological contribution of exotic species with particular attributes important to a species may be justified, particularly if there is an absence of other indigenous habitat providing similar attributes within the area. In this situation a staged removal or exotics and revegetation is recommended.

The limited benefits of exotic species should also be assessed against the ecological threats they pose. Depending on their characteristics and context, exotic species can pose a serious threat by outcompeting and smothering indigenous species, and degrading naturally occurring ecosystems. For example, Radiata Pine, invades bush areas, starves indigenous vegetation of moisture, nutrients and light, in turn restricting the natural regeneration and growth of understory species. Willow trees are devastating to waterways outcompeting streamside vegetation and changing the waterway ecology through shading and deciduous leaves. It's noted that Willow *Salix* species are considered a noxious weed under the CaLP Act while most non-native Pine species are considered environmental weeds on the advisory list of environmental weeds in Victoria (M. White 2022).

3.1.6 Wetlands and Waterbodies

A number of wetlands and waterbodies were observed across the four Townships. The location of these is provided as part of Map Set 'E' for each individual Township in Appendix 1–Appendix 4. These areas varied in their vegetation type and quality but often included Spike-rushes *Eleocharis* spp., Rushes, Sedges, Common Reed *Phragmites australis,* and Bulrush *Typha* spp.

It was not possible to confidently assign an EVC to the wetlands/waterbodies based on the over-the-fence survey and further surveys are recommended if this is desired. While this is the case, at this stage it is anticipated that some of these may be representative of EVC 647: Plains Sedgy Wetland and EVC 125: Plains Grassy Wetland. Such wetlands/waterbodies are expected to provide important habitat for a variety of species such as waterbirds and frogs including the listed Brolga *Antigone rubicunda* and Growling Grass Frog *Litoria raniformis* (see Appendix 7). The main areas with wetlands/waterbodies are as follows:

- **Clunes**
    - Large wetland at the intersection of Fawcett Dr and McDonald Road (aerial analysis only).
    - Multiple farm dams scattered across the Investigation Areas.
- **Daylesford**
    - Lake Daylesford (adjacent to Investigation Areas)
    - Jubilee Lake (adjacent to Investigation Areas)
    - Wetland to the south of Hogans Lane within D5a.
    - Multiple farm dams scattered across the Investigation Areas.
- **Glenlyon**
    - Wetland observed within Gl1 north of Ford Street.
    - Multiple farm dams
    - Glenlyon Recreation Reserve (adjacent to Investigation Areas)
- **Trentham**
    - Multiple farm dams and man-made lakes, highly concentrated within Investigation Area T3.

It is noted that Merin Merin Swamp and Middle Swamp, despite being outside of the Investigation Areas are considered important from a biodiversity perspective due to their high wildlife value. This is reflected by the high number of records of significant species (mainly wetland birds) that have been observed in these areas. Middle Swamp is located directly adjacent to Investigation Area Cl2a and should be considered with any proposals to change existing planning schemes, as discussed as part of the recommendation made for this project.

3.2 Threatened Ecological Communities

3.2.1 EPBC Act Listed Communities

The PMST report generated for each Township identified five EPBC Act listed communities that are known occur within the Investigation Areas and surrounding landscape, or have some potential to occur there. These five communities are shown in Table 9 below along with an indication of the Townships in which they are expected to occur based on the field surveys, which is also further discussed in in Table 10.

As shown in Table 9, all communities identified through the EPBC Act PMST are Critically Endangered, with the exception of *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia*, which is Endangered.

Table 9. EPBC Act communities expected to occur across Townships based on PMST reports.

Township	**EPBC Act communities** (listing status)				
	Natural Temperate Grassland of the Victorian Volcanic Plain (Critically Endangered)	**White Box–Yellow Box–Blakely's Red Gum Grassy Woodland and Derived Native Grassland** (Critically Endangered)	**Grassy Eucalypt Woodland of the Victorian Volcanic Plain**) (Critically Endangered	**Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia** (Endangered)	**Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains** (Critically Endangered)
Clunes	Unlikely	Possible	Likely	Likely	Unlikely
Daylesford–Hepburn Springs	Unlikely	Highly Likely	Unlikely	Unlikely	Unlikely
Glenlyon	Unlikely	Possible	Possible	Possible	Possible
Trentham	Very Unlikely	Very Unlikely	Very Unlikely	Very Unlikely	Very Unlikely

Further details on each of these EPBC Act listed communities is provided in Table 10. This includes a brief description of each community.

Note that for native vegetation to qualify as the EPBC Act listed community, it must meet certain key diagnostic criteria and condition thresholds. Detailed on-ground assessments are therefore required to determine the actual presence of such communities within each Township. While inferences have been made within Table 9 above, and throughout Section 4 regarding the likely presence of these EPBC Act listed communities within the Investigation Areas, these should be considered indicative only and further surveys will be required to determine actual presence of site.

Table 10. Description of EPBC Act listed communities likely to occur on site.

Biodiversity Community	Description
Natural Temperate Grassland of the Victorian Volcanic Plain	This grassland is mainly associated with Quaternary basalt soils within the Victorian Volcanic Plain IBRA bioregion. It includes typical species: Kangaroo-grass, Wallaby-grasses, Spear-grasses and/or Tussock-grasses. Wildflowers and herbs grow among the tussocks, including daisies, lilies, peas and orchids (DoE 2015a). It includes typical species: Kangaroo-grass *Themeda triandra*, Wallaby-grasses *Rytidosperma* spp., Spear-grasses *Austrostipa* spp. and/or Tussock-grasses *Poa* spp. Wildflowers and herbs grow among the tussocks, including daisies, lilies, peas and orchids (DoE 2015a). Relevant EVCs with synergies with this Ecological Community include (but not limited to): EVC 132 Plains Grassland EVC 654 Creekline Tussock Grassland EVC 897 Plains Grassland/Plains Grassy Woodland Mosaic
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Box-Gum Grassy Woodlands and Derived Grasslands are characterised by a species-rich understorey of native tussock grasses, herbs and sparse, scattered shrubs, and the dominance, or prior dominance, of White Box, Yellow Box or Blakely's Red Gum trees. The tree-cover is generally discontinuous and consists of widely-spaced trees of medium height in which the canopies are clearly separated (Yates and Hobbs 1997). This biodiversity community occurs in areas where rainfall is between 400 and 1200 mm per annum, on moderate to highly fertile soils at altitudes of 170 metres to 1200 metres. Relevant EVCs with synergies with this Ecological Community include (but not limited to): EVC 47 Valley Grassy Forest (Goldfields) EVC 55 Plains Grassy Woodland (Goldfields) EVC 175 Grassy Woodland (Goldfields)
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	This is an open eucalypt woodland often dominated by River Red-gum with a predominantly grassy understorey (DoE 2015b). At sites that receive higher rainfall, typically more than 700 mm per annum. Swamp Gum and Manna Gum) may replace River Red Gum as the dominant species in the canopy layer. Other tree species that may be present in the canopy layer include Lightwood *Acacia implexa*, Black Wattle *Acacia mearnsii*, Blackwood, Drooping Sheoak *Allocasuarina verticillata* and Silver Banksia. Relevant EVCs with synergies with this Ecological Community include (but are not limited to): EVC 55_61 Plains Grassy Woodland EVC 651 Plains Swampy Woodland
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	The community generally occurs in landscapes of low-relief such as flat to undulating plains, low slopes and rises and, to a lesser extent, drainage depressions and flats. The mean annual rainfall associated with the distribution of the biodiversity community lies in the range 375-700 mm/year. The tree canopy is dominated (≥ 50% canopy crown cover) by Grey Box Eucalyptus microcarpa or in some circumstance other species may be co-dominant (but never dominant). Relevant EVCs with synergies with this Ecological Community include (but are not limited to): 55 Plains Grassy Woodland (Goldfields) 67 Alluvial Terraces Herb-rich Woodland (Goldfields) 175 Grassy Woodland (Goldfields) 235 Plains Woodland/herb-rich Gilgai Wetland Mosaic (Goldfields, CVU) 803 Plains Woodland (CVU, VVP)

Biodiversity Community	Description
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	These are isolated, freshwater wetlands that are usually inundated on a seasonal basis through rainfall, then dry out, so surface water is not permanently present. Rainfall is the main water source for this community. They occur on the lowland plains of temperate south-eastern Australia and have a vegetation structure that is open, i.e. woody cover is absent to sparse, and the ground layer is dominated by herbs (grasses, sedges and forbs) adapted to seasonally wet or waterlogged conditions. The community typically includes one or more of the following: Wallaby Grasses spp. Swamp Wallaby-grasses (particularly Brown-back Wallaby-grass *Rytidosperma duttonianum*) *Amphibromus* spp., Poong'ort *Carex tereticaulis*, Bent Grasses *Deyeuxia* spp., Sweet Grasses *Glyceria* spp., Blown-grasses *Lachnagrostis* spp., and Common Tussock-grass *Poa labillardierei* (DoE 2015d). Relevant EVCs with synergies with this Ecological Community include (but are not limited to): 125 Plains Grassy Wetland + complexes 306 Aquatic Grassy Wetland 647 Plains Sedgy Wetland 678 Ephemeral Drainage-line Grassy Wetland 778 Gilgai Wetland 920 Sweet Grass Wetland 956 Herb-rich Gilgai Wetland

3.2.2 FFG Act Listed Communities

While there are no specific criteria for specifically determining the presence of FFG Act communities, descriptions are provided in the document: *Characteristics of Threatened Communities – Flora and Fauna Guarantee Act 1988* (DEECA 2023b). This document (DEECA 2023b) was therefore consulted when considering the native vegetation and habitat across the Investigation Areas with a view to determining if one or more FFG Act listed communities has the potential to occur.

Based on this analysis, nine State listed (FFG Act) threatened communities are considered to have some potential to occur across the Townships. These are summarised in Table 11 below, with further detail provided for individual Townships and associated Investigation Areas within Section 4 below.

A description of each of the FFG Act listed communities is provided in Table 12 below, along with commentary on the potential for these communities to occur within the Townships assessed. Further detail for each individual Township is provided in Section 4 below.

Table 11. FFG Act communities expected to occur across Townships.

Township	FFG Act communities							
	Butterfly Community No. 1	Western Basalt Plains (River Red Gum) Grassy Woodland	Victorian Temperate Woodland Bird Community	Creekline Grassy Woodland (Goldfields) Community	Grey Box – Buloke Grassy Woodland Community	Red Gum Swamp Community No. 1	Lowland Riverine Fish Community of the Southern Murray–Darling Basin	Western (Basalt) Plains Grasslands Community
Clunes	Very unlikely	Highly Likely	Likely	Not present	Possible	Unlikely	–	Likely
Daylesford–Hepburn Springs	Very unlikely	–	Possible	Not present	Unlikely	–	–	–
Glenlyon	Unlikely	Possible	Unlikely	–	Possible	–	Not present	–
Trentham	Very Unlikely	–	Unlikely	–	Not present	–	–	✓

Table 12. Description of FFG Act listed communities likely to occur on site.

Community Name	Description ^
Butterfly Community No. 1	Butterfly Community No.1 is a community characterized by the presence of several species of butterfly. The most important of these are the Small Ant-blue *Acrodipsas myrmecophii* and the Large Ant-blue *Acrodipsas brisbanensis cyrilus* but the list also includes other species, such as the Southern Purple *Genoveva* Azure *Ogyris genoveva araxes*, Northern Dusky Blue *Candalides hyacinthus simplex* and Miskin's or Wattle Blue *Theclines miskini miskini*, together with the ant *Iridomyrex nitidus* on which the ant-blues depend. Characteristic vegetation is a mosaic of dry open forest and woodland of eucalypts, such as Broad-leaved Peppermint, Long-leaf Box, Messmate Stringybark and Red Stringybark with an understorey with both grasses and shrubs. Typical understorey species are Poa grasses, Rock-ferns *Cheilanthes spp.*, Common Heath *Epacris impressa*, Groundsels *Senecio spp.* and Mountain Grevillea *Grevillea alpina*. The main food plants on which these butterflies lay their eggs are tree lichens, rock lichens and fungi (DELWP).
Western Basalt Plains (River Red Gum) Grassy Woodland	This grassy woodland community has a clearly-recognizable structure made up of an open canopy of River Red-gum, a middle layer chiefly of scattered wattles such as Golden Wattle *Acacia pycnantha* and Hedge Wattle *Acacia paradoxa* but including a few other shrubs as well, such as Tree Violet *Hymenanthera dentata = Melicytus dentatus*, and a ground layer dominated by grasses. In its least disturbed state, the ground layer is predominantly tussock grasses such as Common Tussock Grass *Poa labillardierei = P. labillardierei var. labillardierei* and Wallaby Grass *Rytidosperma spp.*, together with Kangaroo Grass *Themeda triandra* and various forbs in the spaces between the tussocks. The composition of the ground layer varies greatly from site to site, being heavily influenced locally by the amount of tree cover, soil characteristics and the site's grazing and fire histories. More disturbed sites have a high proportion of introduced grasses and forbs in the ground layer (DELWP).
Victorian Temperate Woodland Bird Community	The Victorian Temperate Woodland Bird Community has been defined as a suite of bird species, mainly associated with drier woodlands on the slopes and plains north of the Great Dividing Range, that seem to have declined markedly in numbers since records began. There are a total of 24 bird species associated with this community. The distributions of these birds differ between species. Many are closely associated with (but not exclusive to) northern Victorian drier woodlands dominated by Box, Stringybark, Ironbark, Yellow Gum or River Red-gum Eucalypts, or by Buloke or Cypress-pine (DELWP).
Creekline Grassy Woodland (Goldfields) Community	The Creekline Grassy Woodland (Goldfields) Community occurs as small remnants within the box-ironbark ecosystems of Victoria. Two sub-communities have been identified. Both have River Red Gum (*Eucalyptus camaldulensis*) forming open overstorey canopy, often with larger old trees. Groundcover is a dense layer of grasses and sedges including Weeping Grass *Microlaena stipoides = M. stipoides var. stipoides*),

Community Name	Description ^
	Tall Sedge *Carex appressa*, rushes *Juncus* spp., Wirilda *Acacia retinodes = Acacia provincialis*, Black Wattle *Acacia mearnsii*, and Rough-barked Honey-myrtle *Melaleuca parvistaminea*. Broome *Bromus* spp., Quaking-grass *Briza* spp. and Fescue *Vulpia* spp. are commonly-present weed species. Yellow Box *Eucalyptus melliodora* and Grey Box *Eucalyptus microcarpa* occur in one of the sub-communities, whereas the other has a characteristic understorey dominated by Common Tussock-grass (*Poa labillardierei = P. labillardierei var. labillardierei*) and Kangaroo Grass *Themeda triandra*. The community occurs as a woodland interface between the undulating sedimentary rises and the geologically younger alluvial plains. It fringes shallow or ephemeral drainage lines on the lower slopes of box-ironbark forests, but is distinct from the riparian vegetation found along permanently flowing streams on the alluvial plains.
Grey Box – Buloke Grassy Woodland Community	The Grey Box – Buloke Grassy Woodland Community is a mainly grassy woodland found on flat or very gently undulating plains in northern Victoria and a few places in central Victoria. It tends to develop in the absence of fire on sites with relatively fertile, fine-grained soils. Grey Box *Eucalyptus microcarpa* is usually the structurally dominant tree over a lower stratum of Buloke *Allocasuarina luehmannii*. Where fire is absent over a very long period, Buloke may become the dominant species. The ground layer is mainly grasses such as Bristly Wallaby-grass *Danthonia setacea = Rytidosperma setaceum*, Squirrel-tail Fescue *Vulpia bromoides*, Soft Brome *Bromus hordeaceous = B. hordeaceus*, Windmill-grass *Chloris truncata*, Common Wheat-grass *Elymus scaber = E. scaber var. scaber*, occasionally Kangaroo Grass *Themeda triandra* and (rarely) Tussock-grass *Poa sieberiana*. Although a shrub layer is usually lacking, a scattering of wattles is present at some sites, including Deane's Wattle *Acacia deanei*, Gold-dust Wattle *Acacia acinacea* and Golden Wattle *Acacia pycnantha* and a few other shrubs such as Drooping Cassinia or 'Chinese Scrub' *Cassinia arcuata*.
Red Gum Swamp Community No. 1	The Red Gum Swamp Community No. 1 is a community dominated by River Red Gum (Eucalyptus camaldulensis), and distinguished from other communities that include River Red Gum by the presence of seasonal or intermittent surface water up to a depth of 40 cm that can inundate a site for up to four months of the year.
Western (Basalt) Plains Grasslands Community	The Western (Basalt) Plains Grasslands Community is an open grassland community found mainly on undisturbed, poorly-drained heavy clay soils on the basalt plains of western Victoria. The vegetation is characteristically dominated by perennial native grasses, with very few eucalypts and shrubs. Perennial native plants predominate. On drier sites, the community is usually dominated by Kangaroo Grass, together with composites such as Common Everlasting *Chrysocephalum apiculatum* and Lemon Beauty-heads *Calocephalus citreus*. On moister sites tussock grasses, particularly Wallaby Grasses, Spear Grasses and Tussock Grasses tend to predominate, often with Common Onion Orchid *Microtis unifolia* and Pale Sundew *Drosera peltata* in spaces between the tussocks (DELWP 2022b).
Lowland Riverine Fish Community of the Southern Murray-Darling Basin	The geographical area that delineates this fish assemblage can be broadly defined as the lowland river reaches and associated floodplains of the Murray River tributaries in Victoria that drain the northern slopes of the Great Dividing Range, together with the lowland section and floodplain of the Murray River upstream of the South Australian border. The major streams involved are: the Mitta Mitta, Ovens, Broken, Goulburn, Campaspe, Loddon and Avoca Rivers. Whilst this community mainly occurs in the lowland river reaches, some species may also occur (at least at certain times) in both the slope and upland river reaches.

3.3 Listed Flora and Fauna Species

Rare or threatened species are known to and expected to occur within the Township Investigation Areas.

As part of this current study, three listed flora species were observed during the course of field surveys: Creeping Grevillea *Grevillea repens,* Brookers Gum *Eucalyptus brookeriana* and Wiry Bossiaea *Bossiaea cordigera*. Each of these species is listed as Endangered under the FFG Act.

These three flora species were observed on roadsides and areas with public access within the Daylesford-Hepburn Springs and Trentham Townships. They are likely to also occur within the other Investigation Areas within their respective Townships given their proximity, similar habitat types and given the rapid nature of the current assessment that was undertaken which may have resulted in them not being detected as part of this study.

Beyond these observed listed flora species, there are a number of other species of rare or threatened flora and fauna listed under the FFG Act and/or EPBC Act that are likely to occur within the Investigation Areas of the four Townships. A full overview of the species documented on the VBA for a 5m radius around each Growth Area, or predicted to occur based on the EPCB Act PMST, are presented in Appendix 6 and Appendix 7. This includes a detailed analysis of the likelihood of occurrence for each of these species in relation to each Township.

Overall, each Township is likely to support at least some of the FFG Act and EPBC Act listed species documented on the databases accessed as part of this study. Key flora and fauna species that are deemed to have a moderate or higher likelihood of occurring within the assessed Investigation Areas are presented in Table 13 below.

For these species in particular, further exploration will be required to further determine their actual presence within each Township. The results presented below should be considered a sub-set of those in Appendix 6 and Appendix 7 and these tables should be read in conjunction with the below. Note that the species listed below as having a moderate or higher likelihood of occurrence should be considered preliminary only – further investigation is required to fully determine the potential presence of these species.

Information regarding permit and or referral requirements under the FFG Act and EPBC Act in relation to listed species is discussed in Section 5.

Table 13. FFG Act and EPBC Act listed species with moderate or higher likelihood of occurrence

Status*		Scientific name	Common name
Treaty	EPBC Act	FFG Act		
Fauna				
B			*Acrocephalus australis*	Australian Reed Warbler
C,R,J			*Apus pacificus*	Fork-tailed Swift
		En	*Accipiter novaehollandiae*	Grey Goshawk
		En	*Antigone rubicunda*	Brolga
		Vu	*Aythya australis*	Hardhead
	EN		*Callocephalon fimbriatum*	Gang-gang Cockatoo
	VU		*Climacteris picumnus*	Brown Treecreeper (south-eastern ssp.)
	VU		*Heteronympha cordace*	Western Bright-eyed Brown Butterfly
C,R,J	VU	Vu	*Hirundapus caudacutus*	White-throated Needletail
B,R,J,C			*Gallinago hardwickii*	Latham's Snipe
	VU	Vu	*Grantiella picta*	Painted Honeyeater
		Vu	*Hieraaetus morphnoides*	Little Eagle
	CR	Cr	*Lathamus discolor*	Swift Parrot
	VU	Vu	*Litoria raniformis*	Growling Grass Frog
		Vu	*Melanodryas cucullata*	Hooded Robin
B			*Myiagra cyanoleuca*	Satin Flycatcher
	VU		*Neophema chrysostoma*	Blue-winged Parrot
		Vu	*Ninox strenua*	Powerful Owl
		Vu	*Ornithorhynchus anatinus*	Platypus
	VU	Vu	*Petauroides volans*	Greater Glider
		Vu	*Phascogale tapoatafa*	Brush-tailed Phascogale
		En	*Pseudophryne bibronii*	Brown Toadlet
		En	*Pyrrholaemus sagittatus*	Speckled Warbler
B			*Rhipidura rufifrons*	Rufous Fantail
		Vu	*Spatula rhynchotis*	Australasian Shoveler
		Vu	*Stagonopleura guttata*	Diamond Firetail
	VU	Vu	*Synemon plana*	Golden Sun Moth
Flora				
		Vu	*Acacia nanodealbata*	Dwarf Silver-wattle
		En	*Bossiaea cordigera*	Wiry Bossiaea
		En	*Bossiaea riparia*	River Leafless Bossiaea
		Cr	*Bossiaea vombata*	Wombat Bossiaea
		Cr	*Calotis anthemoides*	Cut-leaf Burr-daisy
	EN	Cr	*Dianella amoena*	Matted Flax-lily
		Cr	*Discaria pubescens*	Australian Anchor Plant
		En	*Dipodium pardalinum*	Spotted Hyacinth-orchid
		En	*Eucalyptus brookeriana*	Brooker's Gum
		En	*Eucalyptus conferta*	Fryers Range Scentbark
		Cr	*Eucalyptus yarraensis*	Yarra Gum
		En	*Grevillea obtecta*	Fryerstown Grevillea
		En	*Grevillea repens*	Creeping Grevillea
		Cr	*Hovea asperifolia subsp. Spinosissima*	Rough Hovea
		En	*Leucopogon microphyllus var. pilibundus*	Hairy Beard-heath
	EN	En	*Lepidium hyssopifolium s.s.*	Basalt Peppercress
		Cr	*Microseris scapigera s.s.*	Plains Yam-daisy
	CR	Cr	*Pimelea spinescens subsp. spinescens*	Spiny Rice-flower
		En	*Platylobium rotundum*	Penny-leaf Flat-pea
		En	*Pultenaea graveolens*	Scented Bush-pea
		Vu	*Pultenaea reflexifolia*	Wombat Bush-pea
		En	*Eucalyptus conferta*	Fryers Range Scentbark

Status*			Scientific name	Common name
Treaty	EPBC Act	FFG Act		

*** Listing Status Key:**

International Treaty B: Bonn Convention; C: CAMBA; J: JAMBA; R: ROKAMBA.

EPBC Act 1999 conservation status: EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant.

FFG Act 1988 status: Status under FFG Act: Cd: Conservation dependant, Cr: Critically endangered, En: Endangered, Ex: Extinct, Th: Threatened, Vu: Vulnerable En(ExV): Endangered (extinct in Vic)

3.4 Culturally Significant Flora and Fauna

Plants and animals may also be culturally-significant for Traditional Owners, spiritually and as a source of food, medicine, shelter and fibre. Some of these may now be rare, regionally extinct or at numbers that cannot sustain their continued cultural use (NCCMA 2022). Table 14 below lists some flora and fauna species of the cultural significance to the Dja Dja Wurrung. This has been derived from a number of sources, including the Dja Dja Wurrung Country Plan 2014-2034 (Dja Dja Wurrung Clans Aboriginal Corporation) and North Central Regional Catchment Strategy (Haw and Munro 2010; NCCMA 2022).

Some of these culturally significant flora and fauna species were identified during the field survey or from desktop analysis. For example, areas with Kangaroo Grass, one of the culturally significant flora species listed in Table 14, were observed across all four Townships. Areas with a high cover of this species are in turn also likely to support culturally significant herb species such as Chocolate, Vanilla and Bulbine Lilies, although additional surveys are needed in Spring to confirm their presence. VBA records also indicate past Brolga observations throughout the Township of Clunes, and in particular, the area north of defined Investigation Area for this Township from within Merin Merin Swamp and Middle Swamp.

It is anticipated that biodiversity values documented in this report can be useful for future engagement with the Dja Dja Wurrung to begin recognising culturally significant flora and fauna within the Townships assessed and the wider Hepburn municipality, and identify ways to apply cultural land management practices, such as Wi (fire) to promote native vegetation and associated habitat for fauna. Figure 4 through to Figure 6 show images of culturally significant flora and fauna values observed during field surveys.

Table 14. Table that lists some of the culturally important flora and fauna for the Dja Dja Wurrung. Information drawn from (Haw and Munro 2010; NCCMA 2022).

Name	Likelihood of presence	Potential for retention, enhancement and/or re-introduction
Food, Medicine and Fibre plants:		
• Kangaroo Grass	**Present** Kangaroo Grass was present within the majority of the mapped grassland areas.	**High** Kangaroo grass was present across the mapped grassland areas. With protection and management, it should be possible to retain and enhance these grassland areas in the context of future development.
• Mat-rush *Lomandra* spp. to weave baskets	**Present** Mat-rushes species were observed in many of the forest and woodland areas. Most of these were Wattle Mat-rush *L. filiformis* however, which is likely to be less ideal for weaving than Spiny-headed Mat-rush *L. longifolia.*	**High** Mat-rushes were reasonably abundant in mapped areas of moderate-high quality woodland and forest. With protection and management, it should be possible to retain and enhance these.
• Flax-lily *Dianella* spp.	**Present** Black-anther Flax-lily *Dianella admixta* was observed in woodland and forest areas, with large quantities particularly seen in Trentham and Daylesford.	**High** Black-anther Flax-lily *Dianella* was reasonably abundant across areas of moderate-high quality woodland and forest. With protection and management, it should be possible to retain and enhance these.
• Chocolate, Vanilla and Bulbine Lilies	**Likely** These species are likely present within mapped areas of moderate to high quality grassland and woodland. Previous records are located in Clunes, Daylesford-Hepburn and Trentham Townships. They would not have been in flower at the time of survey.	**High** With protection and management of moderate to high quality grassland areas. Management of the grasslands to reduce biomass and increase inter-tussock space would also be beneficial in many cases.
• Murnong (Yam Daisies)	**Likely** Only one historic observation (1997) of this species has been recorded within 5 km of any of the 4 townships (Atlas of Living Australia. However Brian Bainbridge has indicated that Yam Daisies *Microseris walteri* is present and relatively abundant in bushland around Daylesford- Hepburn Springs and Glenlyon and is probable around Trentham (Pers. Comms. Brian Bainbridge 12.09.23). While it was not observed during the field survey, it would also not have been in flower at the time of survey..	**Moderate** Species could be included in revegetation and/or amenity plantings.

Name	Likelihood of presence	Potential for retention, enhancement and/or re-introduction
• Wattles/Wattle seeds	**Present** Wattles were observed within all of the mapped areas of vegetation, particularly within areas of Heathy Dry Forest and Valley Grassy Forest. Wattles were observed to be the dominate midstory tree for all areas of Moderate to High quality vegetation across all 4 townships.	**High** Many areas lacking indigenous vegetation would be suited to planting a range of Wattle species.
• Buloke *Allocasuarina luehmannii* for tools and ceremony	**Unlikely** This species was not observed during the field survey and there are no VBA records within 5 km of any of the four Townships. Historically these have been heavily cleared and Creswick is at the edge of its range.	**Moderate** Not typical of this area but could be included in revegetation and/or amenity plantings.
• River Red-gum timber for tools and ceremony	**Present** River Red-gums were present within all four Townships, particularly within areas mapped as Plains Grassy Woodland, Riparian Woodland and Plains Grassland.	**High** With plantings and protection of existing trees to allow for regeneration.
• Waterbodies, including farm dams with extensive stands of Rushes, Poong'ort *Carex tereticaulis* and other Sedges, Bulrushes and Reeds.	**Present** There are many dams and wetlands scattered across the Creswick area. These varied in their vegetation but often included Spike-rushes, Rushes, Sedges, Common Reed, and Bulrush.	**Moderate** With weed management and/or revegetation.
Spiritual importance (Murrup):		
• Brolga	**Likely** Recent records from Merin Merin Swamp and Middle Swamp north of Clunes Investigation Areas. While Brolga is not considered migratory, this species is known to be nomadic in part as it moves to different areas based on seasonal rainfall. Therefore, given the number of recent records in the area, it is highly likely that animals occasionally visit these swamps when inundated for foraging. Brolgas could use waterbodies, pastures and croplands in the Investigation areas.	**Moderate** While reintroductions are not realistic for this species, existing habitat (especially the habitat near large waterbodies) could be enhanced with weed management and/or revegetation.
• Gal Gal (Dingo *Canis dingo*)	**Unlikely** No VBA records in the surrounding area.	**Low** Re-introduction program is not recommended given the land uses and associated high level of human activities within the Investigation Areas. Indeed, re-introduction of dingos within the Investigation areas may lead to interbreeding between domestic dogs and dingos and an increase in human-wildlife conflicts in the area. Therefore, this could compromise the success of the re-introduction program.

Name	Likelihood of presence	Potential for retention, enhancement and/or re-introduction
• Barramul (*Emu Dromaius novaehollandiae*)	**Unlikely** No VBA records in the surrounding area.	**Moderate** Suitable habitat exists across the townships and emus are known to occur on farmland. However, a detailed translocation-reintroduction proposal would be needed including (but not limited to) the selection of a suitable release site able to host a self-sustaining population of the species and demonstration that all threats to the species can be managed. Many hazards for this species are present within the Investigation Areas including railways, main roads, frequent wildlife-human interaction. Considering the township contexts, it is also likely that extensive community engagement would be required to ensure support by residents.
• Yung (Eastern Quoll *Dasyurus viverrinus*).	**Highly Unlikely** No VBA records in the surrounding area. These were considered extinct/rare in mainland Australia from about 1960s, although they have been re-introduced to areas.	**Low** As for the Emu, many hazards for this species are present within the Investigation areas. They include railways, main roads, predation by domestic animals and other risks caused by the proximity of residential areas. Predation by foxes is also a likely key driver of mainland extinction of the Eastern Quoll, given its persistence in Tasmania, which is largely fox free. However, if vegetation in the Creswick Regional Park is large enough to support a viable population, this could possibly be a long-term goal.
Other Fauna		
• Brushtail Possum *Trichosurus vulpecula* and the hollows they rely on • Eastern Grey Kangaroo • Wallaby *Wallabia* spp.	**Present or Likely present** Within mapped areas of bushland and forest. Kangaroos and Wallabies were observed within the Investigation Areas.	**High** With retention of a variety of natural areas such as woodland, forest and plains, and maintained/improved connectivity.
• Goanna/Lace Monitor *Varanus* spp.	**Highly Unlikely** No VBA records in any of the 4 townships or their surrounding area.	**Low** Lack of suitable habitat as well as likely predation
Healthy waterways, aquatic plants and fauna:		

Name	Likelihood of presence	Potential for retention, enhancement and/or re-introduction
• Nardoo *Marsilea* spp.	**Likely** Many areas of appropriate habitat observed, In particular within the Township of Daylesford. Previous observations have been recorded within the Atlas of Living Australia.	**Moderate** Many areas of appropriate habitat where species of this genus could be planted.
• River Blackfish *Gadopsis marmoratus* habitat	**Possible** The Atlas of Living Australia indicates records as recent as 2007, 2006 and 2017 in Clunes, Daylesford and Trentham respectively. Multiple areas of habitat along Creswick Creek (Clunes), Loddon River (Glenlyon) and Coliban River (Trentham)	**Unclear** Potential for habitat improvement but unclear how abundant this fish is in the area. Its preferred habitat is slow flowing streams with rock cover and abundant snags, fallen timber and debris, and gravel bottom. Hence restoring such conditions may help their establishment.
• Re-snagging	**Possible** Re-snagging could occur naturally with the re-establishment of native vegetation along Waterways. Logs could also be introduced where their removal is unavoidable for other projects/Council maintenance. Majority of creek lines throughout the four townships, are dominated by exotic vegetation. This is especially seen along Creswick Creek within the Township of Clunes and north of Daylesford along Woman's Gully. The management of these weeds should be conducted to coincide with re-snagging.	



Figure 4. *Dianella revoluta* within Daylesford–Hepburn



Figure 5. Kangaroos within a grassy field within Daylesford–Hepburn



Figure 6. Large remnant River Red Gum observed in Clunes



Figure 7. Large waterbody adjacent to Glenlyon Investigation Areas (Glenlyon Recreation Reserve).



Figure 8. *Acacia pycnantha* observed in Clunes

3.5 Erosion

To get an indication of erosion susceptibility across the townships, the geomorphology database from DEECA was consulted. This indicated that there were regions within each Township that are more prone to surface runoff and gullying erosion. Maps 'H' for each Township within Appendix 1 to Appendix 4 for Clunes, Daylesford, Glenlyon and Trentham, respectively, show susceptibility to soil erosion. This is based on modelling from DEECA regarding surface run off, which are likely to also be more prone to gully and wind erosion.

While no areas with significant erosion were observed across the Townships overall, a localised area with significant evidence of erosion was observed during ground truthing within Daylesford-Hepburn along Woman's Gully as shown in Figure 9.



Figure 9. Gully erosion along Woman's Gully in Daylesford-Hepburn Springs

3.6 Location Categories and Strategic Biodiversity Scores

Maps 'I' and 'J' for each Township in Appendix 1 through to Appendix 4 present DEECA's location Categories and Strategic Biodiversity Scores for each of the Townships for reference. These are described in more detail in the sections below.

3.6.1 DEECA Location Categories

A *Location map* has been developed by DEECA aimed at indicating the potential risk to biodiversity from removing a small amount (0.5 hectares or less) of native vegetation at any given location across the landscape. It shows three location categories, Location 1, Location 2 and Location 3, which represent the different levels of risk. Location categories on the *Location map* by DEECA are determined as follows:

- Location 1
    - Any location that is not native vegetation within DEECA's 25 x 25 metre scale Native vegetation extent map and any location not mapped as Location 3 or 2 is assigned Location Category 1. This ensures that all locations in Victoria have a category in the Location map
- Location 2
    - Any location that includes a mapped endangered EVC, sensitive wetland or coastal area that is not already Location Category 3, and is native vegetation in the *Native vegetation extent map* is assigned Location Category 2.
- Location 3
    - Location 3 includes all areas where the removal of less than 0.5 hectares of native vegetation could have a significant impact on habitat for a rare or threatened species. All locations within highly localised habitats are assigned Location Category 3. For dispersed species habitats, the impact of removing less than 0.5 hectares at each location across Victoria is calculated individually using the species-general offset test described in the *Guidelines* (DELWP 2017a) and modelled condition scores.

The location category together with the amount of habitat being removed, also has implications for assessment pathways (Basic, Intermediate or Detailed) under Clause 52.17 as shown by Table 1.

Most of the Glenlyon and Clunes Townships are mapped as either Location 1 or 2, with Location 2 typically coinciding with treed areas. There are also several areas of Location 3 in Clunes, which coincide with listed flora and fauna records. Location 1 is mapped across most of the Daylesford-Hepburn Spring Township except for a narrow strip of Location 2 along Sailors Creek. Most of Trentham Township is mapped Location 1. However, Location 3 is mapped within the southern part of the Investigation Areas T1, T2 and T3, which also extends into the ranges, again coinciding with records for a number of listed flora and fauna.

Table 15. Determining the Assessment Pathway

Extent of native vegetation	Location category		
	Location 1	Location 2	Location 3
Less than 0.5 hectares and not including any large trees	Basic	Intermediate	Detailed
Less than 0.5 hectares and including one or more large trees	Intermediate	Intermediate	Detailed
0.5 hectares or more	Detailed	Detailed	Detailed

Source: Table 3, *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017b)

3.6.2 DEECA Strategic Biodiversity Scores

The DEECA *Strategic biodiversity value map* is a landscape scale map that combines information on biodiversity values with connectivity and fragmentation information to show the relative value of landscapes across Victoria. The map was created by combining and analysing biodiversity information that aimed to rank all locations across Victoria for their ability to represent rare or threatened vertebrate fauna, vascular flora, and the full range of Victoria's native vegetation. The data used to create the DEECA *Strategic biodiversity value map* includes:

- species habitat distribution models
- models of uncertainty of the likelihood of modelled species habitat
- models of vegetation types in Victoria, and
- the modelled native vegetation condition (DELWP 2017c).

The analysis behind the *Strategic biodiversity value map* rated areas with little biodiversity value lower, the most degraded and poorly located examples of the most common habitat or vegetation in the middle of the ranking, and the best and most well-connected examples of species' habitats across the state ranked highest. This has meant that some locations with low condition vegetation can be more highly ranked because they provide links for habitats, or are the only remaining habitat for certain species. Maps 'J' for each Township in in Appendix 1 through to Appendix 4 present the Strategic Biodiversity Values rankings for each Investigation Area assessed as part of this study.

4. RESULTS –INDIVIDUAL TOWNSHIPS

4.1 Clunes

The Township of Clunes has three associated Investigation Areas. These are described in the table below.

Table 16. Clunes Investigation Areas

Investigation Area	Area within Clunes	Description of area
Cl1	Cl1 is located within the centre of Clunes township.	Covers the majority of the higher density residential dwelling and retail properties within the main centre of Clunes.
Cl2	Cl2 is located to the northwest (Cl2a) and north east (Cl2b) of Clunes.	Areas zoned as Low Density Residential.
Cl3	Cl3 is located on the outermost fringes of the Investigation Areas. Located to the northwest (Cl3a), north east (Cl3b) and south of Clunes (Cl3c)	Areas currently used for farming, majority of Cl3b and Cl3c are grazed native grasslands. Whereas Cl3a is adjacent to Dunach Nature Reserve and is seen to have large areas of treed vegetation.

4.1.1 Native Vegetation: EVCs and Quality

Maps 1K and 1L, Appendix 1, give an overview of vegetation extent, type and EVCs present across the Clunes Investigation Areas, as determined from the desktop review and subsequent field surveys.

Most native vegetation patches within the Clunes Township agreed with the EVCs previously modelled by the Department of Energy, Environment and Climate Action (DEECA). Areas where there was an exception over a substantial area included the following:

- Box Ironbark Forest (EVC 61) observed in areas Cl2a and Cl3a. These were deemed representative of the Box Iron Bark Forest community due to the dominance of Grey Box, Bundy (*Eucalyptus goniocaylx)* and Yellow Gum in the overstorey, typical of this EVC within the Victorian Volcanic Plain and Goldfield Bioregions. It is also present on colluvial soils, typical of Box Ironbark forests. This area within Cl 3a is an extension of Dunach Nature Conservation Reserve.

- Grassy Woodland (EVC 175) observed in areas modelled as Plains Grassy Woodland. These areas are an extension of areas previously modelled as Grassy Woodland by DEECA. These areas were deemed Grassy Woodland by the dominance of Grey Box and Yellow Gum in the overstorey as well as the presence of grasses and herbs in the understorey (however at some points dominated by Cassinia sifton in poorer quality areas). This is typical of EVC 175_61 described in the Goldfields Bioregion.

- Plains Woodland (EVC 803) observed in areas modelled as Plains Grassy Woodland. These areas were deemed Grassy Woodland by the dominance of Grey Box, Yellow Box, and Yellow Gum in the overstorey as well as the presence of a grassy understorey.

Approximately 27.7% of the Clunes Investigation Areas are covered by native vegetation. The desktop assessment and the field surveys undertaken as part of this study revealed that ten EVCs are likely to occur within the Investigation Areas, in the form of patches of native vegetation or Scattered Trees. Map 'K'& 'L' for Clunes and Table 17 detail the native vegetation present throughout the Clunes Investigation Areas as determined by this current study.

As shown in Table 17, the Clunes Investigation Areas are likely to support approximately 509.3 ha of native vegetation as patches. General condition of this native vegetation was determined as part of field surveys and through consultation of DEECAs NatureKit.

Table 17. Native Vegetation Patches within Clunes Investigation Areas.

Bioregion	EVC	Township EVC description	Investigation Area(s) and Hectares by Quality		
			High/ Indicative High	Medium/ Indicative Medium	Low/ Indicative Low
Victorian Volcanic Plain	PGW	Areas of low-moderate quality, treeless grasslands. Large areas located with Clunes Common Nature Reserve (Cl3b). Spread across all Investigation areas	X	All Areas (188.5)	All Areas (85.2ha)
	BIF	Densely treed areas of moderate-high quality within Cl2a	Cl2a (69.6ha)	Cl2a (15.8ha)	X
	CGW	Small patch of low-quality vegetation along One Mile Creek.	X	X	Cl3a (0.3ha)
	ClHrW	Small patches of low-quality vegetation located along Kilkenny Creek and Creswick Creek.	X	X	Cl2a (2.0ha)
	SS	Small areas of vegetation along streams	X	Cl3b (1.0ha)	Cl1 (0.05ha)
	GW	Areas of moderate-high vegetation within the northern ends of Cl2a and Cl3a.	Cl2a (17.1ha)	Cl2a (15.0ha)	Cl2a (4.1ha)
	PW	Small areas of vegetation located adjacent to PGW.	X	Cl2a, Cl3a (3.3ha)	X
Goldfields	PGW	Clusters of large, remnant River Red Gums with little to no indigenous understorey within	X	Cl3a (2.1ha)	Cl3a (5.0ha)
	BIF	Areas of moderate to high quality vegetation within Cl2a and Cl3a (adjacent to Dunach Nature Reserve). Ironbarks mainly absent from these areas, likely due to historic logging.	Cl2a, Cl3a (32.1ha)	Cl3a (53.6ha)	X
	GW	Mainly moderate to high quality Vegetation located within private properties in the northern area of Cl2a	Cl2a, Cl3a (8.3ha)	Cl2a, Cl3a (6.2ha)	X
		Total	**127.1ha**	**285.5ha**	**96.65ha**

4.1.2 Scattered Trees

A total of 157 Scattered Trees were documented across the Clunes Investigation Areas. The location of these trees is shown on Map 1K and Map 1L in Appendix 1.

As shown, these Scattered Trees were located across the Investigation Areas and more concentrated in areas of Plains Grassy Woodland and within dense residential areas. This is likely due to historical clearing of surrounding native vegetation for development or agriculture, leaving individual trees with little to no native understorey. Large areas of land historically modelled as Plains Grassy Woodland are currently being used for agricultural and although the understorey has been disturbed/modified, remnant River Red Gums have been retained, this is evident in Investigation Areas Cl2a and Cl3a.

4.1.3 Threatened Ecological Communities

EPBC Act Listed Communities

Five EPBC Act listed communities have been identified using the PMST Act report as having potential to occur within the Clunes Township. Table 18 below provides more information on these communities and their occurrence within the Clunes Investigation Areas.

Table 18. EPBC Act listed communities likely to occur

Listed communities	Status	Occurrence on site
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	The PMST report states this community is likely to occur within this Township and surrounds. The current assessment also confirms that this community is **likely** to occur as patches of EVC 55 and 175 (Plains Grassy Woodland and Grassy Woodland) particularly in areas that fall within the Goldfields Bioregion (Cl3a and Cl2a) and are expected to extend into the Victorian Volcanic Plains Bioregion within these Investigation Areas.
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	The PMST report states this community is likely to occur within this Township and surrounds. This community **possibly occurs** within Cl3a and Cl2a in areas that were unable to be accessed. These are most likely to be located directly adjacent to Dunach Nature Conservation Reserve.
Natural Temperate Grassland of the Victorian Volcanic Plain	Critically Endangered	The PMST report states this community may occur within this Township and surrounds. . The current assessment also confirms that this community is **unlikely** within the Clunes Investigation Areas. While moderate quality grasslands were observed, these have however been assessed as a treeless expression of Plains Grassy Woodland (EVC 55) as described below, rather than Plains Grassland (EVC 132) of which this EPBC Act listed community is represented by in general. Further assessment required.
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	Critically Endangered	The PMST report states this community is known to occur within this Township and surrounds. The current assessment also confirms that it is **likely** to occur in at least a derived grassland state. Areas of moderate quality (treeless) Plains Grassy Woodland (EVC 55) were observed, in particular within Investigation Area Cl3b (Clunes Common Nature Conservation Reserve)that could be representative of derived grassland expression of this community.
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered	The PMST report states this community is likely to occur within this Township's surrounds. Overall, the current assessment confirmed that this community is **unlikely** to occur. While this is the case, there may be localised areas that could contain this community, but it was not possible to confirm given the scale of mapping and rapid nature the current assessment.

A detailed site assessment with access to all the properties included within the township of Clunes is recommended to determine with certitude the presence of these EPBC Act listed communities. If future investigations confirm the occurrence of these listed communities on site, a referral to the *Department of Climate Change, Energy, the Environment and Water* (DCCEEW) may be recommended in due course. Should impacts to these communities be deemed a "significant impact", this may trigger Federal offset obligations. Further detail is provided in Section 5 below.

FFG Act Communities

Listed threatened communities of flora and fauna under the FFG Act and their characteristics (DELWP 2022b) were consulted to determine their potential to occur within the Clunes Investigation Areas during the desktop review.

Based on this, four State listed (FFG Act) threatened communities were identified with potential to occur within the Investigation Area. These are listed in Table 19.

As shown in Table 19, the *Western Basalt Plains (River Red Gum) Grassy Woodland* FFG Act listed community is present on site as confirmed as part of field surveys. This community was identified to the north of area C13a, adjacent to the Dunach Nature Conservation Reserve. Within this area species representative of this community are present in native vegetation patches representative of Plains Grassy Woodland (EVC 55).

In addition to this, the Victorian Temperate Woodland Bird Community is also considered likely to be present within the Investigation Areas, particularly within Cl2a and Cl3a.

All other communities listed in Table 19, that were identified as potentially present within the Clunes Investigation Areas as part of the desktop review undertaken, are considered unlikely to be present based on observations during the field surveys completed for this project.

If future investigations confirm the occurrence of these listed communities within the Clunes Investigation Areas, a permit may be required to remove them, or species that form part of them, from the areas where they occur on public land. For more information on legislation requirements see Section 5.

Table 19. FFG Act listed communities likely to occur

Listed communities	Occurrence on site
Butterfly Community No. 1	This community is **very unlikely** to occur within the investigation zone as no characteristic species of this community are located within a 5km radius (according to VBA records). Some habitats components are present of varying qualities.
Western Basalt Plains (River Red Gum) Grassy Woodland	This community is **highly likely** within the Investigation Areas. Multiple species components present (Tree Violet, Golden Wattle, Kangaroo Grass, Hedge Wattle etc) within the Investigation Areas of moderate and high quality and located on newer basalt. In particular this was observed to the west of area Cl3a adjacent to Dunach Nature Conservation Reserve.
Victorian Temperate Woodland Bird Community	This community is **likely** to occur within the Investigation Areas due to VBA records for 12 of the 24 woodland species. Recent records for three of these (within last decade). Multiple habitat components (Eucalyptus woodlands) are present and of high quality to support this community. Areas were this is likely to be present include Cl2a and Cl3a.
Creekline Grassy Woodland (Goldfields) Community	This community is **not present** on site. In areas that within the Investigation Areas that fall under the Goldfield Bioregion, no areas of Creekline Grassy Woodland were observed.

Listed communities	Occurrence on site
Grey Box – Buloke Grassy Woodland Community	This community is **possibly present** within the Investigation Areas as patches of EVC 55 and 175 (Plains Grassy Woodland and Grassy Woodland) particularly in areas that fall within the Goldfields Bioregion (Cl3a and Cl2a). No observations of Buloke were recorded however there are areas dominated by Grey Box that could represent this community. Further consideration required based on detailed field surveys.
Red Gum Swamp Community No. 1	This community is **unlikely** to occur within the Investigation Areas, no areas of significant inundation were observed (with the exception of farm dams and some road reserves).
Western (Basalt) Plains Grasslands Community	This community is **unlikely** to occur within the Investigation Areas. Assessed grassland is expected to be treeless Plains Grassy Woodland as opposed to Plains Grassland which is expected to best represent this community.

4.1.4 Flora

Flora species recorded

A total of 63 plant taxa were recorded during the field survey across the Clunes Investigation Areas, of which 27 were indigenous (43%) and 36 were introduced or growing outside their natural range (57%).

Appendix 5 lists the flora recorded across the Clunes Investigation Areas. Please note that this was not a comprehensive list of species across the Investigation Areas as the survey was only undertaken from roadsides, on public land and via an over-the-fence inspection. Due to this and time limitations, the list is only based on an observation of the main character species observed.

Table 20. Summary of plant taxa recorded

Flora Status	Number of Taxa
Indigenous vascular taxa	27
Exotic taxa	33
Victorian species outside of natural range	3
TOTAL	**63**

State and Nationally Listed Flora Species

Field Survey

No national or state significant flora species were observed during field surveys within the Clunes Investigation Areas.

Database records

A search of the VBA found 736 flora species, including 198 introduced species, within a 5 km buffer of the Clunes Investigation Areas. Of these VBA records, 21 were significant flora species.

Records for listed flora within and adjacent to the Clunes Investigation Areas are shown in Map 1F. As shown by this mapping there was only one significant flora species, Cut-leaf Burr-daisy recorded within the Investigation Areas (Cl2b). There are likely to be a large number of significant flora present in areas that are unlikely to have been surveyed. For example, similar habitat

conditions are located directly adjacent to Cl3b that have recorded a large amount of significant flora species yet no records were observed here.

The EPBC Act PMST tool identified a further 18 significant flora species with potential to occur within a 5 km buffer of the Investigation Areas based on modelled habitat suitability.

Of the 39 significant species documented across both the VBA and PMST, five are considered to have at least a moderate likelihood of occurring within the Investigation Areas, mainly within areas of grassy woodlands. These five species are presented in Table 21. Further details on these, and other listed species recorded in databases is provided in Appendix 5.

Please note that the field survey was rapid, and of limited access and coverage, hence significant flora species may still have potential to occur within the Investigation areas as detailed in Appendix 5, despite not being observed during the field survey.

Table 21. Significant Flora species with at least a moderate likelihood of presence in the Investigation Area.

Scientific Name	Common Name	Listing Status^	
		EPBC Act	FFG Act
Pultenaea graveolens	Scented Bush-pea		En
Calotis anthemoides	Cut-leaf Burr-daisy		Cr
Discaria pubescens	Australian Anchor Plant		Cr
Microseris scapigera s.s.	Plains Yam-daisy		Cr
Pimelea spinescens subsp. spinescens	Spiny Rice-flower	CR	Cr

^ Listing Status Key:

EPBC Act 1999 conservation status: EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant.
FFG Act 1988 status: Status under FFG Act: Cd: Conservation dependant, Cr: Critically endangered, En: Endangered, Ex: Extinct, Th: Threatened, Vu: Vulnerable En(ExV): Endangered (extinct in Vic)

Noxious Weeds

The declared noxious weeds under the *Catchment and Land Protection Act 1994* (CaLP Act) observed across the Investigation Areas are listed in Table 22. Four CaLP Act listed species were observed during the field survey, noting that again that this was not a comprehensive survey and was only an observation of the character species present across the Investigation Areas.

Table 22. Declared noxious weeds observed during field surveys.

Scientific Name	Common Name	Control Category (North Central)
**Ailanthus altissima*	Espartillo	R
**Lycium ferocissimum*	African Box Thorn	C
**Rosa rubiginosa*	Sweet Briar	C
**Salix spp.*	Willow	R
**Ulex europaeus*	Gorse	C

4.1.5 Fauna

Incidental Fauna sightings

Several fauna species, predominantly birds, were observed during field surveys. Species recorded across the Clunes Investigation Areas are presented in Table 23.

Table 23. Incidental fauna list recorded during field surveys.

Family	Record Type	Scientific Name	Common Name
Psittacidae	Observed	*Platycercus eximius*	Eastern Rosella
Corvidae	Observed	*Corvus spp.*	Raven
Meliphagidae	Observed	*Anthochaera carunculata*	Red Wattlebird
Meliphagidae	Observed	*Manorina melanocephala*	Noisy Miner
Accipitridae	Observed	*Aquila audax*	Wedge-tailed Eagle
Myobatrachidae	Observed	*Crinia signifera*	Common Froglet
Cacatuidae	Observed	*Eolophus roseicapilla*	Galah
Cacatuidae	Observed	*Cacatua galerita*	Sulphur-crested Cockatoo
Leporidae	Observed	**Oryctolagus cuniculus*	European Rabbit
Meliphagidae	Observed	*Phylidonyris novaehollandiae*	New Holland Honeyeater
Pardalotidae	Observed	*Pardalotus punctatus*	Spotted Pardalote
Columbidae	Observed	*Phaps chalcoptera*	Common Bronzewing
Vanellinae	Observed	*Vanellus miles*	Masked Lapwing
Dicruridae	Observed	*Rhipidura leucophrys*	Willie Wagtail
Psittacidae	Observed	*Platycercus elegans*	Crimson Rosella
Sturnidae	Observed	**Acridotheres tristis*	Common Myna
Passeridae	Observed	**Passer domesticus*	House Sparrow
Accipitridae	Observed	*Elanus axillaris*	Black-shouldered Kite
Muscicapidae	Observed	**Turdus merula*	Common Blackbird
Artamidae	Observed	*Gymnorhina tibicen*	Australian Magpie
Nymphalidae	Observed	*Heteronympha merope*	Common Brown Butterfly
Hylidae	Observed	*Litoria ewingii*	Southern Brown Tree Frog

Fauna habitat

The main focus of the fauna assessment was to consider the potential of the Investigation Areas within the Township to provide habitat for rare or threatened fauna species.

Key areas of fauna habitat observed within the Investigation Areas are:

- Creswick Creek
- Clunes Common Nature Reserve
- Dunach Nature Conservation Reserve
- Open grasslands located within Cl3
- Treed areas within Cl2 and Cl3

- Scattered trees.
- Native plantings particularly in Cl2

These areas are further described in Section 4.1.6 below.

State and Nationally Listed Fauna Species

Overall, 446 Fauna species were identified within a 5 km radius of the Clunes Investigation Area on the VBA database. Fifteen of these were introduced species while 42 were listed as significant species under either state or national legislation. The location of the listed fauna records is shown in Map 2G (Appendix 2). There was a concentration of observations around certain areas as shown in Map 2G, but this may also reflect greater surveying time in these locations. Listed species documented on the VBA with post-1980 records within the Investigation Areas are shown in Table 24.

Table 24. Significant fauna records from VBA (post 1980) located within Investigation Areas

Scientific Name	Common Name	Investigation Area
Antigone rubicunda	Brolga	Cl1
Oreoica gutturalis	Crested Bellbird	All
Ornithorhynchus anatinus	Platypus	Cl1, Cl2
Lathamus discolor	Swift Parrot	All
Lophoictinia isura	Square-tailed Kite	Cl1, Cl3
Phascogale tapoatafa	Brush-tailed Phascogale	Cl2, Cl3
Synemon plana	Golden Sun Moth	Cl2, Cl3
Gallinago hardwickii	Latham's Snipe	Cl2, Cl3
Merops ornatus	Rainbow Bee-eater	Cl2, Cl3
Stagonopleura guttata	Diamond Firetail	Cl2, Cl3
Hieraaetus morphnoides	Little Eagle	Cl2, Cl3
Acrocephalus australis	Reed-warbler	Cl2, Cl3
Melanodryas cucullata	Hooded Robin	Cl2, Cl3
Grantiella picta	Painted Honeyeater	Cl2, Cl3
Burhinus grallarius	Bush Stone-curlew	Cl3
Pyrrholaemus sagittatus	Speckled Warbler	Cl3
Ninox strenua	Powerful Owl	Cl3

The PMST tool identified a further 22 significant species with potential to occur in the area but without records within a 5 km buffer of the Investigation Area.

Most significant species documented on databases were birds (51), which can more readily navigate the highly cleared and fragmented landscape and tap into a range of habitat resources. For example, there were a number of water birds and duck species that can take advantage of farm dams and waterbodies across the landscape, especially the Middle and Merin Merin Swamps, as well as raptors and owls that can forage above farmland and woodlands. Swift Parrots *Lathamus discolor* and Painted Honeyeaters *Grantiella picta* may occasionally forage in flowering Eucalypts and Mistletoes in the more wooded areas particularly if these support box-iron box communities. A number of woodland bird species such as Crested Bell bird *Oreoica gutturalis*, Diamond Firetail

Stagonopleura guttata and Speckled Warbler *Pyrrholaemus sagittatus* likely use grassy woodland habitat, especially box-ironbark communities.

Based on habitat suitability and local records, a number of the species documented on the VBA or predicted to occur based on the PMST have a moderate likelihood or higher of occurring within these same areas, as per Table 25.

Table 25. Significant fauna species with at least a moderate likelihood of occurrence

Source	Scientific Name	Common Name	Listing Status^		
			EPBC	FFG	Treaty
VBA	*Antigone rubicunda*	Brolga		En	
VBA	*Aythya australis*	Hardhead		Vu	
VBA	*Climacteris picumnus*	Brown Treecreeper (south-eastern ssp.)			
VBA	*Gallinago hardwickii*	Latham's Snipe			B,R
VBA	*Grantiella picta*	Painted Honeyeater	VU	Vu	
VBA	*Hieraaetus morphnoides*	Little Eagle		Vu	
VBA	*Lathamus discolor*	Swift Parrot	CR	Cr	
VBA	*Melanodryas cucullata*	Hooded Robin		Vu	
VBA	*Ornithorhynchus anatinus*	Platypus		Vu	
VBA	*Pyrrholaemus sagittatus*	Speckled Warbler		En	
VBA	*Spatula rhynchotis*	Australasian Shoveler		Vu	
VBA	*Stagonopleura guttata*	Diamond Firetail		Vu	
VBA	*Synemon plana*	Golden Sun Moth	VU	Vu	

^ Listing Status Key:

International Treaty B: Bonn Convention; C: CAMBA; J: JAMBA; R: ROKAMBA.
EPBC Act 1999 conservation status: EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant.
FFG Act 1988 status: Status under FFG Act: Cd: Conservation dependant, Cr: Critically endangered, En: Endangered, Ex: Extinct, Th: Threatened, Vu: Vulnerable, En(ExV): Endangered (extinct in Vic)

Yellow Grass Ticker *Mugadina marshalli*

In addition to the State and Nationally listed fauna species, Yellow Grass-Tickers *Mugadina marshalli* , a type of Cicada was also recently observed in the Clunes Township area by Brian Bainbridge (https://www.inaturalist.org/observations/146716185). See Figure 10.

While not listed under the FFG Act, this population can be expected to be of conservation significance as the Yellow Grass Ticker has been reported only one other time in Victoria, with other populations in Australia from northern New South Wales and Queensland.

All records of Yellow Grass Ticker (Brian Bainbridge) within the Clunes Township are located within close proximity of observed native grasslands. The locations of recent observations can be seen on Map 1G, Appendix 1.



Figure 10. Observations of *Mugadina marshalli* in Clunes (Brian Bainbridge 2023).

4.1.6 Connectivity Considerations

This section considers wildlife corridors through the Clunes Township and opportunities to strengthen existing habitat corridors and create linkages especially between core habitat areas (large areas of habitat suitable to support populations of a species) and habitat nodes (smaller areas of habitat that can provide additional habitat to that found in core areas). Map 1N provides an overview of wildlife corridors in and around Clunes. This connectivity mapping considered both the mapped vegetation within the township zones that are the focus of this report as well as a desktop analysis of vegetation across the wider landscape.

Two types of vegetation were considered separately, grassland and treed vegetation, as species typical of these two habitats tend to have different mobility, home-range and patch size requirements. Note that grassland vegetation was not analysed in detail for other townships, but was a focus for Clunes due to the importance of this habitat in the township. Vegetation in Clunes was therefore divided into the following two types:

(i) Grasslands and derived grasslands

These are concentrated to the south-east of Clunes and are associated with Golden Sun Moths records (GSM). There is also strong potential for these grasslands to support further threatened species such as Striped Legless Lizards (SLL) and Tussock Skinks. These species typically have limited mobility. Male GSM are unlikely to fly more than ~100 m (DAWE 2021). The smallest patch size that can reliably contribute to the overall survival of GSM species has been estimated to be 0.25 ha (Tailored Restoration Ecology and Conservation 2022). SLL movements are less well-known but reports indicate small home ranges of 10-50 m (DCCEEW 2016). Hence these grassland species can be supported in small core areas of vegetation but also have limited ability to disperse through cleared areas, such that stepping stone habitat should be closely spaced to provide sufficient connectivity. It is also likely that habitat exists for these species in other areas mapped as PGW throughout the municipality.

(ii) Treed vegetation types

The Brush-tailed Phascogale was used as a focal species to guide this initial assessment given its presence in Dunarch Nature Conservation Reserve, its threatened status and arboreal nature. However, this did not entail a detailed assessment of its habitat attributes and movement requirements. In contrast to the grassland species, brush-tailed Phascogales have much larger home ranges. Core areas were defined as those of predominantly indigenous woodland and forest vegetation with a size greater than ~50 ha, as Brush-tailed Phascogales typically require large home ranges (female up to 20-70 ha, males up to 100 ha) (SWIFFT 2021).

Core habitat areas include:

Woodland/Forests

- Dunarch Nature Conservation Reserve/Clunes State Forest (C1)
- Mount Beckworth Scenic reserve (C2)
- Areas adjacent and south of the Cemetery (C4 and C6 in Map 1N). Several high-quality vegetation patches mapped in the southern part of CL2a form a key component of Core area C6, and provide connectivity with C4, hence they are considered a high priority for retention.

Grasslands and Derived Grasslands

- Clunes Common Nature Conservation Reserve (C7)
- Lothair Reserve and adjacent mapped patches (C8)
- Many of the smaller areas of mapped grassland in Cl3b are of sufficient size to support GSM populations and are well connected.

Swamps

- Middle Swamp and Merin Merin Swamp (C3 and C5)

Wildlife Corridors

There is limited connectivity between the above core areas, especially Woodland/Forest Core habitat, with much of Clunes and the surrounding landscape cleared of native trees and vegetation. However, there is significant opportunity to strengthen connectivity particularly through restoration works along creeks and road reserves running between the core areas. Wildlife corridors included:

- The vegetation along the Ballarat-Maryborough Rd, Railway Line and Golf Course Road provides one of the best vegetated linkages between Core area C1 to the north, and Core areas C4 & C6 within the township. Hence the mapped vegetation along this route and within investigation area CL3a should be a high priority for retention.

- Scattered patches of good quality vegetation in Investigation area CL2a, also provide a stepping stone corridor between Core area C1 to the north and Core areas C4 & C6. This stepping stone corridor could be utilised by more mobile species such as bird species.

- The mapped vegetation in the northern parts of CL2a provides key habitat connectivity between Dunach Nature Conservation reserve (C1) and Middle Swamp (C5), a hot spot for fauna records, particularly waterbirds. Hence this vegetation is important for retention.

- The Creswick and Kilkenny Creeks provide corridors through the township including the more urbanised centre. In many areas there is a lack of canopy and understorey vegetation and weed invasion. Hence there is significant opportunity to enhance these riparian corridors through weed management, re-vegetation and restoration works. There is also potential for these creek corridors to be better linked to Core areas through enhancement of the two mapped 'potential' linkages in Map 1N which run in a west-east direction. These would provide improved connectivity between the Creswick Ck corridor to the Dunach Nature Conservation Reserve (C1) and Railway reserve/Lothair reserve (C8).

- There are several areas of smaller grassland patches adjacent core area C7 within Investigation area Cl3b. These currently have good connectivity and this should be a high priority for retention, particularly given the evidence of GSM activity in this area. Grassland species within the Core Area C7 may be able to disperse through and use land within the surrounding properties, dependent on the characteristics of the exotic and native grasses present and how often these sites are cultivated. This is represented by radiating arrows in Map 1N.

- While well outside the Investigation Areas, there is a lack of direct connectivity between Core areas C2 and C4, establishing such a linkage is highly recommended.

The riparian corridors discussed above, particularly in relation to Creswick Creek, are also important for the dispersal of amphibians and aquatic and semi-aquatic species.

4.1.7 Priority Areas for Retention

The township of Clunes was historically a gold mining town, home to Victoria's first registered discovery of gold. As such, large areas of the Township were historically overturned and disturbed. While this is the case, Clunes has both open grasslands rich in diversity and treed areas that provide habitat for a range of indigenous flora and fauna species and associated communities.

In the context of the Investigation Areas that were the focus of this study, locations recommended for retention and future enhancement include:

- All areas along Creswick Creek, which is an important corridor through the township for both native terrestrial fauna and aquatic – semi-aquatic species. The riparian vegetation is also important for protection of the this waterway, despite the high levels of weed invasion.

- Areas adjoining Dunach Nature Reserve in Cl3a and Cl2a. These areas are likely to support significant species due to their medium-high quality and connectivity to larger treed areas within the reserve. The vegetation mapped within Cl2a in the north adjoining Dunach

Nature Reserve provides an important wildlife corridor to Middle Swamp, a hot spot for fauna records, particularly waterbirds.

- Mapped areas of vegetation in Cl3a and the south-west portion of Cl2a (near the cemetery), which form a wildlife corridor between Dunach Nature Reserve and the large forested area adjacent Clunes Bushland Reserve
- Treed areas within Cl2a generally, which provide stepping stone habitat corridor between Dunach Nature Reserve and Clunes Common Nature Conservation Reserve.
- Large areas of native grassland within Cl2b, Cl3b and Cl3c, including Clunes Common Nature Conservation Reserve.
- There are several areas of smaller grassland patches adjacent core area C7 within Investigation area Cl3b. These currently have good connectivity and this should be a high priority for retention, particularly given the evidence of GSM activity in this area.
- Vegetation patches more generally that contribute to the corridors identified in Section 4.1.6.

All of the above-mentioned localities were confirmed to have moderate-high biodiversity value based on observations during field surveys. This is on the basis of the native vegetation and flora species present, and the habitat for fauna that these areas are expected to provide. Further detail on two of the higher profile areas listed above – Creswick Creek and Dunach Nature Reserve – are discussed below.

Creswick Creek

Creswick Creek runs through Cl1 and Cl2a within the Clunes Investigation Areas. While large areas of Creswick Creek and the direct surrounds are dominated by exotic species, the area still provides habitat, including foraging resources, for a range of fauna species. This is likely to include significant fauna species also, such as Platypus and multiple bird species.



Figure 11. Areas along Creswick Creek dominated by exotic vegetation but is still providing habitat value

Dunach Nature Conservation Reserve

Dunach Nature Conservation Reserve is located adjacent to the Clunes Investigation Area, Cl3a. Vegetation like that within Dunach Nature Conservation Reserve extends into the privately owned land that is located within Cl3a. These areas were therefore assessed as having high-quality vegetation and given that numerous significant species have been recorded Dunach Nature Conservation Reserve, it is expected that the areas of Cl3a with similar habitat and vegetation quality would also support such species. It is noted that historical tree lopping was evident throughout this area. Trees were seen to be coppiced and have since regrown. Trees within this area were observed to be of reduced height than described in the observed EVC.

Anomalous Zoning for Clunes Common Nature Conservation Reserve

As discussed above the Clunes Common Nature Conservation Reserve is a high-quality grassland. However, it seems to still be zoned as Rural Living Zone – Schedule 1 (RLZ1) and Farm Zone – Schedule 1 (FZ1) with no Environmental Overlays other than the Environmental Significance Overlay 1, which is related to special water supply catchment protection. Additional protection through the planning scheme zoning and overlays is highly recommended for this high-quality grassland.



Figure 12. Drosera sp. located in high quality forest areas.



Figure 13. Vegetation within Dunach Nature Conservation Reserve.

4.2 Daylesford-Hepburn Springs

The Township of Daylesford-Hepburn Springs has eight associated Investigation Areas. These are described in the below table.

Table 26. Daylesford-Hepburn Springs Investigation Areas

Investigation Area	Area within Daylesford-Hepburn Springs	Description of area
D1	D1 covers the centre of Daylesford-Hepburn Township excluding the commercial/retail zoning. D1a includes majority of Daylesford town centre with housing extending southwest (D1b) and north (D1c).	Areas of high-density residential housing extending up through Hepburn Springs. Vegetation is mostly planted native and exotic vegetation.
D2	D2 is located to the north (D2d-f) and south (D2a-c, D2j-h) of the main centre of Daylesford.	Comprised of low-density residential housing.
D3	D3 is a small parcel of land to the north east of the centre of Daylesford	High-density residential dwellings are currently being developed.
D4	D4 is a small parcel of land to the north east of the centre of Daylesford	High-density residential dwellings are currently being developed.
D5	D5 comprises of two large areas to the south of the Investigation Areas	Rural Living zone comprising of small scaling farming areas. High quality vegetation located to the south of these areas, connecting to Wombat State Forest.
H1	Located directly north of the main town centre of Daylesford (D1a)	Residentially zoned area mainly comprised of holiday accommodation. Very small area.
H2	Located directly west of the main town centre (D1a)	Low density residential housing including holiday accommodation
H3	Northern most area of the Investigation Areas (H3a) and areas to the north-west (H3b)	Densely treed areas zoned Rural Living Zone. Significant vegetation located within H3.

