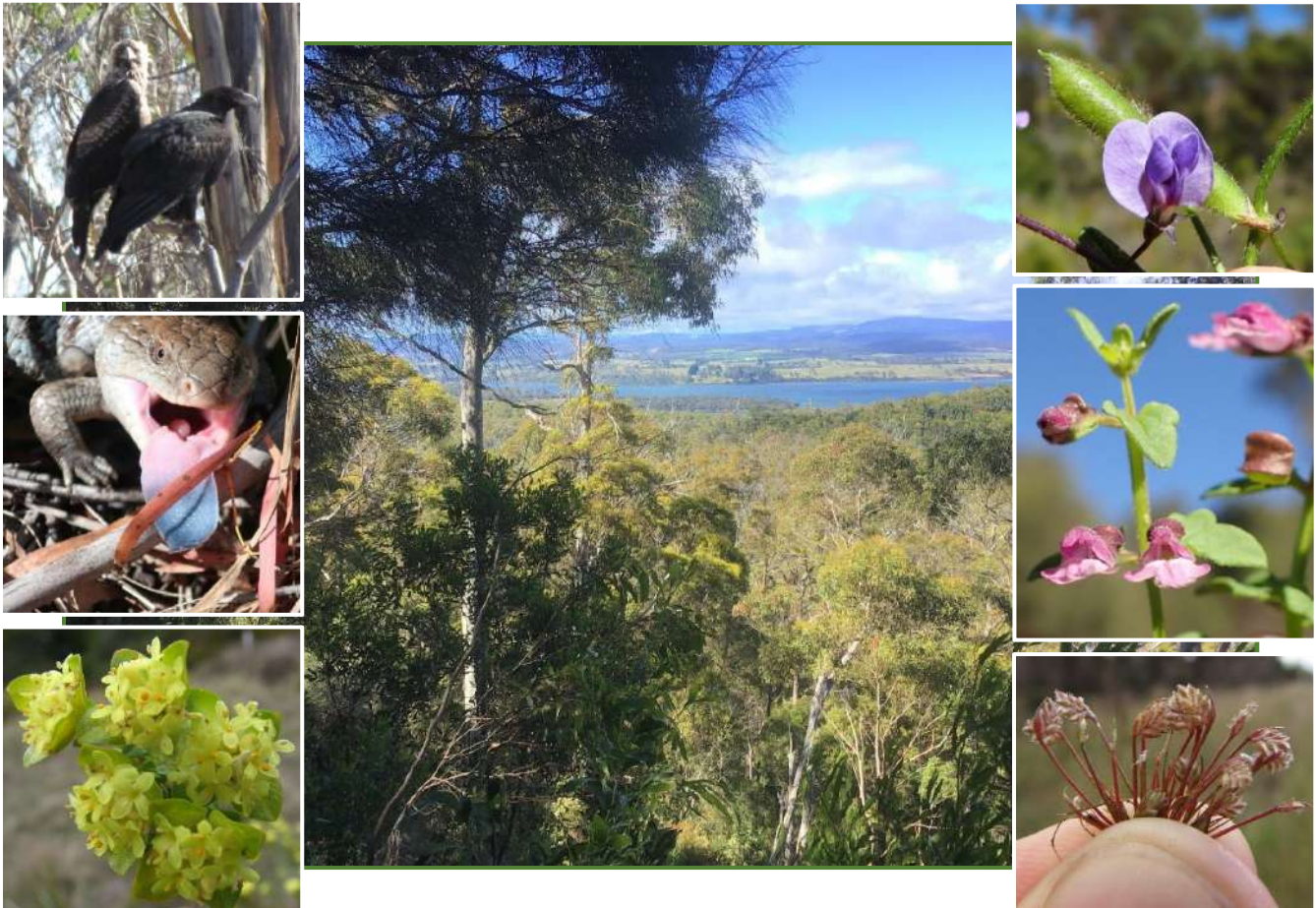


**NATURAL VALUES ASSESSMENT OF PROPOSED GEORGE TOWN
MOUNTAIN BIKE TRAIL PROJECT, TIPPOGOREE HILLS EAST,
TASMANIA**



**Environmental Consulting Options Tasmania (ECOtas) for
George Town Council**

**25 October 2021 (Original Version)
27 October 2021 (Trail 45 Addendum)**

Mark Wapstra

28 Suncrest Avenue

Lenah Valley, TAS 7008

ABN 83 464 107 291

email: mark@ecotas.com.au

web: www.ecotas.com.au

phone: (03) 62 283 220

mobile: 0407 008 685

CITATION

This report can be cited as:

ECOtas (2021). *Natural Values Assessment of Proposed George Town Mountain Bike Trail Project, Tippogoree Hills East, George Town, Tasmania*. Report by Environmental Consulting Options Tasmania (ECOtas) for George Town Council, 25 October 2021 (Original Version), 27 October 2021 (Trail 45 Addendum).

AUTHORSHIP

Field assessment: Brian French & Mark Wapstra

Report production: Mark Wapstra, Brian French

Habitat and vegetation mapping: Brian French

Base data for mapping: LISTmap

Digital and aerial photography: Brian French, Mark Wapstra, GoogleEarth, LISTmap

ACKNOWLEDGEMENTS

We would like to acknowledge the assistance of the following people:

- Peter Rickards (Project Manager, George Town Council): general information and discussion on project and field assistance;
- Gerald McHugh (World Trail Pty Ltd): .gpx files of proposed routes;
- Henry Mainwaring (Tasmanian Helicopters): expert piloting skills for eagle nest surveys; and
- Nick Mooney: specialist input into wedge-tailed eagle nest management including aerial and ground surveys.

DISCLAIMER

Except where otherwise stated, the opinions and interpretations of legislation and policy expressed in this report are made by the author(s) and do not necessarily reflect those of the relevant agency. The client should confirm management prescriptions with the relevant agency before acting on the content of this report. This report and associated documents do not constitute legal advice.

COVER ILLUSTRATIONS

Main image: view west from the Tippogoree Hills. Insets (left top to bottom): wedge-tailed eagle, blotched bluetongue, yellow riceflower; (right top to bottom) small-leaf glycine, dwarf skullcap, slender fanwort.

Please note: the blank pages in this document are deliberate to facilitate double-sided printing.

CONTENTS

SUMMARY 1

INTRODUCTION..... 7

 Purpose 7

 Scope 7

 Structure of report 8

 Limitations 9

 Qualifications 9

 Permit 9

STUDY AREA 9

 Land tenure and zoning 9

 Geology 12

 Topography, elevation, drainages and existing land uses..... 12

 Fire history 12

LAND USE PROPOSAL 12

METHODS 13

 Nomenclature 13

 Preliminary investigation 13

 Site assessments 13

 General..... 14

 Botanical survey 14

 Vegetation classification 14

 Vascular flora species (including threatened flora) 15

 Declared weeds and other exotic species..... 15

 Zoological survey 15

 Tasmanian devil (*Sarcophilus harrisii*) & quoll species (*Dasyurus* spp.)..... 15

 Wedge-tailed eagle (*Aquila audax* subsp. *fleayi*) & white-bellied sea-eagle (*Haliaeetus leucogaster*) 15

 Plant and animal disease..... 15

FINDINGS 16

 Vegetation types 16

 Comments on TASVEG mapping..... 16

 Vegetation types recorded as part of the present study..... 17

 Conservation value of identified vegetation types 19

Plant species	23
Threatened flora species recorded from the study area	23
Threatened flora species potentially present (database analysis)	29
Fauna species	29
Threatened fauna species recorded from the study area	29
Threatened fauna species potentially present (database analysis)	30
Other ecological values	30
Weed species.....	30
Rootrot pathogen, <i>Phytophthora cinnamomi</i>	39
Myrtle wilt	39
Myrtle rust	39
Chytrid fungus and other freshwater pathogens	39
Matters of National Environmental Significance – Threatened Ecological Communities..	40
DISCUSSION.....	40
Summary of key findings.....	40
Legislative and policy implications	41
Recommendations.....	52
REFERENCES.....	54
APPENDIX A. Vegetation community structure and composition	57
APPENDIX B. Vascular plant species recorded from study area	63
APPENDIX C. Analysis of database records of threatened flora	68
APPENDIX D. Analysis of database records of threatened fauna	75
APPENDIX E. DPIPWE’s <i>Natural Values Atlas</i> report for the study area	80
APPENDIX F. Forest Practices Authority’s <i>Biodiversity Values Atlas</i> report for the study area	80
APPENDIX G. CofA’s <i>Protected Matters</i> report for the study area	80
ATTACHMENTS	80
ADDENDUM A. Trail 45	81

SUMMARY

General

George Town Council (herein the Council) engaged Environmental Consulting Options Tasmania (herein ECOtas) to undertake a natural values assessment of the proposed mountain bike trail project area (herein the Project) in the eastern Tippogoree Hills, George Town, Tasmania, primarily to ensure that the requirements of the identified ecological values are appropriately considered during any further project planning under local, State and Commonwealth government approval protocols.

This report covers the eastern Tippogoree Hills (PART 4) component of the project with the adjacent western Tippogoree Hills and Lauriston Park (PART 5) section subject to a separate report and findings.

Site assessments

The following natural values assessments of the project area were undertaken:

- 19 Mar. 2020 aerial (helicopter) survey of potential nesting habitat [M. Wapstra, N. Mooney, P. Rickards];
- 14 Jul. 2020 Shuttle Road and Lauriston Reservoir trail head area (B. French);
- 9 Dec 2020 Tippogoree Hills East (M. Wapstra, B. French); and
- 10 Dec 2020 Tippogoree Hills East (M. Wapstra, B. French).

Summary of key findings

Threatened flora

- No plant species listed as threatened on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) were detected, or are known from database information, from the study area.
- Four plant species listed as threatened on the Tasmanian *Threatened Species Protection Act 1995* (TSPA) were detected from the study area, as follows:
 - *Aphelia gracilis* (slender fanwort): listed as rare (Schedule 5), detected from a small part of the firebreak at the start of the shuttle road and confluence of various tracks;
 - *Glycine microphylla* (small-leaf glycine): listed as vulnerable (Schedule 4), detected from a short section of the shuttle road and scattered occurrences elsewhere;
 - *Pimelea flava* subsp. *flava* (yellow riceflower): listed as rare (Schedule 5), detected from various disturbed sites such as tracks and firebreaks but also scattered in less disturbed forest; and
 - *Scutellaria humilis* (dwarf skullcap): listed as rare (Schedule 5), detected from a rocky ridgeline/slope in sheoak-peppermint forest from two patches.

Threatened fauna

- Two fauna species listed as threatened on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) and/or Tasmanian *Threatened Species Protection Act 1995* (TSPA) are known from database information from the project area.

- Evidence of the Tasmanian devil was noted in the form of a scat.
- Known nests of the Tasmanian wedge-tailed eagle are known adjacent to the project area and are reported on in ECOtas (2020).
- The study area supports potential habitat of some species.

Vegetation types

- The project area supports the following TASVEG mapping units:
 - *Eucalyptus amygdalina* forest and woodland on dolerite (TASVEG code: DAD);
 - *Eucalyptus obliqua* dry forest (TASVEG code: DOB);
 - *Eucalyptus ovata* forest and woodland (TASVEG code: DOV);
 - *Eucalyptus amygdalina-Eucalyptus obliqua* damp sclerophyll forest (TASVEG code: DSC);
 - *Eucalyptus obliqua* forest with broad-leaf shrubs (TASVEG code: WOB);
 - *Allocasuarina verticillata* forest (TASVEG code: NAV); and
 - extra-urban miscellaneous (TASVEG code: FUM).
- DOV is listed as threatened on Schedule 3A of the Tasmanian *Nature Conservation Act 2002* and equates to a threatened ecological community under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, viz. Tasmanian Forests and Woodlands dominated by Black Gum or Brookers Gum (*Eucalyptus ovata* / *E. brookeriana*).

Weeds

- One plant species classified as a declared weed within the meaning of the Tasmanian *Weed Management Act 1999* was detected from the study area, as follows:
 - *Erica lusitanica* (spanish heath): scattered to locally dense along firebreaks.

Plant disease

- No evidence of *Phytophthora cinnamomi* (PC, rootrot) was recorded within the study area.
- No evidence of myrtle wilt was recorded from within the study area.
- No evidence of myrtle rust was recorded from within the study area.

Animal disease (chytrid)

- The project area is not known to support frog chytrid disease and there is limited potential habitat for amphibian species within the anticipated specific project footprint (generally very well-drained terrain).

Recommendations

The recommendations provided below are a summary of those provided in relation to each of the ecological features described in the main report. The main text of the report, and supported appendices, provide the relevant context for the recommendations. It is assumed that the phrasing below will be modified in planning documents for the project. It is essential that machinery operators and other contractors are made aware of the reasons for undertaking the recommended actions.

Vegetation types

In a general sense, it is recommended that the disturbance of native vegetation be minimised as far as practical.

The proposed route passes through short sections of *Eucalyptus ovata* forest and woodland (TASVEG code: DOV). This is a resilient and robust vegetation type and installation and use of a mountain bike track not more than about 1.2 m wide through the understorey will not have a material impact on the extent, viability and ecological condition of the patches.

Threatened flora

Four plant species listed as threatened on the Tasmanian *Threatened Species Protection Act 1995* are known from the project area. The following recommendations have been developed for each species. Note that these recommendations should not require on-site consultation with a suitably qualified botanist.

Pimelea flava subsp. *flava* (yellow riceflower)

- no special management required for any occurrences – but note permit requirements

Aphelia gracilis (slender fanwort)

- no special management required for any occurrences – but note permit requirements

Glycine microphylla (small-leaf glycine)

- avoid occurrences in southern section of project area, if practical (already flagged);
- no special management required for shuttle road (impractical to avoid) – but note permit requirements.

Scutellaria humilis (dwarf skullcap)

- re-route a short section to avoid a particularly dense patch of the species (population extent already flagged to facilitate this).

Threatened fauna

Apart from the generic recommendation to minimise the extent of “clearance and conversion” and/or “disturbance” to native vegetation, specific management in relation to threatened fauna is limited to those related to the wedge-tailed eagle as follows:

- avoid construction of a permanent feature such as a service/shuttle road or drop-off/pick-up points within 500 m of nest site RND#130;
- design trails to be a minimum of 500 m from RND#130; and
- anticipate that any construction activities will need to assume that RND#130 is active and that therefore breeding season restrictions will apply to any works within 500 m (or 1,000 m line-of-sight) of the nest between July to January, inclusive (noting that the design avoids the need for this restriction).

It is assumed that there should be no requirement to remove larger trees that may be hollow-bearing and provide potential habitat for species such as the masked owl.

If any features suspected of being a den of the Tasmanian devil or spotted-tailed quoll are detected during construction, works should cease within 50 m of any such feature and specialist advice sought from a suitably qualified ecologist (to determine the status of the feature). If a den is confirmed, management actions will need to be determined in consultation with officers from DPIPWE, but generally in accordance with *Survey Guidelines and Management Advice for Development Proposals that may Impact on the Tasmanian Devil (Sarcophilus harrisii)* (DPIPWE 2015).

Weed and disease management

In the case of the present project, any management actions should aim to minimise the risk of introducing or further spreading weeds within the project area. The key to this will be hygiene protocols for machinery, vehicles and personnel entering the area during works, particularly if they have come from a potentially weed-affected site.

Several planning manuals provide guidance on appropriate management actions, which can be referred to develop site-specific prescriptions for any proposed works in the study area. These manuals include:

- Allan, K. & Gartenstein, S. (2010). *Keeping It Clean: A Tasmanian Field Hygiene Manual to Prevent the Spread of Freshwater Pests and Pathogens*. NRM South, Hobart;
- Rudman T. (2005). *Interim Phytophthora cinnamomi Management Guidelines*. Nature Conservation Report 05/7, Biodiversity Conservation Branch, Department of Primary Industries, Water & Environment, Hobart;
- Rudman, T., Tucker, D. & French, D. (2004). *Washdown Procedures for Weed and Disease Control*. Edition 1. Department of Primary Industries, Water & Environment, Hobart; and
- DPIPWE (2015). *Weed and Disease Planning and Hygiene Guidelines - Preventing the Spread of Weeds and Diseases in Tasmania*. Department of Primary Industries, Parks, Water & Environment, Hobart.

Development of a Construction Environmental Management Plan (CEMP) or equivalent type of document for construction activities and post-construction monitoring is recommended due to the abundance of *Erica lusitanica* (spanish heath) along the firebreak, which is the location that the proposed shuttle road is to be sited. This plan should include consideration of the order of construction of the shuttle road and track sections, ideally working within the vicinity of the most heavily weed-infested area near the firebreak last, as this provides the means to minimising the risk of introducing weeds to other parts of the track network. Furthermore, it is recommended that preconstruction herbicide application occur prior to construction of the shuttle road. This will minimise the risk of introducing this species to the weed-free area in the east. Consideration should also be given to the implementation of a washdown area in the vicinity of the point that the shuttle road and trail network enter the eastern Tippogoree area. This will be important given the currently weed-free status of the project area to the east of the existing firebreak.

Legislative and policy implications

A formal referral to the Commonwealth Department of Agriculture, Water and the Environment under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* is not considered warranted.

A permit under the Tasmanian *Threatened Species Protection Act 1995* will be required to take individuals of *Pimelea flava* subsp. *flava*, *Glycine microphylla* and *Aphelia gracilis* (and *Scutellaria humilis* if the patches cannot be practically avoided). This permit should only be applied for once

the design of the track is finalised (but note that the certification of a Forest Practices Plan may “act” as the permit).

Development will require a planning permit pursuant to the provisions of the *George Town Interim Planning Scheme 2013*. A review of the provisions of the Biodiversity Code indicates likely full compliance with P1 & P2.1 of E8.6.1 without the need for specific planning permit conditions (except in relation to confirming the preceding recommendations).

It is recommended that the proponent seek advice from the Forest Practices Authority on the application of the Act and Regulations and the specific need, or otherwise, for a Forest Practices Plan (and how this may interact with the planning scheme requirements).

INTRODUCTION

Purpose

George Town Council (herein the Council) engaged Environmental Consulting Options Tasmania (herein ECOtas) to undertake a natural values assessment of the proposed mountain bike trail project area (herein the project) in the eastern Tippogoree Hills, George Town, Tasmania, primarily to ensure that the requirements of the identified ecological values are appropriately considered during any further project planning under local, State and Commonwealth government approval protocols.

This report covers the eastern Tippogoree Hills (PART 4) component of the project with the adjacent western Tippogoree Hills and Lauriston Park (PART 5) section subject to a separate report and findings.

Scope

This report relates to:

- flora and fauna species of conservation significance, including a discussion of listed threatened species (under the Tasmanian *Threatened Species Protection Act 1995* and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*) known to be or potentially present;
- other fauna and flora species of conservation significance/interest (e.g. species of biogeographic interest);
- vegetation types (forest and non-forest, native and exotic) present, including a discussion of the distribution, condition, extent, composition and conservation significance of each community under the Tasmanian *Nature Conservation Act 2002* and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*;
- plant and animal disease management issues;
- weed management issues;
- geoconservation issues; and
- a discussion of some of the policy and legislative implications of the identified ecological values.

This report follows the government-produced *Guidelines for Natural Values Surveys - Terrestrial Development Proposals* (DPIPWE 2015) in anticipation that the report (or extracts of it) may be used as part of various approval processes that will be required for the project. The report has been structured to assist those preparing additional planning approval documents including:

- referral to the Commonwealth Department of Agriculture, Water and the Environment for consideration under the provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*;
- Reserve Activity Assessment (RAA) under the Tasmania Parks & Wildlife Service (DPIPWE) protocols;
- Forest Practices Plan (FPP) under the Tasmanian *Forest Practices Act 1985* and associated *Forest Regulations 2017*; and
- planning/development application under the provisions of the *George Town Interim Planning Scheme 2013*.

Structure of report

The project is of a nature that a staged and structured natural values assessment process has been followed, with five main parts, as follows:

- PART 1: "fatal flaws" (critical constraints) analysis

This was undertaken to identify critical constraints related to natural values to inform design at the earliest stage possible such that such values can be managed as practically as possible (i.e. early identification rather than late-stage identification).

This part of the assessment included standard database interrogations (e.g. *Natural Values Atlas*, *Biodiversity Values Database*, *Protected Matters Search Tool*, etc.).

This stage is complete and was reported in:

ECOtas (2020). *Natural Values 'Fatal Flaws' (Critical Constraints) Assessment of Proposed Mountain Bike Trail Project, Tippogoree Hills to Mount George, Tasmania*. Report by Environmental Consulting Options Tasmania (ECOtas) to George Town Council, 3 May 2020.

- PART 2: eagle nest management

Analysis of available information undertaken as part of early discussions about the project identified three known nests of the wedge-tailed eagle from the general project area. This prompted the need to assess the whole project area in relation to these nests and any new nests prior to further project planning i.e. the known nests (and any additional nests) were identified as a potential critical constraint requiring early knowledge to properly inform planning.

The findings of this stage of assessment were included in Part 1 reporting above but are further expounded herein in relation to more detailed project planning.

- PART 3: detailed natural values assessment – Mount George area

This is intended as the combined desktop and on-ground assessment of natural values to meet the intent and specifics of the *Guidelines for Natural Values Assessments – Terrestrial Development Proposals* (DPIPWE 2015).

This stage is complete and was reported in:

ECOtas (2020). *Natural Values Assessment of Proposed Mountain Bike Trail Project, Mount George Area, George Town, Tasmania*. Report by Environmental Consulting Options Tasmania (ECOtas) for George Town Council, 22 September 2020.

- PART 4: detailed natural values assessment – upper (eastern) Tippogoree Hills area including shuttle road

This is intended as the combined desktop and on-ground assessment of natural values to meet the intent and specifics of the *Guidelines for Natural Values Assessments – Terrestrial Development Proposals* (DPIPWE 2015): this report.

- PART 5: detailed natural values assessment – lower (western) Tippogoree Hills and Lauriston Park areas

This is intended as the combined desktop and on-ground assessment of natural values to meet the intent and specifics of the *Guidelines for Natural Values Assessments – Terrestrial Development Proposals* (DPIPWE 2015).

As the project has progressed, it became apparent that the on-ground assessments would also be staged, undertaken when specific parts of the project were identified and/or at a stage of design/planning to allow such assessments to be informative. This was considered the most efficient way forward with respect to field assessments. However, it also leads to the potential for more complex reporting, in progressive stages of separate reports on each stage/area. Due to

separate approvals being undertaken, it will be important to cross-reference to the relevant report for the area of concern.

Limitations

The ecological assessments were undertaken at various times of the year. Many plant species have ephemeral or seasonal growth or flowering habits, or patchy distributions (at varying scales), and it is possible that some species were not recorded for this reason. However, every effort was made to sample the range of habitats present in the survey area to maximise the opportunity of recording most species present (particularly those of conservation significance). Late spring and into summer are usually regarded as the most suitable period to undertake most botanical assessments. While some species have more restricted flowering periods, a discussion of the potential for the site to support these is presented.

The survey was also limited to vascular species: species of mosses, lichens and liverworts were not recorded. However, a consideration is made of threatened species (vascular and non-vascular) likely to be present (based on habitat information and database records) and reasons presented for their apparent absence.

Surveys for threatened fauna were largely limited to an examination of "potential habitat" (i.e. comparison of on-site habitat features to habitat descriptions for threatened fauna), and detection of tracks, scats and other signs.

Qualifications

Except where otherwise stated, the opinions and interpretations of legislation and policy expressed in this report are made by the authors and do not necessarily reflect those of the relevant agency. The client should confirm management prescriptions with the relevant agency before acting on the content of this report. This report and associated documents do not constitute legal advice.

Permit

Any plant material was collected under DPIPWE permit TFL 20167 (in the names of Mark Wapstra & Brian French). Relevant data will be entered into DPIPWE's *Natural Values Atlas* database by the authors. Some plant material may be lodged at the Tasmanian Herbarium by the authors.

No vertebrate or invertebrate material was collected.

STUDY AREA

Refer to Figure 1 for the general location of the study area and Figure 2 for detail of the proposed project design.

Land tenure and zoning

The eastern Tippogoree Hills study area is partially on private property (Rio Tinto – Bell Bay Aluminium) and mostly within the Tippogoree Hills Conservation Area (DPIPWE).

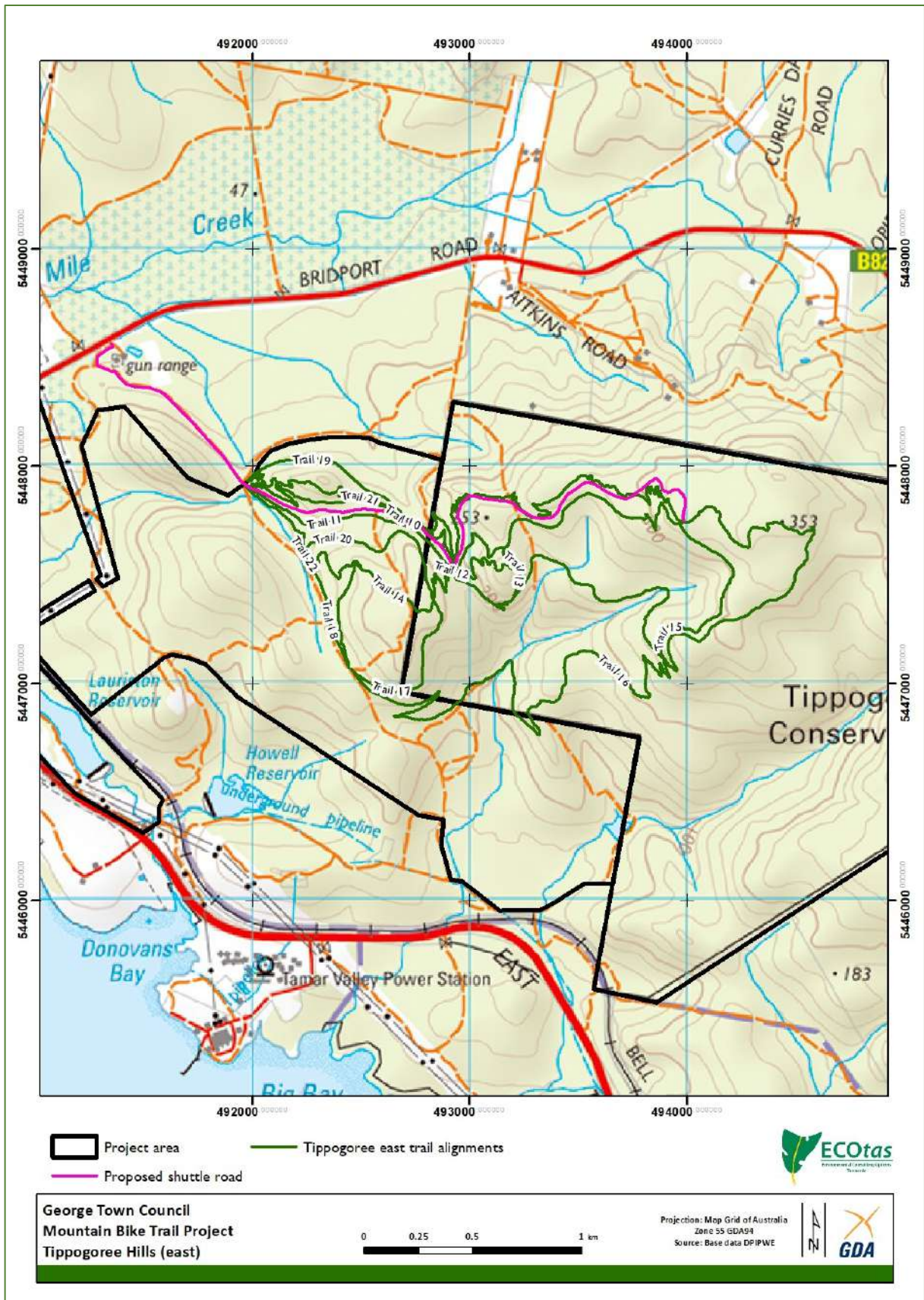


Figure 1. General location of the Tippogoree Hills project area [source: LISTmap]

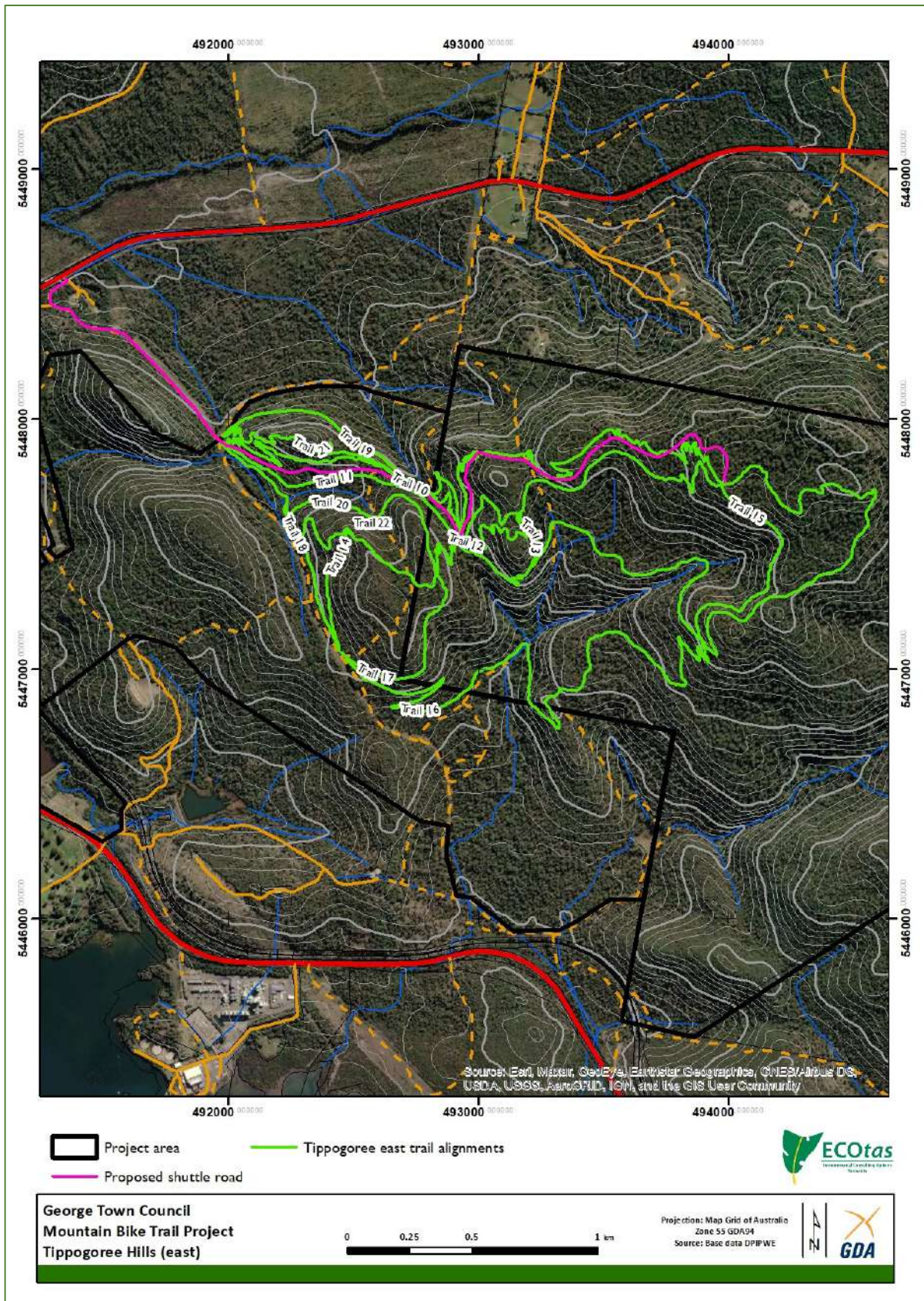


Figure 2. Detail of the project area including aerial imagery, topographical features and the project design [source: LISTmap]

The Rio Tinto land is zoned as General Industrial and the reserved land as Environmental Management pursuant to the George Town Interim Planning Scheme 2013. The reserved land is wholly subject to the Priority Habitat overlay.

