PRACTICAL ECOLOGY
ecological restoration & consulting

Biodiversity Impact Assessment
Proposed Warburton Mountain Bike Trail

December 2019

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Contents

APPENDICES

TABLES

MAPS

1. INTRODUCTION

Yarra Ranges Council proposes to construct an extensive network of mountain bike trails near the Warburton Township. Appendix 1, provides an overview of the entire project area.

The trail network is in two main regions, Region 1 is 61.5 km to the north of the Warburton township within the Yarra Ranges National Park. Region 1 includes 4 trails that lead off from Mt Donna Buang Road. The main trail runs from the Mount Donna Buang Summit in a westerly direction until it reaches the Ben Cairn section of the National Park and then heads south from Donna Buang Road and gradually descends through to the O'Shannassy Aqueduct Trail approximately 1km north of the Warburton Township. The other 3 trails descend from Donna Buang Road further east of the summit road with each of these heading towards the township in the vicinity of the Warburton Golf Course.

Region 2 is to the south of the Warburton Highway and Rail Trail within the Yarra State Forest. This area includes Mount Little Joe and Mount Tugwell. A network of trails in the vicinity of Mt Little Joe Track link to the west with the existing Crusher Track towards Wesburn and to the east towards Mt Tugwell in the Cemetery Fireline and Mt Bride Road region.

The total trail length of the project is approximately 180km.

The mountain bike trails are generally constructed with an initial bench width of 1.2m, but this reduces over time to a ride line of 0.3–0.6m wide. Tree branches are lopped to 2.5 metres high. Appendix 2 provides a series of maps to illustrate the trail alignment and the biodiversity values within or near to the trail corridor.

Appendix 3 provides a map series that highlights some of the more ecologically sensitive areas of the trail alignment.

Appendix 4 provides a 'Risk Assessment Matrix' to provide guidance on various design and construction approaches based on risk categories and established protocols for various sections of the trail.

1.1 Project Scope

The trail alignment traverses National Park and State Forest through vegetation that is generally high quality. The purpose of this study is to investigate the trail alignment and identify impacts to native vegetation and fauna habitats and how the planning and design of the alignment may minimise impacts to the most significant biodiversity values.

Environmental Protocols to guide the alignment of the trail network were developed with DELWP, Parks Victoria, Melbourne Water and ecological specialists. The current draft of the protocols, dated October 2019 has been incorporated into the Risk Assessment Matrix. A copy of the protocols is attached as Appendix 10.

Key deliverables included:

1. Establishment of agreed ecological assessment methodologies that can be applied to the Warburton Trail network

2. A comprehensive ecological assessment of the trail network including:

    - EVCs and conservation significance
    - Identification of any EPBC or FFG listed vegetation communities
    - Habitat Hectare Assessments
    - Locations of habitat importance for threatened flora and fauna species
    - Locations of threatened flora or fauna observed during the assessment
    - Compilation of a comprehensive flora list for the potential impact zone
    - Locations of noxious and high threat environmental weeds
    - Significant features including stream buffers, Leadbeater's Possum (LPB) buffer areas and special protection zones
    - Detailed mapping illustrating the trail alignment and biodiversity information.

3. Development implications under State and Commonwealth biodiversity legislation including:

    - The Flora and Fauna Guarantee Act (FFG Act) 1988
    - The Environment Protection and Biodiversity Conservation Act (EPBC Act) 1988
    - The Catchment and Land Protection Act (CaLP Act) 1994

4. All necessary biodiversity information relevant to the Yarra Ranges Council Planning Scheme including:

    - Information relevant to clause 52.17 Native Vegetation Protection
    - Information pertaining to relevant environmental overlays (e.g. ESO and SLO)
    - Information in relation to the Yarra Ranges local vegetation policy clause (c22.05)
    - An assessment of biodiversity impact in accordance with the *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017a) (recently replacing the *Permitted Clearing Biodiversity Assessment Guidelines*) (DEPI 2013a)
    - Implications of the Environmental Effects Act
    - Implications of the Planning and Environment Act 1987
    - Discussion of how the proposal has avoided and minimised biodiversity loss

- Assessment of whether the proposal has a significant impact on Victoria's biodiversity
- A discussion of biodiversity offset requirements associated with proposed clearing

5. Strategies for minimising impact to important habitat for threatened species including though not limited to the Mount Donna Buang Wingless Stonefly, Leadbeater's Possum, Powerful Owl, Barking Owl and Sooty Owl.

1.2 Clarifications and Definitions

Key definitions that apply to the assessment and construction components of the proposed trail include:

The Ride Line (Tread Width) – The 'tread' is the firm, compacted section of the trail on the inside of the bench, where riders generally ride. On most trails, the tread is generally around 300-600mm wide, although it may be wider on corners and on some specific types of trails such as shared-use trails, high traffic trails and jump trails. It is also referred to as the 'ride line'.

The Trail Corridor (Construction Corridor) – The construction corridor is defined as the horizontal corridor from the top of the upslope batter to the toe of the downslope batter and the vertical corridor to about 2m high (sufficient to allow passage of the excavator).

Impact Zone – This zone refers to the impact on native vegetation. Throughout most of the trail, the impact is expected to be limited to the 1.2-metre wide trail corridor, however, the more difficult areas or the end of switchbacks may require a disturbance footprint up to 2 metres for construction purposes:

Indicative Trail Alignment – This represents the general alignment of the trail following ground truthing. It does not represent the exact alignment once constructed. Prior to construction starting, all trail alignments will be subject to a Pre-Start Trail Review (PSTR), during which the land manager, project manager and construction team will walk the trail alignment, determining any final location of structures, no-go zones etc. In areas of high environmental significance and/or sensitive species, a qualified Ecologist will be required to attend the PSTR to assist in 'micro-siting' the exact position of the trail in order to minimise potential impacts to native vegetation and fauna habitats.

Assessment Corridor – a 20-metre wide transect (10 metres either side of the indicative trail alignment). The assessment corridor provides options for re-aligning the trail during the detailed design and construction phase. The average construction impact is anticipated to be no more than 2 metres.

Broader Assessment Area – The broader assessment of biodiversity values (native vegetation and fauna habitats) to inform the indicative alignment of the trail and a more refined Assessment Corridor. Broader Assessment Areas helped to inform the general alignment of the trail including avoiding significant biodiversity values such as Cool Temperate Rainforest.

Section 2 of this document explains the ecological definitions and methods applied to this assessment.

1.3 Overview of the Assessment Area

The assessment corridor is 10 metres either side of the indicative centreline of the trail (though the actual trail construction zone will be 1.2m). This 20m wide corridor allows for some flexibility to realign the trail within the corridor to avoid and minimise impacts to significant biodiversity values.

For the purpose of describing and illustrating the landscape, vegetation and habitat types, the assessment area is divided into several sections (as illustrated in Appendix 1 and Appendix 2– Maps 1 to 25):

- The Summit to Donna Buang Road (Map 1)
- Donna Buang Road East(Map 2)
- Donna Buang Road Central (Map 3)
- Donna Buang Road West (Map 4)
- Ben Cairn Region (Map 5)
- South of Ben Cairn / Donna Buang Road (Map 6)
- APM Access Track (Map 7)
- O'Shannassy Aqueduct (Map 8)
- Donna Buang Road to Aqueduct Link (Map 9)
- Yuonga Track North (Map 10)
- Yuonga Track South (Map 11)
- Golf Course Trail (Map 12)
- Mount Little Joe– Hooks Road Region (Map 13)
- Mount Little Joe– Backstairs Track (Map 14)
- Wesburn Climb (Map 15)
- Mount Little Joe West (Map 16)
- Mount Little Joe Central (Map 17)
- Mount Little Joe East (Map 18)
- Crusher Track Link (Map 19)
- Mount Tugwell Cemetery Fireline (Map 20)
- Cemetery Fireline East (Map 21)
- La La Falls Region (Map 22)
- Cumming Spur Track West (Map 23)
- Cumming Spur Track East (Map 24)
- Mount Bride Road South East (Map 25)

1.4 Landscape Context

The entire assessment area supports various foothill and montane forest types in a relatively high rainfall region. The assessment area traverses' elevations between 160–1200 metres above sea level. The Mount Donna Buang Summit represents the highest elevation within the assessment area while the lowest elevation is in the vicinity of the rail trail south of the Warburton Highway (Appendix 1).

The trail alignment traverses several Crown land tenures including:

- The Yarra Ranges National Park managed by Parks Victoria (the majority of the Drop A K route)
- The Dee River Corridor north of Warburton (managed by DELWP and Melbourne Water)

- Warburton Bushland Reserve managed by DELWP (incorporating 'The Elevator' in the vicinity of Hooks Road) and,

- The Yarra State Forest managed by DELWP (accounting for the majority of the network within the Mount Tugwell Area)

Tall Eucalypt forest of various age classes persist across the majority of the assessment area, however areas north of Mount Donna Buang Road supports Cool Temperate Rainforest where Eucalypt cover subsides in favour of canopy species such as Southern Sassafras *Atherosperma moschatum* and Myrtle Beech *Nothofagus cunninghamii*.

The study area falls within 2 bioregions. Most of the assessment area in proximity to Donna Buang Road is within the Victorian Alps Bioregion while the most southerly section of Donna Buang Road transitions into the Highland Southern Falls Bioregion for the remainder of the trail network.

The entire assessment area is within the Port Phillip and Westernport Catchment (DEPI 2013a).

2. ASSESSMENT METHODOLOGY

A preliminary trail alignment was identified through a desktop exercise applying the primary objectives and protocols established for this project. Various GIS biodiversity layers provided by DELWP and the State of Victoria assisted with the preliminary planning of the trail alignment. Following this, the next step in the process was to ground truth the trail alignment and consider opportunities and constraints that aims to avoid significant ecological values.

Out of approximately 180 km of trail there were about 150km of the trail alignment that received site assessment. The most recent additions to the proposed trail have only undergone a desktop assessment of the potential ecological values as at the time of writing this report.

2.1 Site assessment

Assessment Process

The potential trail alignment is 10 metres either side of the indicative trail centreline (though the actual trail construction zone will be 1.2m). However, the Assessment Area was not limited to a 10-metre corridor. The assessment was undertaken in four steps as outlined below:

a) **The Desktop Alignment** – This is the starting point for all ground truthing assessments. Using various GIS layers including contours/elevations and biodiversity data (including but not limited to Wingless Stonefly Locations, LPB habitat and next boxes and modelled cool temperate rainforest), COX architecture and World Trail Pty Ltd plotted an indicative alignment that aimed to avoid significant biodiversity values while maintaining a reasonable gradient suitable for a Mountain Bike Trail. This provided a valuable starting point for the purpose of:

- Identifying access points for undertaking ground truthing
- Planning for ground truthing in remote areas
- Providing a reference point with flexibility to vary the alignment in any direction up to 60m based on environmental constraints
- Comparing mapped biodiversity data to conditions on the ground

b) **Ground Truthing to determine the Revised Alignment** – The alignment was revised based on identifying significant environmental features on the ground such as Habitat Trees, Threatened Ecological Communities (i.e. Cool Temperate Rainforest) and constraints imposed by the terrain while also considering known mapped habitat values such as Leadbeater's Possum (LBP) nest boxes, Mount Donna Buang (MDB) Stone Fly Buffer Zones and Monitoring Sites of the Australian National University (ANU). While there were often significant limitations in avoiding biodiversity values, the ground truthing approach provided flexibility in the direction of the alignment. As the revised alignment was being ground-truthed, it was still considered indicative within a 20-metre assessment corridor i.e. 10 metres either side of the centre line of the alignment.

c) **The Assessment Corridor –** Once determination of an indicative alignment was in progress, a 20-metre wide Assessment Corridor was defined to:

- provide an adequate width for undertaking Habitat Hectare Assessments as a measure of vegetation quality across a representative area (including mapping of significant trees and assessments of understorey, recruitment, logs etc).
- investigate potential siting alternatives if there were substantial constraints within the 20m corridor i.e. if areas beyond the corridor presented a better opportunity to minimise impacts, then the alignment would be rerouted.

The Broader Assessment Area – Ecological Values beyond the 20m corridor were also considered including:

a) Although habitat hectare assessments were applied within a 20 metre transect, assessments were not limited to this width. Visual and 'on foot' observations across the broader area were made both before and after determining the current alignment. Examples of these broader assessments included:

- Long-range assessments across the landscape, particularly when viewed from designated vehicle tracks on elevated sites. These assessments allowed the opportunity to determine a start point and a direction of travel from the main track where there appeared to be less constraints in terms of terrain, significant trees and drainage lines
- Boarder assessments were also undertaken on the first few days of preliminary site assessments within the Ben Cairn Area and locations to the north of Donna Buang Road and west of the Summit Road. These preliminary assessments were subject to broad investigations (60-100 metres in width) where large areas of Cool Temperate Rainforest to the north of Donna Buang Road were identified (refer to Map 4 – Series 1). The alignment was ultimately taken close to the road to avoid most areas of Cool Temperate Rainforest. Despite these efforts, not all sections of Cool Temperate Rainforest could be avoided as large areas of this vegetation type dominated sections to the north of the road. Melbourne Water requirements to minimise incursions into the mapped boundaries of Maroondah Water Catchment, while strictly avoiding incursions into the actual catchment, further limited opportunities to avoid sections of rainforest.

In addition to the four-step process outlined above, the chosen trail alignment is also based on additional factors including:

a) Available access points from existing roads and tracks

b) The target average and maximum trail gradient, based on the intended difficulty rating of the proposed mountain bike trail, as stipulated in the Trail Difficulty Rating System published in the Australian Mountain Bike Trail Guidelines (Mountain Bike Australia, 2019). Any constraints identified in the agreed protocols and identified during ground truthing e.g. Cool

Temperate Rainforest, nesting sites for Leadbeater's Possum, Buffer Zones for the Mount Donna Buang Stonefly and significant habitat trees.

c) Any other constraints such as creek lines, gullies and steep inclines.

Preliminary ground truthing and project planning was undertaken by staff from Cox Architecture, World Trail Pty Ltd (the trail survey team) and Practical Ecology staff who initially worked with the survey team to identify environmental constraints. Practical Ecology then worked independently to undertake more detailed assessments based on the indicative alignment determined by the trail survey team. Prior to undertaking detailed assessments, the trail survey team provided spatial files (KML and ESRI Shapefiles) to Practical Ecology to enable a desktop assessment of biodiversity values. Practical Ecology staff then walked the alignment with the aid with a GPS enabled tablet using GIS software for recording field data in addition to known biodiversity values (e.g. mapped LBP nest boxes, Previous records of significant flora and fauna, MDB Stonefly Habitat).

2.2 Tree Habitat Assessment

A core component of the ground truthing was to identify potential Leadbeater's' Possum habitat trees particularly at higher elevations in locations where they are either known to occur or there is a high probability (>65%) of occurrence. Identification of suitable habitat for forest owls and other hollow dependant mammals was also considered simultaneously. Trees within lower elevation forests (in the vicinity of the O'Shannassy Aqueduct or within Mount Little Joe and Mount Tugwell) were equally considered and although age classes vary, mature stands of forest tended to exhibit a greater range of hollows visible at ground level.

Mapping of significant trees in close proximity to the alignment served two purposes:

- Firstly, it identifies trees that should be afforded maximum protection including avoiding construction within the Structural Root Zone and for the purpose of maintaining a hazard buffer for the uses of the trail and,
- Mapping trees within sample plots (including diameter, tree health and size class) also served the purpose of scoring as per the Habitat Hectare Assessment method (refer to section 2.3).

Significant Trees

Tree assessments and mapping were undertaken where significant habitat trees were observed within range of the trail alignment. Four classes of trees were mapped as described below:

a) **Pre-1900 living trees** (estimated to be greater than 120cm diameter) of which all are considered to be suitable habitat for LBP and potentially forest owls where large hollows are present.

b) **Smaller habitat trees** defined as trees less than 120cm diameter with visible hollows that may provide nesting habitat for a range of fauna species including (where relevant):

- Trees with visible hollows suitable for LPB and other hollow dependent fauna within areas of high probability LPB habitat. These include trees that meet the Large Old Tree Benchmark (equal to or greater than 90cm diameter) although numerous smaller trees with hollows were also identified as suitable habitat

- Dead trees greater than 50cm within high probability LBP habitat as the species has a tendency to inhabit dead trees, providing they are a suitable height (>10 metres)

c) Other hollow bearing trees of various size classes in lower probability LBP habitat that exhibit hollows suitable for a range of owl species and other hollow dependent fauna

d) Sample areas of **Large Trees** were mapped for the purpose of:

   a. Assisting with Large Tree counts per hectare (based on the Large Tree benchmark) as a part of habitat hectare assessments[1]

   b. Identifying significant trees close to the indicative alignment so to allow for the alignment to be adjusted during the detailed design and construction phase

Large Trees are defined as those defined by the large tree benchmarks, which vary according to the Ecological Vegetation Class.

Note: Due to time constraints and the sometimes-extreme difficulty in accessing trees due to the rugged terrain, not all large trees in the assessment corridor were mapped. However, all large trees were mapped where the indicative alignment was within the assumed Structural Root Zone (SRZ). The SRZ varies depending on trunk size, for example an old growth tree of 250cm diameter (when measured from the buttress of the tree) requires a protection zone of 4.9 metres and a younger tree of 100cm diameter requires a protection zone of 1.5 metres. Sections where not all of the above categories of trees were mapped included:

- Areas with a sparse cover of Large Trees (less than 10 per hectare) and no visible hollows (Category D) where not at risk from impacts to the alignment.

- Where no other significant trees (Category A, B and C) were identified.

Sub-canopy Trees

While sub-canopy trees were not mapped for this project, observations of sub-canopy trees were a key component of assessments within High Probability LBP Habitat. For the purpose of this project, a sub-canopy tree is defined as any species of tree between 10-25 metres high that sits below the

[1] Sample areas of Large Trees was undertaken in accordance with standard methodology outlined in section D – page 45 of the *Assessor's Handbook* (DELWP 2018)

mature Eucalypt canopy. This sub-canopy provides critical connectivity between canopy trees for the movement of LBP and other arboreal mammals.

2.3 Trail alignment – Desktop only

The newest proposed trail alignments (approximately 30km of trail) as shown in Appendix 1 underwent desktop assessment of ecological values.

The potential trail alignment is 10 metres either side of the indicative trail centreline (though the actual trail construction zone will be 1.2m). However, the Assessment Area was not limited to a 20-metre corridor. The assessment was undertaken in the steps as outlined below:

- EVCs and conservation significance (using modelled EVC datasets)
- Identification of any EPBC or FFG listed communities
- Vegetation Condition using modelled quality scores
- Locations of habitat importance for threatened flora and fauna species

Detailed mapping illustrating the trail alignment and desktop biodiversity information.

2.4 Vegetation Categorisation, Classification and Quality

Vegetation was assessed in terms of type (as defined by Ecological Vegetation Class) and its quality, by undertaking a Habitat Hectare assessment. Where the trail alignment only received a desktop assessment modelled Vegetation Quality scores were applied in place of a Habitat Hectare assessment.

2.4.1 Vegetation Categories

Vegetation in the study area was surveyed for categorisation as per the definitions within *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017):

Native Vegetation

Native Vegetation as per the Victorian Planning Provisions (Clause 72): 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 understory 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 NVIM and other DELWP systems.

Scattered tree:

A scattered tree is a native canopy tree that does not form part of a patch.

Scattered trees have two sizes, small and large:

- a small scattered tree is less than the large tree benchmark for the species in the relevant EVC
- a large tree is equal to or greater than the large tree benchmark for the species in the relevant EVC

A standing dead tree that does not form part of a patch is treated as a scattered tree if it has a trunk diameter of 40 centimetres or more at a height of 1.3 metres above the ground.

2.4.2 Ecological Vegetation Classes

Ecological Vegetation Classes (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 (forest, woodland, grassland, saltmarsh), landform (gully, foothill, plain) and environmental characteristics (soil type, climate).

DELWP EVC mapping was accessed to assess the EVCs likely to occur within the assessment areas. EVCs were then identified in the field according to observable attributes including dominant and characteristic species consistent with the benchmark descriptions (DEPI 2014b).

2.4.3 FFG Listed Threatened Communities

In addition to the standard Ecological vegetation Classes, FFG listed vegetation communities considered for this assessment includes *Cool Temperate Mixed Forest Community* and *Cool Temperate Rainforest Community.* Both these FFG listed communities fall within the broader EVC description for Cool Temperate Rainforest.

Cool Temperate Rainforest Community

Rainforest is defined ecologically as forest vegetation with a more-or-less continuous rainforest tree canopy of variable height, and a characteristic diversity of other plant species and life forms.

Cool Temperate Rainforest is dominated by combinations of Myrtle Beech, Southern Sassafras, Black Olive-berry *Elaeocarpus holopetalus* and Blackwood *Acacia melanoxylon* according to the site, the dominant tree species varying with the longitude. Cool Temperate Rainforest includes closed

transitional and seral communities, with emergent eucalypts, that are similar in botanical composition to mature rainforests in which eucalypts are absent. In these situations, a more or less closed rainforest canopy occurs beneath the emergent eucalypts. The understorey is typically dominated by Musk Daisy-bush *Olearia argophylla*, Austral Mulberry *Hedycarya angustifolia* and tree-ferns, with a ground stratum dominated by ferns. Epiphytes are abundant on both trees and tree-ferns, and a rich bryophyte flora is also present. In undisturbed conditions, Cool Temperate Rainforest has a closed canopy.

Cool Temperate Rainforest occurs in the Otway and Strzelecki ranges, Central Highlands and East Gippsland. It often occurs along the margins of streams or forms more extensive stands where it has been undisturbed and protected from fire.

Cool Temperate Mixed Forest Community

This ecological community is described as 'a structurally complex forest that has an upper canopy of eucalypts above an understorey layer of smaller trees of species that characterise Cool Temperate Rainforest communities. Its main tree species alter from east to west across Victoria. In the east the rainforest species include Black Oliveberry and Southern Sassafras . To the west their composition changes: Black Oliveberry is found in East Gippsland only, Southern Sassafras extends from East Gippsland to the Central Highlands and Myrtle Beechfrom the Central Highlands to the Otway Ranges'. Given sufficient time, and if bushfires do not intervene, the eucalypts of the overstorey gradually senesce and die and the community as a whole develops into Cool Temperate Rainforest. Cool Temperate Mixed Forest can therefore be regarded as a seral or successional stage of Cool Temperate Rainforest that typically develops after rainforest experiences severe fire damage and persists until the community reaches a climax phase.

Cool Temperate Mixed Rainforest is recognised as meeting the EVC description for Cool Temperate Rainforest. Vegetation consistent with either of these two FFG listed communities' definitions are mapped and assessed as Cool Temperate Rainforest EVC as this is the only EVC approved by DELWP that an EVC benchmark is provided for to enable the habitat scoring process.

2.4.4 Vegetation Quality Assessment

Habitat hectare assessments were applied to the entire 20 metre corridor to determine the condition and significance of the vegetation. This methodology is outlined in *Vegetation Quality Assessment Manual-Guidelines for Applying the Habitat Hectares Scoring Method* (DSE 2004a). The habitat hectare method involves making visual and quantitative assessments on various characteristics of native vegetation according to established criteria that are set against an optimum benchmark.

This process begins with the identification of the EVC. Each EVC has a benchmark of optimal values relating to the vegetation conditions. In addition, the ecological landscape context is scored based on patch size, connectivity and distance to core habitats. If an assessment area meets all benchmark criteria it will receive a total score of 100%.

Large Tree

When undertaking a habitat hectare assessment, a **Large Tree (LT)** is a tree with a diameter measured at breast height (DBH) equal to or greater than the large tree diameter as specified in the relevant EVC benchmark.

2.5 DELWP biodiversity impacts and offset requirements

GIS data of the 2 metre impact zone from the proposed alignment was tested to provide an indication of impact and offset requirements under *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017a) including:

- Site condition scores of impacted native vegetation (highest modelled condition scores were applied to each habitat zone in the desktop only sections)
- strategic biodiversity value
- habitat importance maps for rare or threatened species and application of the specific-general offset test
- the offset requirements, specified in General Habitat Units and Species Habitat Units (as appropriate), and the required offset attributes

2.6 Flora

2.6.1 Plant taxonomy

Plant taxonomy used in this report are generally in accordance with Walsh and Stajsic (2008) and/or Flora Information System (Viridans Biological Databases 2012).

2.6.2 Existing information

Existing flora available through the Victorian Biodiversity Atlas (VBA) (2019 update) database was queried within a five-kilometre radius around the assessment areas to provide an indication of the potential occurrence of Victorian Rare and Threatened species.

2.6.3 Flora survey

During the assessment, the study area was inspected on foot. Flora surveys were undertaken over several stages based on the alignment and project brief spanning from October 2017 until November 2019. A species list (or defined area list) for indigenous or naturalised flora (i.e. not including planted species) over the entire study site was compiled.

The flora survey including mapping of rare flora and high threat weeds observed during site assessments.

2.6.4 Plant identification

Species that could not be identified in the field were recorded to the nearest possible family or genera. These were then collected as per the protocols associated with Practical Ecology's Flora and Fauna Guarantee (FFG) Act 1988 permit (No. 10004805) for the collection of plant material. In order to assist in the identification of some flora, major features of the specimens were collected where possible, including leaves, parts of branches, fruit and/or flowers.

2.6.5 Limitations of flora survey

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

- it was undertaken over a range of seasons but mostly in late spring which is an optimal time for identification of many but not all plant species
- however, each site was only assessed once so optimal timing of for plant species at all sites was not possible
- it is expected that some other species, particularly orchids, lilies and other herbaceous species that can only be observed for a limited period of time may not have been recorded during the present assessment
- within each section of trail, flora surveys were undertaken over a short period of time and were undertaken during the course of habitat hectare assessments.

2.7 Fauna

2.7.1 Fauna taxonomy

Animal taxonomy is consistent with naming conventions listed in the Victorian Biodiversity Atlas (VBA).

2.7.2 Habitat Assessment

Only a brief incidental fauna survey was undertaken for this study. As it was undertaken in association with other tasks it is likely some species onsite were not observed. The main focus in regard to fauna was to undertake a habitat assessment. The habitat assessment relies upon making judgements on the suitability of habitat present within the study site for any significant species recorded on existing databases. Potential habitat values considered include:

- old hollow-bearing trees
- intact EVCs including the understorey strata

- connectivity to existing reserves and other patches of remnant vegetation
- water bodies, drainage lines, wetlands or wet depressions
- large fallen logs, especially hollow or concave-shaped logs
- rocks and rock outcrops
- leaf litter and grassy understorey vegetation
- vegetation that provides fruiting/feeding resources for birds and other fauna
- dense vegetation particularly in the midstorey and understorey strata
- burrows

2.8 Potentially occurring rare or threatened species

Existing information of Victorian Biodiversity Atlas (VBA) (2019 update) for fauna records within a five-kilometre radius around trail alignment were obtained to provide an indication of potentially occurring significant species.

VBA database information was used to determine likelihood of occurrence of rare or threatened species that occur or are predicted to occur within five kilometres of the study area. In determining this 'likelihood of occurrence' and utilisation of the study area by national or state significant flora and fauna, the following factors were considered:

- the conservation status of the species and its distribution
- previous recordings of species in the local area
- date of last record
- the habitat requirements of individual species
- the physical attributes of the assessment area, such as topography, geology, soils, aspect and habitat features such as trees with hollows, the presence of rocks or boulders, logs on the ground
- the history of land use at the study site
- the level of fragmentation and modification to the environment surrounding areas.