4.2.1 Native Vegetation: EVCs and Quality

Maps 2K and 2L, Appendix 1give an overview of vegetation extent, type and EVCs present across the Daylesford-Hepburn Springs Investigation Areas as determined from the desktop review and subsequent field surveys.

Most native vegetation patches within the Trentham Township agreed with the EVCs previously modelled by DEECA. Areas where there was an exception over a substantial area included the following;

;

- Areas of Valley Grassy Forest (EVC 47) observed in areas H3b, and D1c that were modelled as Heathy Dry Forest and an area of H3a that was modelled as Grassy Dry Forest. These were observed to have overstorey and understorey species best described by Valley Grassy Forest, including a dominant overstorey of Yellow Box *Eucalyptus melliodora* and Manna Gum *Eucalyptus viminalis.* Areas of Valley Grassy Forest are modelled adjacent to these areas.

- Areas of Shrubby Foothill Forest (EVC 45) observed in D5b and D2h where it was modelled as several other EVCs. Characteristic overstorey species typical of Shrubby Foothill Forest were observed in these areas including a combination of Messmate Stringeybark *Eucalyptus obliqua,* Narrow-leaved Peppermint *Eucalyptus radiata,* and Broad-leaved Peppermint *Eucalyptus dives*. Shrubby Foothill Forest near these areas to the south of D2h and within D5a.

- Creekline Herb-rich Woodland (EVC 164) observed in areas D5b, D2a, D2b, and D2c, where it was modelled as several other EVCs. Characteristic overstorey species that were observed include Swamp Gum *Eucalyptus ovata,* Manna Gum *Eucalyptus viminalis,* and Narrow-leaf Peppermint *Eucalyptus radiata.*

- Herb-rich Foothill Forest (EVC 23) observed extensively in D2d as well as in areas D1a, and H3a, where it was modelled as several other EVCs. These areas were observed in lower slopes and in gullys (particularly in H3a leading down to Womans Gully). Midstorey species such as Silver Wattle *Acacia dealbata* were observed and is characteristic of this EVC in both the Central Victorian Upland and Goldfield Bioregions. These areas had a diverse herb understorey and characteristic overstorey species (over both bioregions) include Messmate Stringeybark, and Eurabbie *Eucalyptus globulus ssp. bicostata.*

- Sedgy Riparian Woodland (198) was observed in D2b, an area that was previously modelled as Heathy Dry Forest. These areas had a sedge dominated understorey including *Lomandra spp.* and *Dianella spp.,* these areas also have charactertic overstorey spieces of Swamp Gum, Narrow-leaf Pepperment, and Messmate Stringeybark.

Approximately 28.3% of the Daylesford-Hepburn Springs Investigation Areas are covered by native vegetation. The desktop assessment and the field surveys undertaken as part of this study revealed that nine EVCs are likely to occur within the Investigation Areas, in the form of patches of native vegetation or Scattered Trees. Maps 'K' and 'L' for Daylesford-Hepburn Springs and Table 27 detail the native vegetation present throughout the Daylesford-Hepburn Springs Investigation Areas.

As shown in Table 27, the Daylesford-Hepburn Springs Investigation Areas are likely to support approximately 386.1 ha of native vegetation as patches. General condition of this native vegetation was determined as part of field surveys and through consultation of DEECAs NatureKit.

Table 27. Native Vegetation Patches within Daylesford-Hepburn Springs Investigation Areas.

Bioregion	EVC	Township EVC description	Investigation Area(s) and Hectares by Quality		
			High/ Indicative High	Medium/ Indicative Medium	Low/ Indicative Low
Goldfields	HDF	Dominant vegetation type throughout the northern extent of the Daylesford-Hepburn Springs Township. Large area of high quality in H3b	D1, D2, H2, H3 (57.4ha)	D1, D2, H1-3 (43.1ha)	All Investigation Areas within Goldfield Bioregion (9.3ha)
	HrFF	Largely concentrated within Investigation area D2d	H3, D1, D2 (10.0ha	D1, D2, H2 (14.5ha)	D1, D2, H2 (4.6ha)
	SRW	Small patch, potentially planted.	X	X	D1 (0.04ha)
	VGF	Largely located towards the northern end of the site with high quality vegetation observed within Hepburn Regional Park.	D2, H3 (15.0ha)	D1, D2, H3 (48.9ha)	D1, D2, H3 (33.7ha)
Central Victorian Uplands	ClHrW	Largely located towards the south-west portion of the Investigation Areas. These areas are a continuation of Hepburn Regional Park.	D2, D5 (4.6ha)	D1, D2, D5 (41.7ha)	D1, D2, D5 (9.4ha)

	HDF	Small patches of Low-Moderate quality within low-density residential areas.	X	D5 (4.6ha)	D5 (1.6ha)
	HrFF	Small patches of Low-Moderate quality within low-density residential areas.	X	D1, D2 (1.4ha)	D2 (0.5ha)
	SFF	Dominant vegetation within areas of Daylesford-Hepburn that are within the Central Victorian Uplands Bioregion. Areas to the south of the Town of high quality and providing north-south connectivity with Wombat State Forest.	D2, D5 (42.8ha)	D2, D5 (18.3ha)	D2, D5 (3.9ha)
	SRW	Largely located towards the centre of the investigation area and high-quality vegetation bordering Blind Creek	D2 (6.5ha)	D2, D5 (8.2ha)	D2, D5 (2.4ha)
	VGF	Small patches of Low-Moderate quality within low-density residential areas.	X	D2 (0.8ha)	D2 (3.4ha)
	Total		**136.3ha**	**181.5ha**	**68.8ha**

4.2.2 Scattered Trees

A total of 349 Scattered Trees were documented across the Daylesford-Hepburn Springs Investigation Areas. The location of these trees is shown on Map 2K and Map 2L in Appendix 2.

As shown, these Scattered Trees were located across the Investigation Areas and more concentrated in areas of residential developments. This is likely due to historical clearing of surrounding native vegetation for development, leaving individual trees that were likely part of a larger stand of trees. Where clearing for development was less extensive, tree canopies were seen to touching and therefore meeting requirements of a native vegetation patch, any area with three or more native canopy trees where the drip line of each tree touches the drip line of at least one other tree, forming a continuous canopy, (DELWP 2017). This is reflective of majority of the mapped EVC areas being treed areas (e.g. HDF, VGF, and SFF).

4.2.3 Threatened Ecological Communities

EPBC Act Listed Communities

The Protected Matters Report for the Daylesford-Hepburn Springs Township (available upon request) nominated four *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed communities likely to occur within the Daylesford-Hepburn Springs Township.

Four EPBC Act listed communities have been identified using the PMST Act report as having potential to occur within the Daylesford-Hepburn Springs Township. Table 28 below provides more information on these communities and their occurrence within the Daylesford-Hepburn Springs Investigation Areas.

Table 28. EPBC Act listed community likely to occur

Listed communities	Status	Occurrence on site
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	The PMST report states this community is likely to occur within this Township and surrounds.

Listed communities	Status	Occurrence on site
		Our assessment confirms that this community is **unlikely** to occur in the Investigation Area. While NatureKit shows Grassy Woodland to the north of H3a, this area was not accessible. Regardless, it is not expected that Grey Box would dominate this area.
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	The PMST report states this community is likely to occur within this Township and surrounds. This community is **highly likely** to be present within the investigation area. Large patches of moderate-high quality Valley Grassy Forest (EVC 43) that are predominantly Yellow Box have been assessed to the north of the investigation area in areas D1, D2 and H3.
Natural Temperate Grassland of the Victorian Volcanic Plain	Critically Endangered	The PMST report states this community may occur within the areas surrounding this Township (in buffer area only). The current assessment confirms that this community is **unlikely** to occur within the Investigation Areas, as no areas of grassland were observed.
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	Critically Endangered	The PMST report states this community is likely to occur within this Township and surrounds. This community is **unlikely** to occur within the Investigation Areas, as neither Plains Grassy Woodland (EVC 55) or Plain Swampy Woodland (EVC 651) – typical EVCs that represent this community – were observed. Further to this, the Investigation Areas are not located within the Victorian Volcanic Plain Bioregion.

A detailed site assessment with access to all the properties that could contain communities listed in the table above that have potential to occur is recommended to determine with certitude the presence of EPBC Act listed communities within the Daylesford-Hepburn Springs Investigation Areas. If future investigations confirm the occurrence of these listed communities on site, a referral to the DCCEEW may be recommended in due course. Should impacts to these communities be deemed a "significant impact", this may trigger Federal offset obligations. Further detail is provided in Section 5 below.

FFG Act Communities

Listed threatened communities of flora and fauna under the FFG Act and their characteristics (DELWP 2022b) were consulted to determine their potential to occur within the Daylesford-Hepburn Springs Investigation Areas during the desktop review.

Based on this, four State listed (FFG Act) threatened communities were identified with potential to occur within the Investigation Area. These are listed in Table 29.

As shown in Table 29, there is potential for the *Victorian Temperate Woodland Bird Community* to occur within the Investigation Areas. Although only one characteristic species has been recorded in recent times, this could be due to a lack of surveying. Multiple habitat components are present including undisturbed native woodlands (such as areas in D2 and H3) within the Investigation Areas.

The remaining three FFG Act listed communities that were highlighted during the desktop review have been assessed as being very unlikely or not present based on observations during the field surveys completed for this project.

If future investigations confirm the occurrence of these listed communities within the Daylesford-Hepburn Springs Investigation Areas, a permit may be required to remove them, or species that form part of them, from the areas where they occur on public land. For more information on legislation requirements see Section 5.

Table 29. FFG Act listed community likely to occur

Listed communities	Occurrence on site
Butterfly Community No. 1	This community is **very unlikely** to occur within the investigation zone as no characteristic species of this community are located within a 5km radius (according to VBA records). Some habitats components are present of varying qualities.
Victorian Temperate Woodland Bird Community	This community is **possible** to occur within the investigation Areas. VBA records for 6 species but only one with recent records. Multiple habitat components present to support this community.
Grey Box – Buloke Grassy Woodland Community	This community is **unlikely** present within the Investigation Areas. Buloke was not observed in the Investigation Area. While Grassy Woodland areas to the north of H3a were not accessible, it is not expected that Grey Box would dominate this area.
Creekline Grassy Woodland (Goldfields) Community	This community is **not present** within the Investigation Areas. This EVC was not recorded during ground truthing

4.2.4 Flora

Flora species recorded

A total of 104 plant taxa were recorded during field surveys across the Daylesford – Hepburn Springs Investigation Areas, of which 60 were indigenous (58%) and 38 were introduced or growing outside their natural range (42%).

Appendix 5 lists the flora recorded across the Investigation Areas. Please note that this was not a comprehensive list of species across the Investigation Areas as the survey was only undertaken from road-side, public land and over-the-fence, and due to time limitations, the list is only an observation of the main character species.

Table 30. Summary of plant taxa recorded

Flora Status	Number of Taxa
Indigenous vascular taxa	60
Exotic taxa	38
Victorian species outside of natural range	6
TOTAL	**104**

State and Nationally Listed Flora Species

Field Survey

One protected species was observed during field surveys: Creeping Grevillea *Grevillea repens*. All observations and records of this species have been included in the Significant Flora Map for the Daylesford – Hepburn Springs Township (Map 2F, Appendix 1).

Creeping Grevillea is listed as Endangered under the Victorian FFG Act. The species is considered rather rare, with disjunct occurrences in mountains north-east and north-west of Melbourne: i.e. between Mt Disappointment and Healesville (Mt Slide form), and from near Daylesford. The species grows in moist to well-drained situations in shallow clayey soils in dry sclerophyll forest.

Within the Investigation Areas, the species was recorded in Investigation Areas D2a (along the western boundary and just north of Cattersons Lane) and D5a (within the property of Shanahans Lane, Musk Vale and the adjacent road reserves along Foxes Lane and Shanahans Lane).

Database records

A search of the VBA found 921 flora species, including 236 introduced species, within a 5 km buffer of the Daylesford – Hepburn Springs Investigation Areas. Of these 21 were significant flora species.

Records within and adjacent to the Daylesford-Hepburn Investigation Areas are shown in Map 2F. Species were seen to mostly occur in areas of dense woodland, in particular, bordering Hepburn Regional Park and Wombat State Forest. A high concentration of records was observed adjacent to Investigation Area H3b, this is likely due to past surveys and easy access to the nearby Bryce's Flat Picnic Area. All species that were recorded within the Investigation areas are listed in Table 31 below.

Table 31. Significant Flora species recorded within the Investigation Area

Scientific Name	Common Name	Investigation Area
Correa aemula	Hairy Correa	H3b
Pultenaea reflexifolia	Wombat Bush-pea	D1a
Grevillea repens	Creeping Grevillea	D2b, D5a, D2a
Dipodium pardalinum	Spotted Hyacinth-orchid	D5a

It is noted that while multiple individuals of Creeping Grevillea were recorded during the field surveys completed as part of this project, these have been included in the Table above and depicted on maps but at the time of writing had not yet been uploaded to the VBA.

The EPBC Act PMST tool identified a further 15 significant flora species with potential to occur within a 5 km buffer of the Investigation Areas based on modelled habitat suitability.

Of the 36 significant species documented across both the VBA and PMST, 12 are considered to have at least a moderate likelihood of occurring within the Investigation Areas. These 12 species are presented in Table 32. Further details on these, and other listed species recorded in databases is provided in Appendix 2.

Please note that the field survey was rapid, and of limited access and coverage, hence significant flora species may still have potential to occur within the Investigation areas as detailed in Appendix 5, despite not being observed during the field survey.

Table 32. Significant Flora species with at least a moderate likelihood of presence

Scientific Name	Common Name	Listing Status^	
		EPBC	FFG
Bossiaea cordigera	Wiry Bossiaea		En
Bossiaea riparia	River Leafless Bossiaea		En
Bossiaea vombata	Wombat Bossiaea		Cr
Dianella amoena	Matted Flax-lily	EN	Cr
Dipodium pardalinum	Spotted Hyacinth-orchid		En
Eucalyptus brookeriana	Brooker's Gum		En
Eucalyptus conferta	Fryers Range Scentbark		En
Eucalyptus yarraensis	Yarra Gum		Cr
Grevillea repens	Creeping Grevillea		En
Hovea asperifolia subsp. Spinosissima	Rough Hovea		Cr
Pultenaea reflexifolia	Wombat Bush-pea		Vu

^ Listing Status Key:

EPBC Act 1999 conservation status: EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant.
FFG Act 1988 status: Status under FFG Act: Cd: Conservation dependant, Cr: Critically endangered, En: Endangered, Ex: Extinct, Th: Threatened, Vu: Vulnerable, En(ExV): Endangered (extinct in Vic)

Noxious Weeds

The declared noxious weeds under the *Catchment and Land Protection Act 1994* (CaLP Act) observed across the Investigation Areas are listed in Table 33. Seven CaLP Act listed species were observed during the field survey, noting that again that this was not a comprehensive survey and was only an observation of the character species present across the Investigation Areas.

Table 33. Declared noxious weeds observed during field surveys.

Scientific Name	Common Name	Control Category (North Central)
**Cirsium vulgare*	Spear Thistle	R
**Cynara cardunculus subsp. flavescens*	Artichoke Thistle	C
**Cynara cardunculus subsp. flavescens*	Artichoke Thistle	C
**Genista monspessulana*	Montpellier Broom	R
**Lycium ferocissimum*	African Box-thorn	C
**Rubus fruticosus spp. agg.*	Blackberry	C
**Salix spp.*	Willows	R
**Ulex europaeus*	Gorse	C

4.2.5 Fauna

Incidental Fauna sightings

Several fauna species, predominantly birds, were observed during field surveys. Species recorded across the Clunes Investigation Areas are presented in Table 34.

Table 34. Incidental fauna list recorded during field surveys

Family	Record Type	Scientific Name	Common Name
Macropodidae	Observed	*Macropus giganteus*	Eastern Grey Kangaroo
Anatidae	Observed	*Chenonetta jubata*	Australian Wood Duck
Alcedinidae	Observed	*Dacelo novaeguineae*	Laughing Kookaburra
Cacatuidae	Observed	*Cacatua galerita*	Sulphur-crested Cockatoo
Psittacidae	Observed	*Platycercus elegans*	Crimson Rosella
Rallidae	Observed	*Gallinula tenebrosa*	Dusky Moorhen
Corvidae	Observed	*Corvus spp.*	Raven
Cacatuidae	Observed	*Eolophus roseicapilla*	Galah
Artamidae	Observed	*Gymnorhina tibicen*	Australian Magpie
Cacatuidae	Observed	*Cacatua spp.*	Corellas and Cockatoos
Cacatuidae	Observed	*Calyptorhynchus funereus*	Yellow-tailed Black-Cockatoo
Anatidae	Observed	*Anas superciliosa*	Pacific Black Duck
Artamidae	Observed	*Strepera graculina*	Pied Currawong
Maluridae	Observed	*Malurus cyaneus*	Superb Fairy-wren

Fauna habitat

The main focus of the fauna assessment was to consider the potential of the Investigation Areas within the Township to provide habitat for rare or threatened fauna species.

Key areas of fauna habitat observed within the Investigation Areas are:

- Waterbodies including Daylesford and Jubilee Lake, Mineral Springs
- Creeks, streams and gullies (e.g., Doctor's Creek and Gully, Stony Creek)
- A variety of woodland/forest areas in the surrounding ranges.
- Reserves within the township including Hepburn Mineral Springs Reserve and Cornish Hill

These areas are further described in Section 4.1.6 below.

State and Nationally Listed Fauna Species

Overall, 310 Fauna species were identified within a 5 km radius of the Investigation Area on the VBA database. 26 of these were introduced species, while 23 were listed as significant species under either State or National legislation. The location of the listed fauna records is shown in Map 2G. There was a concentration of observations around certain areas as shown in Map 2G, but this may also reflect greater surveying time in these locations. Listed species documented on the VBA with post-1980 records within the Investigation Areas are shown in Table 35.

While these records are scattered throughout the ranges surrounding Daylesford and Hepburn-Springs, there is a concentration of bird records around Daylesford and Jubilee Lakes such as Hardhead *Aythya australis*, Australian Reed Warbler *Acrocephalus australis* and Gang Gang Cockatoo *Callocephalon fimbriatum*.

Table 35. Significant fauna records from VBA (post 1980) located within Investigation Areas

Scientific Name	Common Name	Investigation Area
Accipiter novaehollandiae	Grey Goshawk	D1
Acrocephalus australis	Reed-warbler	D1
Hieraaetus morphnoides	Little Eagle	D5
Hirundapus caudacutus	White-throated Needletail	D1
Lathamus discolor	Swift Parrot	D1
Phascogale tapoatafa	Brush-tailed Phascogale	D2, H2

The PMST tool identified a further 30 significant species with potential to occur in the area but without records within a 5 km buffer of the Investigation Area.

Most local records of listed fauna species are of birds which are highly mobile and can more readily navigate the highly cleared and fragmented landscape and tap into a range of habitat resources. An exception is the Brush-tailed Phascogale, for which there were numerous records throughout the Hepburn Regional Park.

Based on habitat suitability and local records, a number of the species documented on the VBA or predicted to occur based on the PMST have a moderate likelihood or higher of occurring within these same areas, as per Table 36.

Table 36. Significant fauna species with at least a moderate likelihood of occurrence

Source	Scientific Name	Common Name	Listing Status^		
			EPBC	FFG	Treaty
VBA	*Acrocephalus australis*	Australian Reed Warbler			B
VBA and pers. Comms. Brian Bainbridge	*Callocephalon fimbriatum*	Gang-gang Cockatoo	EN		
VBA	*Climacteris picumnus*	Brown Treecreeper (south-eastern ssp.)	VU		
VBA	*Neophema chrysostoma*	Blue-winged Parrot	VU		
VBA	*Phascogale tapoatafa*	Brush-tailed Phascogale		Vu	
VBA	*Rhipidura rufifrons*	Rufous Fantail			B
PMST	*Synemon plana*	Golden Sun Moth	VU	Vu	

^ Listing Status Key:

International Treaty B: Bonn Convention; C: CAMBA; J: JAMBA; R: ROKAMBA.
EPBC Act 1999 conservation status: EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant.
FFG Act 1988 status: Status under FFG Act: Cd: Conservation dependant, Cr: Critically endangered, En: Endangered, Ex: Extinct, Th: Threatened, Vu: Vulnerable, En(ExV): Endangered (extinct in Vic)

4.2.6 Connectivity Considerations

This section considers wildlife corridors through the Daylesford-Hepburn Springs Townships and opportunities to strengthen existing habitat corridors and create linkages especially between core habitat areas (large areas of habitat suitable to support populations of a species) and habitat nodes (smaller areas of habitat that can provide additional habitat to that found in core areas). Map 2N provides an overview of wildlife corridors in and around the township. This connectivity mapping considered both the mapped vegetation within the township zones that are the focus of this report as well as a desktop analysis of vegetation across the wider landscape.

The Brush-tailed Phascogale was used as a guide for this initial assessment given its presence in the surrounding ranges, threatened status and arboreal nature. However, this did not entail a detailed assessment of its habitat quality and attribute, and movement requirements. Core areas were defined as those of predominantly indigenous woodland and forest vegetation with a size greater than ~50 ha, as Brush-tailed Phascogales typically require large home ranges (female up to 20-70 ha, males up to 100 ha) (SWIFFT 2021). Areas continuous with a Core area but width less than ~100 m wide were considered a corridor rather than part of a Core or Node area. Smaller areas of indigenous vegetation 5-50 ha with a width greater than 100m were defined as Nodes. Both Core and Node areas are shown in Map 2N and O, and are given labels to add the discussion below.

Core habitat areas include:

Daylesford-Hepburn Springs is fortunate to be nestled into forested ranges on either side to form extensive core areas including:

- Hepburn Regional Park extending to Hepburn Mineral Springs Reserve, Daylesford Lake, and Jubilee Lake, which is continuous with vegetation to the north, east and south which in turn connects to Castlemaine Diggions National Heritage Park and other vegetation around Castlemaine to the north, and to the south through to Lerderderg State Park

For Investigation Areas adjacent the Hepburn Regional Park, the majority of mapped EVC patches abut the Park and essentially contribute to this core habitat area. This is especially the case for Investigation Areas H3a, H3b, D2d, D2c and D2h. Any proposed development or clearing of vegetation adjacent the core areas should consider its impacts on connectivity and avoid the creation of isolated patches of vegetation.

Node areas include:

- Cornish Hill (N7 – Map 2N)
- Two areas adjacent the Hepburn Springs Golf Course (N1 and N2). One of these is within Investigation Area D1c, and, as discussed below, its retention is important to maintain connectivity.
- Pockets of Hepburn Regional Park:
    - adjacent Doctor's Gully (N3 – Map 2O)
    - adjacent Cobbler's Gully (N4 – Map 2O)
- A pocket of Woodland north of Raglan Street (N5– Map 2O)

Wildlife Corridors

The Daylesford – Hepburn Springs townships are nestled between north-south travelling ranges on either side (Hepburn Regional Park), especially in the northern and southern parts. Hence a key consideration was ensuring connectivity across the townships in a west-east direction between these two ranges. A second consideration was ensuring, where ever possible, that nodes within the townships were not isolated from the ranges.

Based on this and given the extensive natural habitat present, both priority and secondary wildlife corridors were identified within Hepburn – Daylesford Springs as shown in the maps.

<u>Hepburn Springs</u>

- Spring Creek and Doctor's Gully (labelled P1 and P2) – together these form an important riparian corridor through Hepburn Springs in a NW-SE direction, also providing a key linkage between the west and east ranges. This corridor also links to the large node of Wombat State Forest (N3).

- Priority linkage P3 links Hepburn Regional Park to the west with Doctor's Gully via the two Node areas (N1 and N2) and Golf Links Road. N1 is within Investigation area D1c and ideally all should be retained to ensure connectivity.
- Priority linkage P4 links Hepburn Regional Park on either side of the township via an unnamed Creek.
- Several smaller Priority linkages P5 – 8, provide connections from the large Node (N3) with Hepburn Regional Park either side.

There are also two priority links north of the Hepburn Springs Township (P21 and P22). Although these are unlikely to be impacted by the township structure planning.

Daylesford

- Stony Creek Corridor (P12)
- Blind Creek Corridor (P13)
- Priority linkage P15 links Stony Ck to Blind Creek. The vegetation mapped within Investigation Area D2b is essential to this linkage and its retention highly recommended.
- Smaller linkages P16 and P20 connect the Stony Ck and Blind Ck corridors to Hepburn Regional Park to the west and east, respectively. Secondary linkages S17 and S8 also link Stony Ck to Hepburn Regional Park to the west. Both could be strengthened.
- Priority linkage P19, is critical as it is the southern most point providing a providing a key linkage between the Hepburn Regional Park to the west and east at a narrow point.

Road crossings were not considered in this connectivity work. However, its noted that there are several road crossings, particularly in the west-east running corridors that should be considered in future work, particularly whether they could warrant specialised wildlife crossing structures. Road kill data analysis could give an indication of priority areas for such structures. Further analysis of wildlife records could also give further support regarding the use of corridors by different species and their prioritisation for protection.

4.2.7 Priority Areas for Retention

Daylesford-Hepburn Springs is famous for its natural mineral springs, beautiful scenery, and nature, attracting large numbers of tourists and nature enthusiasts every year. Many of the areas of high biodiversity significance in the local area are not included within the Investigation Areas and therefore not discussed below beyond their role in connectivity considerations. This includes for example Daylesford Lake, areas of Hepburn Regional Park, Cornish Hill and Wombat State Forest.

While this is the case, locations within the Investigation Areas that are considered to have higher biodiversity value that are recommended for retention and enhancement include:

- Woman's Gully, in particular areas to the east of H3a, which supports large areas of high-quality vegetation providing connectivity to the wider landscape. It consists of support Valley Grassy Forest that may contain areas of the EPBC Act Listed Community, *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*.

- All areas adjacent to Hepburn Regional Park, particularly vegetation in Investigation Areas H3a,b and D2(a,b,c,d,e,g,h,i). These areas had a high concentration of significant fauna and flora records and high connectivity to the Regional Park.
- Vegetation located within Shanahans Lane (D5a), Muskvale (large area of high-quality vegetation and FFG protected *Grevillea repens)*.
- Vegetation and habitat adjacent to Sailors Falls, a free-flowing waterway providing connectivity to a range of fauna and extending into Hepburn Regional Park.
- Areas adjacent to Jubilee Lake.
- Vegetation adjacent to Blind Creek – Significant undisturbed vegetation corridor continuing into private properties, provides connectivity to eastern areas such as Jubilee Lake.
- Vegetation adjacent to Blacksmith Gully and within D2d more generally. There was extensive good quality vegetation providing connectivity through Low Density Residential dwellings and Hepburn Regional Park.
- Vegetation patches to the south-east of Investigation Area D1c that form part of Priority linkage P3 that provides connectivity between Hepburn Regional Park to the west with Doctor's Gully
- Vegetation patches that contribute to the priority corridors identified in Section 4.2.6.

4.3 Glenlyon

The Township of Glenlyon has three associated Investigation Areas. These are described in the table below.

Table 37. Glenlyon Investigation Areas

Investigation Area	Area within Clunes	Description of area
GI1	GL1 covers majority of the Glenlyon township that has been highlighted for the biodiversity assessment.	Areas of low-density housing and areas of inundation.
GI2	GI2 is located to the west of the township and is encompassed by Green Gully Road to the west and McMahons Road to the east.	Comprised of mainly small-scale farming.
GI3	GI3 includes one property.	Property is located adjacent to Loddon River and Glenlyon Recreation Reserve.

4.3.1 Native Vegetation: EVCs and Quality

Maps 3K and 3L, Appendix 3, give an overview of vegetation extent, type and ecological vegetation communities present across the Investigation Areas as determined from the desktop review and subsequent field surveys.

Most native vegetation patches within the Glenlyon Township agreed with the EVCs previously modelled by DEECA. Areas where there was an exception over a substantial area included the following;

- Riparian Forest (EVC 18) observed in Gl1 in areas previously modelled as Sedgy Riparian Woodland. These areas were located on the heads of gullies leading into the Loddon River, typical of this EVC. These area also appeared to be regularly inundated and permentantly moist, characteristic overstorey tree species for this EVC were also observed.

Approximately 8% of the Glenlyon Investigation Areas are covered by native vegetation. The desktop assessment and the field surveys undertaken as part of this study revealed that four EVCs are likely to occur within the Investigation Areas, in the form of patches of native vegetation or Scattered Trees. Map 'K'& 'L' for Glenlyon and Table 38 detail the native vegetation present throughout the Glenlyon Investigation Areas as determined by this current study.

As shown in Table 38, the Glenlyon Investigation Areas are likely to support approximately 17.2 ha of native vegetation as patches. General condition of this native vegetation was determined as part of field surveys and through consultation of DEECAs NatureKit.

Table 38. Patches of native vegetation likely to occur throughout the Glenlyon Investigation Areas.

Bioregion	EVC	Township EVC description	Investigation Area(s) and Hectares by Quality		
			High/ Indicative High	Medium/ Indicative Medium	Low/ Indicative Low
Central Victorian Uplands	RF	Areas of small moderate and low-quality RP bordering the Loddon River within Gl1.	X	Gl1 (0.5ha)	Gl1 (0.8ha)
	HrFF	Small low-quality patches within Gl2	X	x	Gl2, (0.4ha)
	PGW	Seen in small patches across the township. Majority of patches are large, remnant trees in clusters of greater than three specimens with little to no understorey vegetation. Most patches of PGW are located within Gl1	X	Gl1 (10.6ha)	Gl1, Gl2 (2.8ha)
	HHrW	Small patch extending from vegetation within Glenlyon Recreation Reserve within Gl3.	X	Gl3 (2.1 ha)	X
Total			**0ha**	**13.2ha**	**4.0ha**

4.3.2 Scattered Trees

A total of 20 Scattered Trees were documented across the Glenlyon Investigation Areas. The location of these trees is shown on Map 3K and Map 3L in Appendix 3

As shown, these Scattered Trees were located scattered across the Investigation Areas. Majority of trees were large in size and likely to be remnant vegetation retained during agricultural clearing. This includes some roadside vegetation

4.3.3 Threatened Ecological Communities

EPBC Act Listed Communities

Four EPBC Act listed communities have been identified using the PMST Act report as having potential to occur within the Glenlyon Township. Table 39 below provides more information on these communities and their occurrence within the Glenlyon Investigation Areas.

Table 39. EPBC Act listed community likely to occur

Listed communities	Status	Occurrence on site
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Critically Endangered	The PMST report states this community may occur within this Township's surrounds. Our assessment also confirms that this community is **possible** to occur within patches of EVC 71, Hills Herb Rich Woodland, within Gl3. Areas that were accessible were assessed as having Grey Box present and dominant in areas. The Glenlyon Township also has an annual rainfall of 580mm, within the range for this community
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	The Protected Matter Report states this community is likely to occur on site. This community is **possible** to be present within Gl3, with a native vegetation patch observed as Hills Herb Rich Woodland (EVC 71). Yellow Box is present within areas that were accessible, further surveying is required to confirm presence or absence,
Natural Temperate Grassland of the Victorian Volcanic Plain	Critically Endangered	The Protected Matter Report states this community may occur on site (in buffer area only). Our assessment also confirms that this community is **unlikely** to occur within the assessment area. Only small areas of grasslands were observed (within Gl1) and are of Low-Moderate quality. Few native grasses were observed across the site.
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	Critically Endangered	The Protected Matter Report states this community is likely to occur on site. Our assessment also confirms that is **possible** to occur on site. Areas of moderate quality Plains Grassy Woodland (EVC 55) have been observed; however the entirety of this site is located within the Central Victorian Uplands.
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered	**Possible** One wetland was identified over-the-fence within in Areas Gl1. However, a more detailed on-foot assessment is needed to determine if they could meet the Key Diagnostic Characteristics and Condition Thresholds of this biodiversity community

A detailed site assessment with access to all the properties included within the Township of Glenlyon is required to determine with certitude the presence of these EPBC Act listed communities. If future investigations confirm the occurrence of these listed communities on site, a referral to the DCCEEW may be recommended in due course. Should impacts to these communities be deemed a "significant impact", this may trigger Federal offset obligations. Further detail is provided in Section 5 below. Federal offset obligations.

FFG Act Communities

Listed threatened communities of flora and fauna under the FFG Act and their characteristics (DELWP 2022b) were consulted to determine their potential to occur within the Glenlyon Investigation Areas during the desktop review.

Based on this four State listed (FFG Act) threatened communities were identified with potential to occur within the Investigation Area. These are listed in Table 40.

Lowland Riverine Fish Community of the Southern Murray-Darling Basin and Grey Box – Buloke Grassy Woodland Communities are not expected to occur within the Investigation Areas. It is also unlikely that the Butterfly community and Victorian Temperate Woodland Bird Communities are present due to the lack of habitat present (little to no treed woodland to support either community) based on observations during the field surveys completed for this project.

If future investigations confirm the occurrence of these listed communities within the Glenlyon Investigation Areas, a permit may be required to remove them, or species that form part of them, from the areas where they occur on public land. For more information on legislation requirements see Section 5.

Table 40. FFG Act listed community likely to occur on site

Listed communities	Occurrence on site
Butterfly Community No. 1	This community is **very unlikely** to occur within the investigation zone as no characteristic species of this community are located within a 5km radius (according to VBA records). Little to no habitat components (woodland) present.
Victorian Temperate Woodland Bird Community	This community is **unlikely** to occur within the Investigation Areas as little to no characteristics of the community (woodland) was observed during ground truthing. Only two species have been recorded within 5 km (Brown-headed Honeyeater 2019 and Jacky Winter 2011).
Western Basalt Plains (River Red Gum) Grassy Woodland	Our assessment also confirms that is **possible** to occur on site. Areas of Plains Grassy Woodland (EVC 55) have been observed; however the entirety of this site is located within the Central Victorian Uplands.
Grey Box – Buloke Grassy Woodland Community	This community is **possibly present** within the Investigation Areas, within patches of EVC 71, Hills Herb Rich Woodland, within Gl3. No observations of Buloke were recorded however there are areas dominated by Grey Box that could represent this community. Further consideration required based on detailed field surveys.
Lowland Riverine Fish Community of the Southern Murray-Darling Basin	This community is **not present** within the Investigation Areas. Although in close proximity, the Loddon River does not pass through the Investigation Areas.

4.3.4 Flora

Flora species recorded

A total of 22 plant taxa were recorded during the field survey across the Glenlyon Investigation Areas, of which 15 were indigenous (68%) and 7 were introduced (32%).

Appendix 5 lists the flora recorded across the Glenlyon Investigation Areas. Please note that this was not a comprehensive list of species across the Investigation Areas as the survey was only undertaken from roadsides, on public land and via an over-the-fence inspection. Due to this and time limitations, the list is only based on an observation of the main character species observed.

Table 41. Summary of plant taxa recorded

Flora Status	Number of Taxa
Indigenous vascular taxa	15
Exotic taxa	7
TOTAL	**22**

State and Nationally Listed Flora Species

Field Survey

No national or state significant flora species were observed during field surveys within the Glenlyon Investigation Areas.

Database records

A search of the VBA found 597 flora species, including 129 introduced species, within a 5 km buffer of the Glenlyon Investigation Areas. Of these VBA records, 12 were significant flora species.

Records for listed flora within and adjacent to the Glenlyon Investigation Areas are shown in Map 3f. As shown by this mapping, there was only one significant flora species, Spotted Hyacinth-orchid, within the Wombat State Forest to the east of the Investigation Areas. There are likely to be a large number of significant flora present in areas that are unlikely to have been surveyed. a survey by Karl Just of the Glenlyon Biolink Reserve and Recreation Reserve to the east of the Loddon River recorded Austral Crane's bill *Geranium solanderi s.s* and Pale-flower Crane's-bill *Geranium sp. 3* both listed as threatened under the State legislation (FFG Act) as well as Matted Flax Lily *Dianella amoena,* which is listed under both National (EPBC Act) and State legislation (Just 2023).

The EPBC Act PMST tool identified a further 13 significant flora species with potential to occur within a 5 km buffer of the Investigation Areas based on modelled habitat suitability.

Of the 28 significant species (including 3 records from Karl Just's observations), five are considered to have at least a moderate likelihood of occurring within the Investigation Area, mainly within areas of grassy woodlands. Details of these species and reasoning for their likelihood of presence are given in Appendix 5.

Please note that the field survey was rapid, and of limited access and coverage, hence significant flora species may still have potential to occur within the Investigation areas as detailed in Appendix 5, despite not being observed during the field survey.

Table 42. Significant Flora species with at least a moderate likelihood of presence.

Scientific Name	Common Name	Listing Status^	
		EPBC Act	FFG Act
Dianella amoena	Matted Flax-lily	EN	Cr
Eucalyptus brookeriana	Brooker's Gum		En
Grevillea obtecta	Fryerstown Grevillea		En
Pultenaea graveolens	Scented Bush-pea		En
Pultenaea reflexifolia	Wombat Bush-pea		Vu

^ Listing Status Key:

EPBC Act 1999 conservation status: EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant.
FFG Act 1988 status: Status under FFG Act: Cd: Conservation dependant, Cr: Critically endangered, En: Endangered, Ex: Extinct, Th: Threatened, Vu: Vulnerable, En(ExV): Endangered (extinct in Vic)

Noxious Weeds

The declared noxious weeds under the *Catchment and Land Protection Act 1994* (CaLP Act) observed across the Investigation Areas are listed in Table 43. Two CaLP Act listed species were observed during the field survey, noting that again that this was not a comprehensive survey and was only an observation of the character species present across the Investigation Areas.

Table 43. Declared noxious weeds observed during field surveys.

Scientific Name	Common Name	Control Category (North Central)
**Rubus fruticosus spp. agg.*	Blackberry	C
**Ulex europaeus*	Gorse	C

4.3.5 Fauna

Incidental Fauna sightings

Several fauna species, predominantly birds, were observed during field surveys. Species recorded across the Glenlyon Investigation Areas are presented in Table 44

Table 44. Incidental fauna list recorded during field surveys.

Family	Record Type	Scientific Name	Common Name
Cacatuidae	Observed	*Platycercus elegans*	Crimson Rosella
Psittacidae	Observed	*Cacatua galerita*	Sulphur-crested Cockatoo
Cacatuidae	Observed	*Macropus giganteus*	Eastern Grey Kangaroo
Macropodidae	Observed	*Chenonetta jubata*	Australian Wood Duck
Anatidae	Observed	*Vanellus miles*	Masked Lapwing
Vanellinae	Observed	*Platycercus elegans*	Crimson Rosella
Cacatuidae	Observed	*Cacatua galerita*	Sulphur-crested Cockatoo

Fauna habitat

The main focus of the fauna assessment was to consider the potential of the Investigation Areas within the Township to provide habitat for rare or threatened fauna species.

As described earlier in section 3.1, key fauna habitat components observed within the Investigation Area are:

- Significantly large roadside trees, many of which contain hollows and bark types capable of supporting nesting and roosting for a number of species, including arboreal mammals, bats and birds.
- Scattered trees, again able to provide habitat for local fauna including microbats even where they occur as paddock trees
- Native plantings particularly in Gl1, that can provide local foraging resources and cover for a range of species over time, but especially woodland birds
- Wetland within Gl1, likely to support a range of bird species as well as amphibians, and act as a water source for mammals such as Eastern Grey Kangaroo
- Treed areas adjacent to Glenlyon Recreation reserve within Gl1 and Gl3, that include good canopy cover that can provide nesting, roosting and foraging resources for a range of native fauna species.
- Loddon River surrounds- although the Loddon River is not included within the Glenlyon Investigation Zones, the surrounding vegetation corridor extends into private property and provides habitat value for indigenous fauna,

State and Nationally Listed Fauna Species

Overall, 275 Fauna species were identified within a 5 km radius of the Glenlyon Investigation Area on the VBA database. Twenty-two of these were introduced species while 16 were listed as significant species under either state or national legislation. The location of the listed fauna records is shown in Map 3G (Appendix 3). There was a concentration of observations around certain areas as shown in Map 3G, but this may also reflect greater surveying time in these locations. Listed species documented on the VBA with post-1980 records within the Investigation Areas are shown in Table 45.

Table 45. Significant fauna records from VBA (post 1980) located within Investigation Areas

Scientific Name	Common Name	Investigation Area
Antigone rubicunda	Gang Gang Cockatoo	Gl1
Acrocephalus australis	Reed-warbler	Gl1
Myiagra cyanoleuca	Satin Flycatcher	Gl1 (close proximity to Investigation Area)
Aythya australis	Hardhead	Gl1 (close proximity to Investigation Area)

The PMST tool identified a further 27 significant species with potential to occur in the area but without records within a 5 km buffer of the Investigation Area.

This shows four significant fauna species within proximity of the Glenlyon township. These are all highly mobile birds (Gang-gang Cockatoo, Australian Reed Warbler, Satin Flycatcher and Hardhead) that can more readily navigate the highly cleared and fragmented landscape and tap into a range of habitat resources. Recent records for Southern Greater Gliders *Petauroides volans,* Powerful Owl and Brown Toadlet *Pseudophryne bibronii* have also been recorded in the Wombat State Forest to the south and east of the Investigation Areas.

Based on habitat suitability and local records, a number of the species documented on the VBA or predicted to occur based on the PMST have a moderate likelihood or higher of occurring within these same areas, as per Table 46.

Table 46. Significant fauna species with at least a moderate likelihood of occurrence

Source	Scientific Name	Common Name	Listing Status^		
			EPBC	FFG	Treaty
VBA and pers. Comms. Brian Bainbridge	*Acrocephalus australis*	Australian Reed Warbler			B
VBA	*Apus pacificus*	Fork-tailed Swift			C,R,J
VBA and pers. Comms. Brian Bainbridge	*Callocephalon fimbriatum*	Gang-gang Cockatoo	EN		
PMST	*Litoria raniformis*	Growling Grass Frog	VU	Vu	-
PMST	*Neophema chrysostoma*	Blue-winged Parrot	VU		
VBA	*Pseudophryne bibronii*	Brown Toadlet		En	-
PMST	*Synemon plana*	Golden Sun Moth	VU	Vu	-

^ Listing Status Key:

International Treaty B: Bonn Convention; C: CAMBA; J: JAMBA; R: ROKAMBA.
EPBC Act 1999 conservation status: EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant.
FFG Act 1988 status: Status under FFG Act: Cd: Conservation dependant, Cr: Critically endangered, En: Endangered, Ex: Extinct, Th: Threatened, Vu: Vulnerable, En(ExV): Endangered (extinct in Vic)

4.3.6 Connectivity Considerations

This section considers wildlife corridors through the Glenlyon Township and opportunities to strengthen existing habitat corridors and create linkages especially between core habitat areas (large areas of habitat suitable to support populations of a species) and habitat nodes (smaller areas of habitat that can provide additional habitat to that found in core areas). Map 2N provides an overview of wildlife corridors in and around the township. This connectivity mapping considered both the mapped vegetation within the township zones that are the focus of this report as well as a desktop analysis of vegetation across the wider landscape.

Core and Node habitat

The identified core and node areas are shown in within Map 3N.

- Glenlyon is fortunate to be surrounded by ranges with extensive forests including Wombat State Forest to the south-east, and Castlemaine Diggings National Heritage Park and Upper Loddon State Forests to the north and west, all of which form core areas of habitat.

- Holoombe Scenic Reserve forms a smaller (~21 ha) habitat node north of Glenlyon. The wetland area within Glenlyon itself was also considered a smaller habitat node.

Strengthening linkages between these core and node areas is strongly recommended and was a primary consideration when determining the habitat corridors shown in Map 3N.

Two key threatened arboreal species with records in the surrounding forested areas are the Southern Greater Glider *Petauroides volans* and Brush-tailed Phascogale. While these species were considered when assessing connectivity, this did not entail a detailed assessment or mapping of their particularly habitat attribute (e.g. presence of preferred food resources, tree hollows), and movement requirements. The Greater Glider has a relatively small home-range of ~1-5 ha but up to 19 ha in less fertile areas with their probability of occurrence found to increase with the area of remnant habitat (Lindenmayer 2000). They have a strong dependence on undisturbed, forested areas with several large hollow bearing trees per hectare. Importantly, they disperse poorly across vegetation that is not native forest (Lindenmayer 2000). Hence, strengthening, and enhancing corridors to ensure a strong canopy and understorey is a key consideration for the dispersal of this species between core and node habitat. The Brush-tailed Phascogale requires much larger home ranges (female up to 20-70 ha, males up to 100 ha) and has limited capacity to traverse cleared areas (SWIFFT 2021). Hence ensuring connectivity between core and node areas is important to ensure as much habitat availability as possible to this species.

The riparian corridor discussed below in relation to the Loddon River is also important for the dispersal of amphibians and aquatic and semi-aquatic species.

Wildlife Corridors

Glenlyon is largely cleared but the mapped patches of vegetation along the roadsides and other areas of the township contribute to several corridors as follows:

- Loddon River is a major corridor connecting Holoombe Scenic Reserve north of the township with core areas to the south. This riparian corridor could be further strengthened to ensure sufficient canopy and understory coverage to support dispersal of species such as Greater Gliders and Brush-tailed Phascogales discussed above. A smaller but still important corridor also exists adjacent the Racecourse and Recreation Reserve (labelled as GI3) that provides a rather direct link between the Loddon River and Wombat State Forest.
- A number of road reserves support large mature trees providing wildlife corridors from core areas to the south through the township itself to link with the wetland area in the township's north. Several potential linkages are shown in Map 3N, which would allow these corridors to extend beyond the wetland by connecting to other corridors that continue to the east and north to core habitat areas. These potential linkages currently lack sufficient tree and understorey cover to allow the dispersal of many arboreal species.

- The Daylesford–Malmsbury Road reserves are well vegetated providing an important corridor running east of the township to connecting to the Loddon River corridor and Core areas.

Road crossings were not considered in this connectivity work. If more detailed connectivity studies are undertaken, an assessment of road crossing and opportunities for specialised wildlife crossing structures, is recommended. Road kill data analysis could give an indication of priority areas for such structures.

4.3.7 Priority Areas for Retention

In summary, Glenlyon, historically dominated by open woodland has been transformed into areas of farmland and low-density housing.

In the context of the Investigation Areas that were the focus of this study, locations recommended for retention and future enhancement include:

- Road reserve corridors that support significant large trees and provide habitat to indigenous fauna, despite the lack of a native understorey. These trees likely contribute to the filtration and absorption of storm water runoff, in turn reducing the risk of flooding. These road reserves and their functioning as wildlife corridors could be enhanced through understorey plantings.

- Vegetation bordering Glenlyon Recreation Reserve and adjacent to Loddon River, which provide a substantial wildlife corridor between large reserves to the township's north, south and east.

- The large spring-fed wetland observed on public land within Gl1. This could potentially be providing habitat to multiple fauna species including Growing Grass Frogs. This wetland continues on private land north of Ford Street.

All three areas discussed above for retention were highlighted by Hepburn Shire Council as areas of interest for ground-truthing, and were confirmed to be areas of moderate biodiversity value.

4.4 Trentham

The Township of Trentham has three associated Investigation Areas. These are described in the table below.

Table 47. Trentham Investigation Areas

Investigation Area	Area within Clunes	Description of area
T1	Located towards the centre of all Investigation Areas.	Areas of high-density residential dwellings. Located within the town centre.
T2	Areas adjacent to T1 to the north (T2a), east (T2b) and west (T2c).	Low density residential housing with connecting vegetation to Wombat State Forest. Large areas of native vegetation within T2b.
T3	Fringe properties located to the west (T3a) and to the southwest (T3b).	Low-density residential housing with large areas of connecting vegetation from Wombat State Forest.

		Zone T3b is separated from all other Investigation Areas and surrounded by native vegetation.
T4	Fringe properties located to the northeast of the town centre	Small scale farming properties with remnant roadside vegetation located on Kyneton-Trentham Road.

4.4.1 Native Vegetation: EVCs and Quality

Maps 4K and 4L, Appendix 4, give an overview of vegetation extent, type and EVCs present across the Trentham Investigation Areas, as determined from the desktop review and subsequent field surveys.

Most native vegetation patches within the Trentham Township agreed with the EVCs previously modelled by the Department of Energy, Environment and Climate Action (DEECA). Areas where there was an exception over a substantial area included the following;

;

- Creekline Herb-rich Woodland (EVC 164) was observed in T3a in areas modelled as Shrubby Foothill Forest. These areas were in shallow drainage lines. Observed characteristic overstorey species of this EVC include Manna Gum *Eucalyptus viminalis,* and Narrow-leaf Peppermint *Eucalyptus radiata.*

- Sedgy Riparian Woodland (EVC 198) was observed in T2b in areas that were modelled as Shrubby Foothill Forest. These areas appeared subject to seasonal inundation and waterlogging with drainage streams running throughout. Observed characteristic overstorey species of this EVC include Swamp Gum, Narrow-leaf Pepperment, and Messmate Stringeybark. Sedgy Riparian Woodland has been modelled directly adjacent to these areas to the west and north of T2b.

Approximately 21% of the Trentham Investigation Areas are covered by native vegetation. The desktop assessment and the field surveys undertaken as part of this study revealed that four EVCs are likely to occur within the Investigation Areas, in the form of patches of native vegetation or Scattered Trees. Map 'K'& 'L' for Trentham (Appendix 4) and Table 48 detail the native vegetation present throughout the Trentham Investigation Areas as determined by this current study.

As shown in Table 48, the Trentham Investigation Areas are likely to support approximately 109.3 ha of native vegetation as patches. General condition of this native vegetation was determined as part of field surveys and through consultation of DEECAs NatureKit.

Table 48. Native Vegetation Patches within Trentham Investigation Areas.

Bioregion	EVC	Township EVC description	Investigation Area(s) and Hectares by Quality		
			High/ Indicative High	Medium/ Indicative Medium	Low/ Indicative Low
Central Victorian Uplands	SRW	Areas of moderate and low quality SRW towards the southern and northern ends of Trentham township. Most of these patches are connected to larger patches of native vegetation in the greater landscape, such as Wombat State Forest to the south.	X	T1a, T2b, T2c (6.8ha)	T1a, T2b, (2.3ha)
	SFF	Predominate EVC across the township and of varying quality. Largely seen in areas T3b.	T1a, T2b, T3a, T3b (42.5ha)	T1a, T2a, T2b, T2c, T3a, T3b, T4 (36.2ha)	T3a, T3b, T1a, T1b, T2a, T2b, (14.5ha)
	HRFF	Seen in small patches across the township. Largely in areas that were unable to be accurately assessed (north of T3b)	X	T2c, T3b, T1a (5.3ha)	T2c (0.2ha)
	ClHrW	Small patch of high quality seen in zone T3a, dominated by Candlebark.	T3a (1.5ha)	X	X
Total			**44ha**	**48.3ha**	**17ha**

4.4.2 Scattered Trees

A total of 29 Scattered Trees were documented across the Trentham Investigation Areas. The location of these trees is shown on Map 4K and Map 4L in Appendix 4.

As shown, these Scattered Trees were located across the Investigation Areas and more concentrated in areas of residential developments. This is likely due to historical clearing of surrounding native vegetation for development, leaving individual trees that were likely part of a larger stand of trees.

4.4.3 Threatened Ecological Communities

EPBC Act Listed Communities

Four EPBC Act listed communities have been identified using the PMST Act report as having potential to occur within the Trentham Township. Table 49 below provides more information on these communities and their occurrence within the Trentham Investigation Areas.

Table 49. EPBC Act listed community likely to occur

Listed communities	Status	Occurrence on site
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Critically Endangered	The Protected Matter Report states this community may occur on site. Our assessment confirms that it is **very unlikely** to occur on site. No relevant EVCs with synergies with this biodiversity community have been recorded
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	The Protected Matter Report states this community is likely to occur on site. Our assessment confirms that it is **very unlikely** to occur on site. No relevant EVCs with synergies with this biodiversity community have been recorded
Natural Temperate Grassland of the Victorian Volcanic Plain	Critically Endangered	The Protected Matter Report states this community may occur on site. Our assessment confirms that this community is **very unlikely** to occur within the assessment area. Only small areas of low-quality grasslands were observed (within T3a) Few native grasses were observed across the site.
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	Critically Endangered	The Protected Matter Report states this community may occur on site. Our assessment confirms that it is **very unlikely** to occur on site. No relevant EVCs with synergies with this biodiversity community have been recorded.

A detailed site assessment with access to all the properties included within the Township of Trentham is recommended to determine with certitude the presence of these EPBC Act listed communities. If future investigations confirm the occurrence of these listed communities on site, a referral to the DCCEEW may be recommended in due course. Should impacts to these communities be deemed a "significant impact", this may trigger Federal offset obligations. Further detail is provided in Section 5 below.

FFG Act Communities

Listed threatened communities of flora and fauna under the FFG Act and their characteristics (DELWP 2022b) were consulted to determine their potential to occur within the Trentham Investigation Areas during the desktop review.

Based on this, three State listed (FFG Act) threatened communities were identified with potential to occur within the Investigation Area. These are listed in Table 50.

As shown in Table 50, all communities that that were identified as potentially present within the Trentham Investigation Areas as part of the desktop review undertaken, are considered unlikely, very unlikely or not present based on observations during the field surveys completed for this project.

If future investigations confirm the occurrence of these listed communities within the Trentham Investigation Areas, a permit may be required to remove them, or species that form part of them, from the areas where they occur on public land. For more information on legislation requirements see Section 5.

Table 50. FFG Act listed community likely to occur on site

Listed communities	Occurrence on site
Butterfly Community No. 1	This community is **very unlikely** to occur within the investigation zone as no characteristic species of this community are located within a 5km radius (according to VBA records). Some habitats components are present of varying qualities.
Victorian Temperate Woodland Bird Community	This community is **unlikely** to occur within the Investigation Areas as little to no characteristics of the community was observed to support listed species. Only five species have been recorded within 5 km and only two within recent times (last decade).
Grey Box – Buloke Grassy Woodland Community	This community is **not present** within the Investigation Areas. No observations of Buloke were recorded and it is unlikely to be located within the Investigation Areas.

4.4.4 Flora

Flora species recorded

A total of 45 plant taxa were recorded during the site visit, of which 15 were indigenous (71%) and 7 were introduced (29%). Appendix 5 lists the flora recorded across the Investigation Areas ground according to the EVCs in which they were recorded. This was not a comprehensive list of species across the Investigation Areas as the survey was only undertaken from road-side, public land and over-the-fence, and due to time limitations, the list is only an observation of the main character species.

Table 51. Summary of plant taxa recorded

Flora Status	Number of Taxa
Indigenous vascular taxa	32
Exotic taxa	13
TOTAL	**45**

State and Nationally Listed Flora Species

Field Survey

One protected species was observed during field surveys: Creeping Grevillea *Grevillea repens*. All observations and records of this species have been included in the Significant Flora Map for the Daylesford – Hepburn Springs Township (Map 2f, Appendix 1).

Two protected species was observed during the field survey. All observations and records of Brooker's Gum *Eucalyptus brookeriana* and Wiry Bossiaea *Bossiaea cordigera* have been included in the Significant Flora Map for the Trentham Township (Map 4F, Appendix 4).

Brooker's Gum is listed as Endangered under the FFG Act. The species is only known to occur in two areas in Victoria, on the northern foothills of the Otway Ranges, and north of the Great Dividing Range in the Bells Reef-Trentham area. Within the Trentham Investigation Areas, this species was observed in Investigation Area T2b.

Wiry Bossiaea is listed as Endangered under the FFG Act. The species occurs sporadically in south-western and central Victoria, but is apparently nowhere common. It favours moist situations in

heathland, heathy woodland and open-forest and flowers from October to January. Within the Trentham Investigation Areas, this species was observed in Investigation Area T3b, along the western boundary.

Database records

A search of the VBA found 589 flora species, including 116 introduced species, within a 5 km buffer of the Trentham Investigation Areas. Of these 15 were significant flora species.

Records within and adjacent to the Trentham Investigation Areas are shown in Map 4F. Species were seen to mostly occur in within the centre of Trentham Township, this is likely due to increased surveys within this area as opposed to vegetation quality. A high concentration of records was observed directly south and west of the Investigation Area within Wombat State Forest, this is likely due to past surveys as well as high quality vegetation within these areas. All species that were recorded within the Investigation areas are listed in Table 52 below.

Table 52. Significant Flora species recorded within the Investigation Area

Scientific Name	Common Name	Investigation Area
Eucalyptus brookeriana	Brooker's Gum	T1, T2
Pultenaea reflexifolia	Wombat Bush-pea	T3a
Bossiaea cordigera	Wiry Bossiaea	T3

As shown by this mapping there are three significant flora species located within the Investigation Areas. Two significant species were observed during the limited site assessment, demonstrating that there is likely to be numerous unrecorded species located within the Investigation Areas due to the lack of surveying efforts (mainly within privately owned land). These species have been included within the significant species table despite not yet being uploaded to the VBA.

The EPBC Act PMST tool identified a further 13 significant flora species with potential to occur within a 5 km buffer of the Investigation Area based on modelled habitat suitability.

Of the 28 significant species, nine were considered to have at least a moderate likelihood of occurring within the Investigation Area, mainly within areas of eucalyptus woodland. Details of these species and reasoning for their likelihood of presence are given in Appendix 5. Please note that the field survey was rapid, and of limited access and coverage, hence significant flora species may still have potential to occur within the Investigation areas as detailed in Appendix 5, despite not being observed during the field survey.

Table 53. Significant Flora species with at least a moderate likelihood of presence

Scientific Name	Common Name	Listing Status^	
		EPBC Act	FFG Act
Acacia nanodealbata	Dwarf Silver-wattle		Vu
Bossiaea cordigera	Wiry Bossiaea		En
Dipodium pardalinum	Spotted Hyacinth-orchid		En
Eucalyptus brookeriana	Brooker's Gum		En
Eucalyptus yarraensis	Yarra Gum		Cr
Leucopogon microphyllus var. pilibundus	Hairy Beard-heath		En
Lepidium hyssopifolium s.s.	Basalt Peppercress	EN	En
Platylobium rotundum	Penny-leaf Flat-pea		En
Pultenaea reflexifolia	Wombat Bush-pea		Vu

^ **Listing Status Key:**

EPBC Act 1999 conservation status: EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant.
FFG Act 1988 status: Status under FFG Act: Cd: Conservation dependant, Cr: Critically endangered, En: Endangered, Ex: Extinct, Th: Threatened, Vu: Vulnerable, En(ExV): Endangered (extinct in Vic).

Noxious Weeds

The declared noxious weeds under the *Catchment and Land Protection (CaLP) Act 1994* observed on site are listed in Table 54. Three CaLP listed species were observed during the field survey, noting that again that this was not a comprehensive survey and was only an observation of the character species present across the Investigation Areas.

Table 54. Declared noxious weeds observed during the Field Survey.

Scientific Name	Common Name	Control Category (North Central)
**Cytisus scoparius*	English Broom	R
**Rubus fruticosus spp. agg.*	Blackberry	C
**Salix spp.*	Willows	R
**Ulex europaeus*	Gorse	C

4.4.5 Fauna

Incidental Fauna sightings

Several fauna species, predominantly birds, were observed during field surveys. Species recorded across the Trentham Investigation Areas are presented in Table 55.

Table 55. Incidental fauna list recorded during site visit

Family	Record Type	Scientific Name	Common Name
Macropodidae	Observed	*Wallabia bicolor*	Black-tailed Wallaby
Anatidae	Observed	*Chenonetta jubata*	Australian Wood Duck
Psittacidae	Observed	*Platycercus elegans*	Crimson Rosella
Macropodidae	Observed	*Macropus giganteus*	Eastern Grey Kangaroo
Alcedinidae	Observed	*Dacelo novaeguineae*	Laughing Kookaburra
Maluridae	Observed	*Malurus cyaneus*	Superb Fairy-wren
Artamidae	Observed	*Gymnorhina tibicen*	Australian Magpie

Fauna habitat

The main focus of the fauna assessment was to consider the potential of the Investigation Areas within the Township to provide habitat for rare or threatened fauna species.

Key areas of fauna habitat observed within the Investigation Areas are:

- Vegetation along watercourses such as Doctors Creek
- Densely treed areas such as south of Racecourse Road.

State and Nationally Listed Fauna Species

Overall, 341 Fauna species were identified within a 5 km radius of the Trentham Investigation Area on the VBA database. 19 of these were introduced species while 42 were listed as significant species under either state or national legislation. The location of the listed fauna records is shown in Map 4G (Appendix 4). There was a concentration of observations around certain areas as shown in Map 4G, but this may also reflect greater surveying time in these locations. Listed species documented on the VBA with post-1980 records within the Investigation Areas are shown in Table 56.

Table 56. Significant fauna records from VBA (post 1980) located within Investigation Areas

Scientific Name	Common Name	Investigation Area
Ardea alba modesta	Eastern Great Egret	T1
Callocephalon fimbriatum	Gang-gang Cockatoo	T1 and T3*
Heteronympha cordace	Bright-eyed Brown Butterfly	T1**
Litoria raniformis	Growling Grass Frog	T3
Ninox strenua	Powerful Owl	T3

*Records from Atlas of Living Australia

** This is a locally significant species not listed under the FFG or EPBC Acts

The PMST tool identified a further 27 significant species with potential to occur in the area but without records within a 5 km buffer of the Investigation Area.

These records were primarily scattered through the Wombat State Forests ranges that hug Trentham to the south. There were many records for Growling Grass Frog and Powerful Owl near and within the township Investigation Areas. Other records nearby within the Wombat State Forest included Gang Gang Cockatoos, Greater Gliders *Petauroides Volans* and Brush-tailed Phascogales.

As with the other townships, there was also a predominance of bird species which are highly mobile and can more readily navigate the highly cleared and fragmented landscape and tap into a range of habitat resources.

It is also understood that Hepburn Shire's Biodiversity Officer, Brian Bainbridge has observed Bright-eyed Brown butterfly *Heteronympha cordace ssp. cordace* within the central township of Trentham (see Map 4G (Appendix 4)), This species and the most recent observations have been considered following discussion with butterfly experts on possible conservation significance of local populations of this species (B Bainbridge pers. comm., 2023).

Based on habitat suitability and local records, a number of the species documented on the VBA or predicted to occur based on the PMST have a moderate likelihood or higher of occurring within these same areas, as per Table 57. Details and reasoning for their likelihood of presence are given in Appendix 7.

Table 57. Significant fauna species with at least a moderate likelihood of occurrence

Source	Scientific Name	Common Name	Listing Status^		
			EPBC	FFG	Treaty
VBA	*Accipiter novaehollandiae*	Grey Goshawk		En	
VBA and pers. Comms. Brian Bainbridge	*Callocephalon fimbriatum*	Gang-gang Cockatoo	EN		
VBA	*Hirundapus caudacutus*	White-throated Needletail	VU	Vu	C,R,J
VBA	*Litoria raniformis*	Growling Grass Frog	VU	Vu	
VBA	*Myiagra cyanoleuca*	Satin Flycatcher			B
VBA	*Neophema chrysostoma*	Blue-winged Parrot	VU		
VBA	*Ninox strenua*	Powerful Owl		Vu	
VBA	*Petauroides volans*	Greater Glider	VU	Vu	
VBA	*Phascogale tapoatafa*	Brush-tailed Phascogale		Vu	
VBA	*Rhipidura rufifrons*	Rufous Fantail			B

^ Listing Status Key:

International Treaty B: Bonn Convention; C: CAMBA; J: JAMBA; R: ROKAMBA.
EPBC Act 1999 conservation status: EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant.
FFG Act 1988 status: Status under FFG Act: Cd: Conservation dependant, Cr: Critically endangered, En: Endangered, Ex: Extinct, Th: Threatened, Vu: Vulnerable, En(ExV): Endangered (extinct in Vic)Vu – vulnerable, En – Endangered, Cr – Critically Endangered. B – Bonn treaty, R – ROKAMBA treaty, J–JAMBA treaty C–CAMBA treaty

In summary, the main habitats likely to be used by the listed fauna species included:

- Wombat State Forest to the south and Coliban river corridor

- Areas of treed habitat, particularly areas of high-quality vegetation within T1a, T2b, T3a, and T3b. These areas are more likely to support listed significant species due to their connectivity and higher percentage of indigenous vegetation.

- Creeks and waterbodies (Doctors Ck, Stony Ck, Trent Ck, Coliban River).

4.4.6 Connectivity Considerations

This section considers wildlife corridors through the Trentham Township and opportunities to strengthen existing habitat corridors and create linkages especially between core habitat areas (large areas of habitat suitable to support populations of a species) and habitat nodes (smaller areas of habitat that can provide additional habitat to that found in core areas). Map 2N provides an overview of wildlife corridors in and around the township. This connectivity mapping considered both the mapped vegetation within the township zones that are the focus of this report as well as a desktop analysis of vegetation across the wider landscape. .

Core habitat areas

- Trentham is nestled into the Wombat State Forest primarily to its south and west, with this area providing key core habitat – mapped brown in Map 4N.

  Most of the larger patches of mapped indigenous vegetation within the investigation areas abut the Wombat State Forest to the south and essentially contribute to this core area. These patches were typically of medium to high quality and their retention highly recommended. Any proposed development or clearing should consider its impacts on connectivity and avoid the creation of isolated, fragmented patches.

- The Wombat State Forest also consists of separated core areas to the north (shown in Map 4N) and west (not shown in Map 4N and beyond the focus area of this analysis).

  Strengthening linkages between these areas is strongly recommended and was a key consideration when determining habitat corridors shown in Map 4N.

Two key threatened arboreal species with records within the Wombat State Forest are the Southern Greater Glider and Brush-tailed Phascogale. Both and have been loosely considered when assessing connectivity. This did not entail a detailed assessment of their habitat quality and attributes (e.g. presence of preferred food resources, tree hollows), and movement requirements. The Greater Glider has a relatively small home-range of ~1-5 ha but up to 19 ha in less fertile areas with their probability of occurrence found to increase with the area of remnant habitat (Lindenmayer 2000). They have a strong dependence on undisturbed, forested areas with several large hollow bearing trees per hectare. Importantly they disperse poorly across vegetation that is not native forest (Lindenmayer 2000). Hence, as mentioned above, strengthening, and enhancing corridors between core areas of Wombat State Forest is a key consideration for this species. The Brush-tailed Phascogale requires much larger home ranges (female up to 20-70 ha, males up to 100 ha) (SWIFFT 2021), hence connectivity of areas is important to ensure sufficient habitat availabiltiy.

The riparian corridors discussed below in relation to creeks and the Coliban river are also important for the dispersal of amphibians and aquatic and semi-aquatic species including threatened species such as the Platypus and Growling Grass Frogs, with records in the area.

Wildlife Corridors

Based on the above considerations several habitat corridors were identified within Trentham as shown in Map 4N.

- Coliban River is a major Corridor between the north and south core areas of Wombat State Forest. This could be further strengthened to ensure sufficient canopy and understory coverage to support dispersal of species such as Greater Gliders and Brush-tailed Phascogales discussed above.
- Several smaller creeks (incl. Stony and Trent Creeks) running north to south and feeding into Coliban River provide important wildlife corridors through the township, connecting the southern and northern areas of Wombat State Forest. There is a significant opportunity to strengthen these corridors, through restoration and revegetation works.
- Mapped vegetation patches along property boundaries, the golf course and road sides provide further connectivity through the township as shown in Map 4N.
- The Domino Trail provides a key corridor running in a west-east direction through the township providing an important linkage between the various creek corridors. Again there is significant opportunity to strengthen this corridor through revegetation works.

Please note that road crossings were not considered in this connectivity work. If more detailed connectivity studies are undertaken, an assessment of road crossing and opportunities for specialised wildlife crossing structures, is recommended. Road kill data analysis could give an indication of priority areas for such structures.

4.4.7 Priority Areas for Retention

The township of Trentham is surrounded by Wombat State Forest. The township areais likely to have been historically densely treed but is now transformed into areas of small-scale farming and residential areas. Areas recommended for retention and enhancement include:

- Road reserve corridors with remnant vegetation including Beatties Rd – Mullens road, Kyneton-Trentham Road and Feelays Lane.
- Mapped vegetation abutting Wombat State Park located within private properties and road reserves.Vegetation along the Coliban River and Creek Corridors, and other identified habitat corridors (Section 4.4.6 which provide important connectivity through the township and between parts of Wombat State Forest.

Four areas were highlighted by Hepburn Shire Council in the RFQ as areas of interest:

- Roadside vegetation within Vegetation Protection Overlay along Kyneton-Trentham Road
- Areas along the Trent and Stony Creeks
- Feelys Lane – Blue-Mount Road -Puddingstone Road vicinity
- Beatties Rd – Mullens road – Chamberlains Road vicinity

All four were confirmed during ground truthing to have moderate to high biodiversity value based on the native vegetation and flora species present, and the habitat for fauna that these areas are expected to provide. Further detail on Wombat State Forest is discussed below.