Geology

The study area is mapped correctly as:

- Jurassic-age “dolerite (tholeiitic) with locally developed granophyre” (geocode: Jd): mapped across virtually the entire project area; and
- Quaternary-age “talus, vegetated and active” (geocode: Qpt): occurs as a small slither on the north-facing slopes of the Tippogoree Hills.

The geology is mentioned because it can have a strong influence on the classification of vegetation communities and the presence of plant species with a priority for conservation management (and to a lesser extent on fauna species with a priority for conservation management).

LISTmap does not indicate that any part of the study area includes sites of geoconservation significance.

Topography, elevation, drainages and existing land uses

The Tippogoree Hills part of the study area is on relatively complex topography broadly referred to as the Tippogoree Hills, which is a long ridgeline trending northwest-southeast but with several more complex ridge systems and associated generally steep slopes of various aspects. The elevation is between ca. 40-350 m a.s.l.

Tributaries of Four Mile Creek, Williams Creek and un-named drainages are present.

There are also numerous old vehicle tracks, firebreaks and roads. However, most of the area supports largely undisturbed native vegetation (forest).

Fire history

The fire history is mentioned because it can have a significant influence on the potential occurrence of flora species with a priority for conservation management.

The Tippogoree Hills part of the study area was subject to an extensive bushfire on 27 Nov. 2006 (Incident Number: 128420; Fire Name: “Tippogoree Hills”).

LAND USE PROPOSAL

The proposal is to construct a network of mountain bike tracks in the hills east of the East Tamar Highway, south of Bridport Road in the Tippogoree Hills area. The tracks will be serviced by utilising a new shuttle road as indicated in Figure 2. This report only considers the eastern section of the trail routes in the Tippogoree Hills with the western section including Lauriston Park being subject to a separate report (PART 5).

Further project details are held by George Town Council and will form part of the various planning and approval documents. For the purposes of field assessments and reporting, we have relied on supplied files (e.g. GoogleEarth and GIS files, hard copy maps) and officer guidance to define specific part of the study area.

METHODS

Nomenclature

All grid references in this report are in GDA94, except where otherwise stated.

Vascular species nomenclature follows de Salas & Baker (2020) for scientific names and Wapstra et al. (2005+) for common names. Fauna species scientific and common names follow the listings in the cited *Natural Values Atlas* report (DPIPWE 2020).

Vegetation classification follows TASVEG 4.0, as described in *From Forest to Fjaeldmark: Descriptions of Tasmania's Vegetation* (Kitchener & Harris 2013+).

Preliminary investigation

Available sources of threatened flora records, vegetation mapping and other potential environmental values were interrogated. These sources include:

- Tasmanian Department of Primary Industries, Parks, Water & Environment's *Natural Values Atlas* records for threatened flora and fauna (GIS coverage maintained by the authors current as at date of report);
- Tasmanian Department of Primary Industries, Parks, Water & Environment's *Natural Values Atlas Report* ECOTas_GTC_MTB_TippogoreeEast_Appendix-NVR for a polygon defining the approximate extent of the study area, buffered by 5 km, dated 16 December 2020 (DPIPWE 2020);
- Forest Practices Authority's *Biodiversity Values Database* report, specifically the species' information for grid reference centroid 493104mE 5447518mN (i.e. the centroid of the *Natural Values Atlas* search area), buffered by 2 km and 5 km for threatened flora and fauna, respectively, hyperlinked species' profiles and predicted range boundary maps, dated 16 December 2020 (FPA 2020);
- Commonwealth Department of Agriculture, Water and the Environment's *Protected Matters Search Tool Report* for a point feature approximately in the centre of the study area (-41.12257, 146.91902), buffered by 5 km, dated 16 December 2020 (CofA 2020);
- the TASVEG 4.0 vegetation coverage (as available through a GIS coverage and/or LISTmap);
- GoogleEarth and LISTmap aerial orthoimagery; and
- other sources listed in tables and text as indicated.

Site assessments

Site assessments were undertaken as follows:

19 Mar. 2020	aerial (helicopter) survey of potential nesting habitat [M. Wapstra, N. Mooney, P. Rickards];
13 Jul. 2020	Mount George area [B. French];
14 Jul. 2020	Shuttle Road and Lauriston Reservoir trail head area (B. French);
7 Sept 2020	Mount George south area (M. Wapstra);
9 Dec 2020	Tippogoree Hills East (M. Wapstra, B. French); and
10 Dec 2020	Tippogoree Hills East (M. Wapstra, B. French).

General

The study area was assessed on the days indicated in **METHODS Site assessments**. The survey aimed to assess the range of habitat types present in the study area (at the broad scale e.g. vegetation types, altitude variation, geological substrates; and at the finer scale e.g. microhabitats such as open areas, tracks, rock outcrops, poorly-drained patches, disturbed sites, etc.).

Reference to topographic maps, aerial photography (GoogleEarth, LISTmap) and existing vegetation mapping (TASVEG 4.0 as per the cited *Natural Values Atlas* report and as available to the authors as a GIS coverage) established the approximate range and distribution of topographic and habitat variation present in the study area. It is also noted that the authors have considerable knowledge of the natural values associated with the broader project area because of previous assessments near the area, targeted on-ground surveys for the Gunns pulp mill project (which included extensive assessments of the proposed effluent pipeline route between Long Reach and Low Head, as well as several sites in the greater Bell Bay-George Town area), and additional surveys of various private property sites between Long Reach and George Town.

Access was general relatively straightforward because of the supplied .gpx route or .kmz file (converted and uploaded to GPS/tablet) and pre-flagged sections of routes. The study area was surveyed by following the flagged trail routes and meandering transects through different vegetation types.

While the final track width will be narrow, for the purposes of the field assessment any habitat features of note adjacent to the nominal route were examined (e.g. rock outcrops). In addition, it was assumed that construction activities may create a temporarily wider footprint than the final track width, especially at key track features such as hairpin bends, and these areas were assessed more broadly. Creek crossing points were also examined more closely because it was assumed that such sites may present installation issues and that minor shifts upstream or downstream of the currently defined crossing point may be needed.

While a 20 m wide (i.e. 10 m each side of the nominal route) corridor is reported against (e.g. for vegetation classifications), in practice any habitat/site features considered to be of potential ecological significance within ca. 10-30 m of the nominal route were examined.

Botanical survey

Vegetation classification

The vegetation of the study area was classified according to TASVEG 4.0 (Kitchener & Harris 2013+). Boundaries of vegetation types were determined as encountered along the route, with transitions between vegetation types recorded using hand-held GPS by waypoint function, later downloaded onto GIS and comparing to aerial imagery. Detailed non-permanent plots (nominally

30 m radius) recording all vascular species, vegetation structure and site characteristics were undertaken in representative vegetation types.

Vascular flora species (including threatened flora)

Vascular flora species were recorded within plots used to classify vegetation types and in running species lists within continuous vegetation types along the route of the proposed tracks. Some plant material was collected for later laboratory identification.

Where threatened flora populations (or species considered of biogeographic/local interest e.g. a new record for the general area) were encountered, hand-held GPS was used to delineate the point location and/or extent of the population and estimates made of abundance of individuals, where practical.

Declared weeds and other exotic species

The survey area was assessed with respect to plant species classified as declared weeds under the Tasmanian *Weed Management Act 1999*, Weeds of National Significance (WoNS) or “environmental weeds” (author opinion and as included in *A Guide to Environmental and Agricultural Weeds of Southern Tasmania*, NRM South 2017). Where detected, the waypoint function on hand-held GPS was used to delineate the point location and/or extent of the population and estimates made of abundance of individuals, where practical. In some cases, weeds (e.g. *Cirsium vulgare* rosettes) were grubbed out/hand-pulled and left to die on site.

Zoological survey

Surveys for threatened fauna were practically limited to an examination of “potential habitat” (i.e. comparison of on-site habitat features to habitat descriptions for threatened fauna), and detection of tracks, scats and other signs, except as indicated below.

Tasmanian devil (*Sarcophilus harrisii*) & quoll species (*Dasyurus* spp.)

Surveys were limited to recording of scats (only devil scats detected), using hand-held GPS.

Wedge-tailed eagle (*Aquila audax* subsp. *fleayi*) & white-bellied sea-eagle (*Haliaeetus leucogaster*)

Parts of the study area support potential nesting habitat. An aerial survey was scheduled for outside the recognised breeding season (August to January, inclusive) with the flight undertaken on 19 March 2020. The findings were reported in ECOtas (2020a) – see also Figure 9 for habitat modelling and search area.

Additional searches for nests were made during the on-ground ecological assessments.

Plant and animal disease

The survey area was assessed with respect to potential impacts of plant and animal pathogens, by reference to habitat types and field symptoms.

FINDINGS

Vegetation types

Comments on TASVEG mapping

This section, which comments on the existing TASVEG 4.0 mapping for the study area, is included to highlight the differences between existing mapping and the more recent mapping from the present study to ensure that any parties assessing land use proposals (via this report) do not rely on existing mapping. Note that TASVEG mapping, which was mainly a desktop mapping exercise based on aerial photography, is often substantially different to ground-truthed vegetation mapping, especially at a local scale. An examination of existing vegetation mapping is usually a useful pre-assessment exercise to gain an understanding of the range of habitat types likely to be present and the level of previous botanical surveys.

The TASVEG 4.0 mapping of the study area is largely correct due to the largely homogenous nature of the vegetation in the Tippogoree Hills area (Figure 3). TASVEG 4.0 maps most of the area as *Eucalyptus amygdalina* forest and woodland on dolerite (TASVEG code: DAD). However, the mapping of rainforest communities and wet heathland are entirely incorrect and are discussed further in Table 1.

Table 1. Existing vegetation mapping units present in the study area

[conservation status: NCA – as per Schedule 3A of the Tasmanian *Nature Conservation Act 2002*, using units described by Kitchener & Harris (2013+); table headings are as per modules in Kitchener & Harris (2013+); EPBCA – as per the listing of ecological communities on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, relating to communities as described under that Act, but with equivalencies to TASVEG units]

TASVEG equivalent (Kitchener & Harris 2013+)	Conservation priority TASVEG EPBCA	Comments
Dry eucalypt forest and woodland		
<i>Eucalyptus amygdalina</i> forest and woodland on dolerite (DAD)	not threatened <i>not threatened</i>	DAD is mapped extensively across much of the project area. Our experience of this area and aerial viewing indicates that the DAD mapping is likely to be largely correct. It should be noted that there are areas mapped as DAD that are clearly not forest.
<i>Eucalyptus amygdalina</i> - <i>Eucalyptus obliqua</i> damp sclerophyll forest (DSC)	not threatened <i>not threatened</i>	DSC is mapped as 'patches' across the study area. The survey found that this community was not present in any of the TASVEG mapped areas but did occur in an area mapped as DAD and RFE (see comments on RFE below). Most of the mapped DCS areas were found to be DAD, DOB or WOB (see discussions of these mapping units under Table 2).
Scrub, heathland and coastal complexes		
wet heathland (SHW)	not threatened <i>not threatened</i>	A small area of SHW is mapped in the centre of the study area surrounding a poorly drained area associated with a drainage feature. This community was not present and was found to be eucalypt woodland dominated by <i>Eucalyptus ovata</i> (see discussion under DOV in Table 2).

TASVEG equivalent (Kitchener & Harris 2013+)	Conservation priority TASVEG EPBCA	Comments
Rainforest and related scrub		
<i>Nothofagus-Atherosperma</i> rainforest (RMT)	not threatened <i>not threatened</i>	RMT is mapped in a wet gully in the centre of the study area. The field assessment found that this community was entirely absent from the study area and was a wet eucalypt community.
Rainforest fernland (RFE)	threatened <i>not threatened</i>	As with RMT above, RFE was not located within the study area. This community was a eucalypt dominated (see discussion under DSC in Table 2 below).
Modified land		
permanent easements (FPE)	not threatened <i>not threatened</i>	The managed firebreak in the west of the study area has been mapped as FPE. However, the intent of this mapping unit is for permanent liner features such as powerlines/ pipelines. In this regard, 'extra-urban miscellaneous' (FUM) better represents the firebreak area (see discussion under FUM in Table 2).

Vegetation types recorded as part of the present study

Vegetation types have been classified according to TASVEG 4.0, as described in *From Forest to Fjaeldmark: Descriptions of Tasmania's Vegetation* (Kitchener & Harris 2013+). The survey indicated that existing TASVEG vegetation mapping is essentially correct at a broad-scale i.e. much of the project area is correctly mapped as DAD. However, rainforest communities (RMT and RFE) are entirely absent and are represented by wet and dry eucalypt mapping units (see Table 2 & Figures 4 & 5). Appendix A provides detailed descriptions of the native vegetation mapping units identified from the project area.

Table 2. Vegetation mapping units present in the study area

[conservation status: NCA – as per Schedule 3A of the Tasmanian *Nature Conservation Act 2002*, using units described by Kitchener & Harris (2013+), relating to TASVEG mapping units (DPIPWE 2020); table headings are as per modules in Kitchener & Harris (2013+); EPBCA – as per the listing of ecological communities on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, relating to communities as described under that Act, but with equivalencies to TASVEG units]

TASVEG mapping unit (Kitchener & Harris 2013+)	Conservation priority NCA EPBCA	Comments
Dry eucalypt forest and woodland		
<i>Eucalyptus amygdalina</i> forest and woodland on dolerite (DAD)	not threatened <i>not threatened</i>	DAD dominates much of the vegetation within the project area. Most of the DAD is dominantly a shrubby woodland with a dense understorey of <i>Pultenaea daphnoides</i> , <i>Acacia verticillata</i> and <i>Goodenia ovata</i> . The relatively moist and poorly-drained areas are shrubby with <i>Eucalyptus ovata</i> being a sub-dominant canopy species with <i>E. amygdalina</i> and tall shrubs of <i>Melaleuca ericifolia</i> common over a sedgy understorey. DAD open woodland areas occur on the more insolated sites that have a grassy and sedgy

TASVEG mapping unit (Kitchener & Harris 2013+)	Conservation priority NCA EPBCA	Comments
		understorey with scattered small trees of <i>Allocasuarina verticillata</i> and a high portion of exposed dolerite bedrock. DAD is in good condition with introduced plants confined to ubiquitous herbs and grass species. No symptoms of PC were noted.
<i>Eucalyptus obliqua</i> dry forest (DOB)	not threatened <i>not threatened</i>	DOB occurs in relatively moist and sheltered south-facing gullies on the upper slopes in the east of the study area. DOB is characterised by tall forest canopy of <i>Eucalyptus obliqua</i> over a dense shrubby understorey dominated by <i>Pultenaea daphnoides</i> , <i>Acacia verticillata</i> and <i>Goodenia ovata</i> . DOB is gradational with WOB as moisture availability increases and forms clear boundaries with DAD as sites become more insolated and exposed. TASVEG 4.0 mapped several areas of DSC, which were found to be DOB. No weed species or symptoms of PC were noted.
<i>Eucalyptus ovata</i> forest and woodland (DOV)	threatened <i>threatened</i>	DOV occurs in a poorly-drained area associated with an unnamed tributary of Four Mile Creek in the west of the study area. DOV is characterised by a forest canopy of <i>Eucalyptus ovata</i> over a dense and shrubby layer of <i>Melaleuca ericifolia</i> and <i>Acacia verticillata</i> . A small segment (ca. 80 m) of Trail 11 traverses through this threatened community. However, it should be noted that the trail alignment generally follows natural openings in the understorey and avoids all trees of <i>Eucalyptus ovata</i> . Disturbance will be minimal. DOV is listed as threatened at a State level, and in some cases can equate to an EPBCA-listed threatened ecological community (depending on extent, condition, and composition). No weed species or symptoms of PC were noted.
<i>Eucalyptus amygdalina</i> - <i>Eucalyptus obliqua</i> damp sclerophyll forest (DSC)	not threatened <i>not threatened</i>	DSC occurs in a moist south-facing gully in the south of the study area. DSC is characterised by the mixed dominance of <i>Eucalyptus obliqua</i> , <i>E. amygdalina</i> , <i>E. ovata</i> and <i>E. viminalis</i> over a dense understorey of <i>Pomaderris apetala</i> , <i>Acacia verticillata</i> , <i>Melaleuca ericifolia</i> and <i>Goodenia ovata</i> . The fern species <i>Pellaea falcata</i> and <i>Polystichum proliferum</i> dominate the groundcover. TASVEG 4.0 mapped this area as RFE (see Table 1), which is entirely incorrect as eucalypt species dominate and form approx. 25% of the canopy cover. RFE was not noted during the survey. Furthermore, other areas mapped as DSC were found to be DOB. No weed species or symptoms of PC were noted.
Wet eucalypt forest and woodland		
<i>Eucalyptus obliqua</i> forest with broad-leaf shrubs (WOB)	not threatened <i>not threatened</i>	WOB occurs in south-facing slopes and moist gullies associated with creeks. WOB occurs as a classic wet sclerophyll forest i.e. a relatively tall even-aged canopy generated after a major disturbance event (older fire) over a dense secondary canopy of mainly broad-leaved shrubs, sedges and ground ferns. WOB and DOB intergrade, especially on the margins of gullies, lower slopes and heads of relatively indistinct gullies, with some areas of WOB shifting into DOB due to more recent fire history. WOB is in good condition with no weeds of symptoms of PC noted.

TASVEG mapping unit (Kitchener & Harris 2013+)	Conservation priority NCA EPBCA	Comments
Non-eucalypt forest and woodland		
<i>Allocasuarina verticillata</i> forest (NAV)	not threatened <i>not threatened</i>	Several small areas of NAV were located amongst the much more extensive DAD. The location of the areas of NAV relate to topographic features such as rocky rises and/or north- and west-facing more insolated slopes. NAV is entirely dominated by a uniform canopy of large shrubs/small trees of <i>Allocasuarina verticillata</i> over a generally low grassy and sedgy understorey. Scattered sparse individuals of <i>E. amygdalina</i> and <i>E. viminalis</i> occur in most of the mapped areas. NAV is generally in good condition with introduced plants confined to ubiquitous herbs and grass species. No symptoms of PC were noted.
Modified land		
extra-urban miscellaneous (FUM)	not threatened <i>not threatened</i>	The firebreak in the west of the study area is mapped as FUM. Whilst there is some vegetation present within this area mapped as FUM, the vegetation is managed to minimise fire risk and is slashed or cut regularly with a service road along the break. Some invasive weed species were noted along the firebreak. These species and their management are discussed further below under FINDINGS Other ecological values <u>Weed species</u> . No symptoms of PC were noted.

Conservation value of identified vegetation types

DAD, DOB, DCS, WOB and NAV are not classified as threatened under Schedule 3A of the Tasmanian *Nature Conservation Act 2002* and do not equate to threatened ecological communities on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

DOV is classified as threatened under Schedule 3A of the Tasmanian *Nature Conservation Act 2002*. Patches of DOV can equate to Tasmanian Forests and Woodlands dominated by Black Gum or Brookers Gum (*Eucalyptus ovata/Eucalyptus brookeriana*), which is a threatened ecological community classified as Critically Endangered on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, where the key diagnostic characteristics and condition thresholds are met, mainly related to patch size, composition and condition (CofA 2019).

For DOV to be listed as the EPBCA-listed entity, an interaction of the following criteria is used to determine if a minimum condition threshold is met:

- size of the patch (≥ 0.5 or ≥ 2.0 ha);
- contiguity of the patch with a native vegetation remnant ≥ 2.0 ha;
- proportion of the understorey that is native ($\geq 70\%$ or $\geq 50\%$);
- quantity of large or hollow-bearing trees; and
- understorey species diversity in 0.5 ha area.

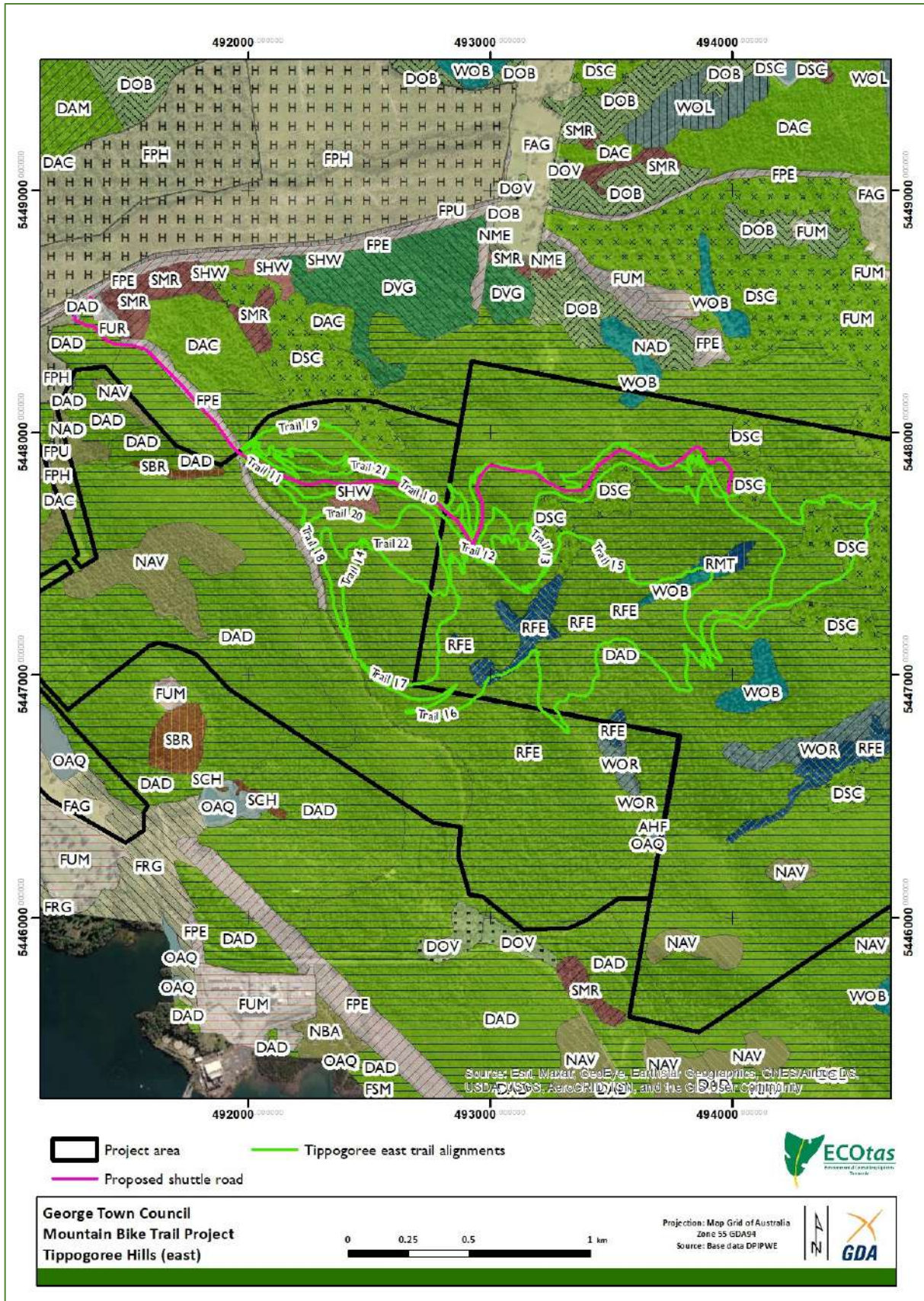


Figure 3. Existing TASVEG 4.0 vegetation mapping for the project area (refer to text for codes)

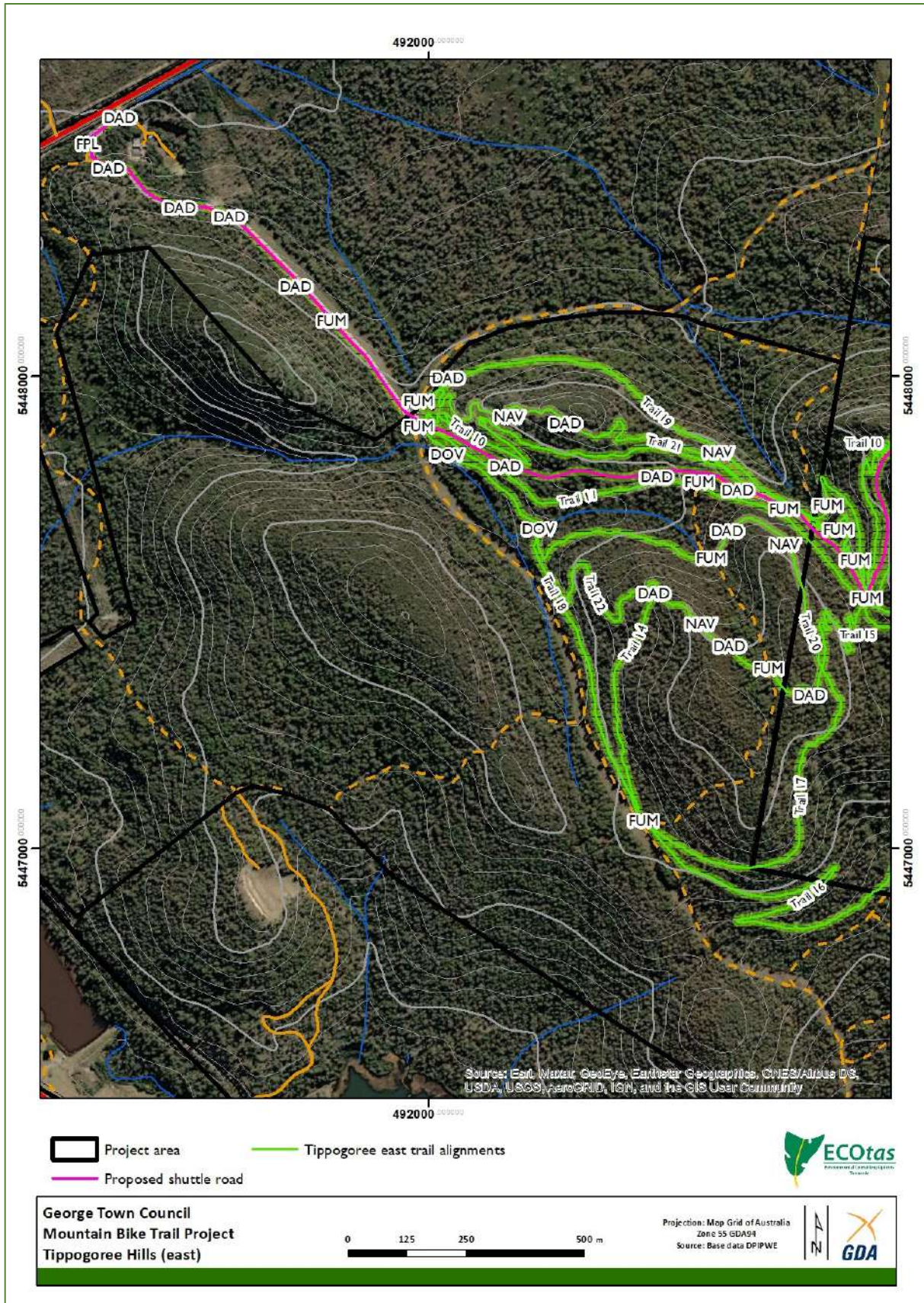


Figure 4. Revised vegetation mapping for the study area west (refer to text for codes)

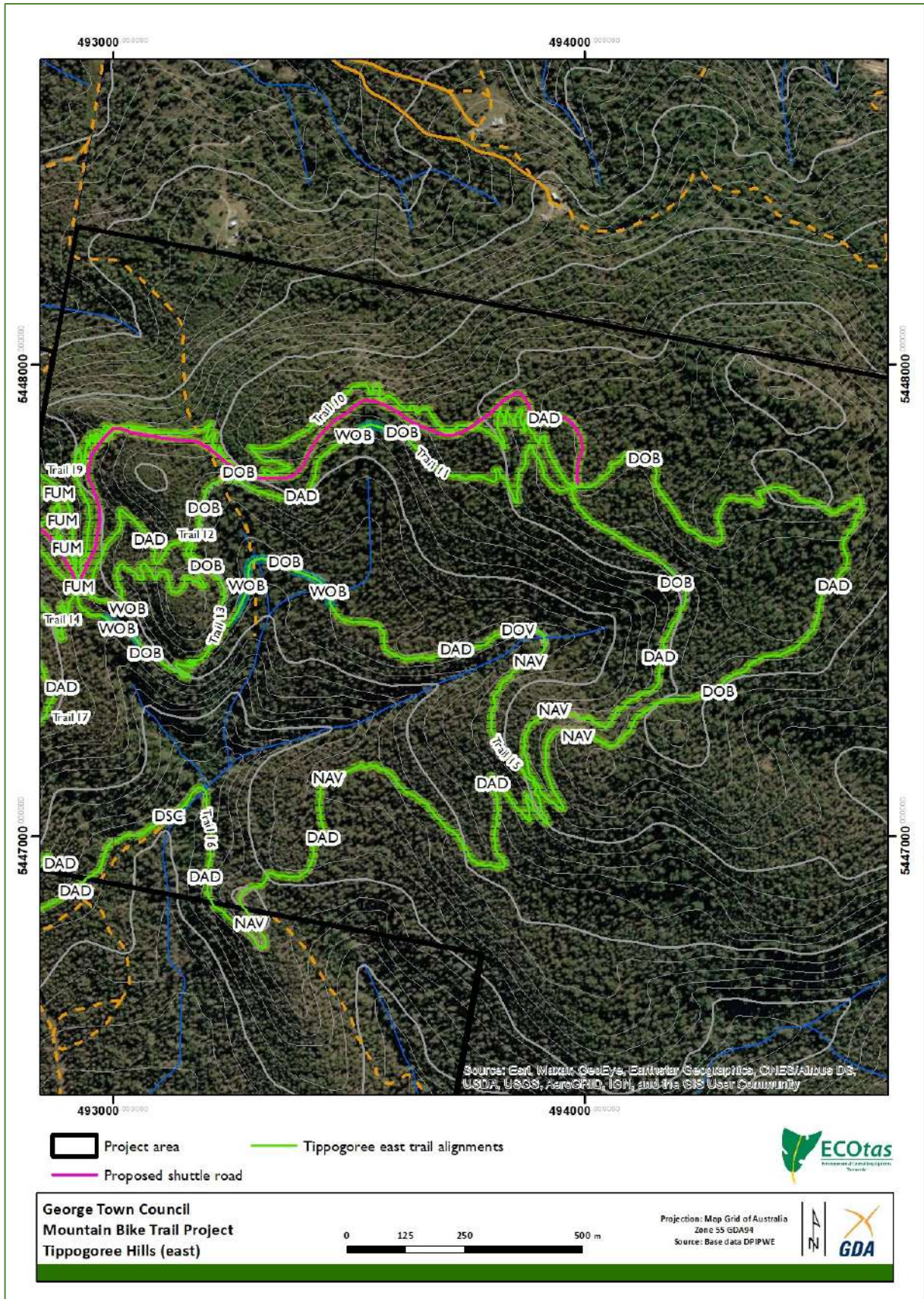


Figure 5. Revised vegetation mapping for the project area east (refer to text for codes)

In the case of the study area, the areas allocated to DOV may marginally exceed 0.5 ha (the patch can extend beyond the immediate “disturbance footprint” i.e. extend up and down the associated gully, are contiguous with larger patches of native vegetation, are wholly native in composition and have a relatively high understorey diversity. Hollow-bearing trees are absent (due largely to fire history), although in the absence of further disturbance, this would be a temporary situation (albeit perhaps 50-100 years away). On balance, the patches technically qualify as the EPBCA-listed entity.

Refer to **DISCUSSION Legislative and policy implications** for further details on this community. However, in summary, the installation and use of a narrow mountain bike track through the understorey of the densely shrubby wet/dry forest dominated by *Eucalyptus ovata* is not anticipated to have a significant impact at any reasonable level.

Plant species

General information

A total of 197 vascular plant species were recorded from the area (Appendix B), comprising 130 dicotyledons (including 7 endemic and 5 introduced species), 56 monocotyledons (including 3 endemic species) and 11 pteridophytes (all native).

Additional surveys at different times of the year may detect additional short-lived herbs and grasses but a follow-up survey is not warranted because of the small disturbance footprint and low likelihood of species with a high priority for conservation management being present.