A description of the justification for the likelihood of occurrence is presented below.

Table 1. Criteria for potential occurrence of significant species

Likelihood of occurrence	Criteria
Nil	Species known to be extinct in local area and/or absent from the region.
Low	Unsuitable habitat at study site; or habitat conditions intermediate and records very limited and dated; or if it were present, it is highly likely to have been observed on site.
Medium	Habitat conditions are intermediate, and/or optimal habitat conditions for species but local records limited or dated and/or if it were present, it is not likely to have been observed on site.
High	Optimal habitat conditions for species or species recorded at site, or intermediate habitat conditions but extensive local records and/or if it were present, it is not likely to have been observed on site.

Appendix 6 provides the results of the Likelihood of Occurrence for rare or threatened flora and Appendix 7 provides the results of the Likelihood of Occurrence for threatened fauna. Likelihood of impact to EPBC listed fauna is included in Appendix 8.

2.9 Mapping

Geographical positioning data collection in the field for the purposes of map display was carried out using QGIS 2.16 and a GPS enabled tablet. Map production post-field was undertaken in QGIS format using a combination of GPS data, GPX tracks, spatial layers provided by DELWP and VicMap with geo-referenced aerial photography (Google Satellite imagery available through AusMap).

Due to limitations of satellite reception in heavily forested environments, it is rare that a GPS points are recorded within 1m accuracy. GPS points taken in the field were generally between 2-5 metre accuracy. The same limitation applies to the trail alignment itself. These limitations emphasize the importance of determining re-alignments with mitigation solutions on the ground when it comes to construction.

Prior to construction starting, all trail alignments will be subject to a Pre-Start Trail Review (PSTR), during which the land manager, project manager and construction team will walk the trail alignment, determining any final location of structures, no-go zones etc. In areas of high environmental significance and sensitivity, a qualified Ecologist will be required to attend the PSTR to assist in 'micro-siting' the exact position of the trail in order to minimise potential impacts to native vegetation and fauna habitats.

3. RESULTS

3.1 Vegetation Categorisation, Classification and Quality

The Department of Environment, Land, Water and Planning (DELWP) has broadly mapped vegetation types (referred to as Ecological Vegetation Classes) within and surrounding the assessment corridor. Although the extent of Ecological Vegetation Classes (EVC's) as identified in the field vary markedly compared to modelled mapping units, all EVCs mapped within the vicinity were found at various locations within the assessment corridor including:

- Montane Damp Forest (EVC 38))
- Wet Forest (EVC 30)
- Damp Forest (EVC 29)
- Herb-rich Foothill Forest (EVC 23)
- Cool Temperate Rainforest (EVC 31)
- Lowland Forest (EVC 16)
- Shrubby Foothill Forest (EVC 45)
- Riparian Forest (EVC 18)

Overview Maps A and B (Appendix 1) illustrate the location of 25 sections of the assessment areas. Habitat Zones and Ecological Vegetation Classes are discussed in the context of these sections. Maps 1-25 in Appendix 2 illustrate the extent of habitat zones and EVCs within the assessment corridor.

The vegetation within the referral area is located across two Bioregions of Victoria, Highland Southern Fall and Victorian Alps. The most prominent Ecological Vegetation Classes are Wet Forest, Damp Forest and Shrubby Foothill forest which combined equate to about 90% of the vegetation within the disturbance footprint (Table 2). These EVC's have a Bioregional Conservation Status of Least Concern. Another 6% of this area is made up of Lowland Forest, Riparian Forest, Herb-rich Foothill Forest and Montane Damp Forest which are also listed as Least Concern.

Cool Temperate Rainforest EVC has a Bioregional Conservation Status of Endangered and is a listed ecological community under the *Victorian Flora and Fauna Guarantee Act 1988 (FFG Act.)*. Cool Temperate Mixed Forest Community which is a listed community under the FFG Act was also encountered but for the remainder of this report has been incorporated under the Cool Temperate Rainforest EVC. The project is only likely to impact upon 1.06 hectares of this vegetation type with specific design and construction mitigations strategies to further minimise the long-term impact.

Table 2. Area (Hectares) of EVC's within the proposed disturbance footprint of the mountain bike trail.

Bioregion	EVC	EVC Name	Bioregional Conservation Significance	Hectares Desktop	Hectares Ground-truthed	TOTAL
HSF	EVC 16	Lowland Forest	Least Concern	0.11	0.28	0.39
HSF	EVC 18	Riparian Forest	Least Concern	0.16		0.16
HSF	EVC 23	Herb-rich Foothill Forest	Least Concern		0.30	0.30
HSF	EVC 29	Damp Forest	Least Concern	2.05	4.43	6.47
HSF	EVC30	Wet Forest	Least Concern	1.51	7.40	8.91
HSF	EVC 31	Cool Temperate Rainforest	Endangered		0.15	0.15
HSF	EVC 45	Shrubby Foothill Forest	Least Concern	0.49	7.22	7.71
Alp	EVC 30	Wet Forest	Least Concern		0.49	0.49
Alp	EVC 31	Cool Temperate Rainforest	Endangered		0.91	0.91
Alp	EVC 38	Montane Damp Forest	Least Concern		0.10	0.10
			TOTAL	4.31	21.28	**25.59**

General vegetation type and quality descriptions are provided below.

Mount Donna Buang East (Map 1, Map 2 and Map 3)

This section is within the Victorian Alps Bioregion and comprises 2 EVCs; Montane Wet Forest (EVC 38) and Cool Temperate Rainforest (EVC 31). While these areas do not represent classified 'Old Growth Forest' they represent mature vegetation communities that have not been subject to logging over the past 50 years and have not been impacted by fire since 1939.

Vegetation from the Mount Donna Buang summit moves through Montane Wet Forest dominated by Alpine Ash *Eucalyptus delegatensis subsp. delegatensis*. While most of this area supports a continuous Eucalypt canopy, some areas transition into Cool Temperate 'Mixed' Forest while other areas are definitively Cool Temperate Rainforest with less than 5% Eucalypt canopy and dominated by a Myrtle Beech *Nothofagus cunninghami* and Southern Sassafras *Atherosperma moschatum* canopy which is the key determinant of this EVC.

Habitat Zones 4, 6 and 8 are consistent with the Cool Temperate Rainforest Benchmark. These areas account for 2.24 kilometres of trail length. Some other sections of Cool Temperate Rainforest have Myrtle Beech sub-canopy with an overstorey of Eucalypts (Zone 1, Zone 3 and Zone 5). All of the aforementioned habitat zones require particular care in design and construction of the alignment due to the abundance of Myrtle Beech and its vulnerability to Myrtle Wilt that can be facilitated by disturbance.

While the vegetation quality varies marginally across the 2 designated zones that represent Montane Wet Forest (zone 2 and7), each zone supports a near benchmark cover and diversity of understorey species and organic litter and logs meet the optimal benchmark but natural recruitment is often patchy. Large old trees through Montane Wet Forests are reasonably abundant and vary from 50-100% of the large Tree benchmark per hectare.

As the vegetation moves further west towards McKenzie Creek, elements of Blackthorn Scrub (EVC 27) appear in association with drainage lines although a Eucalypt cover is still present among a suite of understorey species associated with Montane Wet Forest.

Other than some minor occurrences of grassy or herbaceous weeds on the road verges, there is virtually no weed cover within the Donna Buang East Region.

Mount Donna Buang West to Ben Cairn (Map 4 and Map 5)

Large areas of Cool Temperate Rainforest persist to the north of Donna Buang Road where the proposed trail is located. The trail then crosses the road and heads south where the vegetation suddenly transitions into a relatively open Wet Forest (EVC 30) (Habitat Zone 9). Despite the relatively open canopy, Large Trees are at least 70% of the per hectare benchmark.

The middle section of Habitat Zone 9 features large rocky outcrops in the western margins of the assessment corridor.

As the trail moves further south, the vegetation transitions into a very sparse canopy immediately west of Donna Buang Road (habitat zone 10). While still present, large trees are less abundant throughout this zone (less than 50% per hectare benchmark).

The alignment then continues south of Donna Buang Road where the assessment corridor traverses steeper downslopes and moves from the Victorian Alps Bioregion into the Highlands Southern-fall Bioregion.

South of Donna Buang Road towards the APM Access Track (Map 6 and Map 7)

Canopy cover and forest age class varies as the trail descends further south. With Habitat Zones 11, 13 and 15 exhibiting a partially mature forest cover with a Large Old Tree per hectare varying between from of 40-60% of benchmark cover. In contrast, Habitat Zones 10, 12, 14 and 16 generally lack a mature canopy with only sparse occurrences of Large Old Trees. However, most of the above zones support a near benchmark understorey cover and lifeform diversity. Mountain Ash *Eucalyptus regnans* is the dominant canopy species across these zones although scattered occurrences of Messmate *Eucalyptus obliqua* occur within the most south-westerly portions.

Mountain Ash *Eucalyptus regnans* dominated Wet Forest continues as the trail heads further east of Kennedy Creek although the forest age and quality are variable all the way through to Dee River. Within this section, the trail alignment often interacts with the APM Access Track which includes some trafficable areas and other former abandoned tracks which support young regrowth (~20-30 years old). Past logging activity is evident in patches within this landscape including more recently logged

forested approximately 30–40 years old (e.g. Habitat Zones 16 and 17) and mature forests apparently undisturbed since 1939 (e.g. Habitat Zones 15 and 18).

A small area of Riparian Forest vegetation occurs in association with the Dee River that supports Swamp Gum and Manna Gum in addition to a suite of riparian species not observed throughout most areas in the vicinity of the APM Access Track.

Most of the zones between Kennedy Creek and Dee River support a suite of understorey lifeforms with most understorey components present. Like most of the assessment areas, the ground layer supports ample organic litter and logs of various sizes. Although most areas from south of Donna Buang Road to Dee Road have minimal overall weed cover, small patches of Blackberry **Rubus fruticosus,* Ragwort **Jacobaea vulgaris* and Spear Thistle **Cirsium vulgare* were identified and mapped at various locations where the canopy cover is sparse and/or where previous disturbance is evident along track edges.

O'Shannassy Aqueduct and Donna Buang Road to Aqueduct Link (Map 8 and Map 9)

A similar pattern of Wet Forest vegetation persists throughout Habitat Zone 18 where vegetation is mostly consistent with Wet Forest with varying age classes based on historical disturbance (both natural and anthropogenic). Lower elevations between Harrison and Walkers Creek support elements of Damp Forest EVC 29 due to the sparse occurrence of wetter elements such as ground ferns and shade dependent herbs and the transition from a Mountain Ash dominated canopy to increasing cover of Mountain Grey-gum and Messmate Stringybark.

As the trail moves further east (Habitat Zones 19–20), there are some stands of pines which are a legacy of pine plantations established in various patches to the north of the Aqueduct Trail, although native vegetation in the understorey and canopy is still dominant. However, further to the east, mature pines and newer recruits dominate the canopy and upper storey (within and surrounding habitat zone 21). Native understorey vegetation has recolonised these areas, however, there is only a sparse occurrence of mature Eucalypts with minimal Large Old Trees and no recruitment cohorts observed. Trails further to the east (Habitat Zones 25 and 26) return to largely intact Wet Forest with a mature Eucalypt canopy.

Two trails descend from Donna Buang Road to meet the trails in the vicinity of the O'Shannassy Aqueduct; these include Habitat Zones 22–24. The easterly trail (HZ22 is on a sheltered southerly slope and is attributable to Wet Forest. The trail to the west (id 5A) occurs on slightly more exposed slopes where Damp Forest (HZ23) and Shrubby Foothill Forest (HZ24) are the prevailing vegetation types. These sections support highly intact native vegetation with no weed cover although some sections have only sparse occurrences of Large Old Trees.

There is an existing walking track that links Donna Buang Road to the Aqueduct Trail where a number of paths converge at the southern end of the route. There are some notable weed populations in these areas, particularly large populations of Arum Lily **Zantedeschia aethiopicum.*

Yuonga Track to O'Shannassy Aqueduct (Map 10 and Map 11)

This section starts from the intersection of Donna Buang Road and Yuonga Track and then departs the track as its winds its way down to Yuonga Road. The trail section that traverses Yuonga Track is not trafficable as native vegetation has fully colonised this area. The entire section supports mature Wet Forest, however, Habitat Zone 27 has a generally low occurrence of Large Old Trees although there are some notable habitat trees (>150 cm in diameter). Once the trail departs the track there is a mix of mature forest with greater density of Large Trees, however, there are also sections containing large Pines further towards the aqueduct.

Warburton Golf Course (Map 12)

This section starts from O'Shannassy Aqueduct and heading south through the Warburton Golf Course. This section of trail has only received a desktop assessment. There is mapped Wet Forest vegetation located in the northern end of the Golf Course property that is not actively used as part of the golf course. As the trail moves through the Golf Course the vegetation appears to be highly modified with overstorey trees on the edge of fairways.

Mount Little Joe – Backstairs Track (Map 13 and Map 14)

This section supports generally drier vegetation types compared to the alignment to the north of Warburton Highway. The northern portion of this landscape is on a steep exposed aspect and mostly supports Shrubby Foothill Forest (EVC 45) and in some cases, Herb-rich Foothill Forest (EVC 23). Much of this landscape has experienced numerous fire events since 1939 including wildfires from 1983 (Ash Wednesday) and 1991. Several fuel reduction burns have also been undertaken over the past 10 years between the ridgeline and the Warburton Highway. Many of these areas support immature forests with a low occurrence of Large Trees although the understorey is highly intact.

Gully lines and sheltered aspects at lower elevations support Damp Forest EVC including Habitat Zones 29-31 and 35. These areas are associated with drainage lines and occur on the interface of the township. Consequently, these areas have a notable cover of high threat weeds including Sweet Pittosporum #*Pittosporum undulatum*, Wild Tobacco Tree **Solanum mauritianum,* Arum Lily **Zantedeschia aethiopica* and Red Cestrum **Cestrum elegans*. Other than these areas, the vegetation is virtually weed free.

Wesburn (Map 15)

This trail section has alignments of trail that generally head west and linking other trail sections. This section of trail has only received a desktop assessment. The mapped vegetation in the area includes Lowland Forest and Shrubby Foothill Forest on the drier ridges and mid-slopes and Riparian Forest and Damp Forest in the wetter gullies. There is a record of Greater Glider within close proximity of the proposed trail.

Old Warburton Road Region (Map 16 and Map 19)

Most of this region supports highly intact Shrubby Foothill Forest and smaller sections of Damp Forest in sheltered easterly and southerly aspects. Forest age classes vary, and all areas have experienced various degrees of fire intensity and frequency. Although there are notable gaps, most of the determined Habitat Zones support an abundance of Large old trees and smaller habitat trees (i.e. 70%

to >100% of the per hectare benchmark for large trees). There are minimal weeds throughout the entire landscape.

Mount Bride Road and Cumming Spur Track Region (Map 17, Map 20, Map 21, Map 23 and Map 24)

This area supports a mix of Damp Forest and Shrubby Foothill Forest with Wet Forest being confined to sheltered easterly aspects at higher elevations (ASL +750m). State databases indicate that most of the landscape to the west of Mount Bride Road was logged in the 1980s and while Large Trees are underrepresented across much of this area, native vegetation at all stratas is high in diversity with virtually no weeds present.

There are some significant old habitat trees (>150cm DBH) to the west of Mount Bride Road within areas of Damp Forest. Notably, most of these are Mountain Grey Gum among a relatively sparse canopy with few large old trees. It appears that Mountain Ash may have been the target species during past logging activities while many 100+ year old Mountain Grey Gums have been left.

Cumming Spur Track East Region (Map 17, Map 18,Map 21,Map 22,Map 24 and Map 25)

This section of trail has only received a desktop assessment. The mapped vegetation in the area includes Shrubby Foothill Forest on the drier ridges and mid-slopes and Damp Forest and Wet Forest in the wetter gullies. The majority of this region occurs within high probability habitat for Leadbeater's Possum.

Two species of Burrowing Crayfish; Curve-tail Burrowing Cray *Engaeus curvisuturus* and Tubercle Burrowing Crayfish *Engaeus tuberculatus* are likely to be found within this section based on records within the broad assessment area and the habitat conditions they favour. It will be important to record any burrow activity along the alignment when this section goes through the detailed assessment.

3.2 Habitat hectare assessment

Sixty-nine vegetation quality zones (Habitat Zones) were assessed across the approximately 150 km of the project alignment. Using the Vegetation Quality Assessment (Habitat scoring methodology). The original March 2017 report included over 100 habitat zones assessed in accordance with the *Permitted Clearing Biodiversity Assessment Guidelines* (DEPI 2013). The revised assessment consolidates many of the previously assessed zones and new zones based on the current native vegetation policy and the *Assessor's Handbook* (October 2018). Page 17 of the *Assessor's Handbook* provides the following approach to Vegetation Quality (Habitat Hectare) Assessments (VQA):

> 'Changes in habitat condition should generally not influence how a habitat zone is defined. In general, a habitat zone should only be split based on the presence of a different EVC, not based on a change in the vegetation condition. However, a Habitat Zone must be split when it cannot be reasonably represented by a single VQA because:
>
> - The condition score (out of 75) varies by at least 15 points
> - the extent of the continuous patch of vegetation to be removed is greater than 1 hectare.

Table 3, Table 4, Table 5 and Table 6 on the following pages presents the results of the Habitat hectare assessment.

The newest alignment sections (approximately 30km) that have, to date, only received a desktop assessment were assigned Habitat Zones based on modelled EVCs and vegetation quality scores. This information is what is currently used in Section 4 to assessed the potential native vegetation loss and offset requirements. Details of each of the Habitat Zones in the desktop only sections can be found in the Scenario Test Native Vegetation Report Zones 70- 113 in Appendix 11.

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Table 3. Habitat hectare assessment – Mount Donna Buang East and West

Habitat Zone			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Bioregion			VALP	VALP	VALP	VALP	VALP	VALP	VALP	HSF	VALP	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF
Criteria		Max Score	EVC CTR	EVC MWF	EVC CTR	EVC MWF	EVC CTR	EVC CTR	EVC MWF	EVC CTR	EVC WF	EVC WF	EVC WF	EVC WF	EVC WF	EVC WF	EVC WF	EVC WF	EVC WF
Site Condition	Large Trees	10	5	9	6	10	10	4	5	4	7	5	5	2	3	2	3	5	5
	Canopy	5	4	4	4	4	4	4	4	5	4	2	4	2	5	3	4	2	4
	Lack of Weeds	15	13	15	13	13	15	13	13	13	15	13	13	13	13	13	13	13	13
	Understorey	25	20	20	20	20	15	20	20	20	25	20	20	25	25	20	20	20	20
	Recruitment	10	3	6	3	3	6	6	6	6	6	10	6	6	3	3	6	6	6
	Organic Litter	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Logs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Sub-total		55	64	56	60	60	57	58	58	67	60	53	58	59	52	55	56	58
Landscape	Patch Size	10	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	Neighbourhood	10	7	7	7	7	7	7	7	7	6	7	7	7	7	7	7	7	7
	Distance to Core	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Sub-total		19	19	19	19	19	19	19	19	18	19	19	19	19	19	19	19	19
Total Habitat Score			74	83	75	79	79	76	77	77	85	84	72	77	79	70	74	75	77
Habitat Hectare Score /100			0.74	0.83	0.79	0.79	0.78	0.76	0.77	0.77	0.85	0.84	0.72	0.77	0.79	0.70	0.74	0.75	0.77
Area (Hectares)			2.51	1.73	0.91	1.57	2.46	1.6	1.01	1.48	3.09	4.38	2.31	2.51	2.44	0.64	3.68	1.5	2

Table 4. Habitat hectare assessment – Drop A K South

Habitat Zone			18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Bioregion			HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF
Criteria		Max Score	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC
			WF	WF	WF	WF	WF	DF	SFF	WF	WF	WF	WF	SFF	DF	DF	DF	SFF	DF
Site Condition	Large Trees	10	3	2	0	0	5	2	8	7	2	3	7	5	3	3	5	0	4
	Canopy	5	3	2	2	0	4	4	4	4	2	2	2	2	2	2	4	2	2
	Lack of Weeds	15	13	7	7	0	15	15	15	15	7	13	7	11	13	13	13	13	13
	Understorey	25	15	20	20	15	20	15	15	25	15	20	20	15	20	20	25	15	20
	Recruitment	10	3	6	6	5	6	10	5	6	6	6	6	3	6	6	6	3	10
	Organic Litter	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5
	Logs	5	5	3	3	2	5	5	5	5	5	5	5	5	5	5	5	5	5
	Sub-total		47	45	43	27	60	56	57	67	42	54	52	46	54	54	63	43	59
Landscape	Patch Size	10	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	Neighbourhood	10	7	7	7	7	7	7	7	7	7	7	7	6	6	6	6	6	6
	Distance to Core	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Sub-total		19	19	19	19	19	19	19	19	19	19	19	18	18	18	18	18	18
Total Habitat Score			66	64	62	45	79	75	76	86	61	73	71	64	72	72	81	61	77
Habitat Hectare Score /100			0.66	0.64	0.62	0.45	0.79	0.75	0.76	0.86	0.61	0.73	0.71	0.64	0.72	0.72	0.81	0.61	0.77
Area (Hectares)			19	6.58	10.8	2.57	10.5	2.41	6.7	4.91	1.63	5.32	4.58	0.71	2.13	1.82	3.92	4.3	2.8

Table 5. Habitat hectare assessment – Drop A K East

Habitat Zone			35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
Bioregion			HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF
Criteria		Max Score	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC
			DF	HHRFF	SFF	SFF	SFF	DF	DF	LF	SFF	DF	SFF	SFF	DF	SFF	DF	DF	DF	SFF
Site Condition	Large Trees	10	5	1	0	5	3	7	9	3	5	7	3	9	8	8	5	3	6	10
	Canopy	5	4	3	4	4	4	4	5	2	2	4	4	4	5	5	2	4	5	5
	Lack of Weeds	15	7	13	13	15	15		15	15	15	15	15	15	15	13	15	15	15	15
	Understorey	25	15	15	15	20	20	25	20	20	25	20	25	25	20	20	25	20	20	20
	Recruitment	10	6	3	6	6	6	10	6	3	10	6	10	10	6	10	10	6	10	10
	Organic Litter	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Logs	5	5	5	5	5	5	5	5	4	4	5	5	5	5	5	5	5	5	5
	Sub-total		47	45	48	60	58	56	65	52	66	62	67	73	64	66	67	58	66	70
Landscape	Patch Size	10	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	Neighbourhood	10	6	6	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7
	Distance to Core	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Sub-total		18	18	18	18	18	18	18	18	18	18	19	19	19	19	19	19	19	19
Total Habitat Score			65	63	66	78	76	74	83	70	84	80	86	92	83	85	86	77	85	89
Habitat Hectare Score /100			0.65	0.63	0.66	0.78	0.76	0.74	0.83	0.7	0.84	0.8	0.86	0.92	0.83	0.85	0.86	0.77	0.85	0.89
Area (Hectares)			2.8	2.98	1.3	1.57	9.7	2.12	5.55	2.71	1.72	1.21	3.41	0.9	1.73	0.73	4.45	2.77	6.13	3.03

Table 6. Habitat hectare assessment – Mount Tugwell North

Habitat Zone			53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
Bioregion			HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF
Criteria		Max Score	EVC SFF	EVC SFF	EVC SFF	EVC SFF	EVC WF	EVC SFF	EVC DF	EVC SFF	EVC DF	EVC DF	EVC SFF	EVC SFF	EVC DF	EVC SFF	EVC SFF	EVC SFF	EVC SFF
Site Condition	Large Trees	10	10	3	3	4	9	10	9	10	6	5	7	8	9	6	8	10	0
	Canopy	5	5	5	5	5	5	5	5	5	5	4	4	5	4	5	5	5	5
	Lack of Weeds	15	13	13	13	13	15	13	15	13	13	15	13	15	13	15	15	15	15
	Understorey	25	20	20	15	20	15	20	15	20	15	20	20	20	20	20	20	20	20
	Recruitment	10	10	10	6	10	6	10	1	10	1	1	10	10	3	10	10	10	10
	Organic Litter	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Logs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Sub-total		**68**	**61**	**52**	**62**	**60**	**68**	**55**	**68**	**50**	**55**	**64**	**68**	**59**	**66**	**68**	**70**	**60**
Landscape	Patch Size	10	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	Neighbourhood	10	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Distance to Core	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Sub-total		**19**	**19**	**19**	**19**	**19**	**19**	**19**	**19**	**19**	**19**	**19**	**19**	**19**	**19**	**19**	**19**	**19**
Total Habitat Score			**87**	**80**	**71**	**81**	**79**	**87**	**74**	**87**	**69**	**74**	**83**	**87**	**78**	**85**	**87**	**89**	**79**
Habitat Hectare Score /100			0.87	0.8	0.71	0.81	0.79	0.87	0.74	0.87	0.69	0.74	0.83	0.87	0.78	0.85	0.87	0.89	0.79
Area (Hectares)			**0.62**	**11.4**	**0.92**	**1.72**	**0.98**	**1.24**	**0.75**	**0.9**	**0.62**	**0.32**	**2.71**	**6.02**	**1.2**	**3.16**	**5.56**	**1.63**	**0.36**

3.3 Flora

A total of 190 plant species were recorded in the study area during the survey including 171 that are indigenous and 19 are introduced or naturalised outside their natural range. Appendix 5 lists all flora recorded within the study site. Table 7 summarises plant taxa recorded during surveys within the assessment corridor.

Table 7. Summary of plant species recorded

Flora Status	Number of Taxa
Indigenous vascular species	171
Exotic species	18
Native species outside of natural range	1
TOTAL	**190**

3.3.1 State or nationally significant flora

The presence of 2 rare Victorian threatened flora species was confirmed. Numerous occurrences of Tree Geebung *Persoonia arborea* were identified towards the summit, although no specimens were found to occur directly within the trail alignment or assessment corridor. A small population of Long Pink Bells *Tetratheca stenocarpa* was identified within habitat zone 45 and 52 (Map 20 and Map 21of Appendix 2). The locations were flagged and mapped with a GPS and it is likely that direct impact to this species can be avoided.

It is also possible that numerous populations of Powelltown Correa *Correa reflexa var. lobata* persists within the Mount Tugwell area where sites have recently experienced wildfire and prescribed burns. These plants were mostly immature (regrowth from bushfire) and no flowering parts were found. Without flowering parts, Powelltown Correa is difficult to distinguish from its common counter-part *Correa reflexa var. reflexa.* While these species are rare to Victoria, they do not have any legislated protection under the FFG or EPBC Act, however they are considered under the Biodiversity Assessment Guidelines in the context of Habitat Importance Maps (Section 4.4).

Habitat modelling produced by DELWP (DEPI 2013b) includes 21 additional significant flora species that potentially occur in the assessment corridor. Location records were obtained from the Victorian Biodiversity Atlas (VBA) for the relevant species within a 5-kilometre radius of the subject site. Appendix 5 details these species with regard to habitat requirements, local VBA records and likelihood of occurrence within the subject site.

Threatened flora species, that to date haven't been observed, but have a moderate to high likelihood of occurring (Appendix 6) include Round-leaf Pomaderris *Pomaderris vacciniifolia,* Slender Tree-fern *Cyathea cunninghamii,* Skirted tree-fern *Cyathea x marcescens* and Fairy Lanterns *Thismia rodwayi*.