Wombat State Forest

Wombat State Forest is located to the south and west of Trentham Investigation zones and has connecting vegetation into private property and road reserves. Wombat State Forest provides habitat to numerous protected flora and fauna species. This forest is an asset to both biodiversity and the local community of Hepburn Shire Council. All areas of assessed vegetation providing connectivity to Wombat State Forest (such as Investigation Areas T3b and T2b) should be protected from any proposed development.



Figure 14. Areas of native vegetation along Racecourse Road connecting to Wombat State Forest

5. RELEVANT POLICY AND LEGISLATION

Planning and approval requirements associated with future development of the Investigation Area and any additional surveys that may be required are provided in below in Table 58 in relation to National and State legislation.

Table 58. Relevant Policy and Legislation and associated permits and approvals

Legislation	Description	Relevance and Constraints
Environment Protection and Biodiversity Conservation Act 1999	The EPBC Act applies to sites where proposed developments or projects may have a significant impact on Matters of National Environmental Significance (MNES). There are nine MNES: • World heritage sites; • National heritage places; • Wetlands of international importance (often called 'Ramsar' wetlands after the international treaty under which such wetlands are listed); • Nationally threatened species and biodiversity communities; • Migratory species; • Commonwealth marine areas; • Nuclear actions; • The Great Barrier Reef Marine Park; and • A water resource, in relation to coal seam gas development and large coal mining development. Under the EPBC Act, a proponent must refer proposed actions that may have a significant impact on matters of national environmental significance to the Australian Government Environment Minister (or delegate). The EPBC Act provides for the listing of nationally threatened native species and biodiversity communities, native migratory species and marine species. The EPBC Act protects Australia's native species and biodiversity communities by providing for: • Identification and listing of species and biodiversity communities as threatened; • Development of conservation advice and recovery plans for listed species and biodiversity communities; • Development of a register of critical habitat; • Recognition of key threatening processes; and • Where appropriate, reducing the impacts of these processes through threat abatement plans.	EPBC Act listed ecological communities with the potential to occur within the four Townships and their associated Investigation Areas are described in Section 3.2.1. As outlined in this Section, it is possible that the following communities may occur: • *Natural Temperate Grassland of the Victorian Volcanic Plain* – Possibly occurring within the Clunes Investigation Areas. • *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*– Possibly occurring within the Clunes and Glenlyon Townships and Highly Likely to be present within the Daylesford-Hepburn Springs Townships. • *Grassy Eucalypt Woodland of the Victorian Volcanic Plain* – Possibly occurring within the Glenlyon Township and Highly Likely to be present within the Clunes Township. • *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia*– Possibly occurring within the Daylesford-Hepburn Springs and Glenlyon Townships and likely to be present within the Clunes Township. • *Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains*– Possibly occurring within the Clunes Investigation Areas. For more information regarding locations and likelihoods as discussed above, see individual Township results, Section 4. While it is possible that these communities could occur, further surveying is needed to confirm if the native vegetation within the Investigation Areas indeed meets the Key Diagnostic Characteristics and Condition Thresholds for these communities. In addition to EPBC Act listed communities, three flora species and 10 fauna species listed under the EPBC Act were considered to have at least a moderate likelihood of occurrence within the Investigation Areas within the 4 townships (See Section 0). If present, there is potential for EPBC Act listed communities, along with species and their associated habitat, to constrain opportunities for development within the Investigation Areas as measures to avoid and minimise impacts to these values (if present) will be required. Any unavoidable impacts to confirmed EPBC Act listed communities and/or species that may result in a significant impact to these matters, as defined by the EPBC Act, may also require federal offsets to be sourced and managed. These constraints and implications are taken into consideration as part of the recommendations for potential development within each Investigation Area discussed in Section 6.

Legislation	Description	Relevance and Constraints
Flora and Fauna Guarantee Act 1988	The FFG Act was legislated to ensure the continued survival of all Victorian species of flora and fauna and all Victorian communities of plants and animals. The FFG Act provides a number of ways to achieve its objectives including: • The listing of threatened taxa, communities of flora or fauna and potentially threatening processes, and creation of Action Statements and Management Plans for these. • Listing of protected flora species. It is an offence to take, trade in, keep, move or process protected flora without a permit, or unless authorised by Order of the Governor in Council published in the Government Gazette (GIC Order). The FFG Act defines "take" to mean to kill, injure, disturb or collect. This does not apply to private land where permission is given by the owner and the flora is not taken for the purposes of selling. • Declaration of a Critical Habitat if the habitat is critical for the survival of a species or a community of flora or fauna, if listed as Critical Habitat, the Minister for Environment may then make an Interim Conservation Order (ICO) to conserve the Critical Habitat (NB: no Critical Habitat has been declared in the State). • Protection of flora and fauna through listing offences such as penalties relating to not following an ICO and taking, trading in, keeping, moving or processing protected flora without a licence. (NB: this does not apply to taking protected flora from private land (other than land which is part of the critical habitat for the flora) except for taking tree-ferns, grasstrees or sphagnum moss for the purpose of sale. DEECA is the referral authority for matters under the FFG Act. Proponents are required to apply for a Protected Flora Permit to 'take' flora in areas of public land (e.g., road reserves) that are listed as protected or threatened. This also includes individual species that may belong to an FFG Act listed community. A permit is not typically required under the FFG Act to take listed species on private land if it is not taken for the purposes of selling.	Based on the desktop analysis and field surveys the following communities have been assessed as, at a minimum. possibly occurring in at least one township; • *Western Basalt Plains (River Red Gum) Grassy Woodland*– Likely present in Clunes • *Victorian Temperate Woodland Bird Community*– Likely in Clunes and Possible in Daylesford-Hepburn Springs in woodland areas with previous recordings of characteristic species for this community • *Western (Basalt) Plains Grasslands Community*– Likely in Clunes. Beyond communities, three FFG Act listed flora species were recorded during the field surveys completed as part of this study: Creeping Grevillea, Brookers Gum and Wiry Bossiaea. A range of additional FFG Act listed flora and fauna are also expected to occur within the Investigation Areas. This includes seventeen flora species and ten fauna species listed under the FFG Act that were considered to have at least a moderate likelihood of occurrence within the four Township's Investigation Areas. The FFG Act requires public authorities to have regard to the objectives of the Act in their operations, which includes the conservation of all of Victoria's taxa of flora and fauna. Development of public areas within the Investigation Area with potential to impact the listed communities, flora and fauna may require a permit from DEECA. This could include road widening, realignment or accessways, for example. Much of the Investigation Area is privately owned however, and therefore the provisions of the FFG Act do not directly apply to many of these areas. However, there is still a need to consider the FFG Act and listed species and communities under the *Planning and Environment Act 1987* as directed by Clause 12 of all Victorian Planning Schemes. Further surveying of native vegetation patches is required to determine if they represent FFG Act listed communities. Further analysis is also required to determine the known and potential presence of listed flora and fauna species, noting that several are already known to occur. Much like the presence of EPBC Act listed matters, FFG Act communities and listed species may constrain opportunities for development, particularly where they occur on public land but also on public land given wording in Clause 12 of all Victorian Planning Schemes. These constraints and implications are taken into consideration as part of the recommendations for potential development within each Investigation Area discussed in Section 6.

Legislation	Description	Relevance and Constraints
Environment Effects Act 1978	Under Victoria's *Environmental Effects Act 1978*, projects that could have a 'significant effect' on Victoria's environment can potentially require an Environmental Effect Statement. This Act applies to works 'reasonably considered to have or be capable of having a significant effect on the environment'. The Minister for Planning and Environment is the responsible person for assessing whether this Act applies. The criteria for the types of potential effects on the environment that might be of significance with regard to ecology include: • Clearing of 10 ha or more of native vegetation (that is of an endangered EVC or of very high conservation significance); • Impacts to matters listed under the *Flora and Fauna Guarantee Act 1988*, including: o Potential loss of a significant area of a listed biodiversity community; or o Potential loss of a genetically important population of an endangered or threatened species (listed or nominated for listing), including as a result of loss or fragmentation of habitats; or o Potential loss of critical habitat; or o Potential significant effects on habitat values of a wetland supporting migratory bird species. • Potential extensive or major effects on land stability, acid sulphate soils or highly erodible soils over the short or long term; and • Potential extensive or major effects on beneficial uses of waterbodies over the long-term due to changes in water quality, stream flows or regional groundwater levels. The above are based on referral criteria in the *Ministerial guidelines for assessment of environmental effects under the Environment Effects Act 1978* (DSE 2006).	The following thresholds associated with the *Environmental Effects Act 1978* could trigger the need for an EE Act referral for individual subdivisions and developments in due course, given the presence of the following in each Township: • Greater than 10ha of native vegetation patches from an Endangered EVC or of very high conservation significance. • Contains FFG listed ecological communities, with an area, that if lost could be deemed significant • Range of endangered or threatened species that could utilise the habitat within the Investigation Areas and could be lost Before commencing any works to which this Act applies, a proponent firstly must undertake a self-assessment to determine if the proposal meets the criteria to trigger an Environmental Effects Statement (EES). If the trigger is met, then the proponent must initiate an EES referral to the Victorian Minister for Planning. The Minister will then make a decision on the need for an EES.

Legislation	Description	Relevance and Constraints

Planning and Environment Act 1987

The *Planning and Environment Act 1987* establishes the framework for planning the use, development, and protection of land in Victoria in the present and long-term interests of all Victorians. This includes providing the structure for and administering the implementation of Planning Schemes in each municipality through the Victorian Planning Provisions (VPPs). Planning Schemes are legal instruments outlining provisions for land use, development, and protection. They are constructed and sourced from the VPPs.

Planning Policy Framework

Clause 12 – Environmental and Landscape Values

Clause 12 of the planning scheme recognises that:

- *Planning should help to protect the health of ecological systems and the biodiversity they support (including ecosystems, habitats, species, and genetic diversity) and conserve areas with identified environmental and landscape values.*
- *must implement environmental principles for ecologically sustainable development that have been established by international and national agreements.*
- *should protect sites and features of nature conservation, biodiversity, geological or landscape value*

Two subclauses are particularly relevant as discussed below.

12.01-1S Protection of biodiversity

The objective of Clause 12.01-S is to protect and enhance Victoria's biodiversity. It provides several strategies to meet this objective including:

- *Use biodiversity information to identify important areas of biodiversity, including key habitat for rare or threatened species and communities, and strategically valuable biodiversity sites.*
- *Strategically plan for the protection and conservation of Victoria's important areas of biodiversity.*
- *Ensure that decision making takes into account the impacts of land use and development on Victoria's biodiversity, including consideration of:*
  - *Cumulative impacts.*
  - *Fragmentation of habitat.*
  - *The spread of pest plants, animals and pathogens into natural ecosystems.*
- *Avoid impacts of land use and development on important areas of biodiversity.*

The body of work presented in this report is an important aspect of implemented this Clause's strategies. The fieldwork, data analysis and discussion of this report relate to identifying ecological values throughout the areas of the township most likely to be affected by development pressure. The ecological values identified include:

- High quality areas of indigenous vegetation
- Vegetation areas likely to represent threatened communities
- Habitat likely to support listed species under the FFG Act and EPBC Act
- Wildlife Corridors/Connectivity
- Culturally significant flora and fauna

This biodiversity information will ensure the Township Structure Plans are well informed and allow strategic planning to direct future development and land-use in a manner to protect and enhance biodiversity. It is key that the town planning process considers the identified ecological values and applies these strategies when developing the new township structure plans.

Legislation	Description	Relevance and Constraints
	• *Consider impacts of any change in land use or development that may affect the biodiversity value of national parks and conservation reserves or nationally and internationally significant sites;* • *Assist in the identification, protection and management of important areas of biodiversity.* • *Assist in the establishment, protection and re-establishment of links between important areas of biodiversity, including through a network of green spaces and large-scale native vegetation corridor projects.* • *Support land use and development that contributes to protecting and enhancing habitat for indigenous plants and animals in urban areas.*	
	12.01-1L Native vegetation and habitat protection Further information on local biodiversity values and strategies is provided by the local clause 12.01 L which has the objective to protect and enhance the Shire's native vegetation and habitats. This clause has strategies: • *Protect identified remnant vegetation and habitat across the Shire as shown on the Native vegetation and habitat protection map.* • *Enhance linkages between habitat on private land, roadsides, waterways and public land for wildlife and plant dispersal.* • *Encourage revegetation and restoration in areas of significant remnant areas.* • *Protect large old native trees on private and public land.* • *Protect native vegetation and habitat significant to the survival of the listed threatened species.* • *Retain Environment Protection and Biodiversity Conservation Act (EPBC) listed ecological communities as a significant environmental and landscape asset.*	As discussed above in relation to Clause 12.01-1S, this current body of work provides the necessary biodiversity information to ensure the strategies under Clause 12.01-1L can be implemented in an informed and effective manner so that future development and township structure plans respond appropriately to protect and enhance the identified ecological values. However, it should be kept in mind that the surveys were undertaken from the roadsides, public land and "over-the fence". Hence ecological values may have been missed, and further "on-foot" detailed biodiversity surveys are recommended where rezoning or future development is planned, especially where surveying was undertaken over-the-fence. For example, a key strategy is the protection of large old trees. However, due to the nature of the survey it is unlikely these have all been captured. Table 61also indicates where targeted surveys are recommended to confirm the presence of listed species and communities. Noxious weeds under the CaLP Act were also noted when observed for each township with weed management strategies discussed at Section 6.2, and as per the strategies of this Clause could be considered in town planning with requirements for land owners to remove these.

Legislation	Description	Relevance and Constraints
	• *Encourage the planting of indigenous vegetation that responds to the bioregion it is located within as listed in Table 1.* • *Encourage land owners to protect and enhance local biodiversity through the removal of weeds listed in the Catchment and Land Protection Act 1994 and the very high threat list in the Advisory List of Environmental Weeds in Victoria.* • *Locate development to minimise loss of significant remnant vegetation and identified habitat areas.* • *Encourage the maintenance and enhancement of habitat corridors in new and existing residential areas and along township watercourses and open space corridors.* • *Encourage proposals to retain and establish vegetation that links regional biodiversity assets and significant wetlands outlined in the North Central Regional Catchment Strategy 2013–2019.* • *Minimise the number of vehicle crossovers and additional access points to vegetated roadsides.* • *Complement the three-step approach to the removal of native vegetation outlined in the Guidelines for the removal, destruction or lopping of native vegetation by seeking to improve biodiversity outcomes prior to considering any offsets.* The Clause also lists known significant habitat, listed species, and vegetation communities, to threatened species, communities.	
	Clause 12.03-1S has the objective to protect and enhance waterway systems including ***river and riparian corridors, waterways, lakes, wetlands and billabongs***. It lists a number of strategies to achieve this objective.	Particularly pertinent strategies to this body of work include: • *Protect the environmental, cultural, landscape values of all waterway systems as significant economic, environmental and cultural assets.* • *Conserve waterway systems and the landscapes and environmental values surrounding them by protecting ecological values, indigenous vegetation, terrestrial and aquatic habitats and encouraging biodiversity.* • *Sensitively design and site development to maintain and enhance the waterway system and the surrounding landscape setting, environmental assets, and ecological and hydrological systems.*

Legislation	Description	Relevance and Constraints
		• *Address the impacts of use and development on drought and flooding events at a catchment and site scale to protect the health and natural function of waterway systems and their surrounding landscape and environment.* Across most of the Investigation Areas the land cover is permeable, with relatively little area covered by buildings, concrete paths, and roads, for example. Future development across these areas could significantly increase impermeable surfaces resulting in increased surface run-off, increased pollution and changed flow regimes with knock on consequences for aquatic ecology of creeks and waterways. Similarly, development near river corridors have potential to impact their effectiveness as wildlife corridors such as through, light and noise pollution, increased weed pressure, and reduced corridor width if insufficient buffers are provided. Hence future township structure plans should also consider the impacts of development on waterway biodiversity values.
	Clause 14 – Natural Resource Management Clause 14 recognises that: • *Planning is to assist in the conservation and wise use of natural resources including energy, water, land, stone and minerals to support both environmental quality and sustainable development.* • *Planning should ensure agricultural land is managed sustainably, while acknowledging the economic importance of agricultural production.* Clause 14.02-1 is relevant to this body of work and discussed below.	
	Clause 14.02-1S Catchment planning and management This clause has the objective *To assist the protection and restoration of catchments, waterways, estuaries, bays, waterbodies, groundwater, and the marine environment.* Hence a range of strategies related to this Clause are also key to protecting water health and ecology. Pertinent strategies include: • *Consider the impacts of catchment management on downstream water quality and freshwater, coastal and marine environments.* • *Retain natural drainage corridors with vegetated buffer zones at least 30 metres wide along each side of a waterway to:*	As mentioned above, changed land-use, development and infill can have a significant impact of surface run off, pollution and sedimentation into creeks and rivers, light and noise pollution, and change flow regimes, impacting the waterway ecology and effectiveness as a habitat corridor. This Clause emphasises the importance of considering the impacts of land-use at a catchment scale on waterway health and ecology. It will be important to consider this in the township planning phase as well as tools to minimise impacts such as water sensitive urban design. It's also noted that the Natural Springs are an important value and feature of the Daylesford – Hepburn Springs township plan, with impacts for development on ground aquifers an important consideration but beyond the scope of work and expertise of Practical Ecology.

Legislation	Description	Relevance and Constraints
	○ *Maintain the natural drainage function, stream habitat and wildlife corridors and landscape values,* ○ *Minimise erosion of stream banks and verges, and* ○ *Reduce polluted surface runoff from adjacent land uses.* • *Undertake measures to minimise the quantity and retard the flow of stormwater from developed areas.* • *Require appropriate measures to filter sediment and wastes from stormwater prior to its discharge into waterways, including the preservation of floodplain or other land for wetlands and retention basins.* • *Ensure that development at or near waterways provide for the protection and enhancement of the environmental qualities of waterways and their instream uses.* • *Ensure land use and development minimises nutrient contributions to water bodies and the potential for the development of algal blooms.* • *Require appropriate measures to restrict sediment discharges from construction sites.* • *Ensure planning is coordinated with the activities of catchment management authorities.* • *Ensure that water quality infrastructure is designed to minimise risk of harm to surface waters and groundwater.* **Clause 14.02-1L** also provides further local context for the above.	
	Clause 52.17 The key relevant clause with regard to native vegetation is Clauses 52.17. Under Clause 52.17, a permit is required to remove, destroy or lop native vegetation on sites greater than 0.4 hectares unless exemptions apply. The *Guidelines for the removal, destruction and lopping of native vegetation* is the main reference document and embedded in Clause 52.17 (DELWP 2017c).	Removal of any patches of native vegetation and Scattered Trees vegetation will most likely require a permit under Clause 52.17 unless exemptions apply. For example, a permit may not be required for trees that are planted for amenity purposes according to the Planted Vegetation exemption at Clause 52.17-7. Where a permit is required under this Clause, applications may fall into a basic, intermediate, or detailed pathway depending on the site's location category and the extent of vegetation removed. There are three location categories that indicate the potential risk to biodiversity from the removal of a small amount of native vegetation, the higher the category the greater the risk. Map 1L, 1L, 3L and 4L presents the location categories across the Investigation Areas. As shown, a significant portion of the

Legislation	Description	Relevance and Constraints
		Investigation Areas across the Townships are mapped as Location 2. This indicates that the removal of even a relatively small amount of vegetation could significantly impact endangered EVCs and/or wetlands. Location 3 indicates the potential for significant impact to habitat for rare or threatened species. The Clause 52.17 assessment pathway associated with the removal of native vegetation, based on the Location in which the site of loss occurs, is outlined in the Table below.

Table 59. Determining the Assessment pathway

Extent of native vegetation	Location category		
	Location 1	Location 2	Location 3
Less than 0.5 hectares and not including any large trees	Basic	Intermediate	Detailed
Less than 0.5 hectares and including one or more large trees	Intermediate	Intermediate	Detailed
0.5 hectares or more	Detailed	Detailed	Detailed

Source: Table 3, Guidelines for the removal, destruction or lopping of native vegetation (DELWP 2017)

A key aspect of Clause 52.17 is the requirement to avoid and minimise negative impacts in the first instance, before moving onto determining offset requirements. Such offsets can be in the form of general habitat offsets and species-specific habitat offsets. Species-specific offsets are linked to Habitat Importance Maps (HIMs) for significant species, such that where vegetation removal falls into areas of habitat importance and moved over a threshold of impact relative to that mapped across Victoria, species-specific habitat offsets may be triggered. Depending on the threatened species impacted by the vegetation removal, these offsets can be expensive and difficult to source.

In terms of future development of the Investigation Areas, it will be important to consider the permits and associated offset requirements under Clause 52.17. For example, areas with high cover of native vegetation will likely require substantial offsets if removed and the need to avoid and minimise impacts to biodiversity may prove difficult when compounded with the need to address bushfire safety. Offsets for EVCs associated with the Victorian Volcanic Plains, or species-specific offsets can also be particularly difficult and expensive to source. Recommendations for avoiding future development in areas with extensive native vegetation form part of the recommendations in Section 6 below.

	Clause 13.02-1s Bushfire Planning	Clause 13.02-1s is in place to strengthen the resilience of settlements and communities to bushfire through risk-based planning that prioritises the protection of human life. This applies to all development within the Bushfire Prone Area and/or subject to a Bushfire Management Overlay. All new settlement planning within these areas must consider and apply 13.02-1s. This clause states the following as a consideration when applying objectives of this clause.

Legislation	Description	Relevance and Constraints
		"*Ensure settlement growth and development approvals can implement bushfire protection measures without unacceptable biodiversity impacts by discouraging settlement growth and development in bushfire affected areas that are important areas of biodiversity.*"
	Clause 52.12 Vegetation Removal for Bushfire Protection	Clause 52.12 provides Native vegetation clearing exemptions to **construct a dwelling** and **create** defendable space for any proposed dwellings that meet all the following requirements; • Land is in the Bushfire Management Overlay. • Land is in the General Residential Zone, Residential Growth Zone, Neighbourhood Residential Zone, Urban Growth Zone, Low Density Residential Zone, Township Zone, Rural Living Zone, Farming Zone or Rural Activity Zone. • The removal, destruction or lopping of vegetation: o Does not exceed the distance specified in Table 1 to Clause 53.02-3 of this planning scheme, based on the bushfire attack level determined by a relevant building surveyor in deciding an application for a building permit under the Building Act 1993 for a dwelling or alteration or extension to the dwelling; or o Is required to be undertaken by a condition in a planning permit issued after 31 July 2014 under Clause 44.06 of this scheme for a dwelling or an alteration or extension to the dwelling. Therefore particular zonings within the Bushfire Management Overlays may enable exemptions to native vegetation clearing in areas, creating a large loss of environmental values with no required offsets. This clause is designed for single dwelling applications and environmental considerations should already be addressed through Clause 13.02-1s and Clause 52.17 for large scale rezoning and subdivisions.
	Zones and Overlays The Planning Provisions can also contain zoning and overlays, some of which pertain to biodiversity values.	It is expected that changes to current zoning will form part of the Hepburn C80Hepb Planning Scheme Amendment to facilitate development within the Investigation Areas. Section 1.2.1 provides additional information on the environmental related Overlays that cover the Investigation Areas. A common theme of the objectives of these overlays lie around avoiding and minimising impacts to biodiversity values, in line with Clause 52.17. Where impacts are unavoidable a Planning Permit under one or more of these overlays are expected to be required. An application in most instances will need to be accompanied by appropriate reporting to document impacts and the measures taken to avoid and minimise impacts as part of a development proposal.

Legislation	Description	Relevance and Constraints
Wildlife Act 1975 and Wildlife Regulations 2013	The *Wildlife Act 1975* provides for the protection and conservation of native wildlife (fauna) within Victoria. It also provides the basis for the majority of wildlife permit/licensing requirements within the state. Under the Act a person must not hunt, take or destroy endangered, notable or protected wildlife; this includes all native vertebrate animals, all kinds of deer, non-indigenous quail, pheasants, and partridges, and all terrestrial invertebrate animals listed under the *Flora and Fauna Guarantee Act 1988*. The *Wildlife Regulations 2013* provide further detail relating to the Act, including that a person not to damage, disturb or destroy any wildlife habitat (s42), although this does not apply if the person is authorised to do so under any other Act such as the *Planning and Environment Act 1987.*	This Act does not directly inform recommendations in this report, although the overall recommendations aim to reduce impacts to wildlife habitat. However, if any wildlife is located within the habitat proposed for development in the future, salvage and translocation of such wildlife may be required as part of the planning permit. This should also ensure wildlife is not damaged during construction works.
Catchment and Land Protection Act 1994	The *Catchment and Land Protection Act 1994* (CaLP Act) intends to manage land degradation including detrimental environmental or economic impacts of declared noxious weeds and pest animals. Under section 20 of the CaLP Act, all land owners, including the Crown, public authorities and licensees of Crown lands, must, in relation to their land, take all reasonable steps to: • Avoid causing or contributing to land degradation which causes or may cause damage to land of another land owner; • Eradicate regionally prohibited weeds; • Prevent the growth and spread of regionally controlled weeds on their land; and • Prevent the spread of, and as far as possible, eradicate established pest animals. There are also provisions within the Act to prevent the spread of declared noxious weeds, through regulating the purchase, sale, possession for the purposes of sale, display, propagation or transport of these species into or within Victoria. Furthermore, under the Act it is prohibited to bring into Victoria, keep, sell or release declared pest animals without an authority (permit).	Future developments should control the spread of CaLP weeds and pests to other areas and minimise impacts to biodiversity values in the area. Please see Section 4 for a list of CaLP weeds observed during the field survey for each individual Township.

6. CONCLUSION AND RECOMMENDATIONS

This report is based on a detailed desktop Investigation followed by field surveys. As discussed throughout Section 3, the field surveys identified a number of sites of high biodiversity value which are likely to support a number of state and nationally significant species and biodiversity communities. Biodiversity Related Constraints and Opportunities

Table 60 below provides commentary on the biodiversity related constraints identified within the Investigation Areas, in the context of future development potential within each Township. The table also aims to highlight opportunities for the protection and enhancement of native vegetation and associated habitat present within the Investigation Areas, that should also form part of the Township structure plans being prepared by Hepburn Shire Council.

Table 60. Summary of biodiversity related constraints and opportunities by Investigation Area

Township	Investigation Area	Biodiversity related constraints and opportunities
Clunes	Cl1	Cl1 is already highly developed with little area for future development. However, potential areas of development are located towards the southern boundary of the Investigation Area, as no native vegetation was observed within these areas. While the vegetation corridor surrounding Creswick Creek is heavily weed infested and should be considered for weed management, such management and enhancement activities such as revegetation using indigenous species has the potential to strengthen this existing biodiversity corridor and provide improved connectivity for a range of aquatic and terrestrial species.
	Cl2	Cl2 is a combination of woodland and grassland vegetation with low-density residential and Rural Living Zone properties. These grasslands have been assessed as Plains Grassy Woodland due to historical modelling and the presence of scattered, retained remnant River Red Gums. It is likely that these trees have been cleared from the landscape. Woodland areas located towards the north and south west of Cl2a provide significant habitat value and should be retained. Areas directly adjacent to Cl1 should be considered as a priority for potential development prior to other areas within Cl2. Areas towards the north are in close proximity to Merin Merin and Middle Swamp Wildlife Reserve, these areas have significant wildlife value, providing habitat to a range of protected fauna species. These areas (properties located along Foukes Crescent) are not recommended for development due to the potential secondary and tertiary impacts to adjacent swamps. This includes water runoff, loss of connected vegetation, erosion, increased domestic animals etc.
	Cl3	Significant grassland vegetation was observed within Cl3, including small patches of grassland vegetation surrounding residential development, agricultural paddocks and a large patch within Clunes Common Nature Conservation Reserve. These areas have potential to be habitat for a multitude of indigenous protected species that may have gone unrecorded, evident with recent observation of Golden Sun Moth and Yellow Grass Ticker for surveys undertaken in these areas. These areas should be managed for retention and highlighted as potential conservation areas. It is recommended that detailed assessments of grassland areas within Cl3 are undertaken prior to any rezoning or development being proposed. The Clunes Common Nature Conservation Reserve seems to still be zoned as Rural Living Zone – Schedule 1 (RLZ1) and Farm Zone – Schedule 1 (FZ1) with no Environmental Overlays other than the Environmental Significance Overlay 1. Additional protection through the planning scheme zoning and overlays is highly recommended for this high-quality grassland. Areas of woodland were also observed within Cl3a, adjacent to Dunach Nature Reserve. These areas are of high ecological value and should be retained and managed. Development is not recommended due to the fauna habitat and connectivity that this area provides to the wider landscape and Dunach Nature Reserve. Areas to the south of Cl3a may have higher development potential due to lack of native vegetation observed. Further assessments would be required to confirm absence of native vegetation within the full extent of each property however. There is opportunity to enhance the existing railway corridor for biodiversity to provide connectivity between Dunach Nature Reserve and areas of dense bushland adjacent to Clunes Bushland Reserve. Restoration and reduced development should be considered in proximity to this corridor.
Daylesford-Hepburn Springs	D1	D1 is already highly developed with little area for future development. Potential areas of development are located towards the northern boundary of D1a within a small parcel of cleared agricultural land. Small patches of native vegetation are located across the Investigation Area and they are mostly of low-moderate quality. Areas of vegetation are likely to be adding neighbourhood character and visual appeal to the Township, particularly in conjunction with mixed patches of native vegetation throughout the

	area. Investigation Area D1 extends up through the Township of Hepburn Springs (D1c), within this area native vegetation patches are seen at the rear of properties, most of which are bordering Investigation Areas H3 and D2.
D2	D2 is an extensive area of the Daylesford-Hepburn Springs Township that is located north and south of D1 that are currently zoned Low-Density Residential Zone 1. Majority of this area is 'fringe' properties extending into native vegetation. D2a- Significant areas of native vegetation were observed along the western boundary of this area, directly adjacent to Hepburn Regional Park. Cattersons Lane provides connectivity between Hepburn Regional Park and vegetation along Stony Creek, and there is opportunity for revegetation to further enhance this roadside corridor. Potential areas of development include agricultural land between Hoaths Rd and Ridge Road. Creeping Grevillea, an FFG listed species, was observed along the western boundary north of Cattersons Lane. D2b- Vegetation towards the north of the Investigation Area, along Rising Star was observed to be of moderate-high ecological value with variable topography and a number of waterways. This area should be highlighted for retention and weed management. Areas of Sedgy Riparian Woodland to the south are also of value and providing connecting habitat to Blind Creek. This area has minimal potential for development without adversely impacting ecological values, it is not recommended for further development. D2c – Vegetation to the south borders Blind Creek and is of high ecological value. Areas towards the north include a pine plantation, this may be considered for development potential. D2d- Native vegetation covers the majority of this Investigation Area, vegetation is located along Blacksmith Gully and Sailors Creek. These creek lines provide habitat for a range of indigenous fauna and flora. The surrounding tree cover further provides shelter and foraging habitat. This area has minimal potential for development without adversely impacting ecological values, it is not recommended for further development. D2e- Heathy Dry Forest located along Ajax Road of moderate value. Small areas of agricultural land to the south have potential for development. D2f-Very few areas of native vegetation were observed. Large areas of agricultural land with the potential of development present. Buffer of disturbed, cleared land between Investigation Areas and Bund Creek. D2g- Area directly south of H3 and Woman's Gully. Large connection of Gullies and Creeks throughout the area as well as providing a vegetation corridor connecting Hepburn Regional Park across the Hepburn township. Area towards the north borders Woman's Gully and is the only connecting corridor before cleared agricultural farmland to the north. It is highly recommended that this area is not developed and is managed for conservation. . D2h- Majority of area covered by native vegetation. Areas of pine forest and cleared agricultural area with potential for development. D2i- Area was unable to be accessed. Agricultural land appears to be present and potentially area for development however further assessment is required.
D3	Area has been cleared for development. Few ecological values were observed and development is expected without adversely impacting biodiversity values
D4	Area has been cleared for development. Few ecological values were observed and development is expected without adversely impacting biodiversity values
D5	D5 is located south of the Daylesford-Hepburn Investigation Area within the suburb of Musk Vale. High quality vegetation is located towards the south of the Investigation Area, adjacent to Sailors Creek and within Shanahans Lane, Musk Vale (Rural Living Zone Property). These areas provide connectivity to areas of extensive indigenous vegetation to the south through private property

		to Wombat State Forest. Vegetation towards the south of D5b should be considered as the closest point of east-west connectivity across Ballan-Daylesford Road. South of this point has been largely cleared for agricultural land use. Additional clearing within this area could possibly disturb east-west movement of fauna in the local area. Creeping Grevillea, an FFG listed species, was observed to the south of D5a within private property and the adjacent road reserve. Areas along the western boundary of D5b provide connectivity to Hepburn Regional Park, majority of this area was inaccessible due to being at the rear of private properties but can be expected to be of moderate-high ecological value based on canopy coverage and proximity to Hepburn Regional Park.
	H1	Bordering Kidds Gully with a number of waterways. Area is largely developed (mostly holiday accommodation) so any further development would be in close proximity of Kidds Gully and is likely to have indirect impacts on this waterway.
	H2	Vegetation located along Doctors Gully and Cobblers Gully. Multiple areas of exotic vegetation and cleared land for agricultural use present along Western Avenue were considered suitable for development however native vegetation to the rear of land parcels should be retained.
	H3	Significant native vegetation was located across the majority of the Investigation Area. Investigation Area H3a could not be fully accessed. Agricultural land appears to be present and is a potential area for development however further assessment is required. Low quality vegetation is present along Woman's Gully due to an infestation of exotic weeds and extensive erosion along the banks. Development is not suitable within this area due to steep slopes and the likelihood of continued erosion and construction run-off into the waterway, impacting Woman's Gully below. It is recommended that both areas within H3 are not developed.
Glenlyon	Gl1	Significant roadside vegetation was located south of the Investigation Area and should be retained where possible. If road expansion is required for increased occupancy or new facilities within the Township, alternative locations should be considered along with the creation of roadside reserves. One large wetland is located south of Ford Street, this area is recommended for retention due to habitat potential for terrestrial fauna and wetland birds.
	Gl2	Few ecological values were observed within Gl2 aside from a few scattered trees across the site. There is potential for development across the site but the areas proposed should be assessed for wetlands and areas of Growling Grass Frog habitat.
	Gl3	Steep slopes surrounding existing residential development. Further development would require removal of native vegetation that may be a threatened or protected community (see Section 4.3.3) and may create erosion. Any development works or vegetation clearing would be expected to impact the Loddon River directly adjacent. Development is not recommended.
	T1	Significant native vegetation was located near the south-eastern boundary of T1a. This area provides connectivity to the Wombat State Forest. Areas to the north of T1a have potential for development. These areas are already developed but have the potential to be subdivided.
Trentham Trentham	T2	Roadside vegetation located within T2a along Kyneton-Trentham Road is recommended for retention. If road expansion is required for increased occupancy within the Township, alternative locations should be considered along with the creation of roadside reserves. All other areas within T2a can be considered for development. Significant Vegetation located within T2b and should be prioritised for retention. Brookers Gum, an FFG listed species, was observed within the Racecourse Road reserve. This road reserve also allows for connectivity to the Wombat State Forest. It is recommended that this area be managed for conservation. Areas for potential development include properties east of Beatties Road. Minimal native vegetation was observed within T2c and large areas of potential development were located along Falls Road.

T3	Wombat State Forest borders Investigation Areas T3a and T3b to the north, west and south. These areas have previous records of significant flora and fauna species. Area T3a is located north of the Domino Trail. This area is not recommended for development due to the presence of native vegetation and the proximity to the Wombat State Forest and the high habitat value for indigenous fauna. This area is recommended for conservation management to improve areas that have been previously cleared/significantly disturbed. Large areas of vegetation to the south west of area T3b were inaccessible. Wiry Bossiaea, an FFG listed species, was observed along the western boundary of T3b, north of Mulcahys Road. Development is not recommended within these vegetated areas however, if proposed for development further assessments for vegetation quality and EVCs should be undertaken.

6.1 Erosion and Salinity

The geomorphology database from DEECA indicates that areas with higher numbers of watercourses have greater potential of erosion due to surface runoff, gully and wind erosion. This is largely seen in the Trentham and Daylesford-Hepburn areas as shown on Map 'H' for these townships (Appendix 1 to Appendix 4).

While this is the case, minimal evidence of erosion was observed during the field surveys. It is still likely that areas around watercourses would have at least some erosion present across the Investigation Areas as evidenced in the highly disturbed areas of Wombat's Gully in the Daylesford-Hepburn Springs Township.

6.2 Weed Management

Woody environmental weeds, including many CaLP Act listed weeds such as Gorse, Hawthorn, Blackberry and Broom, were observed across the Investigation Areas. Grassy and herbaceous weeds *Phalaris, Broad-kernel Espartillo and Chilean Needle-grass* pose a particular threat to grassy ecosystems around Clunes and Creswick. Control of these weeds should prioritise areas with high biodiversity value with regular weed monitoring and control recommended.

Woody weeds were particularly prevalent in wetter areas along creeks, gullies and drainage lines which also act as habitat corridors and landscape connectivity. While these weed species are highly undesirable, they also provide a degree of refuge, cover and habitat for native wildlife, particularly small mammals and birds. Hence carefully staged plans for weed removal across large areas followed by revegetation to re-instate a shrubby understorey is recommended to maintain habitat connectivity.

Multiple non-CaLP listed weeds have the potential to drastically alter existing ecosystems and control measures should still be implemented to prevent their spread. For example, *Phalaris aquatica* is not included in CaLP listed weeds but is as 'High Risk' under the Advisory List of Environmental Weeds in Victoria 2022 (White *et al.* 2018).

6.3 Further surveys

Table 61 outlines further surveys of areas that could potentially support biodiversity communities and species listed under either the EPBC or FFG Act.

Table 61. Further Recommended Surveys

Areas to Survey	Community or Species Survey Recommendations	Further Information
Surveys for the following EPBC Act biodiversity communities are recommended. A referral under the EPBC Act may be required if they are present and impacted by future works.		
Clunes (and Glenlyon?) Townships Areas mapped as EVC 55: Plains Grassy Woodland (Clunes – Cl3a and Cl2a), especially those with moderate to high quality, observed as treed and treeless expressions of this EVC. (Note that Glenlyon located on Central Victorian Uplands Bioregion not Victorian Volcanic Plains which may rule out potential in this Township based on underlying geology)	*Grassy Eucalypt Woodland of the Victorian Volcanic Plain* (Possible *Natural Temperate Grassland of the Victorian Volcanic Plain*, but most likely treeless *Grassy Eucalypt Woodland of the Victorian Volcanic Plain*)	Section 4.1.3 (Clunes) Section 4.2.3 (Daylesford – Hepburn Springs) Section 4.3.3 (Glenlyon)
Clunes, Daylesford- Hepburn Springs and Glenlyon Townships Areas mapped as Plains Grassy Woodland and Grassy Woodland (Clunes – Cl3a and Cl2a) and areas of Hills Herb Rich Woodland (Glenlyon – Gl3).	*Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia*	
Clunes, Daylesford-Hepburn Springs, and Glenlyon Townships Areas mapped as Valley Grassy Forest (Daylesford-Hepburn Springs – D1, D2, H3), Hills Herb Rick Woodland (Glenlyon – Gl3). Possibly in Cl3a and Cl2a (Clunes) in areas that could not be accessed.	*White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*	
Glenlyon Township Potentially occurring within an observed wetland in Gl1.	Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	
Surveys for the following FFG Act biodiversity communities are recommended where public land, such as roadsides, are proposed for development:		
Clunes (and Glenlyon?) Townships Areas mapped as EVC 55: Plains Grassy Woodland (Clunes – Cl3a and Cl2a), especially those with moderate to high quality, observed as treed and treeless expressions of this EVC. (Note that Glenlyon located on Central Victorian Uplands Bioregion not Victorian Volcanic Plains which may rule out potential in this Township based on underlying geology)	*Western Basalt Plains (River Red Gum) Grassy Woodland*	Section 4.1.3 (Clunes) Section 4.2.3 (Daylesford – Hepburn Springs) Section 4.3.3 (Glenlyon)
Clunes and Glenlyon Townships Areas mapped as Plains Grassy Woodland and Grassy Woodland (Clunes – Cl3a and Cl2a) and Hills Herb Rich Woodland (Glenlyon – Gl3). No observations of Buloke were recorded however there are areas dominated by Grey Box at these locations that could represent this community.	*Grey Box – Buloke Grassy Woodland Community*	
Clunes and Daylesford-Hepburn Springs Townships Areas with Eucalypt woodlands of high quality (Clunes – Cl2a and Cl3a and forested areas of Daylesford-Hepburn Springs) have potential to support at least some species of birds that are part of this community assembly.	*Victorian Temperate Woodland Bird Community*	

Further assessment of habitat and potential targeted surveys for various FFG Act and EPBC Act listed species are recommended where land is proposed for development.		
Clunes Investigation Areas	Initial habitat assessments and potential targeted surveys based on localised habitat suitability for species with a moderate or higher likelihood of occurrence, including five species of listed flora (Table 21) and 13 species of listed fauna (Table 25)	Section 4.1.4 Section 4.1.5
Daylesford–Hepburn Springs Investigation Areas	Initial habitat assessments and potential targeted surveys based on localised habitat suitability for species with a moderate or higher likelihood of occurrence, including 11 species of listed flora (Table 32) and six species of listed fauna (Table 36)	Section 4.2.4 Section 4.2.5
Glenlyon Investigation Areas	Initial habitat assessments and potential targeted surveys based on localised habitat suitability for species with a moderate or higher likelihood of occurrence, including five species of listed flora (Table 42) and six species of listed fauna (Table 46)	Section 4.3.4 Section 4.3.5
Trentham Investigation Areas	Initial habitat assessments and potential targeted surveys based on localised habitat suitability for species with a moderate or higher likelihood of occurrence, including nine species of listed flora (Table 53) and ten species of listed fauna (Table 57)	Section 4.4.4 Section 4.4.5
Further "on-foot" detailed biodiversity surveys are recommended if rezoning or future development is planned, especially where surveying was undertaken over-the-fence.		

6.4 Culturally Significant Flora and Fauna

Many culturally significant species may now be rare, regionally extinct or at numbers that cannot sustain their cultural use (NCCMA 2022). Collaboration with the Dja Dja Wurrung would be highly beneficial to better recognise and identify culturally significant species and culturally practices such as Wi (fire) to better manage and promote these.

6.5 Water Sensitive Urban Design (WSUD)

WSUD is a holistic approach that considers the entire water cycle, stormwater, waste water, ground water and potable water, in order to maintain or restore a more natural water cycle.

Across all Investigation Areas (with the exclusion of Daylesford-Hepburn Springs Zone D1) most of the land cover is permeable, with relatively little area covered by buildings, concrete paths and roads, for example. Future development across these areas could significantly increase impermeable surfaces resulting in increased surface run-off. Historically, storm-water collection systems have been designed to collect and deliver surface run-off to the nearest waterway, as quickly as possible. This results in pulses of high-velocity water flows, in turn leading to erosion and other knock-on effects for the stream ecology and biota (Walsh 2004). The surface run-off also typically contains higher pollutant loads, delivering these pollutants to the nearest waterway, especially in the first flush of run-off following a period of low rainfall.

The percentage of impervious surface directly connected to waterways can be reduced through the use of either centralised systems such as swales which intercept, filter and slow the run-off before it enters waterways, or through the encouragement of dispersed systems such as rainwater tanks, green roofs and rain gardens at individual properties.

It is strongly recommended that an integrated approach is taken to stormwater, waste water and potable water in any future redevelopments, especially those in close proximity to creeks and waterways (see Maps 'E' for individual Townships (Appendix 1-Appendix 4)).

6.6 Lighting

Light is a critical input for animals to orient themselves within their niche environment, forage for food, to control the timing of biological processes, and for reproduction and communication.

Any lighting that is incorporated into future developments, especially those nearby habitat corridors and areas of high biodiversity values, should be planned in a manner that ensures biodiversity light pollution is avoided and minimised as much as possible.

General recommendations to minimise light pollution impacts to fauna include:

- Follow the guidelines outlined in The National Light Pollution Guidelines for Wildlife (Commonwealth of Australia 2020).
- Ensure lighting is located away from retained habitat wherever practicable.
- Use adaptive light controls to manage light timing, intensity and colour.

- Light only the object or area intended – keep lights close to the ground, directed and shielded to avoid spill, especially to sensitive areas.
- Use the lowest intensity lighting to achieve the desired effect.
- Use lights with reduced or filtered blue, violet and ultra-violet wavelengths.
- Ensure any temporary lighting is removed promptly from site once not required.
- Consider the use of low walls and/or plantings to prevent headlight and streetlight spill across habitat/sites of biodiversity value, if required.

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Appendix 1. Maps- Clunes

The Appendix 1 package of maps is included as a separate attachment to this document due to their size.

Map 1A. Clunes- Investigation Areas

Map 1B. Clunes-Bioregions

Map 1C. Clunes- Modelled Pre-1750 EVCs

Map 1D. Clunes- Modelled 2005 EVCs

Map 1E. Clunes- Waterways and Waterbodies

Map 1F. Clunes- Listed Flora

Map 1G. Clunes- Listed Fauna

Map 1H. Clunes- Susceptibility – Soil erosion

Map 1I. Clunes- Location Categories

Map 1J. Clunes- SBV

Map 1K. Clunes- Ecology Assessments: EVCs

Map 1L. Clunes- Ecology Assessments: Quality

Map 1M. Clunes- Ground Water Dependent Ecosystems and Spring Locations

Map 1N. Clunes- Connectivity

Appendix 2. Maps- Daylesford-Hepburn Springs

Map 2A. The Appendix 2 package of maps is included as a separate attachment to this document due to their size.Daylesford- Hepburn Springs- Investigation Areas

Map 2B. Daylesford- Hepburn Springs -Bioregions

Map 2C. Daylesford- Hepburn Springs- Modelled Pre-1750 EVCs

Map 2D. Daylesford- Hepburn Springs- Modelled 2005 EVCs

Map 2E. Daylesford- Hepburn Springs- Waterways and Waterbodies

Map 2F. Daylesford- Hepburn Springs -Listed Flora

Map 2G. Daylesford- Hepburn Springs -Listed Fauna

Map 2H. Daylesford- Hepburn Springs -Susceptibility – Soil erosion

Map 2I. Daylesford- Hepburn Springs -Location Categories

Map 2J. Daylesford- Hepburn Springs -SBV

Map 2K. Daylesford- Hepburn Springs -Ecology Assessments: EVCs

Map 2L. Daylesford- Hepburn Springs -Ecology Assessments: Quality

Map 2M. Daylesford- Hepburn Springs -Ground Water Dependent Ecosystems and Spring Locations

Map 2N. Daylesford- Connectivity

Map 2O. Hepburn Springs- Connectivity

Appendix 3. Maps-Glenlyon

The Appendix 3 package of maps is included as a separate attachment to this document due to their size.

Map 3A. Glenlyon- Investigation Areas

Map 3B. Glenlyon-Bioregions

Map 3C. Glenlyon- Modelled Pre-1750 EVCs

Map 3D. Glenlyon - Modelled 2005 EVCs

Map 3E. Glenlyon -Waterways and Waterbodies

Map 3F. Glenlyon -Listed Flora

Map 3G. Glenlyon -Listed Fauna

Map 3H. Glenlyon -Susceptibility - Soil erosion

Map 3I. Glenlyon -Location Categories

Map 3J. Glenlyon -SBV

Map 3K. Glenlyon -Ecology Assessments: EVCs

Map 3L. Glenlyon -Ecology Assessments: Quality

Map 3M. Glenlyon - Ground Water Dependent Ecosystems and Spring Locations

Map 3N. Glenlyon -Connectivity

Appendix 4. Maps- Trentham

The Appendix 4 package of maps is included as a separate attachment to this document due to their size.

Map 4A. Trentham- Investigation Areas

Map 4B. Trentham- Bioregions

Map 4C. Trentham- Modelled Pre-1750 EVCs

Map 4D. Trentham- Modelled 2005 EVCs

Map 4E. Trentham- Waterways and Waterbodies

Map 4F. Trentham- Listed Flora

Map 4G. Trentham- Listed Fauna

Map 4H. Trentham- Susceptibility – Soil erosion

Map 4I. Trentham- Location Categories

Map 4J. Trentham- SBV

Map 4K. Trentham- Ecology Assessments: EVCs

Map 4L. Trentham- Ecology Assessments: Quality

Map 4M. Trentham- Ground Water Dependent Ecosystems and Spring Locations

Map 4N. Trentham- Connectivity

Appendix 5. On-site Flora List

Family	Origin	Scientific Name	Common Name	EPBC	FFG	Townships			
						Clunes	Daylesford–Hepburn Springs	Glenlyon	Trentham
FERNS AND ALLIES									
Cyatheaceae	–	*Cyathea spp.*	Tree Fern	–	–		X		
MOSSES									
Plantae	–	*Bryophyta spp.*	Moss	–	–		X		
CONIFERS									
Pinaceae	Introduced	*Pinus radiata*	Radiata Pine	–	–	X	X		
MONOCOTYLEDONS									
Alliaceae	Introduced	*Agapanthus spp.*	Agapanthus	–	–		X		
Cyperaceae	–	*Carex spp.*	Sedge	–	–		X	X	X
Cyperaceae	Introduced	*Cyperus eragrostis*	Drain Flat-sedge	–	–		X		
Cyperaceae	–	*Gahnia sieberiana*	Red-fruit Saw-sedge	–	–				X
Cyperaceae	–	*Lepidosperma elatius*	Tall Sword-sedge	–	–				X
Hemerocallidaceae	–	*Dianella admixta*	Black-anther Flax-lily	–	–				X
Hemerocallidaceae	–	*Dianella revoluta s.l.*	Black-anther Flax-lily	–	–		X		
Hemerocallidaceae	–	*Dianella spp.*	Flax Lily	–	–	X	X		
Hemerocallidaceae	–	*Dianella tasmanica*	Tasman Flax-lily	–	–				X
Iridaceae	Introduced	*Romulea rosea*	Onion Grass	–	–	X	X		
Juncaceae	–	*Juncus spp.*	Rush	–	–	X	X	X	X
Poaceae	Introduced	*Agrostis capillaris*	Brown-top Bent	–	–	X			
Poaceae	–	*Agrostis s.s. spp.*	Bent	–	–			X	
Poaceae	Introduced	*Amelichloa caudata*	Espartillo	–	–	X			
Poaceae	Introduced	*Anthoxanthum odoratum*	Sweet Vernal-grass	–	–		X	X	

Family	Origin	Scientific Name	Common Name	EPBC	FFG	Townships			
						Clunes	Daylesford–Hepburn Springs	Glenlyon	Trentham
Poaceae	–	*Austrostipa spp.*	Spear Grass	–	–	X	X		
Poaceae	Introduced	*Briza maxima*	Large Quaking-grass	–	–	X	X		
Poaceae	Introduced	*Briza minor*	Lesser Quaking-grass	–	–		X		
Poaceae	Introduced	*Briza spp.*	Quaking Grass	–	–	X			
Poaceae	Introduced	*Bromus hordeaceus*	Soft Brome	–	–		X		
Poaceae	Native but some stands may be alien	*Cynodon dactylon*	Couch	–	–		X		
Poaceae	Introduced	*Cynosurus echinatus*	Rough Dog's-tail	–	–		X		
Poaceae	Introduced	*Dactylis glomerata*	Cocksfoot	–	–	X	X	X	X
Poaceae	Introduced	*Holcus lanatus*	Yorkshire Fog	–	–	X			X
Poaceae	Introduced	*Lagurus ovatus*	Hare's-tail Grass	–	–		X		
Poaceae	Introduced	*Phalaris aquatica*	Toowoomba Canary-grass	–	–	X			
Poaceae	Introduced	*Phalaris spp.*	Canary Grass	–	–	X		X	X
Poaceae	–	*Poa labillardierei*	Common Tussock-grass	–	–	X	X	X	
Poaceae	–	*Poa spp.*	Tussock Grass	–	–		X		X
Poaceae	–	*Rytidosperma pallidum*	Silvertop Wallaby-grass	–	–				X
Poaceae	–	*Rytidosperma spp.*	Wallaby Grass	–	–	X	X		
Poaceae	–	*Tetrarrhena juncea*	Forest Wire-grass	–	–				X
Poaceae	–	*Themeda triandra*	Kangaroo Grass	–	–		X	X	
Typhaceae	–	*Typha spp.*	Bulrush	–	–		X		
Xanthorrhoeaceae	–	*Lomandra filiformis*	Wattle Mat-rush	–	–	X	X		
Xanthorrhoeaceae	–	*Lomandra filiformis subsp. filiformis*	Wattle Mat-rush	–	–				X
Xanthorrhoeaceae	–	*Lomandra longifolia*	Spiny-headed Mat-rush	–	–		X		X
DICOTYLEDONS									
Aquifoliaceae	Introduced	*Ilex aquifolium*	English Holly	–	–		X		X

Family	Origin	Scientific Name	Common Name	EPBC	FFG	Townships			
						Clunes	Daylesford–Hepburn Springs	Glenlyon	Trentham
Araliaceae	Introduced	*Hedera hibernica*	Atlantic Ivy	–	–		X		X
Araliaceae	Introduced	*Hedera spp.*	Ivy	–	–		X		
Araliaceae	–	*Hydrocotyle laxiflora*	Stinking Pennywort	–	–		X		
Asteraceae	–	*Cassinia arcuata s.s.*	Desert Cassinia	–	–	X			
Asteraceae	Native but some stands may be alien	*Cassinia sifton*	Drooping Cassinia	–	–	X	X		
Asteraceae	–	*Cassinia spp.*	Cassinia	–	–		X		
Asteraceae	Introduced	*Cirsium vulgare*	Spear Thistle	–	–		X		
Asteraceae	Introduced	*Cynara cardunculus subsp. flavescens*	Artichoke Thistle	–	–		2		
Asteraceae	Introduced	*Erigeron spp.*	Fleabane	–	–		X		
Asteraceae	Introduced	*Euryops pectinatus*	Grey-leaved Euryops	–	–	X			
Asteraceae	Introduced	*Gazania spp.*	Gazania	–	–	X			
Asteraceae	Introduced	*Helminthotheca echioides*	Ox-tongue	–	–	X			
Asteraceae	Introduced	*Hypochaeris radicata*	Flatweed	–	–	X	X		
Asteraceae	–	*Olearia argophylla*	Musk Daisy-bush	–	–		X		
Asteraceae	–	*Ozothamnus obcordatus*	Grey Everlasting	–	–		X		
Asteraceae	–	*Senecio hispidulus s.s.*	Rough Fireweed	–	–		X		
Asteraceae	–	*Senecio minimus*	Shrubby Fireweed	–	–				X
Asteraceae	–	*Senecio spp.*	Groundsel	–	–		X		
Asteraceae	Introduced	*Sonchus asper s.s.*	Rough Sow-thistle	–	–	X	X		
Asteraceae	Introduced	*Sonchus oleraceus*	Common Sow-thistle	–	–		X		
Asteraceae	–	*Xerochrysum viscosum*	Shiny Everlasting	–	–	X			
Boraginaceae	–	*Myosotis spp.*	Forget-me-not	–	–		X		
Boraginaceae	Introduced	*Pentaglottis (monotypic)*	Alkanet	–	–		X		

Family	Origin	Scientific Name	Common Name	EPBC	FFG	Townships			
						Clunes	Daylesford–Hepburn Springs	Glenlyon	Trentham
Brassicaceae	Introduced	*Brassica spp.*	Turnip	–	–	X	X		X
Cactaceae	Introduced	*Opuntia spp.*	Prickly Pear	–	–	X		X	
Caryophyllaceae	Introduced	*Stellaria media*	Chickweed	–	–	X			
Caryophyllaceae	–	*Stellaria pungens*	Prickly Starwort	–	–		X		
Casuarinaceae	–	*Allocasuarina spp.*	Sheoak	–	–	X			
Droseraceae	–	*Drosera aberrans*	Scented Sundew	–	–		X		
Droseraceae	–	*Drosera spp.*	Sundew	–	–	X			
Elaeocarpaceae	–	*Tetratheca ciliata*	Pink-bells	–	–		X		
Ericaceae	Introduced	*Arbutus unedo*	Irish Strawberry Tree	–	–		X		
Ericaceae	–	*Epacris impressa*	Common Heath	–	–				X
Euphorbiaceae	–	*Euphorbia spp.*	Spurge	–	–		X		
Fabaceae	–	*Bossiaea cordigera*	Wiry Bossiaea	–	Endangered				X
Fabaceae	Introduced	*Cytisus scoparius*	English Broom	–	–				X
Fabaceae	–	*Daviesia latifolia*	Hop Bitter-pea	–	–				X
Fabaceae	–	*Dillwynia cinerascens s.s.*	Grey Parrot-pea	–	–				X
Fabaceae	Introduced	*Genista monspessulana*	Montpellier Broom	–	–		X		
Fabaceae	Introduced	*Genista spp.*	Broom	–	–			X	
Fabaceae	–	*Hovea heterophylla*	Common Hovea	–	–		X		
Fabaceae	Introduced	*Medicago spp.*	Medic	–	–		X		
Fabaceae	–	*Podolobium procumbens*	Trailing Shaggy-pea	–	–		X		
Fabaceae	Introduced	*Ulex europaeus*	Gorse	–	–	2	X	X	X
Fagaceae	Introduced	*Quercus spp.*	Oak	–	–	X			X
Gentianaceae	Introduced	*Centaurium erythraea*	Common Centaury	–	–	X			
Geraniaceae	–	*Geranium solanderi var. solanderi s.s.*	Austral Crane's-bill	–	Endangered		X		
Geraniaceae	–	*Geranium spp.*	Crane's Bill	–	–	X			
Haloragaceae	–	*Gonocarpus tetragynus*	Common Raspwort	–	–		X		X

Family	Origin	Scientific Name	Common Name	EPBC	FFG	Townships			
						Clunes	Daylesford–Hepburn Springs	Glenlyon	Trentham
Hippocastanoideae	Introduced	*Acer pseudoplatanus*	Sycamore Maple	–	–		X		
Lamiaceae	Introduced	*Prunella spp.*	Self-heal	–	–		X		
Lamiaceae	Introduced	*Prunella vulgaris*	Self-heal	–	–				X
Loranthaceae	–	*Amyema pendula*	Drooping Mistletoe	–	–	X			
Loranthaceae	–	*Amyema spp.*	Mistletoe	–	–		X		
Mimosaceae	–	*Acacia acinacea s.s.*	Gold-dust Wattle	–	–	X			
Mimosaceae	Introduced	*Acacia baileyana*	Cootamundra Wattle	–	–		X		
Mimosaceae	–	*Acacia dealbata*	Silver Wattle	–	–		X	X	X
Mimosaceae	Native but some stands may be alien	*Acacia floribunda*	White Sallow-wattle	–	–		X		
Mimosaceae	–	*Acacia mearnsii*	Black Wattle	–	–		X	X	
Mimosaceae	–	*Acacia melanoxylon*	Blackwood	–	–		X	X	X
Mimosaceae	–	*Acacia mucronata subsp. longifolia*	Narrow-leaf Wattle	–	–				X
Mimosaceae	–	*Acacia paradoxa*	Hedge Wattle	–	–	X	X		
Mimosaceae	Native but some stands may be alien	*Acacia pravissima*	Ovens Wattle	–	–		X		
Mimosaceae	–	*Acacia pycnantha*	Golden Wattle	–	–	X			
Myrtaceae	–	*Eucalyptus camaldulensis*	River Red-gum	–	–	X	X	X	
Myrtaceae	Introduced	*Eucalyptus cladocalyx*	Sugar Gum	–	–	X			
Myrtaceae	–	*Eucalyptus dives*	Broad-leaf Peppermint	–	–		X		X
Myrtaceae	Native but some	*Eucalyptus globulus*	Southern Blue-gum	–	–	X	X		

Family	Origin	Scientific Name	Common Name	EPBC	FFG	Townships			
						Clunes	Daylesford–Hepburn Springs	Glenlyon	Trentham
	stands may be alien								
Myrtaceae	–	*Eucalyptus globulus subsp. bicostata*	Eurabbie	–	–		X		
Myrtaceae	–	*Eucalyptus goniocalyx s.s.*	Bundy	–	–	X	X		
Myrtaceae	–	*Eucalyptus macrorhyncha*	Red Stringybark	–	–	X			
Myrtaceae	–	*Eucalyptus melliodora*	Yellow Box	–	–	X	X		
Myrtaceae	–	*Eucalyptus microcarpa*	Grey Box	–	–	X	X	X	
Myrtaceae	–	*Eucalyptus nortonii*	Silver Bundy	–	–		X		
Myrtaceae	–	*Eucalyptus obliqua*	Messmate Stringybark	–	–		X		X
Myrtaceae	–	*Eucalyptus ovata*	Swamp Gum	–	–		X	X	X
Myrtaceae	–	*Eucalyptus polyanthemos*	Red Box	–	–	X			
Myrtaceae	–	*Eucalyptus radiata subsp. radiata*	Narrow-leaf Peppermint	–	–		X	X	X
Myrtaceae	–	*Eucalyptus rubida*	Candlebark	–	–		X		X
Myrtaceae	–	*Eucalyptus sideroxylon subsp. sideroxylon*	Mugga	–	Endangered	X			
Myrtaceae	–	*Eucalyptus viminalis*	Manna Gum	–	–			X	X
Myrtaceae	–	*Eucalyptus viminalis subsp. cygnetensis*	Rough-barked Manna-gum	–	–		X		
Myrtaceae	–	*Leptospermum continentale*	Prickly Tea-tree	–	–				X
Myrtaceae	Native but some stands may be alien	*Melaleuca ericifolia*	Swamp Paperbark	–	–	X			
Onagraceae	–	*Epilobium spp.*	Willow Herb	–	–		X		

Family	Origin	Scientific Name	Common Name	EPBC	FFG	Townships			
						Clunes	Daylesford–Hepburn Springs	Glenlyon	Trentham
Papaveraceae	Introduced	*Fumaria spp.*	Fumitory	–	–		X		
Pittosporaceae	–	*Bursaria spinosa*	Sweet Bursaria	–	–		X		
Pittosporaceae	–	*Pittosporum spp.*	Pittosporum	–	–		X		
Pittosporaceae	Native but some stands may be alien	*Pittosporum undulatum*	Sweet Pittosporum	–	–		X		
Plantaginaceae	Introduced	*Plantago lanceolata*	Ribwort	–	–		X		X
Platanaceae	Introduced	*Platanus X hispanica 'Acerifolia'*	London Plane	–	–	X			
Polygonaceae	–	*Rumex spp.*	Dock	–	–	X	X		
Primulaceae	Introduced	*Lysimachia arvensis var. arvensis*	Scarlet Pimpernel	–	–		X		
Proteaceae	–	*Grevillea repens*	Creeping Grevillea	–	Endangered		X		
Ranunculaceae	–	*Clematis aristata*	Mountain Clematis	–	–		X		
Ranunculaceae	Introduced	*Ranunculus repens*	Creeping Buttercup	–	–				X
Rosaceae	–	*Acaena novae-zelandiae*	Bidgee-widgee	–	–			X	
Rosaceae	–	*Acaena spp.*	Sheep's Burr	–	–		X		X
Rosaceae	Introduced	*Cotoneaster spp.*	Cotoneaster	–	–	X	X		
Rosaceae	Introduced	*Crataegus spp.*	Hawthorn	–	–	X	X		
Rosaceae	Introduced	*Prunus laurocerasus*	Cherry Laurel	–	–		X		
Rosaceae	Introduced	*Prunus spp.*	Prunus	–	–	X			
Rosaceae	Introduced	*Rosa rubiginosa*	Sweet Briar	–	–	X			
Rosaceae	Introduced	*Rubus fruticosus spp. agg.*	Blackberry	–	–		X	X	X
Rosaceae	–	*Rubus parvifolius*	Small-leaf Bramble	–	–		X		
Rubiaceae	–	*Asperula scoparia subsp. scoparia*	Prickly Woodruff	–	–		X		
Rubiaceae	–	*Coprosma quadrifida*	Prickly Currant-bush	–	–		X		

Family	Origin	Scientific Name	Common Name	EPBC	FFG	Townships			
						Clunes	Daylesford–Hepburn Springs	Glenlyon	Trentham
Rubiaceae	–	*Galium spp.*	Bedstraw	–	–		X		
Salicaceae	Introduced	*Populus spp.*	Poplar	–	–	X			
Santalaceae	–	*Exocarpos cupressiformis*	Cherry Ballart	–	–	X	X		
Simaroubaceae	Introduced	*Ailanthus altissima*	Tree of Heaven	–	–	X			
Solanaceae	Introduced	*Lycium ferocissimum*	African Box-thorn	–	–	X	X		
Solanaceae	–	*Solanum aviculare*	Kangaroo Apple	–	–				X
Ulmaceae	Introduced	*Ulmus spp.*	Elm	–	–	X			
Violaceae	–	*Melicytus dentatus s.s.*	Tree Violet	–	–	X			
Violaceae	–	*Viola hederacea sensu Willis (1972)*	Ivy-leaf Violet	–	–		X		2
Violaceae	–	*Viola spp.*	Violet	–	–	X			

Appendix 6. Potentially occurring threatened flora species

Conservation status under EPBC Act X999:
EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant

Conservation status under FFG Act X988:
Vu: Vulnerable, En: Endangered, Cr: Critically Endangered, -x: Extinct in Victoria and ex: Extinct

Origin
*: exotic species; #: Victorian native species extended beyond natural range; Empty: Indigenous species

Township					Clunes				Daylesford-Hepburn Springs				Glenlyon				Trentham			
EPBC	FFG	Scientific name	Common name	Habitat/species notes	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning
	Vu	*Acacia deanei subsp. Paucijuga*	Deane's Wattle	Common in dry forest in north-central Victoria and in the Suggan Buggan area of East Gippsland, often on stony slopes and rocky outcrops. Flowers year-round (mostly in summer).	1	1981	Low	No recent records and not within main area of known occurrence	-	-			-	-			-	-		
	Vu	*Acacia howittii*	Sticky Wattle	Endemic to Victoria. Confined to eastern Victoria from the upper Macalister River area near Mt Howitt south to near Yarram and east to near Tabberabbera. Grows in moist forest. Widely cultivated and naturalising in some areas (e.g. Daylesford, Greater Melbourne, Dandenong Ranges etc.). Flowers mostly Oct.	-	-			1	2002	Low-Moderate	No recent records, however, appropriate habitat present	1	2002	Low	No recent records, however, appropriate habitat present	-	-		
	Vu	*Acacia nanodealbata*	Dwarf Silver-wattle	Known from forests in the Healesville-Warburton area, the top of Mt Macedon, near Creswick, and in the Otway Range. Flowers Aug.-Oct.	-	-			3	2011	Low-Moderate	Few recent records, however, appropriate habitat present	4	2016	Low-Moderate	Few recent records, however, appropriate habitat present	41	2022	Moderate	Multiple areas of potential habitat present and a large number of recent records.
	Cr	*Caladenia clavescens*	Castlemaine Spider-orchid	Endemic to central Victoria where now known only from the Castlemaine region in box-ironbark forest on skeletal or stony brown loam. Flowers Sep.-Oct.	-	-			1	1997	Low	No recent records and lack of habitat (Box-Ironbark Forest) present	1	1997	Low	No recent records and lack of habitat (Ironbark Forest) present	-	-		
	En	*Bossiaea cordigera*	Wiry Bossiaea	Occurs sporadically in south-western and central Victoria, apparently nowhere common.	-	-			77	2022	Moderate-High	Multiple recent records and	-	-			6231	2022	**Present**	Observed within the

Township				Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
EPBC	FFG	Scientific name	Common name	Habitat/species notes	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning
				Favours moist situations in heathland, heathy woodland and open-forest. Flowers Oct.–Jan.								large areas of potential habitat within the investigation area								assessment area
	En	*Bossiaea riparia*	River Leafless Bossiaea	Uncommon to rare in Victoria, occurring in the south-west, in the Grampians, and in eastern Victoria. Grows on streambanks and in moist and dry situations in dry sclerophyll forest, often at fairly high altitudes. Flowers Sep.–Nov.	–	–			12	2018	Moderate	Recent records and multiple areas of potential habitat present.	–	–			–	–		
	Cr	*Bossiaea vombata*	Wombat Bossiaea	Known from a few populations in the Wombat State Forest near Daylesford, with historic records based on herbarium sheets that appear to be the same entity, from East Gippsland (Snowy River gorge and Bendoc areas). Plants grow in open forest near Daylesford, and a Snowy River specimen notes 'sandy-rocky banks of the river' (Mueller, 1854). The habitat near Bendoc is unknown. Flowers Oct.	–	–			15	2016	Moderate	Recent records and multiple areas of potential habitat present.	–	–			–	–		
	Cr	*Coronidium gunnianum*	Pale Swamp Everlasting	Widespread throughout the state except for the north-west and the alpine and adjacent mountainous areas, and usually at low elevations (under c. 100 m) where mostly in grasslands and riverine Eucalyptus camaldulensis woodland on soils that are prone to inundation. Flowers (Nov.–) Feb.–Apr.(–Jun.).	4	2011	Low–Moderate	Areas of potential habitat. Somewhat recent records.	–	–			6	2022	Low–Moderate	Recent records and areas of potential habitat	–	–		
VU	En	*Caladenia ornata*	Ornate Pink-fingers	In Victoria known only from the south-west in heathy forest on seasonally moist sandy loam. Flowers Oct.–Dec.	PMST	PMST	Low	No recent records and not within main area of known occurrence	PMST	PMST	Low	No recent records and not within main area of known occurrence	PMST	PMST	Low	No recent records and not within main area of known occurrence	PMST	PMST	Low	No recent records and not within main area of known occurrence