Threatened flora species recorded from the study area

The study area does not support any records of flora listed as threatened on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Four flora species listed as threatened on the Tasmanian *Threatened Species Protection Act 1995* were located from the study area (Figure 6): *Aphelia gracilis* (slender fanwort), *Glycine microphylla* (small-leaf glycine), *Pimelea flava* subsp. *flava* (yellow riceflower) and *Scutellaria humilis* (dwarf skullcap). The species are discussed further below.

Aphelia gracilis (slender fanwort) [TSPA: r; EPBCA: -]

Aphelia gracilis is a small tufted annual herb (Plate 1). Potential habitat is limited to low-lying flatter terrain with the species likely to be most prevalent on anthropogenically-created bare ground such as tracks, drains and easements. Natural habitat may include rock plates with seepages. This is a highly ephemeral annually-flowering herb that is present for short periods in spring/early summer, depending on seasonal conditions.

Aphelia gracilis was located on the firebreak in the west of the study area on disturbed and moist areas associated with the vehicle track along the firebreak (Figure 6, Plate 2). This site is the convergence point of all tracks and the shuttle road will be constructed partially across the site supporting the species. Avoiding the population is not likely to be practical and not considered warranted. The species has clearly taken advantage of an anthropogenically-created patch of habitat and only persists because of ongoing maintenance of the firebreaks by the land manager. In the absence of ongoing disturbance, the species would almost certainly disappear (at least until

the next major disturbance event, such as fire, created more bare ground). The site represents neither a range extension nor infilling, with the species known from several populations in the greater East Tamar area. Any loss would represent a miniscule proportion of the Statewide population. A permit will be required under the Tasmanian *Threatened Species Protection Act 1995* to take some of the plants within the study area. See **DISCUSSION Legislative and policy implications** for further details.



Plate 1. (LHS). *Aphelia gracilis*, a tiny annual/ephemeral herb [Powranna Road, 5 Nov. 2014]

Plate 2. (RHS) The moist bare-ground habitat of *Aphelia gracilis* in the foreground along the firebreak

Glycine microphylla (small-leaf glycine) [TSPA: v: EPBCA: -]

Glycine microphylla is a small twining perennial herb that occurs in dry to dampish sclerophyll forest and woodland in the north and east of the State (Plate 3). Potential habitat widespread in the study area (Plate 4). This is a distinctive perennial herb that is detectable and identifiable at any time of the year. This species is known to respond positively to disturbance.



Plate 3. (LHS) Juvenile *Glycine microphylla* growing along Trail 16 in the south of the project area (note the long median petiolule – circled); inset: flowers and fruit [Little Beach, 17 Nov. 2016]

Plate 4. (RHS) Widespread woodland habitat of *Glycine microphylla*

Glycine microphylla was located at several locations both on the proposed shuttle road and along proposed trails (Figure 6). The locations along the proposed bike trails have been flagged with red tape and it is suggested that the bike trails simply be moved at least 2 m either side of the flagged locations to avoid disturbance at these sites. The sites(s) located along the shuttle road will be difficult to avoid due to the site being on a steep slope with outcropping dolerite occurring upslope. A permit is required under the Tasmanian *Threatened Species Protection Act 1995* to take some of the plants at this location. See **DISCUSSION Legislative and policy implications** for further details. It is likely that this species is widespread in the greater Tippogoree Hills area considering that there are known records nearby and the number of locations located during the current survey.

Pimelea flava subsp. *flava* (yellow riceflower) [TSPA: r; EPBCA: -]

Pimelea flava subsp. *flava* is a distinctive yellow-flowered perennial shrub to 1.5 m high (Plate 5). The greater East Tamar area (Dilston through to George Town) is a stronghold for this species, where it occurs naturally in heathland and dry sclerophyll forest and into the transition between dry and wet vegetation types but is most prevalent on anthropogenic habitats such as plantations, old paddocks, highway and road batters, drains, old forest tracks, powerline easements, etc. It thrives on disturbance, proliferating after clearing and fire. Within the study area there are several known records, mainly associated with marked tracks.

The survey located this species at numerous sites across the project area from highly disturbed areas such as the main firebreak in the west, old vehicle tracks and within eucalypt woodland (Figure 6 & Plate 6). The greatest abundance is in disturbed areas where this species is common. Within native forest, *Pimelea flava* subsp. *flava* occurs in *Eucalyptus amygdalina*-dominated forest including dense scrubby understorey (where it tends to occur as isolated plants or small scattered patches) and in open grassy areas associated with rockplate vegetation. As noted above, this species responds favourably to disturbance. The track and shuttle road construction is likely to cause proliferation of this species on the verges of such infrastructure, as observed in numerous locations in the greater east Tamar region. A permit is required under the Tasmanian *Threatened Species Protection Act 1995* to take some of the plants within the study area. See **DISCUSSION Legislative and policy implications** for further details.



Plate 5. (LHS)The wiry shrub habit of *Pimelea flava* subsp. *flava*; inset: bright yellow flowers of the species

Plate 6. (RHS) Disturbed firebreak and vehicle tracks that are the favoured habitat of *Pimelea flava* subsp. *flava*

Scutellaria humilis (dwarf skullcap) TSPA: r; EPBCA: -]

Scutellaria humilis a small perennial herb to 30 cm high of the mint (Lamiaceae) family (Plates 7 & 8). This species has been found in moist, shady places in the northeast and southeast of the State. Recent sites have been associated with rocky slopes and rises.



Plate 7. (LHS) Whole plant of *Scutellaria humilis*

Plate 8. (RHS) Plants of *Scutellaria humilis* growing amongst dense grass

The current survey located this species on a low rocky dolerite ridge in *Allocasuarina verticillata* woodland (Figure 6 and Plates 9 & 10). At this site, the species occupied a relatively small area (ca. 225 m²) but population abundance was locally high (mid-100s of individuals, although precise counts difficult because of dense grass). A second smaller population (ca. 1 m² of ca. 20-30 plants) was also detected further west – this site was several metres off the flagged route of the trail.

While the species is listed as rare (i.e. the lowest conservation status), its distribution, number of extant/confirmed populations and usually low abundance suggests a higher status may be warranted. TSS (2003) states that the species “may qualify for uplisting given the paucity of recent records, though more information may be required for a meaningful reassessment”. Based on this, we consider the novel location to have high conservation significance. The species is probably highly tolerant of both natural and anthropogenic disturbance and a narrow mountain bike track dissecting the population may have little long-term impact (in fact, minor canopy gap creation and exposure of some bare soil may actively encourage proliferation of the species). However, given the species’ status, we recommend that the trail in this section be re-routed to avoid direct impact on the species. To that end, on the day of assessment, the extent of the patch upslope and downslope of

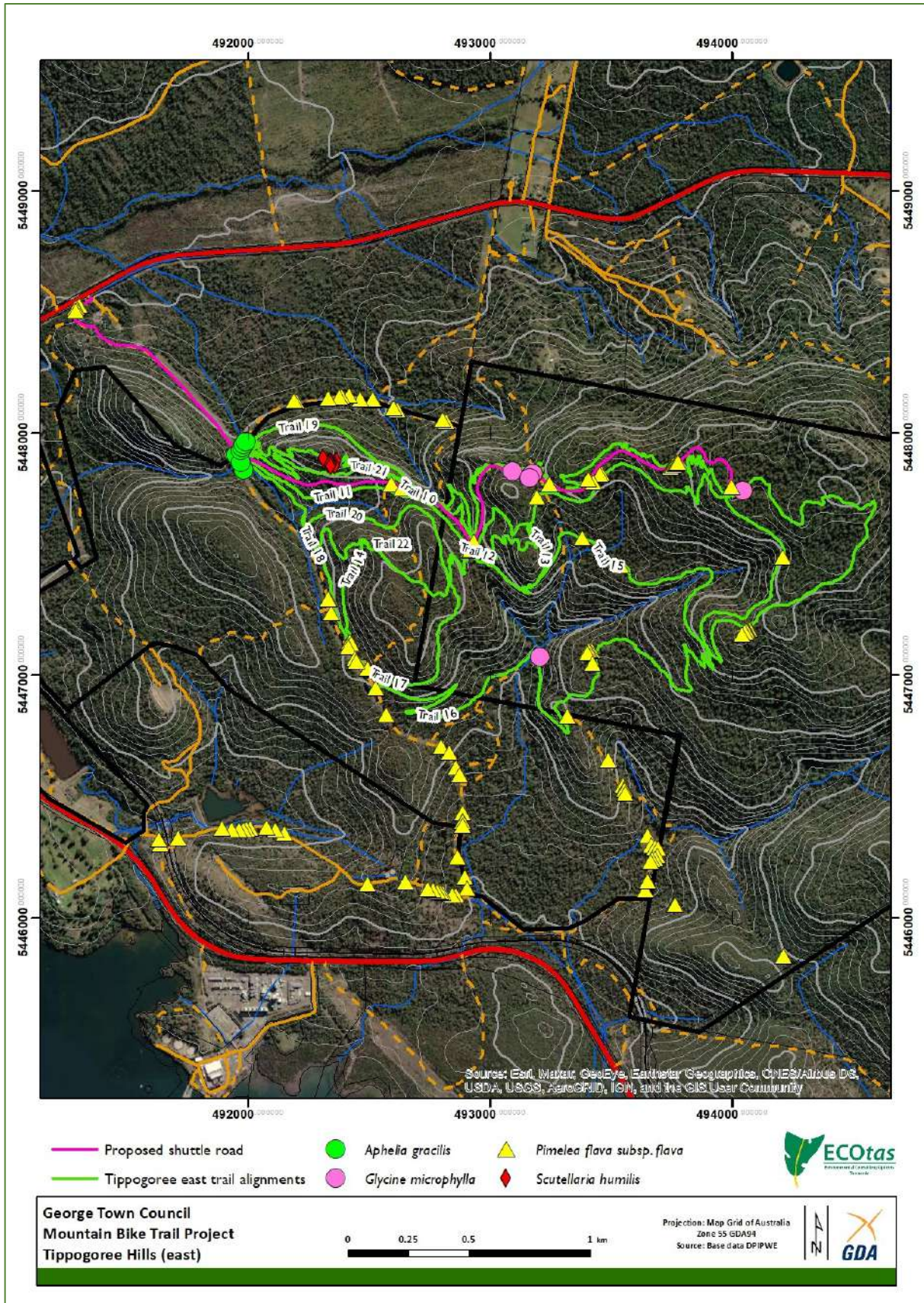


Figure 6a. Threatened flora species located during the current survey from the project area (overview)



Figure 6b. Localised distribution of *Scutellaria humilis* near Trail 21

the currently marked track was assessed. Recognising that any re-routes need to be undertaken from some distance either side of a "pivot point" (i.e. the patch to avoid), the extension survey also included several hundred metres either side of the mapped patch. The extent of the population was flagged with bright green flagging tape (different colour to the flagged route) such that the patch can be sighted from a suitable distance each side to facilitate the required grade/curve of the suggested re-route. Either upslope or downslope of the patch is considered acceptable. Technically, if this is achieved, a permit will not be required (nor indeed possible) under the Tasmanian *Threatened Species Protection Act 1995*.



Plates 9 & 10. Habitat of *Scutellaria humilis*: note the bright green flagging tape defining the extent of the patch

Threatened flora species potentially present (database analysis)

Figure 7 indicates threatened flora species close to the greater study area and Table C1 (Appendix C) provides a listing of threatened flora from within 5,000 m of the study area (nominal buffer width usually used to discuss the potential of a particular study area to support various species listed in databases), with comments on whether potential habitat is present for the species, and possible reasons why a species was not recorded.

Fauna species

Threatened fauna species recorded from the study area

The project area does not support any previous records of fauna listed as threatened on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and/or the Tasmanian *Threatened Species Protection Act 1995*.

A single scat of the Tasmanian devil was found within the project area. This species has been commonly recorded in the greater area in the past.

There are three known nests (RND#130, RND#1401 and RND#2221) of the wedge-tailed eagle, which ECOtas (2020a) discussed following an aerial assessment (see Figure 9 for eagle nest habitat model and search area). At this time, the trail routes were hypothetical and the assessment was based on the model and conservatively applied buffers. The aerial survey and follow-up ground survey indicated that all previously reported nest sites are technically no longer present. No

evidence of RND#1401 nor RND#2221 could be found. There is no apparently obvious reason for the loss of these two nest sites. A novel nest was located very close (i.e. within ca. 50 m) to the original location of RND#130 (such that it will retain this RND designation).

As part of the original trail network design, RND#130 was ca. 360 m from the edge of Trail 16 and not within line-of-sight of any point of the trail network (Figure 9a). ECOtas (2020a) made the following recommendations to guide the trail design:

- avoid construction of a permanent feature such as a service/shuttle road or drop-off/pick-up points within 500 m of the nest site;
- design trails to be a minimum of 300 m from the nest site; and
- anticipate that any construction activities will need to assume that the nest site is active and that therefore breeding season restrictions will apply to any works within 500 m (or 1,000 m line-of-sight) of the nest between July to January, inclusive.

The “minimum of 300 m from the nest site” recommendation stemmed from the principle that provided construction occurs outside the breeding season, track use would not represent a directed disturbance activity of any great significance, hence the reduction from the 500 m to 300 m. In noting this reduction, it is also noted that the 500 m buffer arises from guidelines developed for the commercial wood production sector to take account of much more directed disturbance activities such as a forestry operation moving towards a nest site and not to bikes moving by (with no reason for stopping) through the understorey of what is in effect dense forest between the trail and the nest site. However, subsequent to this recommendation, further discussions between ECOtas, George Town Council and World Trail (track designers and builders) have been undertaken and the location of Trail 16 has been shifted to now be wholly outside the notional 500 m zone and outside the modelled line-of-sight zone of RND#130 (Figure 9b).

Threatened fauna species potentially present (database analysis)

Figure 8 indicates threatened fauna species close to the greater study area and Table D1 (Appendix D) provides a listing of threatened fauna from within 5,000 m of the study area (nominal buffer width usually used to discuss the potential of a particular study area to support various species listed in databases), with comments on whether potential habitat is present for the species, and possible reasons why a species was not recorded.

The project area presents as potential habitat for some species whose ranges coincide with the project area (Table D1, Appendix D) and special management is not recommended for these species in the context of the project.

Other ecological values

Weed species

One plant species classified as a declared weed within the meaning of the Tasmanian *Weed Management Act 1999* was detected from within and adjacent to the project area namely: *Erica lusitanica* (spanish heath) (Figure 10 & Plate 11). This species is common along the entire firebreak including towards the East Tamar Highway to the south of the project area.

Any management actions should aim to minimise the risk of introducing or further spreading weeds within the project area. The key to this will be hygiene protocols for machinery, vehicles and

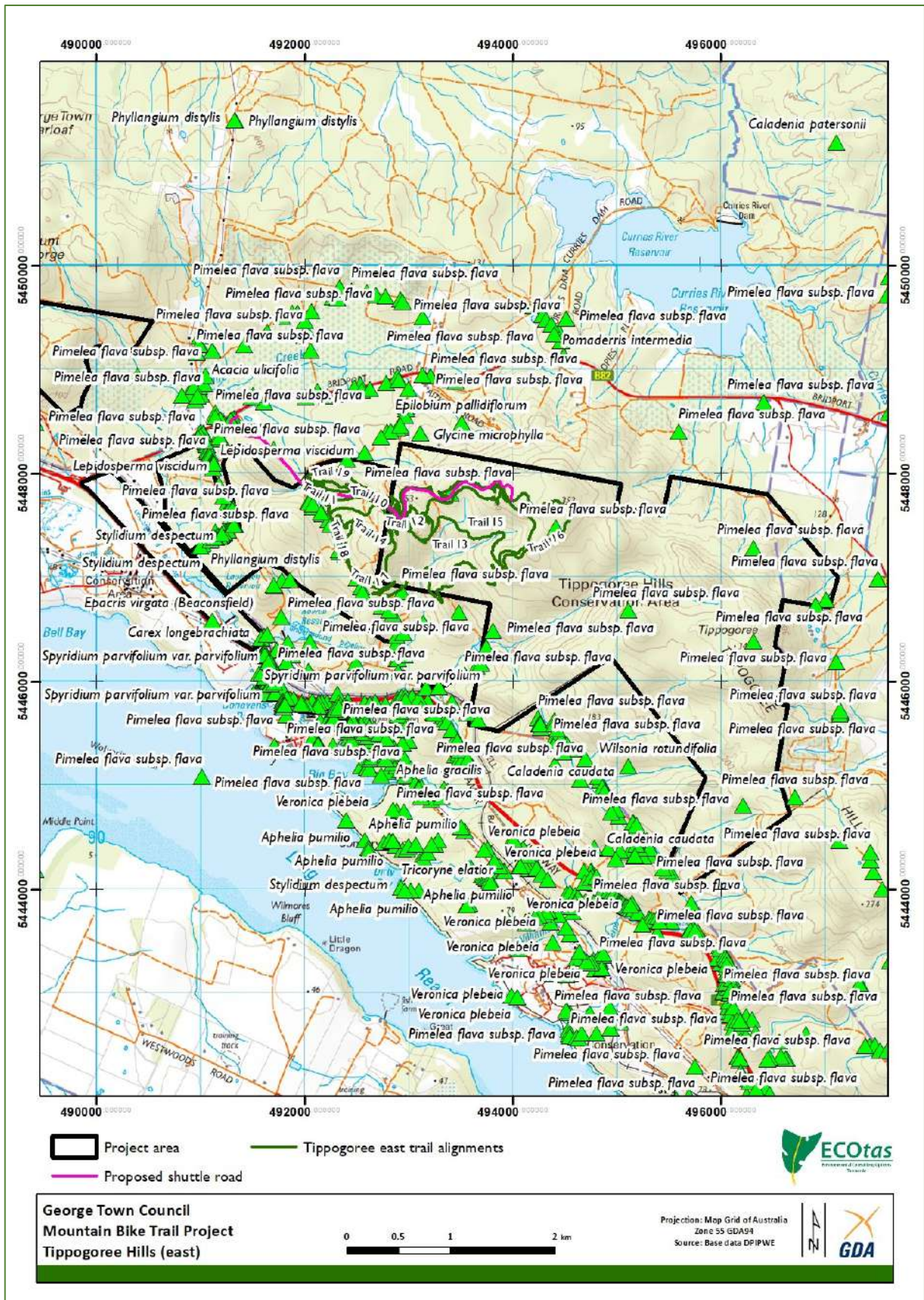


Figure 7. Records of threatened flora from wider area [source: Natural Values Atlas]

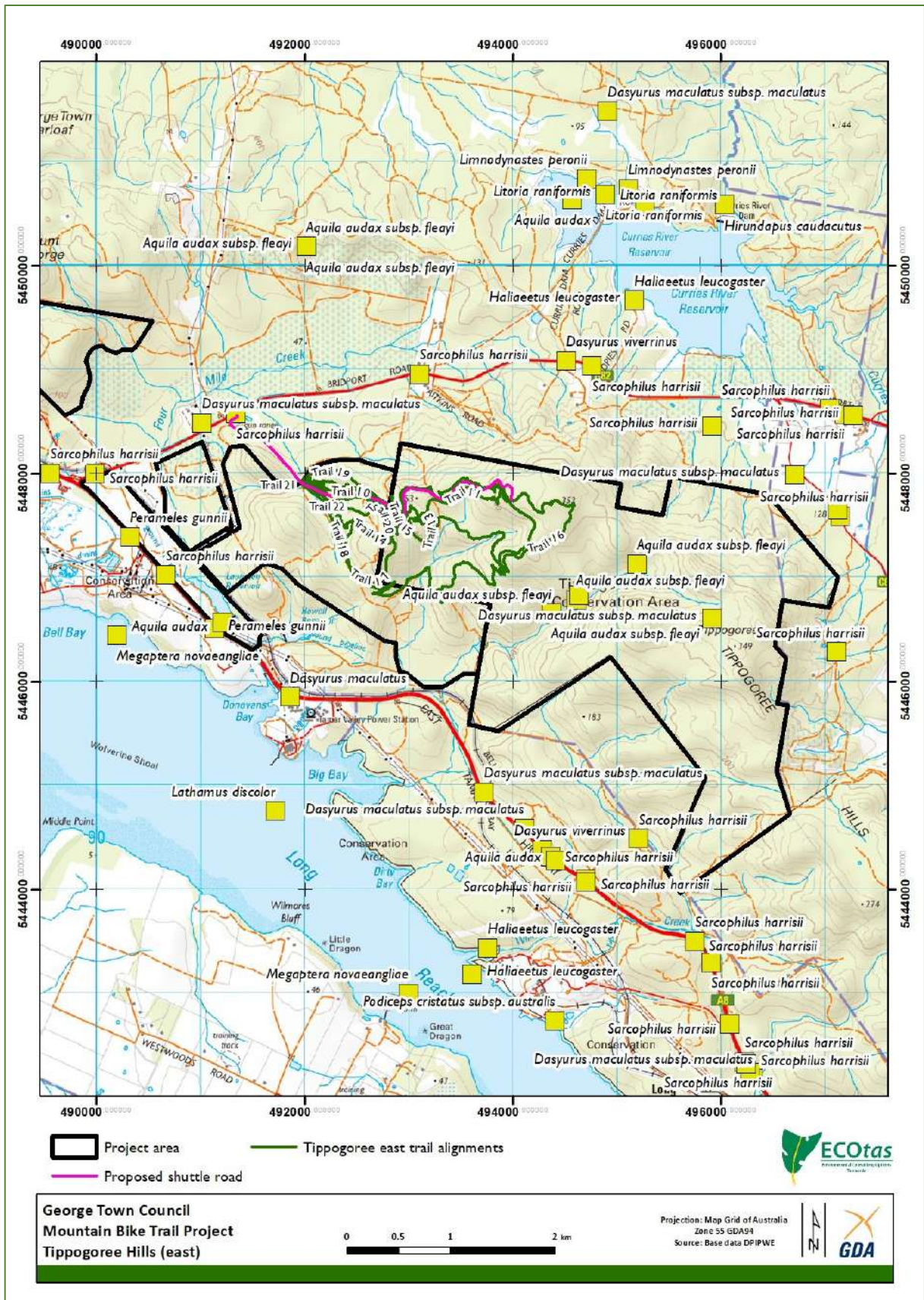


Figure 8. Records of threatened fauna from wider area [source: Natural Values Atlas]

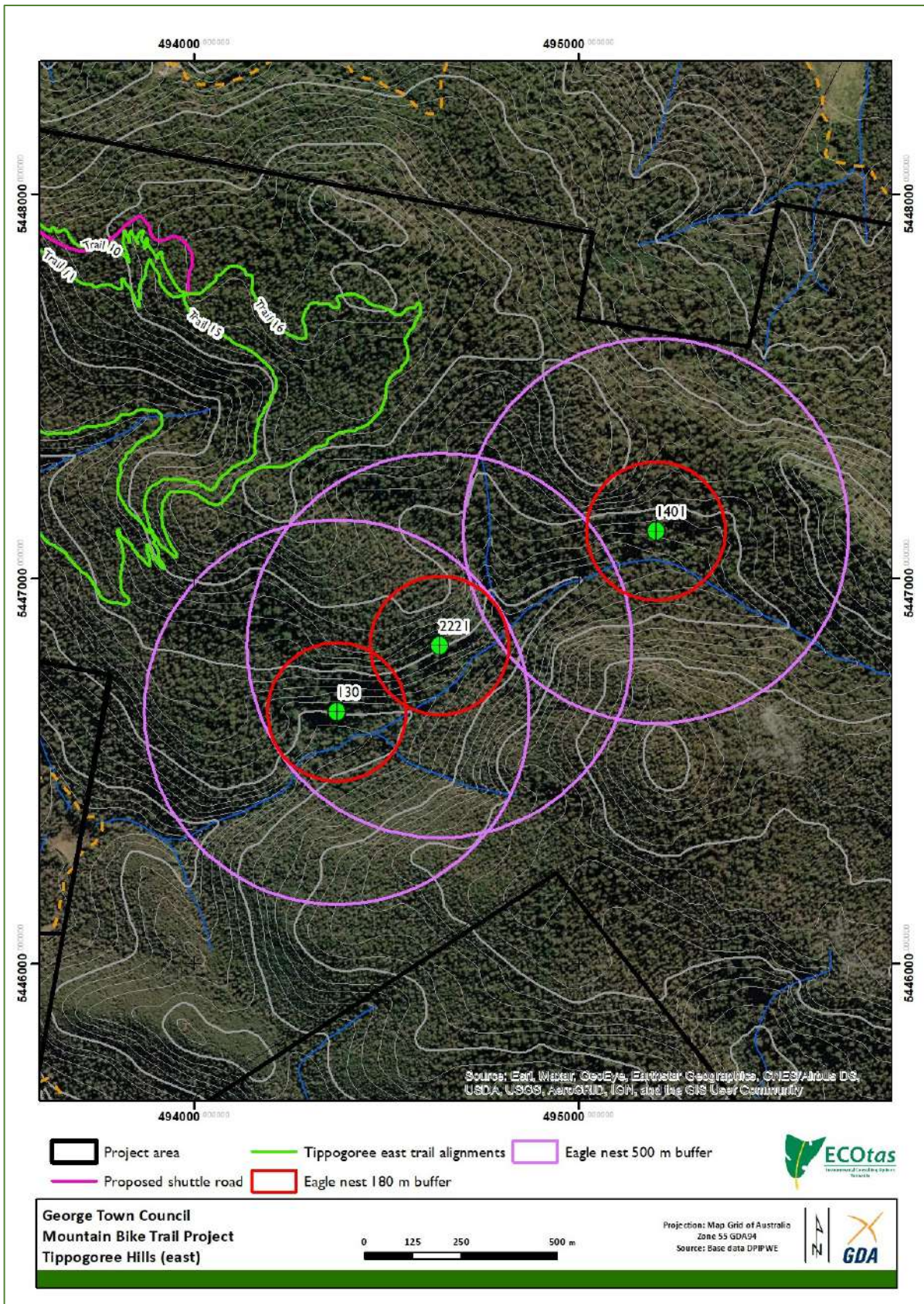


Figure 9a. Known wedge-tailed eagle nest locations to the south of the project area, showing nest locations (noting #2221 & #1401 are lost)

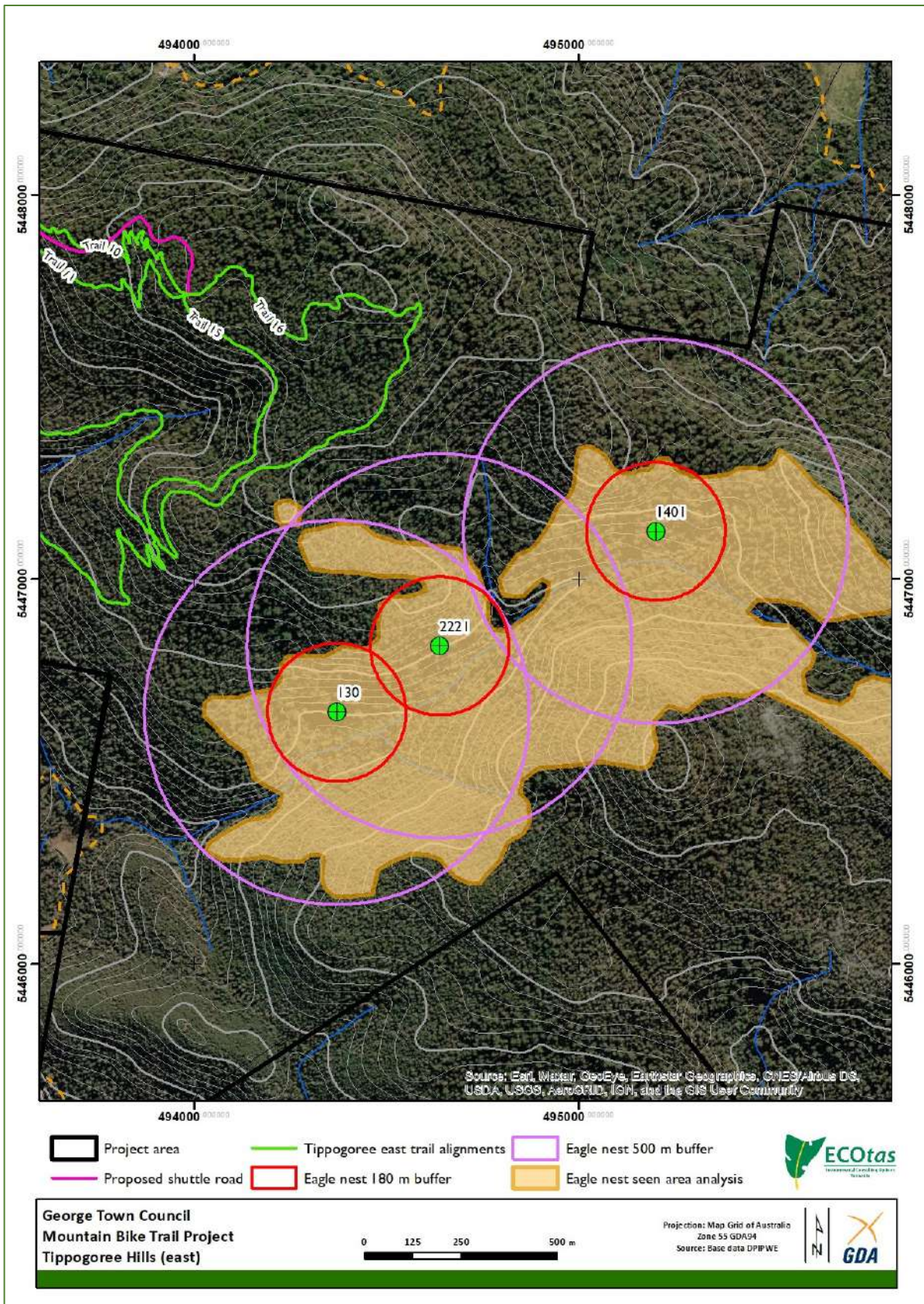


Figure 9b. Known wedge-tailed eagle nest locations to the south of the project area, showing nest locations (noting #2221 & #1401 are lost) and line-of-sight modelling