Although only 2 threatened flora species were identified during assessments undertaken for this study, this does not mean other locations of threatened species do not occur within the indicative

trail alignment as identification of some species has seasonal limitations (e.g. Naked Beard-orchid *Calochilus imberbis* and Fairy Lanterns *Thismia rodwayi)*. At this stage with the survey work conducted, the assessment corridor does not support any nationally threatened flora species listed under the EPBC Act.

3.3.2 Observations of High Threat Weeds

High threat weeds were notably sparse throughout the majority of the assessment corridor. During ground truthing assessments, locations of high threat weeds were mapped. In locations were weed cover was minimal (i.e. less than 5% cover), the main weeds identified were small areas of Blackberry **Rubus fruticosus spp. agg.* patches of Ragwort **Jacobaea vulgaris* and Foxglove **Digitalis purpurea.* These were observed in areas of sparser canopy where there was enough light to penetrate the forest floor.

Scattered woody weeds were observed in the vicinity of high use areas (existing public trails or adjacent to open spaces). Species observed included Sweet Pittosporum *#Pittosporum undulatum*, English Holly **Ilex aquifolium,* Wild Tobacco Tree **Solanum mauritianum,* Japanese Honeysuckle **Lonicera japonica,* Arum Lily **Zantedeschia aethiopica* and Red Cestrum *Cestrum elegans*.

3.3.3 Habitat Trees

A total of 1503 trees were mapped that are potential habitat trees for Leadbeater's' Possum, Greater Glider or for forest owls (such as the Sooty Owl and Powerful Owl) and other dependent fauna. The range of trees recorded include:

- **Pre-1900 living trees** (estimated to be greater than 120cm diameter) of which all are considered to be suitable habitat for LBP.
- **Smaller habitat trees** defined as trees less than 120cm diameter with visible hollows
- **Other hollow bearing trees** of various size classes in lower probability Leadbeater's Possum habitat that exhibit hollows suitable for a range of owl species and other hollow dependent fauna
- **Other Large Trees**; while no hollows were visible, these may provide suitable habitat hollows in the present or near future

The location, size category, condition (dead or alive) and species of each tree was recorded and is maintained within the project database. Hollows were noted for each tree where observed. Appendix 3 (Map Series 2) illustrates locations where there is a high density of significant trees. Protection of significant trees is further detailed in section 5 of this report.

3.4 Fauna

No detailed fauna surveys were undertaken during this study. The main focus of the fauna assessment was the consideration of the assessment area to potential to provide fauna habitat. The habitat observed within the assessment area included:

- tree canopies, and trees with small and large hollows, including dead stags
- dense understorey vegetation including shrubs and grasses
- vegetation (foliage, fruit and grasses) that provide food resources
- leaf litter and rocks
- moist depressions and wet areas along gully lines
- large fallen logs that are hollow or concave

Vegetation throughout the assessment area provides high-quality fauna habitat for hollow dependent fauna due to the abundance of medium and large old trees and or dead stags including trees with a range of hollow sizes suitable for a diverse array of dependent fauna species. There is high habitat connectivity across the landscape for foraging.

The dense midstorey provides suitable nesting and foraging habitat for a range of small bird species. Most of the assessment area supports a consistent cover of leaf litter and large fallen logs, and in some area's grassy tussocks, that is ideal habitat for smaller fauna species such as small mammals, birds, reptiles, frogs and invertebrates.

State or nationally significant fauna

No fauna of state or national significance was recorded during the site inspections. However, the regionally significant Koala *Phascolarctos cinereus* was recorded at Mount Tugwell in the vicinity of 'Little Joe Climb'.

Habitat modelling produced by DELWP includes eleven significant fauna species that potentially occur in the assessment area. Appendix 7 detail these species with regard to habitat requirements, local VBA records (within 5 km of the subject site) and likelihood of occurrence. Appendix 8 includes assessment of significant impacts to nationally listed fauna for those species that have a moderate to high likelihood of occurring in the study area.

Of the eleven species included in DELWP habitat modelling, the following were considered to have a high likelihood of occurring in the study area:

- Leadbeater's Possum *Gymnobelideus leadbeateri*
- Eastern Horseshoe Bat *Rhinolophus megaphyllus megaphyllus*
- Lace Monitor *Varanus varius*
- Powerful Owl *Ninox strenua*

- Grey Goshawk *Accipiter novaehollandiae novaehollandiae*
- Masked Owl *Tyto novaehollandiae*
- Square-tailed Kite *Lophoictinia isura*
- Sooty Owl *Tyto tenebricosa tenebricosa*

The local area supports numerous habitat trees suitable as nesting or roosting habitat for Leadbeater's Possum, owls and raptors, and microbats. The forested area present in the study area provides extensive foraging habitat for all these species.

Two of the remaining species (Australian Grayling *Prototroctes maraena* and Chestnut-rumped Heathwren *Calamanthus pyrrhopygius*) are considered to have a low likelihood of occurrence within or near to the assessment area based on a combination of factors including lack of suitable habitat and lack of local records. Suitable habitat is present for the Smoky Mouse *Pseudomys fumeus* and has a moderate likelihood of occurrence, although the species has a patchy distribution in Victoria and there are no local records.

An additional 29 species state or national significance (Scheduled in DSE 2013) were assessed as to their likelihood of occurrence (Appendix 8) because of sightings made within 5 km of the subject site, or EPBC-listed species that were predicted to occur based on the results of the Protected Matters Search Tool. The EPBC-listed Grey-headed Flying Fox *Pteropus poliocephalus* and Swift Parrot *Lathamus discolor* have a medium likelihood of occurrence, although both species are likely to only be transient individuals foraging through the area during long-distance dispersal. There is a high likelihood of the EPBC listed Southern Brown Bandicoot *Isoodon obesulus obesulus* occurring on the subject site. Other FFG-listed species with a high likelihood of occurrence including Common Bent-wing Bat *Miniopterus schreibersii*, Brush-tailed Phascogale *Phascogale tapoatafa* and Barking Owl *Ninox connivens connivens.*

The Curve-tail Burrowing Cray *Engaeus curvisutus* and Tubercle Burrowing Crayfish *Engaeus tuberculatus* are both likely to occur within the trail alignment areas that have only currently had a desktop assessment (Map 17, Map 18,Map 21,Map 22, Map 24 and Map 25)

3.4.1 General Fauna Observations

The majority of the proposed trail (and sections of existing trail), traverses' intact remnant native vegetation. The presence of many older trees with small to large hollows indicates high likelihood to support tree hollow-dependent fauna, potentially including threatened fauna such as Leadbeater's Possum, Brush-tailed Phascogale, Spot-tailed Quoll *Dasyurus maculata*, Sooty Owl *Tyto tenebricosa*, Barking Owl, Powerful Owl, and Lace Monitor. In more swampy areas supporting plants such as Sword-sedges and Tea-tree, there is a potential for Swamp Skink *Lissolepis coventryi* to be present.

Where the vegetation is highly diverse in species composition and complexity, the habitat is likely to support greater variety of fauna, particularly where there is a dense undergrowth, presence large logs and/or rocks/boulders. Although there are some more open areas, which resemble more of

a woodland type (e.g. as a result of past logging or past Pine plantations), these areas are important for more woodland specialist fauna (including Barking Owl, and a range of woodland birds).

A large number of bird species were observed during trail habitat assessments. Common Wombat *Vombatus ursinsus* dens and droppings were encountered frequently, as were freshwater burrowing cray 'chimneys' near watercourses and Lyrebird *Menura novaehollandiae* display mounds. Swamp Wallaby *Wallabia bicolor* and Eastern Grey Kangaroo *Macropus giganteus* droppings were occasionally observed. Several bird nests were detected within the understorey and canopy, as were Common Ringtail Possum *Pseudocheirus peregrinus* dreys. Skinks were observed in many areas of good organic litter cover within proximity of logs and/or rocks.

In regard to exotic/pest fauna species, there were definite signs of the presence of foxes and rabbits in particular through incidental observations of scats, tracks, remains of bird kill and tree-rubs.

Scats from Sambar Deer *Rusa unicolor* were identified and were sighted on several occasions within the Yarra State Forest. Deer and foxes are a particular issue, as they tend to move through the landscape on formed tracks and would likely use a mountain bike trail for their ease of use. Increasing accessibility of deer could impact the adjacent habitat by increasing spread of weeds and grazing pressure which in turn will reduce recruitment of indigenous vegetation, trampling/pugging of watercourses impacting water quality, and damaging trees through heavy browsing and/or rubbing of basal trunk bark. Increasing accessibility of foxes will likely impact small to medium fauna which are likely to be preyed upon.

4. IMPLICATIONS FOR NATIVE VEGETATION REMOVAL UNDER CLAUSE 52.17

This section addresses the proposed native vegetation impacts associated with this permit application. A permit is required to remove native vegetation as outlined in the Native Vegetation Clause 52.17 of the planning scheme and detailed in the *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017a).

The purpose of clause 52.17 and 'the Guidelines' is to ensure a no net loss to biodiversity as a result of removal or loss of native vegetation. This is achieved in three steps:

1. Avoid the removal, destruction or lopping of native vegetation
2. Minimise impacts from the removal where native vegetation cannot be avoided and,
3. Provide an offset to compensate for the biodiversity impact if a permit is granted

4.1 Assessment Category

An application to remove, destroy or lop native vegetation must be classified as one of the following assessment categories:

- basic
- intermediate
- detailed

The application requirements and decision guidelines in Clause 52.17 must be applied in accordance with the relevant assessment category.

To determine the assessment category, two factors are considered in relation to the native vegetation proposed to be removed:

- the location categories (shown in the location maps a location 1, 2 or 3)
- the extent of proposed native vegetation removal

Table 8. Determining the location category

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 2017a)

4.1.1 Location category

The location category has been determined for all of Victoria. Native vegetation will be in either location 1, 2 or 3 as outlined below

- Location 3 – includes locations 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.
- Location 2 – includes locations that are mapped as endangered EVCs and/or sensitive wetlands and coastal areas are not included in Location 3
- Location 1 – includes all remaining locations in Victoria.

The vegetation to be removed includes location 3. If more than one location risks apply to vegetation proposed for removal the higher number is to be applied to the application. Therefore, the application is in the 'Detailed' category.

The DELWP mapped wetland layer does not intersect with any areas of the alignment.

4.1.2 Extent of impact from proposed development

As outlined in 'The Guidelines', an application must consider:

- the proposal and all buildings and works that could impact on existing native vegetation, including mapped wetlands.
- Consider any ancillary uses, utilities, access and earthworks associated with the use or development and any defendable space requirements.
- The full extent of native vegetation removal must be considered.
- Assumed losses account for indirect loss of native vegetation for example, encroachment into tree protection zones, loss from changed water flows and shading.

The following sections provide preliminary discussion in relation to these requirements.

4.2 Biodiversity loss from the proposed development

At this stage, biodiversity loss associated with this proposal is based on the following:

- The construction width of the mountain bike trail is 1.2 metres. Areas of impact beyond the trafficable width would vary across the alignment based on the various treatments required (e.g. switchbacks, bench cuts, gully crossings, barriers, anchoring points and construction access requirements. It is estimated that (on average) a 2m wide transect accounts for the impact.
- A 50% loss of vegetation assessed in habitat hectares due to:

- No impact or removal of canopy or sub-canopy trees
- Partial impact to understory (throughout the majority of the alignment, no shrubs or understory tree would require removal)
- No loss to habitat connectivity that would affect 'patch size' neighbourhood' or 'distance to core' scoring

The estimated impacts are based on the following assumptions and principles:

- There may be minimal or no construction impact beyond the 1.2 metre trafficable width in locations where the natural grade is relatively even (between 0^0 and 5^0) and no significant earthworks are required.

- There may be greater construction impact where the trail traverses' steeper areas where excavation would be required to create a level grade. This includes steeper slopes (10^0 to 30^0) where switchbacks are required (e.g. south of Donna Buang Road and the north face of Mount Little Joe) or where a crosscut may be required across the steepest locations (e.g. the areas west of Hooks Road).

- While there are a range of engineering solutions available to minimise construction impacts, any areas that cross gully lines and ephemeral drainage lines are expected to have an impact greater than the standard trafficable width, unless an elevated platform is installed. Low-level boardwalks will be installed at all defined water courses, in compliance with Melbourne Water requirements.

With the above principles in mind, it is important to distinguish between direct impacts (within the works footprint) and indirect impacts from development projects. For example, while the width of the trail is unlikely to significantly encroach on a Tree Protection Zone of a large tree, the alignment would need to ensure that damage to the structural root zone of significant trees are avoided. For example, a large to very large old tree (between 100-150cm DBH) would need a setback of 2-3 metres from construction works to avoid potential damage to structural root zones unless there is a demonstrated construction solution.

4.3 Avoiding and Minimising impacts to biodiversity

This type of proposal aims to bring the experience of mountain biking into a significant landscape to enhance the user experience and provide recreational opportunities that will promote tourism and economic growth to the region. In this context, the loss of vegetation cannot be avoided and considerations to minimise impacts within this landscape is limited to re-alignments of the trail to reduce impacts to the highest biodiversity values (e.g. direct impacts to threatened species or reduced impacts to endangered vegetation types) or to reduce impacts through detailed design and construction mitigation. A Risk Assessment Matrix is provided in Appendix 4 to address various siting, design and construction measures to minimise environmental impacts. This matrix is based on the current *Environmental Protocols* (Appendix 10) developed by the project working group.

Prior to the development of the Environmental Protocols, there have been a range of considerations that have sought to minimise biodiversity impact during the planning stages thus far including:

- Establishment of a range of assessment procedures and discussion of design and construction solutions as negotiated with Yarra Ranges Council, DELWP and Parks Victoria. This process has sought to avoid impacts to significant biodiversity values such as Leadbeater's Possum habitat and Cool Temperate Rainforest.

- Identification of significant trees and threatened species during ground truthing and identifying opportunities to avoid or reduce impacts within the 20-metre corridor.

It is also acknowledged that during ground truthing, significant realignments were made to avoid Cool Temperate Rainforest compared to the preliminary trail alignment. While Cool Temperate Rainforest cannot be completely avoided to the north of Donna Buang Road, the alignment attempts to locate the trail close to road upon descent from the Summit, except for steeper gullies within rainforest areas that would otherwise necessitate more earthworks.

Extensive areas of Cool Temperate Rainforest occur between Donna Buang Road and the Ben Cairn Area (refer to Map 1-4). Inspections of these locations to the north of the current trail alignment confirmed the presence of Cool Temperate Rainforest even though it is not represented in the EVC modelled data sets. The original trail alignment (as circulated in September 2017) traversed this highly sensitive landscape. From Habitat Zone 1-8 (where Cool Temperate Rainforest could not be avoided), the revised trail route opted for an alignment close to the road all the way through to its departure from the road as the trail heads south. This alternative substantially avoids Cool Temperate Rainforest compared to the original alignment.

The planning process is to include a *Construction and Environmental Management Plan* (CEMP). As a minimum, items to be addressed in the CEMP are to include:

- mitigation measures to be implemented during operation phase – e.g. minimising spread of pathogens (Myrtle Wilt), litter, weeds etc.

- Specific mitigation measures developed for listed species or communities.

- Risks, impacts and mitigation measures considered should be for both the construction and operation phase of the project.

4.4 Biodiversity impacts and offset requirements

A Native Vegetation Report (NVR) 'test scenario' utilising Ensym software (the approved method provided by DELWP) was undertaken for the groundtruthed assessed trail (21.28 ha of loss). It is important to note that a new Scenario Test based on the actual impacts relating to the desktop assessed sections would be required once the additional areas receive the detailed ecological assessment (4.31 ha of loss).

This preliminary NVR report (Appendix 11) indicates the following offset requirements:

Offset Type	Species Offsets
Offset Amount	14.386 SHU's Brickmaker' Sedge *Gahnia grandis* 14.552 SHU's Long Pink Bells *Tetratheca stenocarpa* 10.556 SHU's Fairy Lanterns *Thismia Rodwayi* 14.387 SHU's Powelltown Correa *Correa reflexa var. lobata* 7.591 SHU's White Star-bush *Asterolasia asteriscophora subsp. albiflora*

Offset Implications

Offsets for threatened species are based on *Habitat Important Maps*, which are managed by DELWP. These maps indicate the importance of locations as habitat for a particular rare or threatened species based on modelled data. Where a proposal determines that native vegetation removal will have an impact on equal or greater than 0.005% of the mapped range for a rare or threatened species, an equivalent offset is required for that species within the same habitat type. Based on the current 'test scenario', there are five threatened species that require *Species Offsets* shown below:

- Fairy Lanterns *Thismia rodwayi*
- Long Pink-bells *Tetratheca stenocarpa*
- Powelltown Correa *Correa reflexa var. lobata*
- Brickmaker's Sedge *Gahnia grandis*
- White Star-bush *Asterolasia asteriscophora subsp. albiflora*

During the original assessment in early 2017, it was predicted that the project would trigger an offset requirement for the Mount Donna Buang (MDB) Wingless Stonefly *Riekoperla darlingtonia.* Habitat importance mapping and the native vegetation policy has since been revised by DELWP and it appears unlikely that specific offsets would be required for (MDB) Wingless Stonefly or other threatened fauna species.

Offsetting Strategy

Attainment of a biodiversity offsets can be either:

- First party – located on land owned by the landholder who is proposing to remove the native vegetation
- Third party – located on land owned by a third party (through the native vegetation credit register)

A report on available Species Habitat Units on the Native Vegetation Credit Register as of the 16/12/2019 demonstrates that all SHU requirements are available for purchase (Appendix 12). This means that it is feasible for Third Party Offsetting to achieve the potential offset requirements for this project. It is important to note that offsets required will change once the desktop assessed alignments are ground-truthed.

The project team is also investigating suitable first party offset sites on either Crown Land or private land in the Warburton area and often close to the proposed trail alignment in order to consider a local offset if possible.

4.4.1 Offset Arrangements on Crown Land

The *Procedure for the removal, destruction or lopping of native vegetation on crown land* (DELWP 2018) outlines the following steps for 'New Removal of Native Vegetation'

- **Step 1**: Consider if native vegetation removal impacts on important biodiversity values
- **Step 2**: Avoid and minimise impacts on native vegetation
- **Step 3**: Record and report native vegetation; DELWP and Parks Victoria will record the amount of new native vegetation removal. This information will be collated at a statewide level, and annually reported to the Secretary to DELWP.

Offset options on Crown Land

The loss of biodiversity value through new removal of native vegetation on Crown land is counterbalanced with corresponding improvements to native vegetation and biodiversity resulting from actions undertaken by DELWP or Parks Victoria. Table 8 outlines options for this approach.

Table 9. Improvements to native vegetation from counterbalancing activities

Increase in condition	Works that improve condition of native vegetation or biodiversity. For example, managing for weeds or discontinuing allowed fire wood collection improves the condition of native vegetation, or managing for pest animals provides an improved outcome for a threatened species, and therefore biodiversity.
Increase in extent	Increase in the extent of native vegetation relates to increases in the area of Crown land that is covered by native vegetation. For example, acquiring freehold land that includes native vegetation and managing it for

	conservation, or revegetating an area of existing Crown land.
Increase in security	An increase in security is achieved by changing the land status or land use to one that manages the native vegetation to a higher conservation standard. For example, changing the reserve status of a State forest to one where native vegetation is managed for conservation, or removing a licence from an area of land that currently allows a degrading land use, such as grazing. Increasing security can provide benefits for biodiversity beyond native vegetation by providing increased protection for all kinds of habitats.

4.5 Offset site eligibility

Whether offsets are achieved on the same land parcels as the impact site or provided as a 'Third Party', there are particular criteria that a site must comply with to be eligible as an offset (DEPI 2013b). A site that is not eligible cannot be used as an offset. The eligibility criteria are detailed and assessed in Table 9.

Table 10. Site eligibility criteria

Eligibility criteria	Details
Current land use and future land use	Current and future land use(s) must be compatible with managing the native vegetation for conservation. Incompatible current and future land use may include: – fuel reduction activities requiring removal of logs or trimming/clearing of understorey plants or trees – horse-riding, cycling or motorised vehicle use of established tracks – infrastructure easements – areas identified for other uses that are incompatible with managing native vegetation for conservation. This includes those with a public acquisition overlay for creation of a road or with approval to undertake activities that will damage native vegetation – other ongoing land uses that are likely to degrade vegetation condition or restrict improvement in vegetation condition.
Existing offsets or existing agreements	An area of native vegetation is eligible to be an offset if the native vegetation to be protected is: – not already being used to offset other clearance of native vegetation or species habitat required under Victorian or federal legislation – not subject to a current agreement or initiative to generate carbon credits – not subject to a current agreement under a biodiversity or native vegetation related incentive or grant program to undertake actions which are equivalent to the commitments specified in Section 4. – An area of land is eligible if it was formerly subject to an agreement and the agreement period has expired.

Eligibility criteria	Details
Threats to native vegetation condition	An area of native vegetation is eligible to be an offset if the landowner can control significant threats to the condition of the native vegetation. Such threats include those associated with: – high levels of continued nutrient run off – secondary salinity with a high likelihood of the effect increasing – continuing significant erosion which is uncontrollable without affecting native vegetation – significant invasion from pest animals such as rabbits, deer, goats and pigs – extensive die-back or other plant diseases – planned disturbance regimes incompatible with native vegetation objectives such as fuel reduction burning or flooding. – lack of, or inappropriate flooding regime – highly invasive weeds that are difficult to control at a site level.
Security (Freehold Land)	Entering into a security agreement with a relevant statutory body that: – contains a legally enforceable provision – has no termination date – is recorded on the land title – contains a site management plan. Agreements that can comply with these requirements include: – an agreement with DELWP under section 69 of the *Conservation Forest and Lands Act 1987* – an agreement with a responsible authority under section 173 of the *Planning and Environment Act 1987* (not available for third party offsets) – an agreement with Trust for Nature as an offset covenant under Section 3A of the *Victorian Conservation Trust Act 1972*.
Minimum management requirements	For an area of native vegetation to be eligible, the landowner must agree to the inclusion of minimum, ongoing commitments as detailed in a 10-year management plan.
Managing bushfire risk of offset sites	Managing an offset site for conservation objectives may be in conflict with managing native vegetation to reduce the risk to life and property from bushfire. To eliminate this conflict all offset sites must meet the following eligibility requirements in relation to managing bushfire risk. An offset cannot be established within: – 150 metres of a dwelling5 or any area (building envelope) to be used as a dwelling in the future if the dwelling or area is within a Bushfire Management Overlay (BMO) – 50 metres of a dwelling or any area (building envelope) that will or may be used as a dwelling in the future, when the dwelling or area is not within a BMO. – The distance can be reduced if the landowner or manager of the offset site has written approval from the Country Fire Authority, or relevant fire authority as defined by the planning schemes, that this distance can be safely reduced.

Eligibility criteria	Details
Revegetation	Revegetation must be done in accordance with the DELWP minimum planting. Revegetation of native vegetation must meet the following eligibility requirements to be an offset: – revegetation must be for a woody vegetation type – revegetation offset sites must meet the following size requirements: – for revegetation not abutting a patch of native vegetation the area of revegetation must have an area to perimeter ratio of at least 20 – for revegetation abutting a patch of native vegetation the combined area of revegetation plus adjacent patch of native vegetation must have an area to perimeter ratio of at least 20. – The area to perimeter ratio is calculated by dividing the area (metres squared) by the perimeter (metres).

5. ENVIRONMENTAL RISK AND IMPACT MITIGATION

This section provides an overview of the development proposal and discussion of mitigation methods during design and construction. Although there are limitations at this stage of the project, it is important to realise that the current proposed trail alignment is indicative only and just the starting point. Once a general alignment is approved, the project team will work towards a more detailed design and construction process with the objective of further avoiding and minimising significant ecological values.

5.1 Environmental Mitigation

The Warburton Mountain Bike Destination: Environmental Protocols (Appendix 10) outline the environmental standards to be met in the alignment of trails.

The protocols are intended to guide the design of alignments that result in minimal environmental disturbance and ensuring that any disturbance to environmental values can be appropriately mitigated where they cannot be avoided. These protocols relate to the alignment of the trail, but include some measures relating to the construction and operation of the trail where there is a reasonable expectation that these will impact the alignment itself. It is acknowledged that further work will be undertaken to develop a Construction Environmental Management Plan and an Operations Management Plan to provide further guidance on these factors.

These protocols were developed in conjunction with species experts for Cool Temperate Rainforest, Leadbeaters Possum and Mt Donna Buang Wingless Stonefly and are the combined work of the following organisations:

- Yarra Ranges Council
- Department of Environment, Land, Water and Planning (DELWP)
- Parks Victoria
- Practical Ecology
- World Trail

The standards and mitigation measures are based on information about the natural values that is currently known, and it is acknowledged that due to the remoteness and lack of disturbance in some of these areas, further ecological assessments, including field surveys at seasonally appropriate times of year will be required. The results of these surveys may require amendments to this document and further approval by the relevant land manager.

The protocols have been divided to provide clarity and to better define the risk to each value. However, there are sections within the landscape where these values overlap and the protocols for each individual value will need to be applied in these instances. For example, on the summit of Mount Donna Buang, there are known occurrences of Cool Temperate Rainforest, Cool Temperate Mixed Forest, Leadbeaters Possum, Mount Donna Buang Wingless Stonefly and native vegetation.

As outlined in Appendix 10, a range of protocols have been established by the project working group in an attempt to minimise environmental impact. These protocols were used to guide the selection and assessment of trail alignments. Further implementation of the environmental protocols and mitigation measures in the final alignment setting and the Construction Environmental Management Plan (CEMP) will be critical to the environmental risk mitigation.

5.2 Project Construction

Appendix 1 presents the maps to illustrate the trail alignment in the context of biodiversity values based on available data and new data collected during ground truthing.

The construction width of the mountain bike tread is 1.2m. Areas that require minimal or no excavation will be able to keep the impact within the 1.2m width of the trail for substantial portions of the trail alignment. For the more difficult areas, it is anticipated that the impact zone will be up to 2 metres and may involve:

- Excavations (i.e. bench cuts on steeper slopes) to facilitate the desired grade
- Any additional works beyond the trafficable zone (batters, retaining areas, anchoring materials and barriers)
- Areas that require switchbacks and gully crossings where more detailed design and construction techniques are required.
- Any minor drainage works that aim to redirect run-off

The exact dimensions of the construction footprint will be refined in negotiation with the appointed trail construction company (World Trail Pty Ltd) and the development of a Construction and Environmental Management Plan (CEMP). Generally, the construction will involve the cutting of a bench to allow the passage of the small excavator, but the finished ride line is only 0.3 – 0.6m.

The construction of the trail will require small purpose-built machinery (such as a mini-digger/traxcavator). The width of impact is considered minor although construction and operation of the trail will need to consider:

- Maintenance of a branch or debris free zone
- Any works near trees that may impact on tree protection zones or structural root zones
- Any requirements to cut and remove substantial logs and organic matter to enable construction and maintenance of the trail

Due to the above considerations and further design and construction detail required, impact mitigation outlined in this report is preliminary only.

5.3 High Risk Areas

In addition to standard Habitat Hectare Assessment and information provided in Map Series 1 (Appendix 1), Map Series 2 (Appendix 2 – Maps 1 to 16) illustrates the sensitive areas of the alignment. While it is expected that the entire construction program will need to follow a *Construction and Environmental Management Plan* (CEMP), the sensitive areas will require more than just the standard construction mitigation measures. Various design treatments specified in the Environmental Protocols and in the *Trail Construction Plan* and revisions to the alignment based on the advice and supervision of ecologists, fauna specialists and tree specialists will be required in these sensitive areas.