Township					Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
EPBC	FFG	Scientific name	Common name	Habitat/species notes	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning
EN		*Caladenia tensa*	Rigid Spider-orchid	In Victoria found mainly in the Little Desert area (also with an isolated record for near Wood Wood) in Eucalyptus/Callitris woodland on well-drained sandy soil. Flowers Sep.-Oct.	PMST	PMST	Low	Lack of potential habitat and no recent records.	–	–			–	–			–	–		
VU	En	*Caladenia versicolor*	Candy Spider-orchid	Restricted to the western part of the Midlands region in the vicinity of Stawell, in woodland on winter-wet sandy loam. Flowers Oct.-Nov.	PMST	PMST	Low	No records and lack of potential habitat	PMST	PMST	Low	No records and lack of potential habitat	PMST	PMST	Low	No records and lack of potential habitat	–	–		
	Cr	*Calotis anthemoides*	Cut-leaf Burr-daisy	Scattered north and west of Melbourne (e.g. Sunshine, Camperdown, Moyston, Dunkeld, Numurkah regions) on heavy soils prone to waterlogging, but now rather rare due to habitat depletion. Flowers Sep.-Dec.	6	2012	Moderate	Previous records within investigation area and suitable habitat present	–	–			–	–			–	–		
	Cr	*Comesperma polygaloides*	Small Milkwort	Found scattered across Victoria and also WA and SA. Occasional on heavier soils (clays, alluvium) supporting grassland and grassy woodland communities in central and south-western areas.	1	1997	Low-Moderate	No recent records although some potential habitat and the species could easily avoid detection	–	–			–	–			–	–		
EN	Cr	*Dianella amoena*	Matted Flax-lily	Largely confined to drier grassy woodland and grassland communities south of the Dividing Range and now much depleted through its range. Flowers mostly Nov.-Jan.	PMST	PMST	Low-Moderate	Somewhat suitable habitat present although no local records	6	2005	Moderate	Lack of recent records although potential habitat present	1	2023	Moderate	Lack of recent records although potential habitat present	PMST	PMST	Low-moderate	Lack of recent records although potential habitat present
	En	*Correa aemula*	Hairy Correa	Occurring in western Victoria in the Grampians and nearby Pyrenees Ranges, where found along streams in woodland or on mountain tops. Flowers spring and summer.	–	–			2	2012	Low-Moderate	Lack of recent records but potential habitat present	–	–			–	–		
	En	*Dipodium pardalinum*	Spotted Hyacinth-orchid	Scattered in higher rainfall parts of western Victoria. Flowers Dec.-Mar.	–	–			15	2021	Moderate-High	Multiple recent records within and in close proximity to	26	2017	Low-Moderate	Recent records well out of investigation area and lack areas	13	2015	Moderate	Records well outside the investigation area. Potential

Township					Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
EPBC	FFG	Scientific name	Common name	Habitat/species notes	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning
												the investigation area. Multiple areas of potential habitat				of potential habitat				habitat present.
EN	Cr	*Senecio behrianus*	Stiff Groundsel	Exceedingly rare in Victoria, and thought to be extinct until 1991 when rediscovered between Rochester and Stanhope, and Miners Rest near Ballarat in 2004. Apparently confined to heavy, winter-wet, clayey soils. Formerly known from Casterton, Swan Hill, Barham areas, with specimens from the 'Wimmera', and You Yangs near Lara of uncertain affinity, but closest to Senecio behrianus.	PMST	PMST	Low	No recent records and not within main area of known occurrence	PMST	PMST	Low	No recent records and not within main area of known occurrence	PMST	PMST	Low	No recent records and not within main area of known occurrence	PMST	PMST	Low	No recent records and not within main area of known occurrence
	En	*Dipodium variegatum*	Blotched Hyacinth-orchid	Confined to East Gippsland where found in dryish open-forest, woodland or heathland. Flowers Dec.-Feb.	–	–			1	1992	Low-Moderate	No recent records however areas of potential habitat present within the investigation areas. Would have been flowering during assessment.	–	–			–	–		
	Cr	*Discaria pubescens*	Australian Anchor Plant	Now extremely rare west of Melbourne (Ballarat district only) and possibly extinct in the north-east (formerly known from Mansfield, Wodonga and Mitta Mitta areas), scattered and uncommon in the east (Snowy Range, Benambra district, Wulgulmerang, Cobberas area, Bendock), usually associated with basaltic substrate near	152	2001	Moderate	Multiple historic records and areas of potential habitat present	–	–			–	–			–	–		

Township					Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
EPBC	FFG	Scientific name	Common name	Habitat/species notes	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning
				streams, in cool, elevated areas. Flowers Oct.–Dec.																
	Cr	*Diuris gregaria*	Clumping Golden Moths	Extremely rare, mostly on basalt plains grasslands of western Victoria. Flowers Sep.–Oct.	1	1997	Low–Moderate	No recent records however habitat present	–	–			–	–			–	–		
	En	*Diuris punctata var. punctata*	Purple Diuris	Formerly widespread and common in Victoria, occurring in the open forests, woodlands and grasslands of the fertile lowlands, now much reduced through clearing for agriculture and restricted to relatively few, isolated sites, but sometimes locally abundant. Flowers Oct.–Nov.	1	1981	Low	No recent records and lack of potential habitat	–	–			–	–			–	–		
VU		*Senecio psilocarpus*	Swamp Fireweed	Rare, restricted in Victoria to a few herb-rich winter-wet swamps throughout the south of the state, west from Sale, growing on volcanic clays or peaty soils. Flowers Nov.–Mar.	PMST	PMST	Low–Moderate	No records but potential habitat present	PMST	PMST	Low	No records and lack of potential habitat present	PMST	PMST	Low	No local records and lack of suitable habitat present.	PMST	PMST	Low	No local records and lack of suitable habitat present.
	Cr	*Duma horrida subsp. horrida*	Spiny Lignum	Infrequent on silty soils and clays fringing shallow swamps and lakes in the northwest, and near the Murray River downstream from about Swan Hill. Flowers mainly Sep.–Nov.	1	1981	Low	Lack of potential habitat. No recent records	–	–			–	–			–	–		
VU	En	*Thelymitra matthewsii*	Spiral Sun-orchid	Widely distributed but rare, in coastal sandy flats or slightly elevated sites (to 400 m) in well-drained soils (sandy loams to gravelly limestone soils) in open forest. Plants colonise disturbed sites and slowly disappear as these sites stabilise. Flowers Aug.–Sep.(–Oct.).	PMST	PMST	Low	No recent records and not within main area of known occurrence	PMST	PMST	Low	No recent records and not within main area of known occurrence	PMST	PMST	Low	No recent records and not within main area of known occurrence	PMST	PMST	Low	No recent records and not within main area of known occurrence
VU	Cr	*Xerochrysum palustre*	Swamp Everlasting	Occurs in lowland swamps, usually on black cracking clay soils, scattered from near the South Australian border north-west of Portland to Bairnsdale	PMST	PMST	Low	No recent records and lack of potential habitat	PMST	PMST	Low	No recent records and lack of potential habitat	PMST	PMST	Low	No recent records and lack of potential habitat	PMST	PMST	Low	No recent records and lack of potential habitat

Township				Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
EPBC	FFG	Scientific name	Common name	Habitat/species notes	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning
				district, but rare due to habitat depletion. Flowers Nov.–Mar.																
	En	*Eucalyptus brookeriana*	Brooker's Gum	It occurs in two areas, on the northern foothills of the Otway Ranges, and north of the Great Dividing Range in the Bells Reef–Trentham area. Flowers summer–autumn.	–	–			201	2021	High	Multiple recent records and areas of potential habitat within the investigation area.	69	2022	Moderate	Recent records and some suitable habitat present	989	2022	Present	Species was observed during assessment within the assessment area
VU		*Amphibromus fluitans*	River Swamp Wallaby–grass	Largely confined to permanent swamps, principally along the Murray River between Wodonga and Echuca, uncommon to rare in the south (e.g. Casterton, Moe, Yarram), probably due to historic drainage of wetlands. Sometimes forming loose turf–like colonies at the edge of receding waters and then spikelets tend to be smaller than typical (represented by the bracketed values in the above description). Flowers Nov.–Mar.	PMST	PMST	Low–Moderate	No records but areas of potential habitat present	PMST	PMST	Low	No records and lack of potential habitat present.	PMST	PMST	Low–Moderate	No records but areas of potential habitat present	PMST	PMST	Low	No recent records and lack of appropriate habitat present
	En	*Eucalyptus conferta*	Fryers Range Scentbark	Apparently restricted to the Fryers Range between Castlemaine and Daylesford, on dry shallow soils. Flowers autumn.	–	–			2	2019	Moderate	Areas of potential habitat, only recently discovered and likely confused with *Eucalyptus aromaphloia*	2	2019	Low	Recent records well out of investigation area	–	–		
	Cr	*Eucalyptus yarraensis*	Yarra Gum	Extending west from Glengarry (near Traralgon) to Melbourne and north–west to Daylesford and Ararat. Collections of small–budded and –fruited swamp gums from east of Cavendish may be this taxon. Very small–fruited forms of	–	–			1	1993	Moderate	No recent records however this species occurs within the speedway at Daylesford	1	1994	Low–Moderate	No recent records however multiple areas of potential habitat and potentially	9	2022	Moderate	Few recent records south of investigation area. Multiple areas of potential

Township					Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
EPBC	FFG	Scientific name	Common name	Habitat/species notes	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning
				the species occur in remnant stands in outer southeastern to northeastern Melbourne suburbs (e.g. Scoresby, Wantirna, Yan Yean). Flowers Sep.–Dec.								and is frequent to the east (Wheatsheaf) and west (Eganstown) (Brian Bainbridge pers. comm. 12.09.23) There are multiple areas of potential habitat and potentially confused with other Eucalyptus species				confused with other *Eucalyptus species*				habitat and potentially confused with other Eucalyptus species
VU		*Dodonaea procumbens*	Trailing Hop-bush	Largely confined in Victoria to the south-west (Penola–Dergholm area, Grampians, Lake Fyans) with outlying occurrences near Castlemaine, Avoca, Skipton, Camperdown and extraordinary disjunctions near Sale where very rare and in perhaps also in the upper Murray River area (represented by a single, 1883 specimen of uncertain provenance). Grows in low-lying, often winter-wet areas in woodland, low open-forest and grasslands on sands and clays. Flowers summer.	PMST	PMST	Low–Moderate	No records although grows in a variety of habitats and easily overlooked	PMST	PMST	Low–Moderate	No records although grows in a variety of habitats and easily overlooked	PMST	PMST	Low–Moderate	No records although grows in a variety of habitats and easily overlooked	–	–		
VU	Cr	*Grevillea floripendula*	Ben Major Grevillea	Restricted to a small area north of Beaufort, from Waterloo to Ben Major Forest. Grows in dry open-forest, on shallow quartzitic soils. Flowers Oct.–Dec.	1	2007	Low	Lack of potential habitat (Quartztic soils) and no recent records	–	–			–	–			–	–		
VU	Vu	*Eucalyptus aggregata*	Black Gum	In Victoria, restricted to Woodend–Gisborne region. Flowers summer–autumn.	–	–			PMST	PMST	Low–Moderate	No records however multiple areas of potential	PMST	PMST	Low–Moderate	No records however multiple areas of potential	PMST	PMST	Low–Moderate	No records however multiple areas of potential

Township					Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
EPBC	FFG	Scientific name	Common name	Habitat/species notes	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning
												habitat and potentially confused with other Eucalypts				habitat and potentially confused with other Eucalypts				habitat and potentially confused with other Eucalypts
	En	*Grevillea repens*	Creeping Grevillea	Rather rare, with disjunct occurrences in mountains north-east and north-west of Melbourne: i.e. between Mt Disappointment and Healesville (Mt Slide form), and near Daylesford. Grows in moist to well-drained situations in shallow clayey soils in dry sclerophyll forest. Flowers Oct.-Feb.	-	-			473	2021	**Present**	Species was extensively observed during the assessment in the lower Daylesford areas	-	-			-	-		
	Cr	*Hovea asperifolia subsp. Spinosissima*	Rough Hovea	Steep rocky slopes in dry forest on ranges near Daylesford and Euroa. Flowers Aug.-Sep.	-	-			9	2013	High	Recorded in the local area. Likely to occur in areas that are inaccessible for vegetation surveys (steep rocky slopes). Few areas of suitable habitat present in northern sections of the investigation area.	-	-			-	-		
EN	En	*Lachnagrostis adamsonii*	Adamson's Blown-grass	Occurs in and around saline depressions on the Volcanic Plain where recorded from Portalington west almost to the South Australian border. Flowers Nov.-Feb.	PMST	PMST	Low-Moderate	Some suitable habitat although no records – species easily overlooked.	-	-			-	-			-	-		

Township					Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
EPBC	FFG	Scientific name	Common name	Habitat/species notes	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning
	En	*Lachnagrostis semibarbata var. semibarbata*	Purple Blown-grass	Scattered from near Melbourne to the South Australian border, mainly in grassland, occasionally woodland communities in somewhat saline depressions of the volcanic plain, but also known from seasonal, slightly brackish swampy sites east of Melbourne (e.g. Cranbourne, Safety Beach, Giffard, Sale areas). Flowers Oct.–Feb.	1	1997	Low–Moderate	Some suitable habitat although no recent records – species easily overlooked.	–	–			–	–			–	–		
VU	En	*Lepidium aschersonii*	Spiny Peppercress	Mostly on heavy clay soil near salt lakes on volcanic plain, but with outlying records from near Lake Omeo (in 1940 &1981) and the Grampians (in 1893). Flowers spring–autumn.	PMST	PMST	Low	Lack of potential habitat and no records within the local area.	–	–			–	–			PMST	PMST	Low	Lack of potential habitat and no recent records
	En	*Geranium solanderi var. solanderi s.s.*	Austral Crane's-bill	An uncommon species of damp to dryish, usually sheltered sites in grassy woodlands, often along drainage lines or in seepage areas. Flowers Oct.–Jan.	–	–			–	–			1	2019	Low–Moderate	Only one recent record but areas of potential habitat present	–	–		
	En	*Geranium sp. 3*	Pale-flower Crane's-bill	In Victoria, currently known only from Stawell, Yan Yean, Eltham, and Bonegilla areas. Incomplete specimens from near Goroke and Hamilton areas may be of this species. Found in open, grassy areas of dry woodland to forest. Flowers Sep.–Jan.	–	–			–	–			1	2023	Low–Moderate	Only one recent record but areas of potential habitat present	–	–		
	En	*Leucopogon microphyllus var. pilibundus*	Hairy Beard-heath	Occasional in elevated, dryish and often rocky sites supporting open-forest and woodland communities. Disjunctly distributed, from the Lerderderg Gorge area, and north and east from near Buchan. Flowers Aug.–Oct.	–	–			–	–			–	–			698	2022	High	Multiple recent records and potential habitat present
Cr		*Microseris scapigera s.s.*	Plains Yam-daisy	Formerly widespread in moist depressions on the basalt plains of western Victoria, but now very rare due to loss of habitat. Flowers mainly spring and summer.	2	1997	Moderate	Large areas of potential habitat present (mainly on private property).	–	–			–	–			–	–		

Township				Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
EPBC	FFG	Scientific name	Common name	Habitat/species notes	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning
								No recent records but potentially due to lack of recording on private land											
	Vu	*Nematolepis squamea subsp. squamea*	Satinwood	In Victoria confined mainly to the Otway Range where locally common in gullies and tall wet forests, but with occurrences in the east, near Bairnsdale and Orbost and more surprising records from drier forest in the Pyrenees Range, Wombat Forest and Beechworth areas. The latter three records are likely to represent occurrences derived from transported seed or perhaps plantings, but the discontinuous distribution of the subspecies through much of its overall range suggests there the possibility of these being natural occurrences can't be discounted. Flowers spring.	–	–			1	1994	Low	Lack of potential habitat and no recent records	–	–			–	–		
CR	Cr	*Pimelea spinescens subsp. spinescens*	Spiny Rice-flower	Grows in grassland, open shrubland and occasionally woodland, often on basalt-derived soils. Mostly west of Melbourne (to near Horsham), but extending as far north as Echuca. Flowers Apr.–Aug.	1	2016	Moderate	Large areas of potential habitat present. Potentially unrecorded in large areas of privately owned grassland	–	–			–	–			–	–		
	En	*Grevillea obtecta*	Fryerstown Grevillea	Restricted to an area bounded approximately by Castlemaine, Guildford, Glenlyon and Taradale. Grows usually in well-drained situations in dry sclerophyll forest, sometimes in shallow gullies on ridge slopes. Flowers Aug.–Dec.	–	–			1	1984	Low–Moderate	No recent records. Potential habitat present and potentially confused with similar *Grevillea repens*	190	2011	High	Numerous records and appropriate habitat present	–	–		

Township					Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
EPBC	FFG	Scientific name	Common name	Habitat/species notes	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning
VU	En	*Prasophyllum aff. validum B*	Woodland Leek-orchid	Apparently endemic to Victoria where scattered across northern, north-eastern (Chiltern area) and western open forest and woodland communities on stony and sandy soils.	1	2003	Low	No recent records and not within main area of known occurrence	PMST	PMST	Low	No recent records and not within main area of known occurrence	–	–			–	–		
	En	*Prasophyllum lindleyanum*	Green Leek-orchid	Occurs in more fertile soils of woodland or scrubby heath, but now localized and uncommon. Flowers Sep.-Jan. Widespread, but generally uncommon in near-coastal scrub, dry woodlands further inland and sub-alpine herbfield.	1	1999	Low	No recent records and not within main area of known occurrence	–	–			–	–			–	–		
	Cr	*Pterostylis agrestis*	Sutton Grange Greenhood	Endemic to Victoria where confined to basalt plains grasslands in the vicinity of Bacchus Marsh, Maldon, Sutton Grange, Taradale and possibly Woorndoo. Flowers Sep.-Oct.	–	–			–	–			–	–			1	2007	Low	No recent records and lack of habitat present.
VU	En	*Pterostylis chlorogramma*	Green-striped Greenhood	Apparently localized in Victoria, but exact range uncertain due to confusion with closely allied species. Grows in moist areas of heathy and shrubby forest, on well-drained soils. Flowers Jul.-Sep.	PMST	PMST	Low-Moderate	No recent records although may have been overlooked due to similarity with other species	PMST	PMST	Low-Moderate	No recent records although may have been overlooked due to similarity with other species	–	–			PMST	PMST	Low-Moderate	No recent records although may have been overlooked due to similarity with other species
EN	En	*Pterostylis despectans*	Lowly Greenhood	Localized in Victoria where known from a few sites near Maryborough in Box/Ironbark Forest, and discovered more recently in grasslands north of Bendigo and woodland south of Horsham. Flowers Oct.-Dec.	1	1984	Low	No recent records although some potential habitat and the species could easily avoid detection	–	–			–	–			–	–		
	En	*Pterostylis lustra*	Small Sickle Greenhood	Widespread and sometimes locally common, growing in swampy areas under thickets of Leptospermum lanigerum (Woolly Tea-tree), on permanently wet, black	–	–			–	–			–	–			1	1999	Low-Moderate	Lack of recent records and only 1 previous record but potential

Township					Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
EPBC	FFG	Scientific name	Common name	Habitat/species notes	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning
				alkaline mud. Flowers Nov.–Feb.																habitat present
VU	Vu	*Glycine latrobeana*	Clover Glycine	Widespread but of sporadic occurrence and rarely encountered. Grows mainly in grasslands and grassy woodlands. Flowers mostly Sep.–Dec.(–Feb. at higher altitudes).	PMST	PMST	Low–Moderate	No records but potential habitat present.	PMST	PMST	Low–Moderate	No records but potential habitat present.	PMST	PMST	Low–Moderate	No records but potential habitat present.	PMST	PMST	Low–Moderate	No records but potential habitat present.
EN	En	*Lepidium hyssopifolium s.s.*	Basalt Peppercress	Collected from scattered sites on the volcanic plain, but now much reduced from its former range and recorded recently only from e.g. Moorabool, Winchelsea, Bacchus Marsh, Woodend, Trentham. Most recent collections are from disturbed, rather weedy sites. One collection from near Port Fairy is noteworthy for its occurrence in a slightly saline estuary amongst saltmarsh and fringing sedgeland. Flowers mostly summer–autumn.	PMST	PMST	Low–Moderate	No records but potential habitat present	PMST	PMST	Low	Lack of potential habitat and no records.	PMST	PMST	Low–Moderate	No recent records but potential habitat present	230	2022	High	Multiple recent records and potential habitat present. Previous recorded within the investigation area.
	En	*Rumex crystallinus s.s.*	Glistening Dock	Inland parts of all mainland states. Rare in Victoria, occurring only in the far north–west of the state on the Murray River floodplain, recorded only from the margins and drying beds of Lakes Wallawalla, Hattah and Lalbert. Flowers Oct.–Mar. (dependent on seasonal rains or river–levels).	1	1981	Low	No recent records and not within main area of known occurrence	–	–			–	–			–	–		
EN	En	*Rutidosis leptorhynchoides*	Button Wrinklewort	In Victoria confined to basaltic grasslands between Rokewood and Melbourne where endangered due to loss of habitat (formerly occurring as far west as Casterton, and on the Gippsland Plain near Newry). Flowers mostly late spring and summer.	PMST	PMST	Low–Moderate	No records but potential habitat present and records adjacent to Clunes yet outside search area.	–	–			–	–			–	–		

Township					Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
EPBC	FFG	Scientific name	Common name	Habitat/species notes	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning
	En	*Scleranthus brockiei*	Brock Knawel	Subalpine to alpine grasslands. Flowers Nov.–Mar.	–	–			–	–			–	–			2	2000	Low	No recent records and suitable habitat not present (no alpine grasslands)
EN	En	*Leucochrysum albicans subsp. tricolor*	White Sunray	Very rare in Victoria, the only recent collections from volcanic grassland remnants in the Wickliffe, Willaura, Streatham, Inverleigh and Creswick districts. All other Victorian collections were made last century, from e.g. Mt Cole, the Grampians and the Port Fairy district. Flowers Nov.–Dec.	PMST	PMST	Low–Moderate	No records but potential habitat present	PMST	PMST	Low	Lack of potential habitat and no records.	PMST	PMST	Low–Moderate	No recent records but potential habitat present	PMST	PMST	Low	Lack of potential habitat and no records.
	En	*Senecio campylocarpus*	Floodplain Fireweed	In Victoria mostly throughout central Victoria and in the north-east in loam to clay soils in forest and woodland, usually in seasonally inundated areas. Flowers spring–autumn.	–	–			1	1982	Low	No recent records and not within main area of known occurrence	–	–			–	–		
	En	*Senecio cunninghamii var. cunninghamii*	Branching Groundsel	Grows in heavy sometimes winter-wet soils as well as dry rocky soils, commonly on embankments or escarpments. Flowers Oct.–Apr.	1	1990	Low	No recent records and not within main area of known occurrence	–	–			–	–			–	–		
VU	Cr	*Senecio macrocarpus*	Large-headed Fireweed	In Victoria largely confined to remnant Themeda grasslands on loamy clay soils derived from basalt from near Melbourne west to Skipton area. Also known from auriferous ground near Stawell. Formerly recorded from near Horsham and Casterton, but apparently long extinct from these areas. Flowers Aug.–Oct.	PMST	PMST	Low	Lack of Themeda grasslands and no records	PMST	PMST	Low	Lack of Themeda grasslands and no records	PMST	PMST	Low–moderate	Some Themeda grassland observed however condition was somewhat poor	PMST	PMST	Low	Lack of Themeda grasslands and no records
	En	*Platylobium rotundum*	Penny-leaf Flat-pea	Grows in open forest on ranges in central and central-western Victoria from Mt Buangor to Blackwood. Flowers Sep.–Dec.	–	–			–	–			1	2017	Low	Only one record and lack of potential habitat within the	13	2019	Moderate	Multiple recent records and potential habitat present

Township				Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
EPBC	FFG	Scientific name	Common name	Habitat/species notes	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning
																investigation area				
	En	*Swainsona behriana*	Southern Swainson-pea	Rare, widespread but sporadic in Victoria, mostly in lowlands west of Melbourne, but extending to montane areas in the east (e.g. Omeo, Cobungra, Gelantipy). Usually found in grassland and grassy woodland on relatively fertile soils. Flowers Aug.-Jan.	–	–			1	1997	Low-Moderate	No recent records but potential habitat present.	–	–			–	–		
	Vu	*Thelymitra luteocilium*	Fringed Sun-orchid	Scattered and rare in Victoria, often in moist depressions. Flowers Sep.-Oct. Grows among low shrubs in open forest, mallee scrub or in open rocky sites in well-drained and moisture-retentive soils. Flowers Sep.-Oct.	2	1981	Low	No recent records and lack of potential habitat	–	–			–	–			–	–		
	En	*Pultenaea graveolens*	Scented Bush-pea	Rare, known in Victoria from a few areas west of Melbourne (e.g. Brisbane Range, northern Grampians and midland areas between Nagambie and Castlemaine). Occurs in shrub under-storey of dry Stringybark or Ironbark Forest. Flowers Oct.	4381	2015	High	Large number of recent records in the north-west of the Study Area.	–	–			334	2011	Moderate-High	High number of local records but potential habitat within the investigation area restricted to discrete areas	–	–		
	En	*Thelymitra X chasmogama*	Globe-hood Sun-orchid	Sporadic in areas where the putative parents T. luteocilium and a member of the T. nuda-pauciflora complex grow together. Flowers late Sep.-early Nov. Occurs sporadically in western Victoria in woodlands, open forests and mallee scrubs and co-extensive with T. luteocilium. Flowers Sep.-Nov.	2	1981	Low	No recent records and parent species also not recorded in the local area	–	–			–	–			–	–		
	Vu	*Thelymitra X macmillanii*	Crimson Sun-orchid	Occurs sporadically in grassland, woodland and open forests, where the parent species grow together. Flowers Aug.-Sep.	1	1981	Low	No recent records and parent species also not	–	–			–	–			–	–		

Township					Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
EPBC	FFG	Scientific name	Common name	Habitat/species notes	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning	No. records	Last Records	Likelihood of Occurrence	Reasoning
								recorded in the local area												
	En	*Viola sieberiana s.s.*	Tiny Violet	Localised in Victoria but locally common in heath and heathy woodland, usually on sandy soils south and west from the Grampians. Mostly at low altitude but to c. 900 m on the Mt William Range. Flowers Sep.–Dec.	–	–			1	2012	Low–Moderate	Only one recent record but large areas of potential habitat located within the investigation area	–	–			–	–		
	En	*Vittadinia cuneata var. morrisii*	Fuzzy New Holland Daisy	Apparently rare in Victoria, known only from Dimboola, Horsham, Donald, Wychitella, Maryborough and Bendigo areas. Flowers Oct.–Nov.	–	–			–	–			–	–			1	2012	Low	No recent records and lack of potential habitat
	Vu	*Pultenaea reflexifolia*	Wombat Bush-pea	Restricted to a few small areas of dry forest west of Melbourne in Gisborne, Barkstead and Lerderderg areas with an isolated, very old record from Apollo Bay. Flowers Nov.	–	–			7	2011	Moderate–High	Few records but multiple areas of potential habitat	760	2022	High	High number of local records but potential habitat within the investigation area restricted to discrete areas	3149	2022	High	Large number of recent records, not in flower during assessment period so likely present in the investigation area. Potential habitat present

Appendix 7. Potentially occurring threatened fauna species

International Treaty
B: Bonn Convention; C: CAMBA; J: JAMBA; R: ROKAMBA.

EPBC Act X999 conservation status
EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant.

FFG Act X988 status
Vu: Vulnerable, En: Endangered, Cr: Critically Endangered, -x: Extinct in Victoria and ex: Extinct dependant.

Township					Clunes				Daylesford-Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
		En	*Accipiter novaehollandiae*	Grey Goshawk	-	-	-	-	2	2018	Low-Moderate	Not typically found in the Victorian Volcanic Plains or Goldfields Bioregion, however, some habitat components like wooded farmlands that the species lives is present in Daylesford.	1	2011	Low	Little to no habitat present within Glenlyon investigation areas (grassland and scattered trees)	3	2021	Moderate	Habitat present and recent records within Trentham investigation areas
B			*Acrocephalus australis*	Australian Reed Warbler	2	2000	Low	Not typically found in high altitude, but some habitat components present in Clunes.	22	2020	Moderate	Some habitat components present in Daylesford and numerous recent records	4	2019	High	Recent observations. Observed breeding in Glenlyon Dam over the past summer and likely present on farm dams in the investigation areas (Pers. Comms. Brian Bainbridge 12.9.23)	-	-	-	
B,R,J,C		Vu	*Actitis hypoleucos*	Common Sandpiper	n/a (PMST Only)	n/a (PMST Only)	Low	No records. Lack of habitat components.	n/a (PMST Only)	n/a (PMST Only)	Low	No records and lack of habitat components	n/a (PMST Only)	n/a (PMST Only)	Low	Migratory bird that mainly inhabits coasts. No recent records	n/a (PMST Only)	n/a (PMST Only)	Low	Not known to inhabit the area and lack of wetland habitat. No records.

Township					Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
B,R,J,C			*Anas querquedula*	Garganey	2	1995	Low–Moderate	No recent records and lack of habitat components	-	-	–	–	-	-	–	–	-	-	–	–
	CR	Cr	*Anthochaera phrygia*	Regent Honeyeater	2	1981	Low	Few dated records in the surrounding area. No Box–Ironbark forests present in the local area for foraging.	n/a (PMST Only)	n/a (PMST Only)	Low	Few dated records in the surrounding area. No Box–Ironbark forests present in the local area for foraging.	n/a (PMST Only)	n/a (PMST Only)	Low	A lack of old growth iron–bark forest in the area, no records	-	-	–	–
	En		*Antigone rubicunda*	Brolga	55	2019	Moderate	Numerous as well as recent records in the local area. Some waterbodies across the investigation area that would provide both foraging and breeding habitat for the species. Most likely to be travelling north of the subject site to Merin Merin and Middle Swamp when inundated.	-	-	–	–	-	-	–	–	-	-	–	–

Township					Clunes				Daylesford-Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
			Aphelocephala leucopsis	Southern Whiteface	30	2005	Low–Moderate	Although not recent, numerous records in the local area. Potential for species to inhabit the local area in times of severe drought.	-	-	-	-	-	-	-	-	-	-	-	-
	VU	En	*Aprasia parapulchella*	Pink-tailed Worm-Lizard	n/a (PMST Only)	n/a (PMST Only)	Low	No records within the area. Limited habitat to support the species	n/a (PMST Only)	n/a (PMST Only)	Low	No records within the area. Limited habitat to support the species	-	-	-	-	-	-	-	-
C,R, J			*Apus pacificus*	Fork-tailed Swift	n/a (PMST Only)	n/a (PMST Only)	Low–Moderate	No recent records within the local area but may be observed flying overhead when migrating from October to April.	8	2019	Low–Moderate	Multiple recent records of the migratory bird being spotted in Daylesford.	8	2019	Moderate	May be seen flying over during migration from October to April. May be seen foraging in open grasslands.	n/a (PMST Only)	n/a (PMST Only)	Low	May be seen flying over during migration. Little to no habitat components present and no records
C,J	Vu		*Ardea alba modesta*	Eastern Great Egret	6	2017	Low–Moderate	Only one recent records from 2017 (remainder prior to 2003). Some potential habitat components for foraging present	1	2017	Low–Moderate	Single recent record and Few areas of potential habitat.	-	-	-	-	1	2019	Low–Moderate	Only a single record, however habitat components present

Township					Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
		Vu	*Aythya australis*	Hardhead	25	2018	Moderate	Numerous recent records and habitat components present.	6	2019	Low–Moderate	Few recent records and habitat components (waterbodies) present within the investigation area.	5	2018	Low	Few recent records and lack of habitat components	-	-	-	-
		Vu	*Biziura lobata*	Musk Duck	9	2009	Low–Moderate	Few dated records however habitat components present	2	2000	Low–Moderate	No recent records but habitat components present	1	2007	Low	No recent records and lack of habitat components present	2	2021	Low–Moderate	Recent records however minimal habitat components (large waterbodies) present
	EN	Cr	*Botaurus poiciloptilus*	Australasian Bittern	n/a (PMST Only)	n/a (PMST Only)	Low	no records and lack of habitat components present	n/a (PMST Only)	n/a (PMST Only)	Low	no records and lack of habitat components present	n/a (PMST Only)	n/a (PMST Only)	Low	Lack of habitat components to support the species and no recent records	n/a (PMST Only)	n/a (PMST Only)	Low	No records within the area and lack of suitable habitat components to support the species
		Cr	*Burhinus grallarius*	Bush Stone-curlew	1	1996	Low	Single dated record. Limited habitat present within the area.	-	-	–	–	-	-	–	–	-	-	–	–
		Vu	*Calamanthus pyrrhopygius*	Chestnut-rumped Heathwren	-	-	–	–	1	2019	Low–Moderate	Single recent record. Lack of suitable habitat and not known to occur inland	-	-	–	–	-	-	–	–

Township					Clunes				Daylesford-Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
B,R,J,C			*Calidris acuminata*	Sharp-tailed Sandpiper	2	1999	Low	No recent records and lack of habitat components	n/a (PMST Only)	n/a (PMST Only)	Low	Sometimes migrates to Western Victoria. No records and lack of suitable habitat present.	n/a (PMST Only)	n/a (PMST Only)	Low	Lack of suitable habitat (saline inland wetlands) and is not known to inhabit the local area. No records.	n/a (PMST Only)	n/a (PMST Only)	Low	Lack of suitable habitat (saline inland wetlands) and is not known to inhabit the local area. No records.
B,R,J,C	CR	Cr	*Calidris ferruginea*	Curlew Sandpiper	n/a (PMST Only)	n/a (PMST Only)	Low	Sometimes migrates to Western Victoria. No recent records and limited preferred habitat	n/a (PMST Only)	n/a (PMST Only)	Low	Sometimes migrates to Western Victoria. No records and lack of suitable habitat present.	n/a (PMST Only)	n/a (PMST Only)	Low	Lack of suitable habitat (saline inland wetlands and/or sewage ponds) and is not known to inhabit the local area. No records	n/a (PMST Only)	n/a (PMST Only)	Low	Lack of suitable habitat (saline inland wetlands and/or sewage ponds) and is not known to inhabit the local area. No records
B,R,J			*Calidris melanotos*	Pectoral Sandpiper	4	1985	Low	Dated records and limited preferred habitat present throughout the area	n/a (PMST Only)	n/a (PMST Only)	Low	Migratory species, some habitat components present. No records and lack of suitable habitat present.	n/a (PMST Only)	n/a (PMST Only)	Low	Lack of suitable habitat (saline inland wetlands) and is not known to inhabit the local area. No records.	n/a (PMST Only)	n/a (PMST Only)	Low	Lack of suitable habitat (saline inland wetlands) and is not known to inhabit the local area. No records.
B,R,J,C			*Calidris subminuta*	Long-toed Stint	1	1981	Low	Dated records and limited preferred habitat present throughout the area	-	-	-	-	-	-	-	-	-	-	-	-

Township					Clunes				Daylesford-Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
	EN		*Callocephalon fimbriatum*	Gang-gang Cockatoo	n/a (PMST Only)	n/a (PMST Only)	Low–Moderate	No records within the area. Areas of suitable habitat scattered throughout. Site is outside species typical range	3	2001	High	No recent records, however, suitable habitat components present. Observed regularly in the area by Brian Bainbridge (Pers. Comm. 12.09.23)	15	2015	High	Recent records and some habitat components present. Likely to be foraging in these areas during the winter months. Observed regularly in the area by Brian Bainbridge (Pers. Comm. 12.09.23)	39	2021	High	Multiple recent records and extensive areas of suitable habitat present. Observed regularly in the area by Brian Bainbridge (Pers. Comm. 12.09.23)
			Climacteris picumnus	Brown Treecreeper (south-eastern ssp.)	255	2019	High	Numerous recent records throughout the area. Species preferred habitat present throughout.	23	2021	Moderate	Numerous recent records and large areas of suitable habitat present.	7	2020	Low–Moderate	Lack of habitat components (Eucalypt woodlands), however multiple recent records for the area	3	2010	Low–Moderate	Suitable habitat within close proximity to the investigation area and somewhat recent records
	EN	En	*Dasyurus maculatus maculatus*	Spot-tailed Quoll	n/a (PMST Only)	n/a (PMST Only)	Low	No records and lack of habitat components (dense treed areas) present.	n/a (PMST Only)	n/a (PMST Only)	Low	No records, few habitat components present.	n/a (PMST Only)	n/a (PMST Only)	Low	No suitable habitat within the investigation area and is not known to occur in the area. No records	n/a (PMST Only)	n/a (PMST Only)	Low	Limited habitat components (dry sclerophyll forest) present and is not known to occur in the area. No records
	VU	En	*Delma impar*	Striped Legless Lizard	1	2002	Low	Single record within the area. Habitat components identified though site is outside the species known habitat range	n/a (PMST Only)	n/a (PMST Only)	Low	Few habitat components present. No records	n/a (PMST Only)	n/a (PMST Only)	Low	No high-quality grassland present, not known to occur in the local area. No records	n/a (PMST Only)	n/a (PMST Only)	Low	No high-quality grassland present, not known to occur in the local area. No records
		En	*Egretta garzetta*	Little Egret	1	2017	Low–Moderate	Single recent record, species may occasionally be present forging around grassland paddocks after rain.	-	-	–	–	-	-	–	–	-	-	–	–

Township					Clunes				Daylesford-Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
	VU	Vu	*Falco hypoleucos*	Grey Falcon	n/a (PMST Only)	n/a (PMST Only)	Low	No records within the area. Species may occur throughout the area while hunting during periods after droughts	n/a (PMST Only)	n/a (PMST Only)	Low	Suitable habitat throughout though no local records for the species	n/a (PMST Only)	n/a (PMST Only)	Low–moderate	May use grassland as habitat during drought. Nesting habitat (large tree hollows) present but few in numbers. No records.	-	-	-	-
		Cr	*Falco subniger*	Black Falcon	3	2017	Low–Moderate	Few recent records and habitat components, mainly occurs in the lowlands.	-	-	-	-	-	-	-	-	-	-	-	-
	CR	Vu	*Galaxias rostratus*	Flat-headed Galaxias	n/a (PMST Only)	n/a (PMST Only)	Low	Restricted to the Murray Darling System and no records	n/a (PMST Only)	n/a (PMST Only)	Low	Restricted to the Murray Darling System and no records	n/a (PMST Only)	n/a (PMST Only)	Low	Lack of records in the area. No connectivity to the Murray Darling Basin System.	n/a (PMST Only)	n/a (PMST Only)	Low	Lack of records in the area. No connectivity to the Murray Darling Basin System.
	VU	En	*Galaxiella pusilla*	Dwarf Galaxias	n/a (PMST Only)	n/a (PMST Only)	Low	Doesn't typically occur in inland western Victoria. No records	n/a (PMST Only)	n/a (PMST Only)	Low	Doesn't typically occur in inland western Victoria. No records	-	-	-	-	n/a (PMST Only)	n/a (PMST Only)	Low	No habitat components (wetland connectivity) present. No records

Township					Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
B,R,J,C			*Gallinago hardwickii*	Latham's Snipe	88	2017	Moderate	Numerous recent records and habitat components (small waterbodies) present.	n/a (PMST Only)	n/a (PMST Only)	Low–Moderate	Some habitat components present such as freshwater waterbodies surrounded by vegetation.	n/a (PMST Only)	n/a (PMST Only)	Low	Lack of habitat components (densely vegetated wetlands and/or swamps) and not known to occur in the local area. No records	n/a (PMST Only)	n/a (PMST Only)	Low	Lack of habitat components (densely vegetated wetlands and/or swamps) and not known to occur in the local area. No records
	VU	Vu	*Grantiella picta*	Painted Honeyeater	63	2008	Moderate	Numerous dated records but multiple areas of suitable habitat (Eucalypt forests) present within the investigation area	n/a (PMST Only)	n/a (PMST Only)	Low	Some habitat components present. No records	n/a (PMST Only)	n/a (PMST Only)	Low	Lack of habitat components (treed areas) within the investigation area. No records	n/a (PMST Only)	n/a (PMST Only)	Low–Moderate	Large areas of Eucalypt forests present however species is not known to occur in the local area. No records
C		En	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	-	-	–	–	1	2010	Low	Not known to occur in inland western Victoria and only a single dated record	-	-	–	–	-	-	–	–

Township					Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
		Vu	*Hieraaetus morphnoides*	Little Eagle	16	2000	Moderate	No recent records. Extensive range of habitat so therefore may be seen hunting within the investigation area.	6	2001	Low–Moderate	No recent records, but some habitat components present.	2	2017	Low–Moderate	Few recent records. May occasionally hunt throughout farmland areas	-	-	–	–
C,R,J	VU	Vu	*Hirundapus caudacutus*	White-throated Needletail	n/a (PMST Only)	n/a (PMST Only)	Low	No records. Almost exclusively aerial therefore habitat components cannot be considered. May be observed flying overhead.	9	2018	Low–Moderate	Multiple recent records. Almost exclusively aerial therefore habitat components cannot be considered. May be observed flying overhead.	2	1988	Low	No recent records. Almost exclusively aerial therefore habitat components cannot be considered. May be observed flying overhead.	15	2018	Moderate	Multiple recent records. Almost exclusively aerial therefore habitat components cannot be considered. May be observed flying overhead.
EN	En		*Isoodon obesulus obesulus*	Southern Brown Bandicoot	n/a (PMST Only)	n/a (PMST Only)	Low	No records and not known to occur within the local area. Dense vegetation not present.	-	-	–	–	-	-	–	–	-	-	–	–
CR	Cr		*Lathamus discolor*	Swift Parrot	192	2006	Moderate	Numerous dated records, Areas of suitable habitat for foraging and may be seen foraging within the township	3	2006	Low–Moderate	Few records, large areas of potential habitat (ornamental trees and shrubs) located within townships.	n/a (PMST Only)	n/a (PMST Only)	Low	Lack of habitat components (Box–Ironbark forests) and few ornamental shrubs planted in residential areas. No records	n/a (PMST Only)	n/a (PMST Only)	Low–Moderate	Large areas of Eucalypt forests and ornamental shrubs observed in residential areas, however no records.

Township					Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
		Vu	*Lewinia pectoralis*	Lewin's Rail	1	2017	Low–Moderate	Single recent records. Few habitat components present but known to go undetected	-	-	–	–	-	-	–	–	-	-	–	–
			Liopholis montana	Mountain Egernia	n/a (PMST Only)	n/a (PMST Only)	Low	Doesn't typically occur in inland western Victoria. No records	-	-	–	–	-	-	–	–	-	-	–	–
	VU	Vu	*Litoria raniformis*	Growling Grass Frog	3	2017	Low–Moderate	Few recent records, some habitat components present and known to occur directly adjacent to investigation area	n/a (PMST Only)	n/a (PMST Only)	Low	Some habitat components present but no records.	n/a (PMST Only)	n/a (PMST Only)	Moderate	Habitat present (open wetlands) within investigation area	12	2017	High	Multiple recent records and areas of suitable habitat (including privately owned dams) present. Previous records within the investigation area
		Vu	*Lophoictinia isura*	Square-tailed Kite	9	2019	Low–Moderate	Some recent records and suitable hunting habitat present	10	2018	Low–Moderate	Prefers coastal and sub–coastal habitats but may occasionally forage within township. Multiple recent records	3	1993	Low	No recent records and no suitable habitat.	2	2018	Low–Moderate	Few recent records and minimal suitable habitat present.
	EN	En	*Maccullochella macquariensis*	Trout Cod	n/a (PMST Only)	n/a (PMST Only)	Low	Doesn't typically occur in the area. No records	n/a (PMST Only)	n/a (PMST Only)	Low	Don't typically occur in the area. No records	n/a (PMST Only)	n/a (PMST Only)	Low	Few free–flowing rivers present and only minimal connection to the Murray River	n/a (PMST Only)	n/a (PMST Only)	Low	Few free–flowing rivers present and only minimal connection to the Murray River. No records.
	VU	En	*Maccullochella peelii*	Murray Cod	n/a (PMST Only)	n/a (PMST Only)	Low	Doesn't typically occur in the area. No records.	n/a (PMST Only)	n/a (PMST Only)	Low	Doesn't typically occur in the area. No records	n/a (PMST Only)	n/a (PMST Only)	Low	Few free–flowing rivers present and only minimal connection to the Murray River	n/a (PMST Only)	n/a (PMST Only)	Low	Few free–flowing rivers present. No records

Township					Clunes				Daylesford-Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
	EN	En	*Macquaria australasica*	Macquarie Perch	-	-	-	-	-	-	-	-	-	-	-	-	n/a (PMST Only)	n/a (PMST Only)	Low	Few free-flowing rivers present. No records
		Vu	*Melanodryas cucullata*	Hooded Robin	36	2018	Moderate-High	numerous recent records and preferred habitat components present. Recorded within investigation area.	-	-	-	-	-	-	-	-	-	-	-	-
J			*Merops ornatus*	Rainbow Bee-eater	13	2003	Low-Moderate	Multiple dated records. Some suitable habitat present (treed areas) in the northern section of Cl3	-	-	-	-	-	-	-	-	-	-	-	-
C, J, R			*Motacilla flava*	Yellow Wagtail	n/a (PMST Only)	n/a (PMST Only)	Low-Moderate	Some habitat components present to support the migratory bird. No records	n/a (PMST Only)	n/a (PMST Only)	Low	Few habitat components present and no records	n/a (PMST Only)	n/a (PMST Only)	Low-moderate	May utilise the open field and wet meadows as temporary habitat during migration. No records	n/a (PMST Only)	n/a (PMST Only)	Low	Lack of suitable habitat and not known to occur in the local area
B			*Myiagra cyanoleuca*	Satin Flycatcher	2	2000	Low	Typically occur more south of Victoria. Two dated records	8	2021	Low-Moderate	Numerous recent records and suitable habitat present. Species has been observed in close proximity to investigation area.	63	2011	Low-Moderate	Multiple previous records but lack of habitat components within the investigation area. All previous records outside of investigation area.	31	2017	Moderate	Some recent records and suitable habitat (woodland along watercourses) present for spring/summer foraging.

Township					Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
	VU	Vu	*Nannoperca australis (Murray-Darling lineage)*	Southern Pygmy Perch (Murray-Darling lineage)	n/a (PMST Only)	n/a (PMST Only)	Low	Few habitat components present. No records	n/a (PMST Only)	n/a (PMST Only)	Low	No records and lack of habitat components present	n/a (PMST Only)	n/a (PMST Only)	Low	No waterways present within the investigation area and no records	n/a (PMST Only)	n/a (PMST Only)	Low	lack of wetlands and waterways few in numbers and of low to moderate quality. Not known to occur in the local area
	VU	Vu	*Nannoperca obscura*	Yarra Pigmy Perch	-	-	–	–	n/a (PMST Only)	n/a (PMST Only)	Low	Typically occurs more south of Victoria and no records	-	-	–	–	n/a (PMST Only)	n/a (PMST Only)	Low	few waterways and not known to occur in the local area. No records.
	VU		*Neophema chrysostoma*	Blue-winged Parrot	4	2005	Low–Moderate	Has been known to occur within direct surrounds to the investigation area. Preferred habitat components present	5	2020	Moderate	Some recent records and suitable habitat present.	9	2019	Moderate	Some recent records and habitat components present.	9	2019	Moderate	Some recent records and habitat components present (woodlands).
	Cr		*Ninox connivens*	Barking Owl	3	2009	Low–Moderate	Species only recorded in the far extents of the search area and not observed within the investigation area. May be seen flying overhead while travelling.	-	-	–	–	-	-	–	–	2	2005	Low–Moderate	No recent records but suitable habitat present
	Vu		*Ninox strenua*	Powerful Owl	4	2000	Low–Moderate	No recent records but records within the investigation area. Suitable habitat (treed areas) observed within the investigation area.	14	1999	Low	No recent records and somewhat outside the species typical range	9	2021	Low–Moderate	Few recent records. Lack of suitable habitat within the investigation area. May be seen hunting in adjacent treed areas.	295	2019	High	Significant number of recent records and large areas of suitable habitat. Particularly on the edges of the investigation area

Township					Clunes				Daylesford-Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
B,R,J,C	CR	Cr	*Numenius madagascariensis*	Eastern Curlew	n/a (PMST Only)	n/a (PMST Only)	Low	Few habitat components present and no records.	n/a (PMST Only)	n/a (PMST Only)	Low	Few habitat components present and no records	n/a (PMST Only)	n/a (PMST Only)	Low	Typically a coastal species and not known to occur in the local area. No records	n/a (PMST Only)	n/a (PMST Only)	Low	Typically a coastal species and not known to occur in the local area
B,R,J,C			*Numenius minutus*	Little Curlew	1	1994	Low	No recent records and limited suitable habitat present	-	-	-	-	-	-	-	-	-	-	-	-
	En		*Oreoica gutturalis*	Crested Bellbird	16	2008	Low–Moderate	Multiple records, somewhat suitable habitat present.	-	-	-	-	-	-	-	-	-	-	-	-

Township					Clunes				Daylesford-Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
		Vu	*Ornithorhynchus anatinus*	Platypus	11	2018	Moderate	Some recent records within the investigation area. Somewhat suitable habitat present	2	1995	Low	Multitude of watercourse present but most outside of the investigation area. No recent records.	2	2020	Low	Few observations and lack of suitable habitat components	1	2013	Low	Few observations and lack of suitable habitat components
		Vu	*Oxyura australis*	Blue-billed Duck	4	1991	Low	No recent records and Limited suitable habitat present	1	2010	Low	No recent records and lack of habitat components present.	-	-	-	-	-	-	-	-

Township					Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
	EN	Cr	*Paralucia pyrodiscus lucida*	Eltham Copper	-	-	–	–	n/a (PMST Only)	n/a (PMST Only)	Low	Not typically found in the area and no records	n/a (PMST Only)	n/a (PMST Only)	Low	Not typically found in the area. No records.	-	-	–	–
	CR	Cr	*Pedionomus torquatus*	Plains-wanderer	n/a (PMST Only)	n/a (PMST Only)	Low	Doesn't typically travel this far south, but some habitat components present. No records.	n/a (PMST Only)	n/a (PMST Only)	Low	Doesn't typically occur this far south, but some habitat components present. No records	n/a (PMST Only)	n/a (PMST Only)	Low–moderate	No records and limited suitable habitat present.	n/a (PMST Only)	n/a (PMST Only)	Low	No recent records and ack of suitable habitat present

Township					Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
		Vu	*Peltohyas australis*	Inland Dotterel	1	1991	Low	No recent records and limited preferred habitat present.	-	-	–	–	-	-	–	–	-	-	–	–
	VU	Vu	*Petauroides volans*	Greater Glider	-	-	–	–	n/a (PMST Only)	n/a (PMST Only)	Low–Moderate	Are typically found in the Daylesford area, however, have declined in numbers in recent years. No records though habitat present	59	2020	Low–Moderate	Large trees hollows present but only in scattered/exposed trees for habitat in the investigation area. All records located outside investigation area.	33	2020	Moderate	Few tree hollows were observed to support the species . Multiple recent records, Likely to occur in the adjacent areas and within the treed areas of the investigation areas.
VU			*Petaurus australis*	Yellow-bellied Glider	n/a (PMST Only)	n/a (PMST Only)	Low	Not typically found in the area, no records and lack of suitable habitat present.	n/a (PMST Only)	n/a (PMST Only)	Low	Not typically found in the area. Some habitat components present. No records	n/a (PMST Only)	n/a (PMST Only)	Low	Lack of forested area and no records	n/a (PMST Only)	n/a (PMST Only)	Low	Not known to occur in the local areas and lack of suitable habitat. No records

Township					Clunes				Daylesford-Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
		Vu	*Phascogale tapoatafa*	Brush-tailed Phascogale	27	2005	Low–Moderate	No recent records but numerous dated records and small areas of potential habitat within the investigation area.	92	2022	High	Numerous recent records within the investigation area and suitable habitat throughout	8	2020	Low–Moderate	Multiple recent records but lack of suitable habitat present	2	2018	Moderate	Few recent records, however suitable habitat is present including open forest comprising of box and stringy bark eucalypts
B,C			*Plegadis falcinellus*	Glossy Ibis	52	2017	Low–Moderate	Numerous recent records within direct vicinity (Middle Swamp and Merin Merin Swamp) but not within investigation area	-	-	-	-	-	-	-	-	-	-	-	-
	VU	En	*Polytelis swainsonii*	Superb Parrot	n/a (PMST Only)	n/a (PMST Only)	Low	Doesn't typically occur in the area and no records	-	-	-	-	-	-	-	-	-	-	-	-

Township					Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
	VU	En	*Prototroctes maraena*	Australian Grayling	-	-	-	-	n/a (PMST Only)	n/a (PMST Only)	Low	Few habitat components present. No records	-	-	-	-	n/a (PMST Only)	n/a (PMST Only)	Low	No suitable habitat (no connection to the ocean) and not known to occur in the local area
		En	*Pseudophryne bibronii*	Brown Toadlet	-	-	-	-	1	1982	Low	No recent records. Some suitable habitat	14	2020	Moderate-High	Multiple recent records (not within the investigation area) and areas of suitable habitat.	-	-	-	-
	VU	Vu	*Pteropus poliocephalus*	Grey-headed Flying-fox	n/a (PMST Only)	n/a (PMST Only)	Low	Doesn't typically occur in the area and no records	n/a (PMST Only)	n/a (PMST Only)	Low	Doesn't typically occur in the area and no records	n/a (PMST Only)	n/a (PMST Only)	Low	Colony not currently present within the immediate area and lack of habitat present. No records	n/a (PMST Only)	n/a (PMST Only)	Low–Moderate	Not known to occur in the local area but potential for a colony to migrate and have suitable habitat
		En	*Pyrrholaemus sagittatus*	Speckled Warbler	11	2017	Moderate	Multiple recent records including within the investigation area. Suitable habitat components present within Cl2 and Cl3.	3	2000	Low	No recent records and not known to occur within the investigation area	-	-	-	-	-	-	-	-
B			*Rhipidura rufifrons*	Rufous Fantail	n/a (PMST Only)	n/a (PMST Only)	Low	Few habitat components present and no records.	10	2020	Moderate	Some recent records and habitat components present.	9	2011	Low–Moderate	Recent records but lack of habitat components within the investigation area	20	2019	Moderate	Multiple habitat components present and recent records within vicinity however none within the

Township					Clunes				Daylesford–Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
																				investigation area.
C	EN	Cr	*Rostratula australis*	Australian Painted Snipe	1	1991	Low	No recent records and limited suitable habitat present	n/a (PMST Only)	n/a (PMST Only)	Low	Few habitat components present and no records	n/a (PMST Only)	n/a (PMST Only)	Low	Does not typically occur within this area, some habitat components present on private land.	n/a (PMST Only)	n/a (PMST Only)	Low-Moderate	Does not typically occur within this area but multiple habitat components present on private land. No records
	Vu		*Spatula rhynchotis*	Australasian Shoveler	95	2017	Moderate	Numerous recent records but large areas of suitable habitat and records present outside of the investigation area (Middle Swamp and Merin Merin Swamp)	-	-	-	-	-	-	-	-	-	-	-	-
	Vu		*Stagonopleura guttata*	Diamond Firetail	22	2018	Moderate	Numerous recent records and some habitat components (grassland with scattered trees) present.	-	-	-	-	-	-	-	-	-	-	-	-
	En		*Stictonetta naevosa*	Freckled Duck	6	1987	Low	Dated records and limited preferrable habitat present.	1	2019	Low	Single recent record. Lack of suitable habitat.	-	-	-	-	-	-	-	-

Township					Clunes				Daylesford-Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
	VU	Vu	*Synemon plana*	Golden Sun Moth	6 (+220 collected by Brian Bainbridge*)	2010 (2023 by Brian Bainbridge*)	High	Observed by Brian Bainbridge summer 2022/2023. Multiple points located within the investigation area. Suitable habitat present.	n/a (PMST Only)	n/a (PMST Only)	Moderate	Few habitat components present but no records	n/a (PMST Only)	n/a (PMST Only)	Moderate	Known to occur within this area (pers comms Brian Bainbridge) and large areas of suitable habitat present.	n/a (PMST Only)	n/a (PMST Only)	Low	Does not typically occur within this area and few habitat components within investigation area. No records
B,R,J,C		En	*Tringa glareola*	Wood Sandpiper	2	1992	Low	No recent records and lack of habitat components	-	-	-	-	-	-	-	-	-	-	-	-
B,R,J,C		En	*Tringa nebularia*	Common Greenshank	1	1991	Low	No recent records and lack of habitat components	n/a (PMST Only)	n/a (PMST Only)	Low	Few habitat components present and no records	n/a (PMST Only)	n/a (PMST Only)	Low	Some habitat present but not known to occur in the local area.	n/a (PMST Only)	n/a (PMST Only)	Low	Does not typically occur in the area. Limited habitat components and no records
		Cr	*Tyto novaehollandiae*	Masked Owl	-	-	-	-	1	1980	Low	No recent records and only one single historical record. Some habitat components present.	-	-	-	-	-	-	-	-

Township					Clunes				Daylesford-Hepburn Springs				Glenlyon				Trentham			
Treaty	EPBC	FFG	Scientific name	Common name	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning	No. Records	Last record	Likelihood of Occurrence	Reasoning
		En	*Tyto tenebricosa*	Sooty Owl	-	-	-	-	-	-	-	-	-	-	-	-	1	1981	Low	Habitat present however only one record within 5 km and no recent records have been recorded. Single dated record

** Brian Bainbridge pers. comm. 29.05.2023

Appendix 8. Potentially occurring threatened fauna species – Species Notes

Treaty	EPBC	FFG	Scientific name	Common name	Habitat/species notes
		En	*Accipiter novaehollandiae*	Grey Goshawk	The Grey Goshawk has a stronghold in Victoria; particularly the white form in the Otway Ranges, where wet forests and gullies containing Mountain Grey Gum adjoin partly cleared farmlands. They occur in lower densities in similar habitats in the Strzelecki Ranges, Gippsland Plains and Otway Plains. Elsewhere in the State they are occasionally seen in woodlands, dry forests, suburban parks and wooded farmlands (Marchant and Higgins 1993).
B			*Acrocephalus australis*	Australian Reed Warbler	Typically dense, low, aquatic or riparian vegetation. Vegetation with a vertical structure, in and around nearly any type of fresh, brackish or saline wetlands, reeds, cumbungi, pencil rush, over water, river red gum regrowth, weeping willows, bamboos, crops near irrigation channels and public gardens. Widespread in E Australia, mostly south of tropics; clings to stems, forages on floating vegetation. In Vic, occurs throughout lowlands and foothills and only rarely in highlands; most common in wetlands and irrigation areas of mid and upper Murray valley. Largely absent from mountainous areas of North-East and Gippsland districts (Pizzey and Knight 2007) (Higgins, Peter and Cowling 2006)
B,R,J,C		Vu	*Actitis hypoleucos*	Common Sandpiper	Regular, widespread but mostly uncommon summer migrant to Australia (Aug-May) (Pizzey and Knight 2007). Wide range of coastal or inland wetlands, with varying levels of salinity. Mainly muddy margins of rocky shores of wetlands; often around estuaries and deltas of streams; also lakes, pools, billabongs, reservoirs, dams and claypans; associated with mangroves. Large coastal mudflats are not favoured (Higgins and Davies 1996).
B,R,J,C			*Anas querquedula*	Garganey	Small and often rather unobtrusive duck of wetlands and freshwater lakes with reedy and other fringing vegetation. The species breeds in Europe and Asia. It migrates south to Africa and Asia in winter. It is a rare visitor to coastal wetlands in Australia.
	CR	Cr	*Anthochaera phrygia*	Regent Honeyeater	Its range has contracted dramatically from its historical distribution as the species has suffered badly from broad-scale clearing and complete absence of old growth box-ironbark habitat so that now only around 100 individuals remain wild in Victoria. It is a rare vagrant to the country around Bendigo (where it was once common) and to Gippsland (where it was a regular visitor), and in most years only a handful of birds are seen in eastern Victoria — four-fifths of sightings are from just three locations: Chiltern, the Killawarra, and the Reef Hills. It is highly nomadic in its movements as determined by the need for a nectar rich diet from the flowering of eucalypts particularly Mugga Ironbark Eucalyptus sideroxylon, White Box Eucalyptus albens, Yellow Box Eucalyptus melliodora and Yellow Gum Eucalyptus leucoxylon (SWIFFT 2017).
		En	*Antigone rubicunda*	Brolga	The Brolga is a large light grey crane reaching up to 1 meter tall. It is generally found in tropical, subtropical and temperate freshwater terrestrial wetlands. It is an omnivorous bird eating tubers, grains, insects and molluscs. Numbers in Victoria have reduced due to draining of freshwater wetlands for agriculture (Marchant and Higgins 1993). Occur in the Northern Plains and along adjacent parts of the Murray River as well as on the plains and adjacent foothills of W. Vic. Uses shallow wetlands, farm dams, flooded areas, margins of large lakes, pastures, grasslands, crops and stubbles. Obtains food from the surface of the ground or by digging in moist areas. Nests are usually made on the ground on islands or as isolated mounds within wetlands. Drainage and grazing of wetlands and other human activities have contributed to reductions in numbers.
			Aphelocephala leucopsis	Southern Whiteface	The southern whiteface is endemic to Australia and typically inhabits arid open woodlands with a shrubby or grassy understory, as well as grass plains throughout much of the continents south.[3][6] Not present in Tasmania or in coastal areas of the mainland, this species prefers Acacia woodlands, particularly those dominated by mulga and drought-resistant chenopod shrub species, including saltbush and bluebush.[3][6] They are considered sedentary; however, atlas records indicate that individuals may move into wetter areas outside of their normal range during drought years.[3]
	VU	En	*Aprasia parapulchella*	Pink-tailed Worm-Lizard	Dry open forest and woodland, with sparse grassy understorey and abundant surface rock. Particular preference for hilly, north-west facing, well-drained slopes with outcropping sedimentary rock. Often shelters beneath rocks and in ant tunnels, on which it preys. Secretive and seldom seen (Tzaros 2005).
C,R,J			*Apus pacificus*	Fork-tailed Swift	The Fork-tailed Swift is a migratory species occurring throughout Australia between October-April. This insectivorous species is almost entirely aerial. Occurs over inland plains, often over cliffs or beaches and also over settled areas. Feed aerially, and probably also roost aerially, although rarely seen to land (Higgins 1999; Pizzey and Knight 2007).
C,J			*Ardea alba*	Great Egret	Habitat includes terrestrial wetlands, estuarine, littoral and moist grass habitats. Forages in open, shallow water and generally avoids dry or deeply flooded areas. Breed in wetlands with fringing or flooded trees, or other tall vegetation in which nests are built. Are known to use mangroves along the coast. Roosts in trees or near wetlands (Marchant and Higgins 1990).
C,J		Vu	*Ardea alba modesta*	Eastern Great Egret	Eastern Great Egret is widespread in Australia and has been observed in a wide range of wetland habitats including swamps and marshes, margins of rivers and lakes, damp or flooded grasslands, pastures or agricultural land, reservoirs, sewage treatment ponds, drainage channels, salt pans and salt lakes, salt marshes, estuarine mudflats, tidal streams, mangrove swamps, coastal lagoons and offshore reefs (Robley *et al.* 2010).
		Vu	*Aythya australis*	Hardhead	Hardheads inhabit deep to shallow wetlands with open water and fringing emergent vegetation (Pizzey and Knight 2007). The species feeds by diving in deep water and occasionally by dabbling just under the water surface (Rogers 1990). Nests are built in thick vegetation (e.g. reeds, lignum, cumbungi), usually over water (Halse *et al.* 2005; Rogers 1990). These birds are most common in the wetland systems of inland Australia (Halse *et al.* 2005). Birds do visit Victoria from these areas in spring and summer, returning as the northern wetlands are replenished by rain (Halse *et al.* 2005). However, some birds are present in Victoria all year round depending on the suitability of the wetland (Pizzey and Knight 2007).
		Vu	*Biziura lobata*	Musk Duck	Usually seen in small numbers on the deep waters of well-vegetated fresh to saline lakes, swamps and occasionally shallow inlets and bays. Nests are formed in low vegetation in areas sheltered by surrounding vegetation (Marchant and Higgins 1990; Pizzey and Knight 2007).
	EN	Cr	*Botaurus poiciloptilus*	Australasian Bittern	This species is part nocturnal and forages over water in dense cover, sometimes from platforms in wetland vegetation. Habitat is usually tall reedbeds, sedges, rushes, cumbungi or lignum. Also occurs on rice fields, drains in tussocky paddocks and occasionally on saltmarshes and brackish wetlands. Nests are shallow saucers on trampled water plants (Pizzey and Knight 2007).