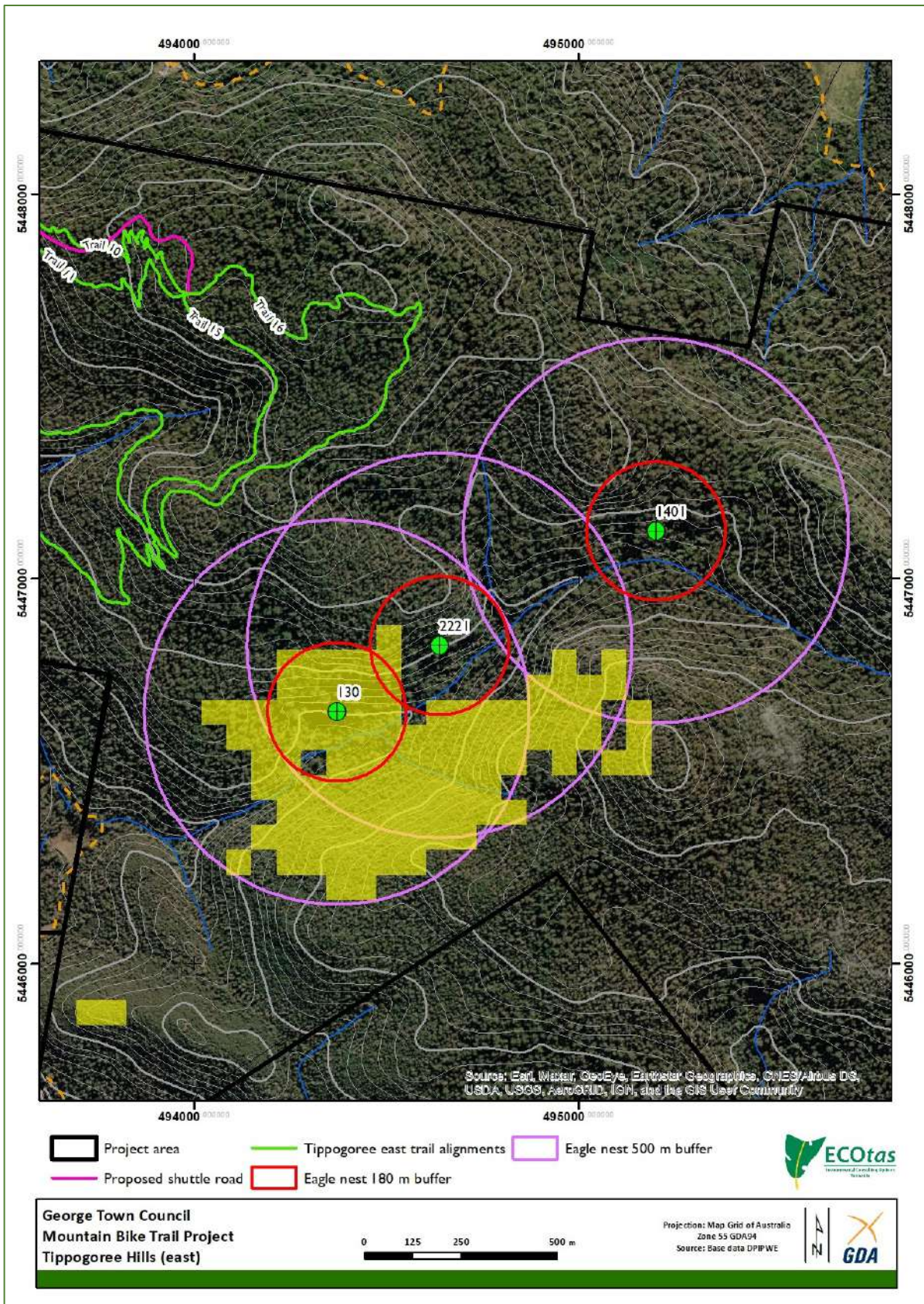


Figure 9c. Known wedge-tailed eagle nest locations to the south of the project area, showing nest locations (noting #2221 & #1401 are lost) and line-of-sight modelling for #130 only (only nest known to be present)

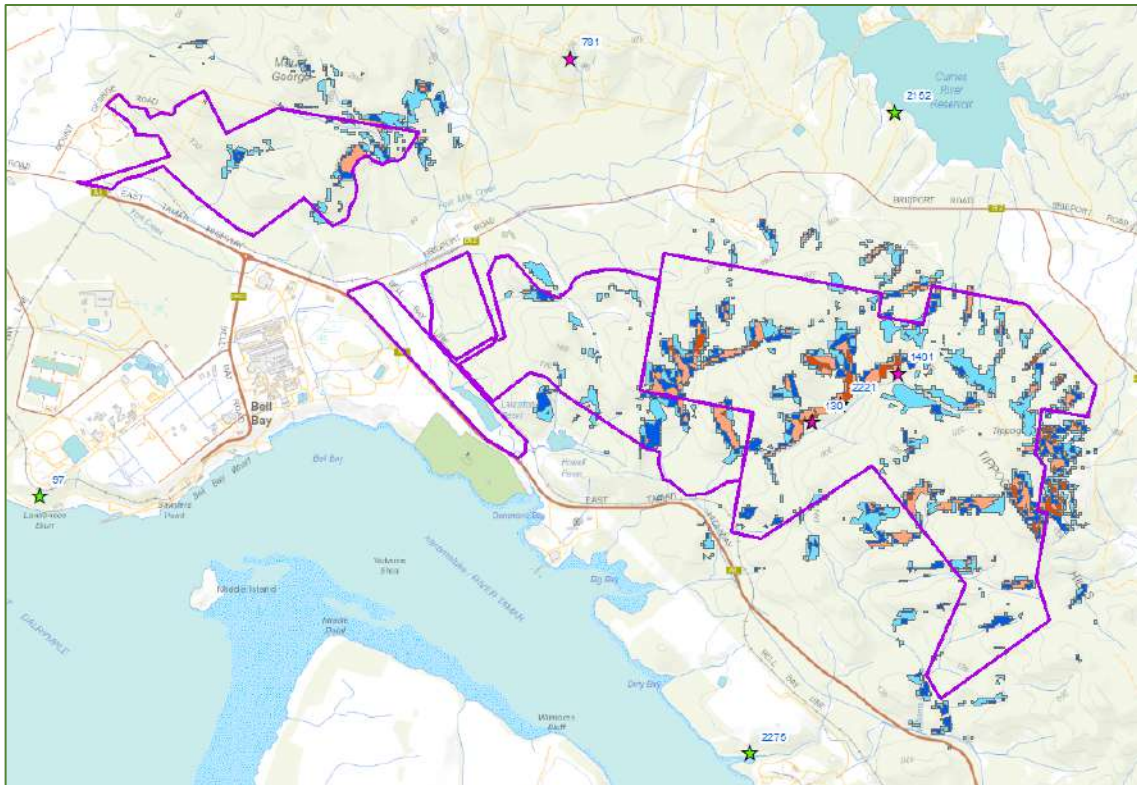


Figure 9d. Modelled eagle nest habitat relative to the study area [source: ECOtas (2020a)]

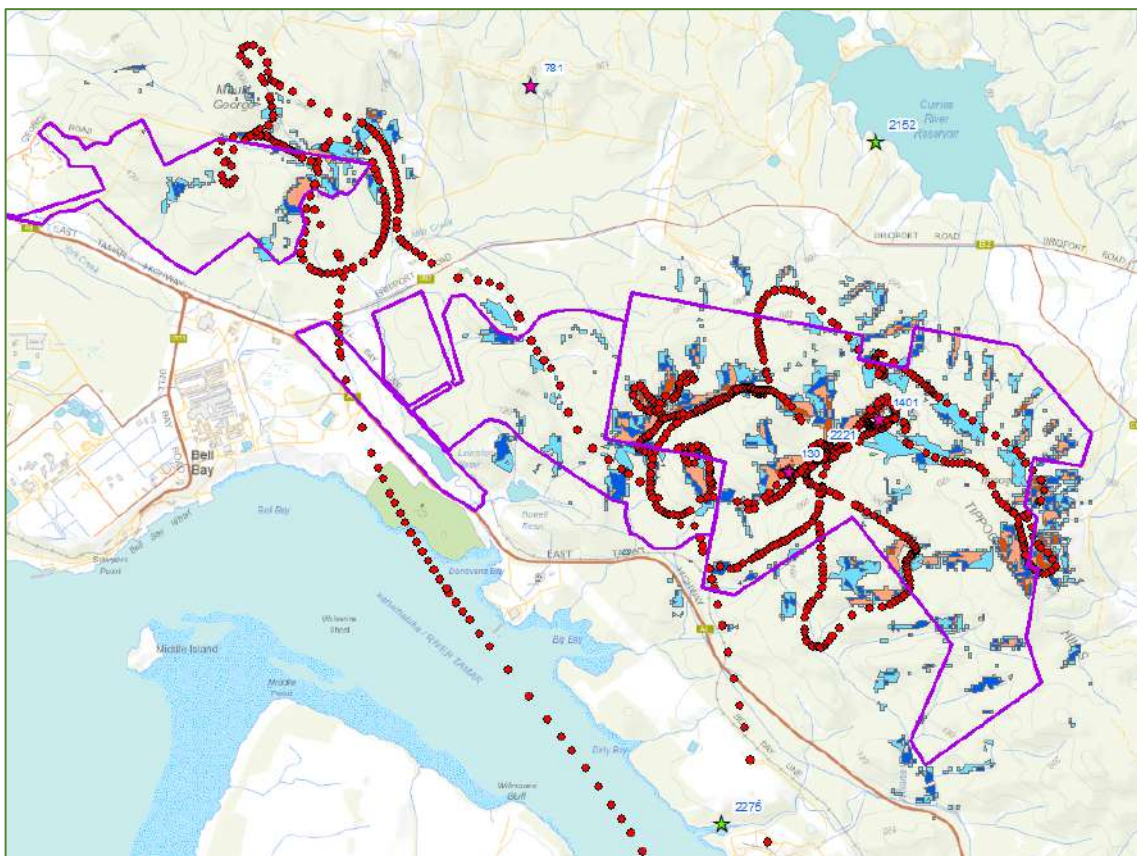


Figure 9e. Aerial survey route [source: ECOtas (2020a)]

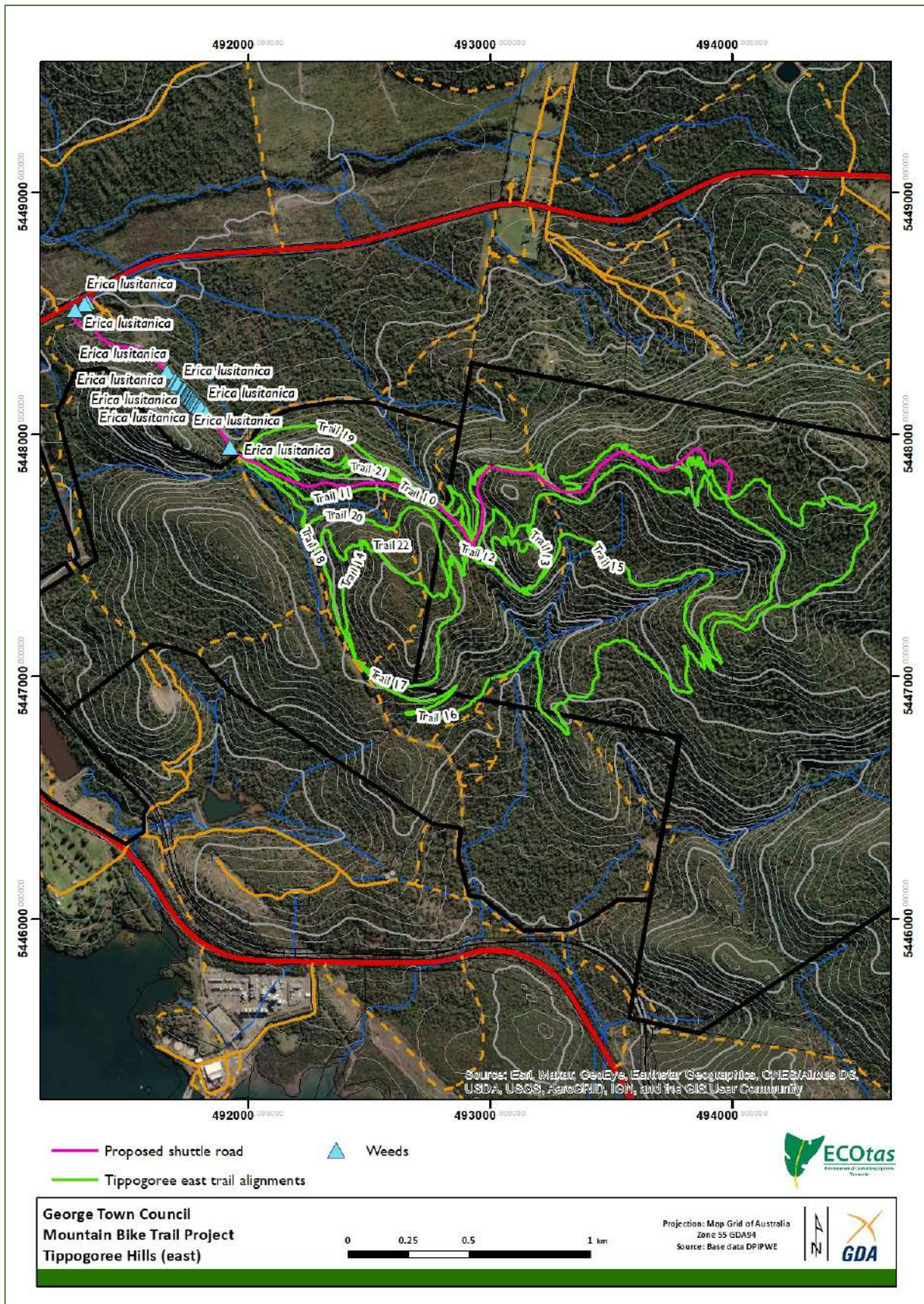


Figure 10. Distribution of weed species within and near to the project area

personnel entering the area during works, particularly if they have come from a potentially weed-affected site.

Several planning manuals provide guidance on appropriate management actions, which can be referred to develop site-specific prescriptions for any proposed works in the study area. These manuals include:

- Allan, K. & Gartenstein, S. (2010). *Keeping It Clean: A Tasmanian Field Hygiene Manual to Prevent the Spread of Freshwater Pests and Pathogens*. NRM South, Hobart;
- Rudman T. (2005). *Interim Phytophthora cinnamomi Management Guidelines*. Nature Conservation Report 05/7, Biodiversity Conservation Branch, Department of Primary Industries, Water & Environment, Hobart;
- Rudman, T., Tucker, D. & French, D. (2004). *Washdown Procedures for Weed and Disease Control*. Edition 1. Department of Primary Industries, Water & Environment, Hobart; and
- DPIPWE (2015). *Weed and Disease Planning and Hygiene Guidelines - Preventing the Spread of Weeds and Diseases in Tasmania*. Department of Primary Industries, Parks, Water & Environment, Hobart.



Plate 11. *Erica lusitanica* (spanish heath) (orange circles) along the existing firebreak trail

Development of a Construction Environmental Management Plan (CEMP) or equivalent type of document for construction activities and post-construction monitoring is recommended due to the abundance of *Erica lusitanica* (spanish heath) along the firebreak, which is the location that the proposed shuttle road is to be sited. This plan should include consideration of the order of construction of the shuttle road and track sections, ideally working within the vicinity of the most heavily weed-infested area near the firebreak last, as this provides the means to minimising the risk of introducing weeds to other parts of the track network. Furthermore, it is recommended that

preconstruction herbicide application occur prior to construction of the shuttle road. This will minimise the risk of introducing this species to the weed-free area in the east. Consideration should also be given to the implementation of a washdown area in the vicinity of the point that the shuttle road and trail network enter the eastern Tippogoree area. This will be important given the currently weed-free status of the project area to the east of the existing firebreak.

Rootrot pathogen, *Phytophthora cinnamomi*

Phytophthora cinnamomi (PC) is widespread in lowland areas of Tasmania, across all land tenures. However, disease will not develop when soils are too cold or too dry. For these reasons, PC is not a threat to susceptible plant species that grow at altitudes higher than about 700 m or where annual rainfall is less than about 600 mm (e.g. Midlands and Derwent Valley). Furthermore, disease is unlikely to develop beneath a dense canopy of vegetation because shading cools the soils to below the optimum temperature for the pathogen. A continuous canopy of vegetation taller than about 2 m is sufficient to suppress disease. Hence PC is not considered a threat to susceptible plant species growing in wet sclerophyll forests, rainforests (except disturbed rainforests on infertile soils) and scrub e.g. teatree scrub (Rudman 2005; FPA 2009).

The vegetation types identified from the study area are not recognised as being particularly susceptible to PC in most circumstances and no evidence of the pathogen was observed. No special management is recommended but note that the planning manuals listed under **Weeds** provides further information on hygiene protocols.

Myrtle wilt

Myrtle wilt, caused by a wind-borne fungus (*Chalara australis*), occurs naturally in rainforest where myrtle beech (*Nothofagus cunninghamii*) is present.

Nothofagus cunninghamii is entirely absent from the project area. No special management is required.

Myrtle rust

Myrtle rust is a disease limited to plants in the Myrtaceae family. This plant disease is a member of the guava rust complex caused by *Austropuccinia psidii*, a known significant pathogen of Myrtaceae plants outside Australia. Infestations are currently limited to NSW, Victoria, Queensland and Tasmania (DPIPWE 2015).

No evidence of myrtle rust was noted. No special management should be required in relation to the proposed works.

Chytrid fungus and other freshwater pathogens

Native freshwater species and habitat are under threat from freshwater pests and pathogens *Batrachochytrium dendrobatidis* (chytrid frog disease), *Mucor amphibiorum* (platypus mucor disease) and the freshwater algal pest *Didymosphenia geminata* (didymo) (Allan & Gartenstein 2010). Freshwater pests and pathogens are spread to new areas when contaminated water, mud, gravel, soil and plant material or infected animals are moved between sites. Contaminated

materials and animals are commonly transported on boots, equipment, vehicles tyres and during road construction and maintenance activities. Once a pest pathogen is present in a water system it is usually impossible to eradicate. The manual *Keeping it Clean - A Tasmanian Field Hygiene Manual to Prevent the Spread of Freshwater Pests and Pathogens* (Allan & Gartenstein 2010) provides information on how to prevent the spread of freshwater pests and pathogens in Tasmanian waterways wetlands, swamps and boggy areas.

The broader project area includes ephemeral watercourses that are generally dry for the most part due to the project occurring on the upper to mid slopes of the Tippogoree Hills. No special management is recommended but note that the planning manuals listed under **Weeds** provides further information on hygiene protocols.

Matters of National Environmental Significance – Threatened Ecological Communities

CofA (2020) indicates that the following threatened ecological community listed on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* is likely to occur in the area, as follows:

- Tasmanian Forests and Woodlands dominated by Black Gum or Brookers Gum (*Eucalyptus ovata/Eucalyptus brookeriana*) (listed as Critically Endangered).

This community is present (refer to **FINDINGS Vegetation types** Vegetation types recorded as part of the present study for more details).

DISCUSSION

Summary of key findings

Threatened flora

- No plant species listed as threatened on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) were detected, or are known from database information, from the study area.
- Four plant species listed as threatened on the Tasmanian *Threatened Species Protection Act 1995* (TSPA) were detected from the study area, as follows:
 - *Aphelia gracilis* (slender fanwort): listed as rare (Schedule 5), detected from a small part of the firebreak at the start of the shuttle road and confluence of various tracks;
 - *Glycine microphylla* (small-leaf glycine): listed as vulnerable (Schedule 4), detected from a short section of the shuttle road and scattered occurrences elsewhere;
 - *Pimelea flava* subsp. *flava* (yellow riceflower): listed as rare (Schedule 5), detected from various disturbed sites such as tracks and firebreaks but also scattered in less disturbed forest; and
 - *Scutellaria humilis* (dwarf skullcap): listed as rare (Schedule 5), detected from a rocky ridgeline/slope in sheoak-peppermint forest from two patches.

Threatened fauna

- Two fauna species listed as threatened on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) and/or Tasmanian *Threatened Species Protection Act 1995* (TSPA) are known from database information from the project area.

- Evidence of the Tasmanian devil was noted in the form of a scat.
- Known nests of the Tasmanian wedge-tailed eagle are known adjacent to the project area and are reported on in ECOtas (2020).
- The study area supports potential habitat of some species.

Vegetation types

- The project area supports the following TASVEG mapping units:
 - *Eucalyptus amygdalina* forest and woodland on dolerite (TASVEG code: DAD);
 - *Eucalyptus obliqua* dry forest (TASVEG code: DOB);
 - *Eucalyptus ovata* forest and woodland (TASVEG code: DOV);
 - *Eucalyptus amygdalina-Eucalyptus obliqua* damp sclerophyll forest (TASVEG code: DSC);
 - *Eucalyptus obliqua* forest with broad-leaf shrubs (TASVEG code: WOB);
 - *Allocasuarina verticillata* forest (TASVEG code: NAV); and
 - extra-urban miscellaneous (TASVEG code: FUM).
- DOV is listed as threatened on Schedule 3A of the Tasmanian *Nature Conservation Act 2002* and equates to a threatened ecological community under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, viz. Tasmanian Forests and Woodlands dominated by Black Gum or Brookers Gum (*Eucalyptus ovata* / *E. brookeriana*).

Weeds

- One plant species classified as a declared weed within the meaning of the Tasmanian *Weed Management Act 1999* was detected from the study area, as follows:
 - *Erica lusitanica* (spanish heath): scattered to locally dense along firebreaks.

Plant disease

- No evidence of *Phytophthora cinnamomi* (PC, rootrot) was recorded within the study area.
- No evidence of myrtle wilt was recorded from within the study area.
- No evidence of myrtle rust was recorded from within the study area.

Animal disease (chytrid)

- The project area is not known to support frog chytrid disease and there is limited potential habitat for amphibian species within the anticipated specific project footprint (generally very well-drained terrain).

Legislative and policy implications

Note that the information provided below is our interpretation of legislation and policy only. It does not constitute legal advice. Advice should be sought from the relevant agency. There may be other relevant legislation and policy instruments that are not discussed below that will need to be taken into account for the project.

Tasmanian Threatened Species Protection Act 1995

Threatened flora and fauna on this Act are managed under Section 51, as follows:

51. Offences relating to listed taxa

- (1) Subject to subsections (2) and (3), a person must not knowingly, without a permit –
 - (a) take, keep, trade in or process any specimen of a listed taxon of flora or fauna; or
 - (b) disturb any specimen of a listed taxon of flora or fauna found on land subject to an interim protection order; or
 - (c) disturb any specimen of a listed taxon of flora or fauna contrary to a land management agreement; or
 - (d) disturb any specimen of a listed taxon of flora or fauna that is subject to a conservation covenant entered into under Part 5 of the *Nature Conservation Act 2002*; or
 - (e) abandon or release any specimen of a listed taxon of flora or fauna into the wild.
- (2) A person may take, keep or process, without a permit, a specimen of a listed taxon of flora in a domestic garden.
- (3) A person acting in accordance with a certified forest practices plan or a public authority management agreement may take, without a permit, a specimen of a listed taxon of flora or fauna, unless the Secretary, by notice in writing, requires the person to obtain a permit.
- (4) A person undertaking dam works in accordance with a Division 3 permit issued under the *Water Management Act 1999* may take, without a permit, a specimen of a listed taxon of flora or fauna.

The simplest interpretation of this is that any activity that results in a specimen (i.e. individual) of listed flora or fauna being “knowingly taken” would require a permit to be issued through Conservation Assessments, DPIPW, through a formal application process. Note that the Act does not make reference to “potential habitat” such that activities that result in loss of/disturbance to potential habitat (but not known sites) – which mainly refers to threatened fauna – would not require a permit.

The project area supports populations of four listed flora species. It should be practical to avoid “taking” of *Scutellaria humilis* (because the sites have been flagged to facilitate minor re-routing) and at least some of the *Glycine microphylla* (but not the site on the proposed shuttle road). It will be impractical (and is not considered warranted) to avoid “taking” of *Pimelea flava* subsp. *flava* and *Aphelia gracilis*. If the project is approved through only the local planning scheme (and/or through the RAA process), a permit issued by DPIPW will still be required.

If a Forest Practices Plan (FPP) is prepared and certified for this project (see section below on the requirements of the Tasmanian *Forest Practices Act 1985* and associated *Regulations*), threatened flora and fauna can be managed under the provisions of the *Forest Practices Code 2020*, specifically the *Procedures for the Management of Threatened Species under the Forest Practices System*. Under Section 51 of the Tasmanian *Threatened Species Protection Act 1995*, it states:

51. Offences relating to listed taxa

- (1) Subject to subsections (2) and (3), a person must not knowingly, without a permit –
 - (a) take, keep, trade in or process any specimen of a listed taxon of flora or fauna; or
 - (b) disturb any specimen of a listed taxon of flora or fauna found on land subject to an interim protection order; or
 - (c) disturb any specimen of a listed taxon of flora or fauna contrary to a land management agreement; or
 - (d) disturb any specimen of a listed taxon of flora or fauna that is subject to a conservation covenant entered into under Part 5 of the *Nature Conservation Act 2002*; or
 - (e) abandon or release any specimen of a listed taxon of flora or fauna into the wild.

- (2) A person may take, keep or process, without a permit, a specimen of a listed taxon of flora in a domestic garden.
- (3) A person acting in accordance with a certified forest practices plan or a public authority management agreement may take, without a permit, a specimen of a listed taxon of flora or fauna, unless the Secretary, by notice in writing, requires the person to obtain a permit.

The administrative implication of 51.(3) of the Act is that a certified FPP prepared in accordance with the provisions of the *Forest Practices Code 2020* and all other relevant legislation and policy, can obviate the need for a separate permit under Section 51 of the Tasmanian *Threatened Species Protection Act 1995*.

Commonwealth Environment Protection and Biodiversity Conservation Act 1999

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* an action will require approval from the minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance.

Matters of national environmental significance considered under the EPBCA include:

- listed threatened species and communities
- listed migratory species;
- Ramsar wetlands of international importance;
- Commonwealth marine environment;
- world heritage properties;
- national heritage places;
- the Great Barrier Reef Marine Park;
- nuclear actions; and
- a water resource, in relation to coal seam gas development and large coal mining development.

The Commonwealth Department of Agriculture, Water and the Environment provides a policy statement titled *Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (CofA 2013, herein the *Guidelines*), which provides overarching guidance on determining whether an action is likely to have a significant impact on a matter protected under the EPBCA.

The *Guidelines* define a **significant impact** as:

"...an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts"

and note that:

"...all of these factors [need to be considered] when determining whether an action is likely to have a significant impact on matters of national environmental significance".

The *Guidelines* provide advice on when a significant impact may be likely:

"To be 'likely', it is not necessary for a significant impact to have a greater than 50% chance of happening; it is sufficient if a significant impact on the environment is a real or not remote chance or possibility."

If there is scientific uncertainty about the impacts of your action and potential impacts are serious or irreversible, the precautionary principle is applicable. Accordingly, a lack of scientific certainty about the potential impacts of an action will not itself justify a decision that the action is not likely to have a significant impact on the environment”.

The *Guidelines* provide a set of Significant Impact Criteria, which are “intended to assist...in determining whether the impacts of [the] proposed action on any matter of national environmental significance are likely to be significant impacts”. It is noted that the criteria are “intended to provide general guidance on the types of actions that will require approval and the types of actions that will not require approval...[and]...not intended to be exhaustive or definitive”.

The sections below provide an initial summary of the potential significant impact of the project on MNES.

Listed ecological communities

The study area supports one listed ecological community on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA), namely patches of *Eucalyptus ovata* forest and woodland (TASVEG code: DOV) that equate to Tasmanian Forests and Woodlands dominated by Black Gum or Brookers Gum (*Eucalyptus ovata* / *E. brookeriana*) listed as Critically Endangered.

The *Guidelines* provide the following guidance on when an action is likely to have a significant impact and may require referral (author commentary below each):

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- reduce the extent of an ecological community
[installation and use of a narrow mountain bike track will not result in the measurable reduction in the extent of the mapped community because the canopy structure and understorey composition will remain essentially unchanged].
- fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines
[installation and use of a narrow mountain bike track will not result in the measurable fragmentation of the community].
- adversely affect habitat critical to the survival of an ecological community
[installation and use of a narrow mountain bike track will not result in the measurable alteration to the community nor its supporting physical habitat].
- modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community’s survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns
[as above]
- cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting
[as above]
- cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:
 - assisting invasive species, that are harmful to the listed ecological community, to become established, or

- causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or

[as above]

- interfere with the recovery of an ecological community

[as above]

That is, the proposal is not anticipated to result in a significant impact on the threatened ecological community.

Threatened flora

The project area does not support known sites or potential habitat of flora species listed on the Act.

Threatened fauna

The project area supports potential habitat of some fauna listed on the Act (e.g. Tasmanian devil, spotted-tailed quoll, eastern quoll, eastern barred bandicoot, wedge-tailed eagle, white-bellied sea-eagle, masked owl). although no particular vegetation types/habitats strongly associated with such species, nor habitat features such as dens.

There are three known nests (RND#130, RND#1401 and RND#2221) of the wedge-tailed eagle, which ECOtas (2020a) discussed following an aerial assessment. At this time, the trail routes were hypothetical and were based on the findings of the search. The aerial survey and follow-up ground survey indicated that all previously reported nest sites are technically no longer present. No evidence of RND#1401 nor RND#2221 could be found. There is no apparently obvious reason for the loss of these two nest sites. A novel nest was located very close to the original location of RND#130 (such that it will retain this RND designation). ECOtas (2020a) made the following recommendations to guide the trail design:

- avoid construction of a permanent feature such as a service/shuttle road or drop-off/pick-up points within 500 m of the nest site;
- design trails to be a minimum of 300 m from the nest site; and
- anticipate that any construction activities will need to assume that the nest site is active and that therefore breeding season restrictions will apply to any works within 500 m (or 1,000 m line-of-sight) of the nest between July to January, inclusive.

In regard to the above recommendations, the shuttle road is ca. 1.2 km away from RND#130 and is not within line-of-sight, the closest trail is greater than 500 m from the nest and not within line-of-sight. On this basis, a significant impact on the wedge-tailed eagle is not anticipated.

The Commonwealth Department of Agriculture, Water and the Environment provides a *Significant Impact Guidelines* policy statement (CofA 2013) to determine if referral to the department is required. In my opinion, any proposed disturbance within the study area will not constitute a "significant impact" because while there may be a loss/modification of potential habitat, the loss is not such that it is likely to lead to a long-term decrease in the size of an important population of a species, reduce the area of occupancy of an important population, fragment an existing important population into two or more populations, adversely affect habitat critical to the survival of a species, disrupt the breeding cycle of an important population, modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, result in invasive species that are harmful to a threatened species becoming established in the threatened species' habitat, introduce disease that may cause the species to decline, or interfere substantially with the recovery of the species.

With respect to the aforementioned species, it is difficult to anticipate a scenario in which a referral to the Commonwealth Department of Agriculture, Water and the Environment would be become necessary at the scale of the proposed activities.

Tasmanian Nature Conservation Act 2002

Schedule 3A of the Act lists vegetation types classified as threatened within Tasmania. The project area supports a small patch of *Eucalyptus ovata* forest and woodland (TASVEG code: DOV), which is so listed. The administrative/regulatory mechanism managing threatened communities is through either the Tasmanian *Forest Practices Act 1985* (and associated *Forest Practices Regulations 2017*) or the local planning scheme (*George Town Interim Planning Scheme 2013*), depending on the zone and code provisions.

Tasmanian Wildlife (General) Regulations 2010

While the assessment of the study area indicated the presence of species listed on schedules of the *Regulations* (i.e. "specially protected wildlife", "protected wildlife", "partly protected wildlife"), no individuals of these species (or products of these species) are likely to be directly physically affected by future works, such that a permit under the *Regulations* should not be required.

Tasmanian Weed Management Act 1999

Erica lusitanica (spanish heath) is classified as declared weed within the meaning of the Tasmanian *Weed Management Act 1999* was detected from the project area.

Erica lusitanica is listed in the previous Statutory Weed Management Plan as a "Zone B" species for the George Town municipality due to the presence of extensive infestations. The Statutory Weed Management Plan states that "containment is the most appropriate management objective for Zone B municipalities that have problematic infestations but no plan and/or resources to undertake control actions at a level required for eradication. The management outcome for Zone B municipalities is ongoing prevention of the spread of the species from existing infestations to areas free or in the process of becoming free of the species". Furthermore, the Statutory Weed Management Plan states that "for the purposes of applying this Weed Management Plan for spanish heath in Zone B municipalities...the spread of spanish heath from the municipality must be prevented...[and]...the spread of spanish heath to the Zone B landholdings listed in Table 3 must be prevented.

In the case of the present project, any management actions should aim to minimise further spread of the current infestations of *Erica lusitanica* and to minimise the risk of introducing further invasive weeds to the project area. The key to this will be hygiene protocols for machinery, vehicles and personnel entering the area during works, particularly if they have come from a potentially weed-affected site.

Several planning manuals provide guidance on appropriate management actions, which can be referred to develop site-specific prescriptions for any proposed works in the study area. These manuals include:

- Allan, K. & Gartenstein, S. (2010). *Keeping It Clean: A Tasmanian Field Hygiene Manual to Prevent the Spread of Freshwater Pests and Pathogens*. NRM South, Hobart;

- Rudman T. (2005). *Interim Phytophthora cinnamomi Management Guidelines*. Nature Conservation Report 05/7, Biodiversity Conservation Branch, Department of Primary Industries, Water & Environment, Hobart;
- Rudman, T., Tucker, D. & French, D. (2004). *Washdown Procedures for Weed and Disease Control*. Edition 1. Department of Primary Industries, Water & Environment, Hobart; and
- DPIPWE (2015). *Weed and Disease Planning and Hygiene Guidelines - Preventing the Spread of Weeds and Diseases in Tasmania*. Department of Primary Industries, Parks, Water & Environment, Hobart.