Sensitive areas as illustrated in Maps 1-7 of Appendix 2 is where the indicative alignment occurs in proximity to:

- Leadbeater's Possum nesting sites and high probability habitat
- MDB Wingless Stonefly buffer zones or modelled habitat
- Cool Temperate Rainforest
- Areas with a high density of Pre-1900 trees, Large Old Trees and or suitable habitat trees
- threatened flora identified during ground truthing or previously recorded in the VBA
- Locations of previous VBA records of Threatened Fauna

In most cases, more than one of the above values occur in the sensitive areas.

A risk assessment matrix (Appendix 3) has been developed by the Practical Ecology and the Project Team to assist with reducing ecological impacts of the trail.

6. RELEVANT POLICY AND LEGISLATION

The following section explores relevant environmental policy and legislation relevant to the proposed trail from the national level through to the local level.

6.1 Environment Protection and Biodiversity Conservation Act

The *EPBC Act 1999* applies to sites where proposed developments or projects may have a significant impact on matters of national environmental significance. There are currently seven matters of National Environmental Significance:

- World Heritage properties
- National Heritage places
- nationally listed threatened species and ecological communities
- listed migratory species
- Ramsar wetlands of international importance
- Commonwealth marine areas
- nuclear actions (including uranium mining).

Under the *EPBC Act*, a proponent must refer proposed actions that may require approval to the Commonwealth Environment Minister (or delegate). The Minister then decides which assessment and reporting option is applied. The Minister may approve a 'controlled action' allowing the development to proceed provided conditions are applied to mitigate significant impacts protected by this act.

Implications of National Environmental Significance

Based on a database query utilising the EPBC Protected Matters Search Tool, there are potential occurrences of numerous threatened species and one ecological community. The protected matters report identifies *Alpine Sphagnum Bogs and Associated Fens* as a potentially occurring ecological community. However, no vegetation types within the assessment corridor meet the definition of this ecological community.

Implications for listed threatened species

Populations of one EPBC species listed as 'endangered' (Leadbeater's Possum) are known to occur in several locations in the Yarra Ranges National Park in the vicinity of Donna Buang Road and the Summit Road, in fact almost the entire area from the Summit to the top of Kennedy Creek (approximately 15 km of the trail corridor) is considered high probability of habitat for the species.

Although the proposed trail traverses' significant areas of known habitat for Leadbeater's Possum, the type of works proposed may be considered minimal where the following objectives can be met:

- All large hollow bearing trees (dead and alive) are retained with no substantial works encroachment that would compromise the health and viability of such trees
- Minimal to no sub-canopy species are removed (such as Silver Wattle, Black Wattle and immature Eucalypts) to construct the trail as this vegetation layer provides a critical habitat component for the movement of the species.

Being an aerial species, the proposed works and its impact on habitat for the Leadbeater's Possum could be considered minimal if every effort was made to minimise loss of sub-canopy species and to avoid larger trees to the extent that any encroachment is minor. Having said this, the trail moves through significant areas of confirmed habitat for a Critically Endangered species.

While it appears there is enough flexibility with the trail alignment to avoid removal of all large and hollow bearing trees, there are numerous locations where the desired protocols in Appendix 2 cannot be met For example, where clusters of Large Trees prevent the opportunity for a significant tree buffer from the location of the works (these limitations are further described in section 5.2).

Although the habitat within Mount Tugwell is potentially suitable for Leadbeater's Possum, there are no known populations within this location and habitat modelling suggests that probability of occurrence is less than 65%.

Mount Tugwell is more likely to support populations of Southern Brown Bandicoot given the species prefers a mosaic of vegetation age classes as a result of fire and shrubby/heath vegetation cover that persists throughout much of this area. A VBA record has been confirmed within 1km of the Mount Little Joe assessment area.

Other EPBC listed species considered for this project include Swift Parrot, Smoky Mouse, Grey-headed Flying-fox, Greater Glider Fork-tailed Swift, White-throated Needletail, Rainbow Bee-eater. The impacts to these species are considered to be low to negligible.

Appendix 8 provides summary tables for the EPBC *Significant Impact Criteria* for all fauna species considered in this assessment.

Round-leaf Pomaderris *Pomaderris vacciniifolia* is one notable EPBC listed flora species recorded in 1 location (10 individuals) within 5 km of the assessment areas. This species was not observed during surveys undertaken for this study.

6.2 The Environmental Effects Act 1975

The Environment Effects Act 1978 provides for assessment of proposed projects (works) that are capable of having a significant effect on the environment.

- there is a likelihood of regionally or State significant adverse effects on the environment

- there is a need for integrated assessment of potential environmental effects (including economic and social effects) of a project and relevant alternatives, and
- normal statutory processes would not provide a sufficiently comprehensive, integrated and transparent assessment.

6.2.1 Relevance to proposal

Given the scale of this project, a referral to the State Minister of Environment will be made for a determination on the requirement of an Environmental Effects Statement (EES), which will consider combined loss or impacts to biodiversity, water quality, geology, landscape values and Archaeological and Aboriginal Heritage.

It is likely that combined biodiversity impacts will be considered as a part of an EES referral, although the combined loss of native vegetation is likely to be well below 10 hectares, which is a key referral trigger. However, defined or potential impacts to significant species and ecological communities include the Wingless Stonefly, Leadbeater's Possum and Cool Temperate Rainforest. As a part of preparation for the EES referral, experts have been engaged to assist in quantifying impacts to these habitats to determine the significance of the likely impacts.

Table 10 summarises biodiversity related referral triggers outlined in the *Ministerial guidelines for assessment* (DSE 2006).

Table 11. Summary of Potential Biodiversity Related Referral Triggers

• Referral criteria: a combination of potential environmental effects A combination of two or more of the following types of potential effects on the environment that might be of regional or State significance, and therefore warrant referral of a project, are:	• Trigger
1. Potential clearing of 10 ha or more of native vegetation, unless authorised under an approved Forest Management Plan or Fire Protection Plan 2. matters listed under the Flora and Fauna Guarantee Act 1988: a) potential loss of a significant area of a listed ecological community, b) 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, c) potential loss of critical habitat, d) potential significant effects on habitat values of a wetland supporting migratory bird species	• Trigger • Likely trigger • May be triggered • Unlikely to be triggered

6.3 The National Parks Act 1975

The Conservation and Recreational Objectives of Australian National Parks is outlined in the National Parks Act 1975. The National Parks Act calls for protection of all flora and fauna, not just threatened species. For this project, the Act is relevant to the Summit and trail section along Mount Donna Buang Road and Ben Cairn which are part of the Yarra Ranges National Park. Some of the stated objectives of National Parks outlined in section 4 of the act include:

a. the protection, preservation and evolution of the natural environment including indigenous flora and fauna and of features of ecological, geological, scenic, archaeological and other scientific significance;

b. the use and enjoyment of those parks by the public for inspiration, solitude and appropriate self-reliant recreation; and

c. to make provision in accordance with the foregoing for the use of parks by the public for the purposes of enjoyment, recreation or education and for the encouragement and control of that use.

Mountain biking fits broadly within nature-based recreation activity. However the various specific uses are not defined in the Act.

6.4 Flora and Fauna Guarantee Act 1988

The *Flora and Fauna Guarantee Act 1988* (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 help achieve its objectives including:

- listing of threatened taxa, communities of flora or fauna and potentially threatening processes, and creation of Action Statements and Management Plans for all listed taxa communities of flora or fauna and processes
- 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
- 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. Although this does not apply to taking listed flora species from private land.
- The Department of Environment and Primary Industries is the referral authority for matters under the FFG Act.

6.4.1 Threatened Flora Species and Ecological Communities

Listed Flora Species

There are 5 threatened flora species listed under the FFG Act 1988 that are included in the States Habitat Importance Mapping in the local area or have been recorded in the VBA within 5km of the study area. These include Slender Tree-fern *Cyathea cunninghamii*, Round-leaf Pomaderris *Pomaderris vacciniifolia*, Fairy Lanterns *Thismia rodwayi*, Purple Diuris *Diuris punctata* and Maroon Leek-orchid *Prasophyllum frenchii.* The latter two species have highly limited distributions throughout Victoria and are most unlikely to occur within or in the vicinity of the trail network. The assessment area provides suitable habitat for Slender Tree-fern, Fairy Lanterns and Round-leaf Pomaderris Slender Tree-fern and Round-leaf Pomaderris are conspicuous species that would have been easily identified if present within the assessment corridor; neither of these species were observed during site assessments. However, Fairy Lanterns is a cryptic species that is rarely seen and its presence cannot be discounted.

Listed Ecological Communities

The trail traverses through Cool Temperate Rainforest as confirmed through ground truthing. Cool Temperate Rainforest is an FFG listed ecological community. The presence of Cool Temperate Rainforest throughout sections of the trail alignment to the north of Donna Buang Road and the Summit road were confirmed. Ground truthing established that the extent of this ecological community is greater than what EVC modelling suggests (refer to Maps 1-4). The FFG Act describes Cool Temperate Rainforest as:

'Combinations of Myrtle Beech *Nothofagus cunninghamii*, Southern Sassafras *Atherosperma moschatum = A. moschatum subsp. moschatum*, Black Olive-berry *Elaeocarpus holopetalus* and Blackwood *Acacia melanoxylon* according to the site, the dominant tree species varying with the longitude. Cool Temperate Rainforest includes closed transitional and seral communities, with emergent eucalypts, that are similar in botanical composition to mature rainforests in which eucalypts are absent. In these situations, a more or less closed rainforest canopy occurs beneath the emergent eucalypts. The understorey is typically dominated by Musk Daisy-bush *Olearia argophylla*, Austral Mulberry *Hedycarya angustifolia* and tree-ferns, with a ground stratum dominated by ferns. Epiphytes are abundant on both trees and tree-ferns, and a rich bryophyte flora is also present. In undisturbed conditions, Cool Temperate Rainforest has a closed canopy.

Much of the vegetation north of Donna Buang Road meets the diagnostic criteria of the above description including some 'transitional communities' where Eucalypts are present.

Approximately 1 hectare of Cool Temperate Rainforest may be impacted along the trail alignment however specific mitigations relating to design and construction techniques are to be implemented to mitigate impacts.

6.4.2 Threatened Fauna Species

There are 16 threatened fauna species listed under the FFG Act 1988 that are included in the State's Habitat Importance Mapping in the local area or have been recorded in the VBA within 5km of the study area. Of these, the entire assessment area provides important habitat for Grey Goshawk, Sooty Owl, Powerful Owl, Leadbeater's Possum, Common Bent-wing Bat and possibly Barking Owl.

Known populations of the Mount Donna Buang Wingless Stonefly occur in the vicinity of the Donna Buang Summit Road (refer below). This is a highly localised species that is unlikely to occur at lower elevations associated with the trail alignment. The key threats to this species as identified in the Action Statement (DSE 2001) include reductions in water quality (siltation, turbidity and chemical pollution. Buffer zones from known records of the species were mapped (Appendix 2) to enable alignment setting of the trail to be located in a way so as to not risk habitat for the species.

Suitable habitat and one local record suggest that the Southern Brown Bandicoot may persist within Mount Tugwell. The majority of the assessment area also provides suitable habitat for Square-tailed Kite while Brush-tail Phascogale, Masked Owl and Eastern Horseshoe Bat may utilise habitats within Mount Tugwell although there are no recent records in the vicinity.

The remaining species including Chestnut-rumped Heathwren, Smoky Mouse, Brown Toadlet and Lewin's Rail are considered unlikely to occur in the vicinity of the study area based on their habitat requirements, no local records and their known distribution throughout Victoria.

Mount Donna Buang Wingless Stonefly

Several populations of the Mount Donna Buang Wingless Stonefly occur in proximity to the trail alignment. However, the alignment does avoid the designated buffer zones (refer to Map 1).

6.4.3 Relevance to proposal

Since all of the proposed works are within Public Land, the FFG Act applies and under the act, an application to DELWP will be required on the basis of:

- Impact to one listed Ecological Community (Cool Temperate Rainforest)
- Impact to a range of common flora species listed under the Act
- Potential impact to habitat for a range of listed fauna species (particularly Mount Donna Buang Stonefly, Leadbeater's Possum and potentially Southern Brown Bandicoot)

6.5 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 implementation of Local Government Planning Schemes. The following section considers relevant sections of the Yarra Ranges Planning Scheme.

6.5.1 Zoning

The following table provides a summary of land zonings for each main section of the trail.

Table 12. Applicable Land Zonings

Section	Land Zonings
Mount Donna Buang Road	Public Park and Recreation Zone, Public Use Zone (PUZ1)
Drop A K South	Public Conservation and Recreation Zone
Drop A K East	Rural Conservation Zone RCZ3, Public Use Zone, Public Conservation and Recreation Zone
Mount Tugwell	Rural Conservation Zone RCZ3, Public Park and Recreation Zone

Given the entire trail alignment is within public land, most of the individual land parcels have an appropriate public land zoning under clause 36 of the planning scheme. The range of public land zonings vary in their purpose and applicable uses, the general objectives of each public land zone is outlined below:

Public Park and Recreation Zone

- To recognise areas for public recreation and open space.
- To protect and conserve areas of significance where appropriate.
- To provide for commercial uses where appropriate.

Public Conservation and Resource Zone

- To protect and conserve the natural environment and natural processes for their historic, scientific, landscape, habitat or cultural values.
- To provide facilities which assist in public education and interpretation of the natural environment with minimal degradation of the natural environment or natural processes.
- To provide for appropriate resource-based uses.

Public Use Zone

- To recognise public land use for public utility and community services and facilities.
- To provide for associated uses that are consistent with the intent of the public land reservation or purpose

Rural Conservation Zone RCZ3

Some parcels within Drop AK East and Mount Tugwell are within the Rural Conservation Zone (RCZ3) which is more often associated with private land in rural areas even though the parcels in question are in public land tenures. The purpose of the Rural Conservation Zone is to:

- To conserve the values specified in a schedule to this zone.
- To protect and enhance the natural environment and natural processes for their historic, archaeological and scientific interest, landscape, faunal habitat and cultural values.
- To protect and enhance natural resources and the biodiversity of the area.
- To encourage development and use of land which is consistent with sustainable land management and land capability practices, and which takes into account the conservation values and environmental sensitivity of the locality.
- To provide for agricultural use consistent with the conservation of environmental and landscape values of the area.
- To conserve and enhance the cultural significance and character of open rural and scenic non-urban landscapes

6.5.2 Overlays

Various overlays relevant to this proposal include:

- The Environmental Significance Overlay (ESO1) applies throughout the majority of trail alignment
- Schedule 3 to the Significant Landscape Overlay (SLO3) applies to the entire 'Drop A K' section north of the Warburton Township
- The Bushfire Management Overlay (BMO) applies throughout the majority of the trail
- Erosion Management Overlay (EMO) applies to a small area of Mount Tugwell south of the summit.
- A heritage Overlay (H140) from the Mount Donna Buang summit to the general vicinity of Road 26.

Environmental Significance Overlay

Subsets of this overlay that apply to the proposal include:

Botanical Significance

- B44 Myrtle Gully Scenic Reserve (north of Donna Buang Road in the vicinity of habitat zone 9 and 10)
- B45 Myrtle Creek (Don River) Public Purpose Reserve (the western section of Mount Donna Buang Road)
- B46 The Acheron Way and the Ben Cairn Road (the eastern section of Donna Buang Road)
- B47 O'Shannassy Aqueduct (the majority of Drop AK South and East)

Zoological Significance

- Z18 Mt Toolebewong – Don River (the central section north of Donna Buang Road)
- Z19 Black Sands Creek and Yarra State Forest (the entire areas of Mount Tugwell)

As the proposal will be subject to decision guidelines and detailed application requirements under clause 52.17 of the Yarra Ranges Planning Scheme, the FFG Act and possibly the EPBC Act, it is considered that the ecological considerations pertaining to the various ESOs will be adequately considered through these 3 levels of regulation (Local, State and National).

Bushfire Management Overlay

The entire project area is under the Bushfire Management Overlay (clause 44.06). Among other matters, permit requirements under this overlay includes any works associated with leisure and recreation as specified in clause 44.06-2. Under the direction of Councils Statutory Planning Department, it is likely that this proposal will be referred to the CFA for comment. Matters for the CFA to consider may include:

- Emergency assembly areas
- Emergency procedures
- Parking areas and access for emergency vehicles
- Potential closure of the trail during days of high or extreme fire danger

A Bushfire Emergency Plan for review by fire authorities may be required to support this application.

Erosion Management Overlay

The Erosion Management Overlay occupies a small area within Habitat Zones 48 and 50. It does appear that the types of works proposed do not require a permit under the EMO (apart from vegetation removal). However, particular design and construction requirements may need consideration within this area (subject to a soil and landslip analysis).

Significant Landscape Overlay (SLO 3)

The SLO3 applies to the entire 'Drop A K' section. Decision guidelines and potential information requirements of the SLO3 include:

- The statement of the nature and key elements of the landscape and the landscape character objective contained in a schedule to this overlay.
- The conservation and enhancement of the landscape values of the area.
- The impact of the proposed buildings and works on the landscape due to height, bulk, colour, general appearance or the need to remove vegetation.
- The extent to which the buildings and works are designed to enhance or promote the landscape character objectives of the area.
- The impact of buildings and works on significant views

6.5.3 Clause 52.17

Under Clause 52.17 a permit is required to remove, destroy or lop native vegetation on sites greater than 0.4 hectares. Clause 52.17 requires a planning permit for the removal of native vegetation (exemptions apply). The purpose of the clause (amongst others) is to minimise impacts on Victoria's biodiversity from the removal of native vegetation and to manage native vegetation to minimise land and water degradation.

Application requirements and decision guidelines are listed within the Clause. Applications may fall into a basic, intermediate or detailed pathway depending on the location and extent of vegetation removed. The application requirements and decisions depend on the relevant assessment pathway. Referral to DELWP under Clause 66.02 may be required for an application to remove native vegetation; e.g. if clearing is greater than 0.5 ha or the application follows the detailed pathway. This report, and in particular, Section 4 responds to this Clause.

6.6 Catchment and Land Protection Act 1994

Three declared noxious weeds listed under the *Catchment and Land Protection (CaLP) Act 1994* was identified within the trail alignment. Plants occurring on this list are known to or have the potential to result in detrimental environmental or economic impact.

Under the CaLP Act declared noxious weeds are categorised into four groups depending on their known and potential impact and specific circumstances for each region. These categories are:

- State Prohibited Weeds (S) is either currently absent in Victoria or are restricted enough to be eradicated. The Victorian Government is responsible for their control.
- Regionally Prohibited Weeds (P) in the Port Phillip Catchment Management Authority (CMA) area; these weeds are not necessarily widespread but have the potential to become widespread. It is expected that weeds that meet these criteria can be eradicated from the region. For weeds considered to be Regionally Prohibited it is the responsibility of the land owner to control these weeds on their land but not on adjacent roadside reserves.
- Regionally Controlled Weeds (C) are usually widespread but it is important to prevent further spread. It is the responsibility of the landowner to control these weeds on their property and on adjacent roadside reserves.
- Restricted Weeds (R) include plants that pose unacceptable risk of spreading in the State or other Australian states and are considered to be a serious threat to primary production, Crown land, the environment and/or community health if they were traded in Victoria. Trade in these weeds and their propagules, either as plants, seeds or contaminants in other material is prohibited.

Table 9 lists the noxious weeds identified during the ground truthing. Although minor in their current extent, these weed species typically thrive in disturbed environments and the proposed earthworks may encourage these small populations to rapidly spread.

Table 13. Declared Noxious weeds occurring within the Subject Site

Scientific Name	Common Name	Control Category
**Cirsium vulgare*	Spear Thistle	C
**Rubus fruticosus spp. agg.*	Blackberry	C
** Jacobaea vulgaris*	Ragwort	C

CaLP listed weeds and other high impact weeds have been mapped during site assessments where identified within the assessment corridor, any infestations should be controlled at the earliest opportunity during and following construction of the trail during an ongoing monitoring program.

7. CONCLUSION AND RECOMMENDATIONS

The project team has undertaken extensive ground truthing and liaison with land management authorities to arrive at the current indicative alignment of the trail. This assessment was undertaken in four steps:

- A Desktop Alignment
- Undertaking broad area assessments to determine locations that are suitable for the alignment
- Ground Truthing to determine a revised alignment based on a 20-metre wide assessment corridor
- Development of Environmental Protocols to address risks and constraints of the alignment

Through development of assessment protocols and re-alignments of the trail, significant biodiversity values, have or can be avoided or minimised but in many instances cannot be completely avoided given the nature of the proposal.

7.1 Protection of Threatened Species and Ecological Communities

Leadbeater's Possum

Protection of Leadbeater's Possum habitat is one of the primary goals of this project,

To date, total of 1503 Trees were mapped that are potential habitat trees for the species OR OTHER dependant species such as Greater Glider, the Sooty Owl and Powerful Owl including:

- **Pre-1900 living trees** (estimated to be greater than 120cm diameter) of which all are considered to be suitable habitat for LBP.
- **Smaller habitat trees** defined as trees less than 120cm diameter with visible hollows
- **Other hollow bearing trees** of various size classes in lower probability Leadbeater's Possum habitat that exhibit hollows suitable for a range of owl species and other hollow dependent fauna
- **Other Large Trees**; while no hollows were visible, these may provide suitable habitat hollows in the present or near future

Documentation of these trees will assist with the detailed design and construction of the trail alignment with the objective of siting the works as far as possible from these trees. Locations of Leadbeater Possum nest boxes were also documented including several in the assessment corridor. A similar approach will be taken to site the trail away from these nest boxes.

No sub-canopy species will be removed in areas of high probability habitat for Leadbeater's Possum as the sub-canopy layer provides critical habitat for the species.

Mount Donna Buang Wingless Stonefly

The assessment corridor is unlikely to support populations of Mount Donna Buang Wingless Stonefly. Nevertheless, particular care is to be taken during the design and construction process to minimise potential impacts including:

- Measures to prevent the spread of myrtle wilt which may impact the species
- Measures to minimise soil contamination or changes to hydrology through raised platforms rather than excavation

Myrtle Wilt control will be a primary objective of construction and maintenance of the trial including:

- Vehicle hygiene procedures for construction equipment
- Mandatory wash down facilities for mountain bikes to be provided at the Summit Car Park and/or other appropriate locations

Cool Temperate Rainforest

The trail traverses through approximately 1 ha of Cool Temperate Rainforest as confirmed through ground truthing. At this stage, Cool temperate rainforest accounts for 4% of the entire area of vegetation to be impacted and this is considered unavoidable if the trail to the north of Donna Buang Road is to proceed. Impacts to this ecological communitiy will be minimised as follows:

- Raised platforms rather than excavation as the standard approach to construction of the trail alignment. This approach will minimise soil disturbance and maintain the integrity of the forest floor
- Measures to prevent the spread of myrtle wilt and other pathogens is also a primary goal within this ecosystem and areas of Montane Eucalypt Forest. Strict hygiene standards must during and following construction.
- Avoiding any earthworks within the root zones of Myrtle Beech to prevent proliferation of Myrtle Wilt

7.2 Further Steps

In addition to the Threatened Species and Ecological Communities listed above, the majority of the alignment traverse's native vegetation of high diversity and ecological condition which supports significant habitat for common and rarer fauna species. Although the presence of threatened flora species appears to be limited within the assessment corridor, this may be due to the seasonal limitations of the assessment.

Field assessment of the ecological values of the new trail sections (that only received a desktop assessment of values) should occur prior to construction.

The design and construction process must be planned and implemented to the highest standards to ensure that impacts to native vegetation and fauna habitat is minimised. The risk assessment matrix and *Trail Construction Plan* is the starting point to identifying environmental risks, design solutions and construction mitigation methods.

Management of environmental risks must be ongoing throughout the planning, construction and maintenance phase of this project and should include:

- A fully developed Construction and Environmental Management Plan (CEMP) that expands on and implements the recommendations outlined in this document and the *Trail Construction Plan*
- A final trail alignment negotiated with land managers and input from ecologists onsite, particularly within high –risk areas.
- A comprehensive weed management program following the trail construction, particularly in locations where high threat weeds were identified and mapped as a part of this project.
- A comprehensive pest animal program, particularly targeting Foxes and Deer.
- Ecological enhancement programs supported by Yarra Ranges Council, Melbourne Water and Park Victoria that involve the local community to compensate for vegetation and habitat impacts associated with the trail.
- Vegetation loss is formally offset in a manner consistent with the Guidelines for the Removal, Destruction or Lopping of Native Vegetation (DELWP 2017) and/or the Procedure for the removal, destruction or lopping of native vegetation on Crown land (DELWP 2018).

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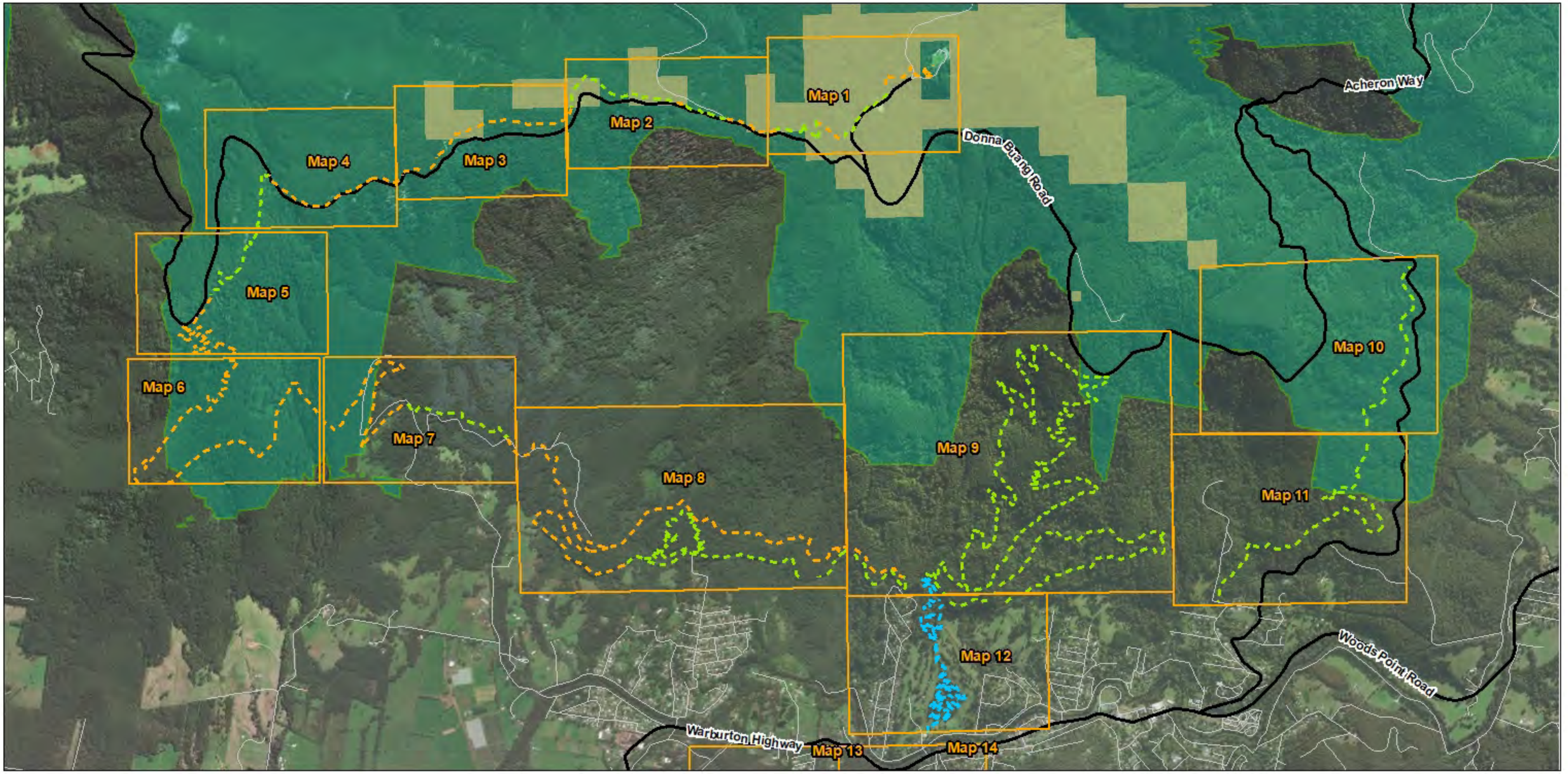
Appendix 1. Overview Maps of the Trail Alignment



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Legend

- Map Reference
- Modelled Habitat for MDB Wingless Stonefly
- LBP high probability habitat

Trail Alignment and Ref No.