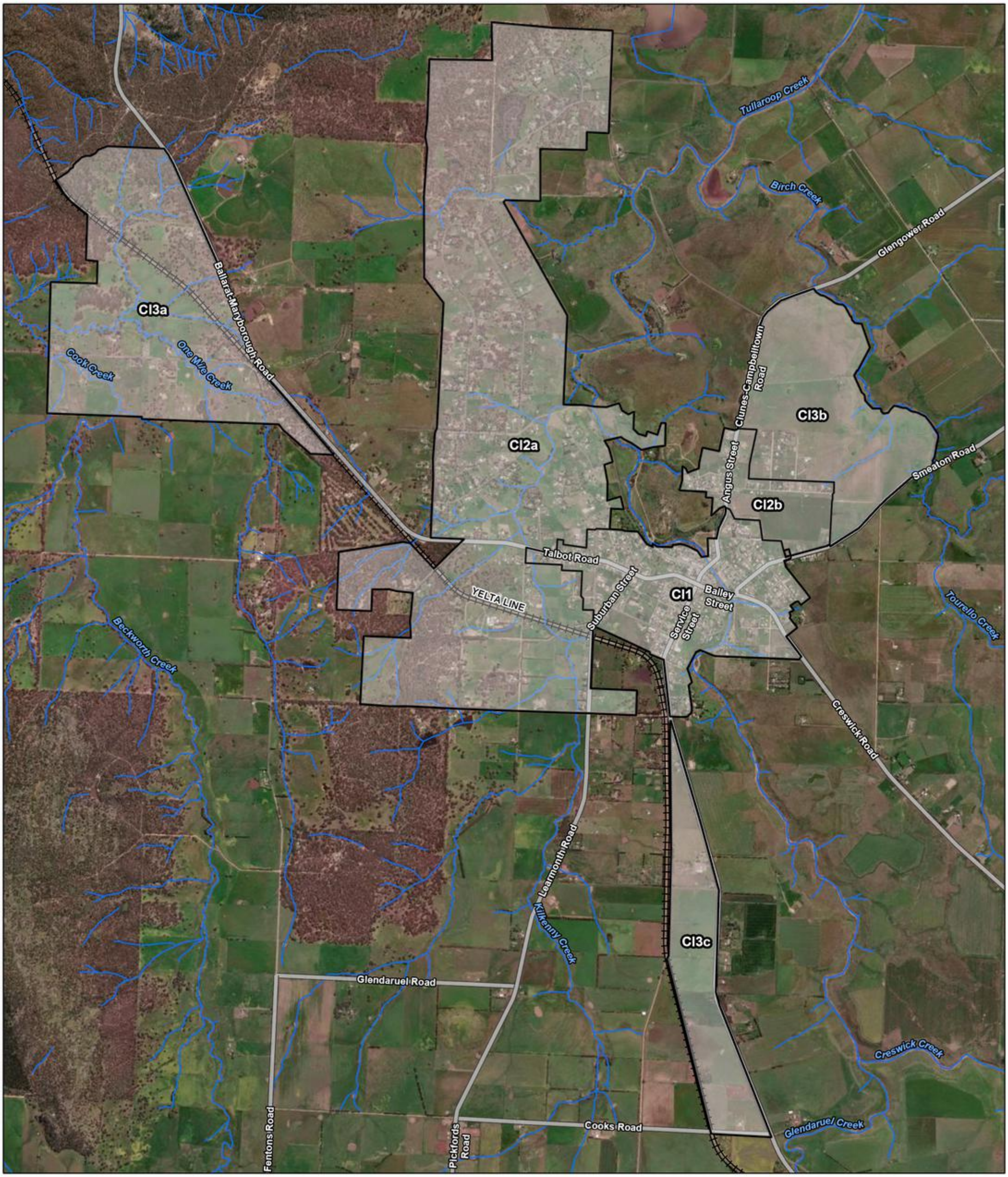
Treaty	EPBC	FFG	Scientific name	Common name	Habitat/species notes
		Cr	*Burhinus grallarius*	Bush Stone-curlew	Inhabit open grassy woodlands and wooded farmlands in northern and western Vic. Most often found in remnants of woodland (particularly Bulokes Allocasuarina luehmannii) among pasture or crops, and on golf courses. They forage on dry, open ground, mainly at night. During the day they rest inconspicuously on the ground among trees. They lay their eggs in scrapes on bare ground.
		Vu	*Calamanthus pyrrhopygius*	Chestnut-rumped Heathwren	Found in heathy woodlands, scrublands and box/ironbark forests in coastal south east Australia (Pizzey and Knight 2007).
B,R,J,C			*Calidris acuminata*	Sharp-tailed Sandpiper	Inhabits tidal mudflats, saltmarshes, mangroves, shallow fresh, brackish or saline inland wetlands, floodwaters, irrigated pastures and crops, sewage ponds and minefields. Breeds in Arctic Siberia, migrates to south and south east Asia. Widespread summer migrant to coastal and inland Aust and Tasmania (Aug – April), mostly SE. Aust, Murray Darling Basin and W. Vic (Pizzey and Knight 2007).
B,R,J,C	CR	Cr	*Calidris ferruginea*	Curlew Sandpiper	Summer migrants to Victoria from Arctic breeding grounds (Aug-April). This species is found in a range of wetland habitats: tidal mudflats, saltmarsh, salt fields, fresh to saline wetlands, both coastal (most) and inland. Also visits sewage ponds (Pizzey and Knight 2007).
B,R,J			*Calidris melanotos*	Pectoral Sandpiper	Summer migrant (Aug-April) (Pizzey and Knight 2007). Mainly shallow, fresh to saline wetlands; usually coastal but are occasionally found inland. Habitat includes coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. Forage in shallow water or soft mud at the edges of wetlands and often close to low fringing or emergent vegetation (Higgins and Davies 1996).
B,R,J,C			*Calidris subminuta*	Long-toed Stint	Prefer shallow freshwater or brackish wetlands such as lakes, swamps, streams, river floodplains, lagoons and sewage ponds with areas of muddy shoreline and growths of short grass, weeds, sedges, low or floating aquatic vegetation, reeds and rushes. Forage on wet mud or shallow water, often among short grass, weeds and other vegetation (Higgins and Davies 1996).
	EN		*Callocephalon fimbriatum*	Gang-gang Cockatoo	The species can be found in eucalypt woodland forests of south-eastern Australia. It is a seasonal altitudinal migrant where it moves from mountain forests at higher altitudes to forests at lower altitudes and coastal areas during Autumn and Winter. Usually seen in small groups but can form large flocks when foraging. Found in South-east Australia. From eastern New South Wales, through to the Central Tablelands and South-Western Slopes around Wagga Wagga and Albury; along the New South Wales south coast. Widespread in the Gippsland region and Central Highlands in Victoria.
			Climacteris picumnus (south-eastern ssp.)	Brown Treecreeper	Occurs in eucalypt woodlands, particularly open woodland lacking a dense understorey (Higgins, Peter and Steele 2001). It is sedentary and nests in tree hollows within permanent territories, breeding in pairs or communally in small groups. Birds forage on tree trunks, on the ground amongst leaf litter and on fallen logs for ants, beetles and larvae (Higgins, Peter and Steele 2001).
	EN	En	*Dasyurus maculatus maculatus*	Spot-tailed Quoll	The species is recorded in a range of treed habitats including tropical, subtropical and temperate rainforests, vine thickets, wet and dry sclerophyll forest, woodland and coastal scrub. In Tasmania it also occurs in heathland (Van Dyck and Strahan 2008).
	VU	En	*Delma impar*	Striped Legless Lizard	Found in native grasslands and open grassy woodlands; also known to occur in areas with cover of exotic species. Shelters beneath loose rocks and in grass tussocks (Miller *et al.* 2008).
		En	*Egretta garzetta*	Little Egret	Inhabits terrestrial wetlands and shallow margins of tidal estuaries and inland lakes and rivers. Feed in shallow water and nest colonially, often with other waterbirds. Stick-nests are usually built in trees over water, although occasionally in reedbeds (Marchant and Higgins 1990).
	VU	Vu	*Falco hypoleucos*	Grey Falcon	Inhabit grasslands, lightly wooded plains and scrublands of interior Australia. Birds occur sporadically on the periphery of their range, such as NW. Vic. More common in Vic during or after droughts. They surprise their prey on the ground while flying low and fast over open country and also catch prey in flight. They nest in trees, in the disused stick-nests of other birds.
		Cr	*Falco subniger*	Black Falcon	The Black Falcon has a stronghold in inland Australia. Most Victorian records come from the lowlands and only occasionally from the foothills. It occurs mainly over croplands, grasslands and wooded farmlands. To catch flushed prey, they sweep low over croplands and grasslands and are often attracted by smoke from grassfires and late-summer burning off. This species nests in trees in old stick-nests of other birds (Marchant and Higgins 1993; Pizzey and Knight 2007).
	CR	Vu	*Galaxias rostratus*	Flat-headed Galaxias	Restricted to the Murray Darling system including major tributaries such as the Murrumbidgee, Loddon, Goulburn, Ovens, Mitta Mitta and Lachlan rivers. Inhabits still or gently flowing water on the margins of lakes, billabongs and streams. It usually occurs in shoals in midwater over rocky or sandy bottoms near aquatic vegetation (Allen Counsulting Group 2002; Gomon and Bray 2011).
	VU	En	*Galaxiella pusilla*	Dwarf Galaxias	Typically occur in slow flowing and still, shallow, permanent and temporary freshwater waterways including swamps, the backwaters of streams and creeks, drains and ditches, usually with dense aquatic, emergent or flooded vegetation. Ephemeral sites require seasonal flooding and linkages to other more permanent populations for population replenishment; therefore wetland connectivity may be critical to survival. They occur across most of southern Victoria, however are sparse in the landscape and more abundant in the south-east of the state, most specifically in Mornington Peninsula & Western Port areas (Allen Counsulting Group 2002; Clunie *et al.* 2002).
B,R,J,C			*Gallinago hardwickii*	Latham's Snipe	Latham's Snipe is a migratory species. The species migrates to Victoria from breeding grounds in Japan. In Victoria this species is widely distributed in a range of habits including heavily vegetated freshwater swamps, and pools or ditches in heaths or subalpine herblands (Pizzey and Knight 2007). Also occurs in small ephemeral wetlands such as wet depressions after floods recede. Generally roosts in thick vegetation during the day, sometimes under shrubs away from wetlands, and will feed in swamps at night. They are occasionally seen feeding during the day. This species feeds by probing in soft mud and rarely moves far from concealing vegetation (Higgins and Davies 1996).

Treaty	EPBC	FFG	Scientific name	Common name	Habitat/species notes
	VU	Vu	*Grantiella picta*	Painted Honeyeater	The Painted Honeyeater is a summer migrant to Victoria. They are generally found to inhabit box-ironbark, Broad-leaved Peppermint and Red Stringybark forests and box-Buloke woodlands in the northern foothills of the great Divide. May also occur in Red Ironbark, Red Box forests in southern Victoria. They are occasionally found along Murray River valley to Hattah-Kulkyne NP where they inhabit Black Box woodlands. This species is usually found in open stands of old eucalypts that are infested with mistletoes (Higgins, Peter and Steele 2001).
C		En	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	Occurs along the coast (especially the forested coasts of the East Gippsland Plains), on coastal islands, around coastal lakes and along some inland rivers and lakes. Catches prey on, or near the water's surface and also takes refuse from fishing boats. On land they feed from the ground on carrion or occasionally catch live prey. Builds stick-nests in tall eucalypts, particularly River Red Gum, Forest Red Gum and Southern Mahogany. Clearing of forests and woodlands along the coast, near coastal lakes, and along the Murray River, threatens this species. In the Gippsland Lakes region more than half of the known nest sites are on private lands (**Beardsell** 2003). Occurs across a range of forests and woodlands throughout Victoria (**Beardsell** 2003).
			Heteronympha cordace	Western Bright-eyed Brown Butterfly	This small butterfly (from the Nymphalidae or 'Brown' family) is known to inhabit peat swamps in coastal and inland areas in the far south-east of South Australia and western Victoria – habitat that has been significantly reduced by wetland drainage and other factors since colonisation.
		Vu	*Hieraaetus morphnoides*	Little Eagle	Found across mainland Australia and Tasmania. Occurs in mountain forests to nearly treeless plains, occasionally over lakes, beaches and cities. The Little Eagle is seen over woodland and forested lands and open country, extending into the arid zone. It tends to avoid rainforest and heavy forest. Little Eagles nest in mature living trees in open woodland or tree-lined watercourses. They rarely nest in isolated trees.
C,R,J	VU	Vu	*Hirundapus caudacutus*	White-throated Needletail	In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Because they are aerial, it has been stated that conventional habitat descriptions are inapplicable. In Australia, White-throated Needletails almost always forage aerially, at heights up to 'cloud level', above a wide variety of habitats ranging from heavily treed forests to open habitats, such as farmland, heathland or mudflats (Higgins 1999).
	EN	En	*Isoodon obesulus obesulus*	Southern Brown Bandicoot	The Southern Brown Bandicoot is active during both the day and night. It is found in forest, heath and shrub communities. It shelters in a nest of vegetation beneath dense cover; it eats fungi, tubers and arthropods (Menkhorst and Knight 2001; Paull 2008).
	CR	Cr	*Lathamus discolor*	Swift Parrot	The Swift Parrot is a winter migrant to Victoria (Swift Parrot Recovery Team 2001). They arrive from their breeding areas in Tasmania, however small numbers of non-breeding birds may remain here during summer (Higgins 1999; Swift Parrot Recovery Team 2001). They are nomadic, and follow the flowering of trees and psyllid infestations. In Victoria their distribution is centred on box-ironbark forests, but they are often seen in town parks and occur sporadically elsewhere in dry forests, dry woodlands and wooded farmlands. They are seldom seen in treeless areas, rainforests or wet forests (Higgins 1999; Pizzey and Knight 2007). Feed mainly in winter-flowering plants, especially Red Ironbarks and ornamental trees and shrubs (Higgins 1999; Swift Parrot Recovery Team 2001).
		Vu	*Lewinia pectoralis*	Lewin's Rail	Inhabits densely vegetated, fresh, brackish or saline wetlands, usually with areas of standing water. Use long tussocky grass, reeds, rushes, sedges or bracken and are occasionally found amongst tangled clumps of weeds such as Blackberries and Lantana (Marchant and Higgins 1993).
			Liopholis montana	Mountain Egernia	Inhabits areas of granite associated with tall, open forest and heath along GDR to upper Yarra River valley. Colonies occupy burrow networks under rocks.
	VU	Vu	*Litoria raniformis*	Growling Grass Frog	The species often inhabits water bodies with a diverse assemblage of aquatic vegetation, including emergent species such as sedges (Gahnia spp.), submergent species such as curly pondweed (Potamogeton spp.), floating species such as water ribbon (Triglochin spp.) and filamentous algae (Heard, Robertson and Moysey 2004; Hill, Hamer and Hill 2006). The aquatic vegetation provides sites for male frogs to call from, sites for eggs to be deposited and relatively safe development, and food and shelter for tadpoles. Dense submergent vegetation is especially important to protect eggs and tadpoles from predation (Heard, Robertson and Moysey 2004). However, it is also known to occur in ditches, dams and swamps or sheltering under discarded debris near those sites (Stromberg, Rychener and Dixon 2009, pp. 38-39).
		Vu	*Lophoictinia isura*	Square-tailed Kite	Found in heathlands, woodlands, forests, tropical and sub-tropical rainforest, timbered watercourses, hills and gorges. Nest are large and loose made of sticks 15-25m up in leafy tree. Range in coastal and sub-coastal south east Australia including Murray River region in SA. (Pizzey and Knight 2007)
	EN	En	*Maccullochella macquariensis*	Trout Cod	Found in rapidly flowing streams, around the cover of logs and debris, over rocky and gravel bottoms. Larger fish occur in deeper sections. The last remaining self-sustaining wild populations occur in the Murray River, both in northern Victoria (Allen Counsulting Group 2002).
	VU	En	*Maccullochella peelii*	Murray Cod	The Murray Cod lives in a wide variety of habitats from silty slow-moving rivers to clear rivers with pools and riffles. This fish prefers instream habitat of rocks and logs with over-hanging vegetation (Allen Counsulting Group 2002).
	EN	En	*Macquaria australasica*	Macquarie Perch	The Macquarie Perch is found in the Murray River and its tributaries and is also found in parts of the Yarra River. It is most often found as a solitary individual, however can form schools during breeding season. The Macquarie Perch is more commonly found in slow moving rivers, reservoirs and lakes (Allen Counsulting Group 2002).
		Vu	*Melanodryas cucullata*	Hooded Robin	Highest density in semi-arid NW. Victoria where they inhabit mallee scrubs, cypress pine woodlands, mallee heaths with scattered trees and box-Ironbarks forests. Uncommon in southern Vic where they occur in a range of lightly timbered habitats containing tall shrubs. These include Box woodlands, coastal heaths and heathy woodlands. Forage on bare ground, using vantage points such as dead limbs or fence posts to detect prey (Marchant and Higgins 1993; Pizzey and Knight 2007).
J			*Merops ornatus*	Rainbow Bee-eater	The species occurs in many types of habitat including woodland, shrubland, semi-cleared land and farmland, however it mainly occurs where eucalyptus species are dominant. It is almost entirely insectivorous and mostly occurs near to permanent water (Higgins 1999).
C, J, R			*Motacilla flava*	Yellow Wagtail	Favors wet meadows, marshland, grassy and muddy lakeshores. Occurs in fields and often near livestock during migration.
B			*Myiagra cyanoleuca*	Satin Flycatcher	The Satin Flycatcher migrates to southern parts of Victoria during the spring/summer months. It is generally found in many habitat types including wet sclerophyll and woodland particularly along watercourses (Higgins, Peter and Cowling 2006).

Treaty	EPBC	FFG	Scientific name	Common name	Habitat/species notes
	VU	Vu	*Nannoperca australis (Murray-Darling lineage)*	Southern Pygmy Perch (Murray-Darling lineage)	Observed to prefer habitats in low-gradient waterways and floodplains with slow-flowing or still water, and aquatic macrophyte cover or wood at shallow depths, with little or no flow in summer (Cadwallader 1979; Humphries 1995; Woodward & Malone 2002; Unmack et al., 2011; 2013; Hammer et al., 2013; Price et al., 2016). The species has a limited tolerance of salinity and prefers waters with salinity less than 3.3 ppt (Chessman & Williams 1974), however it can tolerate a broad range of temperatures and extremely low dissolved oxygen levels (McNeil & Closs 2007).
	VU	Vu	*Nannoperca obscura*	Yarra Pigmy Perch	Inhabits small lakes and streams, preferring habitats with flowing water and abundant aquatic vegetation for shelter. It is found in coastal drainages from southern SA to Frankston, Victoria (Allen Counsulting Group 2002).
			Neophema chrysostoma	Blue-winged Parrot	Occurs in South-eastern mainland Australia and Tasmania. Inhabits woodlands, coastal heaths and grasslands.
		Cr	*Ninox connivens*	Barking Owl	Occurs in dry woodlands, wooded farmlands and dry forests in the 500-800mm annual rainfall zone and extend into semi-arid areas in River Red Gum forests along the Murray River. Hollow dependent species (Higgins 1999; Pizzey and Knight 2007).
		Vu	*Ninox strenua*	Powerful Owl	Widespread in foothill and coastal forests where they especially favour gullies with Peppermint-Manna Gum forests. Occasionally seen in wetter mountain forests, drier box-ironbark forests and woodlands, and softwood plantations. Hunts at night by flying through the forest canopy catching prey from tree branches. They nest in large holes in trees (Duncan, Pritchard and Coates 2003).
B,R,J,C	CR	Cr	*Numenius madagascariensis*	Eastern Curlew	Common summer migrant to Australia (Aug-May) (Pizzey and Knight 2007). Found in sheltered coasts, especially estuaries, embayments, harbours, inlets and coastal lagoons with large intertidal mudflats or sandflats. Mainly forages on soft sheltered intertidal sandflats or mudflats, open and without vegetation, also on salt flats and in saltmarsh (Higgins and Davies 1996).
B,R,J,C			*Numenius minutus*	Little Curlew	The species is most often found feeding in short, dry grassland and sedgeland, including dry floodplains and blacksoil plains, which have scattered, shallow freshwater pools or areas seasonally inundated. Open woodlands with a grassy or burnt understorey, dry saltmarshes, coastal swamps, mudflats or sandflats of estuaries or beaches on sheltered coasts, mown lawns, gardens, recreational areas, ovals, racecourses and verges of roads and airstrips are also used (Higgins & Davies 1996). When resting during the heat of day, the species congregates around pools, river beds and water-filled tidal channels, and shallow water at edges of billabongs. The species prefers pools with bare dry mud (including mudbanks in shallow water) and they do not use pools if they are totally dry, flooded or heavily vegetated (Higgins & Davies 1996).
		En	*Oreoica gutturalis*	Crested Bellbird	Inhabits Slender Cypress Pine (Callitris preissii)-Belah (Allocasuarina cristata) woodlands and Dumosa Mallee (E. dumosa) scrubs (particularly in the Sunset Country) and Red Ironbark (E. sideroxylon) and Grey Box (E. microcarpa) forests in the Northern Goldfields. Less frequent in Yellow Mallee (E. incrassata), Broom Honey myrtle (Melaleuca uncinata) scrubs regenerating after brushwood harvesting and in other mallee scrubs regenerating after fires. Often recorded where their favoured habitats adjoin farmlands. Feeds from the ground or from low, dense shrubs. Nests are built in shrubs or low trees and occasionally in hollows in stumps or limbs.
		Vu	*Ornithorhynchus anatinus*	Platypus	Platypus are endemic to Australia and is dependent on rivers, streams and bodies of freshwater. It is present in eastern Queensland and New South Wales, eastern, central and southwestern Victoria and throughout Tasmania. Platypuses occur in freshwater systems from tropical rainforest lowlands and plateaus of far northern Queensland to cold, high altitudes of Tasmania and the Australian Alps. They feed in both slow-moving and rapid (riffle) parts of streams, but show preference to coarser bottom substrates, particularly cobbles and gravel. When not foraging, the Platypus spends most of the time in its burrow in the bank of the river, creek or a pond. At times, the individuals use rocky crevices and stream debris as shelters, or they burrow under the roots of vegetation near the stream. Hence, the ideal habitat for the species includes a river or a stream with earth banks and native vegetation that provides shading of the stream and cover near the bank. The presence of logs, twigs, and roots, as well as cobbled or gravel water substrate result in increased microinvertebrate fauna (a main food source), and the Platypus also tends to be more abundant in areas with pool-riffle sequences.
		Vu	*Oxyura australis*	Blue-billed Duck	This species inhabits deep, permanent, well-vegetated swamps, but at times (especially in winter) may occur in large numbers on large open wetlands. The Blue-billed Duck catches food while diving or occasionally by feeding from the water surface. Their nests are built on trampled swamp vegetation around the base of established stands of reeds/rushes, often over water or on small islands (Marchant and Higgins 1990; Pizzey and Knight 2007).
	EN	Cr	*Paralucia pyrodiscus lucida*	Eltham Copper	This subspecies of the Dull Copper P. pyrodiscus is endemic to Victoria, with a very sparse, scattered distribution consisting of three general localities in Victoria: Eltham/Greensborough areas where about 10 sites exist across different tenure and management; Kiata and Salisbury areas in western Victoria, known from about 6 sites which includes Crown Land at Kiata and the Salisbury Bushland Reserve; Castlemaine & Bendigo areas: about 5 sites near Castlemaine within National Park, Botanic Gardens & State Forest and 6 sites near Bendigo within National Park and one on private land (SWIFFT 2017). It has an obligatory relationship with Notoncus spp. ants and the dwarfed form of Sweet Bursaria Bursaria spinosa. These discrete populations are found within sparse, dry woodland on well-drained gentle slopes with north to west aspects, particularly with Red Stringybark Eucalyptus macrorhyncha, Red Box E. polyanthemos, Long-leaved Box E. goniocalyx, and Late Black Wattle Acacia mearnsii and an understorey including Cherry Ballart Exocarpos cupressiformis, Hedge Wattle A. paradoxa, Drooping Cassinia Cassinia arcuata Shiny Cassinia C. longifolia, and Sweet Bursaria, and a groundcover including Small-leaf Clematis Clematis microphylla, Purple Coral-pea Hardenbergia violacea, and Common Flat-pea Platylobium obtusangulum amongst native grasses, mosses and leaf litter (**Beardsell** 2003).
	CR	Cr	*Pedionomus torquatus*	Plains-wanderer	Main distribution is within the Riverina of NSW, patchy elsewhere, and only occurring in small numbers in northern Victoria. Inhabits open grasslands with preference towards Danthonia and Stipa species. However, vegetation structure is more important than floristic composition. Does not occur in dense grasslands and woodlands (Marchant and Higgins 1993; Pizzey and Knight 2007).

Treaty	EPBC	FFG	Scientific name	Common name	Habitat/species notes
		Vu	*Peltohyas australis*	Inland Dotterel	The inland dotterel occurs widely in the arid south-east and south-west of Australia. Its distribution corresponds to areas below the 100mm summer rainfall isohyet.[6] It can be found in suitable habitat within this range in all the mainland states.[6] Inland dotterels prefer sparsely vegetated habitat with low cover of 200–400 mm (7.9–15.7 in) saltbush, bluebush or samphire to provide food and shelter.[3][9] It is most often seen in gibber plains, clay pans and gravel flats. It is believed to have benefited from land clearance for agriculture after European settlement.[14][15]
	VU	Vu	*Petauroides volans*	Greater Glider	Occurs in wet sclerophyll forest on the ranges and coastal plains from near Mossman, NE. QLD to Daylesford, VIC. Favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred food tree species. Requires large tree hollows for shelter, and found in most abundance where there is a high density of tree hollows. In southern Queensland require at least 2-4 den trees for every 2ha of habitat. They are significantly vulnerable to logging and have relatively small home ranges and poor dispersal ability. In Victoria, their numbers have declined sharply in recent years (TSSC 2016).
	VU		*Petaurus australis*	Yellow-bellied Glider	The Yellow-bellied Glider is found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria. The species occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south.
		Vu	*Phascogale tapoatafa*	Brush-tailed Phascogale	This species typically inhabits dry forest and woodland dominated by box, ironbark and stringybark eucalypts but may also occur in wetter forests (Menkhorst 1996). Prefers open forest with sparse groundcover, but uses habitats ranging from mallee to rainforest. The understorey and ground cover in these favoured habitats may be sparse, consisting of "scattered tussocks and forest litter" (Menkhorst 1996). Other characteristics of known habitat of this species include dead trees (favoured for foraging), availability of bark from the Red Stringybark (for nest material) (Menkhorst 1996), and a number of tree hollows with entrances as narrow as five centimetres or less (for nesting and shelter). Has disappeared from substantial areas of Victoria in recent times (Van Dyck and Strahan 2008).
B,C			*Plegadis falcinellus*	Glossy Ibis	Found in terrestrial wetlands, occasionally wet grasslands and sheltered marine habitats. Forages in shallow water over soft substrate or on grassy or muddy verges of wetlands, preferring those that provide a variety of depths. Will use brackish and occasionally saline wetlands, mangroves and mudflats (Marchant and Higgins 1990; Pizzey and Knight 2007).
	VU	En	*Polytelis swainsonii*	Superb Parrot	Found only in the Upper Murray Valley, mainly in the riverine forests and woodlands of Barmah Forest in Victoria. All other sightings have been made along or within 10 km of the Murray, Ovens and Goulburn Rivers. Nests located in hollows of very large riparian trees in River Red Gum forests. Feeds mainly in Black Box, Grey Box and Yellow Box woodlands and wooded farmlands away from their nest-trees but also within the River Red Gum forests round their nest. All nests are within 10km of major feeding areas. Forages on the ground and occasionally in eucalypts and mistletoes. The loss in range of this species is attributed to clearing and grazing of woodland feeding habitats but laying of poison baits for rabbits and Galahs, illegal trapping for the avicultural trade and logging of nest-trees are other possible causes (Higgins 1999`. pp. 287-295).
	VU	En	*Prototroctes maraena*	Australian Grayling	This species only spends part of its life in freshwater streams, Australian Graylings migrate between freshwater streams and the ocean. Streams where this species occur tend to be clear with gravel bottoms and a variety of instream habitat such as pools and riffles. The upstream migration of this species has been effectively terminated in some rivers by dams (Allen Counsulting Group 2002).
		En	*Pseudophryne bibronii*	Brown Toadlet	Frequent dry forest, woodland, shrubland and grassland, sheltering under leaf-litter and other debris in moist soaks and depressions. Eggs are spawned in shallow burrows (or nets) under litter, in low areas, near water, that will later be flooded. Tadpoles are aquatic in ponds, flooded grassland and roadside ditches (Hero, Littlejohn and Marantelli 1991).
	VU	Vu	*Pteropus poliocephalus*	Grey-headed Flying-fox	Eastern coastal Australia from Gladstone in Qld to South Gippsland and Melbourne in Vic, with rare influxes further west and south. Rarely more than 200km inland. In warmer months gathers in very large camps, usually in dense forest in gullies. Population is more dispersed in winter. Size of camps fluctuate in response to local food supplies. In south numbers fluctuate in regular pattern, being highest in late summer-autumn and lowest in winter (Menkhorst and Knight 2001).
		En	*Pyrrholaemus sagittatus*	Speckled Warbler	Mainly grassy ground layer of dry sclerophyll forests and woodlands, often with scattered shrubs in under-storey. Mainly found in forests dominated by eucalyptus, especially box-ironbark forests and woodlands e.g. near Chiltern, NE. Victoria. found near Bendigo recorded in red Stringybark, red box and long leaved box with a grassy ground layer and well-spaced shrubs in understorey, but not in red ironbark or yellow gum forests. Occasionally occur in mallee habitats, sometimes with native pine; in Victoria, mostly confined to N. foothills of great divide but scattered on S. slopes of great divide (Higgins and Peter 2002).
B			*Rhipidura rufifrons*	Rufous Fantail	In Victoria, the Rufous Fantail mainly inhabits the undergrowth of temperate rainforests, and wetter eucalypt forests and gullies, but also occurs in paperbark thickets, sub-inland/coastal scrub, along watercourses and within parks/gardens. On migration it is seen at a wide range of locations from farmland to built up streets (Pizzey and Knight 2007).
C	EN	Cr	*Rostratula australis*	Australian Painted Snipe	Generally uncommon in Australia and scattered records in Victoria. Uses terrestrial shallow freshwater (occasionally brackish) wetlands, ephemeral and permanent lakes, swamps, claypans, inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire, often with scattered clumps lignum, canegrass or tea-tree (Marchant and Higgins 1993).
		Vu	*Spatula rhynchotis*	Australasian Shoveler	The Australasian Shoveler occurs mainly on large, well-vegetated wetlands and lakes, occasionally including areas with saline waters. Populations are found in higher numbers on permanent, well-vegetated freshwater swamps with areas of open water. This species nests in grass nests on the ground, usually in dense cover and near water (Marchant and Higgins 1990; Pizzey and Knight 2007).
		Vu	*Stagonopleura guttata*	Diamond Firetail	Inhabit woodlands, open forests and other lightly timbered habitats, such as farmland with remnant trees, or grasslands with scattered trees. Often occurs in vegetation along watercourses and very occasionally near settlements. Habitat usually has open or sparse understorey of shrubs, small trees or regrowth, and grass ground cover (Higgins, Peter and Cowling 2006).
		En	*Stictonetta naevosa*	Freckled Duck	Found in terrestrial wetlands with shallow productive waters or soft mud at wetland edges. In breeding range (Lake Eyre and Murray-Darling Basin) found in densely vegetated waters, particularly flood water swamps and creeks vegetated with lignum. In coastal region , prefers swamps and lakes with dense thickets of Melaleuca, Casuarina or Leptospermum (Marchant and Higgins 1990).

Treaty	EPBC	FFG	Scientific name	Common name	Habitat/species notes
	VU	Vu	*Synemon plana*	Golden Sun Moth	It is generally found in temperate grasslands and open grassy woodlands where the ground layer is dominated by native Wallaby Grass. Optimal habitat is dominated by wallaby grasses Austrodanthonia spp with an open tussock structure. It has also been recorded in grasslands dominated by Kangaroo Grass Themeda triandra and exotic dominated grasslands (i.e. Chilean Needlegrass)(O'Dwyer and Attiwill 2000).
B,R,J,C		En	*Tringa glareola*	Wood Sandpiper	Summer migrants to Aust from their breeding grounds in northern Asia. In Vic they are scarce visitors to shallow freshwater swamps, large farm dams, sewage farms and receding floodwaters, with a concentration of records from the Mid Murray Valley. The records from Port Phillip Bay refer to a few individuals at Seaford Swamp, on lakes near Geelong and on well-vegetated shallow lagoons at Werribee Sewage Farm. These sandpipers usually occur along or in groups of up to five birds, sometimes among other waders such as Sharp-tailed Sandpipers. Wood Sandpipers feed from mud among scattered vegetation, in shallow water or along shores (Higgins and Davies 1996).
B,R,J,C		En	*Tringa nebularia*	Common Greenshank	Habitat consists of mudflats, estuaries, saltmarshes, margins of lakes, wetlands, fresh and saline claypans, commercial salt fields and sewage ponds. Regular, widespread summer migrant to Aust. and Tas. (Sept-April). Mostly coastal but can be found inland in suitable habitat. Some occur over winter. (Pizzey and Knight 2007, p.178)
		Cr	*Tyto novaehollandiae*	Masked Owl	Inhabits forests, woodlands and caves. Active in middle storey (Simpson and Day 2000/2001). Inhabits diverse range of wooded habitats that provide tall or dense mature trees with hollows suitable for nesting and roosting, and nearby open areas for foraging (Higgins 1999).
		En	*Tyto tenebricosa*	Sooty Owl	In eastern Victoria, a sub- population of the species occurs from near Melbourne, east and north-east to the border with New South Wales; within that area, the Sooty Owl is numerically rare (1-9 individuals per 100km2). In Victoria, the species occurs in closed forests (rainforests), tall open-forests and some open forests across a range of Ecological Vegetation Classes (EVCs): Cool Temperate Rainforest, Montane Wet Forest. Damp Forest and Herb Rich Foothill Forest.



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Legend

- Investigation Areas
- Natural watercourse
- Railways

Details

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Map 1a. Investigation Areas

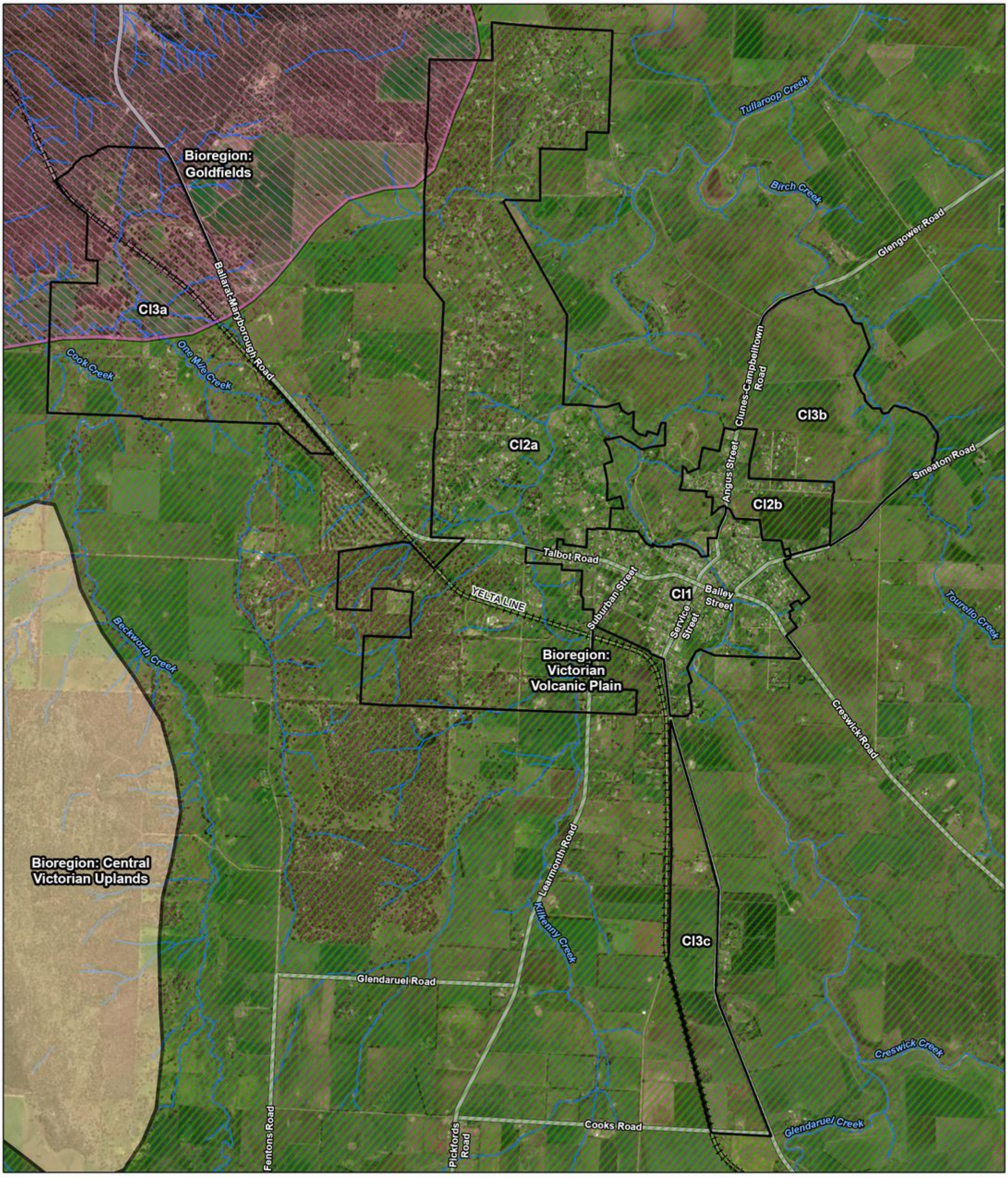
Hepburn 4 Township Structure Plans

Clunes

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Scale: 1:31,000 (Page size A3)



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Legend

- Investigation Areas
- Natural watercourse
- Railways

Bioregion

- Victorian Volcanic Plain
- Central Victorian Uplands
- Goldfields

Details

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Map 1b. Bioregions

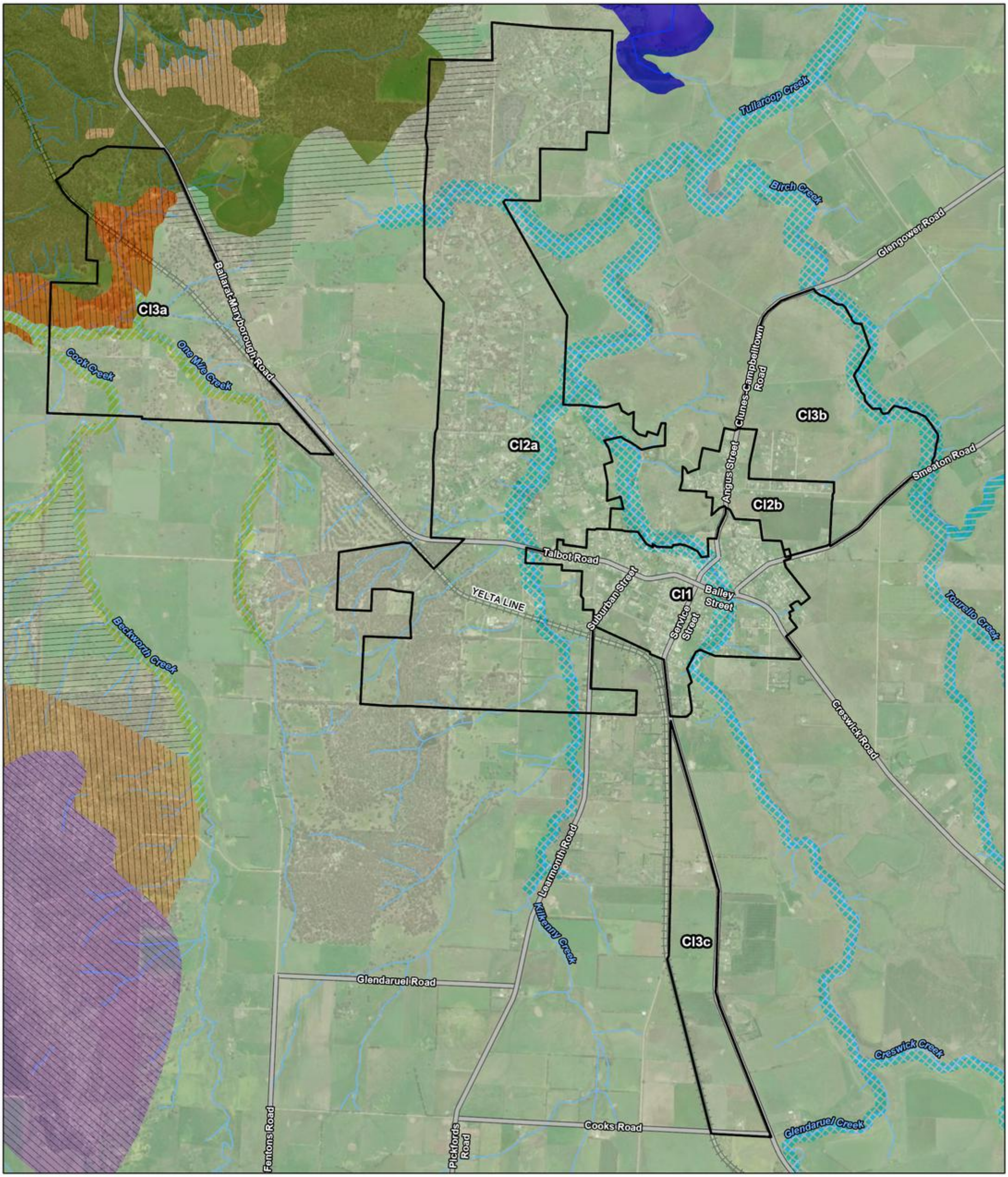
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Legend

- Investigation Areas
- Natural watercourse
- Railways

Pre 1750 Ecological Vegetation Classes

- 175 Grassy Woodland
- 20 Heathy Dry Forest
- 53 Swamp Scrub
- 55 Plains Grassy Woodland
- 61 Box Ironbark Forest
- 68 Creekline Grassy Woodland
- 71 Hills Herb-rich Woodland
- 74 Wetland Formation
- 76 Grassy Woodland/ Alluvial Terraces Herb-rich Woodland Mosaic
- 851 Stream Bank Shrubland

Details

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Map 1c. Modelled pre-1750 EVCs (Data from DEECA)

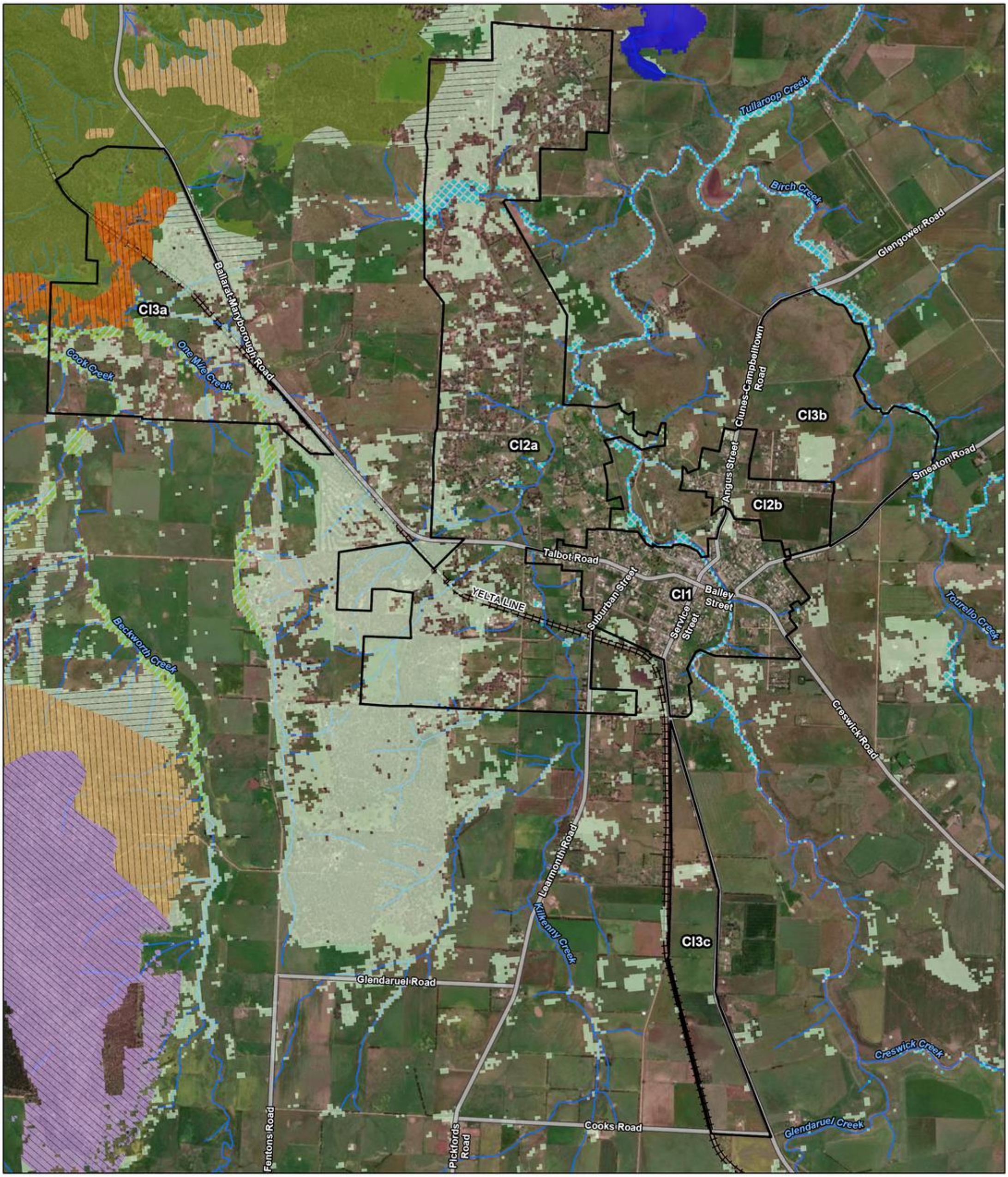
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Clunes

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Legend

- Investigation Areas
- Natural watercourse
- Railways

2005 Ecological Vegetation Classes

- 175 Grassy Woodland
- 20 Heathy Dry Forest
- 53 Swamp Scrub
- 55 Plains Grassy Woodland
- 61 Box Ironbark Forest
- 68 Creekline Grassy Woodland
- 71 Hills Herb-rich Woodland
- 74 Wetland Formation
- 76 Grassy Woodland/Alluvial Terraces Herb-rich Woodland Mosaic
- 851 Stream Bank Shrubland

- 175 Grassy Woodland
- 20 Heathy Dry Forest
- 53 Swamp Scrub
- 55 Plains Grassy Woodland
- 61 Box Ironbark Forest
- 68 Creekline Grassy Woodland
- 71 Hills Herb-rich Woodland
- 74 Wetland Formation
- 76 Grassy Woodland/Alluvial Terraces Herb-rich Woodland Mosaic
- 851 Stream Bank Shrubland

Details

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Map 1d. Modelled 2005 EVCs (Data from DEECA)

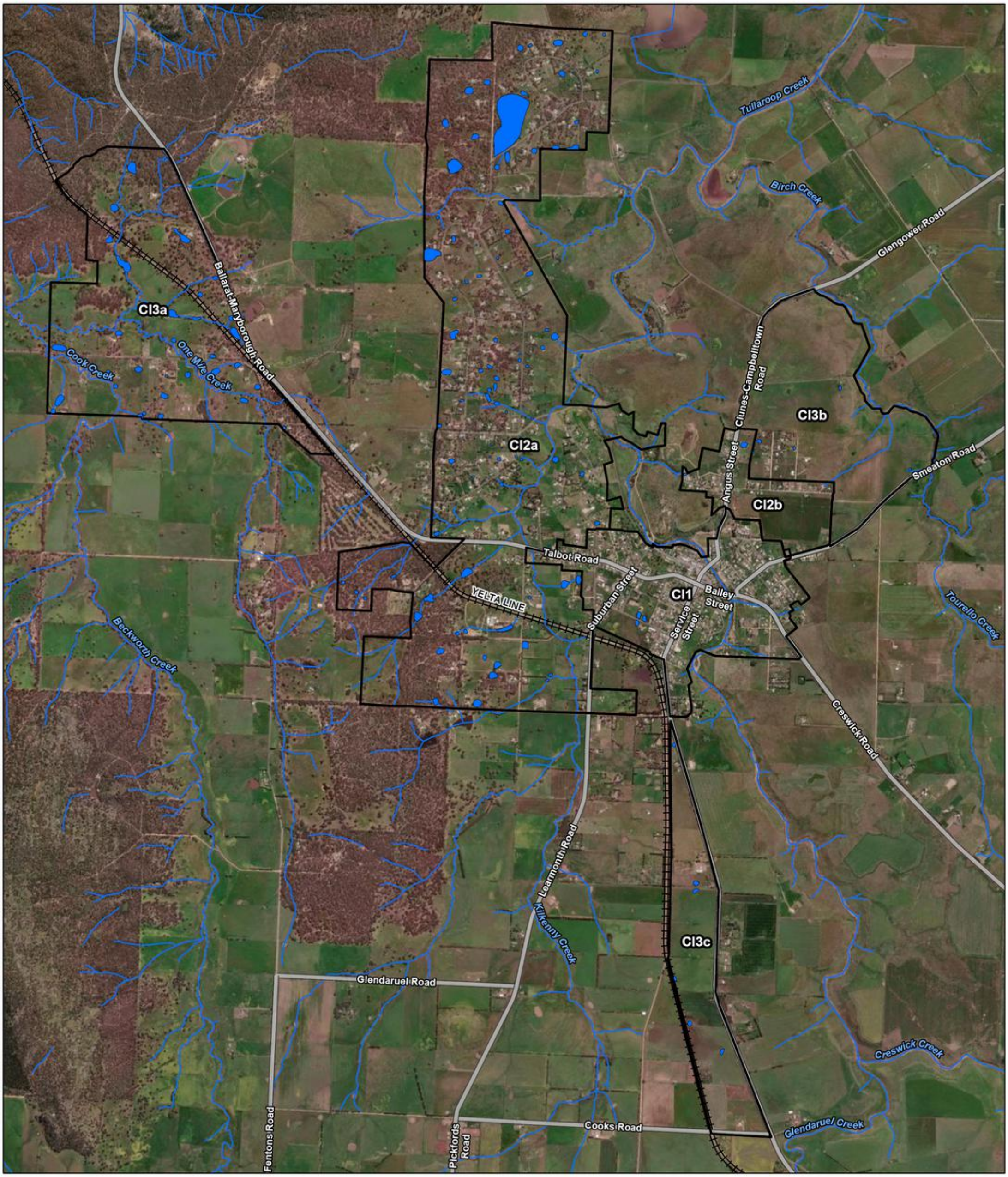
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Clunes

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Legend

- Investigation Areas
- Natural watercourse
- Railways
- Waterbodies

Details

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Map 1e. Waterways and Waterbodies

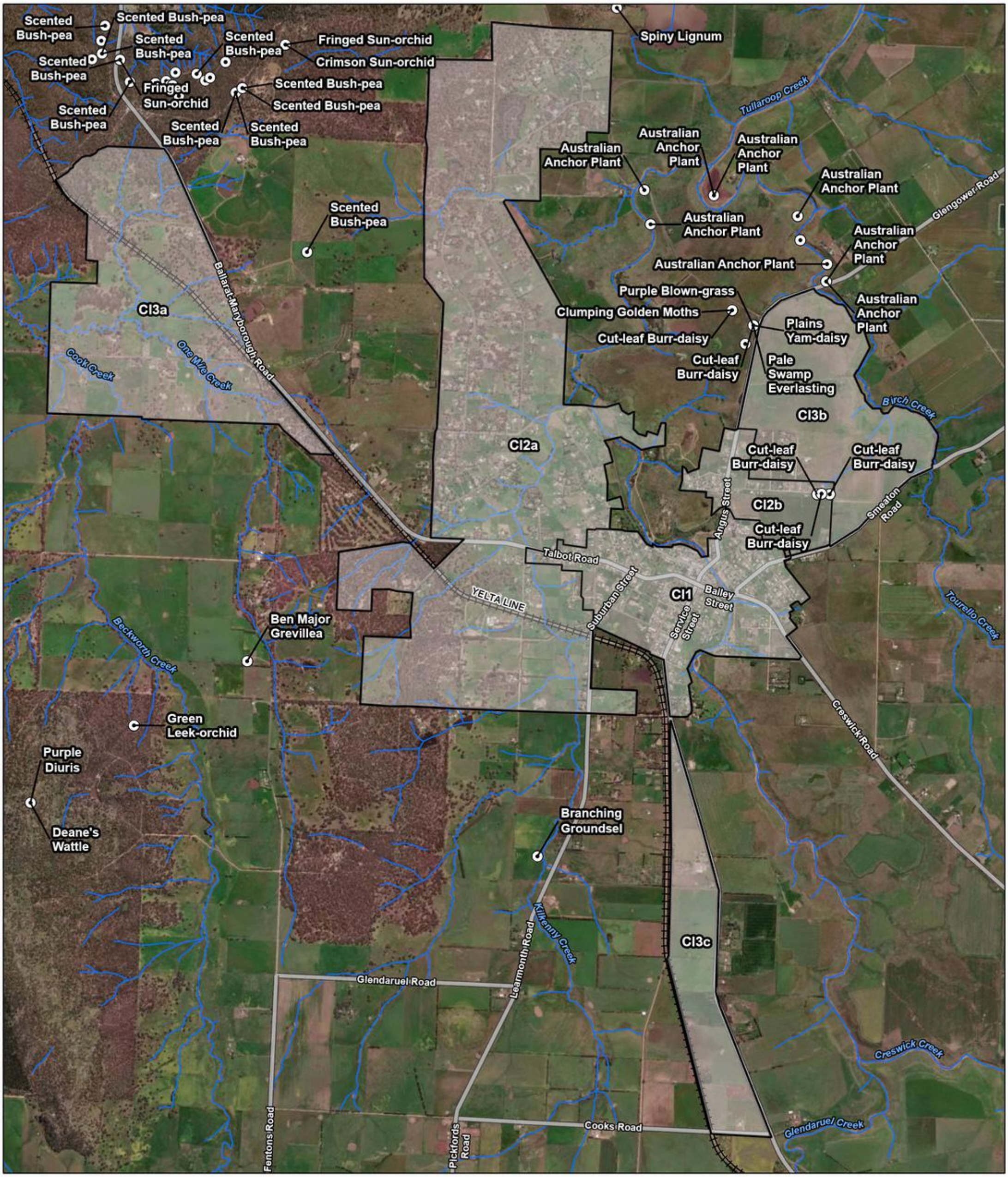
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Clunes

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Legend

- Investigation Areas
- Natural watercourse
- Railways
- Victorian Biodiversity Atlas Flora records

Details

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Map 1f. Listed Flora

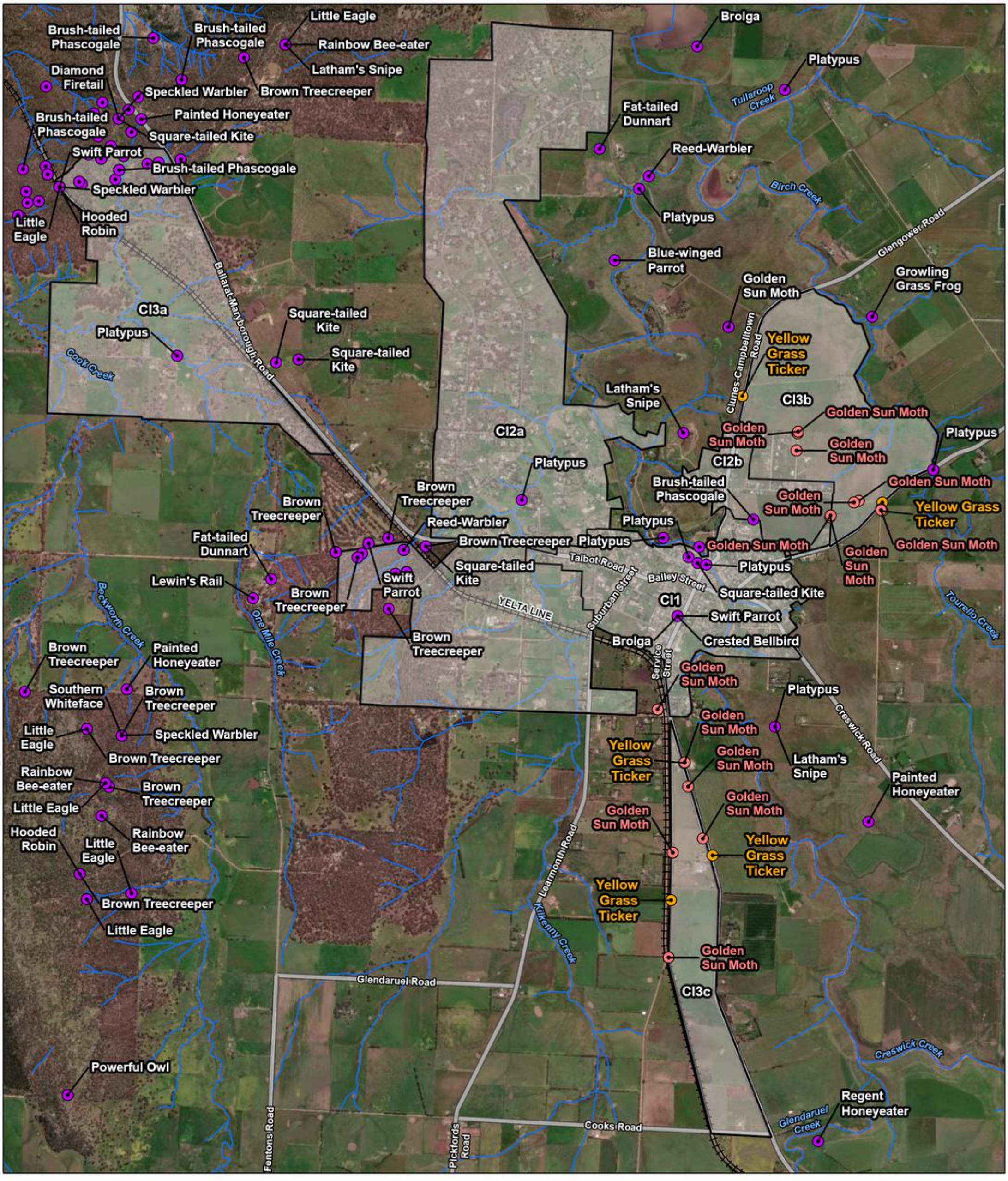
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Clunes

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Legend

- Investigation Areas
- Natural watercourse
- Railways
- Victorian Biodiversity Atlas Fauna records
- Golden Sun Moth
- Yellow Grass Ticker

Details

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Map 1g. Listed Fauna

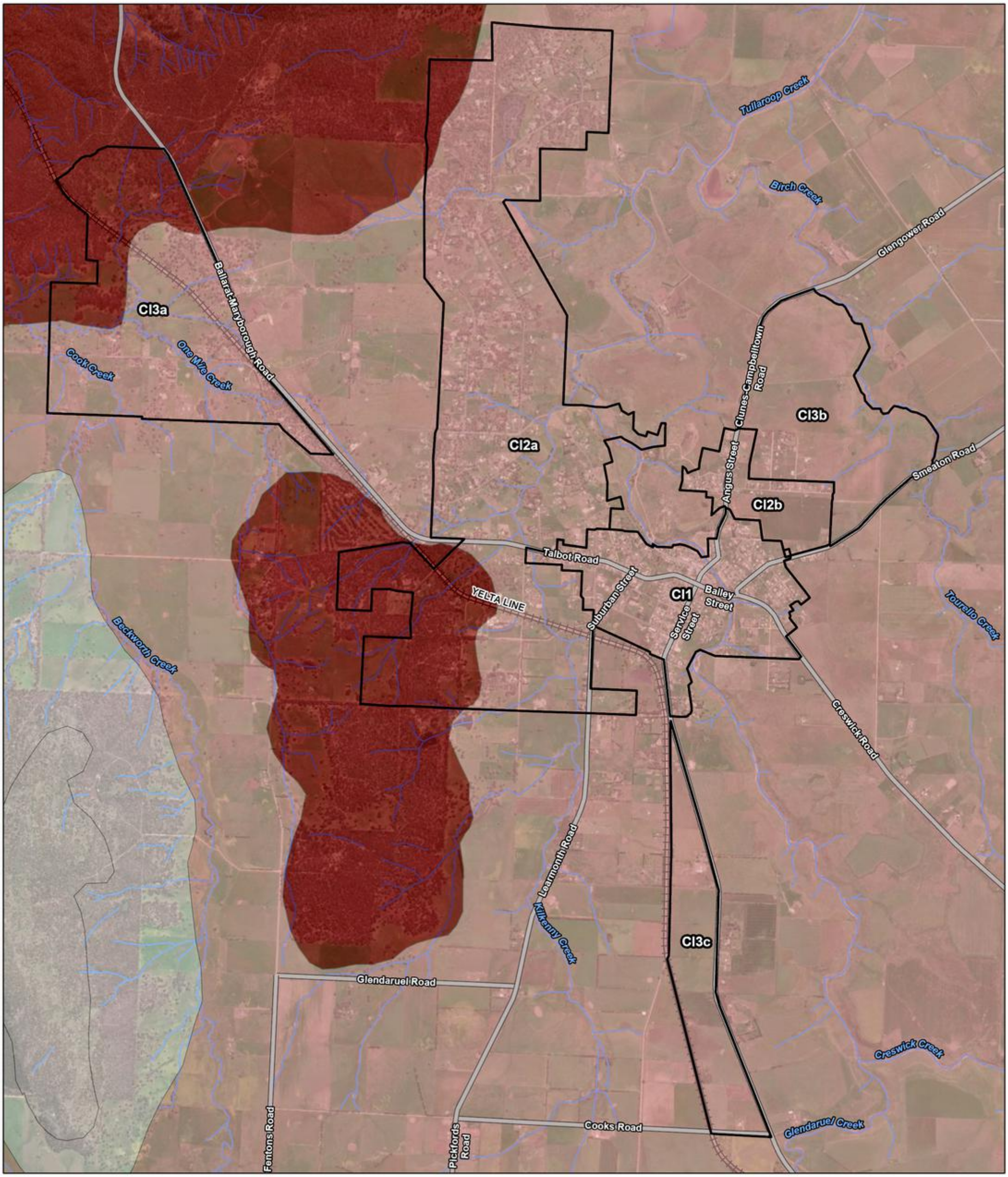
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Clunes

N

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Legend

- Investigation Areas
- Natural watercourse
- Railways

Soil Erosion Susceptibility

- Low
- Moderate
- High
- Very High

Note: data taken from DEECA's Geomorphology of Victoria database

Details

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Map 1h. Soil Erosion Susceptibility – Surface Runoff

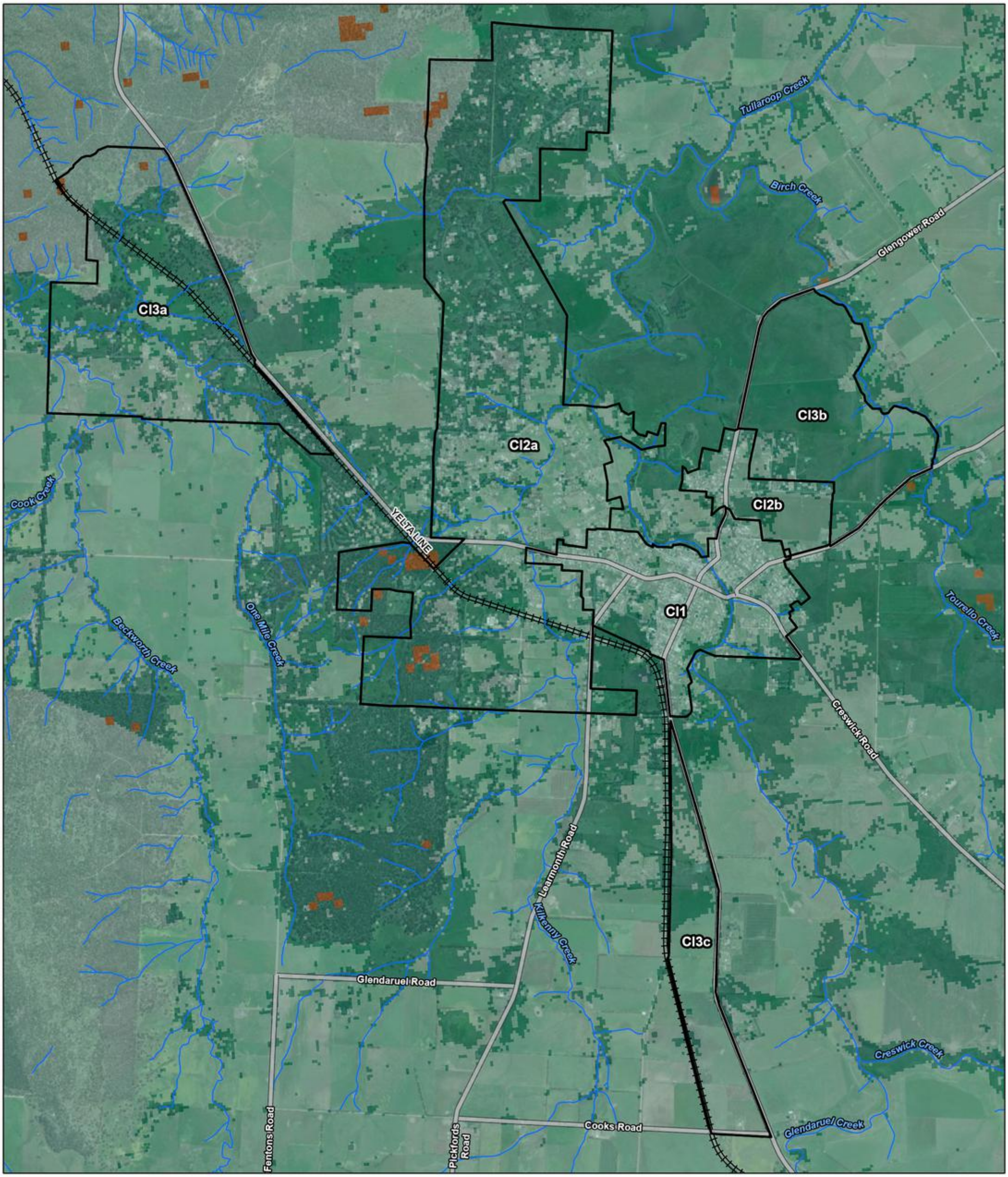
Hepburn 4 Township Structure Plans

Clunes

N

0 320 640m

Scale: 1:31,000 (Page size A3)



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Legend

- Investigation Areas
- Natural watercourse
- Railways

Location category

- Location 1
- Location 2
- Location 3

Details

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Map 1i. Location Categories

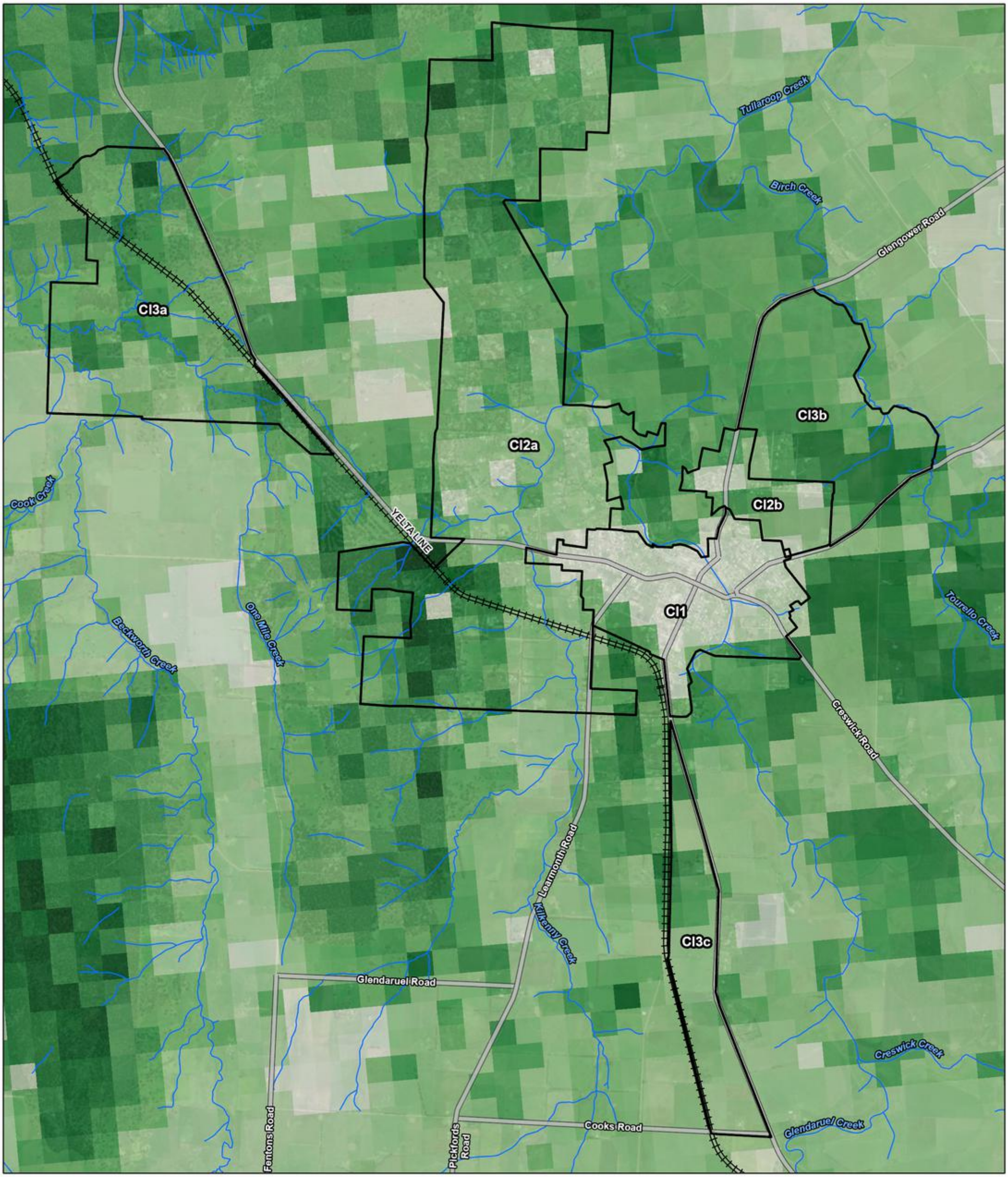
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Clunes

N

0 320 640 m

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Legend

- Investigation Areas
- Natural watercourse
- Railways

Strategic Biodiversity Values (SBV)

100

1

Details

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Map 1j. Strategic Biodiversity Values

Hepburn 4 Township Structure Plans

Clunes

N

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Legend

- Scattered Trees

EVCs

- Box Ironbox Forest
- Creekline Grassy Woodland
- Grassy Woodland
- Plains Grassy Woodland
- Plains Woodland
- Planted Native Vegetation

Details

Mapping by: Ali Nia

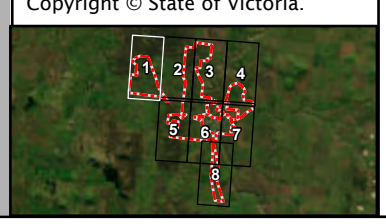
Date: 3/11/2023

Version: 1

Aerial photography from Nearmap (Dec. 2022).

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Map 1K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Clunes

N

0 125 250m

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Legend

- Scattered Trees

EVCs

- Box Ironbox Forest
- Grassy Woodland
- Plains Grassy Woodland
- Plains Woodland
- Planted Native Vegetation

Details

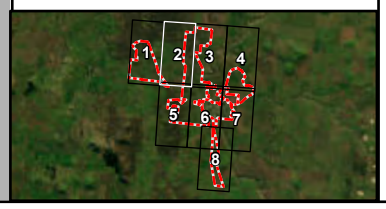
Mapping by: Ali Nia

Date: 3/11/2023

Version: 1

Aerial photography from Nearmap (Dec. 2022).