Development of a Construction Environmental Management Plan (CEMP) or equivalent type of document for construction activities and post-construction monitoring is recommended due to the abundance of *Erica lusitanica* (spanish heath) along the firebreak, which is the location that the proposed shuttle road is to be sited. This plan should include consideration of the order of construction of the shuttle road and track sections, ideally working within the vicinity of the most heavily weed-infested area near the firebreak last, as this provides the means to minimising the risk of introducing weeds to other parts of the track network. Furthermore, it is recommended that preconstruction herbicide application occur prior to construction of the shuttle road. This will minimise the risk of introducing this species to the weed-free area in the east. Consideration should also be given to the implementation of a washdown area in the vicinity of the point that the shuttle road and trail network enter the eastern Tippogoree area. This will be important given the currently weed-free status of the project area to the east of the existing firebreak.

Tasmanian Forest Practices Act 1985 and associated Forest Practices Regulations 2017

The Act provides this definition of the concept of "forest practices":

forest practices means –

- (a) the processes involved in establishing forests, growing or harvesting timber, clearing trees or clearing and converting threatened native vegetation communities; and
- (b) works (including the construction of roads and the development and operation of quarries) connected with establishing forests, growing or harvesting timber or clearing trees;

The Act provides this definition of the concept of "clearing":

clearing of trees means the removal of trees by–

- (a) clearing, cutting, pushing or otherwise removing; or
- (b) destroying the trees in any way.

The Act provides this definition of the concept of "trees":

trees means –

- (a) any woody plants with a height or potential height of 5 metres or more, whether or not living, dead, standing or fallen, that are–
 - (i) native to Tasmania; or
 - (ii) introduced into Tasmania and used for the processing or harvesting of timber; and
- (b) tree ferns [where **tree fern** means a plant of the species *Dicksonia antarctica*].

Within the project area, on this basis, even the removal of seedlings, saplings, logs or trunks (dead or alive) of species of *Eucalyptus* (several species), *Acacia* (e.g. *A. dealbata* – silver wattle, *A. melanoxylon* – blackwood) and *Melaleuca* (e.g. *M. ericifolia* – coast paperbark) may constitute "clearing" of "trees" under the Act.

The *Forest Practices Regulations 2017* specify circumstances in which an FPP is not required, as follows:

4. Circumstances in which forest practices plan, &c., not required

For the purpose of section 17(6) of the Act, the following circumstances are prescribed:

- (a) the harvesting of timber or the clearing of trees with the consent of the owner of the land, if the land is not vulnerable land and–
 - (i) the volume of timber harvested or trees cleared is less than 100 tonnes for each area of applicable land for each year; or
 - (ii) the total area of land on which the harvesting or clearing occurs is less than one hectare for each area of applicable land for each year–

whichever is the lesser.

While the *Regulations* specify various land use activities that are exempt from the requirements of an FPP (e.g. mineral exploration and extraction, construction of dams, public roads, etc.), construction of mountain bike tracks is not specified. The consequence of this non-exemption is that the requirements for an FPP for this project must be considered. Critical to this is whether over a period of one calendar year, the permitted volume of timber (100 tonne threshold) or total area of land (1 ha threshold) is likely to be reached or exceeded.

The following discussion is provided on the assumption that the mountain bike track will be the only clearing on the particular land and will occur within one year.

It is unlikely that clearing will exceed 100 tonnes of timber, meaning clause 4.(a)(i) is potentially met. It is likely, however, that the extent of clearing will exceed 1 ha. The key issue is whether the intent of this clause is the area over which clearing will occur or the cumulative areal extent of clearing. If the former, the clause is obviously not met because clearing could occur over an extent of many 100s of hectares. However, if the latter, the concept of the areal extent of clearing is more difficult to quantify. If say 30 km of projected new track route were cleared to the nominated 0.9-1.2 m width, 2.7-3.6 ha would need to be “cleared”. However, this is not the likely scenario, with many sections requiring little physical disturbance to “trees” (i.e. species with the potential to reach 5 m or more) and only modification of lower stature understorey species.

Setting aside the areal threshold matter, another key issue is whether the land on which the tracks will be established is classified as “vulnerable land”, because if it is, an FPP may be required irrespective of volume or areal clearing thresholds.

The *Regulations* provides this definition of “vulnerable land”:

vulnerable land means land that–

- (a) is within a streamside reserve or a machinery exclusion zone within the meaning of the *Forest Practices Code*; or
- (b) has a slope of more than the landslide threshold slope angles within the meaning of the *Forest Practices Code*; or
- (c) is within the High or Very High Soil Erodibility Class within the meaning of the *Forest Practices Code*; or
- (d) consists of, or contains, a threatened native vegetation community; or
- (e) is inhabited by a threatened species within the meaning of the *Threatened Species Protection Act 1995*; or
- (f) contains vulnerable karst soil within the meaning of the *Forest Practices Code*; or
- (g) contains an area of trees reserved from the harvesting of timber or the clearing of trees under a forest practices plan where the period specified in the plan has expired.

Sections of the proposed track route pass through riparian areas and therefore clause (a) may be met. Some areas are steep but it is beyond the scope of the present report to determine the landslip

threshold slope angles so, if this becomes a critical point, it is recommended that clause (b) be considered in greater detail by relevant specialists. Similar comments apply to soil erodibility [clause (c)]. Small sections of the proposed track passes through a threatened vegetation community namely *Eucalyptus ovata* forest and woodland (TASVEG code: DOV), meaning clause (d) may be met for very short sections (also riparian areas). Most of the project area supports potential habitat of fauna species listed on the Tasmanian *Threatened Species Protection Act 1995*. Irrespective of the ambiguity of clause (e) – because neither the Tasmanian *Threatened Species Protection Act 1995* nor the *Forest Practices Act 1985* and supporting *Regulations* define “inhabited by” – it would appear reasonable to argue that clause (e) is not met in relation to threatened fauna in any reasonable sense. However, at least some threatened flora populations will be impacted such that clause (e) may have effect. Clauses (f) and (g) of the vulnerable land categories are not likely to be met.

It is noted that Section 4 of the *Forest Practices Regulations 2017* also specifies the following circumstance in which an FPP is not required, as follows:

The *Regulations* provide the following relevant circumstances in which a Forest Practices Plan is not required.

4. Circumstances in which forest practices plan, &c., not required

For the purpose of section 17(6) of the Act, the following circumstances are prescribed:

- (j) the harvesting of timber or the clearing of trees on any land, or the clearance and conversion of a threatened native vegetation community on any land, for the purpose of enabling –
 - (i) the construction of a building within the meaning of the *Land Use Planning and Approvals Act 1993* or of a group of such buildings; or
 - (ii) the carrying out of any associated development –
 - if the construction of the buildings or carrying out of the associated development is authorised by a permit issued under that Act.

There is some ambiguity in 4.(j)(i) & (ii) with respect to “associated development” and how this relates to the concept of a “building”, and whether any planning permit issued under the relevant planning scheme means that 4.(j) is satisfied.

On the basis of the above discussion, especially with respect to the uncertainty of interpretation of some terms and clauses and how they may reasonably apply to this type of project, it is recommended that the proponent seek advice from the Forest Practices Authority on the application of the Act and Regulations and the specific need, or otherwise, for a Forest Practices Plan.

Tasmanian National Parks and Reserves Management Regulations 2019

Section 7 of the *Regulations* state:

7. Protection of fauna

- (1) A person must not, on any reserved land –
 - (a) take or have in his or her possession any form of wildlife or the products of wildlife; or
 - (b) use or have in his or her possession any hunting equipment; or
 - (c) lay or set any trap or snare; or
 - (d) deposit any fertiliser, pesticide or other chemical substance that may be poisonous to any form of wildlife; or
 - (e) interfere with the nest, breeding place or habitation of any form of wildlife; or
 - (f) rouse or disturb any form of wildlife.

In relation to the proposed activity (i.e. construction of a mountain bike trail and future use), of these provisions, 7(1)(e) & (f) may have application. While it is clearly the responsibility of the relevant agency administering the Act and *Regulations* to interpret these clauses, the Act or Regulations (nor the Tasmanian *Nature Conservation Act 2002*) do not define the critical terms of “interfere”, “rouse” or “disturb”. However, “wildlife” has the same meaning as in the Tasmanian *Nature Conservation Act 2002*, which is:

wildlife means any living creature other than –

- (a) a dog or cat; and
- (b) domestic stock; and
- (c) fish, within the meaning of the *Living Marine Resources Management Act 1995*; and
- (d) an animal that –
 - (i) is being farmed under and in accordance with the *Animal Farming (Registration) Act 1994*; or
 - (ii) has been so farmed and is legally in the possession of any person;

On this basis, wildlife refers to essentially any fauna species and a general definition of “rouse” or “disturb” would imply that construction and use of a mountain bike trail will not be able to avoid any such action. By extension, virtually no activity within a reserve would not breach 7(1)(f). In any reasonable sense, however, it is unlikely that the works and use will warrant particular consideration of 7(1)(f).

In more specific relation to 7(1)(e), this may be somewhat simpler to interpret and could be related to the known wedge-tailed eagle nest sites (noting the assessments have not detected any dens or like of species such as Tasmanian devils, quolls, wombats, etc. that will be directly impacted). That said, the provision refers to the very general concept of “habitation of any form of wildlife”, which again becomes essentially all-encompassing. The term “interfere” implies a significant impact rather than a peripheral disturbance event. On this basis, provided that the works have been designed to not result in direct impact to the known nests and to apply the general guidelines for minimising impacts, the intent of 7(1)(e) should be satisfied without the need for a permit.

Tasmanian Land Use Planning and Approvals Act 1993

The applicable planning scheme for the study area is the *George Town Interim Planning Scheme 2013*. The project area is zoned as Rural Resource and General Industrial under the *Scheme* and partly subject to the Priority Habitat overlay. The Biodiversity Code, however, has the following application:

E8.2 Application of this Code

E8.2.1 This code applies to use or development of land:

- a) within the area identified as priority habitat on the planning scheme maps; or
- b) for the removal of native vegetation.

That is, E8.2.1(b) has application.

The Development Standards have the following objective:

E8.6 Development Standards

E8.6.1 Habitat and Vegetation Management

Objective

To ensure that:

- a) vegetation identified as having conservation value as habitat has priority for protection and is appropriately managed to protect those values; and
- b) the representation and connectivity of vegetation communities is given appropriate protection when considering the impacts of use and development.

That is, the project as conceptualised would not compromise the broad intent of the objective of the Biodiversity Code.

The Acceptable Solution (relevant to areas identified as "priority habitat") is:

A1.1

Clearance or disturbance of priority habitat is in accordance with a certified Forest Practices Plan.

That is, if a Forest Practices Plan is certified for this project, the Acceptable Solution will be wholly satisfied. If this is not the case, the Performance Criteria are:

P1

Clearance or disturbance of native vegetation within priority habitat may be allowed where a flora and fauna report prepared by a suitably qualified person demonstrates that development does not unduly compromise the representation of species or vegetation communities of significance in the bioregion having regard to the:

- a) quality and extent of the vegetation or habitat affected by the proposal, including the maintenance of species diversity and its value as a wildlife corridor; and
- b) means of removal; and
- c) value of riparian vegetation in protecting habitat values; and
- d) impacts of siting of development (including effluent disposal) and vegetation clearance or excavations, in proximity to habitat or vegetation; and
- e) need for and adequacy of proposed vegetation or habitat management; and
- f) conservation outcomes and long-term security of any offset in accordance with the General Offset Principles for the RMPS, Department of Primary Industries, Parks, Water and Environment.

The preceding report has been prepared in accordance with the intent of the opening section of P1. The key phrasing here is "not unduly compromise the representation of species or vegetation communities of significance in the bioregion". The project will result in minor understorey modification of small areas of native vegetation through mainly non-threatened native vegetation types, such that the intent of P1 is not compromised. Noting that this provision is linked to other provisions through the phrase "having regard to", examination of these sub-clauses indicates that the project should not compromise the intent of P1 in any manner.

The Acceptable Solution (relevant to areas not identified as "priority habitat") is:

A2

Clearance or disturbance of native vegetation is in accordance with a certified Forest Practices Plan.

That is, if a Forest Practices Plan is certified for this project, the Acceptable Solution will be wholly satisfied. If this is not the case, the Performance Criteria are:

P2.1

Clearance or disturbance of native vegetation must be consistent with the purpose of this Code and not unduly compromise the representation of species or vegetation communities of significance in the bioregion having regard to the:

- a) quality and extent of the vegetation or habitat affected by the proposal, including the maintenance of species diversity and its value as a wildlife corridor; and
- b) means of removal; and

- c) value of riparian vegetation in protecting habitat values; and
- d) impacts of siting of development (including effluent disposal) and vegetation clearance or excavations, in proximity to habitat or vegetation; and
- e) need for and adequacy of proposed vegetation or habitat management; and
- f) conservation outcomes and long-term security of any offset in accordance with the General Offset Principles for the RMPS, Department of Primary Industries, Parks, Water and Environment.

That is, apart from the requirement for “a flora and fauna report prepared by a suitably qualified person”, the application of P2.1 is very similar to P1 (see above).

Recommendations

The recommendations provided below are a summary of those provided in relation to each of the ecological features described in the main report. The main text of the report, and supported appendices, provide the relevant context for the recommendations. It is assumed that the phrasing below will be modified in planning documents for the project. It is essential that machinery operators and other contractors are made aware of the reasons for undertaking the recommended actions.

Vegetation types

In a general sense, it is recommended that the disturbance of native vegetation be minimised as far as practical.

The proposed route passes through short sections of *Eucalyptus ovata* forest and woodland (TASVEG code: DOV). This is a resilient and robust vegetation type and installation and use of a mountain bike track not more than about 1.2 m wide through the understorey will not have a material impact on the extent, viability and ecological condition of the patches.

Threatened flora

Four plant species listed as threatened on the Tasmanian *Threatened Species Protection Act 1995* are known from the project area. The following recommendations have been developed for each species. Note that these recommendations should not require on-site consultation with a suitably qualified botanist.

Pimelea flava subsp. *flava* (yellow riceflower)

- no special management required for any occurrences – but note permit requirements

Aphelia gracilis (slender fanwort)

- no special management required for any occurrences – but note permit requirements

Glycine microphylla (small-leaf glycine)

- avoid occurrences in southern section of project area, if practical (already flagged);
- no special management required for shuttle road (impractical to avoid) – but note permit requirements.

Scutellaria humilis (dwarf skullcap)

- re-route a short section to avoid a particularly dense patch of the species (population extent already flagged to facilitate this).

Threatened fauna

Apart from the generic recommendation to minimise the extent of “clearance and conversion” and/or “disturbance” to native vegetation, specific management in relation to threatened fauna is limited to those related to the wedge-tailed eagle as follows:

- avoid construction of a permanent feature such as a service/shuttle road or drop-off/pick-up points within 500 m of nest site RND#130;
- design trails to be a minimum of 500 m from RND#130; and
- anticipate that any construction activities will need to assume that RND#130 is active and that therefore breeding season restrictions will apply to any works within 500 m (or 1,000 m line-of-sight) of the nest between July to January, inclusive (noting that the design avoids the need for this restriction).

It is assumed that there should be no requirement to remove larger trees that may be hollow-bearing and provide potential habitat for species such as the masked owl.

If any features suspected of being a den of the Tasmanian devil or spotted-tailed quoll are detected during construction, works should cease within 50 m of any such feature and specialist advice sought from a suitably qualified ecologist (to determine the status of the feature). If a den is confirmed, management actions will need to be determined in consultation with officers from DPIPWE, but generally in accordance with *Survey Guidelines and Management Advice for Development Proposals that may Impact on the Tasmanian Devil (Sarcophilus harrisii)* (DPIPWE 2015).

Weed and disease management

In the case of the present project, any management actions should aim to minimise the risk of introducing or further spreading weeds within the project area. The key to this will be hygiene protocols for machinery, vehicles and personnel entering the area during works, particularly if they have come from a potentially weed-affected site.

Several planning manuals provide guidance on appropriate management actions, which can be referred to develop site-specific prescriptions for any proposed works in the study area. These manuals include:

- Allan, K. & Gartenstein, S. (2010). *Keeping It Clean: A Tasmanian Field Hygiene Manual to Prevent the Spread of Freshwater Pests and Pathogens*. NRM South, Hobart;
- Rudman T. (2005). *Interim Phytophthora cinnamomi Management Guidelines*. Nature Conservation Report 05/7, Biodiversity Conservation Branch, Department of Primary Industries, Water & Environment, Hobart;
- Rudman, T., Tucker, D. & French, D. (2004). *Washdown Procedures for Weed and Disease Control*. Edition 1. Department of Primary Industries, Water & Environment, Hobart; and
- DPIPWE (2015). *Weed and Disease Planning and Hygiene Guidelines - Preventing the Spread of Weeds and Diseases in Tasmania*. Department of Primary Industries, Parks, Water & Environment, Hobart.

Development of a Construction Environmental Management Plan (CEMP) or equivalent type of document for construction activities and post-construction monitoring is recommended due to the abundance of *Erica lusitanica* (spanish heath) along the firebreak, which is the location that the proposed shuttle road is to be sited. This plan should include consideration of the order of

construction of the shuttle road and track sections, ideally working within the vicinity of the most heavily weed-infested area near the firebreak last, as this provides the means to minimising the risk of introducing weeds to other parts of the track network. Furthermore, it is recommended that preconstruction herbicide application occur prior to construction of the shuttle road. This will minimise the risk of introducing this species to the weed-free area in the east. Consideration should also be given to the implementation of a washdown area in the vicinity of the point that the shuttle road and trail network enter the eastern Tippogoree area. This will be important given the currently weed-free status of the project area to the east of the existing firebreak.

Legislative and policy implications

A formal referral to the Commonwealth Department of Agriculture, Water and the Environment under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* is not considered warranted.

A permit under the Tasmanian *Threatened Species Protection Act 1995* will be required to take individuals of *Pimelea flava* subsp. *flava*, *Glycine microphylla* and *Aphelia gracilis* (and *Scutellaria humilis* if the patches cannot be practically avoided). This permit should only be applied for once the design of the track is finalised (but note that the certification of a Forest Practices Plan may “act” as the permit).

Development will require a planning permit pursuant to the provisions of the *George Town Interim Planning Scheme 2013*. A review of the provisions of the Biodiversity Code indicates likely full compliance with P1 & P2.1 of E8.6.1 without the need for specific planning permit conditions (except in relation to confirming the preceding recommendations).

It is recommended that the proponent seek advice from the Forest Practices Authority on the application of the Act and Regulations and the specific need, or otherwise, for a Forest Practices Plan (and how this may interact with the planning scheme requirements).

REFERENCES

- Allan, K. & Gartenstein, S. (2010). *Keeping It Clean: A Tasmanian Field Hygiene Manual to Prevent the Spread of Freshwater Pests and Pathogens*. NRM South, Hobart.
- APG (Angiosperm Phylogeny Group) (2016). An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV. *Botanical Journal of the Linnean Society* 181(1): 1–20.
- Bryant, S.L. & Jackson, J. (1999). *Tasmania’s Threatened Fauna Handbook: What, Where and How to Protect Tasmania’s Threatened Animals*. Threatened Species Unit, Parks & Wildlife Service, Hobart.
- CofA (Commonwealth of Australia) (2013). *EPBC Act Policy Statement 1.1: Significant Impact Guidelines – Matters of National Environmental Significance*. Commonwealth of Australia, Canberra.
- CofA (Commonwealth of Australia) (2019). *Approved Conservation Advice (incorporating listing advice) – Tasmanian Forests and Woodlands dominated by Black Gum or Brookers Gum (Eucalyptus ovata / E. brookeriana)*. Commonwealth of Australia, Canberra.
- CofA (Commonwealth of Australia) (2020). Department of Agriculture, Water and the Environment’s *Protected Matters Report* for a point location -41.12257 146.91902) defining the approximate centre of the project area, buffered by 5 km, dated 16 December 2020 – Appendix G.

- de Salas, M.F. (Ed.) (2021+). *Flora of Tasmania Online*. Tasmanian Herbarium, Hobart.
- de Salas, M.F. & Baker, M.L. (202a). *A Census of the Vascular Plants of Tasmania, including Macquarie Island*. Tasmanian Herbarium, Hobart.
- DPIPWE (Department of Primary Industries, Parks, Water & Environment) (2015). *Weed and Disease Planning and Hygiene Guidelines – Preventing the Spread of Weeds and Diseases in Tasmania*. Department of Primary Industries, Parks, Water & Environment, Hobart.
- DPIPWE (Department of Primary Industries, Parks, Water & Environment) (2015). *Guidelines for Natural Values Surveys – Terrestrial Development Proposals*. Department of Primary Industries, Parks, Water & Environment, Hobart.
- DPIPWE (Department of Primary Industries, Parks, Water & Environment) (2015). *Survey Guidelines and Management Advice for Development Proposals that may Impact on the Tasmanian Devil (Sarcophilus harrisii)*. Department of Primary Industries, Parks, Water & Environment, Hobart.
- DPIPWE (Department of Primary Industries, Parks, Water & Environment) (2015). *Biosecurity Factsheet: Myrtle Rust*. Department of Primary Industries, Parks, Water & Environment, Hobart.
- DPIPWE (Department of Primary Industries, Parks, Water & Environment) (2020). *Natural Values Atlas report ECOTas_GTC_MTB_TippogoreeEast_Appendix-NVR for line features defining the project area, buffered by 5 km, dated 22 December 2020 – Appendix E*.
- DPIPWE (Department of Primary Industries, Parks, Water & Environment) (2020) Threatened Native Vegetation Communities List, as per Schedule 3A of the *Tasmanian Nature Conservation Act 2002*. [http://dPIPWE.tas.gov.au/conservation/flora-of-tasmania/monitoring-and-mapping-tasmanias-vegetation-\(tasveg\)/tasveg-the-digital-vegetation-map-of-tasmania/threatened-native-vegetation-communities](http://dPIPWE.tas.gov.au/conservation/flora-of-tasmania/monitoring-and-mapping-tasmanias-vegetation-(tasveg)/tasveg-the-digital-vegetation-map-of-tasmania/threatened-native-vegetation-communities).
- ECOtas (2020a). *Natural Values 'Fatal Flaws' (Critical Constraints) Assessment of Proposed Mountain Bike Trail Project, Tippogoree Hills to Mount George, Tasmania*. Report by Environmental Consulting Options Tasmania (ECOtas) to George Town Council, 3 May 2020.
- ECOtas (2020b). *Natural Values Assessment of Proposed Mountain Bike Trail Project, Mount George Area, George Town, Tasmania*. Report by Environmental Consulting Options Tasmania (ECOtas) for George Town Council, 22 September 2020.
- FPA (Forest Practices Authority) (2009). *Management of Phytophthora cinnamomi in Production Forests. Flora Technical Note No. 8*. Forest Practices Authority, Hobart.
- FPA (Forest Practices Authority) (2016). *Habitat Descriptions of Threatened Flora in Tasmania*. Forest Practices Authority, Hobart.
- FPA (Forest Practices Authority) (2017). *Threatened Flora Species Survey Notes*. Forest Practices Authority, Hobart.
- FPA (Forest Practices Authority) (2020). *Biodiversity Values Database* report, specifically the species' information for grid reference centroid 493104mE 5447518mN, buffered by 2 km and 5 km for threatened flora and fauna records, respectively, hyperlinked species' profiles and predicted range boundary maps, dated 16 December 2020 – Appendix F.
- Kitchener, A. & Harris, S. (2013+). *From Forest to Fjaeldmark: Descriptions of Tasmania's Vegetation*. Edition 2 (online edition). Department of Primary Industries, Parks, Water & Environment, Hobart.
- NRM South (2017). *A Guide to Environmental and Agricultural Weeds of Southern Tasmania*. NRM South, Hobart.
- Richardson, A., Hopgood-Douglas, S., Munks, S., Doran, N. & Peters, D. (2008). Predicting the distribution of a threatened freshwater burrowing crayfish: *Engaeus granulatus* in central northern Tasmania. *Freshwater Crayfish* 16: 43–46.
- Rudman T. (2005). *Interim Phytophthora cinnamomi Management Guidelines*. Nature Conservation Report 05/7, Biodiversity Conservation Branch, Department of Primary Industries, Water & Environment, Hobart.

- Rudman, T., Tucker, D. & French, D. (2004). *Washdown Procedures for Weed and Disease Control*. Edition 1. Department of Primary Industries, Water & Environment, Hobart.
- TSSC (Threatened Species Scientific Committee) (2011). *Commonwealth Conservation Advice on Botaurus poiciloptilus (Australasian Bittern)*. Department of Sustainability, Environment, Water, Population & Communities, Canberra.
- Wapstra, M. (2018). *Flowering Times of Tasmanian Orchids: A Practical Guide for Field Botanists*. Self-published by the author (Fourth Edition, July 2018 version).
- Wapstra, M., Bryant, S. & Bell, P. (2010). Conservation overview of the azure kingfisher *Ceyx azureus* subsp. *diemenensis* in Tasmania. *Tasmanian Bird Report* 34: 8–23.
- Wapstra, H., Wapstra, A., Wapstra, M. & Gilfedder, L. (2005+, updated online at www.dpipwe.tas.gov.au). *The Little Book of Common Names for Tasmanian Plants*. Department Primary Industries, Parks, Water & Environment, Hobart.

APPENDIX A. Vegetation community structure and composition

The tables below provide basic information on the structure and composition of the native vegetation mapping units identified from the project area.

***Eucalyptus amygdalina* forest and woodland on dolerite (TASVEG code: DAD)**

DAD dominates much of the vegetation within the project area. Most of the DAD is dominantly a shrubby woodland with a dense understorey of *Pultenaea daphnoides*, *Acacia verticillata* and *Goodenia ovata*. The relatively moist and poorly-drained areas are shrubby with *Eucalyptus ovata* being a sub-dominant canopy species with *E. amygdalina* and tall shrubs of *Melaleuca ericifolia* common over a sedgy understorey. DAD open woodland areas occur on the more insolated sites that have a grassy and sedgy understorey with scattered small trees of *Allocasuarina verticillata* and a high portion of exposed dolerite bedrock. DAD is in good condition with introduced plants confined to ubiquitous herbs and grass species. No symptoms of PC were noted.



LHS. DAD along the proposed shuttle road
RHS. sedgy DAD in the north of the project area

Stratum	Height (m) Cover (%)	Species (underline = dominant, parentheses = sparse or occasional)
Trees	8-12 (-25) m 5-25%	<i>Eucalyptus amygdalina</i> , (<i>E. viminalis</i>)
Tall shrubs	4-8 m 10-40%	<i>Allocasuarina littoralis</i> , <u><i>A. verticillata</i></u> , <i>Exocarpos cupressiformis</i> , <i>Dodonaea viscosa</i> , <i>Melaleuca ericifolia</i> , <i>Bursaria spinosa</i>
Low shrubs	<3 m 50%	<u><i>Goodenia ovata</i></u> , <u><i>Acacia verticillata</i></u> , <u><i>Pultenaea daphnoides</i></u> , <i>Melaleuca ericifolia</i> , <i>Bursaria spinosa</i> , <i>Leptospermum scoparium</i> , <i>Lomatia tinctoria</i> , <i>Epacris impressa</i> , <i>Hibbertia riparia</i> , <i>Indigofera australis</i>
Low shrubs	<0.3 m 10%	<i>Acrotriche serrulata</i> , <i>Astroloma humifusum</i>
Grasses	20-50%	<i>Poa rodwayi</i> , <i>Tetrarrhena distichophylla</i> , <i>Poa labillardierei</i> , <i>Poa tenera</i> , <i>Austrostipa</i> spp., <i>Rytidosperma</i> spp.
Graminoids	20-40%	<i>Lomandra longifolia</i> , <i>Dianella revoluta</i> , <i>Lepidosperma laterale</i> , <i>Diplarrena moraea</i>
Herbs	+ 5-15%	<i>Acaena echinata</i> , <i>Gonocarpus tetragynus</i> , <i>Goodenia lanata</i> , <i>Viola hederacea</i> , <i>Wahlenbergia</i> spp., <i>Plantago varia</i> , <i>Oxalis perennans</i> , <i>Hydrocotyle hirta</i> , <i>Euchiton japonicus</i> , <i>Drosera auriculata</i> , <i>Hypericum gramineum</i>
Climbers	+	<i>Clematis clitoroides</i> , <i>Comesperma volubile</i> , <i>Cassytha</i> spp.
Ferns	<1 m 20-50%	<i>Pteridium esculentum</i>

***Eucalyptus amygdalina-Eucalyptus obliqua* damp sclerophyll forest (TASVEG code: DSC)**

DSC occurs in a moist south-facing gully in the south of the study area. DSC is characterised by the mixed dominance of *Eucalyptus obliqua*, *E. amygdalina*, *E. ovata* and *E. viminalis* over a dense understorey of *Pomaderris apetala*, *Acacia verticillata*, *Melaleuca ericifolia* and *Goodenia ovata*. The fern species *Pellaea falcata* and *Polystichum proliferum* dominate the ground cover.

TASVEG 4.0 mapped this area as RFE (see Table 1), which is entirely incorrect as eucalypt species dominate and form approx. 25% of the canopy cover. RFE was not noted during the survey. Furthermore, other areas mapped as DSC were found to be DOB.

No weed species or symptoms of PC were noted.



DSC in the south of the project area

Stratum	Height (m) Cover (%)	Species (<u>underline</u> = dominant, parentheses = sparse or occasional)
Trees	18-20 (-25) m 25%	<u><i>Eucalyptus amygdalina</i></u> , <i>E. obliqua</i> , <i>E. ovata</i> , <i>E. viminalis</i>
Tall shrubs	3-6 m 45%	<i>Melaleuca ericifolia</i> , <i>Bursaria spinosa</i> , <i>Pomaderris apetala</i> , <i>Acacia verticillata</i> , <i>Olearia lirata</i> (<i>Nematolepis squamea</i>), (<i>Zieria arborescens</i>)
Low shrubs	<2 m 30%	<i>Acacia verticillata</i> , <i>Goodenia ovata</i> , <i>Olearia lirata</i> , <i>Coprosma quadrifida</i>
Grasses	60%	<i>Poa labillardierei</i> , <i>Poa tenera</i>
Graminoids	25%	<i>Lomandra longifolia</i> , <i>Gahnia grandis</i>
Herbs	+	<i>Viola hederacea</i> , <i>Hydrocotyle hirta</i>
Ferns	15-50%	<i>Pteridium esculentum</i> , <i>Polystichum proliferum</i> , <i>Pellaea falcata</i> , (<i>Dicksonia antarctica</i>)

***Eucalyptus obliqua* dry forest (TASVEG code: DOB)**

DOB occurs in relatively moist and sheltered south-facing gullies on the upper slopes in the east of the study area. DOB is characterised by tall forest canopy of *Eucalyptus obliqua* over a dense shrubby understorey dominated by *Pultenaea daphnoides*, *Acacia verticillata* and *Goodenia ovata*. DOB is gradational with WOB as moisture availability increases and forms clear boundaries with DAD as sites become more insolated and exposed.

TASVEG 4.0 mapped several areas of DSC, which were found to be DOB.

No weed species or symptoms of PC were noted.



Shrubby DOB in the east of the project area

Stratum	Height (m) Cover (%)	Species (<u>underline</u> = dominant, parentheses = sparse or occasional)
Trees	25-30 m 25%	<i>Eucalyptus obliqua</i>
Trees	10-15 m 15%	<i>Eucalyptus obliqua</i> , (<i>Bursaria spinosa</i>)
Low shrubs	<3 m 50%	<i>Goodenia ovata</i> , <i>Acacia verticillata</i> , <i>Pultenaea daphnoides</i> , <i>Bursaria spinosa</i> , <i>Lomatia tinctoria</i> , <i>Pultenaea juniperina</i>
Low shrubs	<0.3 m 10%	<i>Acrotriche serrulata</i> , <i>Astroloma humifusum</i>
Grasses	20-50%	<i>Poa tenera</i> , <i>P. sieberi</i>
Graminoids	40-50%	<i>Lomandra longifolia</i>
Herbs	+	<i>Viola hederacea</i> , <i>Lagenophora stipitata</i> , <i>Hydrocotyle hirta</i> , <i>Gonocarpus tetragynus</i> , <i>Oxalis perennans</i>
Ferns	<1 m 20%	<i>Pteridium esculentum</i>

***Eucalyptus ovata* forest and woodland (TASVEG code: DOV)**

DOV occurs in a poorly-drained area associated with an unnamed tributary of Four Mile Creek in the west of the study area. DOV is characterised by a forest canopy of *Eucalyptus ovata* over a dense and shrubby layer of *Melaleuca ericifolia* and *Acacia verticillata*.