- New Trails - Desktop (Dec 2019)
- New Trails (Assessed 2019)
- New Trails (Assessed 2017)
- Existing Trail
- Existing Vehicle Track

Details
Date: 10/12/2019
Version: 2

Data Source:
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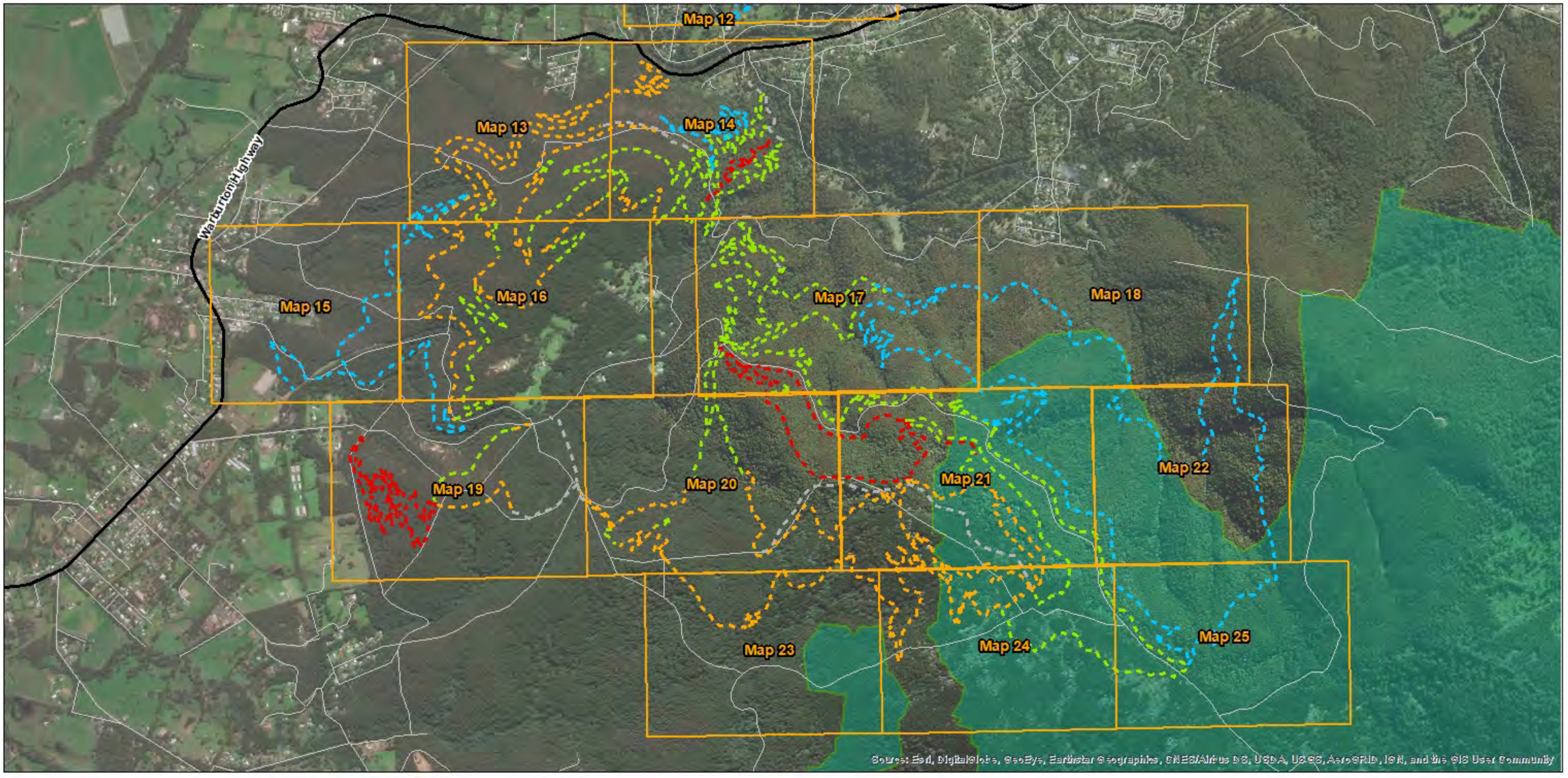
Overview Map A – Mount Donna Buang Summit to Golf Course

N

0 250 500 750 1,000 m

Scale 1:30,000 (Page size A3)



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Legend

- Map Reference
- Modelled Habitat for MDB Wingless Stonefly
- LBP high probability habitat

Trail Alignment and Ref No.

- New Trails - Desktop (Dec 2019)
- New Trails (Assessed 2019)
- New Trails (Assessed 2017)
- Existing Trail
- Existing Vehicle Track

Details
Date: 10/12/2019
Version: 2

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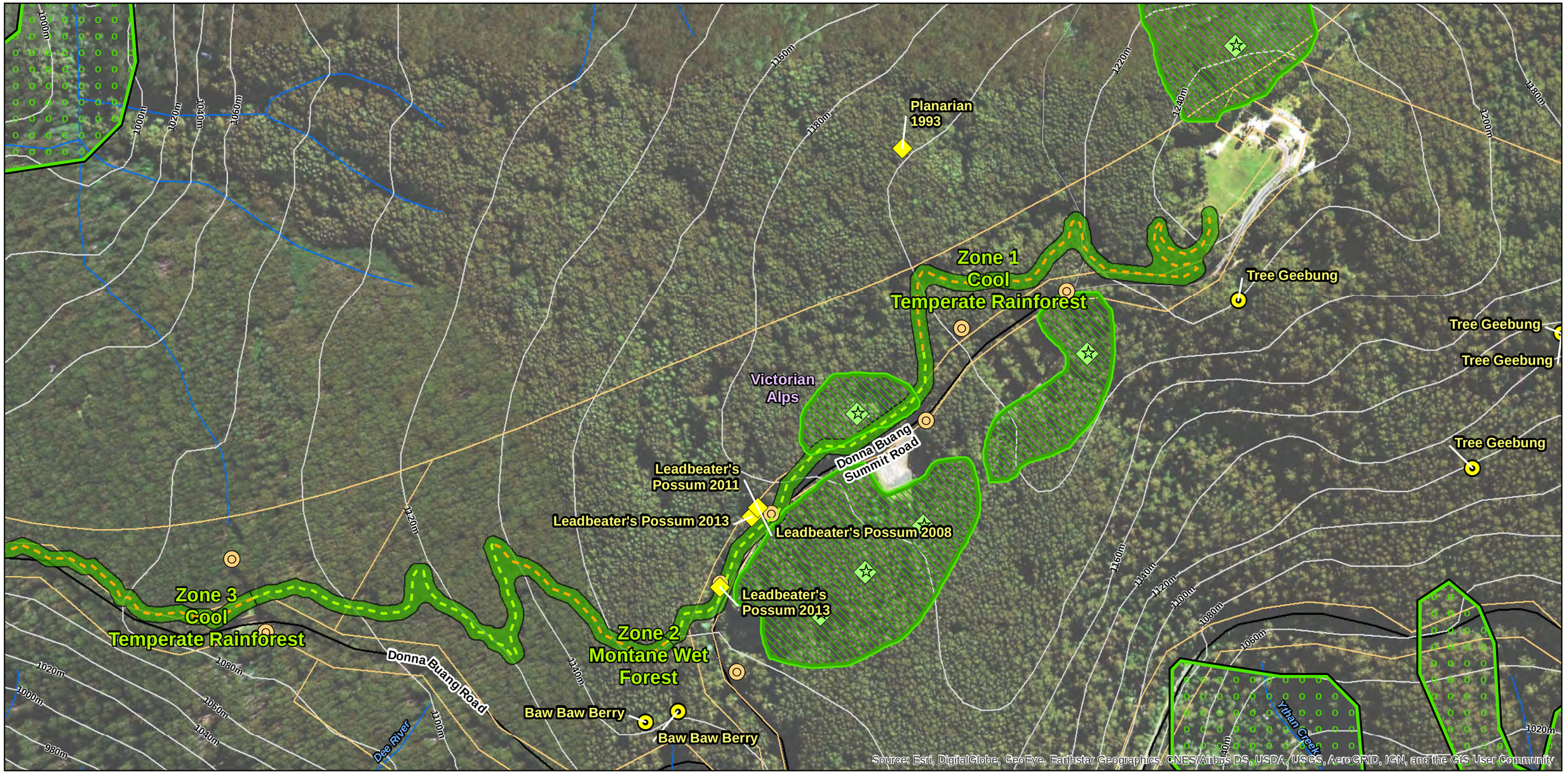
Overview Map B – Warburton Rail Trail to Mount Tugwell

N

0 250 500 750 1,000 m

Scale 1:22,000 (Page size A3)

Appendix 2. Map Series 1– Ecological Assessment Proposed Warburton Mountain Bike Trail



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Legend

- Parcel
- Threatened Fauna VBA
- Threatened Flora VBA
- Leadbeater's Possum nest boxes
- Cool Temperate Rainforest (Modelled)
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)
- MDB Stonefly buffer zones
- MDB Stonefly locations

Trail Alignment and Ref No.

- New Trails (Assessed 2019)
- New Trails (Assessed 2017)

Details
Date: 10/12/2019
Version: 2

Data Source:
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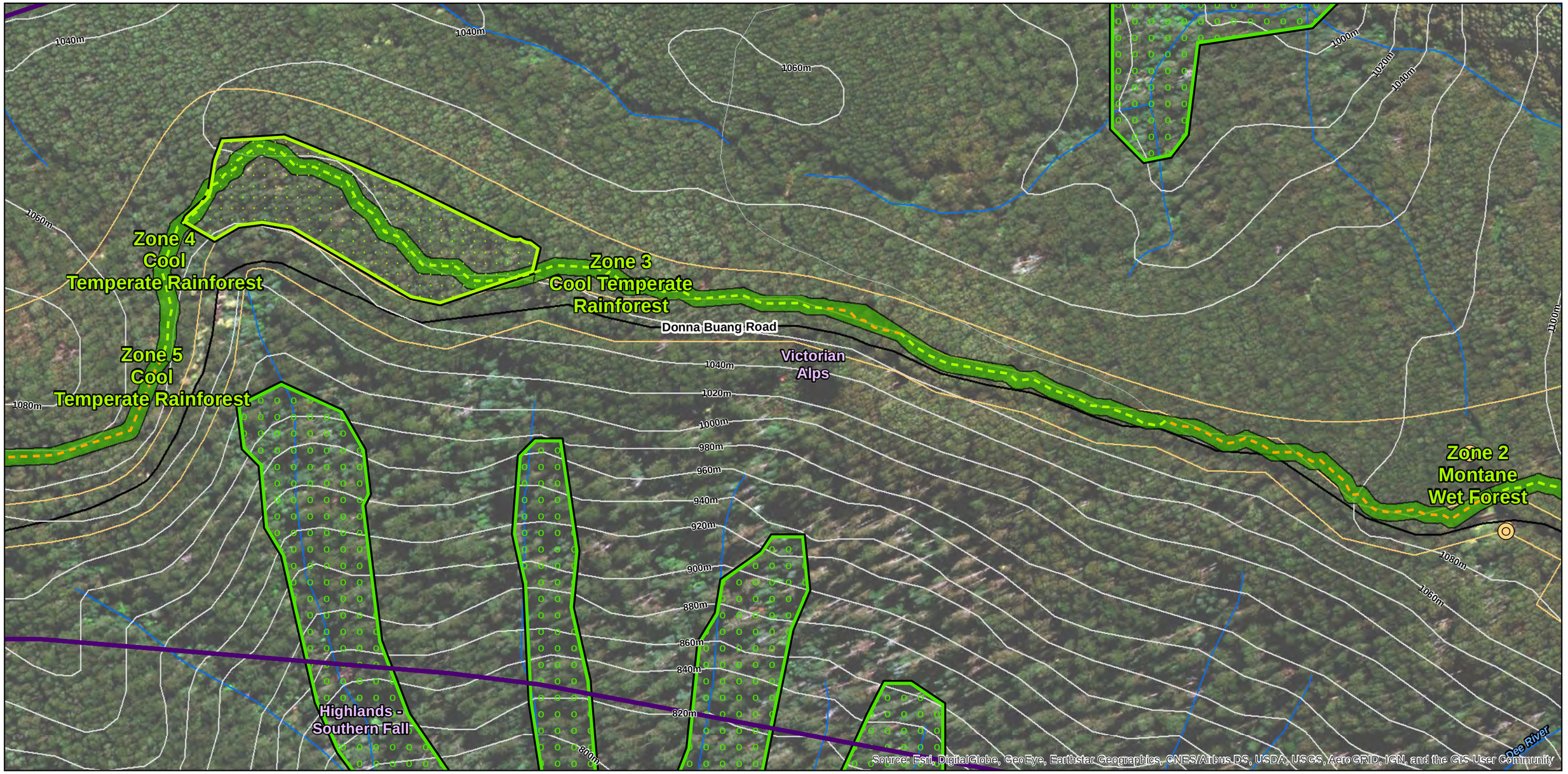
Map 1 –
Summit to Donna Buang Road

Map Series 1 – Proposed
Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:4,940 (Page size A3)



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Legend

- Parcel
- Leadbeater's Possum nest boxes
- Predominantly Rainforest (Ground truthed)
- Cool Temperate Rainforest (Modelled)
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails (Assessed 2019)
- New Trails (Assessed 2017)

Details
Date: 10/12/2019
Version: 2

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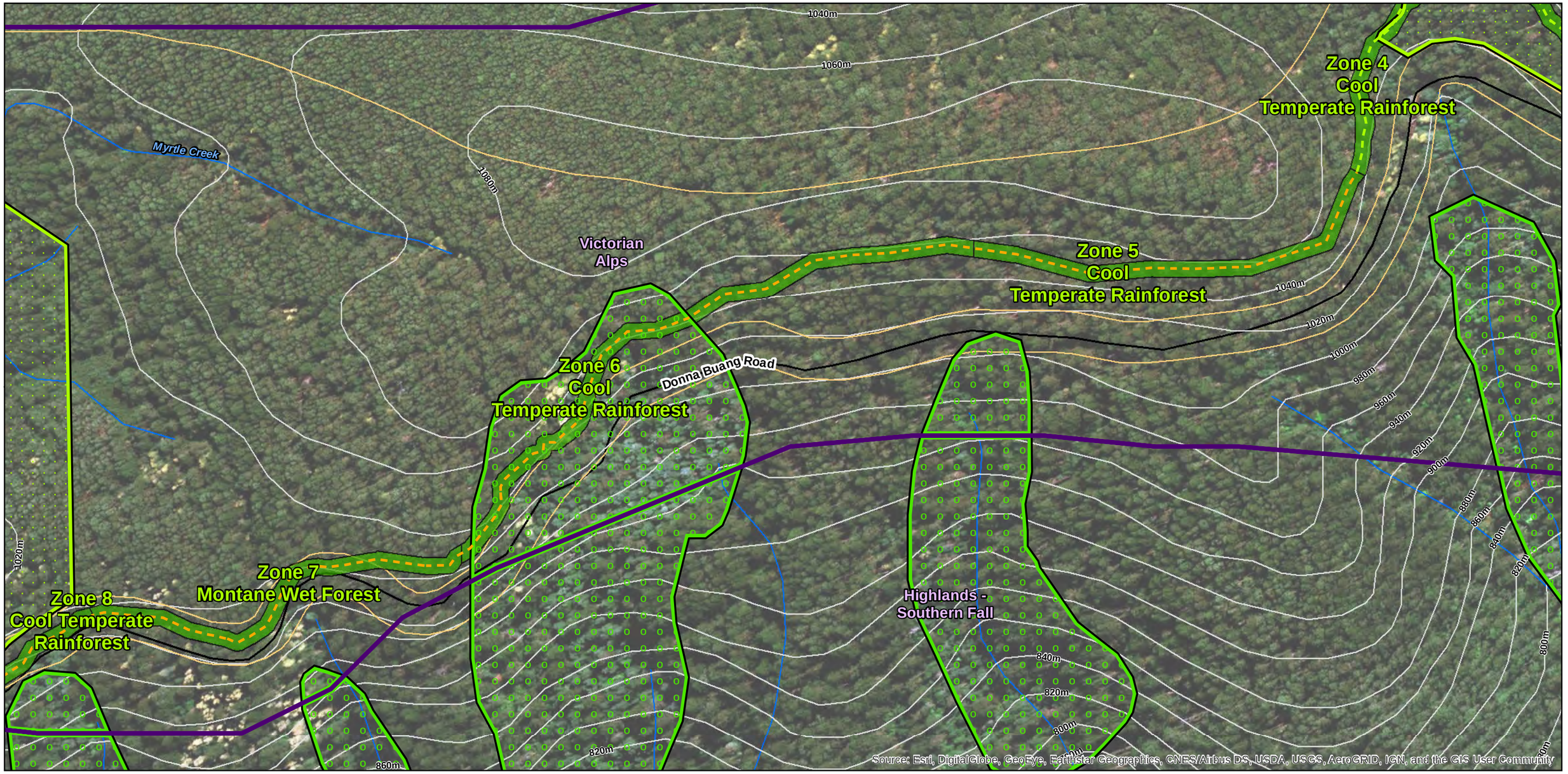
Map 2 –
Donna Buang Road East

Map Series 1 – Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:4,620 (Page size A3)



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Legend

- Parcel
- Predominantly Rainforest (Ground truthed)
- Cool Temperate Rainforest (Modelled)
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails (Assessed 2019)
- New Trails (Assessed 2017)

Details
Date: 10/12/2019
Version: 2

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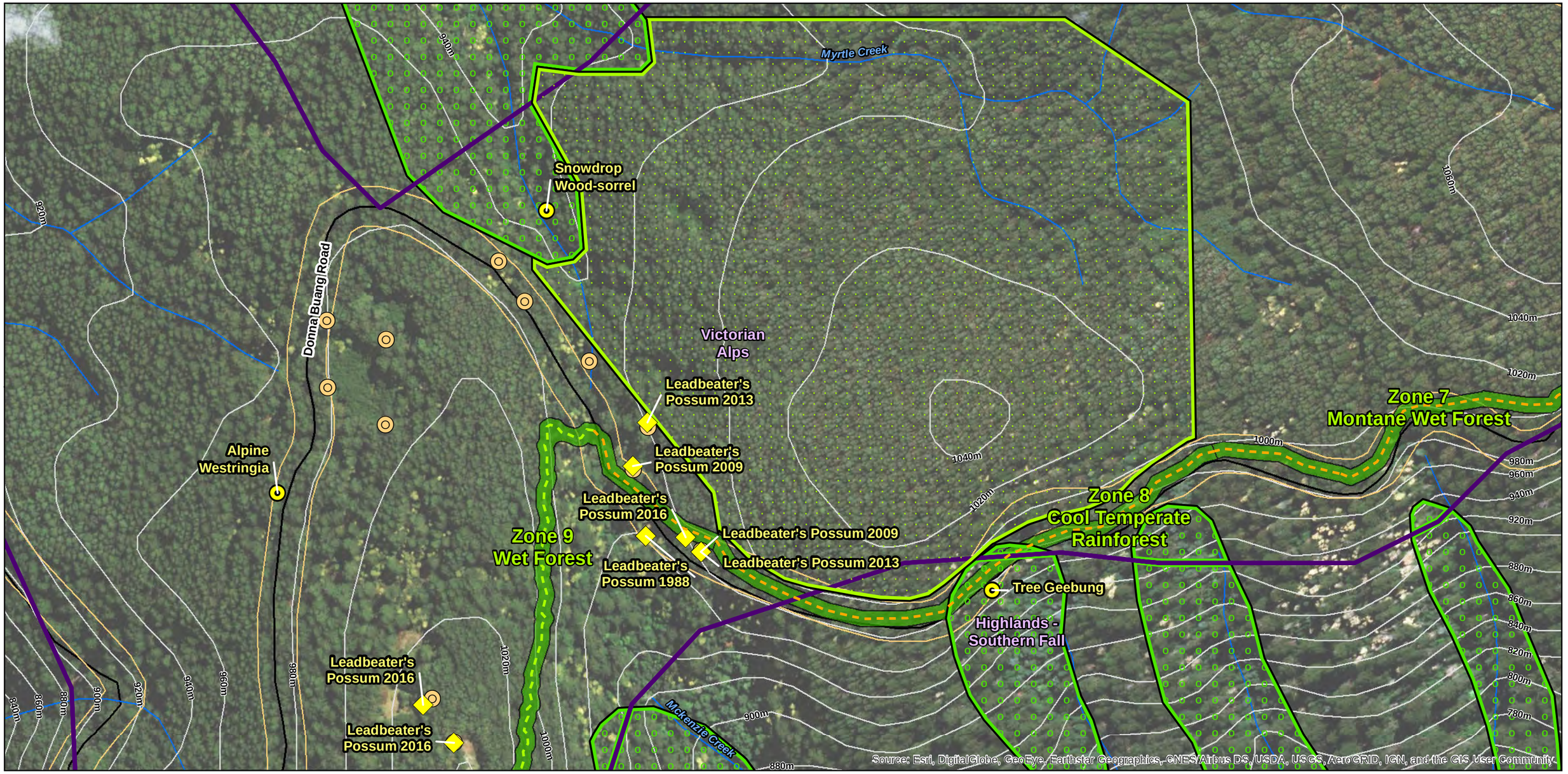
Map 3 –
Donna Buang Central

Map Series 1 – Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:4,720 (Page size A3)



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Legend

- Parcel
- Threatened Fauna VBA
- Threatened Flora VBA
- Leadbeater's Possum nest boxes
- Predominantly Rainforest (Ground truthed)
- Cool Temperate Rainforest (Modelled)
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails (Assessed 2019)
- New Trails (Assessed 2017)

Details
Date: 10/12/2019
Version: 2

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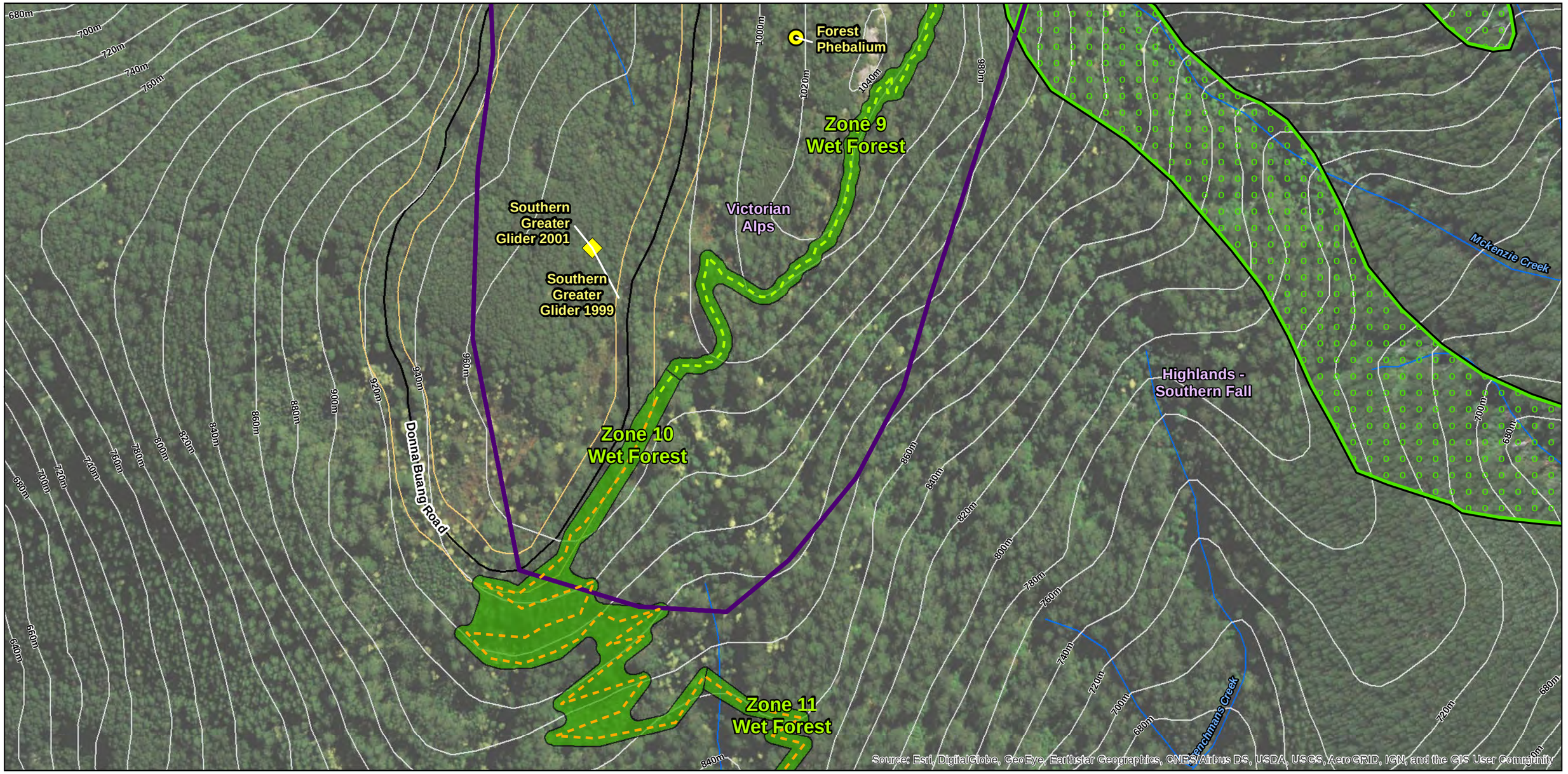
Map 4 –
Donna Buang Road West

Map Series 1 – Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:4,990 (Page size A3)



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Legend

- Parcel
- Threatened Flora VBA
- Cool Temperate Rainforest (Modelled)
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails (Assessed 2019)
- New Trails (Assessed 2017)