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Map 1K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Clunes

N

0 125 250m

Scale: 1:12,300 (Page size A3)

Cl3a

Cl2a

Cl3b

Cl2b

Cl1

Cl3c

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Legend

- Investigation Areas
- Scattered Trees

EVCs

- Box Ironbox Forest
- Creekline Herb-rich Woodland
- Creekline Grassy Woodland
- Grassy Woodland
- Plains Grassy Woodland
- Plains Woodland
- Swamp Scrub
- Planted Native Vegetation

Details

Mapping by: Ali Nia

Date: 3/11/2023

Version: 1

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Map 1K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Clunes

N

0 330 660 m

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Legend

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EVCs

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- Plains Woodland
- Planted Native Vegetation

Details

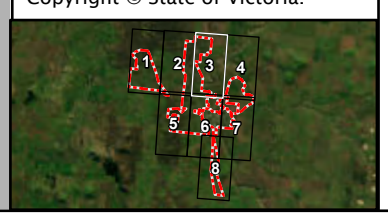
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Legend

- Scattered Trees

EVCs

- Plains Grassy Woodland
- Swamp Scrub
- Planted Native Vegetation

Details

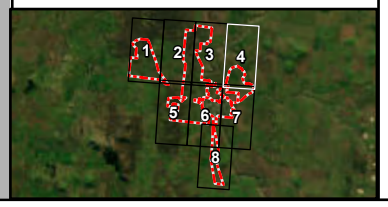
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Legend

Scattered Trees

EVCs

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- Creekline Herb-rich Woodland
- Plains Grassy Woodland
- Plains Woodland
- Planted Native Vegetation

Details

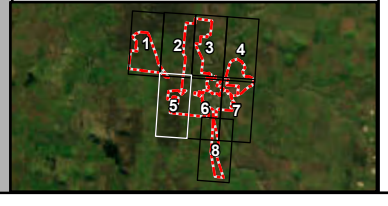
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Map 1K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

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Legend

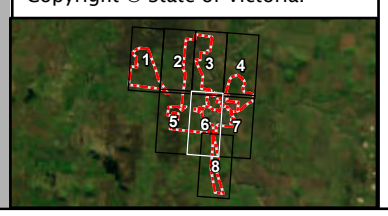
- Scattered Trees

EVCs

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- Creekline Herb-rich Woodland
- Plains Grassy Woodland
- Plains Woodland
- Swamp Scrub
- Planted Native Vegetation

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Legend

Scattered Trees

EVCs

Plains Grassy Woodland

Swamp Scrub

Planted Native Vegetation

Details

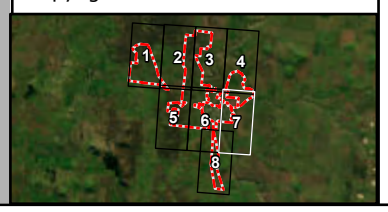
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Map 1K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

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Legend

Scattered Trees

EVCs

Plains Grassy Woodland

Planted Native Vegetation

Details

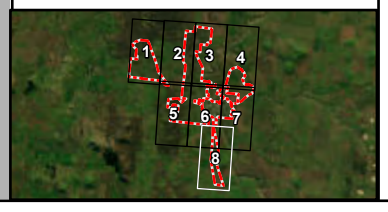
Mapping by: Ali Nia

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Map 1K. Ecological Assessment EVCs

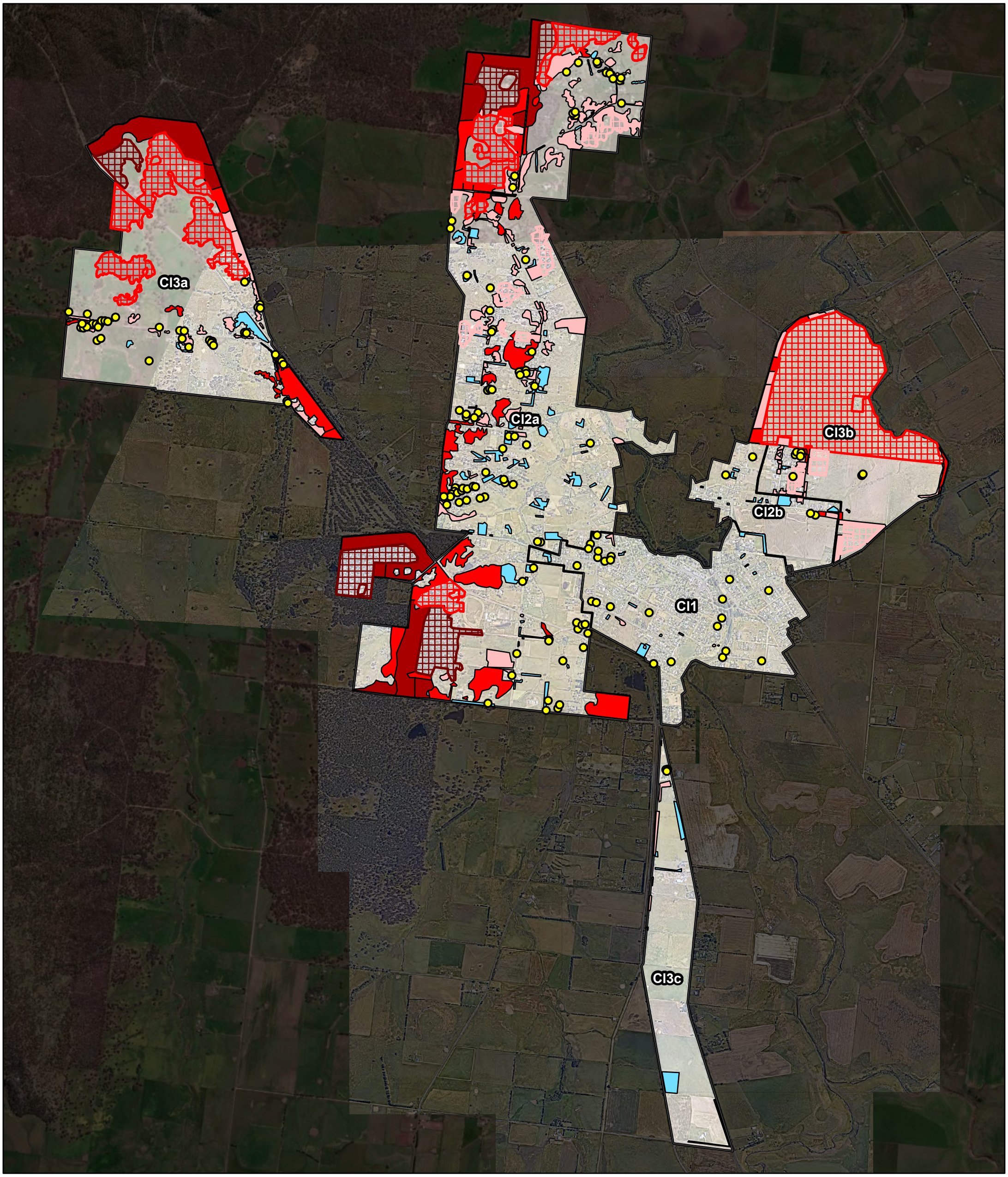
Hepburn 4 Township Structure Plans

Clunes

N

0 125 250m

Scale: 1:12,300 (Page size A3)



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Legend

- Investigation Areas
- Scattered Trees

Quality

- Low Quality
- Moderate Quality
- High Quality
- Indicative-Moderate Quality
- Indicative-High Quality
- Indicative-Low Quality
- Planted Native Vegetation

Details

Mapping by: Ali Nia

Date: 3/11/2023

Version: 1

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Map 1L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Clunes

N

0 320 640 m

Scale: 1:31,000 (Page size A3)

Cl3a

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Legend

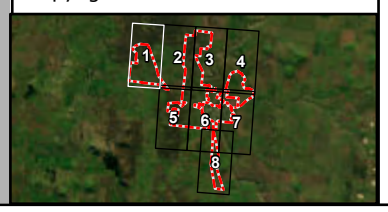
- Investigation Areas
- Parcels
- Scattered Trees

Quality

- Low Quality
- Medium Quality
- High Quality
- Indicative-Medium Quality
- Indicative-High Quality
- Planted Native Vegetation

Details

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Map 1L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Clunes

N

0 125 250m

Scale: 1:12,300 (Page size A3)

Cl2a

Cl3a

nearmap

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Legend

- Investigation Areas
- Parcels
- Scattered Trees

Quality

- Low Quality
- Medium Quality
- High Quality
- Indicative-Medium Quality
- Indicative-High Quality
- Indicative-Low Quality
- Planted Native Vegetation

Details

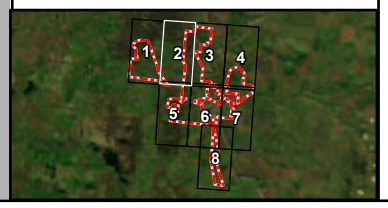
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Map 1L. Ecological Assessment Quality

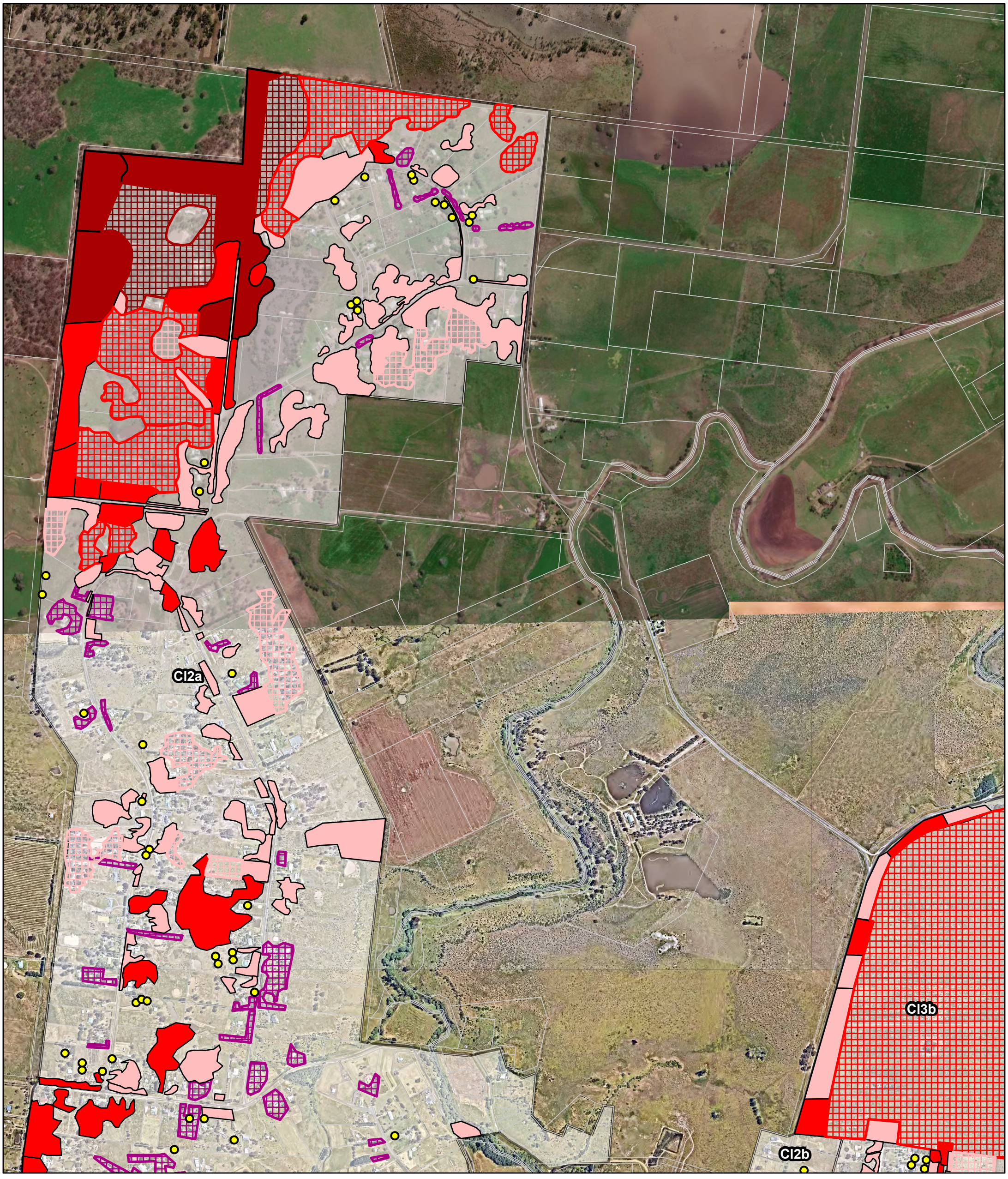
Hepburn 4 Township Structure Plans

Clunes

N

0 125 250m

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Legend

- Investigation Areas
- Parcels
- Scattered Trees

Quality

- Low Quality
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- High Quality
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- Indicative-High Quality
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- Planted Native Vegetation

Details

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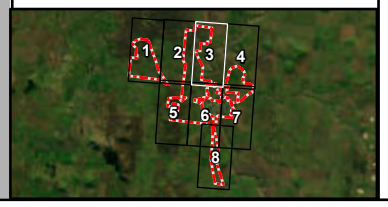
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Map 1L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Clunes

N

0 125 250m

Scale: 1:12,300 (Page size A3)

Cl3b

Cl2a

Cl2b

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Legend

- Investigation Areas
- Parcels
- Scattered Trees

Quality

- Low Quality
- Medium Quality
- Indicative-Medium Quality
- Indicative-Low Quality
- Planted Native Vegetation

Details

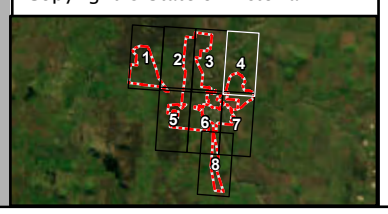
Mapping by: Ali Nia

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Map 1L. Ecological Assessment Quality

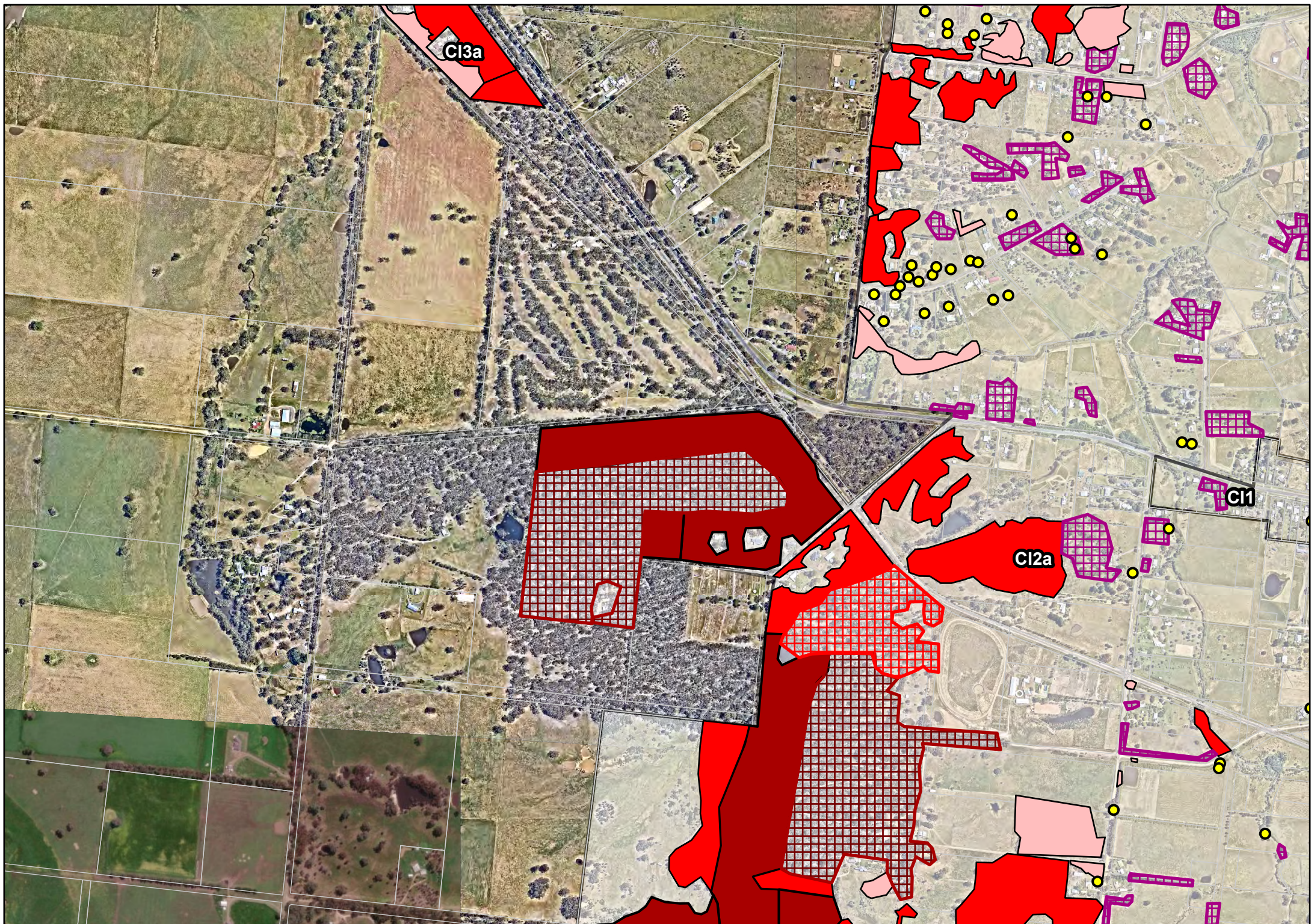
Hepburn 4 Township Structure Plans

Clunes

N

0 125 250m

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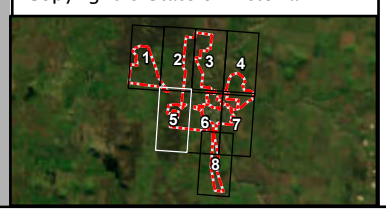
- Investigation Areas
- Parcels
- Scattered Trees

Quality

- Low Quality
- Medium Quality
- High Quality
- Indicative-Medium Quality
- Indicative-High Quality
- Planted Native Vegetation

Details

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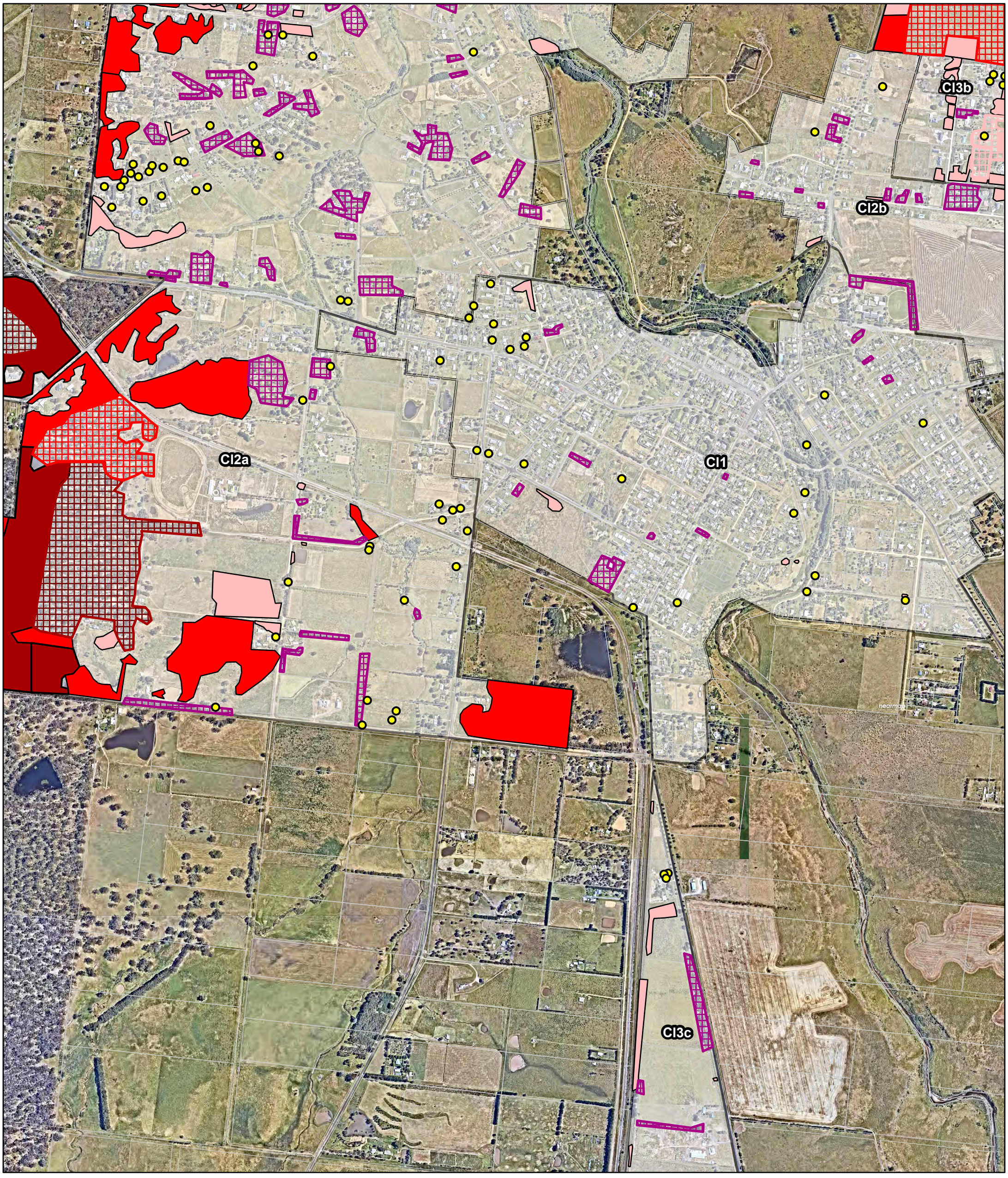
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Legend

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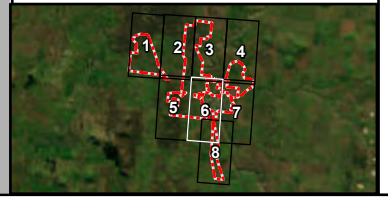
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Hepburn 4 Township Structure Plans

Clunes

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Scale: 1:12,300 (Page size A3)

Cl2a

Cl3b

Cl2b

Cl1

Cl3c

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Legend

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- Parcels
- Scattered Trees

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- Planted Native Vegetation

Details

Mapping by: Ali Nia

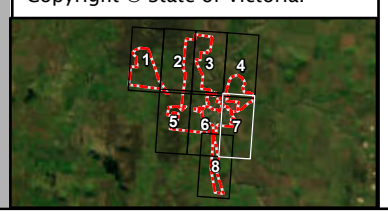
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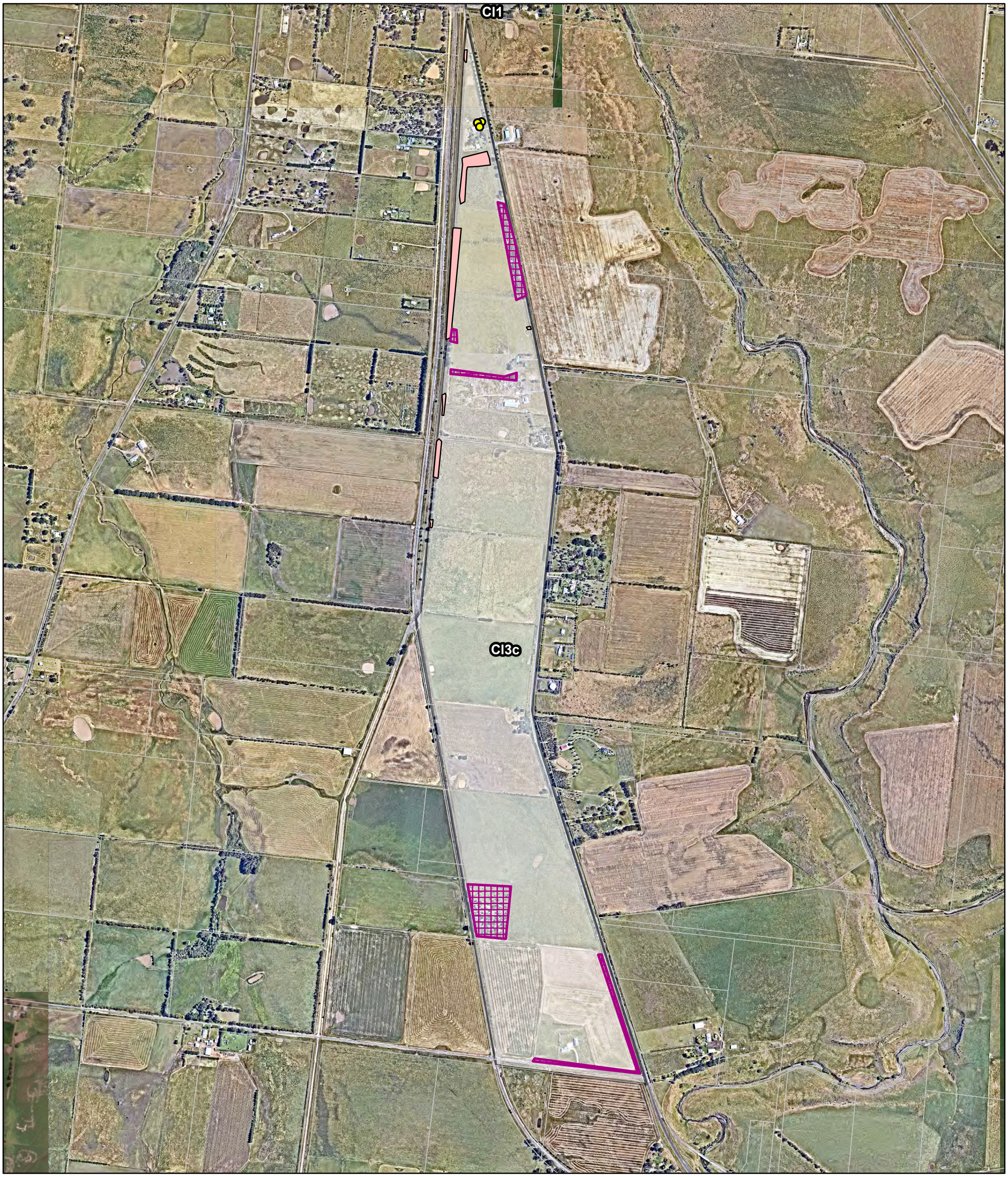
Hepburn 4 Township Structure Plans

Clunes

N

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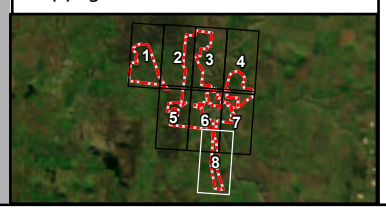
- Investigation Areas
- Parcels
- Scattered Trees

Quality

- Low Quality
- Planted Native Vegetation

Details

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Date: 3/11/2023
Version: 1
Aerial photography from Nearmap (Dec. 2022).
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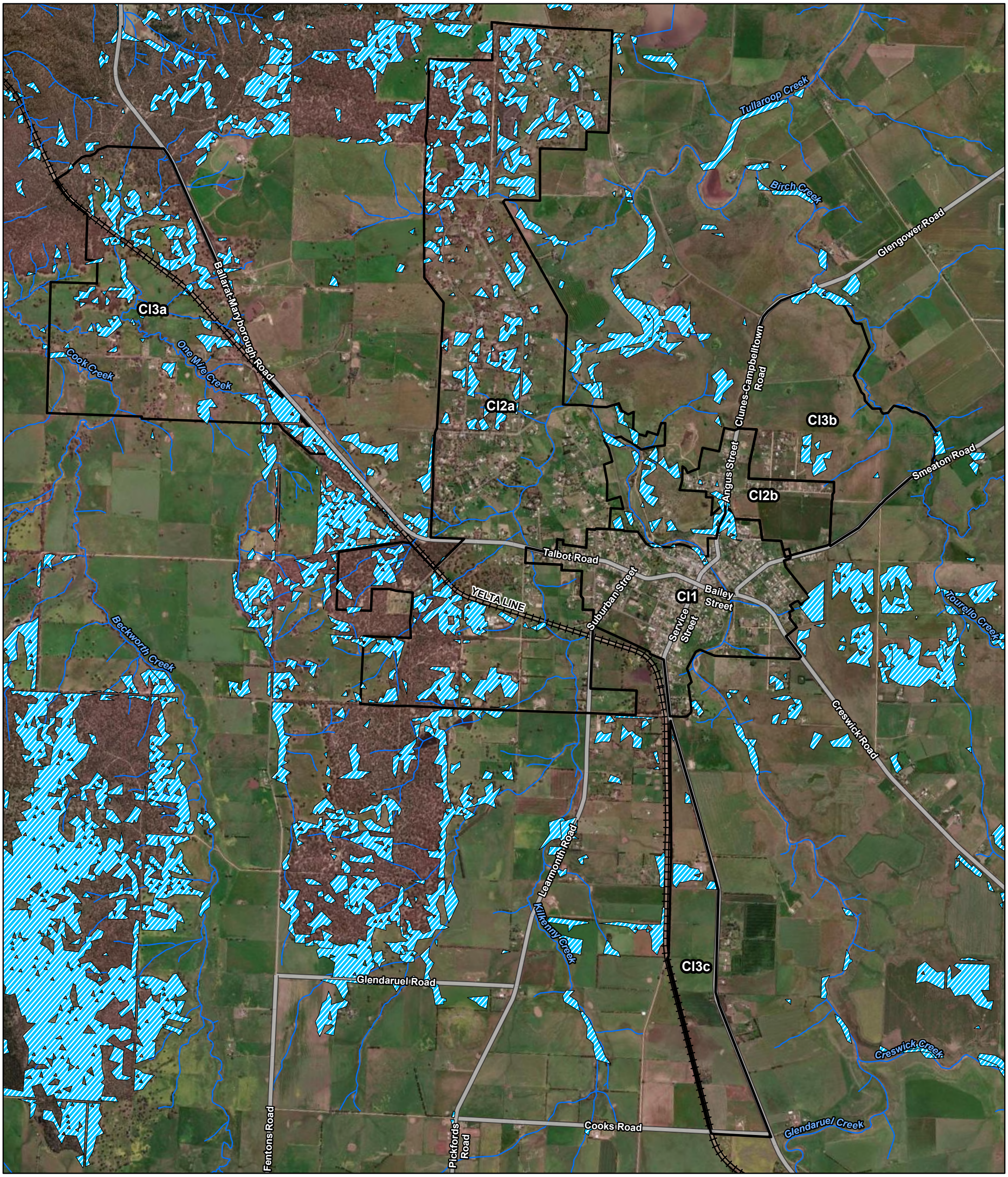
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Legend

- Investigation Areas
- Natural watercourse
- Railways
- Ground Water Dependent Ecosystems

Details

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Date: 3/11/2023
Version: 1
Aerial photography from Esri World Imagery.
Data Source: Base layers courtesy of VicMap,
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Map 1m. Ground Water Dependent Ecosystems and Spring Locations

Hepburn 4 Township Structure Plans

Clunes

N

0 320 640 m

Scale: 1:31,000 (Page size A3)

Map 1N – Connectivity Clunes

C1
C2
C3
C4
C5
C6
C7
C8
Cl1
Cl2a
Cl2b
Cl3a
Cl3b
Cl3c
One Mile Creek
Cook Creek
Kilkenny Creek
Creswick Creek
1

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Legend

Corridors
- Creek Corridor
- Land Corridor
- Road - Rail Corridor
- Stepping Stone
- Potential

Treed EVCs - Quality
- High
- Medium
- Low
- Native Planted Vegetation

Grassland EVCs - Quality
- Medium
- Low

Core Areas
- Grassland
- Treed
- Wetland

VBA Records
- Brush-tailed Phascogale

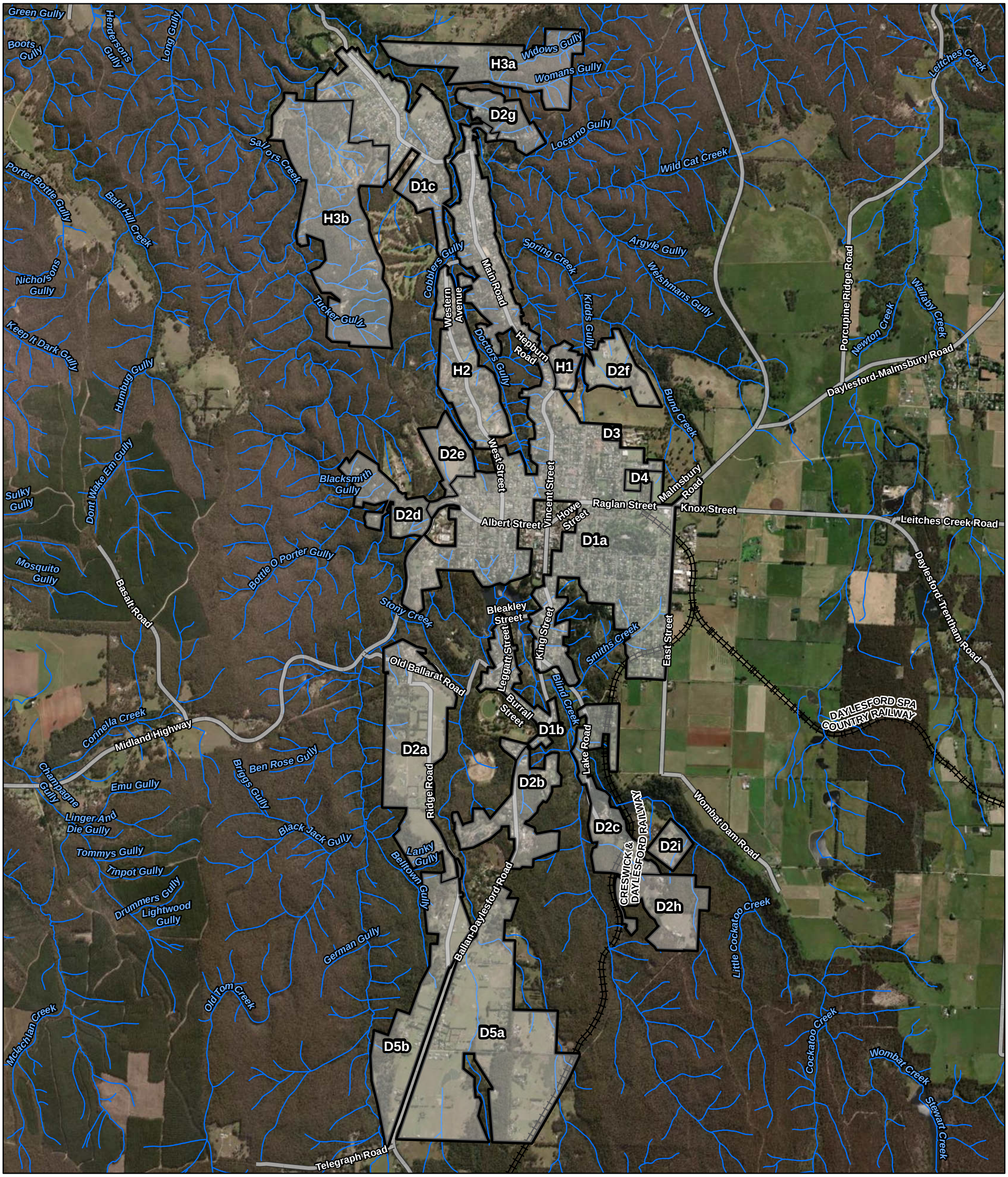
Clunes GSM surveys
- GSM Records

Details

Date: 02 November 2023
Created by:Kallista Sears
Aerial Photography from Google Satellite
Base map data Copyright State of Victoria

0 0.5 1 km

Scale 1:1
(Page size A3)



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Legend

- Investigation Areas
- Natural watercourse
- Railways

Details

Mapping by: Ali Nia
Date: 7/27/2023
Version: 1
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Data Source: Base layers courtesy of VicMap,
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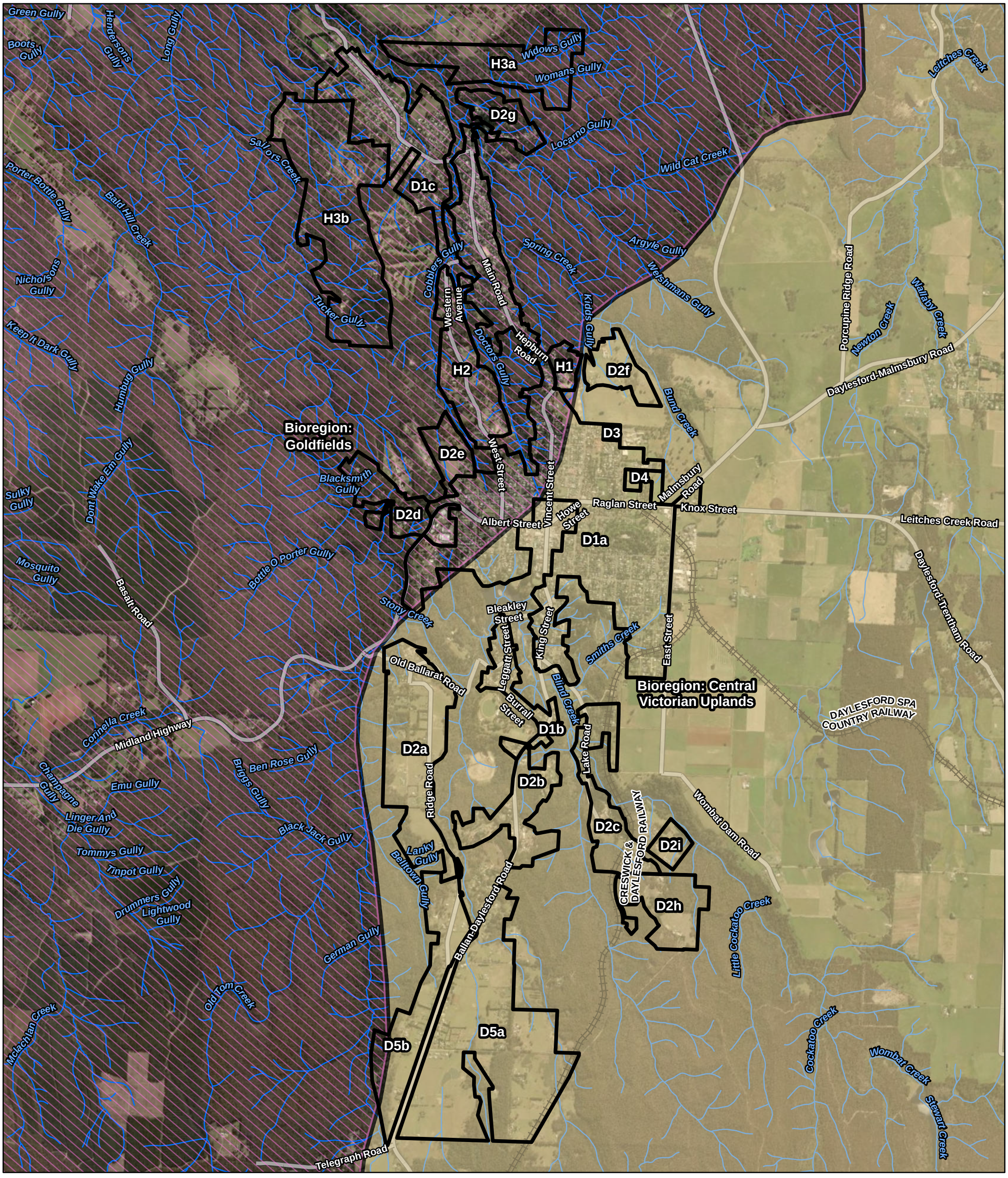
Map 2A. Investigation Areas

Hepburn 4 Township Structure Plans

Daylesford - Hepburn

0 330 660 m

Scale: 1:32,000 (Page size A3)



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Legend

- Investigation Areas
- Natural watercourse
- Railways

Bioregion

- Central Victorian Uplands
- Goldfields

Details

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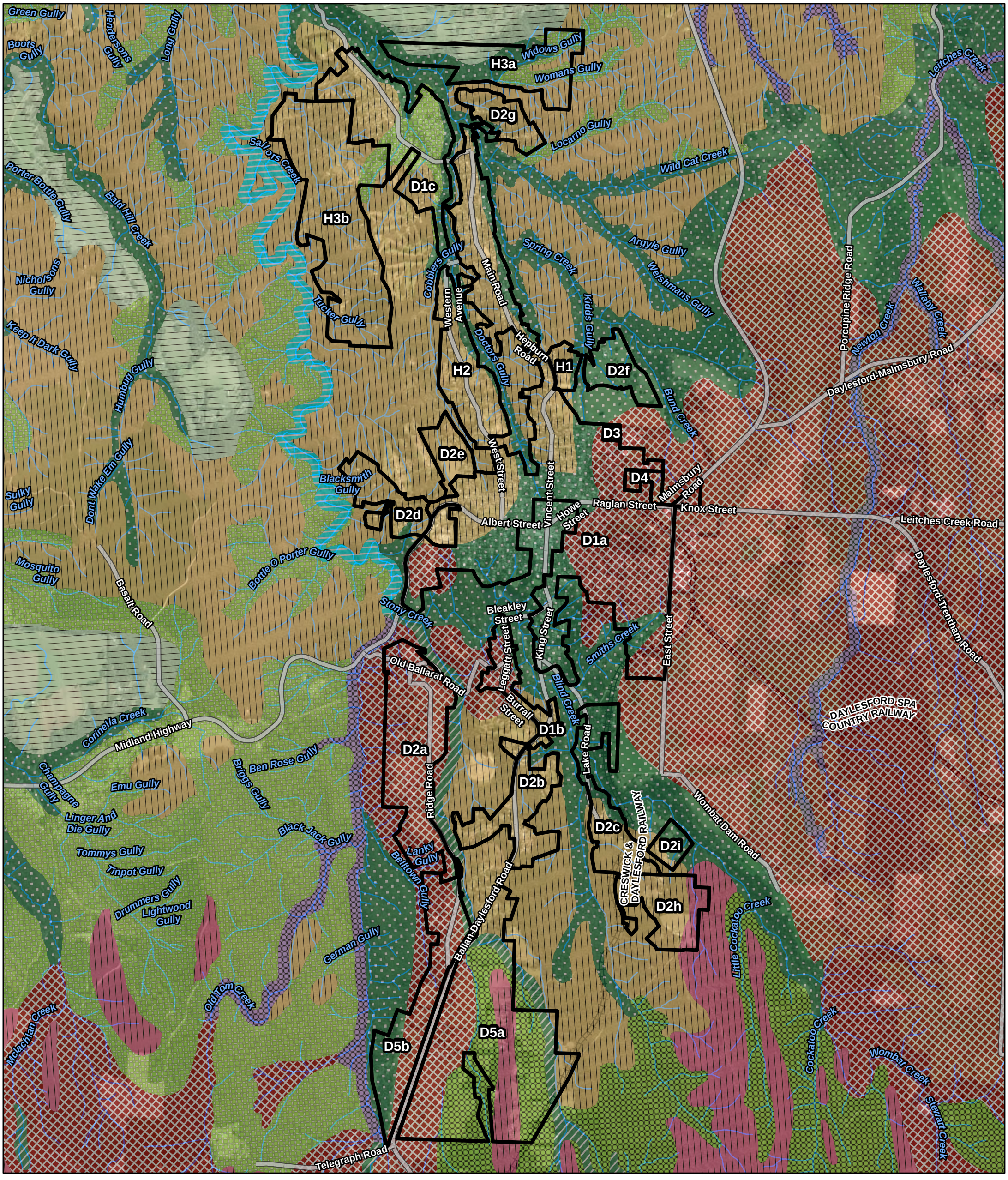
Map 2B. Bioregions

Hepburn 4 Township Structure Plans

Daylesford - Hepburn

0 330 660 m

Scale: 1:32,000 (Page size A3)



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Legend

- Investigation Areas
- Natural watercourse
- Railways

Pre 1750 Ecological Vegetation Classes

- 164 Creekline Herb-rich Woodland
- 175 Grassy Woodland
- 198 Sedgy Riparian Woodland
- 20 Heathy Dry Forest
- 21 Shrubby Dry Forest
- 22 Grassy Dry Forest
- 23 Herb-rich Foothill Forest
- 45 Shrubby Foothill Forest
- 47 Valley Grassy Forest
- 851 Stream Bank Shrubland

Details

Mapping by: Ali Nia
Date: 7/27/2023
Version: 1
Aerial photography from Esri World Imagery.
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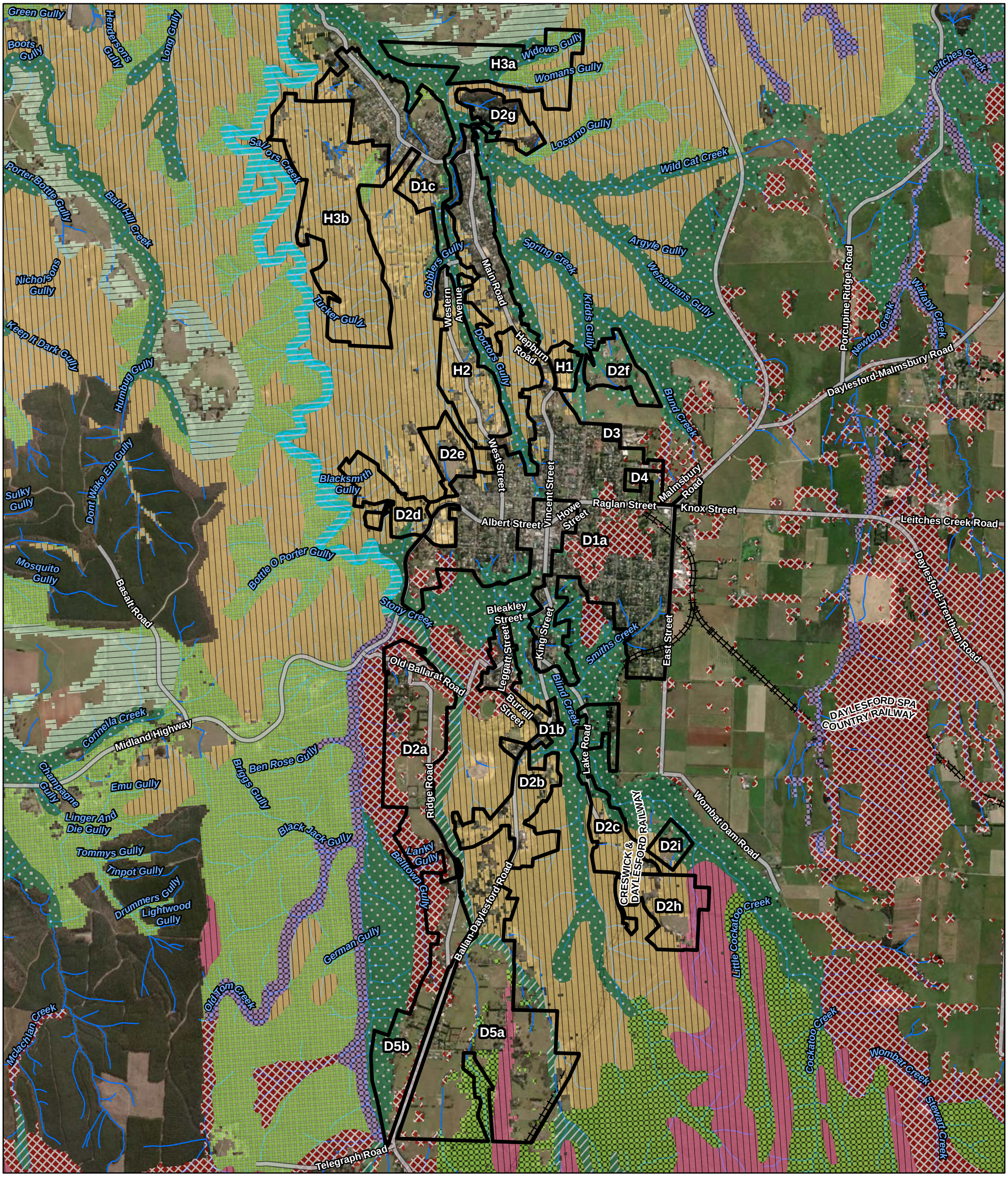
Map 2C. Modelled pre-1750 EVCs (Data from DEECA)

Hepburn 4 Township Structure Plans

Daylesford-Hepburn

0 330 660 m

Scale: 1:32,000 (Page size A3)



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Legend

- Investigation Areas
- Natural watercourse
- Railways

2005 Ecological Vegetation Classes

- 164 Creekline Herb-rich Woodland
- 175 Grassy Woodland
- 198 Sedgy Riparian Woodland
- 20 Heathy Dry Forest
- 21 Shrubby Dry Forest
- 22 Grassy Dry Forest
- 23 Herb-rich Foothill Forest
- 45 Shrubby Foothill Forest
- 47 Valley Grassy Forest
- 851 Stream Bank Shrubland

Details

Mapping by: Ali Nia
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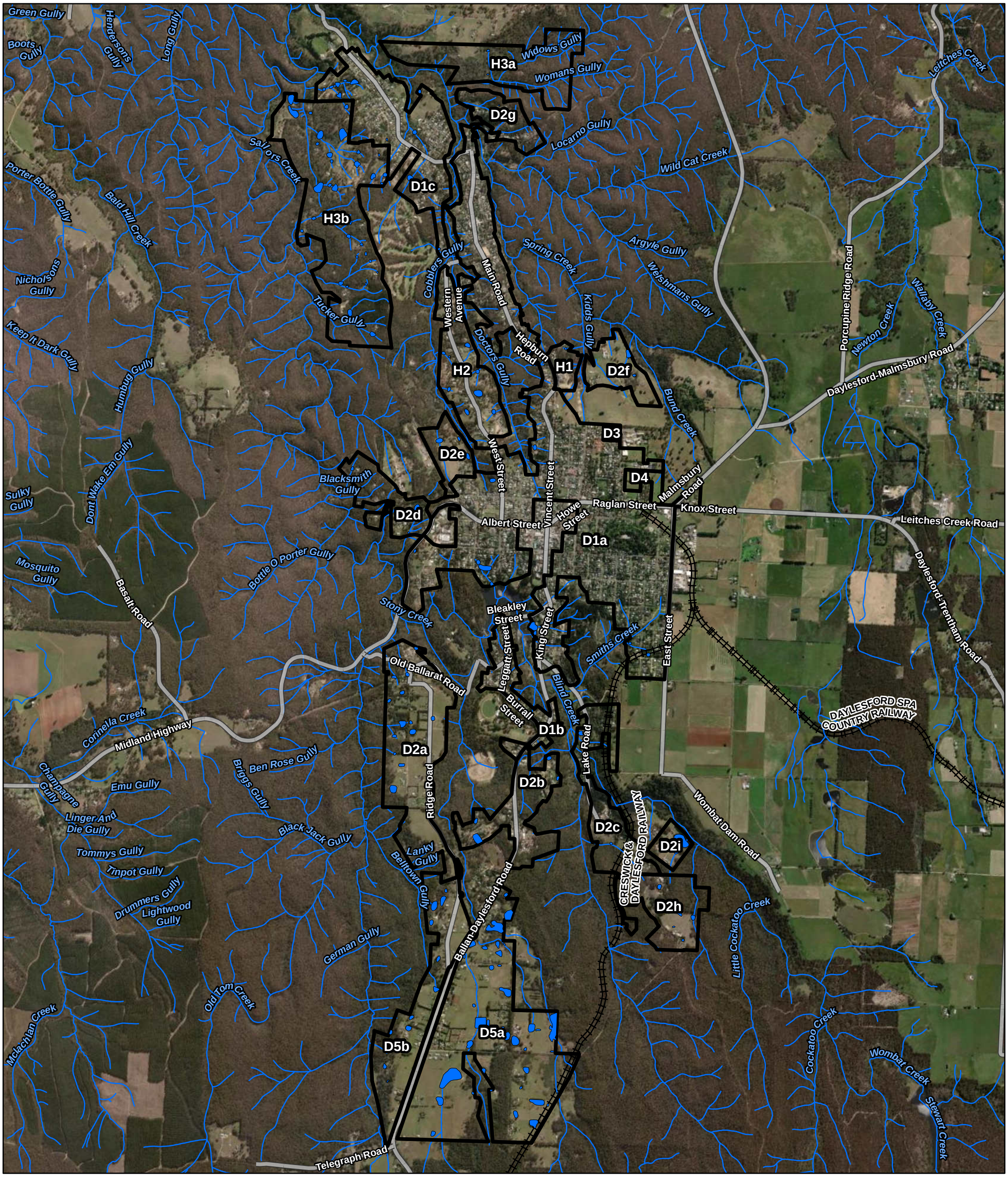
Map 2D. Modelled 2005 EVCs (Data from DEECA)

Hepburn 4 Township Structure Plans

Daylesford-Hepburn

0 330 660 m

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Legend

- Investigation Areas
- Natural watercourse
- Railways
- Waterbodies

Details

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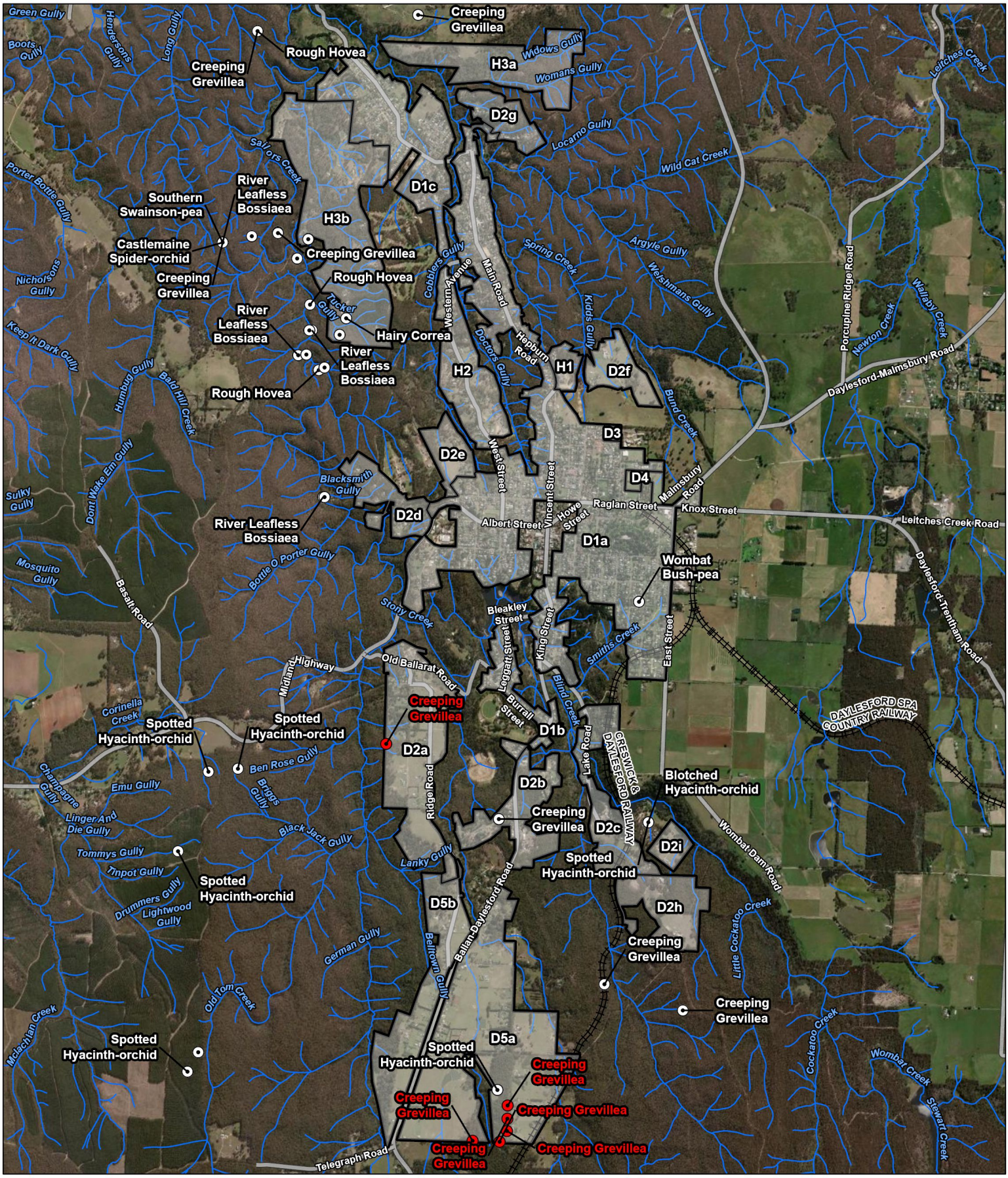
Map 2E. Waterways and Waterbodies

Hepburn 4 Township Structure Plans

Daylesford - Hepburn

0 330 660 m

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Legend

- Investigation Areas
- Natural watercourse
- Railways
- Victorian Biodiversity Atlas Flora records
- Collected Significant Flora

Details

Mapping by: Ali Nia
Date: 7/27/2023
Version: 1
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Map 2F. Listed Flora

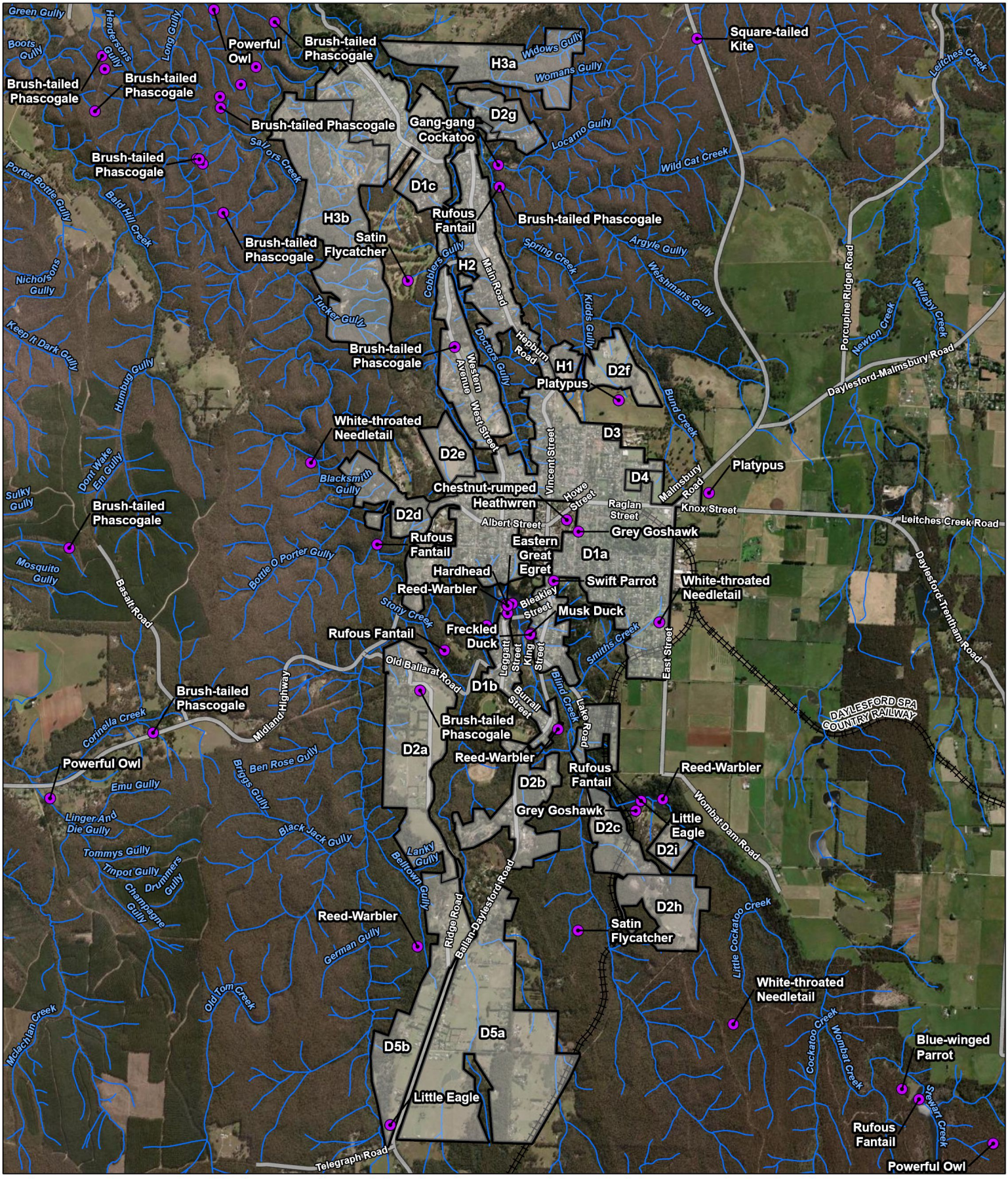
Hepburn 4 Township Structure Plans

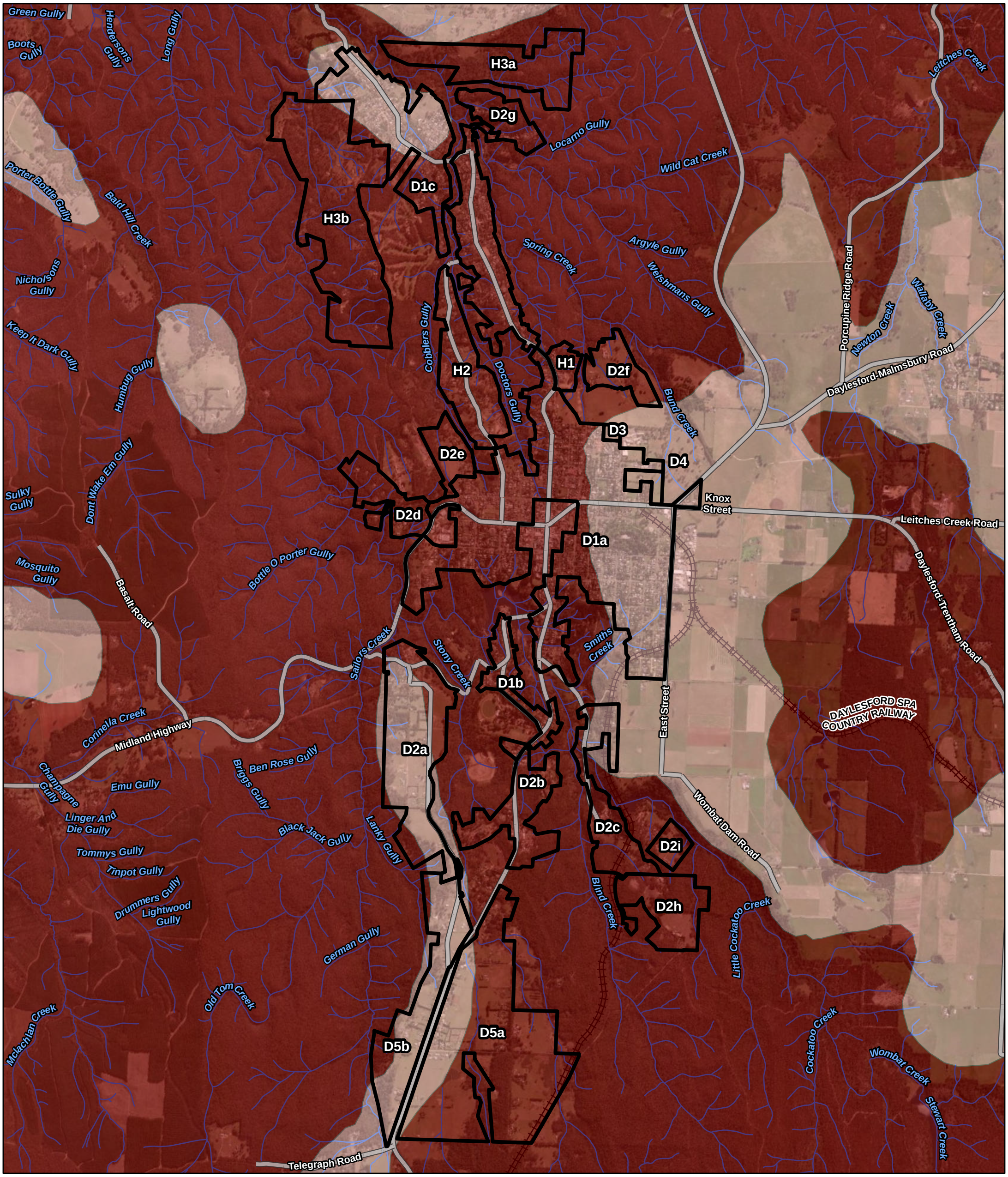
Daylesford-Hepburn

N

0 330 660 m

Scale: 1:32,000 (Page size A3)


Green Gully
Boots Gully
Hendersons Gully
Long Gully
Powerful Owl
Brush-tailed Phascogale
Brush-tailed Phascogale
Brush-tailed Phascogale



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Legend

- Investigation Areas
- Natural watercourse
- Railways

Soil Erosion Susceptibility

- Low
- Moderate
- High
- Very High

Note: data taken from DEECA's Geomorphology of Victoria database

Details

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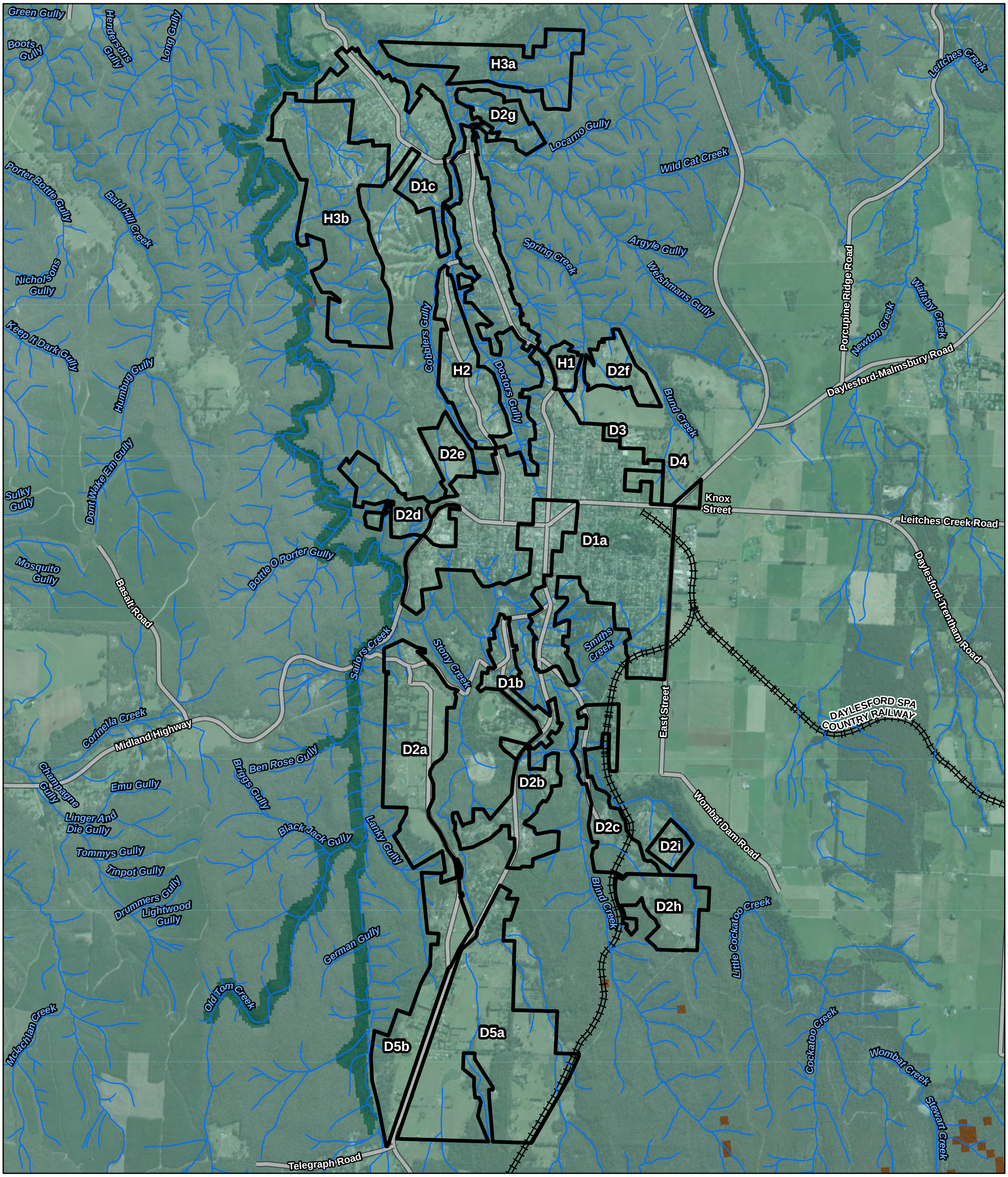
Map 2H. Soil Erosion Susceptibility - Surface Runoff

Hepburn 4 Township Structure Plans

Daylesford - Hepburn

0 330 660 m

Scale: 1:32,000 (Page size A3)