A small segment (ca. 80 m) of Trail 11 traverses through this threatened community. However, it should be noted that the trail alignment generally follows natural openings in the understorey and avoids all trees of *Eucalyptus ovata*. Disturbance will be minimal.

DOV is listed as threatened at a State level, and in some cases can equate to an EPBCA-listed threatened ecological community (depending on extent, condition, and composition).

No weed species or symptoms of PC were noted.



Shrubby DOV in the centre of the project area

Stratum	Height (m) Cover (%)	Species (<u>underline</u> = dominant, parentheses = sparse or occasional)
Trees	24 m 10%	<i>Eucalyptus ovata</i>
Trees	10-14 m 20%	<i>Eucalyptus ovata</i>
Tall shrubs	3-5 m 45%	<u><i>Melaleuca ericifolia</i></u> , <i>A. verticillata</i>
Low shrubs	<2 m 30%	<u><i>Goodenia ovata</i></u> , <u><i>Acacia verticillata</i></u> , <u><i>Melaleuca ericifolia</i></u>
Grasses	+ 25%	<i>Poa labillardierei</i> , <i>Poa tenera</i>
Graminoids	<2 m 40%	<i>Lomandra longifolia</i> , <i>Lepidosperma laterale</i>
Herbs	+	<i>Viola hederacea</i> , <i>Hydrocotyle hirta</i>
Ferns	<1.5 m 15%	<i>Pteridium esculentum</i>

***Eucalyptus obliqua* forest with broad-leaf shrubs (TASVEG code: WOB)**

WOB occurs in south-facing slopes and moist gullies associated with creeks. WOB occurs as a classic wet sclerophyll forest i.e. a relatively tall even-aged canopy generated after a major disturbance event (older fire) over a dense secondary canopy of mainly broad-leaved shrubs, sedges and ground ferns.

WOB and DOB intergrade, especially on the margins of gullies, lower slopes and heads of relatively indistinct gullies, with some areas of WOB shifting into DOB due to more recent fire history.

WOB is in good condition with no weeds or symptoms of PC noted.



Example of WOB

Stratum	Height (m) Cover (%)	Species (<u>underline</u> = dominant, parentheses = sparse or occasional)
Trees	25-30 m 25%	<u><i>Eucalyptus obliqua</i></u>
Tall shrubs	3-9 m 50%	<i>Acacia verticillata</i> , <i>Pomaderris apetala</i>
Low shrubs	<0.3 m <5%	<i>Coprosma quadrifida</i> , <i>Pimelea drupacea</i> , <i>Zieria arborescens</i> , <i>Goodenia ovata</i>
Grasses	+	<i>Poa tenera</i> , <i>Microlaena stipoides</i>
Graminoids	5-30%	<i>Lepidosperma elatius</i> , <i>Gahnia grandis</i>
Herbs	+	<i>Viola hederacea</i> , <i>Hydrocotyle hirta</i> , <i>Gonocarpus teucrioides</i>
Ferns	<1 m variable	<i>Pteridium esculentum</i> , <i>Histiopteris incisa</i> , <i>Polystichum proliferum</i>

***Allocasuarina verticillata* forest (TASVEG code: NAV)**

Several small areas of NAV were located amongst the much more extensive DAD. The location of the areas of NAV relate to topographic features such as rocky rises and/or north- and west-facing more insolated slopes.

NAV is entirely dominated by a uniform canopy of large shrubs/small trees of *Allocasuarina verticillata* over a generally low grassy and sedgy understorey. Scattered sparse individuals of *E. amygdalina* and *E. viminalis* occur in most of the mapped areas.

NAV is generally in good condition with introduced plants confined to ubiquitous herbs and grass species. No symptoms of PC were noted.



NAV in south of study area

Stratum	Height (m) Cover (%)	Species (<u>underline</u> = dominant, parentheses = sparse or occasional)
Tall shrubs	3-8 m 40%	<u><i>Allocasuarina verticillata</i></u> , (<i>Acacia mearnsii</i>), (<i>Bursaria spinosa</i>), (<i>Eucalyptus viminalis</i>), (<i>E. amygdalina</i>)
Low shrubs	<0.5 m <5%	<i>Astroloma humifusum</i>
Grass	5-80%	<i>Austrostipa</i> spp., <i>Rytidosperma</i> spp.
Graminoids	+	<u><i>Lepidosperma laterale</i></u> , <i>Lomandra longifolia</i> , <i>Dianella revoluta</i>
Herbs	+	<i>Oxalis perennans</i>
Ferns	+	<i>Cheilanthes austrotenuifolia</i>

APPENDIX B. Vascular plant species recorded from study area

Botanical nomenclature follows *A Census of the Vascular Plants of Tasmania* (de Salas & Baker 2021), with family placement updated to reflect the nomenclatural changes recognised in the *Flora of Tasmania Online* (de Salas 2021+) and APG (2016); common nomenclature follows *The Little Book of Common Names of Tasmanian Plants* (Wapstra et al. 2005+, updated online at www.dpipwe.tas.gov.au).

e = endemic to Tasmania; i = naturalised;

TSPA = Tasmanian *Threatened Species Protection Act 1995* (status shown);

DW = declared within meaning of *Tasmanian Weed Management Act 1999*.

Table B1. Summary of vascular species recorded from the study area

STATUS	ORDER			
	DICOTYLEDONAE	MONOCOTYLEDONAE	GYMNOSPERMAE	PTERIDOPHYTA
	118	50	-	11
e	7	3	-	-
i	5	3	-	-
Sum	29	56	0	11
TOTAL	197			

DICOTYLEDONAE

APIACEAE

<i>Daucus glochidiatus</i>	australian carrot
<i>Hydrocotyle callicarpa</i>	tiny pennywort
<i>Hydrocotyle hirta</i>	hairy pennywort
<i>Hydrocotyle sibthorpioides</i>	shining pennywort

ASTERACEAE

<i>Argentipallium dealbatum</i>	white everlasting
e <i>Bedfordia linearis</i> subsp. <i>linearis</i>	slender blanketleaf
e <i>Bedfordia salicina</i>	tasmanian blanketleaf
<i>Brachyscome aculeata</i>	hill daisy
<i>Brachyscome spathulata</i>	spoonleaf daisy
<i>Cassinia aculeata</i> subsp. <i>aculeata</i>	common dollybush
i <i>Cirsium vulgare</i>	spear thistle
<i>Coronidium scorpioides</i>	curling everlasting
e <i>Craspedia glauca</i>	common billybuttons
<i>Cymbonotus preissianus</i>	southern bears-ears
<i>Euchiton japonicus</i>	common cottonleaf
i <i>Hypochaeris radicata</i>	rough catsear
<i>Lagenophora stipitata</i>	blue bottledaisy
<i>Olearia lirata</i>	forest daisybush
e <i>Olearia phlogopappa</i> subsp. <i>phlogopappa</i>	coast dusty daisybush
<i>Olearia ramulosa</i>	twiggy daisybush
<i>Olearia stellulata</i>	sawleaf daisybush
<i>Olearia viscosa</i>	viscid daisybush
<i>Ozothamnus ferrugineus</i>	tree everlastingbush
<i>Senecio biserratus</i>	jagged fireweed
<i>Senecio linearifolius</i> var. <i>linearifolius</i>	common fireweed groundsel
<i>Senecio prenanthoides</i>	common fireweed

BORAGINACEAE

<i>Hackelia suaveolens</i>	sweet houndstongue
----------------------------	--------------------

BRASSICACEAE

<i>Rorippa gigantea</i>	large bittercress
-------------------------	-------------------

CAMPANULACEAE

<i>Lobelia pedunculata</i>	matted lobelia
<i>Wahlenbergia gracilentia</i>	annual bluebell
<i>Wahlenbergia multicaulis</i>	bushy bluebell
<i>Wahlenbergia stricta</i> subsp. <i>stricta</i>	tall bluebell

CARYOPHYLLACEAE		
<i>Stellaria multiflora</i> subsp. <i>multiflora</i>	rayless starwort	
<i>Stellaria pungens</i>	prickly starwort	
CASUARINACEAE		
<i>Allocasuarina littoralis</i>	black sheoak	
<i>Allocasuarina verticillata</i>	drooping sheoak	
CELASTRACEAE		
<i>Stackhousia monogyna</i>	forest candles	
CONVOLVULACEAE		
<i>Dichondra repens</i>	kidneyweed	
CRASSULACEAE		
<i>Crassula sieberiana</i>	rock stonecrop	
DILLENACEAE		
<i>Hibbertia riparia</i>	erect guineaflower	
DROSERACEAE		
<i>Drosera auriculata</i>	tall sundew	
<i>Drosera pygmaea</i>	dwarf sundew	
ELAEOCARPACEAE		
<i>Tetratheca labillardierei</i>	glandular pinkbells	
ERICACEAE		
<i>Acrotriche serrulata</i>	ants delight	
<i>Astroloma humifusum</i>	native cranberry	
<i>Epacris impressa</i>	common heath	
i <i>Erica lusitana</i>	spanish heath	DW
<i>Lissanthe strigosa</i> subsp. <i>subulata</i>	peachberry heath	
EUPHORBIACEAE		
<i>Amperea xiphioclada</i> var. <i>xiphioclada</i>	broom spurge	
<i>Beyeria viscosa</i>	pinkwood	
<i>Phyllanthus gunnii</i>	shrubby spurge	
<i>Poranthera microphylla</i>	small poranthera	
FABACEAE		
<i>Acacia dealbata</i> subsp. <i>dealbata</i>	silver wattle	
<i>Acacia mearnsii</i>	black wattle	
<i>Acacia melanoxylon</i>	blackwood	
<i>Acacia myrtifolia</i>	redstem wattle	
<i>Acacia stricta</i>	hop wattle	
<i>Acacia verticillata</i> subsp. <i>verticillata</i>	prickly moses	
<i>Bossiaea prostrata</i>	creeping bossia	
<i>Daviesia ulicifolia</i> subsp. <i>ulicifolia</i>	yellow spiky bitterpea	
<i>Glycine clandestina</i>	twining glycine	
<i>Glycine microphylla</i>	small-leaf glycine	TSPA (vulnerable)
<i>Goodia lotifolia</i>	smooth goldentip	
<i>Hovea heterophylla</i>	winter purplepea	
<i>Indigofera australis</i> subsp. <i>australis</i>	native indigo	
<i>Pultenaea daphnoides</i>	heartleaf bushpea	
<i>Pultenaea juniperina</i>	prickly beauty	
GENTIANACEAE		
i <i>Centaurium erythraea</i>	common centaury	
GERANIACEAE		
<i>Geranium potentilloides</i> var. <i>potentilloides</i>	mountain cranesbill	
<i>Geranium solanderi</i>	southern cranesbill	
<i>Pelargonium australe</i>	southern storksbill	
GOODENIACEAE		
<i>Goodenia lanata</i>	trailing native-primrose	
<i>Goodenia ovata</i>	hop native-primrose	
HALORAGACEAE		
<i>Gonocarpus tetragynus</i>	common raspwort	
<i>Gonocarpus teucrioides</i>	forest raspwort	
HYPERICACEAE		
<i>Hypericum gramineum</i>	small st johns-wort	
LAMIACEAE		
<i>Ajuga australis</i>	australian bugle	
<i>Scutellaria humilis</i>	dwarf skullcap	TSPA (rare)
LAURACEAE		
<i>Cassytha glabella</i> f. <i>dispar</i>	shortfruit slender dodderlaurel	
<i>Cassytha melantha</i>	large dodderlaurel	
<i>Cassytha pubescens</i>	downy dodderlaurel	
LINACEAE		
<i>Linum marginale</i>	native flax	

MYRTACEAE		
e	<i>Eucalyptus amygdalina</i>	black peppermint
	<i>Eucalyptus obliqua</i>	stringybark
	<i>Eucalyptus ovata</i> var. <i>ovata</i>	black gum
	<i>Eucalyptus viminalis</i> subsp. <i>viminalis</i>	white gum
	<i>Euryomyrtus ramosissima</i>	rosy heathmyrtle
	<i>Leptospermum scoparium</i>	common teatree
	<i>Melaleuca ericifolia</i>	coast paperbark
OLEACEAE		
	<i>Notelaea ligustrina</i>	native olive
OXALIDACEAE		
	<i>Oxalis perennans</i>	grassland woodsorrel
PITTOSPORACEAE		
	<i>Billardiera macrantha</i>	forest appleberry
	<i>Billardiera mutabilis</i>	green appleberry
	<i>Bursaria spinosa</i> subsp. <i>spinosa</i>	prickly box
	<i>Pittosporum bicolor</i>	cheesewood
PLANTAGINACEAE		
	<i>Plantago varia</i>	variable plantain
POLYGALACEAE		
	<i>Comesperma volubile</i>	blue lovecreeper
PROTEACEAE		
	<i>Banksia marginata</i>	silver banksia
e	<i>Lomatia tinctoria</i>	guitarplant
RANUNCULACEAE		
	<i>Clematis aristata</i>	mountain clematis
	<i>Clematis clitorioides</i>	pleasant clematis
	<i>Ranunculus lappaceus</i>	woodland buttercup
RHAMNACEAE		
	<i>Pomaderris apetala</i> subsp. <i>apetala</i>	common dogwood
	<i>Pomaderris elliptica</i> var. <i>elliptica</i>	yellow dogwood
	<i>Pomaderris pilifera</i> subsp. <i>pilifera</i>	hairy dogwood
ROSACEAE		
	<i>Acaena echinata</i>	spiny sheepsburr
	<i>Acaena novae-zelandiae</i>	common buzzy
RUBIACEAE		
	<i>Coprosma quadrifida</i>	native currant
	<i>Galium australe</i>	coast bedstraw
	<i>Galium gaudichaudii</i> subsp. <i>parviflorum</i>	smallflower rough bedstraw
	<i>Opercularia varia</i>	variable stinkweed
RUTACEAE		
	<i>Correa reflexa</i> var. <i>reflexa</i>	common correa
	<i>Nematolepis squamea</i> subsp. <i>squamea</i>	satinwood
	<i>Philotheca verrucosa</i>	fairy waxflower
	<i>Zieria arborescens</i> subsp. <i>arborescens</i>	stinkwood
SANTALACEAE		
	<i>Exocarpos cupressiformis</i>	common native-cherry
	<i>Exocarpos strictus</i>	pearly native-cherry
	<i>Leptomeria drupacea</i>	erect currantbush
SAPINDACEAE		
	<i>Dodonaea viscosa</i> subsp. <i>spatulata</i>	broadleaf hopbush
SCROPHULARIACEAE		
	<i>Veronica calycina</i>	hairy speedwell
	<i>Veronica gracilis</i>	slender speedwell
SOLANACEAE		
	<i>Solanum laciniatum</i>	kangaroo apple
i	<i>Solanum nigrum</i>	blackberry nightshade
STYLIDIACEAE		
	<i>Stylidium graminifolium</i>	narrowleaf triggerplant
THYMELAEACEAE		
	<i>Pimelea drupacea</i>	cherry riceflower
	<i>Pimelea flava</i> subsp. <i>flava</i>	yellow riceflower
	<i>Pimelea humilis</i>	dwarf riceflower
	<i>Pimelea linifolia</i>	slender riceflower
e	<i>Pimelea nivea</i>	bushmans bootlace
VIOLACEAE		
	<i>Viola hederacea</i> subsp. <i>hederacea</i>	ivyleaf violet

TSPA (rare)

MONOCOTYLEDONAE

ALSTROEMERIACEAE

Dryophila cyanocarpa

turquoise berry

AMARYLLIDACEAE

Dianella revoluta var. *revoluta*

spreading flaxlily

Dianella tasmanica

forest flaxlily

ASPARAGACEAE

Arthropodium milleflorum

pale vanilla-lily

Lomandra longifolia

sagg

ASPHODELACEAE

Bulbine glauca

bluish bulbine-lily

COLCHICACEAE

Burchardia umbellata

milkmaids

CYPERACEAE

Carex breviculmis

shortstem sedge

Carex iynx

tussock sedge

Gahnia grandis

cutting grass

Lepidosperma concavum

sand sword-sedge

Lepidosperma elatius

tall sword-sedge

Lepidosperma laterale

variable sword-sedge

Schoenus apogon

common bog-sedge

IRIDACEAE

Diplarrena moraea

white flag-iris

JUNCACEAE

Juncus pallidus

pale rush

Juncus subsecundus

finger rush

Luzula flaccida

pale woodrush

ORCHIDACEAE

Acianthus caudatus

mayfly orchid

Acianthus pusillus

small mosquito-orchid

Caladenia carnea

pink fingers

Caladenia gracilis

musky finger-orchid

Caladenia vulgaris

summer fingers

e *Calochilus herbaceus*

pale beard-orchid

e *Chiloglottis triceratops*

threehorned bird-orchid

Corybas diemenicus

stately helmet-orchid

Corybas incurvus

slaty helmet-orchid

Gastrodia sesamoides

short potato-orchid

Microtis unifolia

common onion-orchid

Pterostylis decurva

summer greenhood

Pterostylis melagramma

blackstripe greenhood

Pterostylis nutans

nodding greenhood

Pterostylis pedunculata

maroonhood

e *Pterostylis williamsonii*

brownlip greenhood

POACEAE

i *Aira caryophyllea* subsp. *caryophyllea*

silvery hairgrass

Austrostipa stiposa

corkscrew speargrass

i *Bromus diandrus*

great brome

Deyeuxia quadriseta

reed bentgrass

Dichelachne rara

common plume-grass

Echinopogon ovatus

hedgehog grass

Microlaena stipoides var. *stipoides*

weeping grass

Poa hookeri

hookers tussockgrass

Poa labillardierei var. *labillardierei*

silver tussockgrass

Poa rodwayi

velvet tussockgrass

Poa sieberiana var. *sieberiana*

grey tussockgrass

Poa tenera

scrambling tussockgrass

Rytidosperma caespitosum

common wallabygrass

Rytidosperma penicillatum

slender wallabygrass

Rytidosperma pilosum

velvet wallabygrass

Rytidosperma racemosum var. *racemosum*

stiped wallabygrass

Rytidosperma setaceum

bristly wallabygrass

Tetrarrhena distichophylla

hairy ricegrass

i *Vulpia bromoides*

squirrel-tail fescue

RESTIONACEAE

Aphelia gracilis

slender fanwort

TSPA (rare)

Centrolepis aristata

pointed bristlewort

Centrolepis strigosa subsp. *strigosa*

hairy bristlewort

PTERIDOPHYTA

ASPLENIACEAE

Asplenium flabellifolium

necklace fern

BLECHNACEAE

Blechnum nudum

fishbone waterfern

CULCITACEAE

Calochlaena dubia

rainbow fern

DENNSTAEDTIACEAE

Histiopteris incisa

batswing fern

Pteridium esculentum subsp. *esculentum*

bracken

DICKSONIACEAE

Dicksonia antarctica

soft treefern

DRYOPTERIDACEAE

Polystichum proliferum

mother shieldfern

HYMENOPHYLLACEAE

Hymenophyllum cupressiforme

common filmyfern

PTERIDACEAE

Adiantum aethiopicum

common maidenhair

Cheilanthes austrotenuifolia

green rockfern

Pellaea falcata

sickle fern

APPENDIX C. Analysis of database records of threatened flora

Table C1 provides a listing of threatened flora from within 5,000 m of the project area (nominal buffer width usually used to discuss the potential of a particular study area to support various species listed in databases), with comments on whether potential habitat is present for the species, and possible reasons why a species was not recorded.

Table C1. Threatened flora records from within 5,000 m of boundary of the project area

Species listed below are listed as rare (r), vulnerable (v), endangered (e), or extinct (x) on the Tasmanian *Threatened Species Protection Act 1995* (TSPA); vulnerable (VU), endangered (EN), critically endangered (CR) or extinct (EX) on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA). Information below is sourced from DPIPWE's *Natural Values Atlas* (DPIPWE 2020) and other sources where indicated. Habitat descriptions are taken from FPA (2016), FPA (2017) and TSS (2003+), except where otherwise indicated. Species marked with # are listed in CofA (2020).

Scientific name Common name	Status TSPA EPBCA	Tasmanian habitat description (and distribution)	Comments on project area and database records
<i>Acacia ulicifolia</i> juniper wattle	r -	<i>Acacia ulicifolia</i> is found in sandy coastal heaths and open heathy forest and woodland in the north and east of Tasmania. Populations are often sparsely distributed and most sites are near-coastal but it can occasionally extend inland (up to 30 km).	Potential habitat very marginally present. The species was not detected (distinctive shrub that is detectable and identifiable at any time of the year).
<i>Aphelia gracilis</i> slender fanwort	r -	<i>Aphelia gracilis</i> inhabits damp sandy ground and wet places in the Midlands and northeast of the State. It may readily colonise sites after fire or other disturbance.	Refer to FINDINGS Flora species Threatened flora species recorded from the study area for more details.
<i>Aphelia pumilio</i> dwarf fanwort	r -	<i>Aphelia pumilio</i> is found growing on damp flats, often with impeded drainage. The main vegetation types are lowland grassland (<i>Themeda triandra</i>) and dry sclerophyll forest and woodland dominated by <i>Eucalyptus viminalis</i> , <i>E. amygdalina</i> or <i>E. ovata</i> .	Potential habitat marginally present in patches of impeded drainage areas in DAD and DOV associated with headwaters of minor drainage features. The species was not detected (this is an annual herb but detectable at the time of survey – flowers at the same time as <i>Aphelia gracilis</i> , which was recorded).
<i>Asperula minima</i> mossy woodruff	r -	<i>Asperula minima</i> occurs in a range of vegetation types, the common factor being locally impeded drainage. Habitats include near-coastal swamp forests, <i>Melaleuca ericifolia</i> swamp forest, <i>Eucalyptus ovata</i> sedgy forest, "old pasture" regenerating to sedges and rushes, and firebreaks adjacent to clearfelled forest.	Potential habitat present in occasional patches of impeded drainage in DAD and DOV associated with headwaters of minor drainage features. The species was not detected (perennial herb that is detectable and identifiable at any time of the year).
<i>Barbarea australis</i> riverbed wintercress	e EN # only	<i>Barbarea australis</i> is a riparian species found near river margins, creek beds and along flood channels adjacent to the river. It tends to favour the slower reaches, and has not been found on steeper sections of rivers. It predominantly occurs in flood deposits of silt and gravel deposited as point bars and at the margins of base flows, or more occasionally or between large cobbles on sites frequently disturbed by	Potential habitat is absent.

Scientific name Common name	Status TSPA EPBCA	Tasmanian habitat description (and distribution)	Comments on project area and database records
		fluvial processes. Some of the sites are a considerable distance from the river, in flood channels scoured by previous flood action, exposing river pebbles. Most populations are in the Central Highlands, but other populations occur in the northeast and upland areas in the central north.	
<i>Caladenia caudata</i> tailed spider-orchid	v VU #	<i>Caladenia caudata</i> has highly variable habitat, which includes the central north: <i>Eucalyptus obliqua</i> heathy forest on low undulating hills; the northeast: <i>E. globulus</i> grassy/heathy coastal forest, <i>E. amygdalina</i> heathy woodland and forest, <i>Allocasuarina</i> woodland; and the southeast: <i>E. amygdalina</i> forest and woodland on sandstone, coastal <i>E. viminalis</i> forest on deep sands. Substrates vary from dolerite to sandstone to granite, with soils ranging from deep windblown sands, sands derived from sandstone and well-developed clay loams developed from dolerite. A high degree of insolation is typical of many sites.	Potential habitat is marginally present. While the survey was marginally outside the peak flowering period of the species in northern Tasmania (Wapstra 2018), the distinctive leaves of this species were not recorded. Given the statistically low likelihood of coincidence of a specific track with potential habitat, a targeted-timed survey is not considered warranted.
<i>Caladenia patersonii</i> patersons spider-orchid	v -	<i>Caladenia patersonii</i> favours coastal and near-coastal areas in northern Tasmania, growing in low shrubby heathland and heathy forest/woodland in moist to well-drained sandy and clay loam.	Potential habitat is absent.
<i>Carex longebrachiata</i> drooping sedge	r -	<i>Carex longebrachiata</i> grows along riverbanks, in rough grassland and pastures, in damp drainage depressions and on moist slopes amongst forest, often dominated by <i>Eucalyptus viminalis</i> , <i>E. ovata</i> or <i>E. rodwayi</i> .	Potential habitat marginally present. This distinctive perennial sedge was not detected (no significant seasonal constraint on detection and/or identification).
<i>Dianella amoena</i> grassland flaxlily	r EN # only	<i>Dianella amoena</i> occurs mainly in the northern and southern Midlands, where it grows in native grasslands and grassy woodlands.	Potential habitat is absent.
<i>Epacris exserta</i> south esk heath	e EN # only	<i>Epacris exserta</i> occurs along the lower reaches of the South Esk, North Esk and Supply rivers. It is a strictly riparian species that grows in areas subject to periodic inundation, mainly on alluvium amongst dolerite boulders within dense riparian scrub, and occasionally in open rocky sites. It has been recorded from 10-310 m a.s.l.	Potential habitat is absent.
<i>Epacris virgata</i> Beaconsfield twiggy heath	v EN	<i>Epacris virgata</i> (Beaconsfield) is restricted to a small area of undulating terrain in the foothills of the Dazzler Range near Beaconsfield, where it occurs on serpentinite-derived soils in dry sclerophyll forest at an elevation of 40-80 m a.s.l.	Potential habitat is absent.

Scientific name Common name	Status TSPA EPBCA	Tasmanian habitat description (and distribution)	Comments on project area and database records
<i>Epilobium pallidiflorum</i> showy willowherb	r -	<i>Epilobium pallidiflorum</i> occurs in wet places (e.g. natural wetlands amongst forest, margins of <i>Melaleuca ericifolia</i> swamp forest, scrubby-sedgy <i>E. ovata</i> woodland on heavy soils, etc.) mostly in the north and northwest of the State.	Potential habitat is absent.
<i>Glycine latrobeana</i> clover glycine	v VU # only	<i>Glycine latrobeana</i> occurs in a range of habitats, geologies and vegetation types. Soils are usually fertile but can be sandy when adjacent to or overlaying fertile soils. The species mainly occurs on flats and undulating terrain over a wide geographical range, including near-coastal environments, the Midlands, and the Central Plateau. It mainly occurs in grassy/heathy forests and woodlands and native grasslands.	Potential habitat is absent.
<i>Glycine microphylla</i> small-leaf glycine	v -	<i>Glycine microphylla</i> occurs in dry to dampish sclerophyll forest and woodland in the north and east of the State, with outlying sites at Woolnorth.	Refer to FINDINGS Flora species Threatened flora species recorded from the study area for more details.
<i>Lepidium hyssopifolium</i> soft peppergrass	e EN # only	The native habitat of <i>Lepidium hyssopifolium</i> is the growth suppression zone beneath large trees in grassy woodlands and grasslands (e.g. over-mature black wattles and isolated eucalypts in rough pasture). <i>Lepidium hyssopifolium</i> is now found primarily under large exotic trees on roadsides and home yards on farms. It occurs in the eastern part of Tasmania between sea-level to 500 metres a.s.l. in dry, warm and fertile areas on flat ground on weakly acid to alkaline soils derived from a range of rock types. It can also occur on frequently slashed grassy/weedy roadside verges where shade trees are absent.	Potential habitat is absent.
<i>Lepidosperma viscidum</i> sticky swordgrass	r -	<i>Lepidosperma viscidum</i> occurs in a range of heathland to heathy/shrubby woodland habitats often dominated by species of <i>Allocasuarina</i> (sheoak) on a range of substrates.	Potential habitat widespread. This perennial graminoid was not detected (no significant seasonal constraint on detection and/or identification).
<i>Leucochrysum albicans</i> var. <i>tricolor</i> grassland paperdaisy	e EN # only	<i>Leucochrysum albicans</i> var. <i>tricolor</i> occurs in the west and on the Central Plateau and the Midlands, mostly on basalt soils in open grassland. This species would have originally occupied <i>Eucalyptus pauciflora</i> woodland and tussock grassland, though most of this habitat is now converted to improved pasture or cropland.	Potential habitat is absent.
<i>Limonium australe</i> var. <i>australe</i> yellow sea-lavender	r -	<i>Limonium australe</i> var. <i>australe</i> occurs in succulent or graminoid saltmarsh close to the high water mark, typically near small brackish streams.	Potential habitat is absent.

Scientific name Common name	Status TSPA EPBCA	Tasmanian habitat description (and distribution)	Comments on project area and database records
<i>Phyllangium distylis</i> tiny mitrewort	r -	<i>Phyllangium distylis</i> occurs in sandy humic heaths and open shrublands, muddy soaks and the margins of ephemeral wetlands.	Potential habitat limited to flatter terrain with the species likely to be most prevalent on anthropogenically-created bare ground such as tracks, drains and easements. Natural habitat may include rock plates with seepages. This species was not recorded.
<i>Phyllangium divergens</i> wiry mitrewort	v -	<i>Phyllangium divergens</i> occurs in a wide variety of near-coastal habitats on a range of substrates, a common feature usually being bare ground (e.g. tracks) and rock exposures (e.g. outcrops, coastal cliffs, etc.).	Potential habitat limited to flatter terrain with the species likely to be most prevalent on anthropogenically-created bare ground such as tracks, drains and easements. Natural habitat may include rock plates with seepages. The species was not detected (this is an annual herb but detectable at the time of survey – flowers at the same time as <i>Aphelia gracilis</i> , which was recorded).
<i>Pimelea flava</i> subsp. <i>flava</i> yellow riceflower	r -	<i>Pimelea flava</i> subsp. <i>flava</i> occurs in wet and dry sclerophyll forest and woodland, and extends into hardwood and softwood plantations. It often occurs abundantly on disturbed sites such as in logged forest, firebreaks, powerline easements and road batters.	Refer to FINDINGS Flora species Threatened flora species recorded from the study area for more details.
<i>Pomaderris intermedia</i> lemon dogwood	r -	<i>Pomaderris intermedia</i> occurs in heathland and heathy woodland on eastern Bass Strait islands but extends to mainly dry sclerophyll forest on mainland Tasmania, most often associated with rock outcrops (dolerite), riparian areas and open forest.	Potential habitat widespread. This distinctive shrub was not detected (no significant seasonal constraint on detection and/or identification).
<i>Pomaderris paniculosa</i> subsp. <i>paralia</i> shining dogwood	r -	<i>Pomaderris paniculosa</i> subsp. <i>paralia</i> occurs in exposed sites along cliff lines and within dune and coastal heaths and scrubs, and low forest dominated by <i>Allocasuarina verticillata</i> (drooping sheoak).	Potential habitat is absent.
<i>Pomaderris pilifera</i> subsp. <i>talpicutica</i> moleskin dogwood	e VU #	<i>Pomaderris pilifera</i> subsp. <i>talpicutica</i> is known with certainty from two small subpopulations, one in the Government Hills near Risdon in the south of Tasmania, and one close to the East Tamar Highway in the north. A third location east of Mathinna consists of a single plant in poor condition that has only been tentatively ascribed to the taxon. At East Risdon, the species occurs on western and northwestern slopes within 300 m of the River Derwent and between 10-125 m a.s.l. It occurs on mudstone on very well drained skeletal soils, in either <i>Eucalyptus amygdalina</i> or <i>Eucalyptus risdonii</i> low woodlands. Elsewhere, the taxon occurs in open shrubby woodland dominated by <i>Eucalyptus amygdalina</i> , usually on dolerite.	The East Tamar Highway population is attributed to M. Wapstra and it represents a population that is close to subsp. <i>pilifera</i> with some affinities to subsp. <i>talpicutica</i> . Potential habitat is widespread but previous quite extensive surveys have failed to detect the subsp. <i>talpicutica</i> entity anywhere else in this region. This distinctive shrub was not detected (no significant seasonal constraint on detection and/or identification).