Details
Date: 10/12/2019
Version: 2

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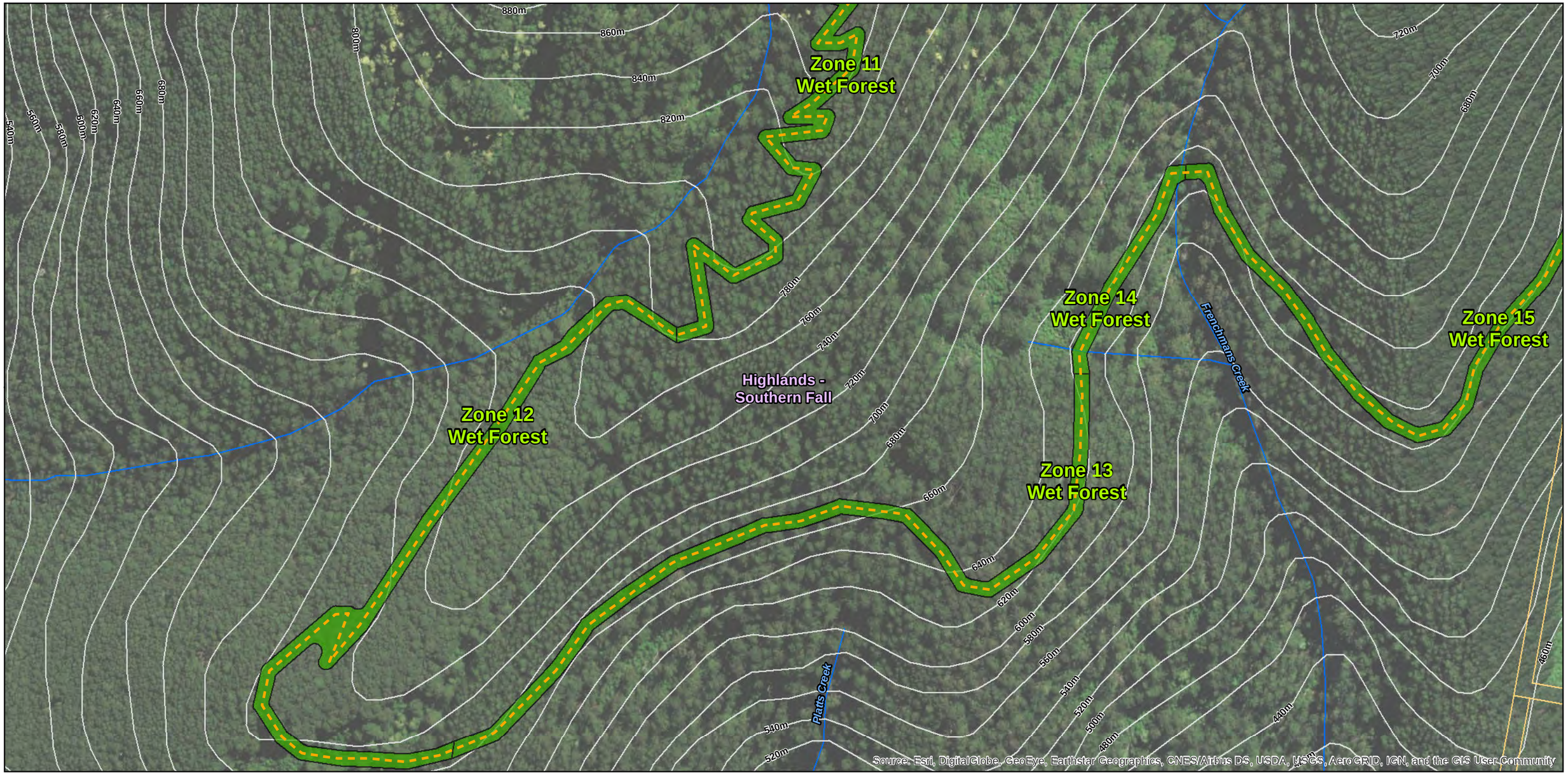
Map 5 –
Ben Cairn Region

Map Series 1 – Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:5,045 (Page size A3)



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Legend

- Parcel
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails (Assessed 2017)

Details
Date: 10/12/2019
Version: 2

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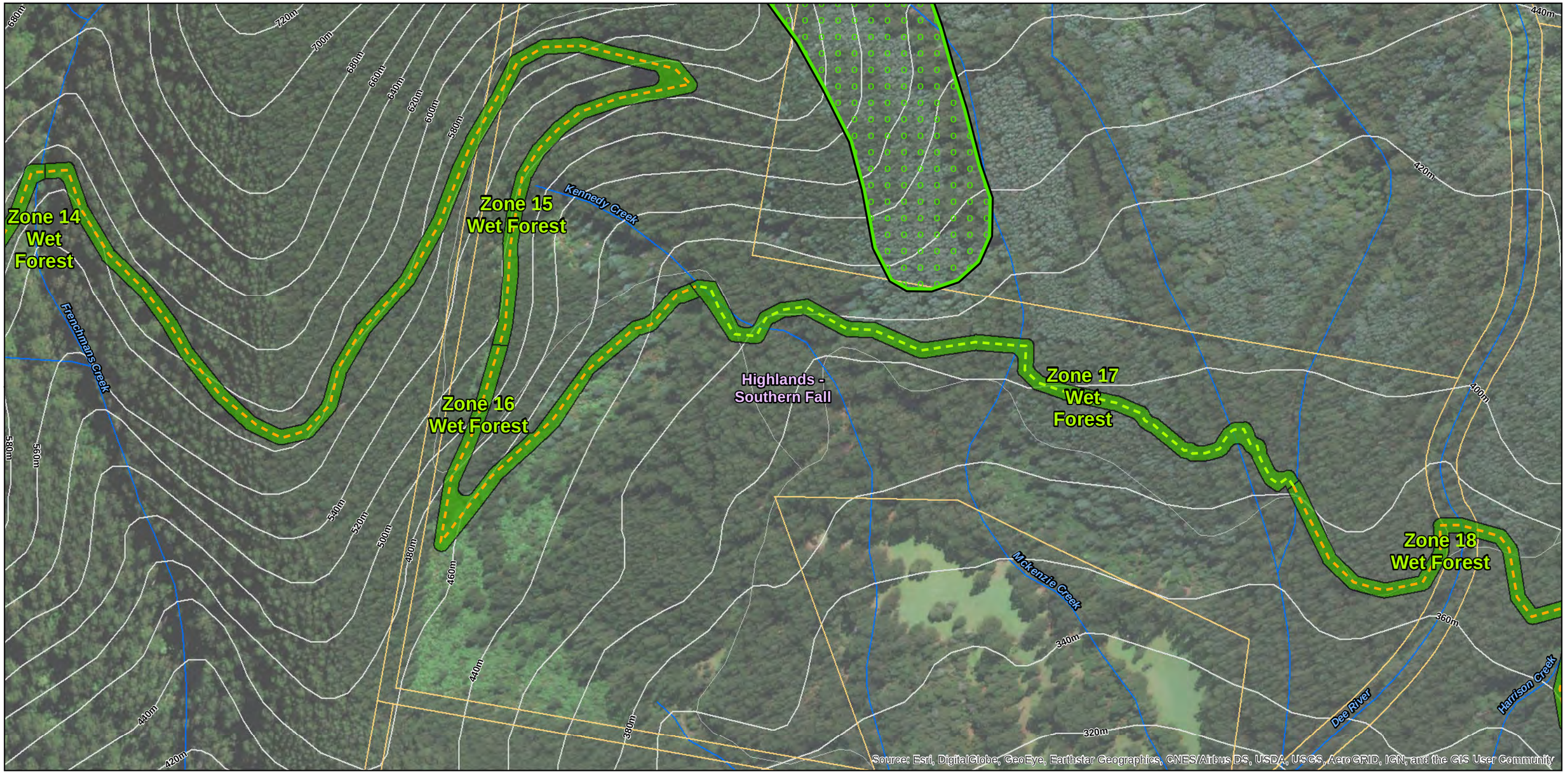
Map 6 –
South of Ben Cairn

Map Series 1 – Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:5,220 (Page size A3)



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Legend

- Parcel
- Cool Temperate Rainforest (Modelled)
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails (Assessed 2019)
- New Trails (Assessed 2017)

Details
Date: 10/12/2019
Version: 2

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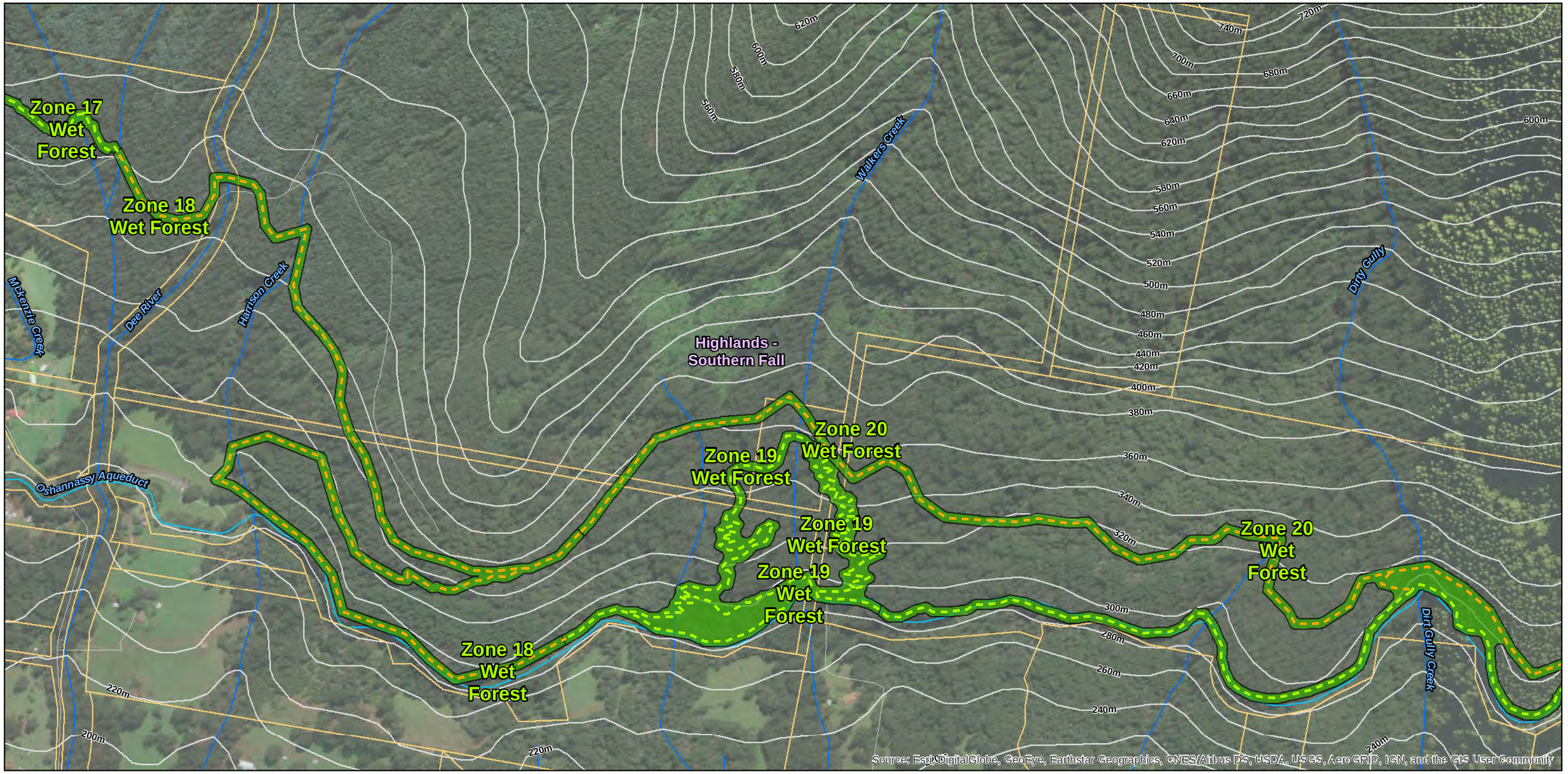
Map 7 –
APM Access Track

Map Series 1 – Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:5,150 (Page size A3)



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Legend

- Parcel
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails (Assessed 2019)
- New Trails (Assessed 2017)

Details
Date: 10/12/2019
Version: 2

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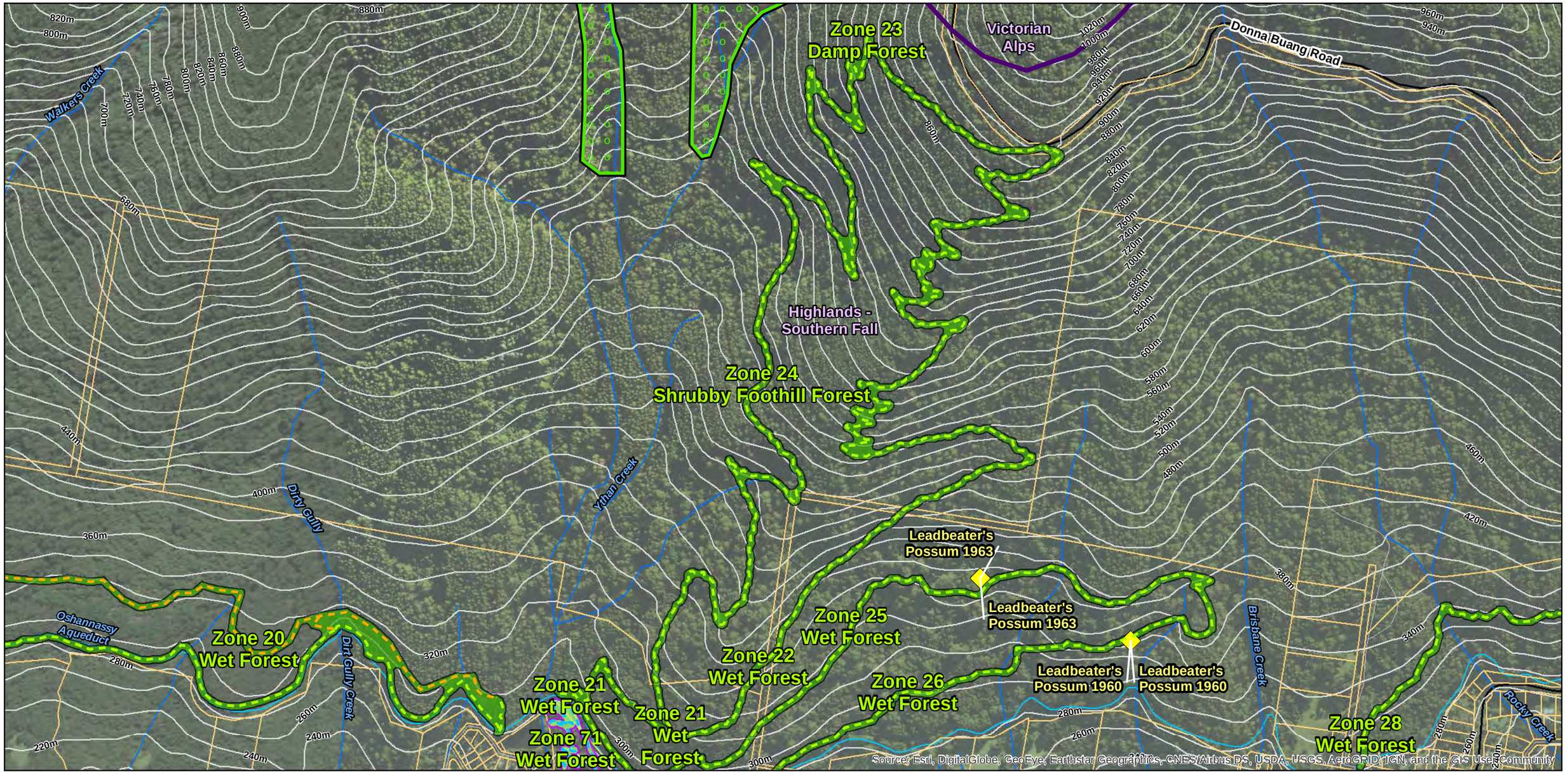
Map 8 –
O'Shannassy Aqueduct

Map Series 1 – Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:7,815 (Page size A3)



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Legend

- Parcel
- Threatened Fauna VBA
- Cool Temperate Rainforest (Modelled)
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)
- Desktop Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails - Desktop (Dec 2019)
- New Trails (Assessed 2019)
- New Trails (Assessed 2017)

Details
Date: 10/12/2019
Version: 2

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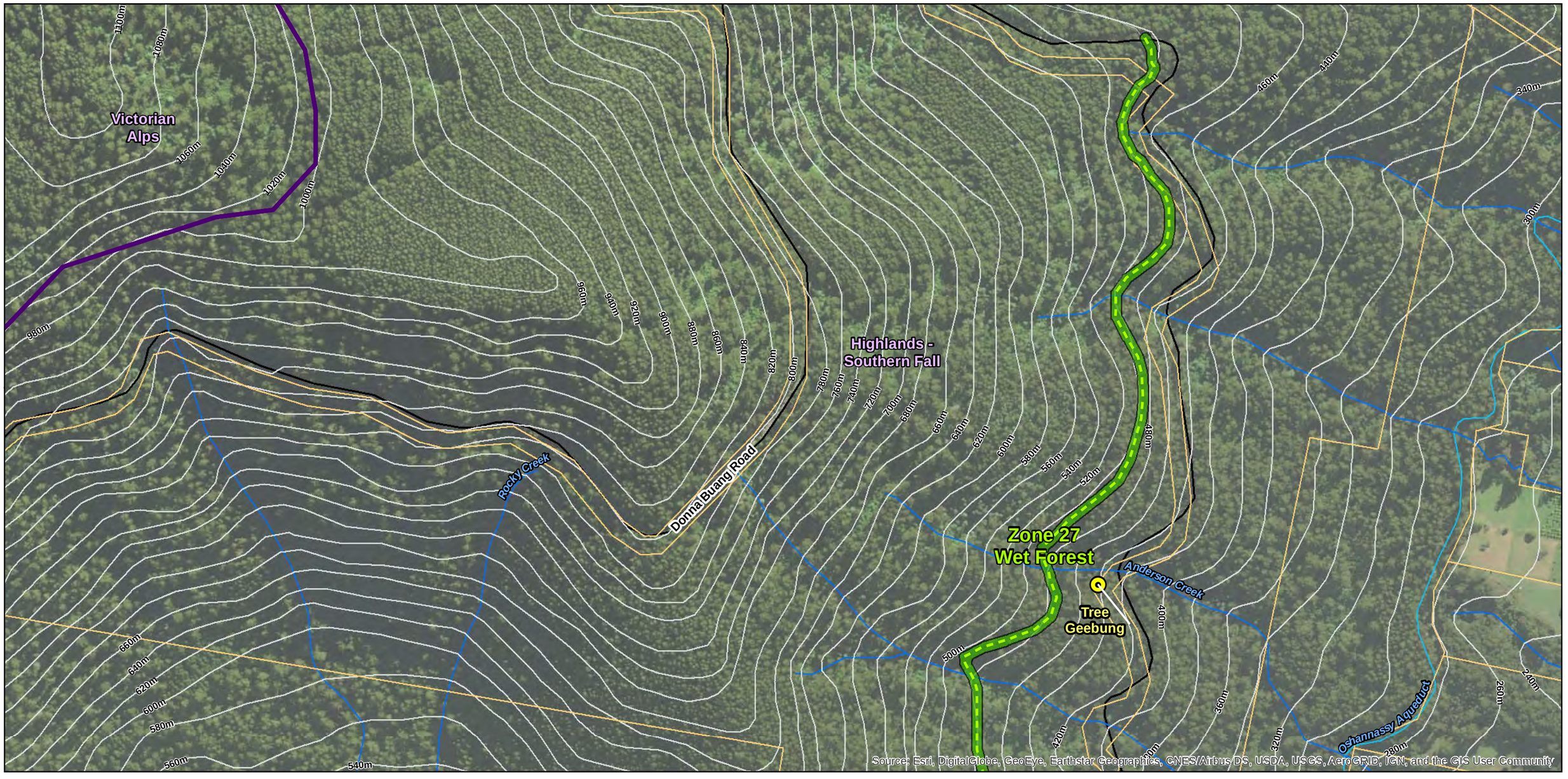
Map 9 -
Donna Buang Road to Aqueduct Link

Map Series 1 - Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:10,945 (Page size A3)



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Legend

- Parcel
- Threatened Flora VBA
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails (Assessed 2019)

Details
Date: 10/12/2019
Version: 2

Data Source:

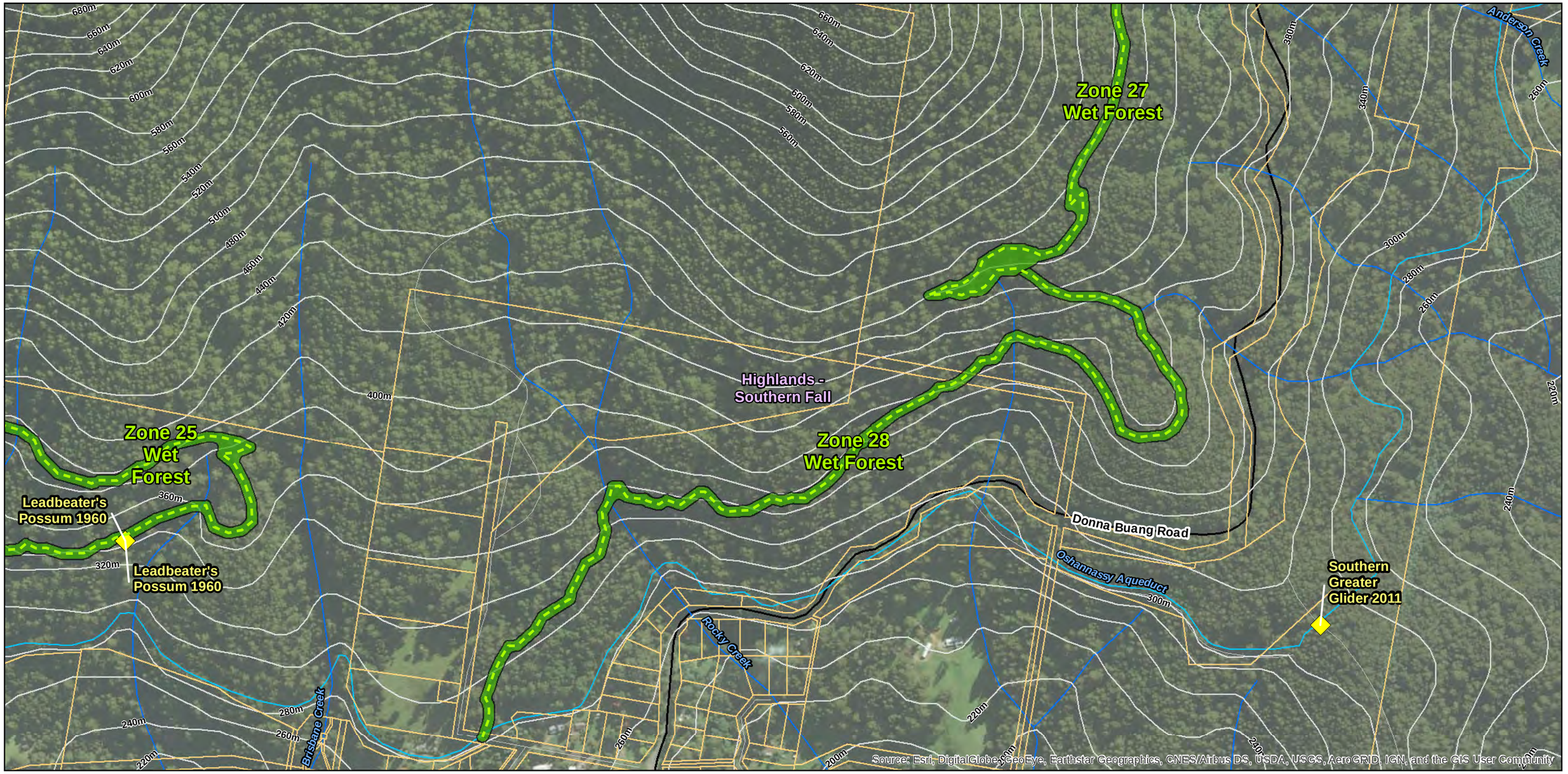
Map 10 –
Yuonga Track North

Map Series 1 – Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:7,335 (Page size A3)



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Legend

- Parcel
- Threatened Fauna VBA
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails (Assessed 2019)

Details
Date: 10/12/2019
Version: 2

Data Source:

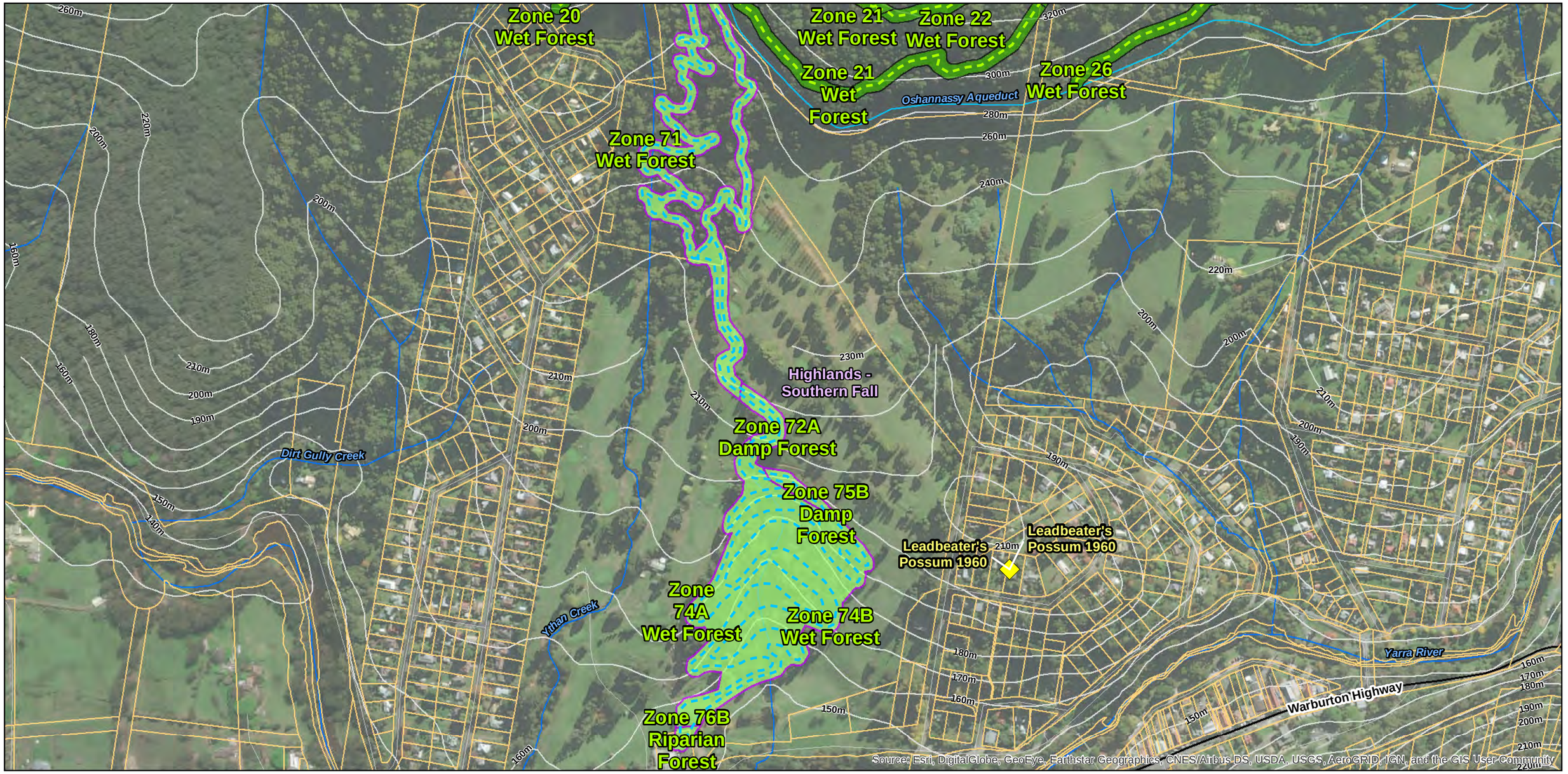
Map 11 –
Yuonga Track South

Map Series 1 – Proposed
Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:7,015 (Page size A3)