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Legend

- Investigation Areas
- Natural watercourse
- Railways

Location category

- Location 1
- Location 2
- Location 3

Details

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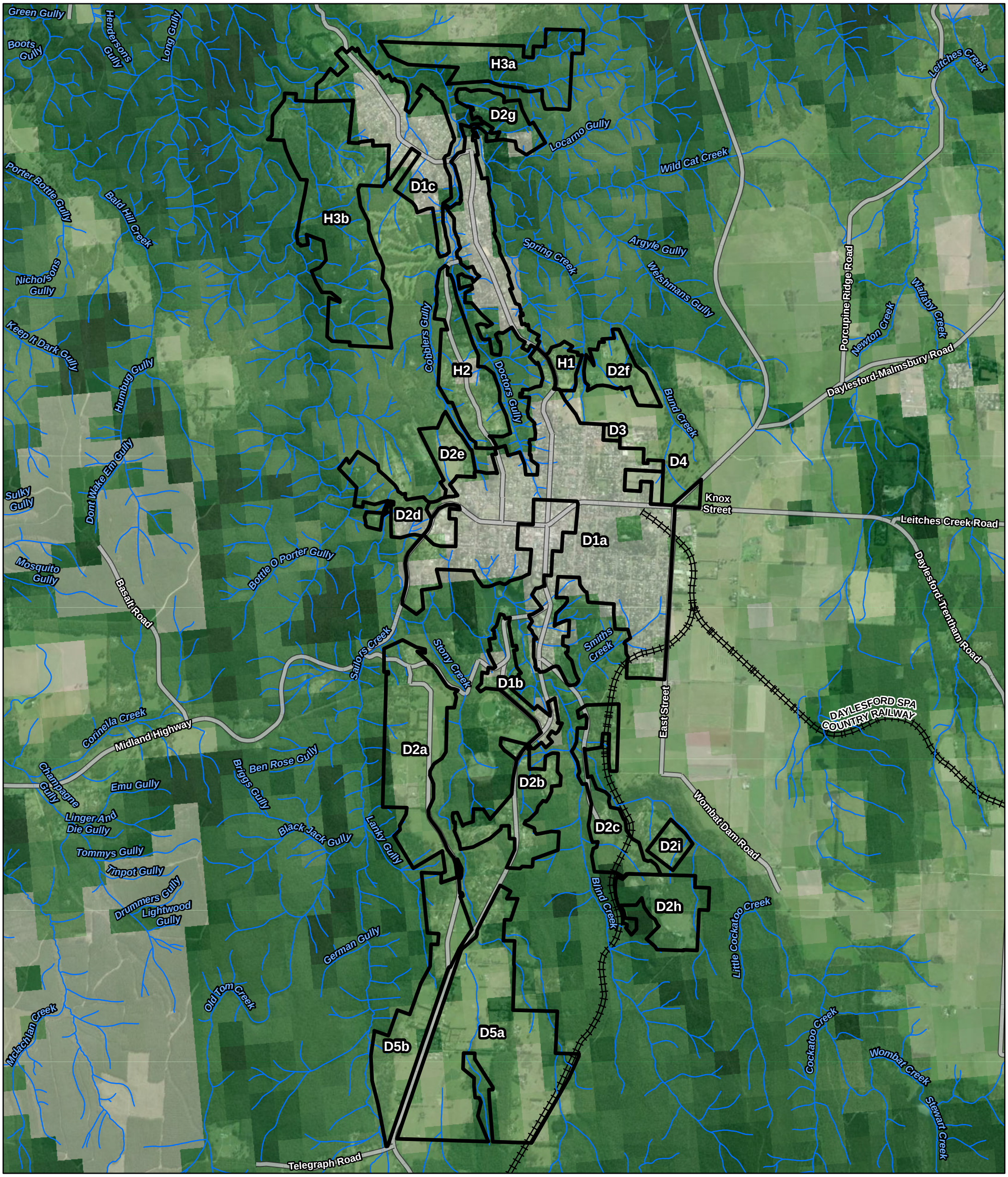
Map 2I. Location Categories

Hepburn 4 Township Structure Plans

Daylesford - Hepburn

0 330 660 m

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Legend

- Investigation Areas
- Natural watercourse
- Railways

Strategic Biodiversity Values (SBV)

100

1

Details

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Map 2J. Strategic Biodiversity Values

Hepburn 4 Township Structure Plans

Daylesford - Hepburn

0 330 660 m

Scale: 1:32,000 (Page size A3)

H3a
D2g
D1c
H3b
H2
H1
D2f
D3
D2e
D1a
D4
D2d

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Legend

- Investigation Areas
- Scattered Trees

EVCs

- Heathy Dry Forest
- Herb-rich Foothill Forest
- Swampy Riparian Woodland
- Valley Grassy Forest
- Planted Native Vegetation

Details

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Map 2K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Daylesford

Scale: 1:15,700

0 160 320 m

(Page size A3)

D1a
D1b
D2a
D2b
D2c
D2i
D2h
D5a
D5b

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Legend

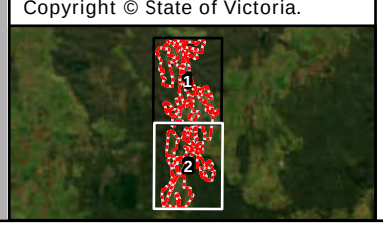
- Investigation Areas
- Scattered Trees

EVCs

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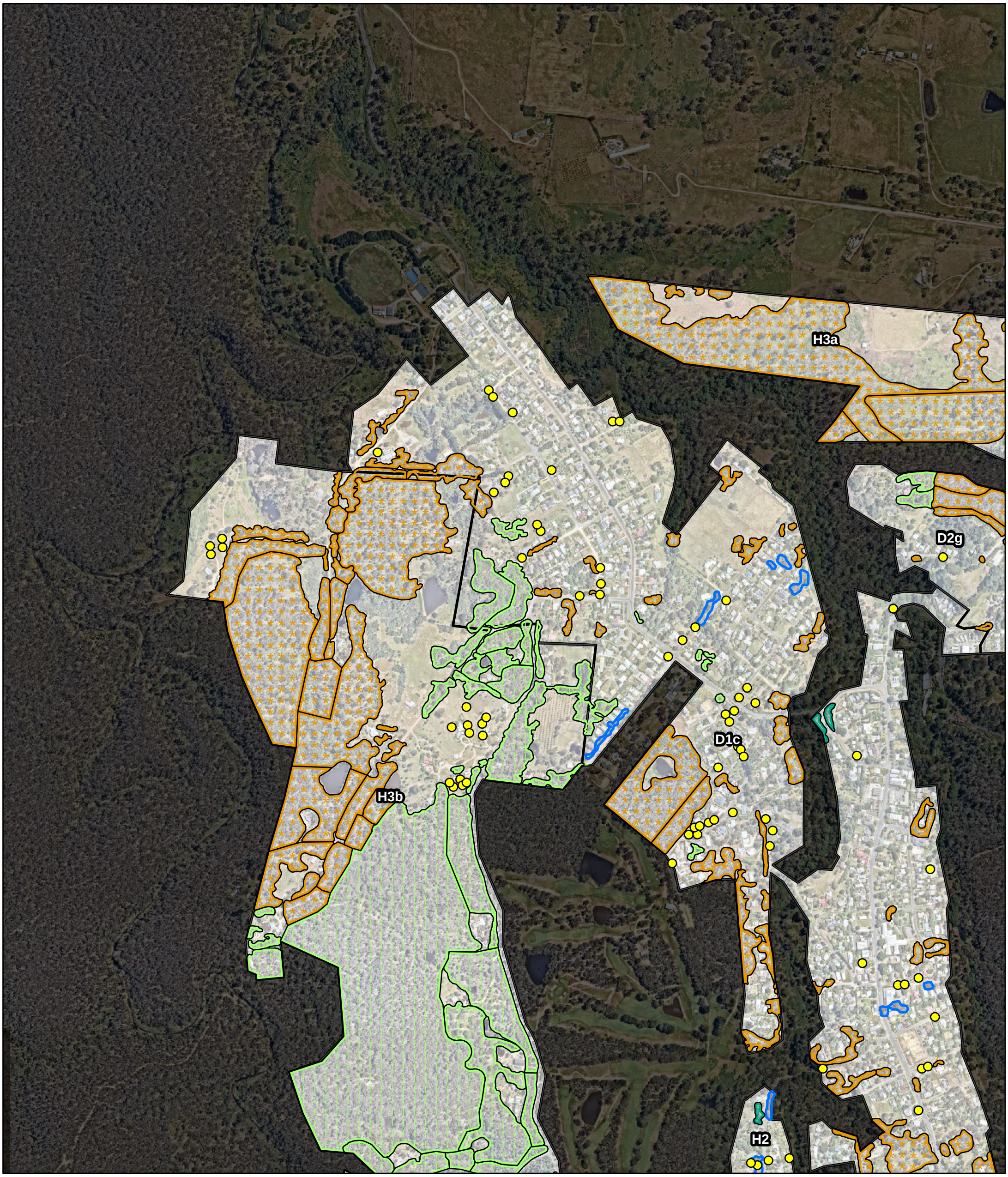
Hepburn 4 Township Structure Plans

Daylesford

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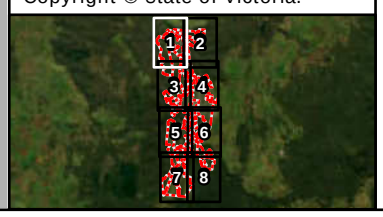
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Map 2K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Daylesford

0 90 180 m

Scale: 1:9,000 (Page size A3)

H3a

D2g

D1c

H2

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Legend

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Legend

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Map 2K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Daylesford

Scale: 1:9,000

0 90 180 m

(Page size A3)

D1c
H2
H1
D2f
D3
D2e
D1a
D4

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Legend

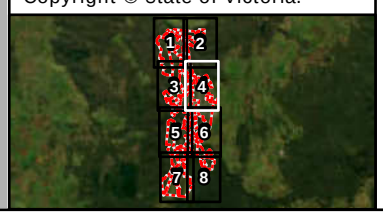
- Investigation Areas
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EVCs

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Map 2K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Daylesford

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0 90 180 m

(Page size A3)

D1a

D1b

D2a

D2b

D2c

D5b

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Legend

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Map 2K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Daylesford

Scale: 1:9,000

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(Page size A3)

D1a

D1b

D2b

D2c

D2i

nearmap

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Legend

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Mapping by: Ali Nia

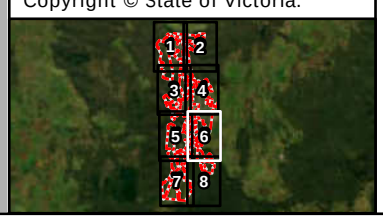
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Map 2K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Daylesford

Scale: 1:9,000

0 90 180 m

(Page size A3)

D2a

D2b

D2c

D5b

D5a

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Legend

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Details

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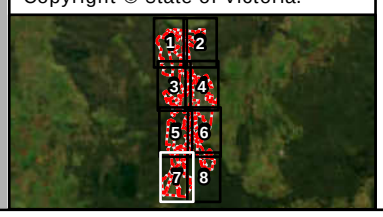
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Map 2K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Daylesford

Scale: 1:9,000

0 90 180 m

(Page size A3)

D2b

D2c

D2i

D2h

D5a

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Legend

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- Scattered Trees

EVCs

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Details

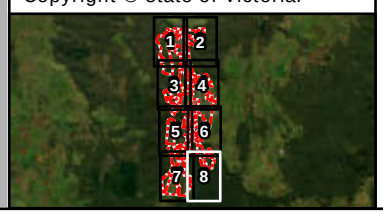
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Map 2K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Daylesford

Scale: 1:9,000

0 90 180 m

(Page size A3)

H3a
D2g
D1c
H3b
H2
H1
D2f
D3
D2e
D1a
D4
D2d

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Legend

- Investigation Areas
- Scattered Trees

Quality

- Low Quality
- Moderate Quality
- High Quality
- Indicative-Moderate Quality
- Indicative-High Quality
- Indicative-Low Quality
- Planted Native Vegetation
- Public Lands

Details

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Map 2L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Daylesford

0 160 320 m

Scale: 1:15,700 (Page size A3)



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Legend

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- Scattered Trees

Quality

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- Indicative-Moderate Quality
- Indicative-High Quality
- Indicative-Low Quality
- Planted Native Vegetation
- Public Lands

Details

Mapping by: Ali Nia

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Map 2L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Daylesford

0 160 320 m

Scale: 1:15,700 (Page size A3)

H3a

D2g

D1c

H3b

H2

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Legend

Investigation Areas

Scattered Trees

Quality

- Low Quality
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- Indicative-High Quality
- Indicative-Low Quality
- Planted Native Vegetation
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Details

Mapping by: Ali Nia

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Map 2L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Daylesford

0 90 180 m

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H3a

D2g

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H2

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Legend

- Investigation Areas
- Scattered Trees

Quality

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Legend

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- High Quality
- Indicative-Moderate Quality
- Indicative-High Quality
- Indicative-Low Quality
- Planted Native Vegetation
- Public Lands

Details

Mapping by: Ali Nia

Date: 11/3/2023

Version: 1

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Map 2L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Daylesford

Scale: 1:9,000

0 90 180 m

(Page size A3)

D1c
H1
H2
D2f
D3
D2e
D1a
D4

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Legend

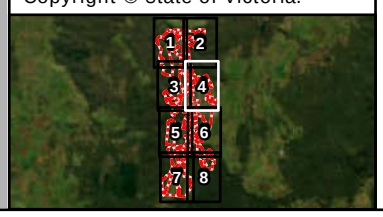
- Investigation Areas
- Scattered Trees

Quality

- Low Quality
- Moderate Quality
- High Quality
- Indicative-Moderate Quality
- Indicative-High Quality
- Indicative-Low Quality
- Planted Native Vegetation
- Public Lands

Details

Mapping by: Ali Nia
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Map 2L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Daylesford

Scale: 1:9,000

0 90 180 m

(Page size A3)

D1a

D1b

D2a

D2c

D2b

D5b

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Legend

- Investigation Areas
- Scattered Trees

Quality

- Low Quality
- Moderate Quality
- High Quality
- Indicative-Moderate Quality
- Indicative-High Quality
- Indicative-Low Quality
- Planted Native Vegetation
- Public Lands

Details

Mapping by: Ali Nia

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Map 2L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Daylesford

Scale: 1:9,000

0 90 180 m

(Page size A3)

D1a

D1b

D2b

D2c

D2i

nearmap

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Legend

- Investigation Areas
- Scattered Trees

Quality

- Low Quality
- Moderate Quality
- High Quality
- Indicative-Moderate Quality
- Indicative-High Quality
- Planted Native Vegetation
- Public Lands

Details

Mapping by: Ali Nia

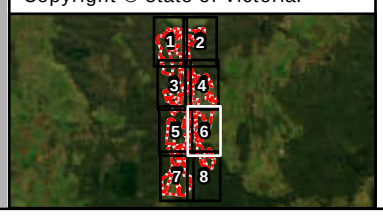
Date: 11/3/2023

Version: 1

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Map 2L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Daylesford

Scale: 1:9,000

0 90 180 m

(Page size A3)

D2a

D2b

D2c

D5b

D5a

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Legend

- Investigation Areas
- Scattered Trees

Quality

- Low Quality
- Moderate Quality
- High Quality
- Indicative-Moderate Quality
- Indicative-High Quality
- Planted Native Vegetation
- Public Lands

Details

Mapping by: Ali Nia

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Version: 1

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Map 2L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Daylesford

0 90 180 m

Scale: 1:9,000 (Page size A3)

D2b
D2c
D2i
D2h
D5a

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Legend

- Investigation Areas
- Scattered Trees

Quality

- Low Quality
- Moderate Quality
- High Quality
- Indicative-Moderate Quality
- Indicative-High Quality
- Planted Native Vegetation
- Public Lands

Details

Mapping by: Ali Nia
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Map 2L. Ecological Assessment Quality

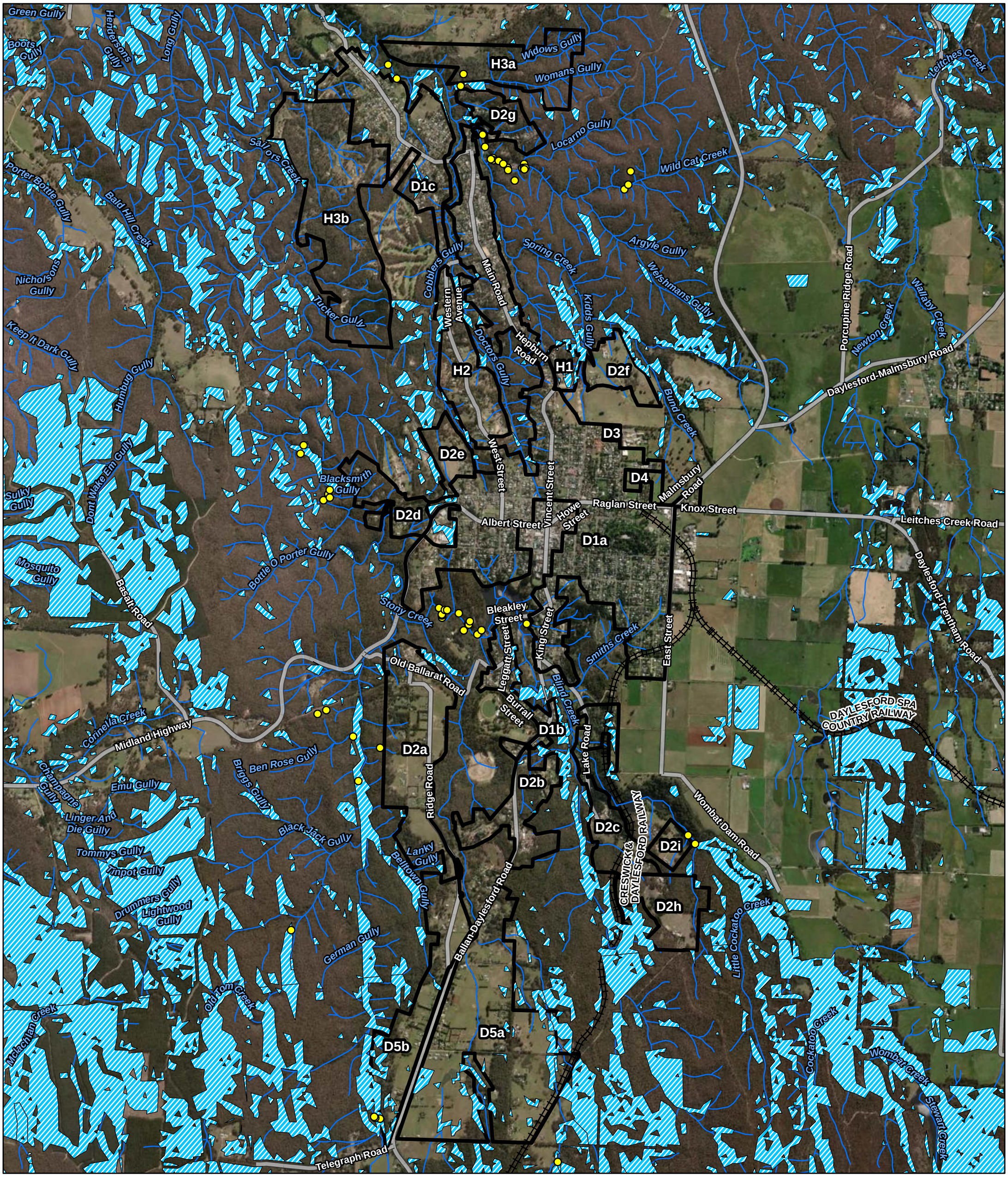
Hepburn 4 Township Structure Plans

Daylesford

Scale: 1:9,000

0 90 180 m

(Page size A3)



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Legend

- Investigation Areas
- Natural watercourse
- Railways
- Spring Locations
- Ground Water Dependent Ecosystems

Details

Mapping by: Ali Nia
Date: 11/3/2023
Version: 1
Aerial photography from Esri World Imagery.
Data Source: Base layers courtesy of VicMap,
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Map 2m. Ground Water Dependent Ecosystems and Spring Locations

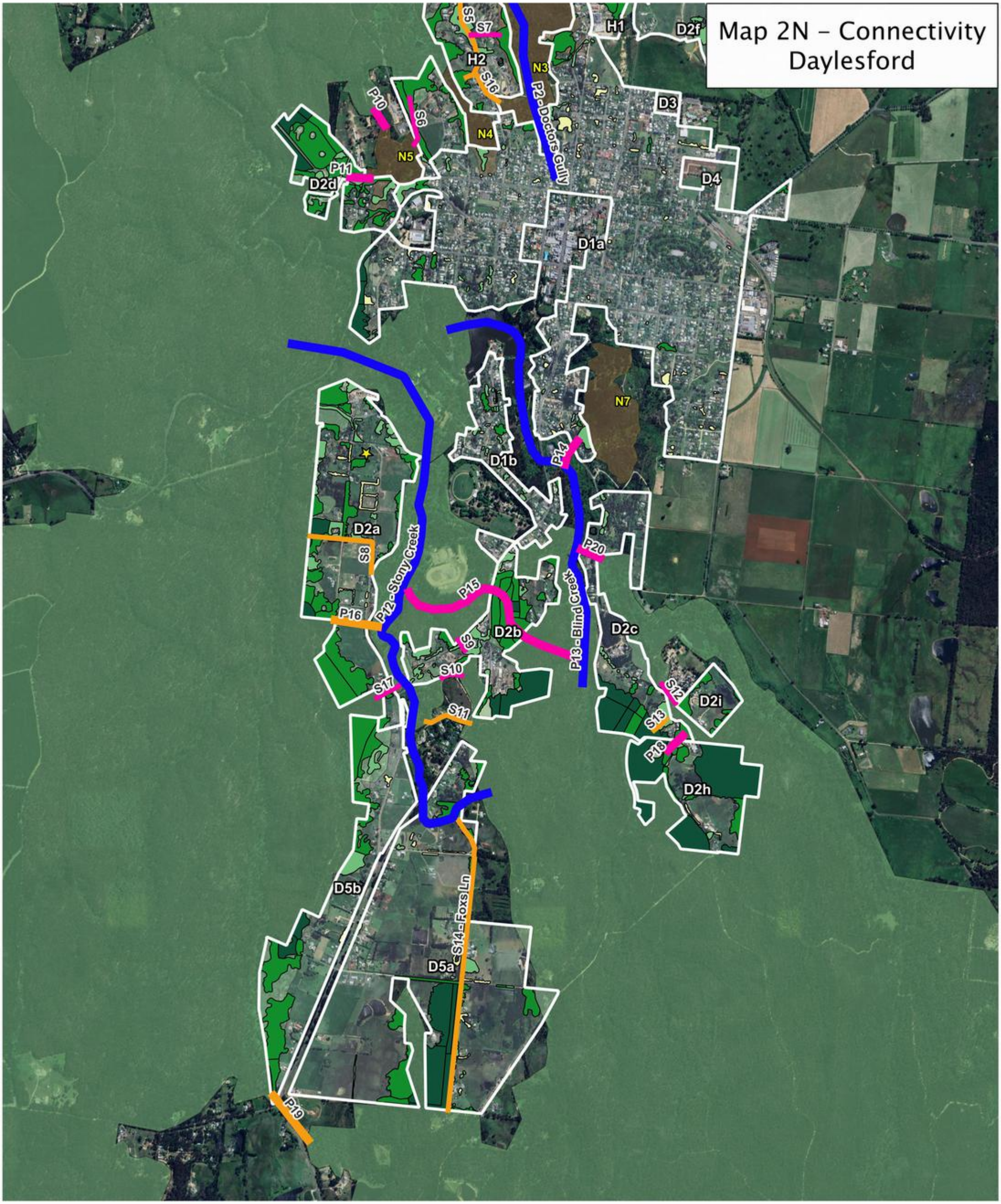
Hepburn 4 Township Structure Plans

Daylesford - Hepburn

0 330 660 m

Scale: 1:32,000 (Page size A3)

Map 2N – Connectivity Daylesford



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Legend

Mapped EVC Quality
- High
- Medium
- Low
- Planted Native Vegetation

Core and Node Areas
- Core
- Node

Priority Corridors
- Creek Corridor
- Land Corridor
- Road Corridor

Secondary Corridors
- Land Corridor
- Road Corridor

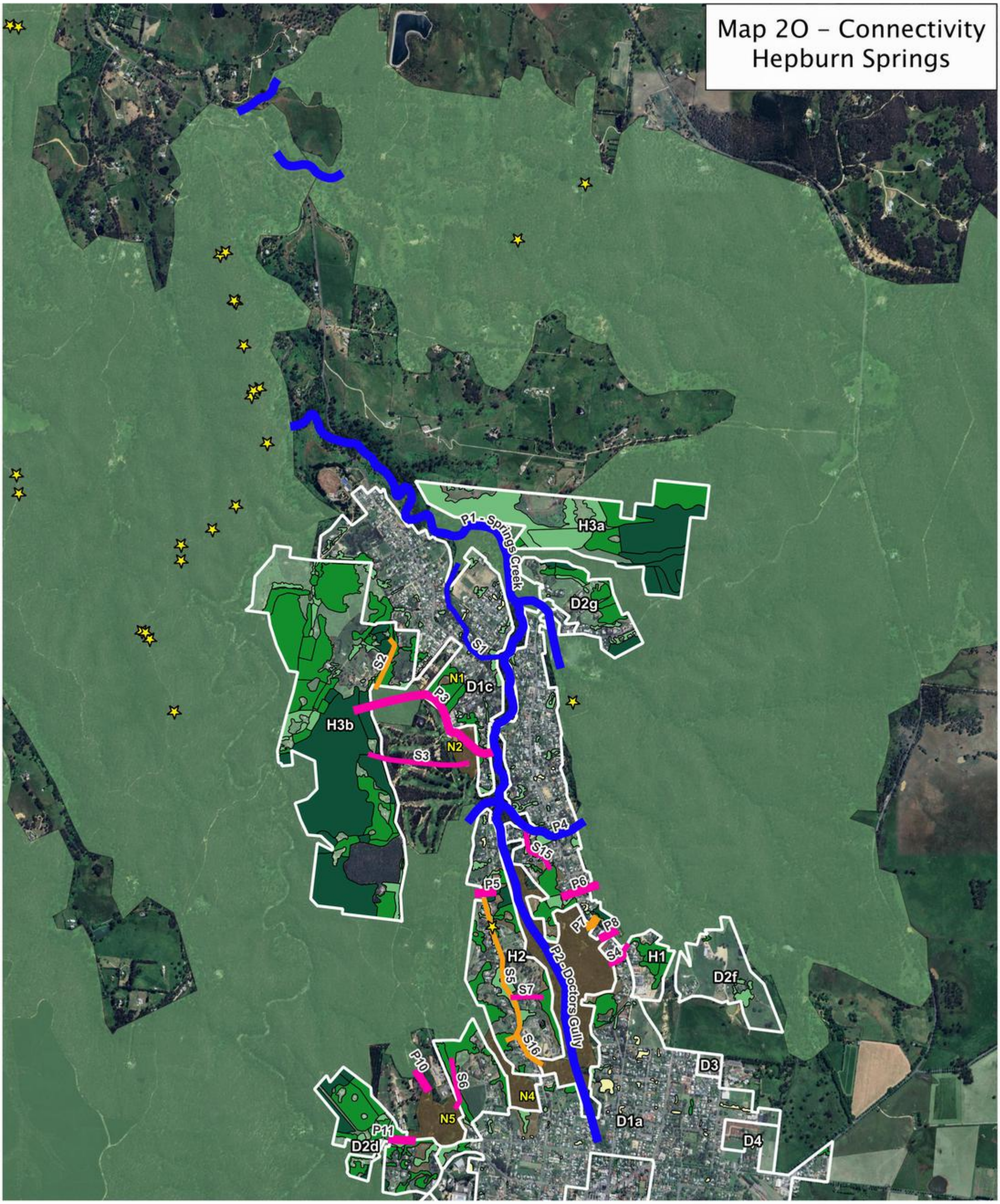
Details

Date: 02 November 2023
Created by:Kallista Sears
Aerial Photography from Google Satellite
Base map data Copyright State of Victoria

0 0.5 1 km

(Page size A3)

Map 20 – Connectivity Hepburn Springs



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Legend

VBA Records
- Brush-tailed Phascogale

Mapped EVC Quality
- High
- Medium
- Low
- Planted Native Vegetation

Core and Nodes
- Core
- Node

Priority Corridors
- Creek Corridor
- Land Corridor
- Road Corridor

Secondary Corridors
- Creek Corridor
- Land Corridor
- Road Corridor

Details

Date: 02 November 2023
Created by:Kallista Sears
Aerial Photography from Google Satellite
Base map data Copyright State of Victoria

0 0.5 1 km

Scale 1:1 (Page size A3)



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Legend

- Investigation Areas
- Natural watercourse

Details

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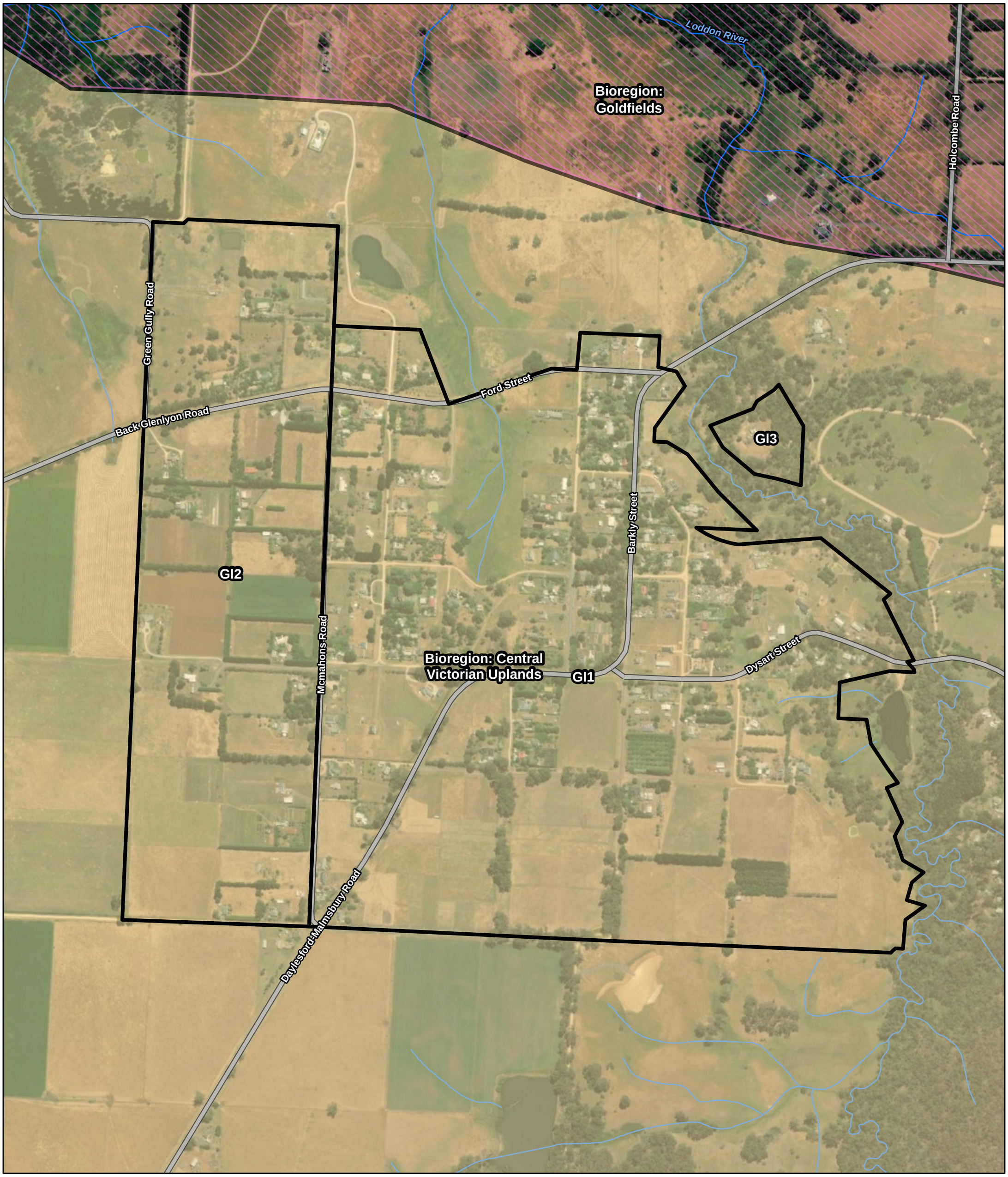
Map 3A. Investigation Areas

Hepburn 4 Township Structure Plans

Glenlyon

0 80 160 m

Scale: 1:8,000 (Page size A3)



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Legend

- Investigation Areas
- Natural watercourse

Bioregion

- Central Victorian Uplands
- Goldfields

Details

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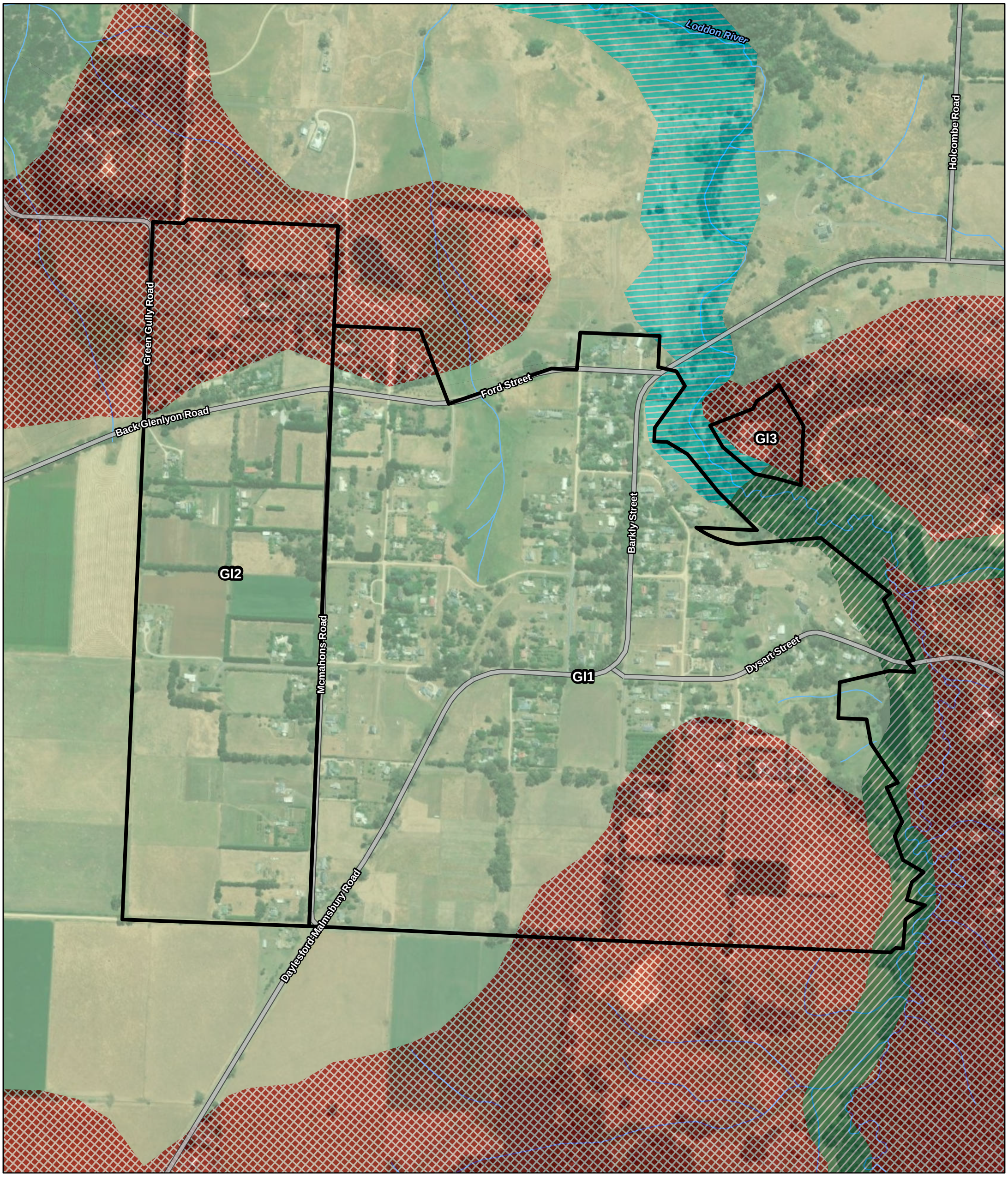
Map 3B. Bioregions

Hepburn 4 Township Structure Plans

Glenlyon

0 80 160 m

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Legend

- Investigation Areas
- Natural watercourse

Pre 1750 Ecological Vegetation Classes

- 198 Sedgy Riparian Woodland
- 23 Herb-rich Foothill Forest
- 55 Plains Grassy Woodland
- 851 Stream Bank Shrubland

Details

Mapping by: Ali Nia
Date: 7/27/2023
Version: 1
Aerial photography from Esri World Imagery.
Data Source: Base layers courtesy of VicMap,
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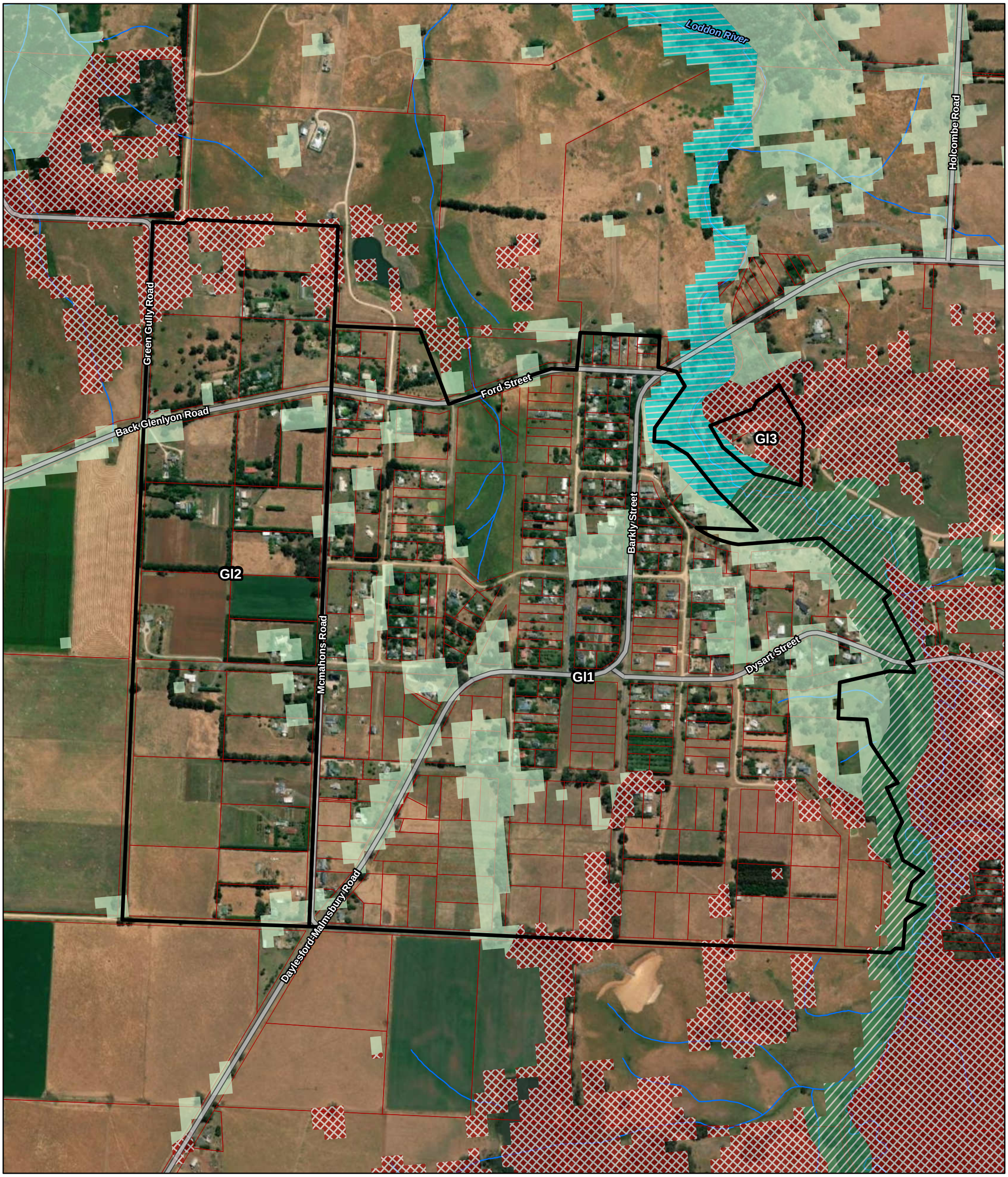
Map 3C. Modelled pre-1750 EVCs (Data from DEECA)

Hepburn 4 Township Structure Plans

Glenlyon

0 80 160 m

Scale: 1:8,000 (Page size A3)



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Legend

- Parcels
- Natural watercourse

2005 Ecological Vegetation Classes

- 198 Sedgy Riparian Woodland
- 23 Herb-rich Foothill Forest
- 55 Plains Grassy Woodland
- 851 Stream Bank Shrubland

Details

Mapping by: Ali Nia
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Map 3D. Modelled 2005 EVCs (Data from DEECA)

Hepburn 4 Township Structure Plans

Glenlyon

0 80 160 m

Scale: 1:8,000 (Page size A3)



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Legend

- Investigation Areas
- Natural watercourse
- Waterbodies

Details

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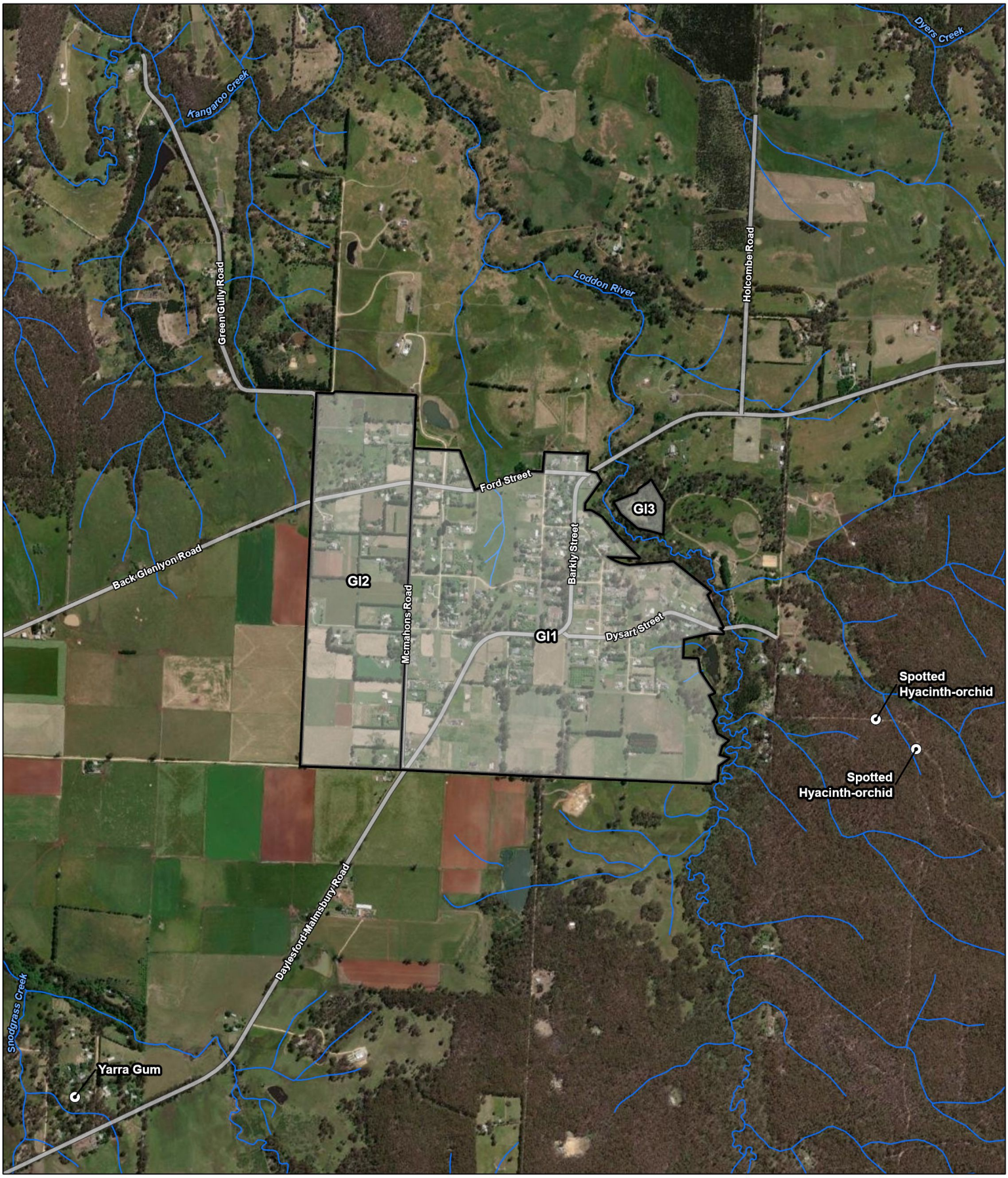
Map 3E. Waterways and Waterbodies

Hepburn 4 Township Structure Plans

Glenlyon

0 80 160 m

Scale: 1:8,000 (Page size A3)



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Legend

- Investigation Areas
- Natural watercourse
- Victorian Biodiversity Atlas Flora records

Details

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Data Source: Base layers courtesy of VicMap,
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Map 3F. Listed Flora

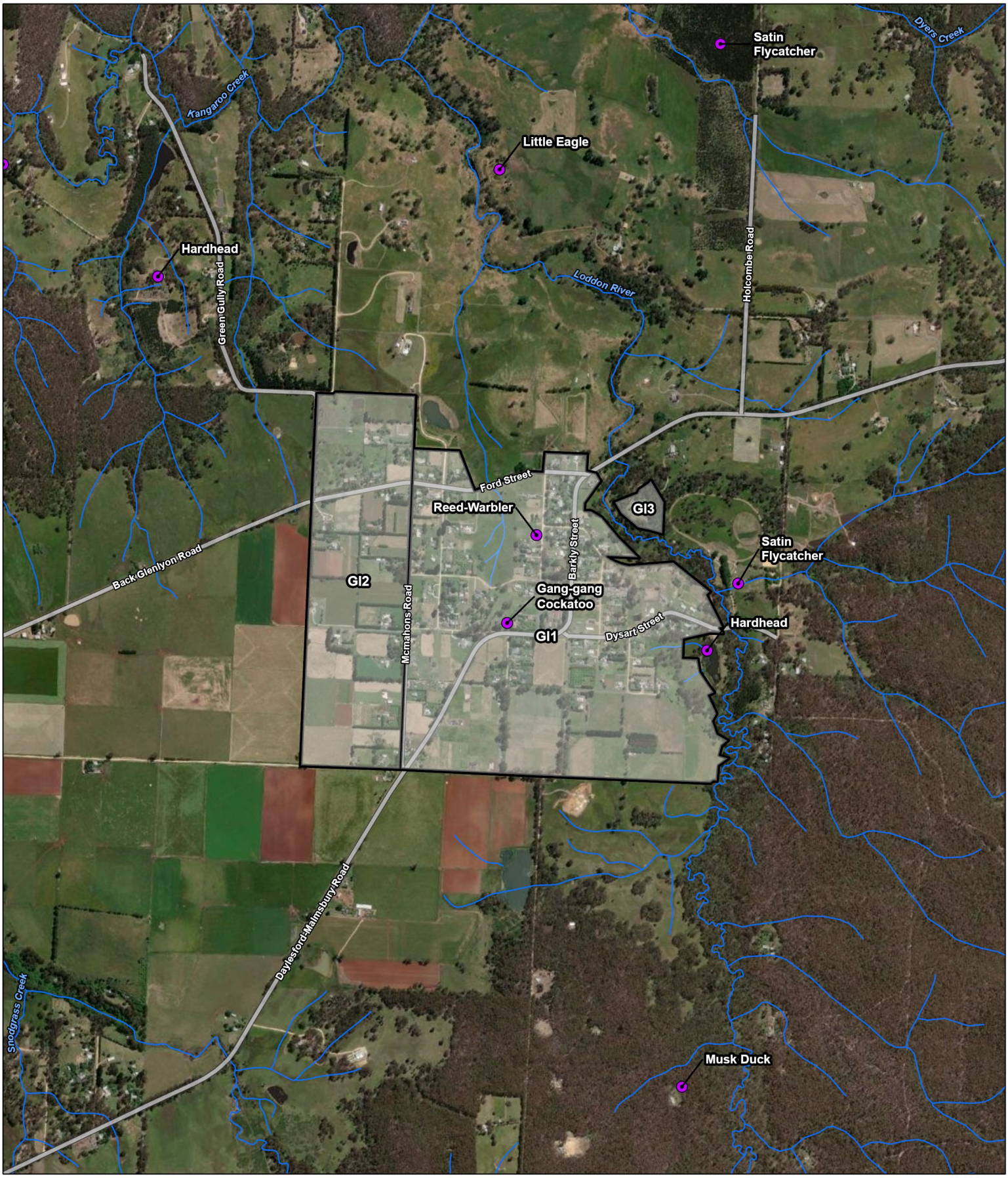
Hepburn 4 Township Structure Plans

Glenlyon

N

0 150 300 m

Scale: 1:15,000 (Page size A3)



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Legend

- Investigation Areas
- Natural watercourse
- Victorian Biodiversity Atlas Fauna records

Details

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Map 3G. Listed Fauna

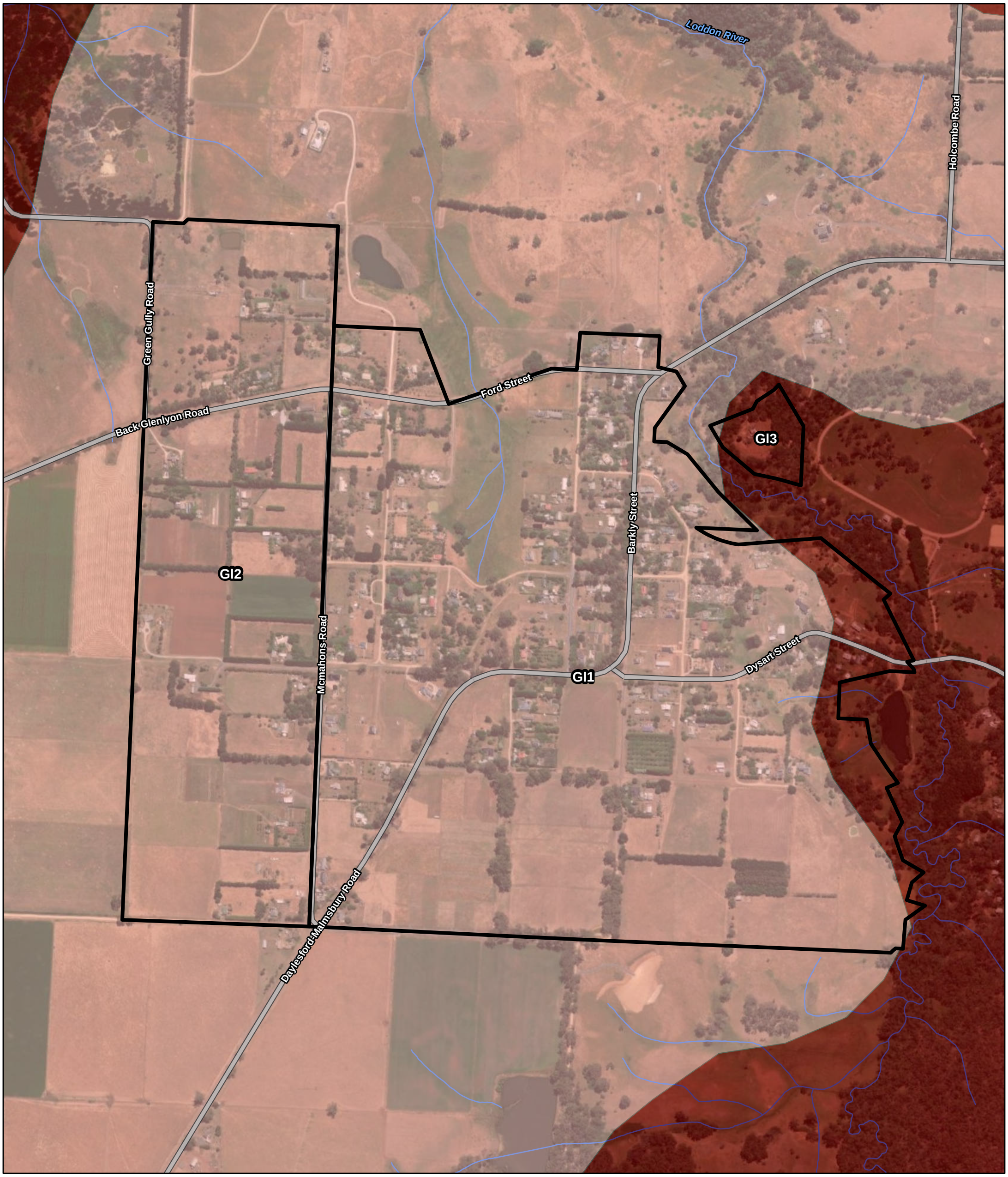
Hepburn 4 Township Structure Plans

Glenlyon

N

0 150 300 m

Scale: 1:15,000 (Page size A3)



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Legend

- Investigation Areas
- Natural watercourse

Soil Erosion Susceptibility

- Low
- Moderate
- High
- Very High

Note: data taken from DEECA's Geomorphology of Victoria database

Details

Mapping by: Ali Nia
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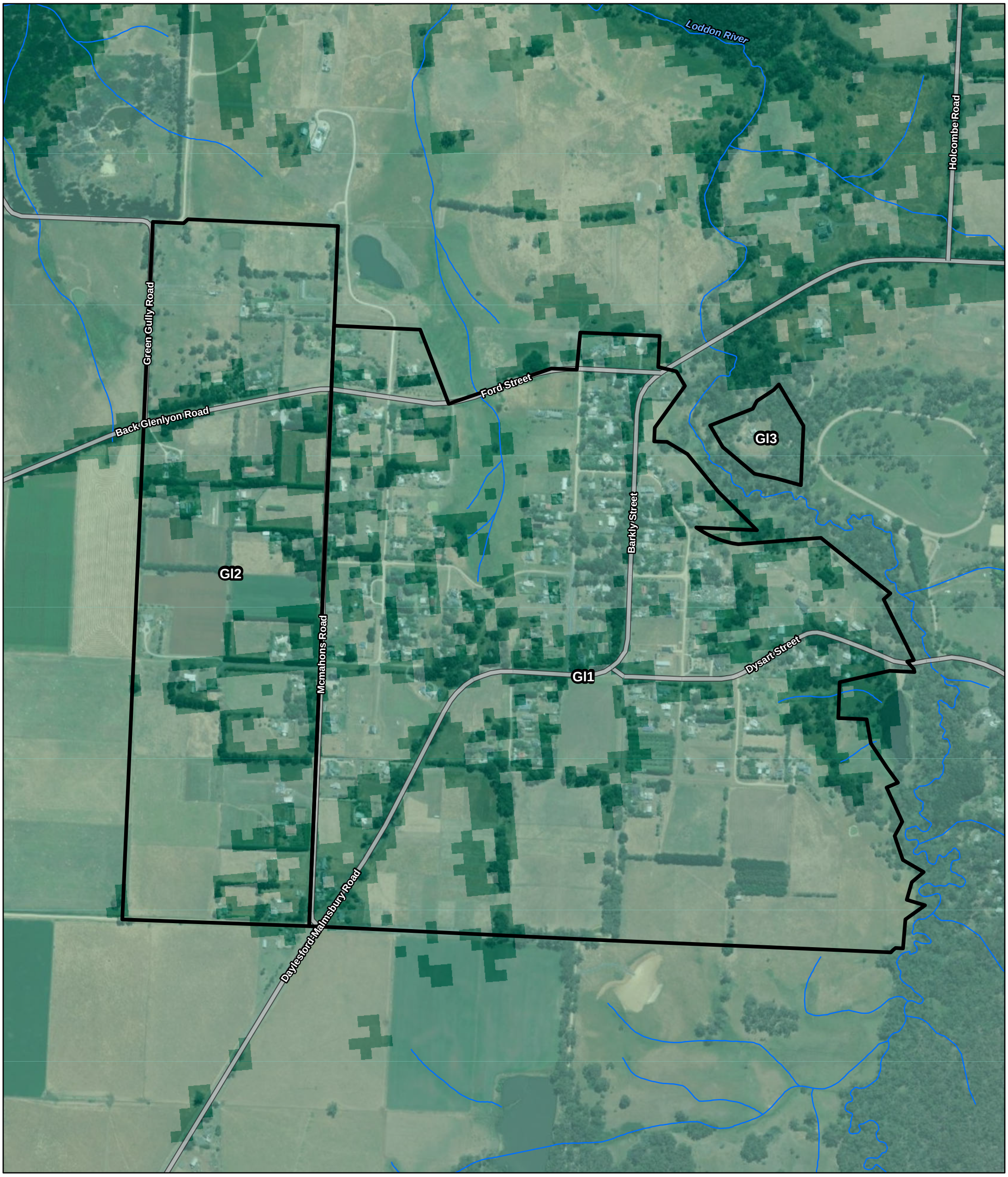
Map 3H. Soil Erosion Susceptibility - Surface Runoff

Hepburn 4 Township Structure Plans

Glenlyon

0 80 160 m

Scale: 1:8,000 (Page size A3)



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Legend

Investigation Areas

Natural watercourse

Location category

Location 1

Location 2

Details

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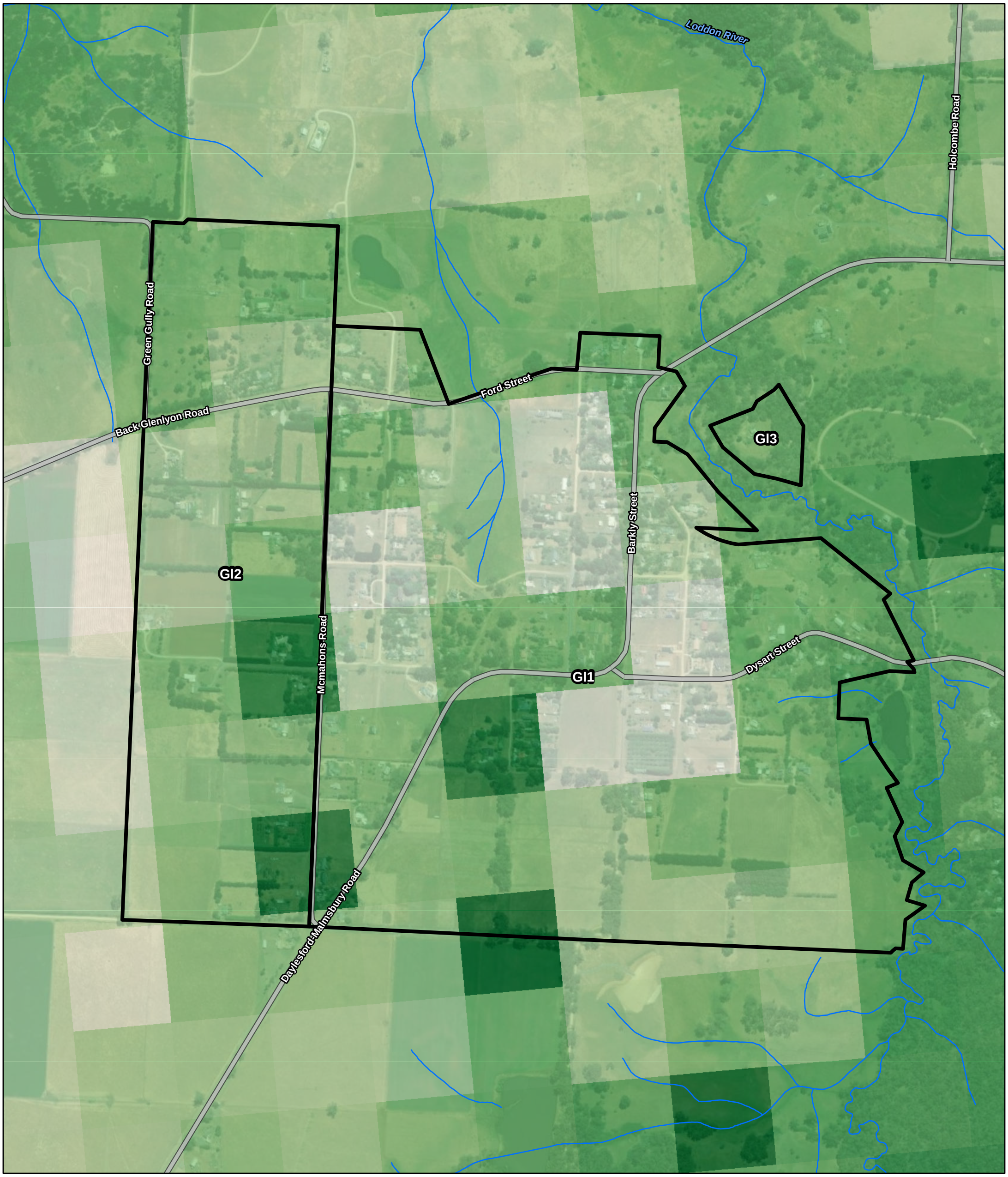
Map 3I. Location Categories

Hepburn 4 Township Structure Plans

Glenlyon

0 80 160 m

Scale: 1:8,000 (Page size A3)



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Legend

Investigation Areas

Natural watercourse

Strategic Biodiversity Values (SBV)

100

1

Details

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Map 3J. Strategic Biodiversity Values

Hepburn 4 Township Structure Plans

Glenlyon

0 80 160 m

Scale: 1:8,000 (Page size A3)

GI3

GI2

GI1

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Legend

- Investigation Areas
- Scattered Trees

EVCs

- Hills Herb-rich Woodland
- Herb-rich Foothill Forest
- Plains Grassy Woodland
- Riparian Forest
- Planted Native Vegetation

Details

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Map 3K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Glenlyon

0 75 150 m

Scale: 1:7,000 (Page size A3)

Unnamed
Boddy Road
Green Gully Road
Back Glenlyon Road
Ford Street
Adcock Road
Mcmahons Road
Church Street
GI2
GI1
Molesworth Street
Fleischer Lane

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Legend

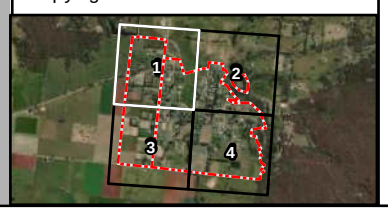
- Investigation Areas
- Scattered Trees

EVCs

- Herb-rich Foothill Forest
- Plains Grassy Woodland
- Planted Native Vegetation

Details

Mapping by: Ali Nia
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Version: 1
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Map 3K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Glenlyon

0 30 60 m

Scale: 1:3,500 (Page size A3)

Unnamed
Ford Street
GI3
Mostyn Street
Barkly Street
GI1
Eldon Street
Morton Street
Molesworth Street

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Legend

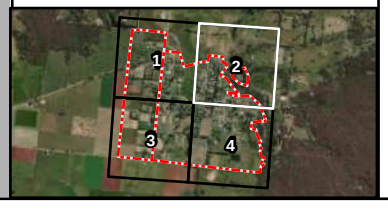
- Investigation Areas
- Scattered Trees

EVCs

- Hills Herb-rich Woodland
- Herb-rich Foothill Forest
- Plains Grassy Woodland
- Riparian Forest
- Planted Native Vegetation

Details

Mapping by: Ali Nia
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Version: 1
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Map 3K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Glenlyon

0 30 60 m

Scale: 1:3,500 (Page size A3)

Molesworth Street
Church Street
Fleischer Lane
Dysart Lane
Dysart Street
GI2
GI1
Mcmahons Road
Collins Road
Dayles ford-Malmsbury Road
Spring Street
Unnamed
Goochs Lane

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Legend

Investigation Areas

Scattered Trees

EVCs

Plains Grassy Woodland

Planted Native Vegetation

Details

Mapping by: Ali Nia

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Version: 1

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Map 3K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Glenlyon

0 30 60 m

Scale: 1:3,500 (Page size A3)

Molesworth Street
Eldon Street
Morton Street
Dysart Street
Regans Lane
GI1
Collins Road
Barkly Street

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Legend

- Investigation Areas
- Scattered Trees

EVCs

- Herb-rich Foothill Forest
- Plains Grassy Woodland
- Riparian Forest
- Planted Native Vegetation

Details

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Map 3K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Glenlyon

0 30 60 m

Scale: 1:3,500 (Page size A3)

GI3

GI2

GI1

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Legend

- Investigation Areas
- Scattered Trees

Quality

- Low Quality
- Moderate Quality
- Indicative-Moderate Quality
- Indicative-Low Quality
- Planted Native Vegetation
- Public Lands

Details

Mapping by: Ali Nia

Date: 11/3/2023

Version: 1

Aerial photography from Nearmap (Dec. 2022).

Data Source: Base layers courtesy of VicMap, Copyright © State of Victoria.

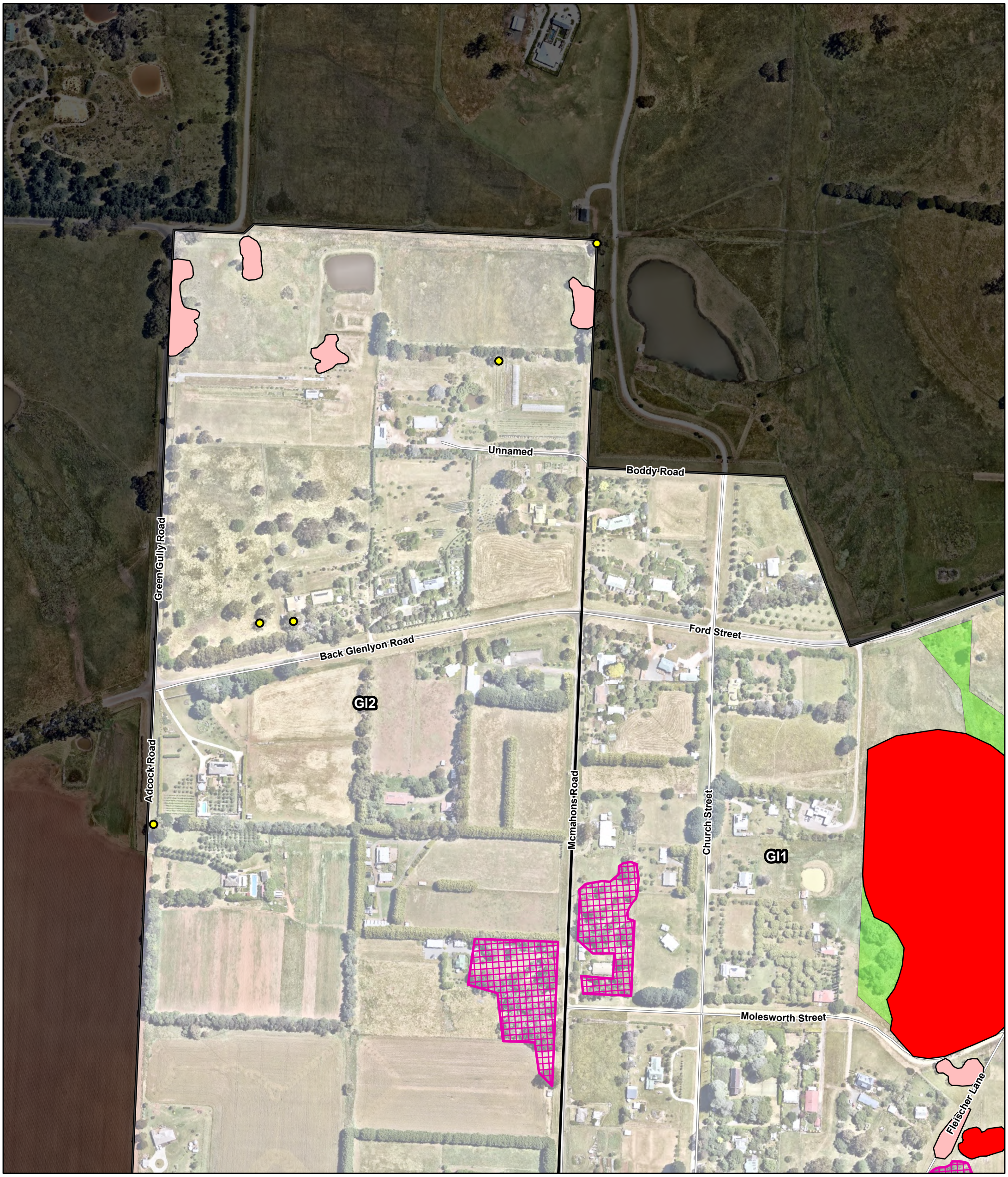
Map 3L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Glenlyon

0 75 150 m

Scale: 1:7,000 (Page size A3)



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Legend

- Investigation Areas
- Scattered Trees
- Public Lands

Quality

- Low Quality
- Moderate Quality
- Planted Native Vegetation

Details

Mapping by: Ali Nia

Date: 3/11/2023

Version: 1

Aerial photography from Nearmap (Dec. 2022).

Data Source: Base layers courtesy of VicMap, Copyright © State of Victoria.