Scientific name Common name	Status TSPA EPBCA	Tasmanian habitat description (and distribution)	Comments on project area and database records
<i>Prasophyllum apoxychilum</i> tapered leek-orchid	v EN # only	<i>Prasophyllum apoxychilum</i> is restricted to eastern and northeastern Tasmania where it occurs in coastal heathland or grassy and scrubby open eucalypt forest on sandy and clay loams, often among rocks. It occurs at a range of elevations and seems to be strongly associated with dolerite in the east and southeast of its range.	Potential habitat superficially present, although there are no database records within at least 10 km of the study area and the general area is atypical of known sites. The survey was within the peak flowering period of the species in northern Tasmania (Wapstra 2018) and the species was not recorded. Given the statistically low likelihood of coincidence of a specific track with potential habitat, a further targeted-timed survey is not considered warranted.
<i>Prasophyllum secutum</i> northern leek-orchid	e CR # only	<i>Prasophyllum secutum</i> occurs in northern Tasmania in dense coastal scrub in the swales of stabilised sand dunes on white to grey sands and sandy loam.	Potential habitat is absent.
<i>Pterostylis grandiflora</i> superb greenhood	r -	<i>Pterostylis grandiflora</i> occurs mostly in heathy and shrubby open eucalypt forests and in grassy coastal <i>Allocasuarina</i> (sheoak) woodland on moderately to well-drained sandy and loamy soils. It prefers to grow amongst undergrowth on lightly shaded sites. A recent population has been detected in wet sclerophyll forests.	Potential habitat is present. While the survey was outside the peak flowering period of the species (Wapstra 2018), the distinctive leaves of this species were not recorded. Given the statistically low likelihood of coincidence of a specific track with potential habitat, a targeted-timed survey is not considered warranted.
<i>Pterostylis ziegeleri</i> grassland greenhood	v VU # only	<i>Pterostylis ziegeleri</i> occurs in the State's south, east and north, with an outlying occurrence in the northwest. In coastal areas, the species occurs on the slopes of low stabilised sand dunes and in grassy dune swales, while in the Midlands it grows in native grassland or grassy woodland on well-drained clay loams derived from basalt.	Potential habitat is absent.
<i>Pultenaea mollis</i> soft bushpea	v -	<i>Pultenaea mollis</i> occurs in heathy and shrubby forest and woodland.	Potential habitat is absent.
<i>Scutellaria humilis</i> dwarf scullcap	r -	<i>Scutellaria humilis</i> is found in moist, shady places in the northeast and southeast of the State. Recent sites have been associated with rocky slopes and rises.	This species does not appear in DPIPW (2020) because at the time of production of that database report, there were no records of the species within 5 km of the study area. Subsequent to that, the species was detected from the project area. Refer to FINDINGS Flora species Threatened flora species recorded from the study area for more details.
<i>Senecio psilocarpus</i> swamp fireweed	e VU # only	<i>Senecio psilocarpus</i> is known from six widely scattered sites in the northern half of the State, including King and Flinders islands. It occurs in swampy habitats including broad valley floors associated with rivers, edges of farm dams amongst low-lying grazing/cropping ground, herb-rich native grassland in a broad swale between stable sand dunes, adjacent to	Potential habitat is absent.

Scientific name Common name	Status TSPA EPBCA	Tasmanian habitat description (and distribution)	Comments on project area and database records
		wetlands in native grassland, herbaceous marshland and low-lying lagoon systems.	
<i>Senecio squarrosus</i> leafy fireweed	r -	<i>Senecio squarrosus</i> occurs in a wide variety of habitats. One form occurs predominantly in lowland damp tussock grasslands. The more widespread and common form occurs mainly in dry forests (often grassy) but extends to wet forests and other vegetation types.	Potential habitat widespread. This perennial herb was not detected (no significant seasonal constraint on detection and/or identification).
<i>Siloxerus multiflorus</i> small wrinklewort	r -	<i>Siloxerus multiflorus</i> occurs in a range of somewhat exposed lowland habitats, including bare soil and rocks amongst dense windswept coastal shrubbery to rock outcrops and bare ground associated with native grassland, grassy woodland and forest.	Potential habitat limited to low-lying flatter terrain with the species likely to be most prevalent on anthropogenically-created bare ground such as tracks, drains and easements. Natural habitat may include rock plates with seepages which are present within the project area. The species was not detected (this is an annual herb but detectable at the time of survey – flowers at the same time as <i>Aphelia gracilis</i> , which was recorded).
<i>Spyridium parvifolium</i> var. <i>parvifolium</i> coast dustymiller	r -	<i>Spyridium parvifolium</i> var. <i>parvifolium</i> mainly occurs in near-coastal areas in northern Tasmania. It occurs in a range of vegetation types, mainly shrubby dry sclerophyll forests and woodlands. It can proliferate from soil-stored seed after disturbance.	Potential habitat is widespread. This distinctive shrub was not detected (no significant seasonal constraint on detection and/or identification).
<i>Stylidium beaugleholei</i> blushing triggerplant	r -	<i>Stylidium beaugleholei</i> occurs in wet sandy heaths, moist depressions, soaks and hollows.	Potential habitat is marginally present in damp areas along the firebreak. The species was not detected (this is an annual herb but detectable at the time of survey – flowers at the same time as <i>Aphelia gracilis</i> , which was recorded).
<i>Stylidium despectum</i> small triggerplant	r -	<i>Stylidium despectum</i> has mainly been recorded from wet sandy heaths, moist depressions, soaks and hollows in near-coastal areas. It extends to similar habitat amongst forest and woodland in the Midlands.	As above.
<i>Tricoryne elatior</i> yellow rushlily	v -	<i>Tricoryne elatior</i> occurs in native grassland, grassy woodland and forest.	Potential habitat marginally present (atypical of known sites). This species was not detected (no significant seasonal constraint on detection and/or identification).
<i>Veronica plebeia</i> trailing speedwell	r -	<i>Veronica plebeia</i> typically occurs in dry to damp sclerophyll forest dominated by <i>Eucalyptus amygdalina</i> on dolerite or Tertiary sediments, but can also occur in <i>Eucalyptus ovata</i> grassy woodland/forest and <i>Melaleuca ericifolia</i> swamp forest.	Potential habitat is widespread. This distinctive perennial herb was not detected (no significant seasonal constraint on detection and/or identification). Note that the somewhat superficially similar <i>Veronica calycina</i> was widespread.

Scientific name Common name	Status TSPA EPBCA	Tasmanian habitat description (and distribution)	Comments on project area and database records
<i>Wilsonia rotundifolia</i> roundleaf wilsonia	r -	<i>Wilsonia rotundifolia</i> is found in coastal and inland saltmarshes in the eastern part of the State.	Potential habitat is absent.
<i>Xanthorrhoea arenaria</i> sand grasstree	v VU # only	<i>Xanthorrhoea arenaria</i> is restricted to coastal areas from Bridport in the northeast to Coles Bay on the East Coast, where it occurs in coastal sandy heathland, extending into heathy woodland and forest, mainly dominated by <i>Eucalyptus amygdalina</i> .	Potential habitat is absent. This part of the State is outside the recognised range of the species. The single database record (26 Nov. 1982) would refer to <i>Xanthorrhoea bracteata</i> .
<i>Xanthorrhoea bracteata</i> shiny grasstree	v EN # only	<i>Xanthorrhoea bracteata</i> is restricted to coastal areas from the Asbestos Range to Waterhouse Point in the northeast, where it occurs in sandy soils, often acid and waterlogged, in coastal heathland, extending into heathy woodland and forest, mainly dominated by <i>Eucalyptus amygdalina</i> .	Potential habitat is absent.
<i>Xerochrysum palustre</i> swamp everlasting	v VU # only	<i>Xerochrysum palustre</i> has a scattered distribution with populations in the northeast, east coast, Central Highlands and Midlands, all below about 700 m elevation. It occurs in wetlands, grassy to sedgy wet heathlands and extends to associated heathy <i>Eucalyptus ovata</i> woodlands. Sites are usually inundated for part of the year.	Potential habitat is absent.

APPENDIX D. Analysis of database records of threatened fauna

Table D1 provides a listing of threatened fauna from within 5,000 m of the project area (nominal buffer width usually used to discuss the potential of a particular project area to support various species listed in databases), with comments on whether potential habitat is present for the species, and possible reasons why a species was not recorded.

Table D1. Threatened fauna records from 5,000 m of boundary of the project area

Species listed below are listed as rare (r), vulnerable (v), endangered (e), or extinct (x) on the Tasmanian *Threatened Species Protection Act 1995* (TSPA); vulnerable (VU), endangered (EN), critically endangered (CR) or extinct (EX) on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA). Information below is sourced from the DPIPWE's *Natural Values Atlas* (DPIPWE 2020), Bryant & Jackson (1999) and FPA (2020); marine, wholly pelagic and littoral species such as marine mammals, fish and offshore seabirds are excluded. Species marked with # are listed in CofA (2020).

Scientific name Common name	Status TSPA EPBCA	Tasmanian habitat description (and distribution)	Comments on study area and database records
<i>Accipiter novaehollandiae</i> grey goshawk	e -	Potential habitat is native forest with mature elements below 600 m altitude, particularly along watercourses. Significant habitat may be summarised as areas of wet forest, rainforest and damp forest patches in dry forest, with a relatively closed mature canopy, low stem density, and open understorey in close proximity to foraging habitat and a freshwater body (i.e. stream, river, lake, swamp, etc.).	Potential habitat present in the damp gullies and wet forest associated with watercourses. There are few sightings of the species in the vicinity of the project area but no known nest sites. The species is likely to be observed occasionally within the broader study area, but the project works should not deleteriously affect potential habitat.
<i>Alcedo azurea</i> subsp. <i>diemenensis</i> Tasmanian azure kingfisher	e EN # only	Potential foraging habitat is primarily freshwater (occasionally estuarine) waterbodies such as large rivers and streams with well-developed overhanging vegetation suitable for perching and water deep enough for dive-feeding. Potential breeding habitat is usually steep banks of large rivers (a breeding site is a hole (burrow) drilled in the bank).	Not listed in FPA (2020) or DPIPWE (2020). No database records within 5,000 m. Potential habitat absent (creeklines are flood-prone and/or ephemeral, rocky and with unsuitable banks for nesting). Wapstra et al. (2010) documented the distribution of the species in Tasmania, concluding that this part of the north coast supports a very low number of birds, with a low probability of breeding occurrences. Note that CofA (2020) lists the species as <i>Ceyx azureus</i> subsp. <i>diemenensis</i> .
<i>Antipodia chaostola</i> tax. <i>leucophaea</i> chaostola skipper	e EN #	Potential habitat is dry forest and woodland supporting <i>Gahnia radula</i> (usually on sandstone and other sedimentary rock types) or <i>Gahnia microstachya</i> (usually on granite based substrates).	Potential habitat absent as <i>Gahnia radula</i> was not recorded.
<i>Aquila audax</i> subsp. <i>fleayi</i> Tasmanian wedge-tailed eagle	e EN #	Potential habitat comprises potential nesting habitat and potential foraging habitat. Potential foraging habitat is a wide variety of forest (including areas subject to native forest silviculture) and non-forest habitats. Potential nesting habitat is tall eucalypt trees in large tracts (usually more than 10 ha) of eucalypt or mixed forest. Nest trees are usually amongst the largest in a locality. They are generally in	Potential nesting habitat present and there are three known nest sites to the south of the project area. These nests and recommendations are documented in ECOTas (2020a). Refer also to FINDINGS Fauna species Threatened fauna species recorded from the study area.

Scientific name Common name	Status TSPA EPBCA	Tasmanian habitat description (and distribution)	Comments on study area and database records
		sheltered positions on leeward slopes, between the lower and mid sections of a slope and with the top of the tree usually lower than the ground level of the top of the ridge, although in some parts of the State topographic shelter is not always a significant factor (e.g. parts of the northwest and Central Highlands). Nests are usually not constructed close to sources of disturbance and nests close to disturbance are less productive. More than one nest may occur within a territory but only one is used for breeding in any one year. Breeding failure often promotes a change of nest in the next year.	
<i>Astacopsis gouldi</i> giant freshwater crayfish	v VU #	Potential habitat is freshwater streams of all sizes. Characteristics of potential habitat include a combination of well-shaded flowing and still waters, deep pools, decaying logs and undercut banks. Riparian vegetation needs to be native and predominantly intact to provide shade, nutrient, energy and structural inputs into streams. Smaller juveniles inhabit shallow fast-flowing streams favouring habitats with rocks or logs that are large enough to be stable but not embedded in finer substrates, but overlie coarser substrates and/or have a distinct cavity underneath. Perennial headwater streams have substantially higher juvenile densities than non-perennial headwater streams.	Potential habitat absent.
<i>Botaurus poiciloptilus</i> Australasian bittern	- EN # only	Potential habitat is comprised of wetlands with tall dense vegetation, where it forages in still, shallow water up to 0.3 m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water. It favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and reeds (e.g. <i>Phragmites</i> , <i>Cyperus</i> , <i>Eleocharis</i> , <i>Juncus</i> , <i>Typha</i> , <i>Baumea</i> , <i>Bolboschoenus</i>) or cutting grass (<i>Gahnia</i>) growing over a muddy or peaty substrate (TSSC 2011).	Potential habitat absent.
<i>Dasyurus maculatus</i> subsp. <i>maculatus</i> spotted-tailed quoll	r VU #	Potential habitat is coastal scrub, riparian areas, rainforest, wet forest, damp forest, dry forest and blackwood swamp forest (mature and regrowth), particularly where structurally complex and steep rocky areas are present, and includes remnant patches in cleared agricultural land. Significant habitat is all potential denning habitat within the core range of the species. Potential denning habitat includes: (1) any forest remnant (>0.5 ha) in a cleared or	Potential habitat present. There are database records within and close to the general study area, usually representing sightings and/or roadkill record. No evidence of this species in the form of scats or den sites were found. The project works should not deleteriously affect potential habitat of this species.

Scientific name Common name	Status TSPA EPBCA	Tasmanian habitat description (and distribution)	Comments on study area and database records
		plantation landscape that is structurally complex (high canopy, with dense understorey and ground vegetation cover), free from the risk of inundation, or (2) a rock outcrop, rock crevice, rock pile, burrow with a small entrance, hollow logs, large piles of coarse woody debris and caves.	
<i>Dasyurus viverrinus</i> eastern quoll	- EN #	Potential habitat is a variety of habitats including rainforest, heathland, alpine areas and scrub. However, it seems to prefer dry forest and native grassland mosaics which are bounded by agricultural land.	As above.
<i>Engaeus granulatus</i> Central North burrowing crayfish	e EN	Potential habitat includes any poorly-drained habitats such as streams (of any class and disturbance history), seepages (e.g. springs in forest or pasture, outflows of farm dams), low-lying flat swampy areas and vegetation (e.g. buttongrass and heathy plains, marshy areas, boggy areas of pasture), drainage depressions, ditches (artificial and natural, including roadside ditches, pasture drains, etc.).	The project area is outside the range of this species (Richardson et al. 2008).
<i>Galaxiella pusilla</i> eastern dwarf galaxiid	v VU #	Potential habitat is slow-flowing and still waters such as swamps, shallow pools, lagoons, drains or backwaters of streams, often (but not always) with aquatic vegetation. It may also be found in temporary waters that dry up in summer for as long as 6-7 months, especially if burrowing crayfish burrows are present. Habitat may include forested swampy areas but does not include blackwood swamp forest.	Potential habitat is absent. The project area is well outside the accepted range of the species (no known sites in the Tamar River catchment).
<i>Haliaeetus leucogaster</i> white-bellied sea-eagle	v - #	Potential habitat comprises potential nesting habitat and potential foraging habitat. Potential foraging habitat is any large waterbody (including sea coasts, estuaries, wide rivers, lakes, impoundments and even large farm dams) supporting prey items (fish). Potential nesting habitat is tall eucalypt trees in large tracts (usually more than 10 ha) of eucalypt or mixed forest within 5 km of the coast (nearest coast including shores, bays, inlets and peninsulas), large rivers (class 1), lakes or complexes of large farm dams. Scattered trees along river banks or pasture land may also be used.	Potential nesting habitat absent and no known nests within 500 m or 1 km of the project area (nominal buffer widths often applied to management). Aerial surveys for wedge-tailed eagle nests failed to detect any nests of this species.
<i>Hirundapus caudacutus</i> white-throated needletail	- VU #	This species is mostly aerial, from heights of less than 1 m up to more than 1,000 m above the ground. Although they occur over most types of habitat, they are recorded most often above wooded areas, including open forest and rainforest.	Potential habitat present. However, as this species rarely lands or roosts (and does not breed) on the Australian migration, any proposal should not have a deleterious impact on the species.

Scientific name Common name	Status TSPA EPBCA	Tasmanian habitat description (and distribution)	Comments on study area and database records
<i>Lathamus discolor</i> swift parrot	e CR #	Potential habitat comprises potential foraging habitat and potential nesting habitat. Potential foraging habitat comprises <i>Eucalyptus globulus</i> (blue gum) or <i>Eucalyptus ovata</i> (black gum) trees that are old enough to flower. For management purposes, potential nesting habitat is considered to comprise eucalypt forests that contain hollow-bearing trees.	Potential foraging habitat likely to be highly localised to small patches of vegetation with <i>Eucalyptus ovata</i> (the project area is outside the natural range of <i>Eucalyptus globulus</i>). A narrow track through the understory of any such vegetation should not have a significant impact on potential foraging habitat of this species. There is potential nesting habitat present on ridges and upper slopes, although there are no confirmed nesting sites in the east and west Tamar region. Provided that hollow-bearing trees are avoided, a narrow track through the understory of any such vegetation should not have a significant impact on potential breeding of this species
<i>Limnodynastes peroni</i> striped marsh frog	e -	Potential habitat is natural and artificial coastal and near-coastal wetlands, lagoons, marshes, swamps and ponds (including dams), with permanent freshwater and abundant marginal, emergent and submerged aquatic vegetation.	Potential habitat absent (note that this part of the State does not support known sites of the species).
<i>Litoria raniformis</i> green and golden frog	v VU #	Potential habitat permanent and temporary waterbodies, usually with vegetation in or around them, including features such as natural lagoons, permanently or seasonally inundated swamps and wetlands, farm dams, irrigation channels, artificial water-holding sites such as old quarries, slow-flowing stretches of streams and rivers and drainage features.	Potential habitat absent.
<i>Myiagra cyanoleuca</i> satin flycatcher	Migratory Terrestrial Species # only	Potential habitat is any forest or woodland.	Potential habitat present. The installation of the tracks will not require the substantial alteration of native vegetation such there should be no deleterious impact on potential habitat.
<i>Perameles gunnii</i> subsp. <i>gunnii</i> eastern barred bandicoot	- VU #	Potential habitat is open vegetation types including woodlands and open forests with a grassy understorey, native and exotic grasslands, particularly in landscapes with a mosaic of agricultural land and remnant bushland. Significant habitat is dense tussock grass-sagg-sedge swards, piles of coarse woody debris and denser patches of low shrubs (especially those that are densely branched close to the ground providing shelter) within the core range of the species.	Potential habitat likely to be limited to the near-urban areas as the nearby slopes are more heavily forested on generally quite rocky ground. A narrow track through the understory of marginal potential habitat should not have a significant impact on this species.
<i>Prototroctes maraena</i> Australian grayling	v VU #	Potential habitat is all streams and rivers in their lower to middle reaches. Areas above permanent barriers (e.g. Prosser River dam, weirs) that prevent fish migration, are not potential habitat.	Potential habitat absent.

Scientific name Common name	Status TSPA EPBCA	Tasmanian habitat description (and distribution)	Comments on study area and database records
<i>Pseudemoia pagenstecheri</i> tussock skink	v -	Potential habitat is grassland and grassy woodland (including rough pasture with paddock trees), generally with a greater than 20% cover of native grass species, especially where medium to tall tussocks are present.	Potential habitat absent.
<i>Pseudemoia rawlinsoni</i> glossy grass skink	r -	Potential habitat is wetlands and swampy sites, including grassy wetlands, teatree swamps and grassy sedgelands, and margins of such habitat.	Potential habitat absent.
<i>Pseudomys novaehollandiae</i> New Holland mouse	e VU #	Potential habitat is heathlands (mainly dry heathlands but also where dry heathlands form a mosaic with other heathland, moorland and scrub complexes), heathy woodlands (i.e. eucalypt canopy cover 5-20%), <i>Allocasuarina</i> -dominated forests on sandy substrates (not dolerite or basalt), and vegetated sand dunes. Key indicator plant species include (but are not restricted to) <i>Aotus ericoides</i> , <i>Lepidosperma concavum</i> , <i>Hypolaena fastigiata</i> and <i>Xanthorrhoea</i> spp.	Potential habitat absent.
<i>Sarcophilus harrisii</i> Tasmanian devil	e EN #	Potential habitat is all terrestrial native habitats, forestry plantations and pasture. Devils require shelter (e.g. dense vegetation, hollow logs, burrows or caves) and hunting habitat (open understorey mixed with patches of dense vegetation) within their home range (427 km ²). Significant habitat is a patch of potential denning habitat where three or more entrances (large enough for a devil to pass through) may be found within 100 m of one another, and where no other potential denning habitat with three or more entrances may be found within a 1 km radius, being the approximate area of the smallest recorded devil home range. Potential denning habitat is areas of burrowable, well-drained soil, log piles or sheltered overhangs such as cliffs, rocky outcrops, knolls, caves and earth banks, free from risk of inundation and with at least one entrance through which a devil could pass.	See under spotted-tailed quoll.
<i>Tyto novaehollandiae</i> subsp. <i>castanops</i> Tasmanian masked owl	e VU #	Potential habitat is all areas with trees with large hollows (≥15 cm entrance diameter). In terms of using mapping layers, potential habitat is considered to be all areas with at least 20% mature eucalypt crown cover. Remnants and paddock trees (in any dry or wet forest type) in agricultural areas may constitute potential habitat. Significant habitat for the masked owl is any areas within the core range of native dry forest with trees over 100 cm dbh with large hollows (≥15 cm entrance diameter).	Potential habitat is widespread but specific habitat elements (e.g. roost or nest trees) requiring specific management consideration are limited. It is highly likely that a narrow track and shuttle road through the understorey can appropriately avoid all larger hollow-bearing trees such that the impact on potential habitat will be negligible.

APPENDIX E. DPIPWE's *Natural Values Atlas* report for the study area

Appended as pdf file.

APPENDIX F. Forest Practices Authority's *Biodiversity Values Atlas* report for the study area

Appended as pdf file.

APPENDIX G. CofA's *Protected Matters* report for the study area

Appended as pdf file.

ATTACHMENTS

- .shp file of revised vegetation mapping
- .shp file of point locations of threatened flora
- .shp file of point locations of weeds

ADDENDUM A. Trail 45

Preamble

Following presentation of the original report (unaltered preceding this addendum), a new trail was added to the project concept (Trail 45). As this area had not been specifically assessed with respect to its natural values, George Town Council further engaged ECOtas to undertake assessment and reporting on this new trail.

Assessment

Previous database interrogations remain valid and have not been re-run (except in so far as ECOtas maintains its GIS projects up-to-date with respect to records of threatened flora and fauna and TASVEG mapping).

A site assessment was undertaken by Brian French (ECOtas) on 8 September 2021, with the proposed route pre-uploaded to the iGIS application and also pre-flagged in the field prior to site assessment.

All other methods are as per the preceding report.

Findings

Vegetation types

The proposed route supports five TASVEG mapping units, as follows (Figure Add A-1a & A-1b):

- *Eucalyptus amygdalina* forest and woodland on dolerite (TASVEG code: DAD)

DAD occurs on dry insolated ridgelines mainly in the southern portion of the route. DAD ranges from having a shrubby understorey in drainage depressions to grassy and sedgy on sites with a high percentage of rock exposed including rockplate areas. This community was described in detail in ECOtas (2021)

- *Eucalyptus obliqua* dry forest (TASVEG code: DOB)

Dominates relatively moist upper slopes and gullies on fertile soils mainly in the eastern portion of the route. This community was described in detail in ECOtas (2021)

- *Eucalyptus amygdalina-Eucalyptus obliqua* damp sclerophyll forest (TASVEG code: DSC)

DSC is localised to a moist unnamed creekline at the convergence of Trail 16 and Trail 45. This community was described in detail in ECOtas (2021)

- *Allocasuarina verticillata* forest (TASVEG code: NAV)

The vegetation on the west-facing lower ridgeline slopes in the south of the route is dominated by NAV. These areas are generally very rocky and dry with very low vascular plant species diversity with the canopy entirely dominated by *Allocasuarina verticillata* (drooping sheoak).

- broad-leaf scrub (TASVEG code: SBR)

SBR is localised to a small unnamed drainage line in the south of the route. This area occurs as narrow band along the watercourse on the upper slopes of a ridge line. This site has had low fire frequency. This community is described below and in Appendix A-1.

Conservation value of identified vegetation types

None of the identified vegetation types equate to threatened ecological communities under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

SBR equates to *Notelaea – Pomaderris – Beyeria* forest, which is listed as threatened under Schedule 3A of the Tasmanian *Nature Conservation Act 2002* where it is a natural expression of the community i.e. not created anthropogenically by poor regeneration of a logged area, for example, rather a natural site that has escaped fire for a long period (generally protected gullies). SBR is relatively widespread, albeit usually restricted in extent, in the greater East Tamar area in the numerous steep-sided gullies of drainage systems that feed into the River Tamar. Within the project area, a small patch of SBR has been mapped along a short section of a drainage line (Figure Add A-1b). The proposed route will pass through this area, which will have a minimal impact on the community. A narrow bike track through the dense understorey is unlikely to open the canopy in any substantial manner such that the extent of SBR will not be reduced in any material sense.

In summary, no special management is recommended in relation to the vegetation types identified from the proposed Trail 45.

Threatened flora

Pimelea flava subsp. *flava* (yellow riceflower) had been previously identified from the project area by ECOtas (2021), and the present assessment identified further extensive populations (Figure Add A-2).

Refer to preceding report for detailed discussion of the management requirements of *Pimelea flava* subsp. *flava*. In summary, in this case, the species is locally abundant and is known to thrive on localised disturbance such as fire, colonising tracks, firebreaks and road verges, such that no special management is warranted. In this regard, *Pimelea flava* subsp. *flava* is either the dominant understorey shrub species or is common in the areas burnt in the 2006 fire event that burnt extensive areas of the Tippogoree Hills. The survey of Trail 45 found that the species was sparse or absent in areas not burnt in this fire event.

The species will need to be included in the permit application under Section 51 of the Tasmanian *Threatened Species Protection Act 1995* (preceding report details the administrative protocols). For the purposes of the permit application, it is suggested that 10s of plants of *Pimelea flava* subsp. *flava* be noted as likely to be “taken”.

Refer to preceding report for a discussion of the potential of the project area to support other species of threatened flora.

Threatened fauna

No additional issues to those discussed in preceding report noted.

Refer to Figure ADD A-3 for line-of-sight modelling for wedge-tailed eagle. The location of Trail 45 has been located to avoid direct line-of-sight from the three known nest sites, noting that RND #2221 & RND #1401 are lost (refer to preceding report for details on nest searches and findings).

Weeds

None recorded along the route of Trail 45. It should be noted that spanish heath (*Erica lusitanica*) is common along the vehicle tracks and rehabilitated dam area between the southern side of the trail and the East Tamar Highway. Any works crews accessing the trail from this point will need to ensure that all vehicles, machinery, tools and personnel clothing are cleaned prior to entering the trail at this point.

Refer to preceding report for management recommendations.

Plant disease

No symptoms of PC observed.

Refer to preceding report for management recommendations.

Animal disease

No significant freshwater features present within project area.

Refer to preceding report for management recommendations.

Recommendations

See preceding sections and ECOtas (2021), with particular attention to the **DISCUSSION Legislative and policy implications**.

Additional references

ECOtas (2021). *Natural Values Assessment of Proposed George Town Mountain Bike Trail Project, Tippogoree Hills East, George Town, Tasmania*. Report by Environmental Consulting Options Tasmania (ECOtas) for George Town Council, 25 October 2021.