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Legend

- Parcel
- Threatened Fauna VBA
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)
- Desktop Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails - Desktop (Dec 2019)
- New Trails (Assessed 2019)

Details
Date: 10/12/2019
Version: 2

Data Source:
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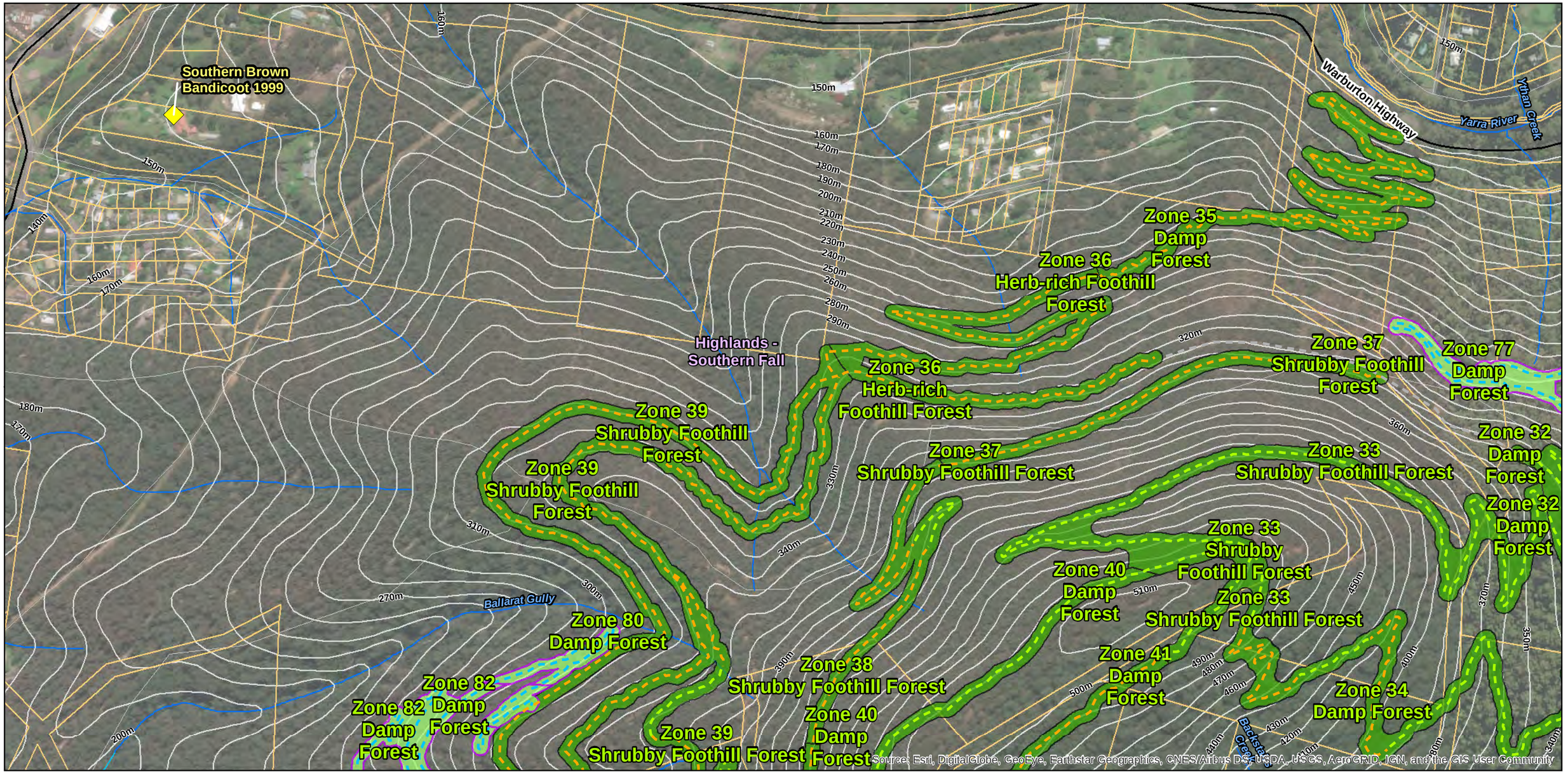
Map 12 –
Golf Course Trail

Map Series 1 – Proposed
Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:5,850 (Page size A3)



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Legend

- Parcel
- Threatened Fauna VBA
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)
- Desktop Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails - Desktop (Dec 2019)
- New Trails (Assessed 2019)
- New Trails (Assessed 2017)
- Existing Vehicle Track

Details
Date: 10/12/2019
Version: 2

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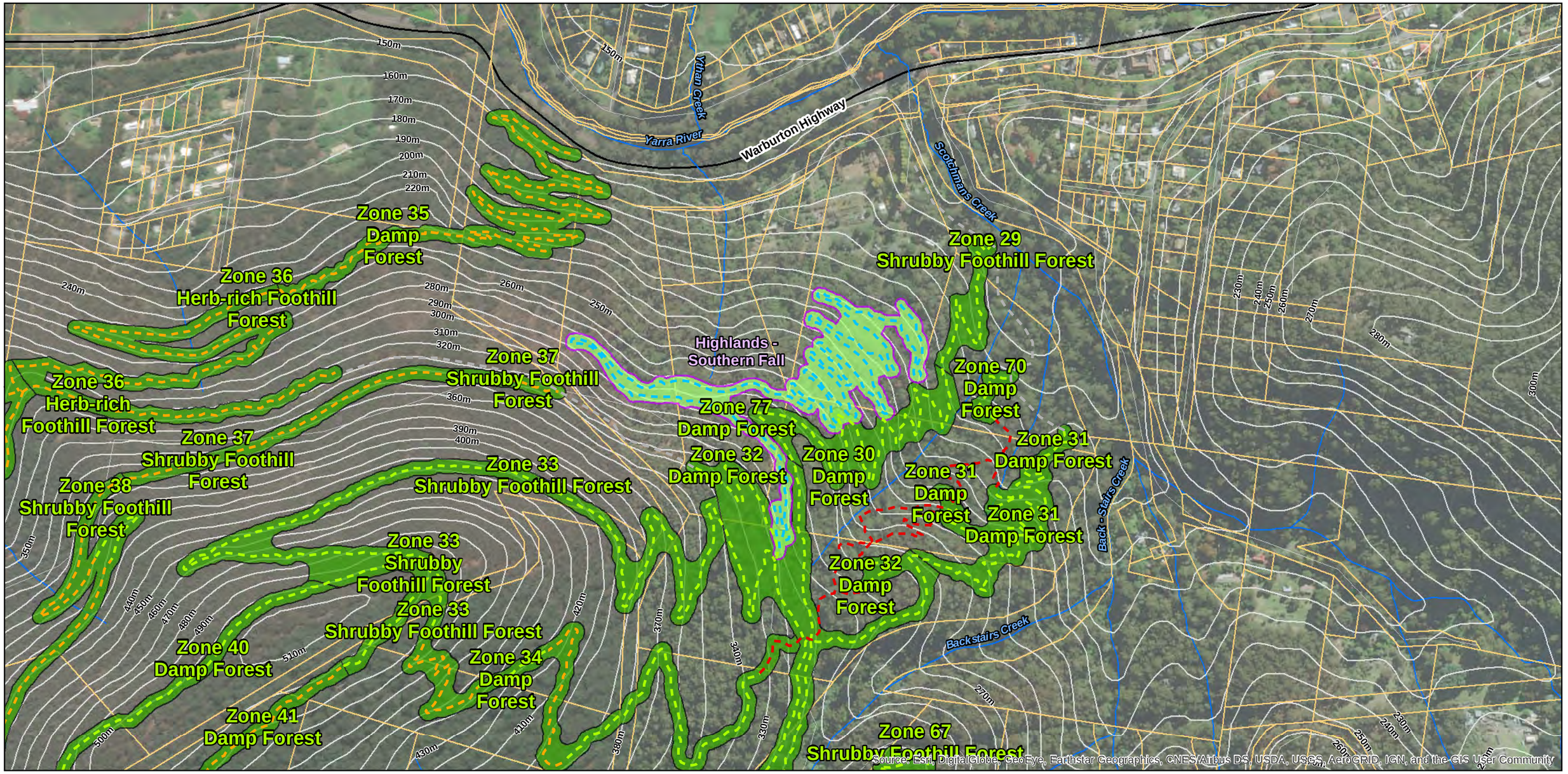
Map 13 –
Mount Little Joe – Hooks Road Region

Map Series 1 – Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:5,415 (Page size A3)



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Legend

- Parcel
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)
- Desktop Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails - Desktop (Dec 2019)
- New Trails (Assessed 2019)
- New Trails (Assessed 2017)
- Existing Trail
- Existing Vehicle Track

Details
Date: 10/12/2019
Version: 2

Data Source:

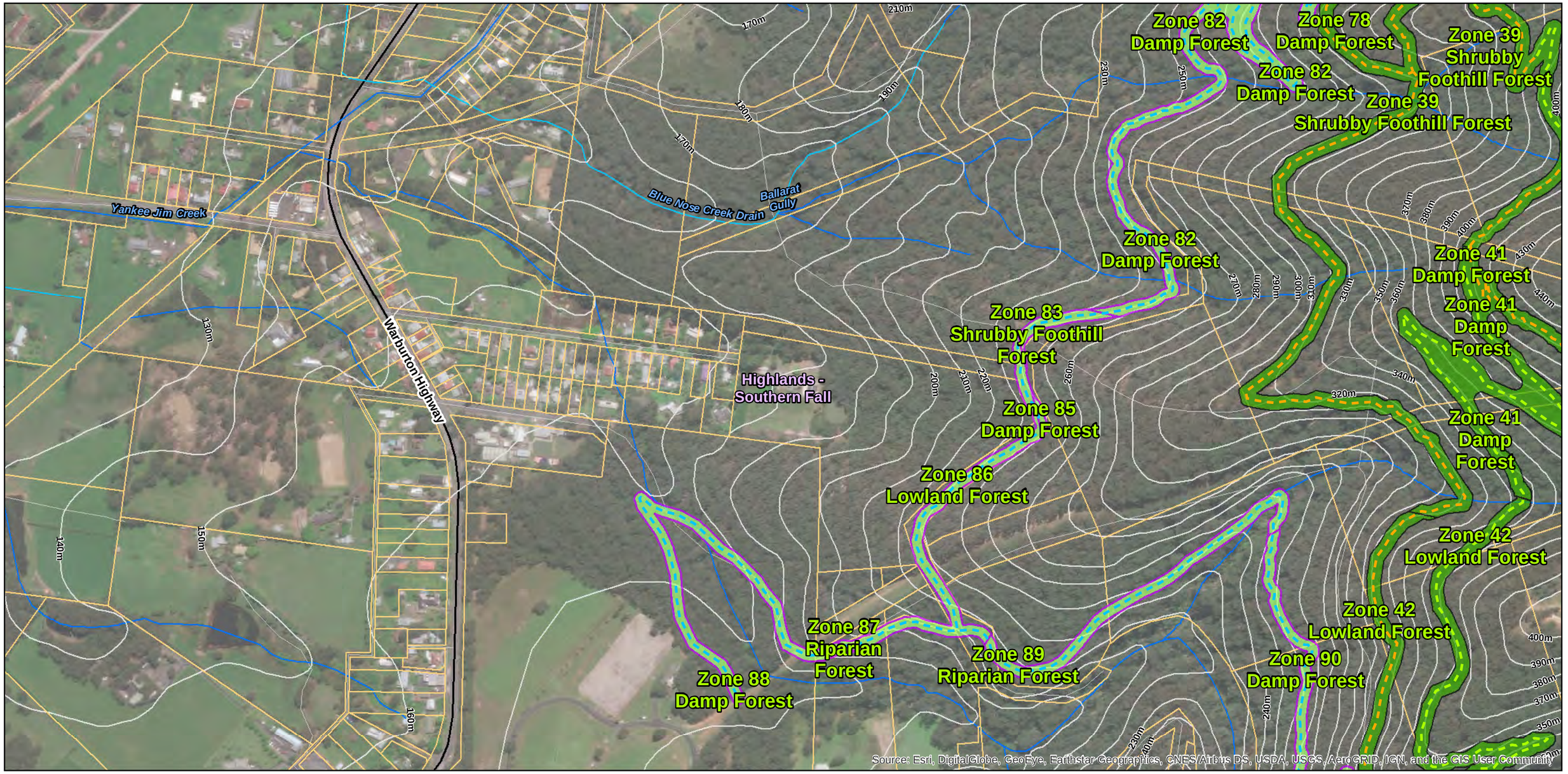
Map 14 –
Mount Little Joe – Backstairs Track

Map Series 1 – Proposed
Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:5,475 (Page size A3)



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Legend

- Parcel
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)
- Desktop Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails - Desktop (Dec 2019)
- New Trails (Assessed 2019)
- New Trails (Assessed 2017)

Details
Date: 10/12/2019
Version: 2

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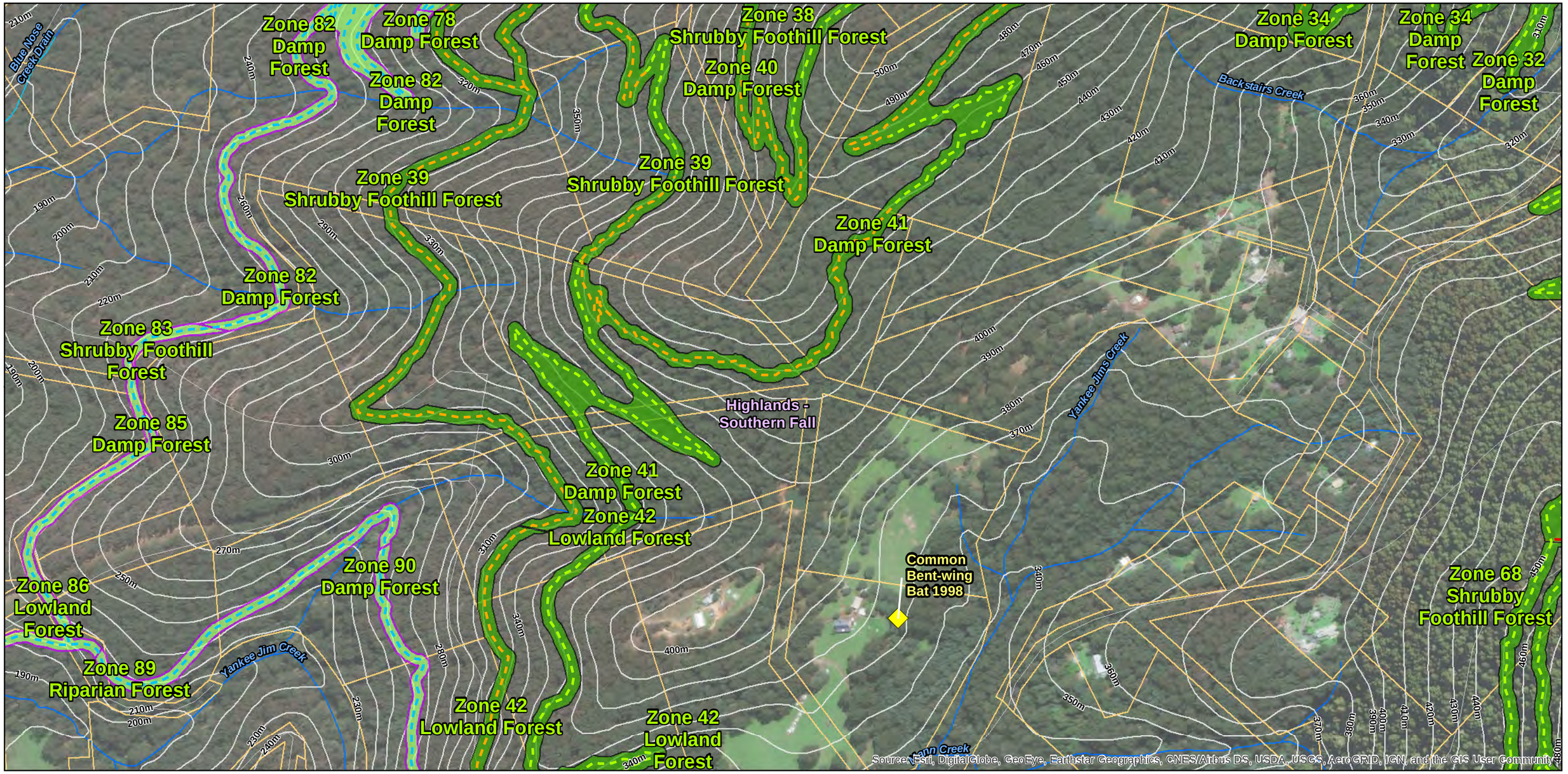
Map 15 –
Wesburn Climb

Map Series 1 – Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:5,465 (Page size A3)



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Legend

- Parcel
- Threatened Fauna VBA
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)
- Desktop Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails - Desktop (Dec 2019)
- New Trails (Assessed 2019)
- New Trails (Assessed 2017)
- Existing Trail

Details
Date: 10/12/2019
Version: 2

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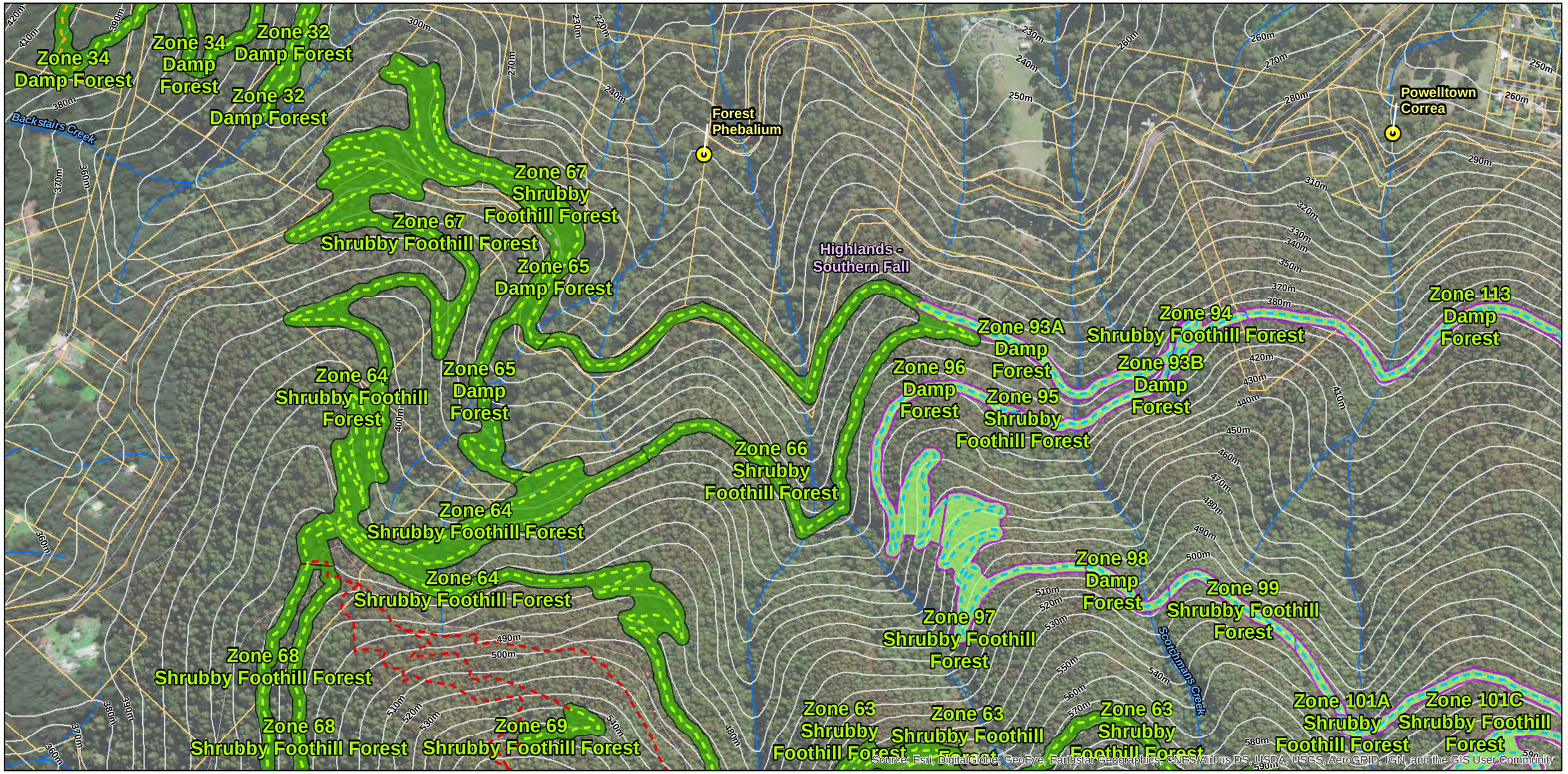
Map 16 –
Mount Little Joe West

Map Series 1 – Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:5,465 (Page size A3)



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Legend

- Parcel
- Threatened Flora VBA
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)
- Desktop Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails - Desktop (Dec 2019)
- New Trails (Assessed 2019)
- New Trails (Assessed 2017)
- Existing Trail
- Existing Vehicle Track

Details
Date: 10/12/2019
Version: 2

Data Source:
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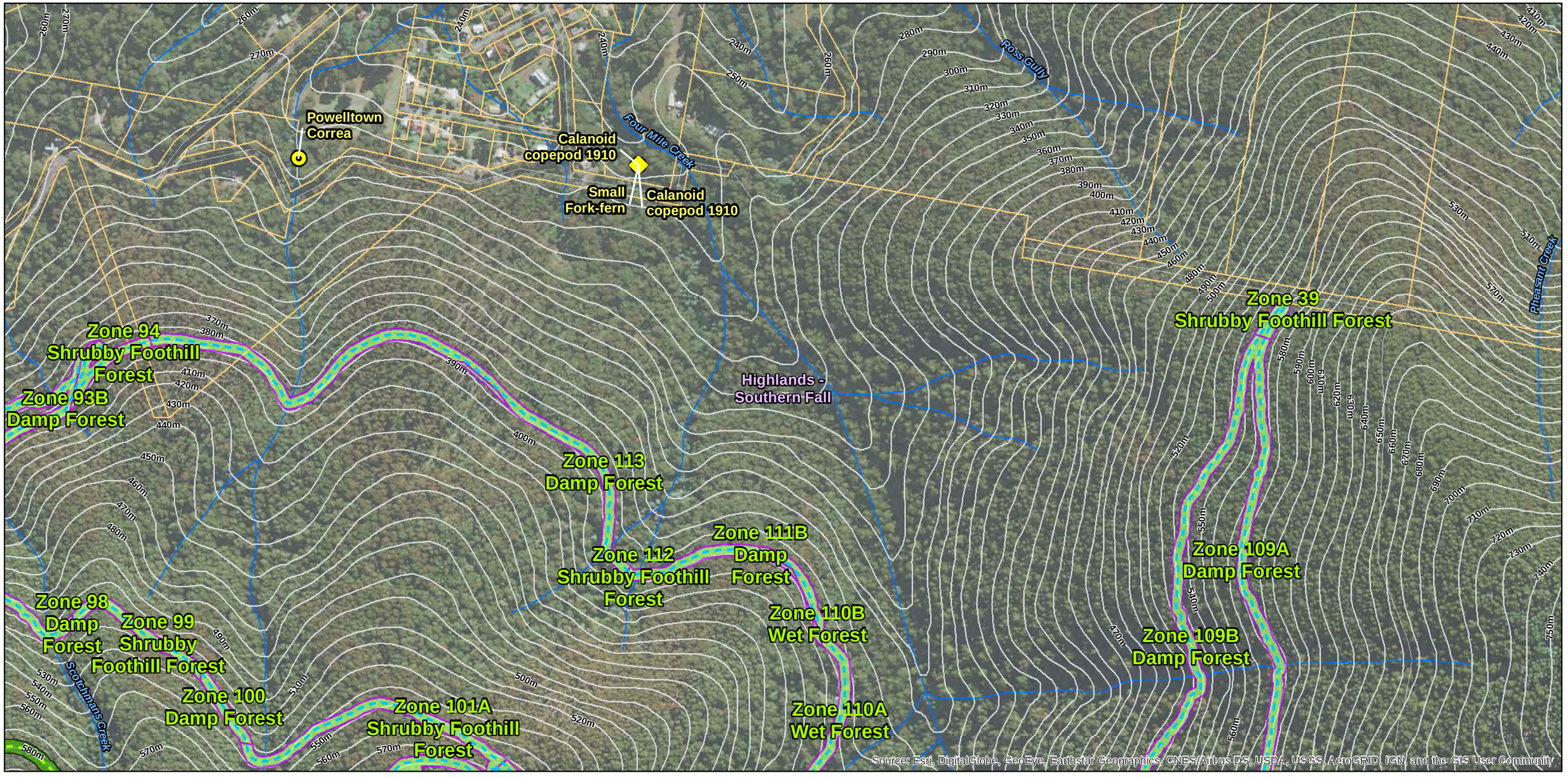
Map 17 –
Mount Little Joe Central

Map Series 1 – Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:5,575 (Page size A3)



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Legend

- Parcel
- Threatened Fauna VBA
- Threatened Flora VBA
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)
- Desktop Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails - Desktop (Dec 2019)
- New Trails (Assessed 2019)

Details
Date: 10/12/2019
Version: 2

Data Source:
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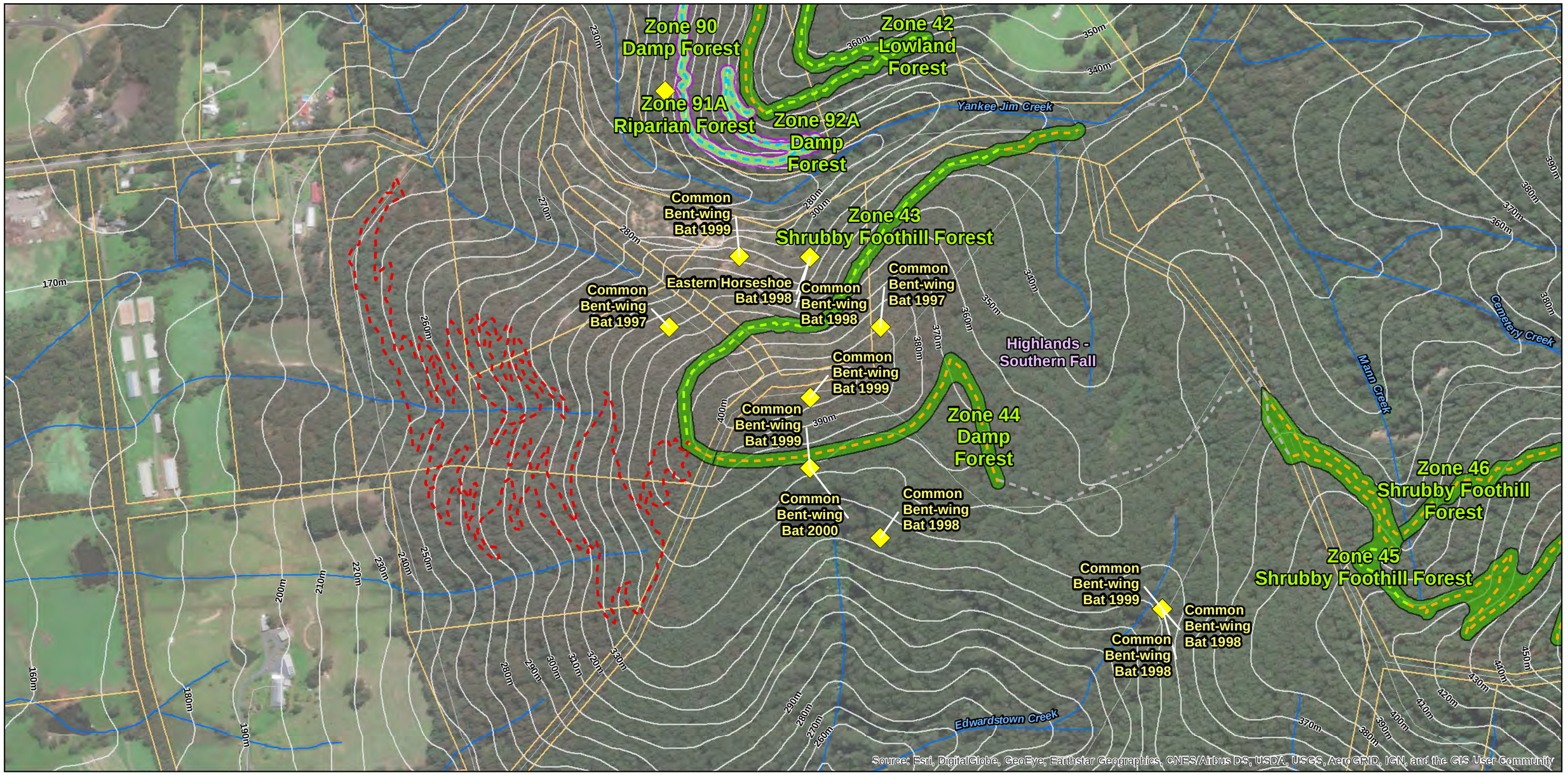
Map 18 –
Mount Little Joe East