Map 3L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Glenlyon

N

0 30 60m

Scale: 1:3,500 (Page size A3)

Unnamed
Ford Street
GI3
Mostyn Street
Barkly Street
GI1
Eldon Street
Morton Street
Molesworth Street

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Legend

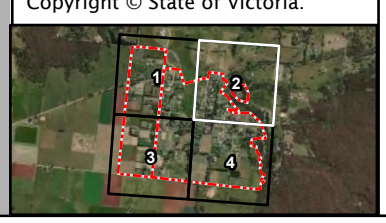
- Investigation Areas
- Scattered Trees
- Public Lands

Quality

- Low Quality
- Moderate Quality
- Planted Native Vegetation

Details

Mapping by: Ali Nia
Date: 3/11/2023
Version: 1
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Map 3L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Glenlyon

N

0 30 60m

Scale: 1:3,500 (Page size A3)

Molesworth Street
Church Street
Fleischer Lane
Dysart Lane
Dysart Street
GI2
GI1
Collins Road
Mcmahons Road
Daylesford-Malmsbury Road
Spring Street
Unnamed
Goochs Lane

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Legend

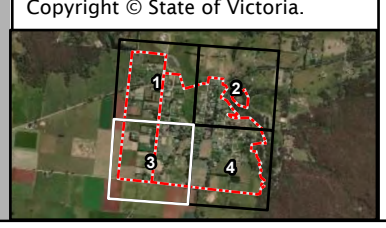
- Investigation Areas
- Scattered Trees
- Public Lands

Quality

- Low Quality
- Moderate Quality
- Planted Native Vegetation

Details

Mapping by: Ali Nia
Date: 3/11/2023
Version: 1
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Map 3L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Glenlyon

N

0 30 60 m

Scale: 1:3,500 (Page size A3)

Molesworth Street
Eldon Street
Morton Street
Dysart Street
Regans Lane
GI1
Collins Road
Barkly Street

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Legend

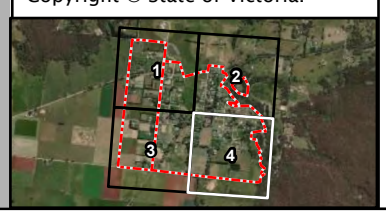
- Investigation Areas
- Scattered Trees
- Public Lands

Quality

- Low Quality
- Moderate Quality
- Indicative-Moderate Quality
- Indicative-Low Quality
- Planted Native Vegetation

Details

Mapping by: Ali Nia
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Map 3L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Glenlyon

N

0 30 60 m

Scale: 1:3,500 (Page size A3)



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Legend

- Investigation Areas
- Natural watercourse
- Spring Locations
- Ground Water Dependent Ecosystems

Details

Mapping by: Ali Nia
Date: 11/3/2023
Version: 1
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Map 3m. Ground Water Dependent Ecosystems and Spring Locations

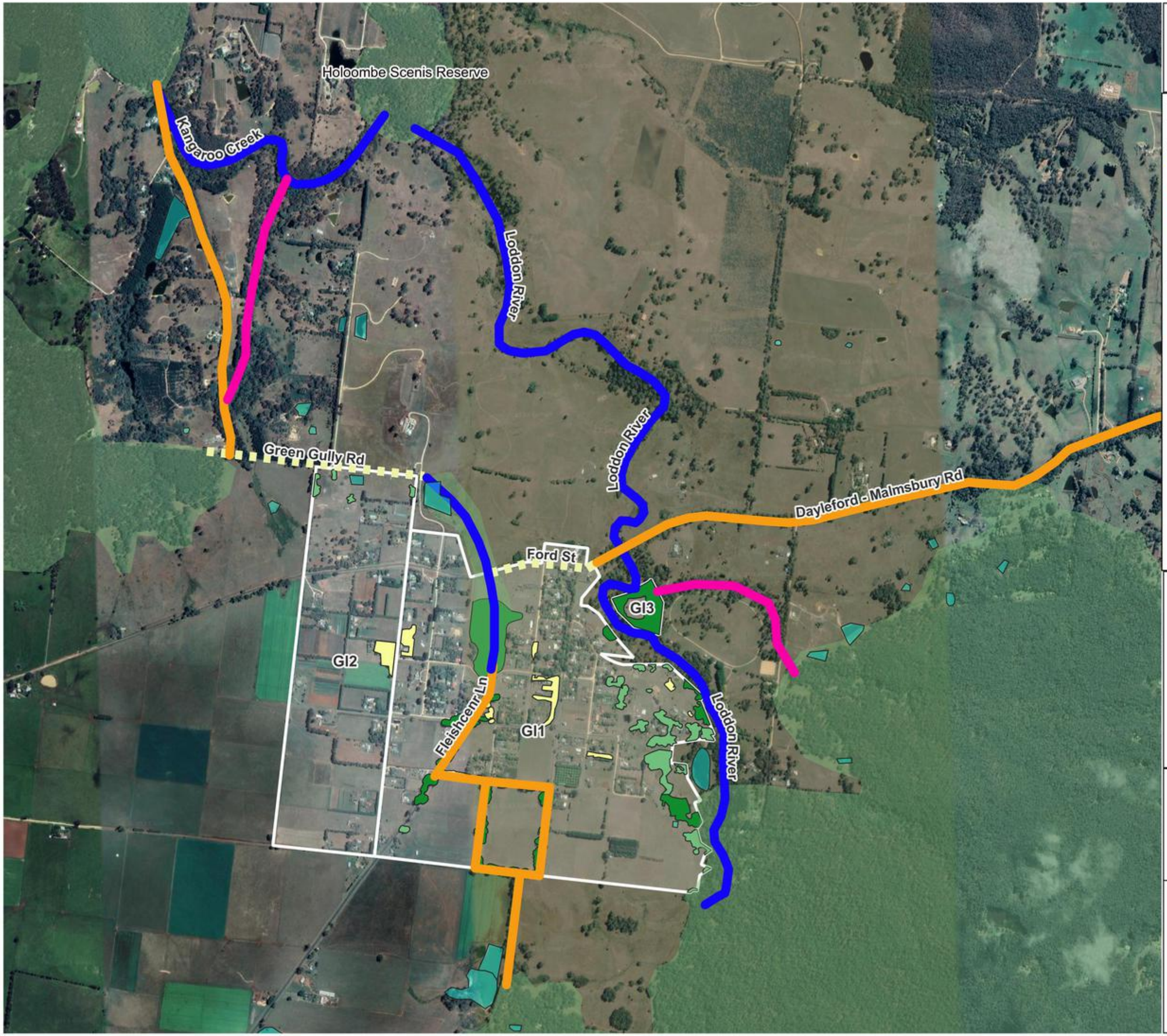
Hepburn 4 Township Structure Plans

Glenlyon

0 80 160 m

Scale: 1:8,000 (Page size A3)

Map 3N – Connectivity Glenlyon



Legend

Corridors
- Creek Corridor
- Land Corridor
- Road Corridor
- Potential
- Core Areas

Mapped EVCs - Quality
- Medium
- Low
- Planted Native Vegetation

Details

Date: 02 November 2023
Created by:Kallista Sears
Aerial Photography from Google Satellite
Base map data Copyright State of Victoria

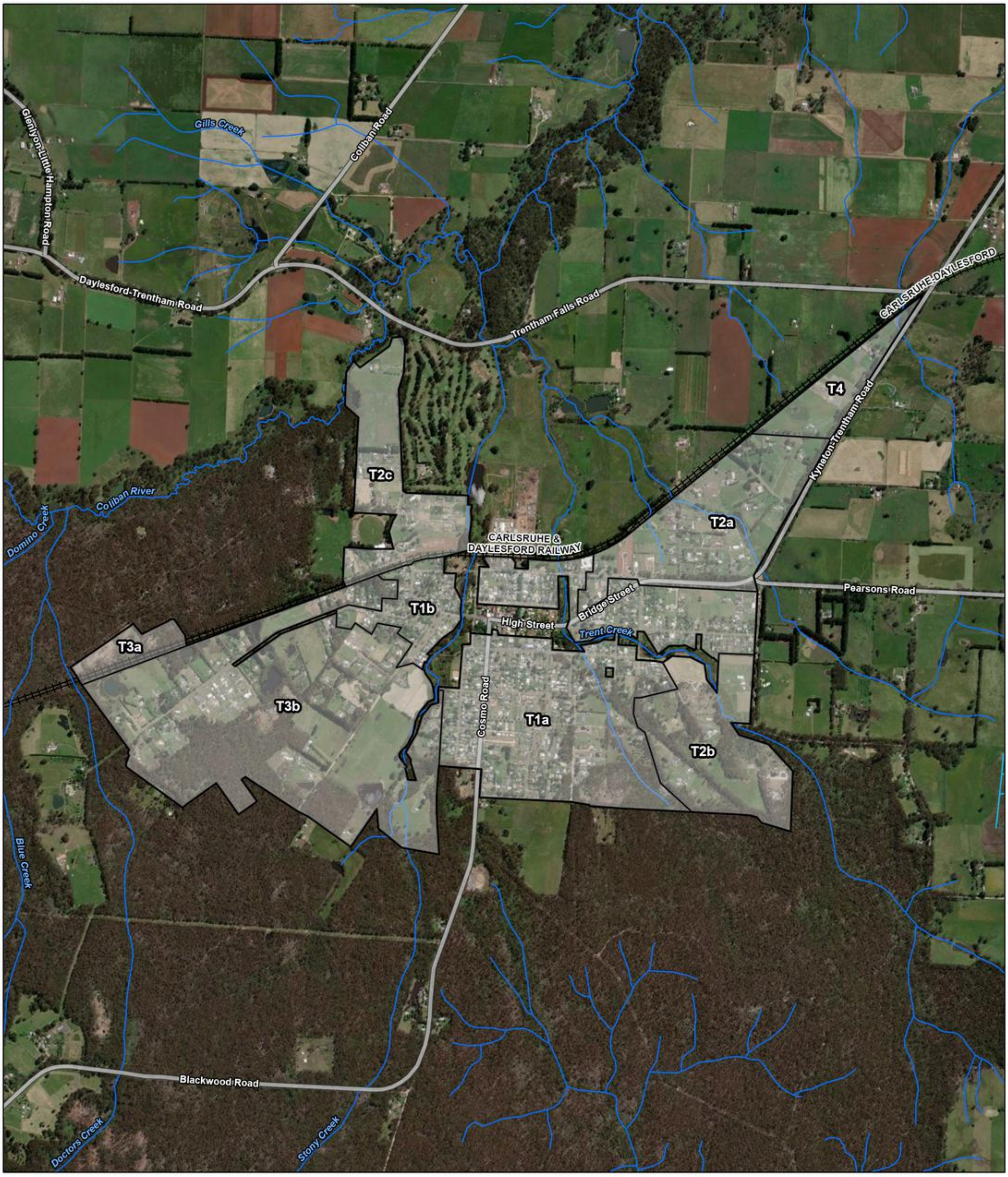
0 0.5 1 km

(Page size A3)

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Legend

- Investigation Areas
- Constructed watercourse
- Natural watercourse
- Railways

Details

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Data Source: Base layers courtesy of VicMap,
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Map 4a. Investigation Areas

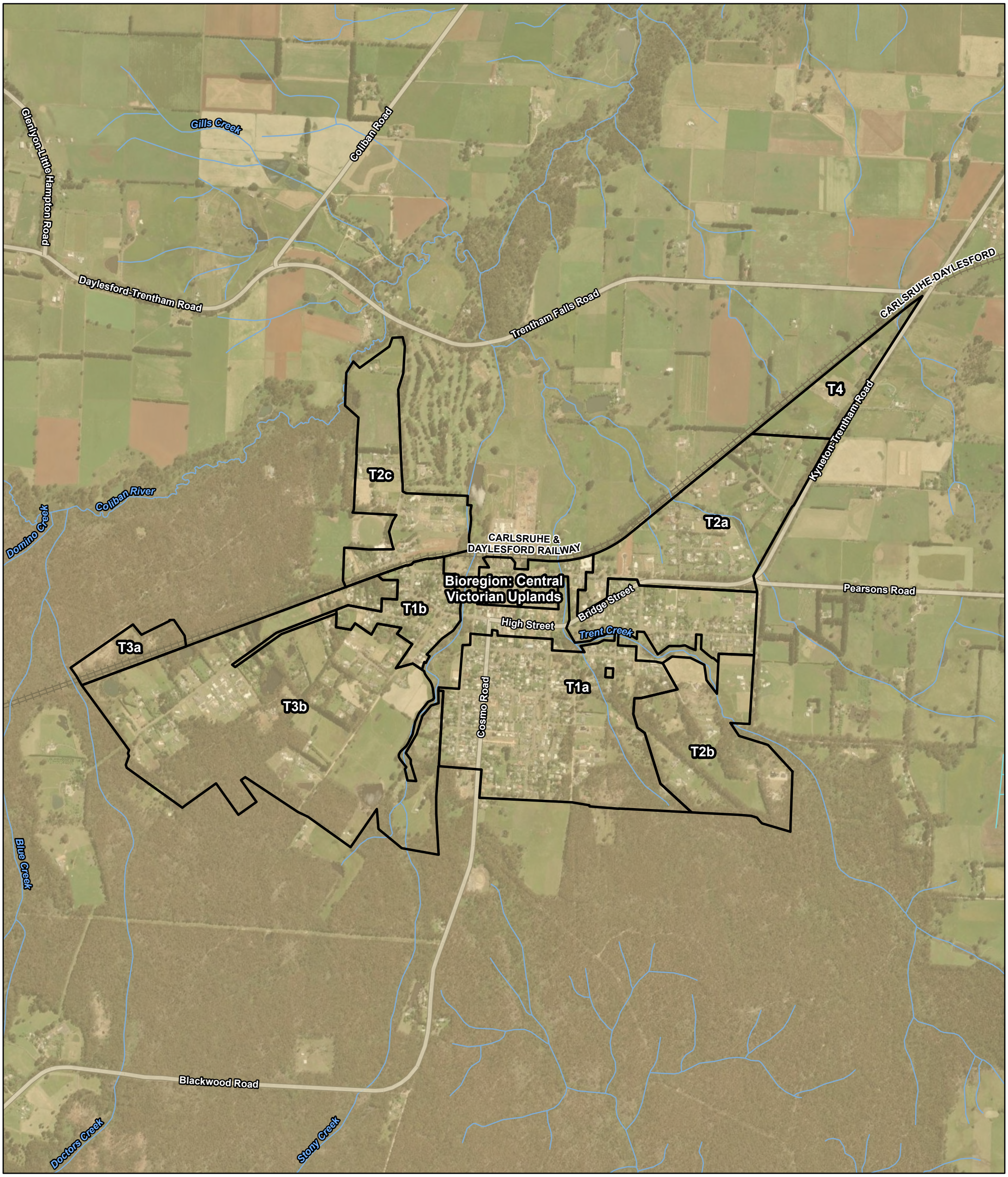
Hepburn 4 Township Structure Plans

Trentham

N

0 190 380m

Scale: 1:19,000 (Page size A3)



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Legend

- Investigation Areas
- Constructed watercourse
- Natural watercourse
- Railways

BIOREGNO

- Central Victorian Uplands

Details

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Map 4B. Bioregions

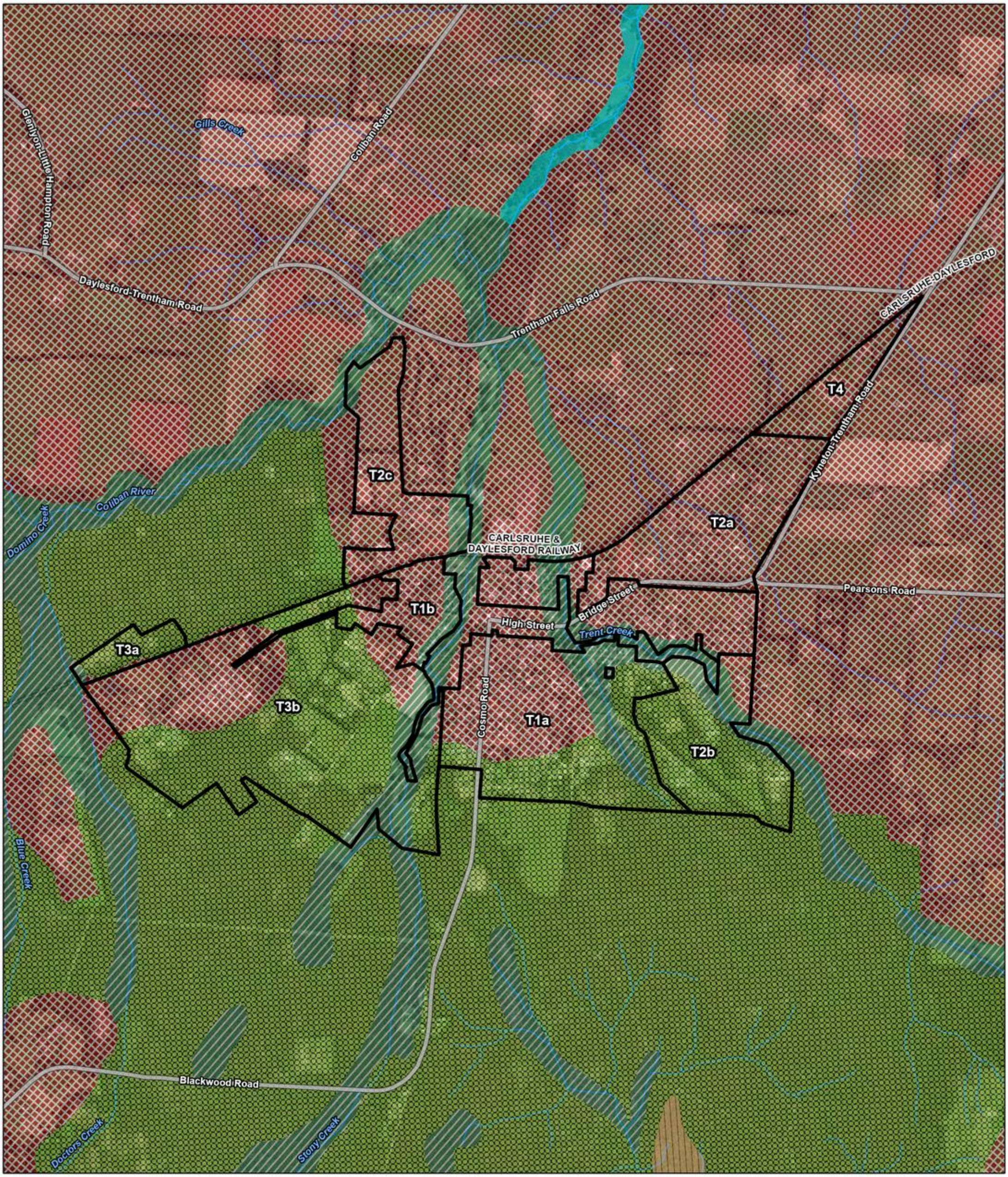
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Trentham

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Legend

- Investigation Areas
- Constructed watercourse
- Natural watercourse
- Railways

Pre 1750 Ecological Vegetation Classes

- 18 Riparian Forest
- 198 Sedgy Riparian Woodland
- 20 Heathy Dry Forest
- 23 Herb-rich Foothill Forest
- 45 Shrubby Foothill Forest

Details

Mapping by: Ali Nia
Date: 7/21/2023
Version: 1
Aerial photography from Esri World Imagery.
Data Source: Base layers courtesy of VicMap,
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Map 4c. Modelled pre-1750 EVCs (Data from DEECA)

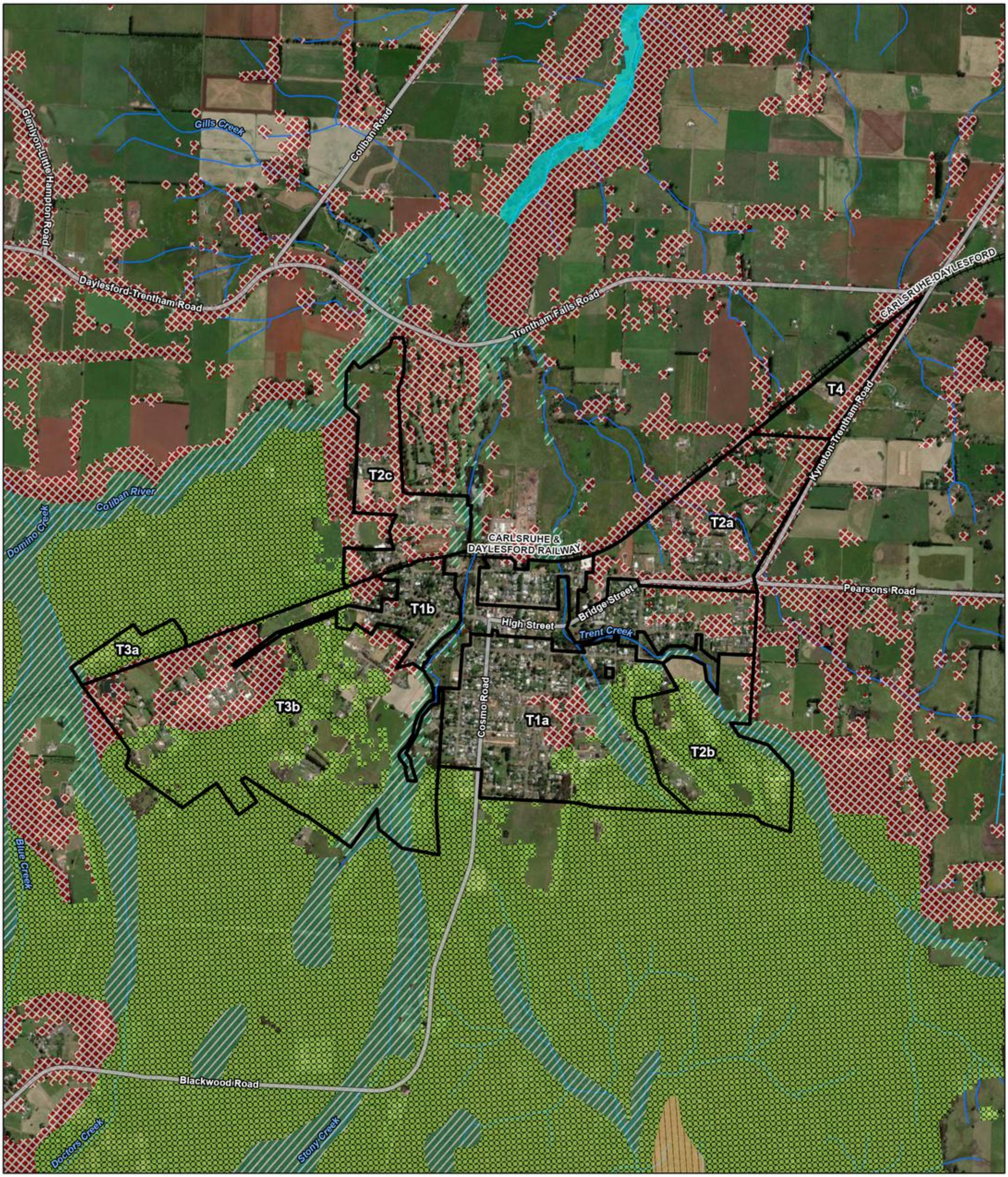
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Trentham

N

0 190 380m

Scale: 1:19,000 (Page size A3)



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Legend

- Investigation Areas
- Constructed watercourse
- Natural watercourse
- Railways

2005 Ecological Vegetation Classes

- 18 Riparian Forest
- 198 Sedgy Riparian Woodland
- 20 Heathy Dry Forest
- 23 Herb-rich Foothill Forest
- 45 Shrubby Foothill Forest

Details

Mapping by: Ali Nia
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Map 4d. Modelled 2005 EVCs (Data from DEECA)

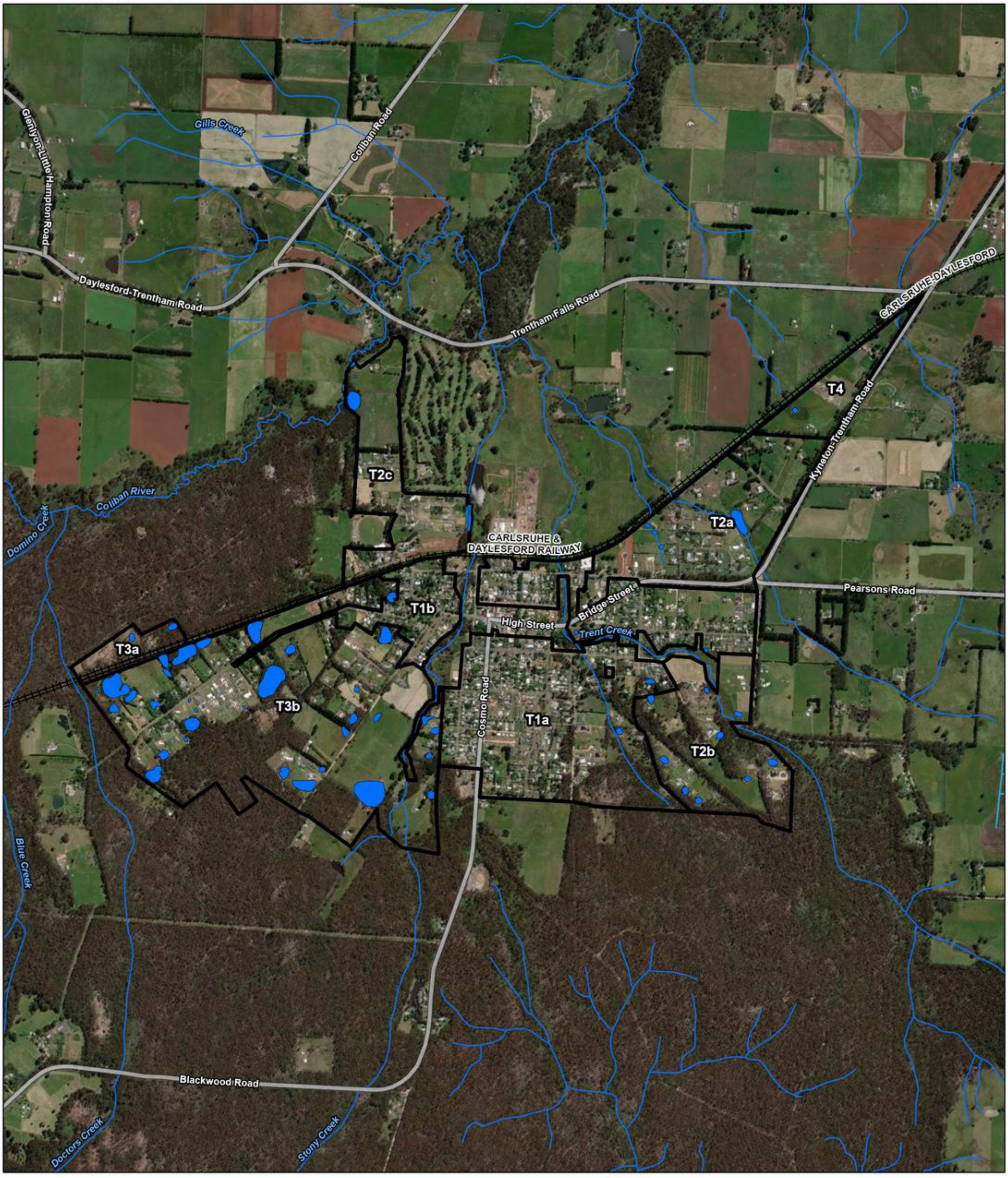
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N

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Legend

- Investigation Areas
- Constructed watercourse
- Natural watercourse
- Railways
- Waterbodies

Details

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Date: 7/21/2023
Version: 1
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Map 4e. Waterways and Waterbodies

Hepburn 4 Township Structure Plans

Trentham

N

0 190 380m

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Legend

- Investigation Areas
- Constructed watercourse
- Natural watercourse
- Railways
- Victorian Biodiversity Atlas Flora records
- Collected Significant Flora

Details

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Version: 1
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Map 4f. Listed Flora

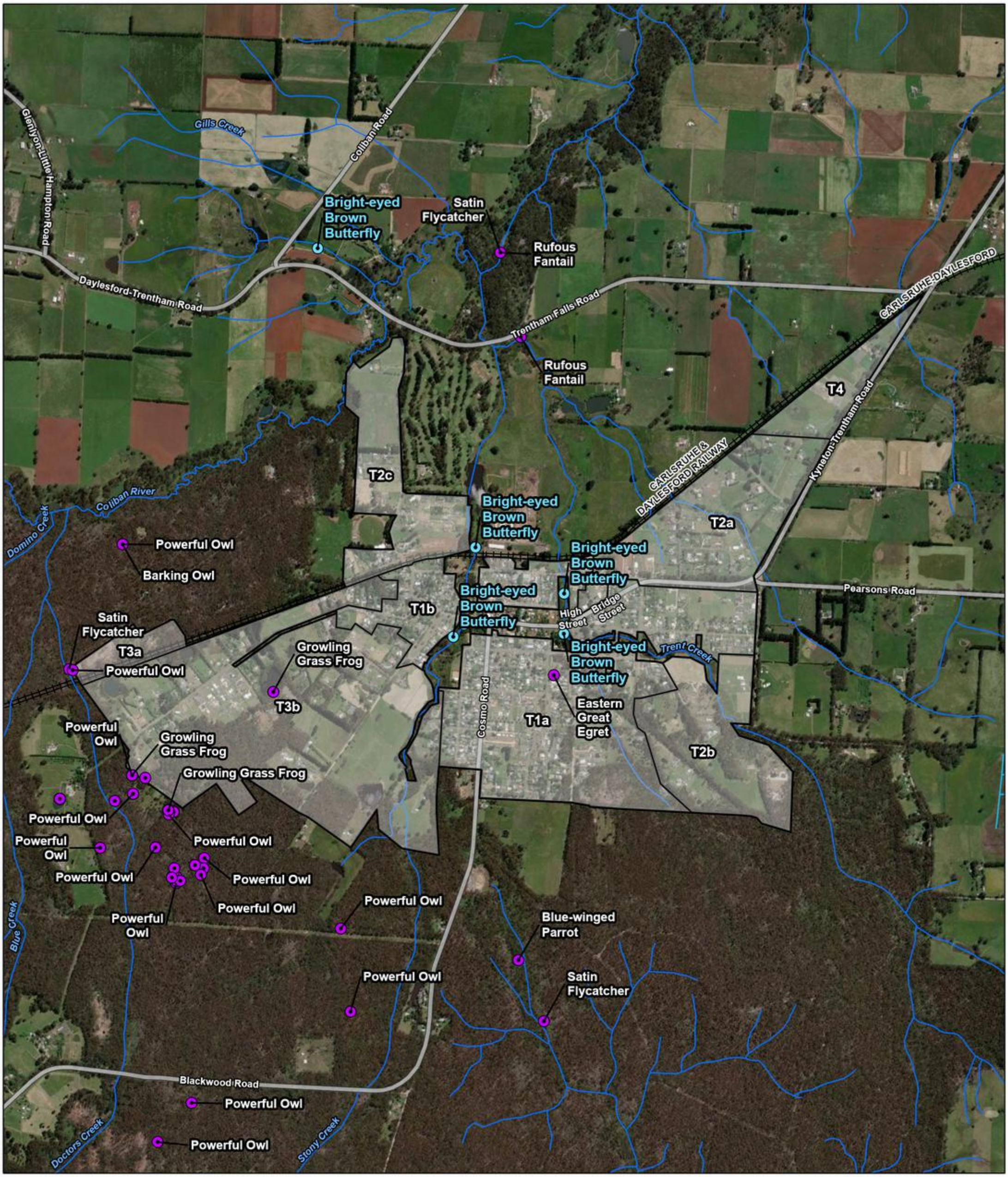
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Trentham

N

0 190 380m

Scale: 1:19,000 (Page size A3)



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Legend

- Investigation Areas
- Constructed watercourse
- Natural watercourse
- Railways
- Victorian Biodiversity Atlas Fauna records
- Brighteyed Brown

Details

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Version: 1
Aerial photography from Esri World Imagery.
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Map 4g. Listed Fauna

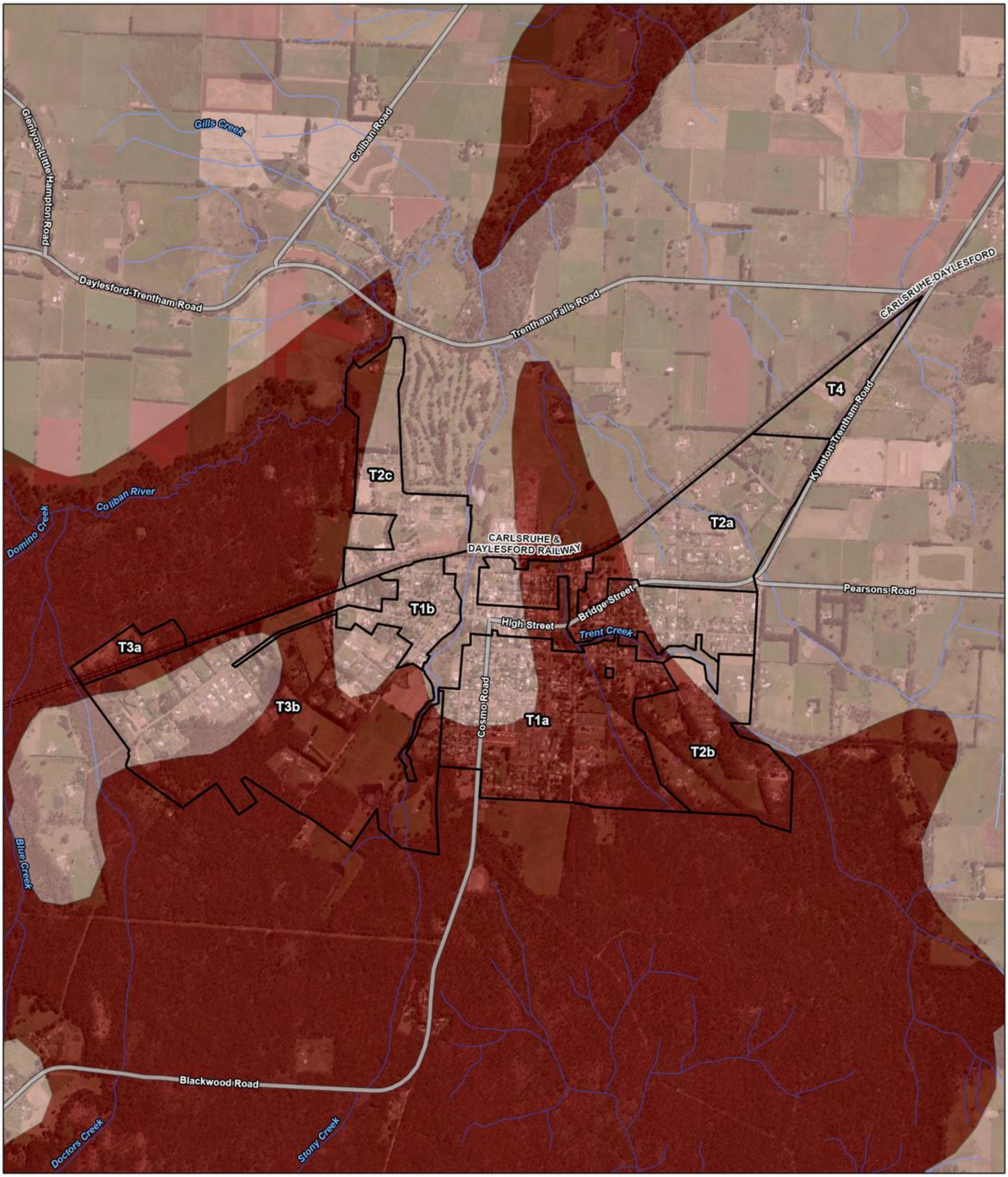
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Trentham

N

0 190 380m

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Legend

- Investigation Areas
- Constructed watercourse
- Natural watercourse
- Railways

Soil Erosion Susceptibility

- Low
- Moderate
- High
- Very High

Details

Mapping by: Ali Nia
Date: 7/21/2023
Version: 1
Aerial photography from Esri World Imagery.
Data Source: Base layers courtesy of VicMap,
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Map 4h. Soil Erosion Susceptibility – Surface Runoff

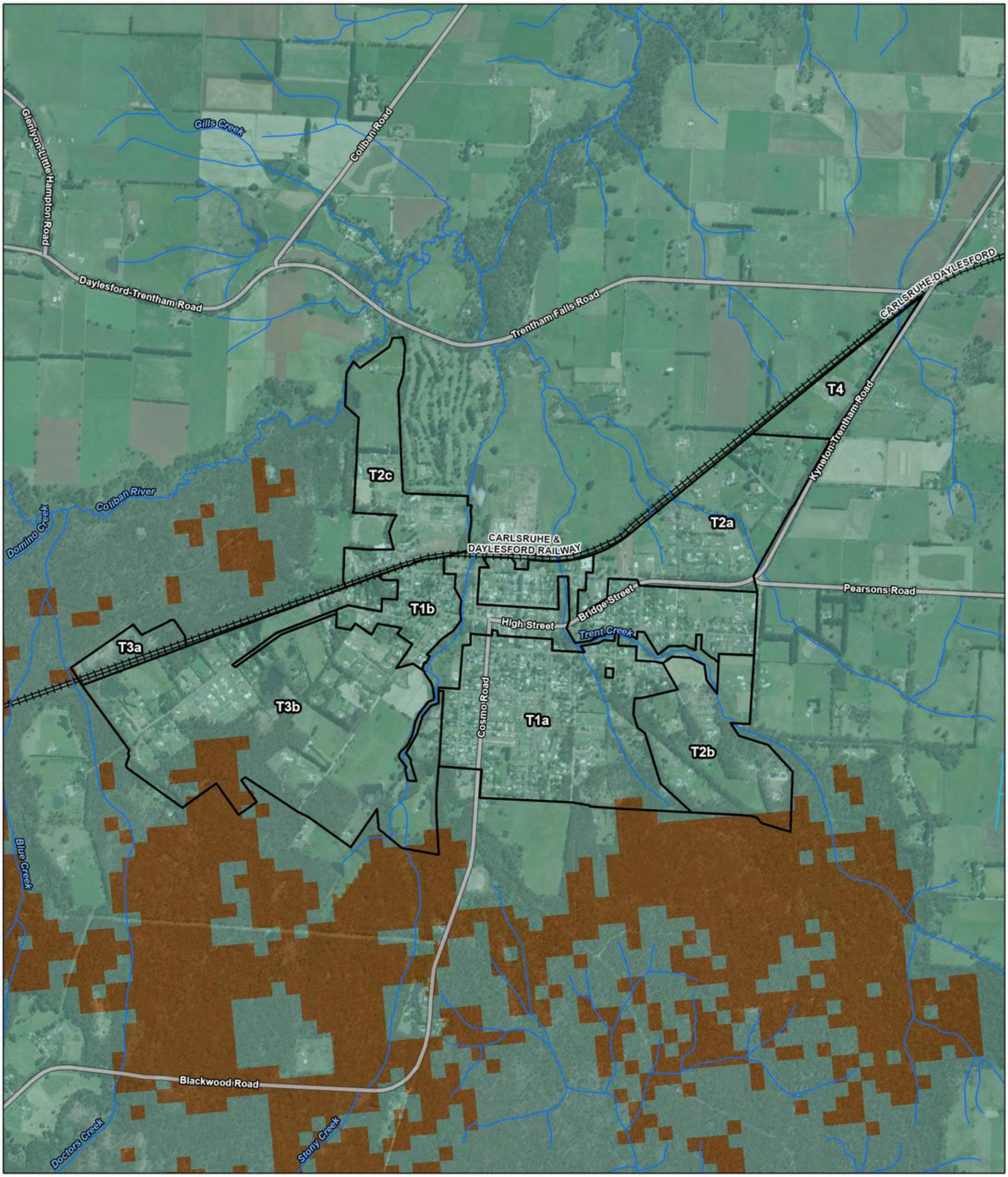
Hepburn 4 Township Structure Plans

Trentham

N

0 190 380 m

Scale: 1:19,000 (Page size A3)



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Legend

- Investigation Areas
- Constructed watercourse
- Natural watercourse
- Railways

Location category

- Location 1
- Location 3

Details

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Map 4i. Location Categories

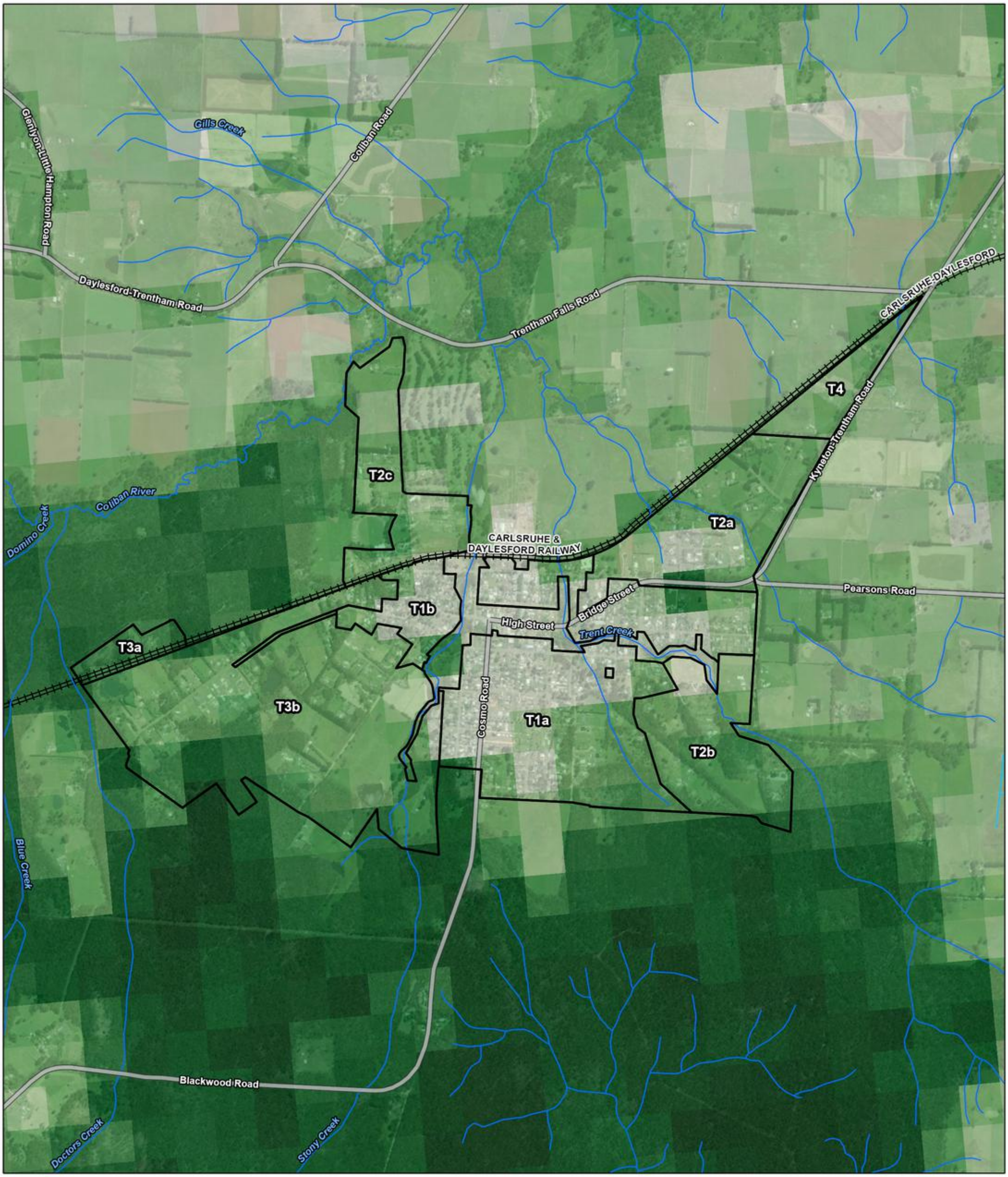
Hepburn 4 Township Structure Plans

Trentham

N

0 190 380 m

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Legend

- Investigation Areas
- Constructed watercourse
- Natural watercourse
- Railways

Strategic Biodiversity Values (SBV)

100

1

Details

Mapping by: Ali Nia
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Map 4j. Strategic Biodiversity Values

Hepburn 4 Township Structure Plans

Trentham

N

0 190 380 m

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Legend

- Investigation Areas
- Scattered Trees

EVCs

- Creekline Herbrich Woodland
- Herb-rich Foothill Forest
- Shrubby Foothill Forest
- Swampy Riparian Woodland
- Planted Native Vegetation

Details

Mapping by: Ali Nia
Date: 3/11/2023
Version: 1
Aerial photography from Esri World Imagery.
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Map 4K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Trentham

N

0 180 360 m

Scale: 1:18,000 (Page size A3)

Falls Road
Falls Rise
T2c
Horvaths Road
Mccashney Way
Victoria Street
T1b
T3b

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Legend

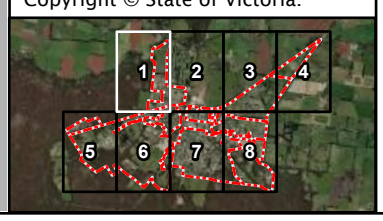
- Investigation Areas
- Scattered Trees

EVCs

- Herb-rich Foothill Forest
- Shrubby Foothill Forest
- Swampy Riparian Woodland
- Planted Native Vegetation

Details

Mapping by: Ali Nia
Date: 3/11/2023
Version: 1
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Map 4K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Trentham

N

0 50 100 m

Scale: 1:4,700 (Page size A3)

Falls Road
Falls Rise
T2c
Horvaths Road
Mccashney Way
T1b
T3b
Lelant Street
Station Street
T1a
Victoria Street
Market Street
Bath Street
T2a

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Legend

- Investigation Areas
- Scattered Trees

EVCs

- Herb-rich Foothill Forest
- Shrubby Foothill Forest
- Swampy Riparian Woodland
- Planted Native Vegetation

Details

Mapping by: Ali Nia
Date: 3/11/2023
Version: 1
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Map 4K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Trentham

N

0 50 100m

Scale: 1:4,700 (Page size A3)

T4

T2a

T1a

Tresidder Court

Unnamed

Sideshow Close

Gunyah Drive

Rocke Court

Victoria Street

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Legend

Investigation Areas

Scattered Trees

EVCs

Shrubby Foothill Forest

Details

Mapping by: Ali Nia

Date: 3/11/2023

Version: 1

Aerial photography from Nearmap (Dec. 2022).

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Map 4K. Ecological Assessment
EVCs

Hepburn 4 Township
Structure Plans

Trentham

N

0 50 100 m

Scale: 1:4,700 (Page size A3)



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Legend

Investigation Areas

EVCs

Shrubby Foothill Forest

Details

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Map 4K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Trentham

N

0 50 100 m

Scale: 1:4,700 (Page size A3)

T3a

T3b

The Domino Trail

Mulcahys Road

Wallaby Jack Road

Feeleys Lane

Puddingstone Road

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Legend

Investigation Areas

EVCs

Creekline Herb-rich Woodland

Herb-rich Foothill Forest

Shrubby Foothill Forest

Details

Mapping by: Ali Nia

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Map 4K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Trentham

N

0 50 100m

Scale: 1:4,700 (Page size A3)

T2c
T1b
T3b
T1a
Mulcahys Road
Falls Road
High Street
Manna Lane
Feeleys Lane
Wallaby Jack Road
Unnamed
Blue Mount Road
Park Street
West Street

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Legend

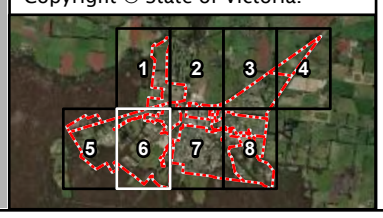
- Investigation Areas
- Scattered Trees

EVCs

- Herb-rich Foothill Forest
- Shrubby Foothill Forest
- Planted Native Vegetation

Details

Mapping by: Ali Nia
Date: 3/11/2023
Version: 1
Aerial photography from Nearmap (Dec. 2022).
Data Source: Base layers courtesy of VicMap,
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Map 4K. Ecological Assessment EVCs

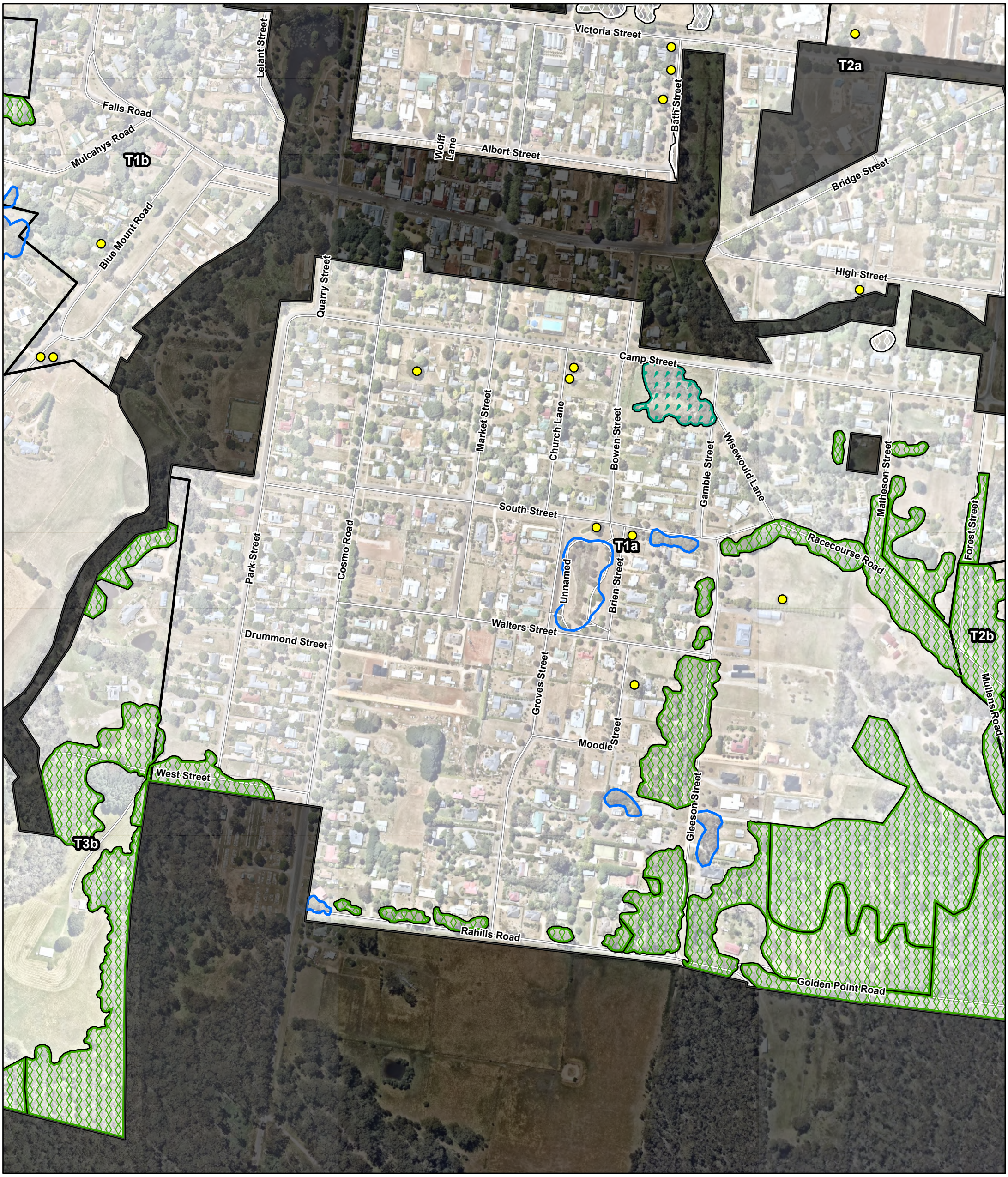
Hepburn 4 Township Structure Plans

Trentham

N

0 50 100m

Scale: 1:4,700 (Page size A3)



Disclaimer

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Legend

- Investigation Areas
- Scattered Trees

EVCs

- Herb-rich Foothill Forest
- Shrubby Foothill Forest
- Swampy Riparian Woodland
- Planted Native Vegetation

Details

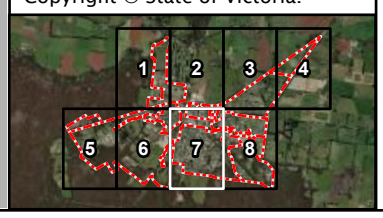
Mapping by: Ali Nia

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Version: 1

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Map 4K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Trentham

N

0 50 100m

Scale: 1:4,700 (Page size A3)

Victoria Street
Gunyah Drive
Rocke Court
T2a
Bridge Street
High Street
Camp Street
Wisewould Lane
Matheson Street
Forest Street
T1a
Beatties Road
Racecourse Road
Mullens Road
T2b
Chamberlain Road
Unnamed
Golden Point Road
Racecourse Track
Old Tram Track

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Legend

- Investigation Areas
- Scattered Trees

EVCs

- Shrubby Foothill Forest
- Swampy Riparian Woodland
- Planted Native Vegetation

Details

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Map 4K. Ecological Assessment EVCs

Hepburn 4 Township Structure Plans

Trentham

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Legend

- Investigation Areas
- Scattered Trees

Quality

- Low Quality
- Moderate Quality
- High Quality
- Indicative-Moderate Quality
- Indicative-High Quality
- Indicative-Low Quality
- Planted Native Vegetation
- Public Lands

Details

Mapping by: Ali Nia

Date: 3/11/2023

Version: 1

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Map 4L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Trentham

N

0 180 360 m

Scale: 1:18,000 (Page size A3)

Falls Road

Falls Rise

T2c

Horvaths Road

Mccashney Way

Victoria Street

T1b

T3b

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Legend

- Investigation Areas
- Scattered Trees

Quality

- Low Quality
- Medium Quality
- Planted Native Vegetation
- Public Lands

Details

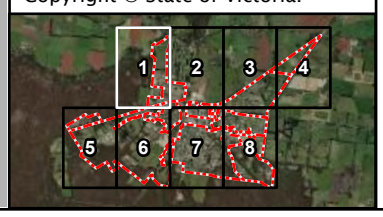
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Version: 1

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Map 4L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Trentham

N

0 50 100 m

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Legend

- Investigation Areas
- Scattered Trees

Quality

- Low Quality
- Medium Quality
- Planted Native Vegetation
- Public Lands

Details

Mapping by: Ali Nia

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Map 4L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Trentham

N

0 50 100m

Scale: 1:4,700 (Page size A3)

T4

T2a

T1a

Unnamed

Tresidder Court

Sideshow Close

Gunyah Drive

Rocke Court

Victoria Street

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Legend

- Investigation Areas
- Scattered Trees

Quality

- Low Quality
- Medium Quality

Details

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Map 4L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Trentham

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Legend

Investigation Areas

Quality

Low Quality

Medium Quality

Details

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Map 4L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Trentham

N

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Legend

- Investigation Areas

Quality

- Low Quality
- Medium Quality
- High Quality
- Indicative-Medium Quality
- Indicative-High Quality
- Public Lands

Details

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Map 4L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Trentham

N

0 50 100 m

Scale: 1:4,700 (Page size A3)

T2c
Falls Road
High Street
Mulcahys Road
T1b
Manna Lane
Wallaby Jack Road
Feeleys Lane
Unnamed
Blue Mount Road
T3b
T1a
Park Street
West Street

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Legend

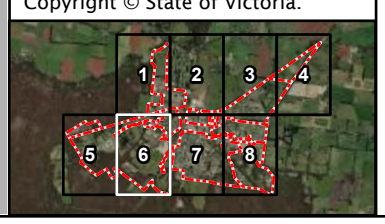
- Investigation Areas
- Scattered Trees

Quality

- Low Quality
- Medium Quality
- High Quality
- Indicative-Medium Quality
- Indicative-High Quality
- Indicative-Low Quality
- Planted Native Vegetation
- Public Lands

Details

Mapping by: Ali Nia
Date: 3/11/2023
Version: 1
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Data Source: Base layers courtesy of VicMap,
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Map 4L. Ecological Assessment Quality

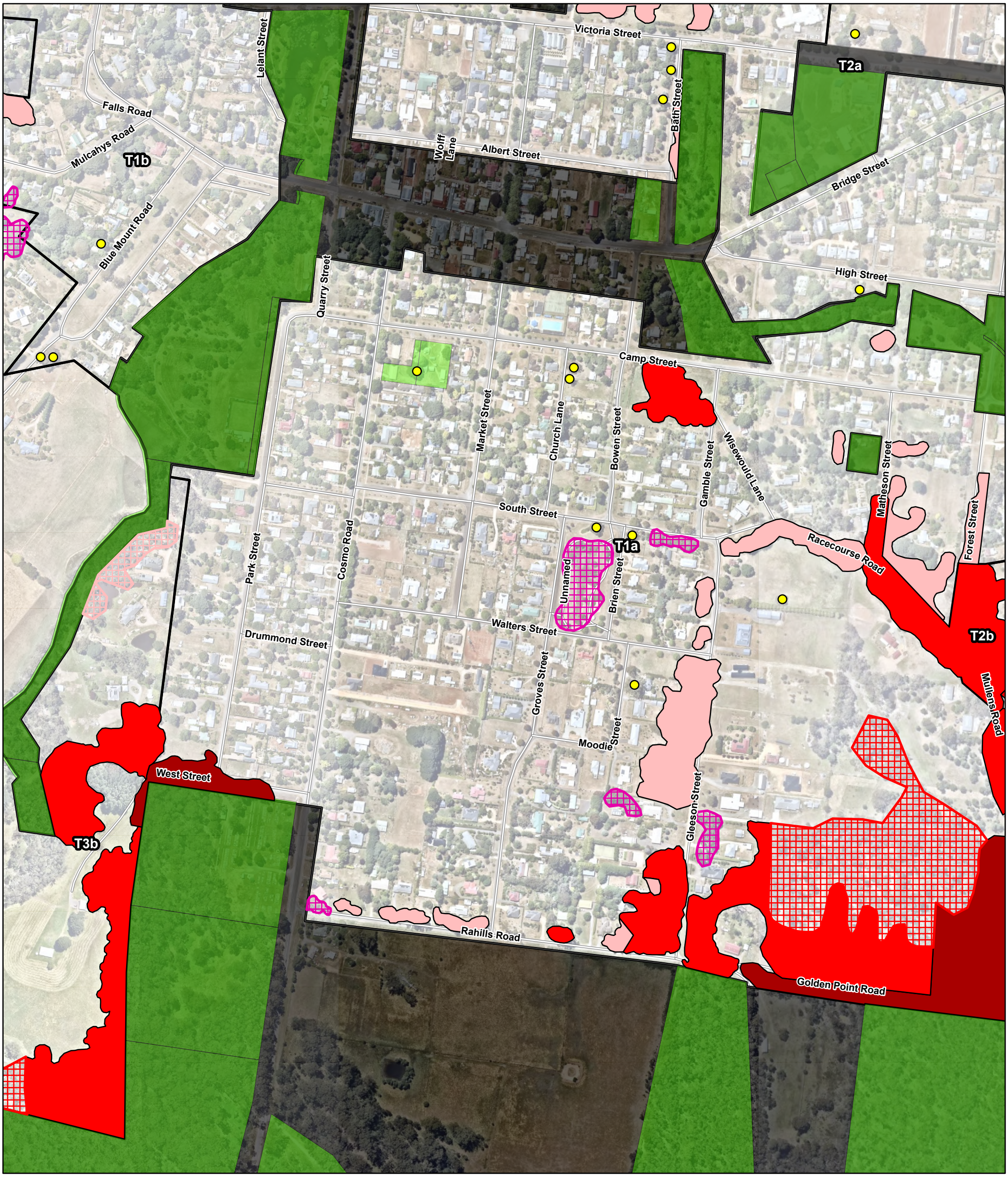
Hepburn 4 Township Structure Plans

Trentham

N

0 50 100 m

Scale: 1:4,700 (Page size A3)



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Legend

- Investigation Areas
- Scattered Trees

Quality

- Low Quality
- Medium Quality
- High Quality
- Indicative-Medium Quality
- Indicative-Low Quality
- Planted Native Vegetation
- Public Lands

Details

Mapping by: Ali Nia
Date: 3/11/2023
Version: 1
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Map 4L. Ecological Assessment Quality

Hepburn 4 Township Structure Plans

Trentham

N

0 50 100 m

Scale: 1:4,700 (Page size A3)

Victoria Street
Gunyah Drive
Rocke Court
T2a
Bridge Street
High Street
Camp Street
Wisewould Lane
Matheson Street
Forest Street
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Racecourse Road
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Golden Point Road
Racecourse Track
Old Tram Track

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Legend

- Investigation Areas
- Scattered Trees

Quality

- Low Quality
- Medium Quality
- High Quality
- Indicative-Medium Quality
- Planted Native Vegetation
- Public Lands

Details

Mapping by: Ali Nia
Date: 3/11/2023
Version: 1
Aerial photography from Nearmap (Dec. 2022).
Data Source: Base layers courtesy of VicMap,
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Map 4L. Ecological Assessment Quality

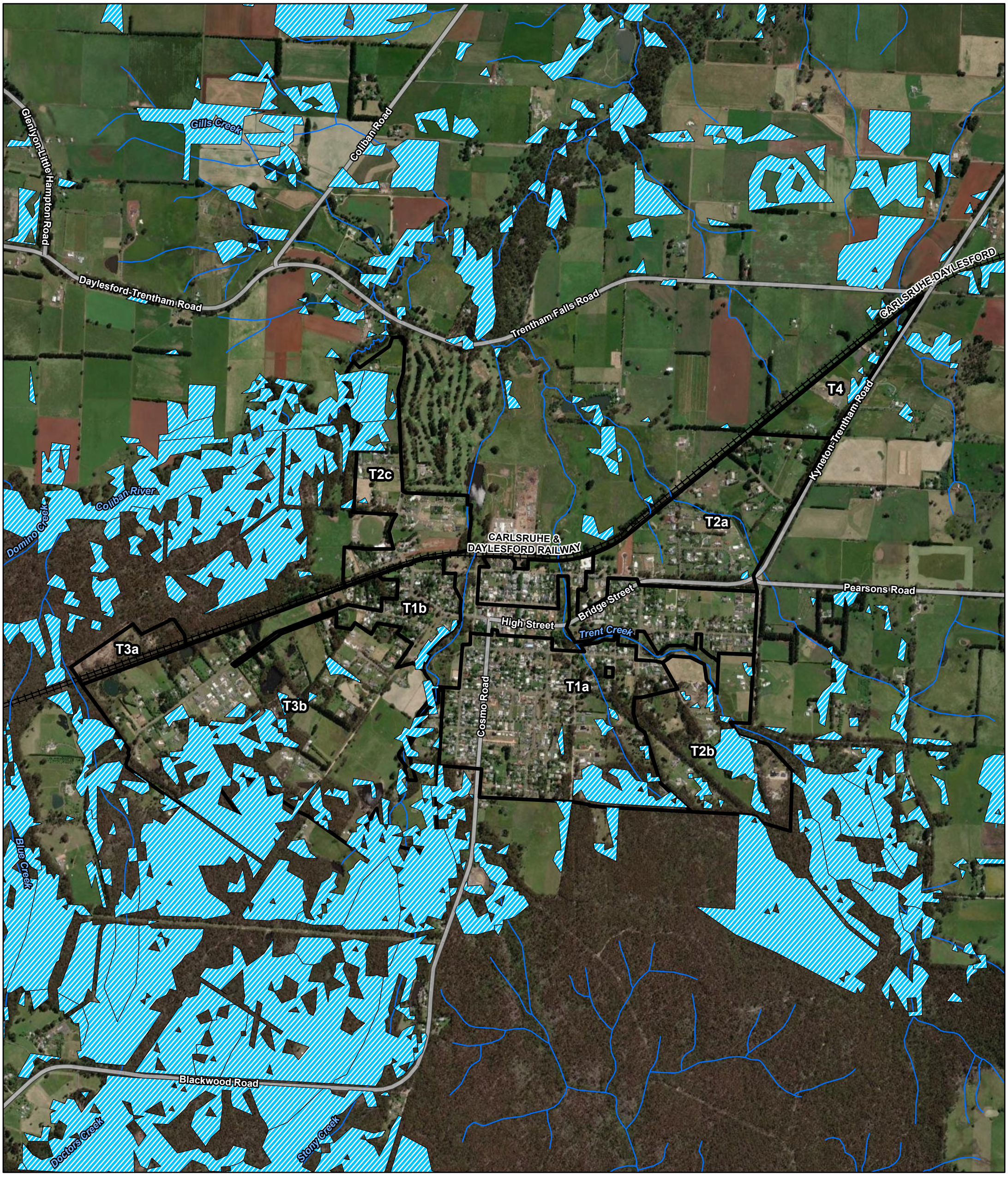
Hepburn 4 Township Structure Plans

Trentham

N

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Legend

- Investigation Areas
- Constructed watercourse
- Natural watercourse
- Railways
- Ground Water Dependent Ecosystems

Details

Mapping by: Ali Nia
Date: 3/11/2023
Version: 1
Aerial photography from Esri World Imagery.
Data Source: Base layers courtesy of VicMap,
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Map 4m. Ground Water Dependent Ecosystems and Spring Locations

Hepburn 4 Township Structure Plans

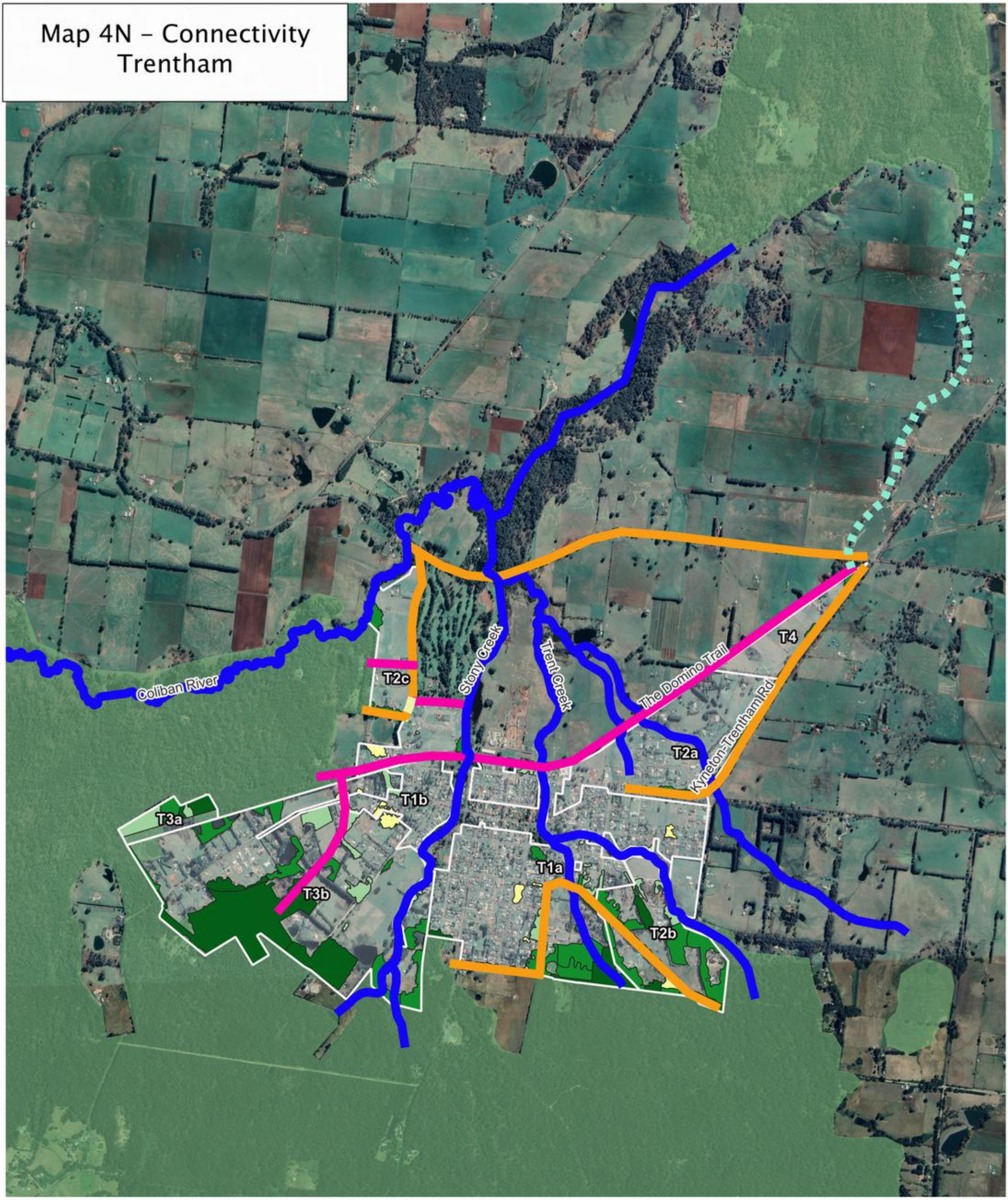
Trentham

N

0 190 380 m

Scale: 1:19,000 (Page size A3)

Map 4N – Connectivity Trentham



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Legend

Corridors
- Creek Corridor
- Land Corridor
- Road Corridor
- Stepping Stone
- Potential Corridor

Core Areas

Mapped EVC Quality
- High
- Medium
- Low
- Planted Native Vegetation

Details

Date: 02 November 2023
Created by:Kallista Sears
Aerial Photography from Google Satellite
Base map data Copyright State of Victoria

0 0.5 1 km