Map Series 1 – Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:5,540 (Page size A3)



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Legend

- Parcel
- Threatened Fauna VBA
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)
- Desktop Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails - Desktop (Dec 2019)
- New Trails (Assessed 2019)
- New Trails (Assessed 2017)
- Existing Trail
- Existing Vehicle Track

Details
Date: 10/12/2019
Version: 2

Data Source:
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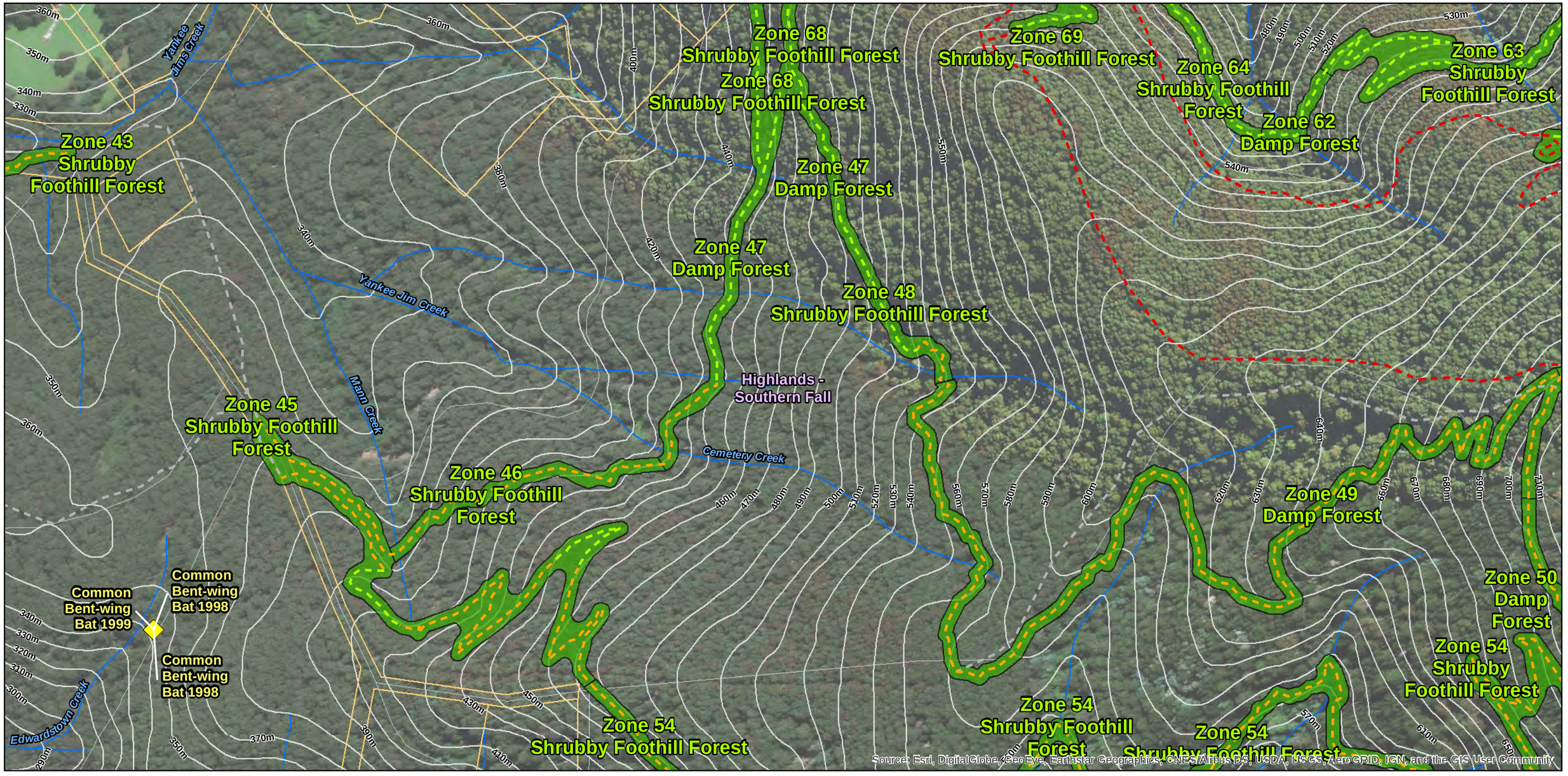
Map 19 –
Crusher Track Link

Map Series 1 – Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:5,540 (Page size A3)



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Legend

- Parcel
- Threatened Fauna VBA
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails (Assessed 2019)
- New Trails (Assessed 2017)
- Existing Trail
- Existing Vehicle Track

Details
Date: 10/12/2019
Version: 2

Data Source:
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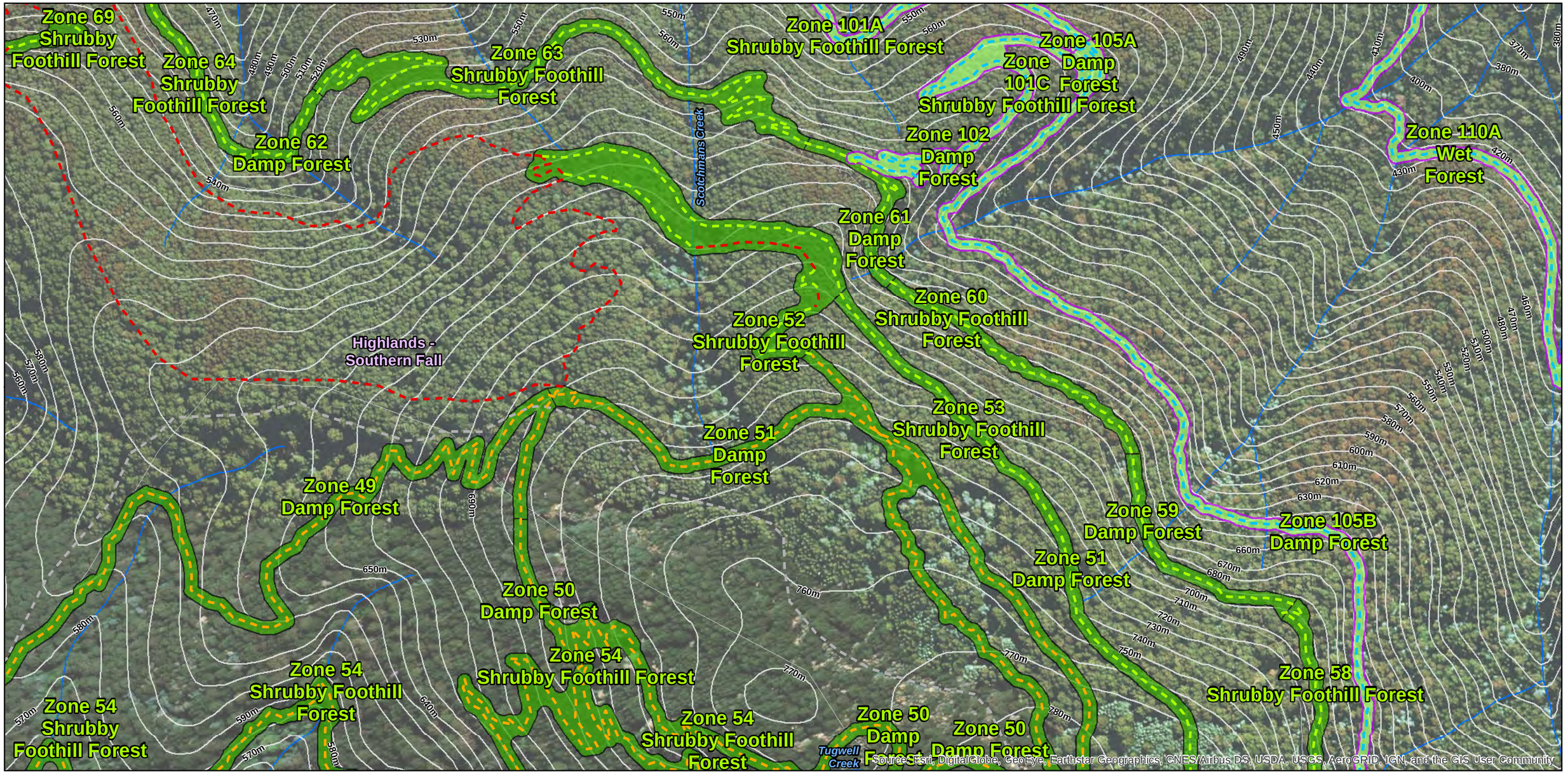
Map 20 – Mount Tugwell Cemetry Fireline

Map Series 1 – Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:5,540 (Page size A3)



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Legend

- Parcel
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)
- Desktop Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails - Desktop (Dec 2019)
- New Trails (Assessed 2019)
- New Trails (Assessed 2017)
- Existing Trail
- Existing Vehicle Track

Details
Date: 10/12/2019
Version: 2

Data Source:
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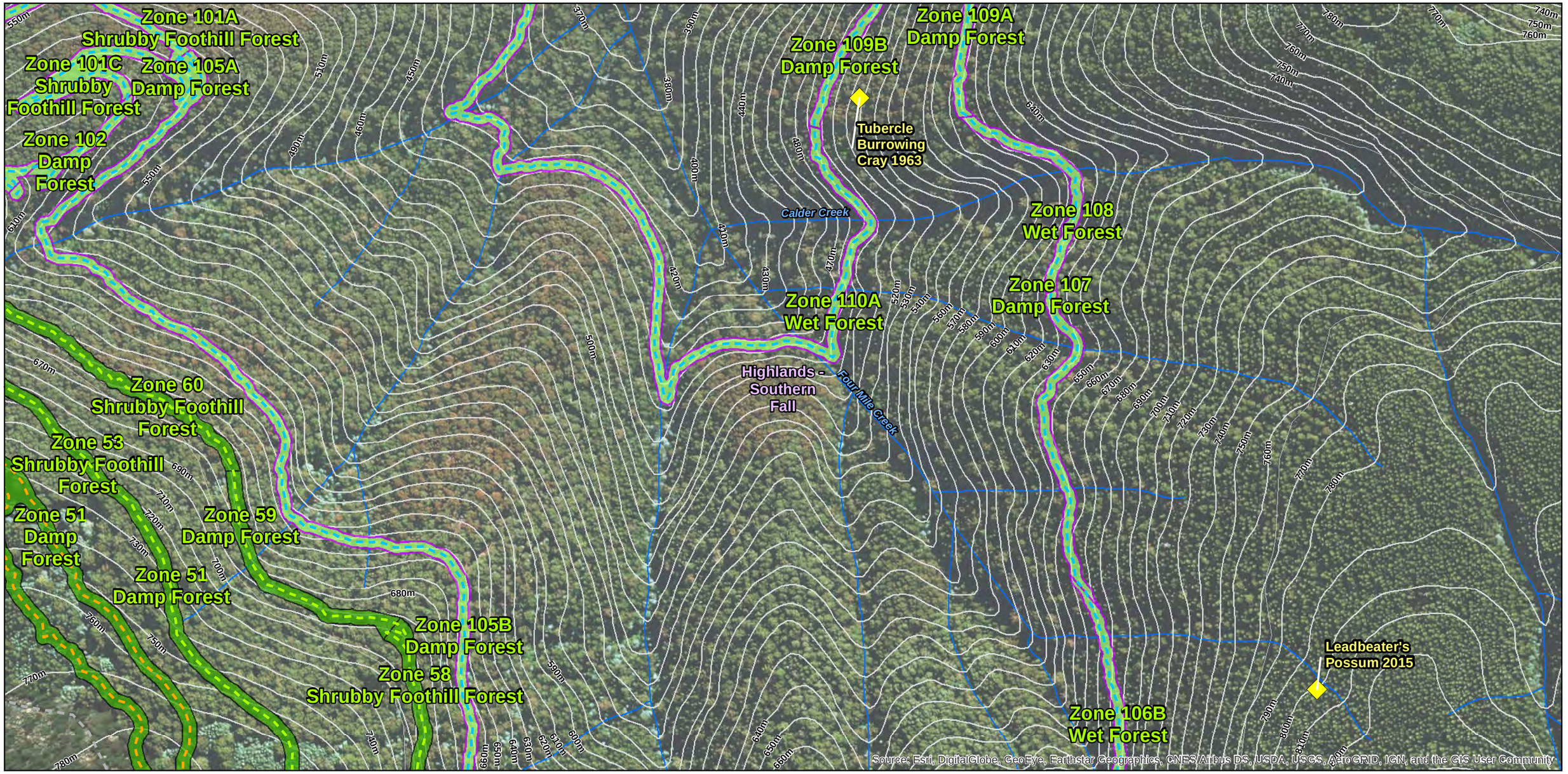
Map 21 –
Cemetery Fireline East

Map Series 1 – Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:5,540 (Page size A3)



PRACTICAL ECOLOGY
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p: (03) 9484 1555 e: enquiries@practicalecology.com.au

Legend

- Parcel
- Threatened Fauna VBA
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)
- Desktop Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails - Desktop (Dec 2019)
- New Trails (Assessed 2019)
- New Trails (Assessed 2017)
- Existing Vehicle Track

Details
Date: 10/12/2019
Version: 2

Data Source:
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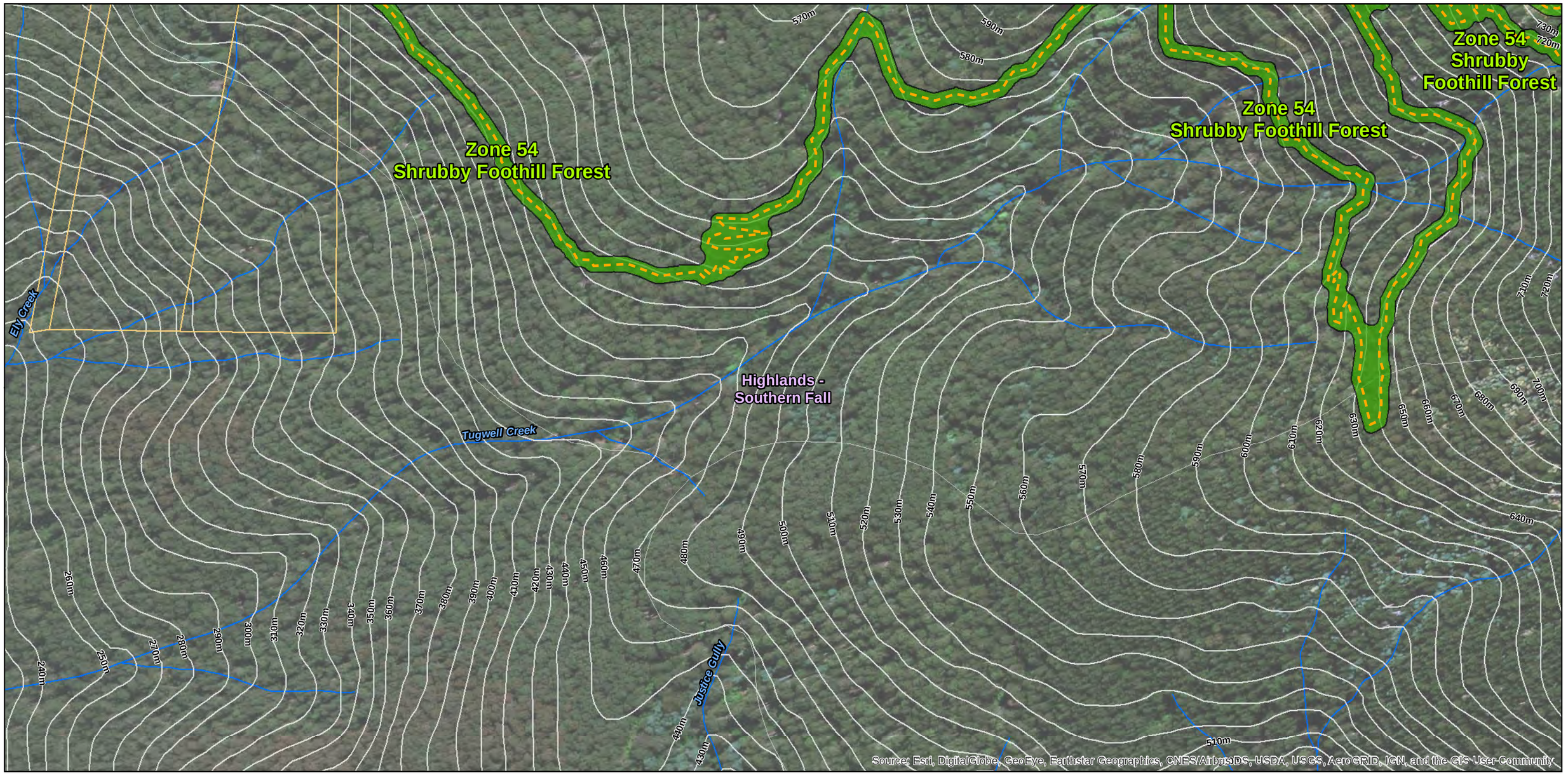
Map 22 –
La La Falls Region

Map Series 1 – Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:5,455 (Page size A3)



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Legend

- Parcel
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails (Assessed 2017)

Details
Date: 10/12/2019
Version: 2

Data Source:
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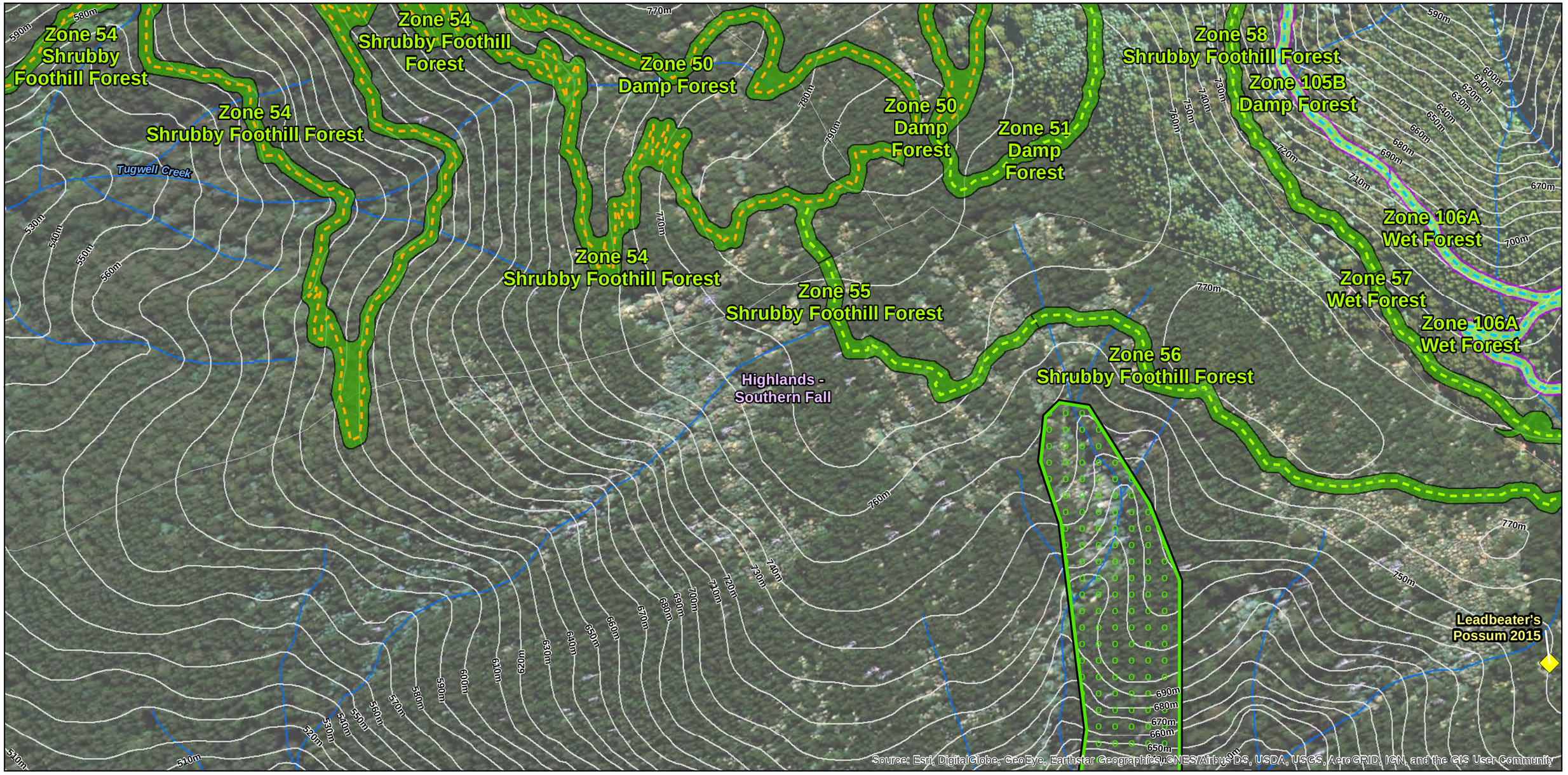
Map 23 –
Cumming Spur Track West

Map Series 1 – Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:5,055 (Page size A3)



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Legend

- Parcel
- Cool Temperate Rainforest (Modelled)
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)
- Desktop Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails - Desktop (Dec 2019)
- New Trails (Assessed 2019)
- New Trails (Assessed 2017)
- Existing Vehicle Track

Details
Date: 10/12/2019
Version: 2

Data Source:
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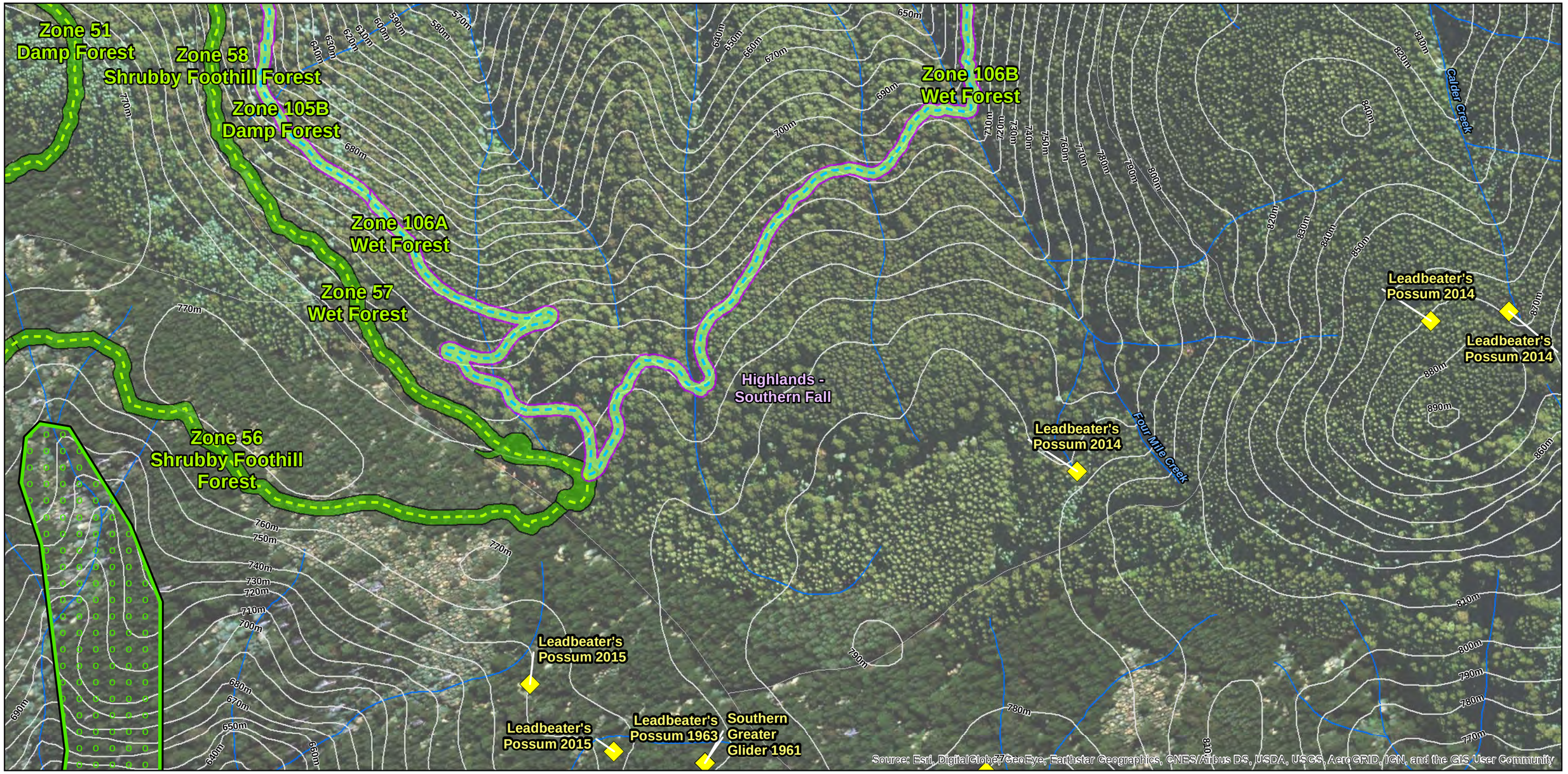
Map 24 –
Cumming Spur Track East

Map Series 1 – Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:5,055 (Page size A3)



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Legend

- Parcel
- Threatened Fauna VBA
- Cool Temperate Rainforest (Modelled)
- Bioregion boundary
- Habitat Hectare Assessment (10m corridor)
- Desktop Assessment (10m corridor)

Trail Alignment and Ref No.

- New Trails - Desktop (Dec 2019)

Details
Date: 10/12/2019
Version: 2

Data Source:
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Map 25 –
Mount Bride Road South East

Map Series 1 – Proposed Warburton Mountain BikeTrail

N

0 50 100 150 m

Scale 1:5,055 (Page size A3)