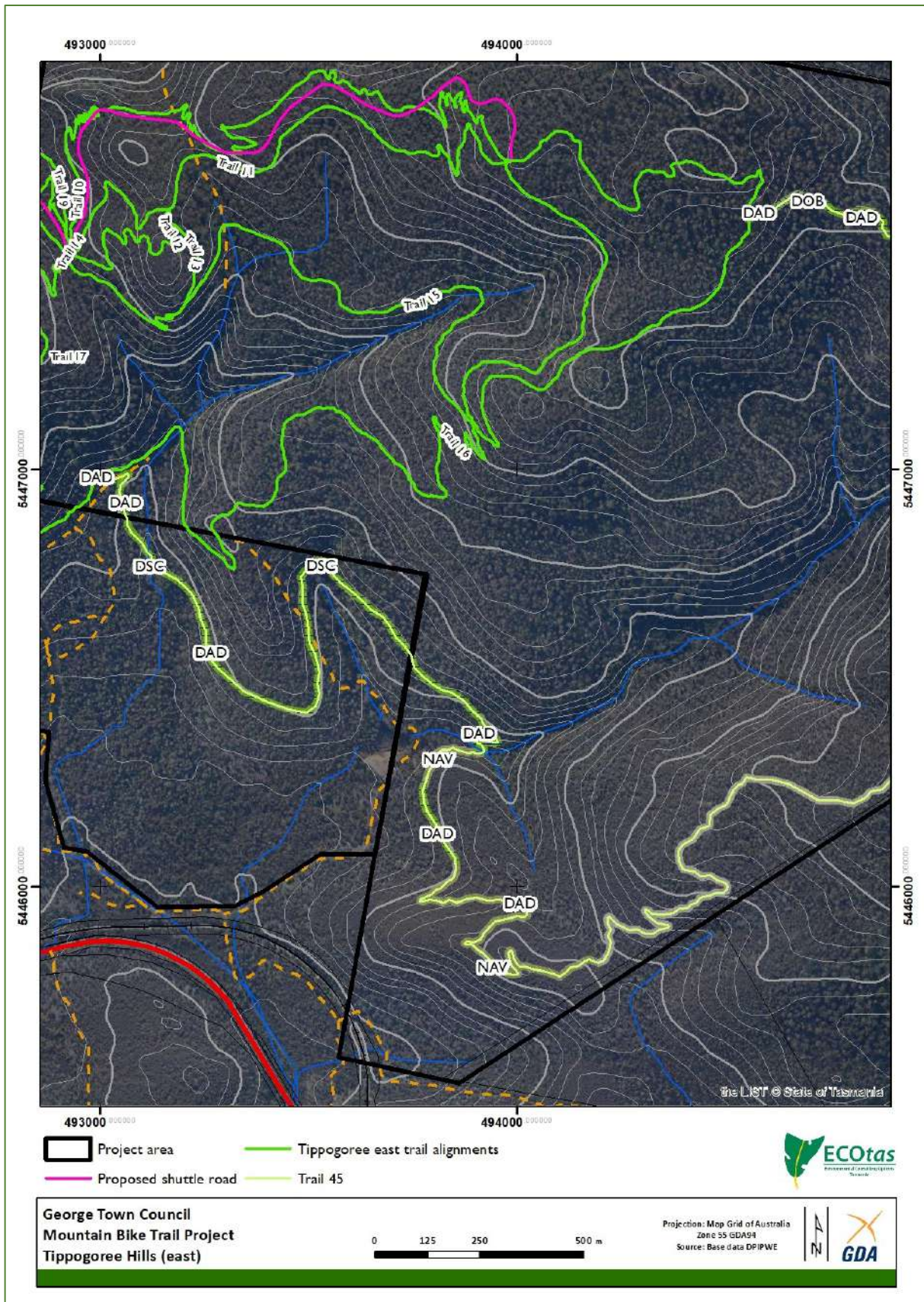


Figure Add A-1a. Vegetation types associated with proposed Trail 45 – west

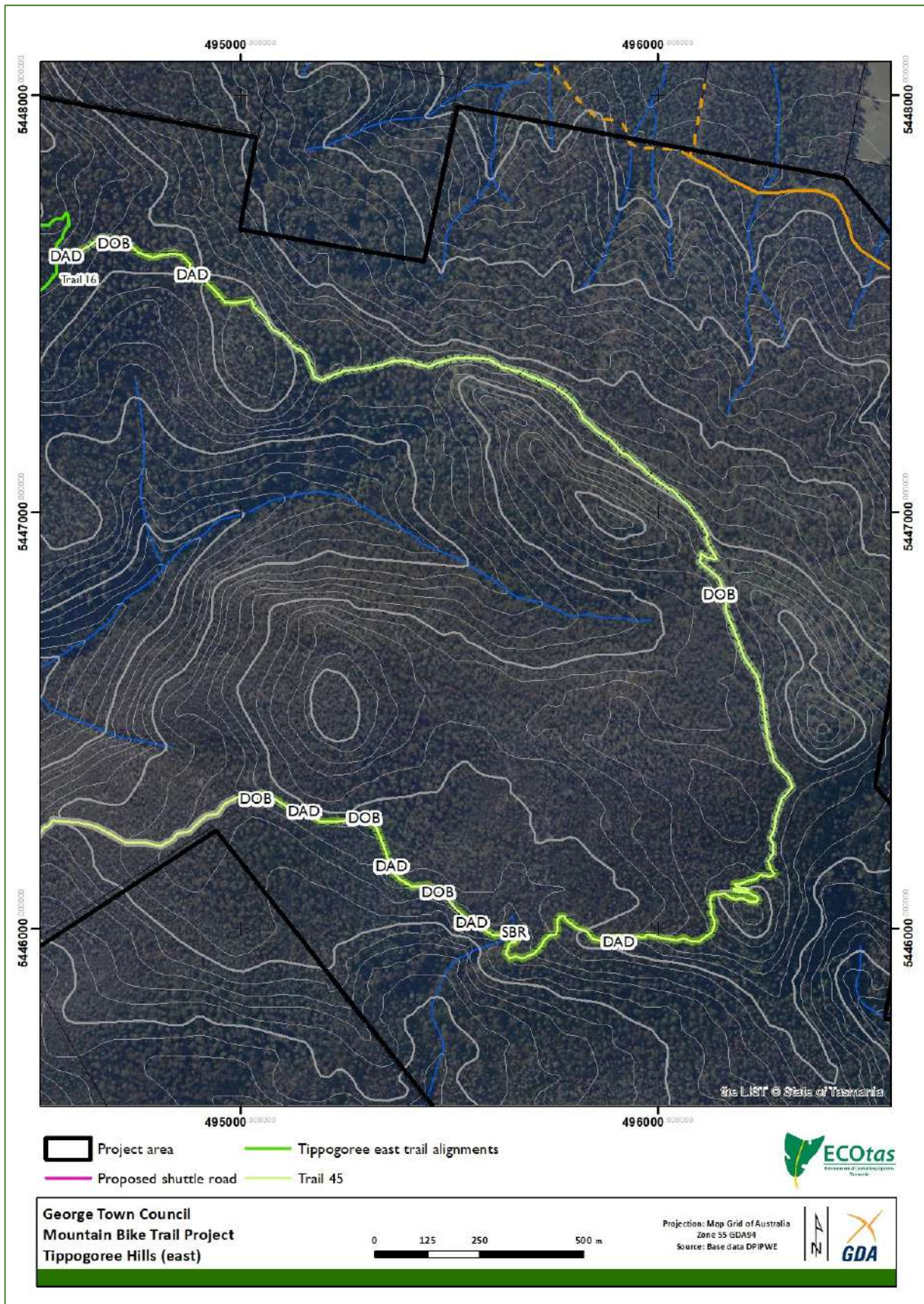


Figure Add A-1b. Vegetation types associated with proposed Trail 45 - east

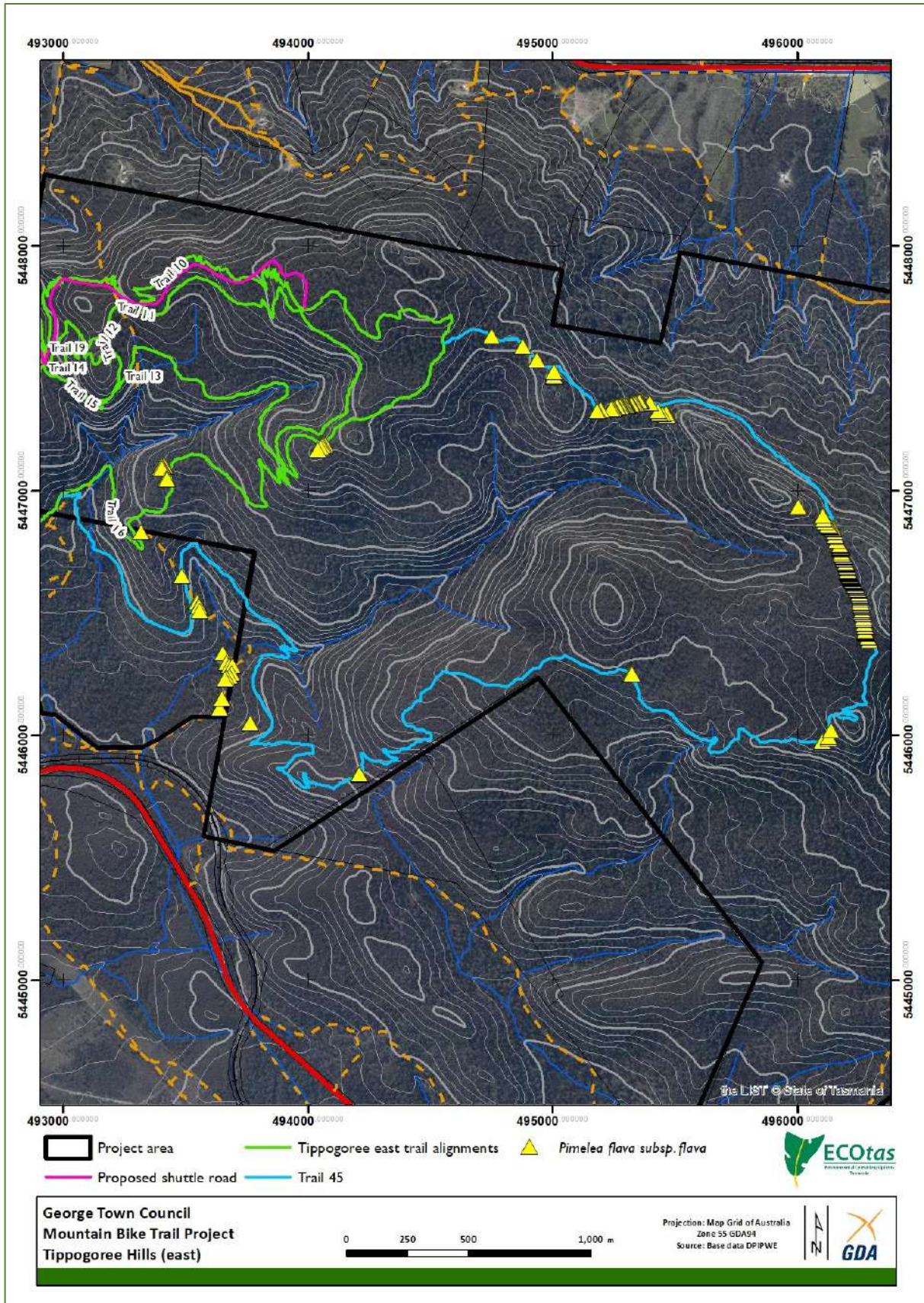


Figure Add A-2. Threatened flora associated with proposed Trail 45

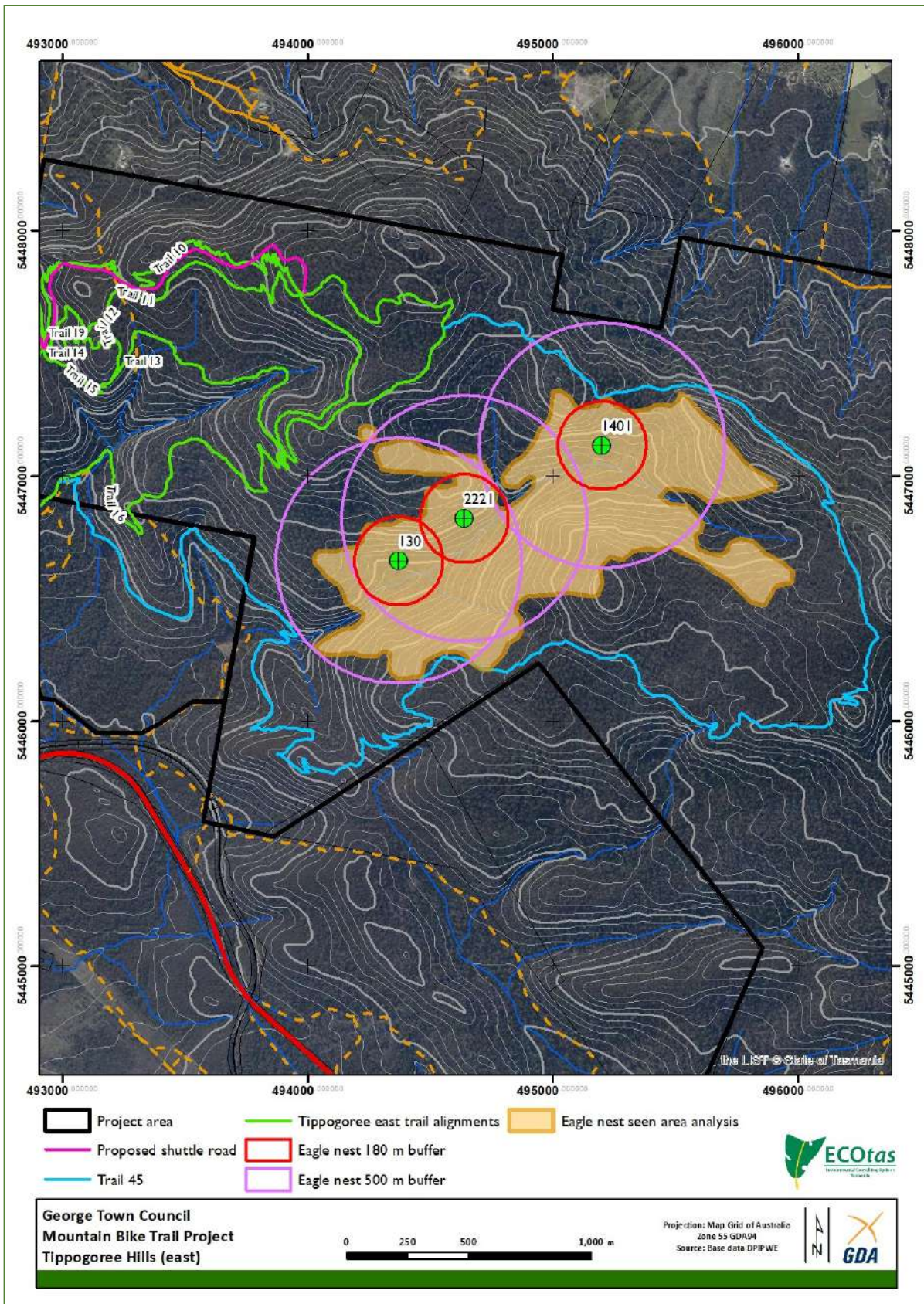


Figure Add A-3. Known wedge-tailed eagle nest locations relative to the project area, showing nest locations (noting #2221 & #1401 are lost) and line-of-sight modelling

APPENDIX A-1. Trail 45 – additional vegetation community structure and composition

The table below provides basic information on the structure and composition of the additional native vegetation mapping unit identified from the project area.

broad-leaf scrub (TASVEG code: SBR)

A patch of SBR was found associated with a drainage line in the southern section of the trail route. At this location, broad-leaf shrubs (predominantly *Pomaderris apetala*) form a tall dense canopy over scattered sedges and ground ferns. The eucalypt canopy is largely absent, reflecting a very long period without fire.

SBR is in excellent condition with no weeds or symptoms of PC noted.



Looking through the understorey of SBR

Stratum	Height (m) Cover (%)	Species (<u>underline</u> = dominant, parentheses = sparse or occasional)
Trees	15 m <5%	(<i>Eucalyptus viminalis</i>)
Low shrubs	1-4 (-6) m 70%	<i>Beyeria viscosa</i> , <i>Pomaderris apetala</i> , <i>Zieria arborescens</i> , <i>Bedfordia salicina</i> , <i>Coprosma quadrifida</i>
Graminoids/grasses	<5%	<i>Lepidosperma elatius</i>
Ground ferns	<1 m 10-20%	<i>Polystichum proliferum</i>
Epiphytic ferns	local	<i>Hymenophyllum cupressiforme</i>



Weed and Disease Management Plan:

Tippogoree Hills Trail Network

George Town Mountain Bike Trail Development

Prepared by

Peter Rickards | Project Manager | George Town Council

December 2021

Document Control

Amendment Record

Version	Date	Prepared / Amended By	Rationale
1	06/10/2020	Peter Rickards	Document created
2	19/10/2020	Peter Rickards	Reviewed by author
3	11/12/2020	Peter Rickards	Reviewed and updated by author
4	04/02/2021	Peter Rickards	Reviewed and updated by author
5	07/04/2021	Peter Rickards	Reviewed and updated by author
6	20/12/2021	Peter Rickards	Reviewed and updated by author

Contents

Document Control	2
Glossary	1
1.0 Introduction	2
1.1 Purpose and Scope.....	2
1.2 Background, Aims and Objectives.....	2
1.3 Site Description and Location	2
2.0 Legislation, Strategies and Plans	6
3.0 Existing and Potential Weed and Disease Issues.....	7
3.1 General Vegetation	7
3.2 Recorded Weed Species.....	8
3.3 Recorded Diseases or Symptoms.....	10
4.0 Identify Management Priorities	11
4.1 Weed Management Zones.....	12
5.0 Management and Control of Weeds and Diseases	21
5.1 Construction Activities	21
5.2 Operational Maintenance.....	23
5.3 Public Usage	24
5.4 Weed Control Techniques.....	25
5.5 Specific Management of Spanish Heath (Erica Lusitanica)	26
6.0 Communication and Reporting.....	27
6.1 Construction Activities	27
6.2 Operational Maintenance	27
6.3 Public Usage	27
7.0 Monitoring	28
7.1 Weed Inspections.....	28
7.2 Maintenance Personnel	29
8.0 Conclusion	30
Appendices.....	31

Appendix A: Weed and Disease Hygiene Washdown Planning Manuals Links 31

Appendix B: Hygiene Protocols for Vehicles and Heavy Machinery..... 32

Appendix C: Inspection and Washdown Checklists 35

Appendix D: Ride Clean Collateral (NRM South)..... 42

Appendix E: Weed Control Techniques 46

Appendix F: Weed Inspection Record Sheet (Draft) (also in the Trail Maintenance Plan)..... 49

Appendix G: Generic CEMP (Construction and Environmental Management Plan) 50

Appendix H: Herbicides for Weed Control..... 1

Glossary

Abbreviations	Definitions
CEMP	Construction and Environmental Management Plan
DPIPWE	Department of Primary, Industries, Water and Environment
EPA	Environment Protection Agency
EPBCA	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
ECOtas	Environmental Consulting Options Tasmania
GTC	George Town Council
LIST	Land Information System Tasmania
NVA	DPIPWE's Natural Values Atlas
TSPA	Tasmanian Threatened Species Protection Act 1995
WoNS	Weed of National Significance
WDMP	Weed and Disease Management Plan

1.0 Introduction

1.1 Purpose and Scope






This Weed and Disease Management Plan (WDMP) outlines the weeds present within the project area, and recommends management treatments under the relevant legislation during both the construction phase and operational phase of the George Town Mountain Bike Trail Development.

This WDMP is specifically the Tippogoree Hills Trail Network area.

1.2 Background, Aims and Objectives

This WDMP details the methodology for mitigating risks and managing impacts associated with the presence, emergence and spread of weeds for the project construction period and into the operational period.

In both cases, the objectives of this WDMP are to: -

-  Record the presence and distribution of weeds declared under the Weed Management Act 1999;
-  Record the presence and distribution of significant, non-declared, environmental weed species;
-  Record the presence and presence and distribution of pathogens;
-  Provide control measures for identified weeds and pathogens and prevent new weeds and pathogens from establishing and spreading
-  Establish an ongoing monitoring and control program for weeds and pathogens into the future for the site.

1.3 Site Description and Location

Trail Alignments

The Tippogoree Hills Network design offers approximately 46.3km over 35 trails with an average width ranging between of 1-2m, with a mix of trail build styles and difficulty ratings, catering for a wide range of users.

The primary access point (commonly referred as a trail head) will be located Lauriston Park on the corner of East Tamar Highway and Bridport Road. The trail head will provide carparking for approximately 40-60 vehicles, and include an information board displaying maps, code of conduct, emergency contact details, advance notice of trail closures, and importantly, information to educate users about bicycle cleanliness and weed hygiene awareness. Lauriston Park has also been assessed for the presence of weeds species.

Lauriston Park is already a publicly accessible recreational space with vehicular access, although no other facilities or infrastructure exists.

The network will also be accessible via a service access road from Bridport Road, which will be gated, locked, and only accessible by a small number of maintenance vehicles and commercial shuttle service operators.

A map of the trail network layout can be seen on the next, followed by a summary of the trail breakdown.

Image 1: Tippetoree Hills Trail Network

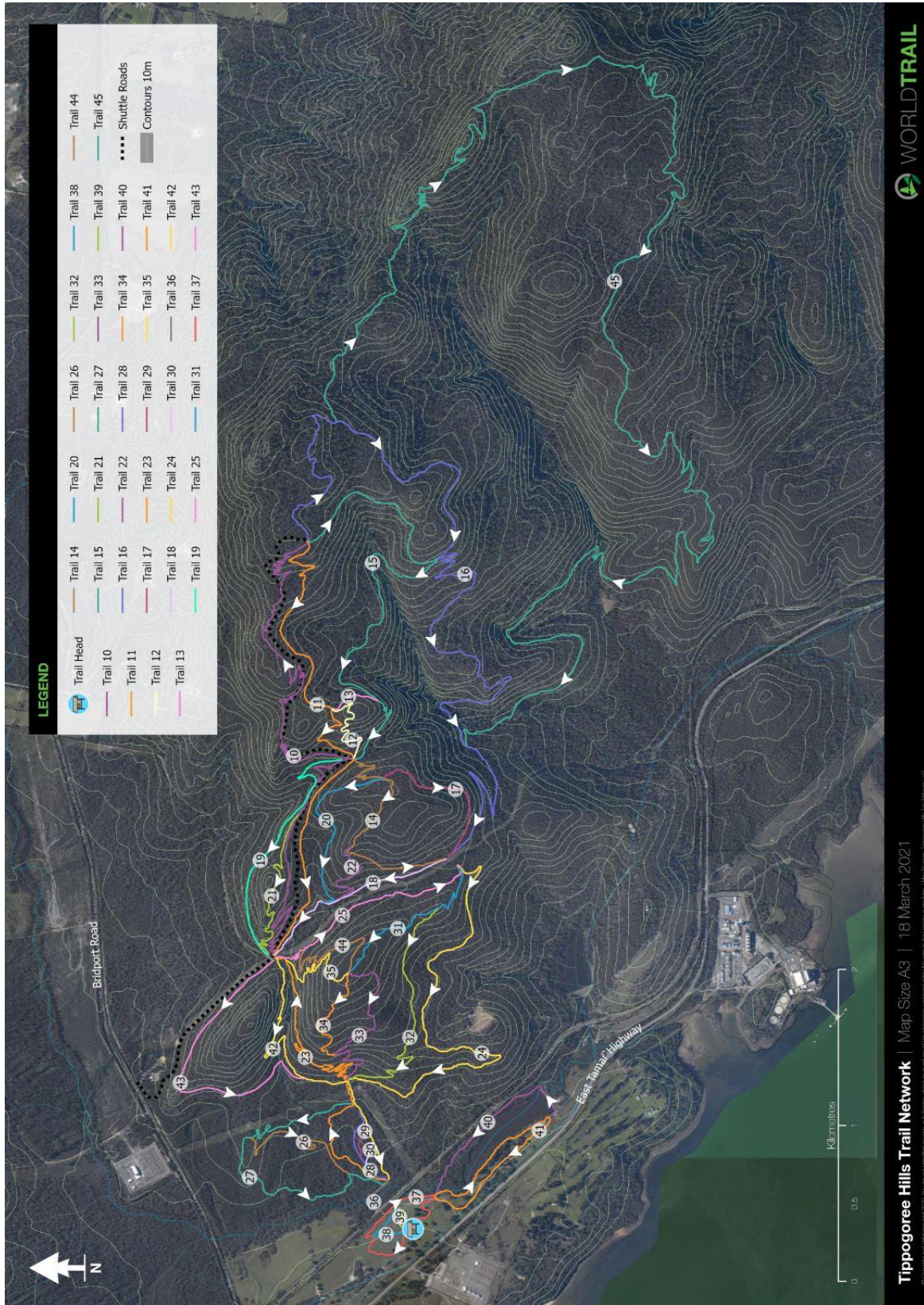


Table 1: Trail Summary Breakdown

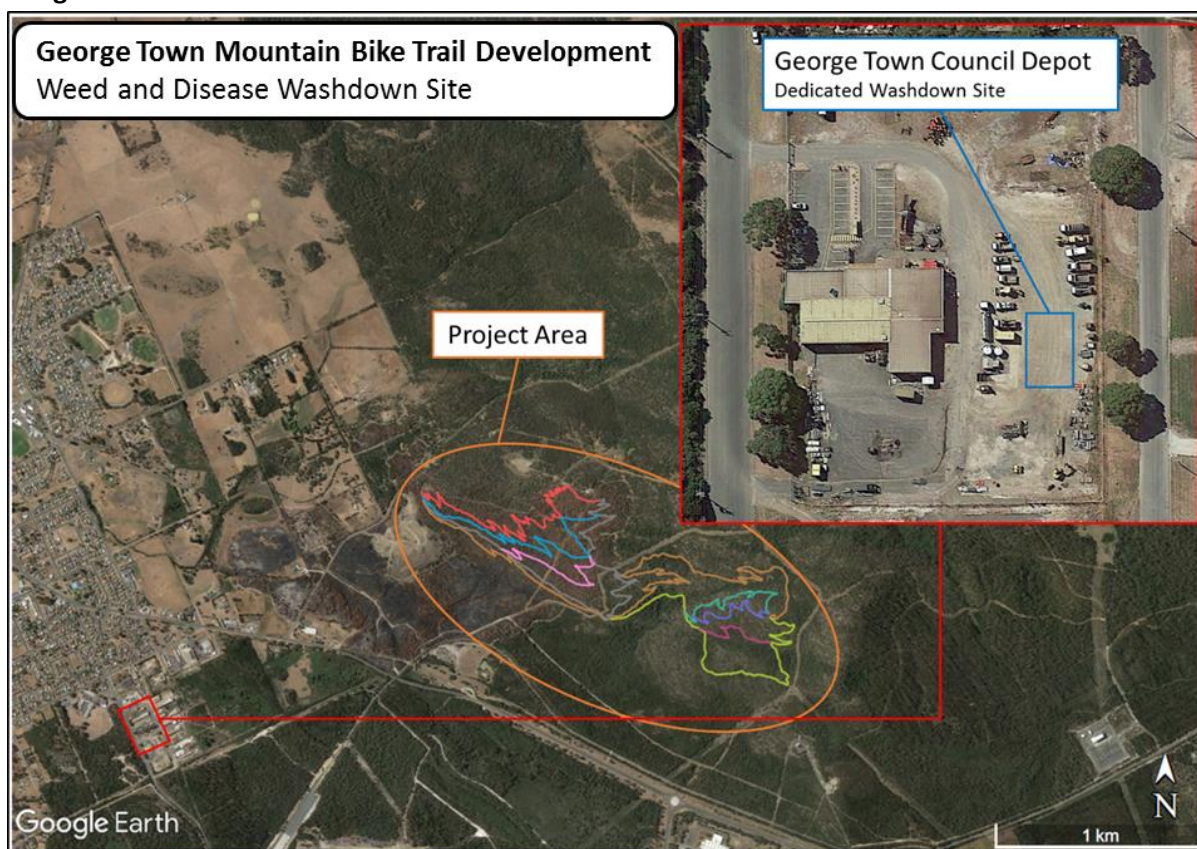
Trail No.	Type	Difficulty Rating	Trail Style	Length (m)
Trail 10	MTB Trail	Easy	Adventure	4278
Trail 11	MTB Trail	Intermediate	Airflow	2830
Trail 12	MTB Trail	Intermediate / Difficult	Airflow	639
Trail 13	MTB Trail	Intermediate / Difficult	Gravity	261
Trail 14	MTB Trail	Intermediate	Adventure	1426
Trail 15	MTB Trail	Intermediate	Gravity	2854
Trail 16	MTB Trail	Easy	Adventure	5632
Trail 17	MTB Trail	Intermediate	Airflow	801
Trail 18	MTB Trail	Easy / Intermediate	Airflow	1017
Trail 19	MTB Trail	Easy / Intermediate	Airflow	1335
Trail 20	MTB Trail	Easy / Intermediate	Airflow	947
Trail 21	MTB Trail	Easy / Intermediate	Airflow	1011
Trail 22	MTB Trail	Easy / Intermediate	Airflow	501
Trail 23	MTB Trail	Intermediate	Adventure	2219
Trail 24	MTB Trail	Easy / Intermediate	Gravity	2997
Trail 25	MTB Trail	Easy / Intermediate	Adventure	1187
Trail 26	MTB Trail	Easy	Adventure	834
Trail 27	MTB Trail	Easy / Intermediate	Gravity	1831
Trail 28	MTB Trail	Easy / Intermediate	Gravity	432
Trail 29	MTB Trail	Intermediate	Gravity	160
Trail 30	MTB Trail	Intermediate	Gravity	114
Trail 31	MTB Trail	Intermediate	Adventure	981
Trail 32	MTB Trail	Intermediate	Adventure	1368
Trail 33	MTB Trail	Intermediate / Difficult	Gravity	1068
Trail 34	MTB Trail	Difficult	Gravity	648
Trail 35	MTB Trail	Difficult	Gravity	716
Trail 36	MTB Trail	Easy / Intermediate	Pathway	481
Trail 37	MTB Trail	Easy	Airflow	1144
Trail 38	MTB Trail	Easy / Intermediate	Airflow	386
Trail 39	MTB Trail	Easy / Intermediate	Airflow	186
Trail 40	Shared-use	Easy / Intermediate	Adventure	982
Trail 41	Shared-use	Very Easy	Pathway	1543
Trail 42	MTB Trail	Intermediate / Difficult	Gravity	1178
Trail 43	MTB Trail	Easy	Airflow	1538
Trail 44	MTB Trail	Difficult	Adventure	803
Trail 45	MTB Trail	Easy / Intermediate	Wilderness	10835
TOTAL				57307

Vehicle and Machinery Washdown Site

An existing dedicated washdown site is located at the George Town Council Depot. The site is in a clear and open location on a concrete pad, has access to high-pressure washing facilities, and serviced by a compliant mains drainage system. This site is to be used as the washdown site for the duration of the project when vehicles and machinery are moving between sites with known weeds and diseases present. Before the project commences, all vehicle and machinery require pre-construction washdown at a commercial cleaning facility, or to the satisfaction of council.

A map showing the location of the dedicated washdown facility in relation to the project area can be seen below.

Image 2: Weed and Disease Washdown Site



A temporary washdown site may be installed on the main firebreak which dissects the project area to avoid moving vehicles in and out of the site too frequently, which in itself can increase the potential of weeds spreading into weed free areas. The need for this will be determined through discussion with landowners.

2.0 Legislation, Strategies and Plans

This report has been prepared with consideration given to the following legislation, and guiding strategies and plans in the table below.

Table 2: Supporting/Guiding Documentation

Document	Application
Tasmanian Weed Management Act 1999	This Act is the primary legislation relating to declared weeds in Tasmania.
Statutory Weed Management Plan: Blackberry	Outlines the legal responsibilities of landholders and other stakeholders in dealing with Blackberry.
Statutory Weed Management Plan: Gorse	Outlines the legal responsibilities of landholders and other stakeholders in dealing with Gorse.
Statutory Weed Management Plan: Erica	Outlines the legal responsibilities of landholders and other stakeholders in dealing with Erica species. (document under review and not currently available)
Weed and Disease Planning and Hygiene Guidelines (DPIPWE 2015)	The present WDMP is structured on this set of guidelines.
Keeping it Clean – A Tasmanian Field Hygiene Manual to Prevent the Spread of Freshwater Pests and Pathogens (Allan & Gartenstein 2010)	Provides guidance on hygiene management and to reduce the risk of spreading environmental diseases.
Washdown Procedures for Weed and Disease Control. Edition 1. (DPIPWE 2004)	Guidelines for washdown and its application where codes of practice or environmental management plans are not in place.
Interim Phytophthora Cinnamomi Management Guidelines. (DPIPWE 2005)	Advice on the management of Phytophthora cinnamomi in Tasmania.
Ride Clean – Information Sheet by Tasmanian NRM regions	Wash your bike every time you ride it information sheet provides a guide on the way to keep your bike and equipment clean.
Natural Values Assessment of Mountain Bike Trail Project, Upper Tippgoree Hills, George Town (ECOtas)	Provides an overview of the ecological (natural values) issues identified from the upper Tippgoree Hills project area.
George Town Mountain Bike Trail - Trail Maintenance Plan	Provides details of the Maintenance activities and timing of these activities of the trail network once operational.
George Town Mountain Bike Trails: Construction and Environmental Management Plan	Prepared by World Trail to guide construction activities associated with the construction of the George Town Mountain Bike Trails to minimise impacts to the environment and ensure compliance with all permits, approvals and legislative requirements.
Declared Weeds Index: Blackberry (DPIPWE)	Guiding information and useful links for Blackberry. (https://dripwe.tas.gov.au/invasive-species/weeds/weeds-index/declared-weeds-index/blackberry)
Declared Weeds Index: Gorse (DPIPWE)	Guiding information and useful links for Gorse. (https://dripwe.tas.gov.au/invasive-species/weeds/weeds-index/declared-weeds-index/gorse)
Declared Weeds Index: Erica (DPIPWE)	Guiding information and useful links for Erica species. (https://dripwe.tas.gov.au/invasive-species/weeds/weeds-index/declared-weeds-index/erica)

3.0 Existing and Potential Weed and Disease Issues

Weeds, diseases and other pests have the potential to establish and/or spread across the project site during construction. Increased weed colonisation can impact on the ecological values of vegetation through displacement of native species and degradation of fauna habitat.

The primary activities associated with the construction and operation of mountain bike trail networks at risk of introducing or spreading weeds and diseases are: -

- ✦ During construction and maintenance works where vehicles, machinery, equipment, and clothing and shoes of personnel, carrying soil or plant materials and freshwater water which may be contaminated;
- ✦ Imported construction and maintenance materials that may be contaminated (soil, sand, and gravel or others, including water); and
- ✦ Trail users and their bikes spreading weeds or diseases along the trail networks or introducing them once the trail network is operational.

Parts of the land in which the trails are being constructed has been illegally accessed for many years by other users for the purposes of rubbish dumping, wood collecting, four-wheel driving, and trail bike riding. This illegal use of the land may have already negatively impacted on the environmental values. Council cannot be held solely responsible for the potential weed and disease risks associated with these external and illegal uses.

Additionally, several easements exist, neighbour, and dissect the trail network, some of which have heavy infestations of weeds and present a greater risk of spreading into the project area (and in some cases already have).

3.1 General Vegetation

A natural values assessment was undertaken by ECOtas on the project area, which was found to support the following TASVEG mapping units: -

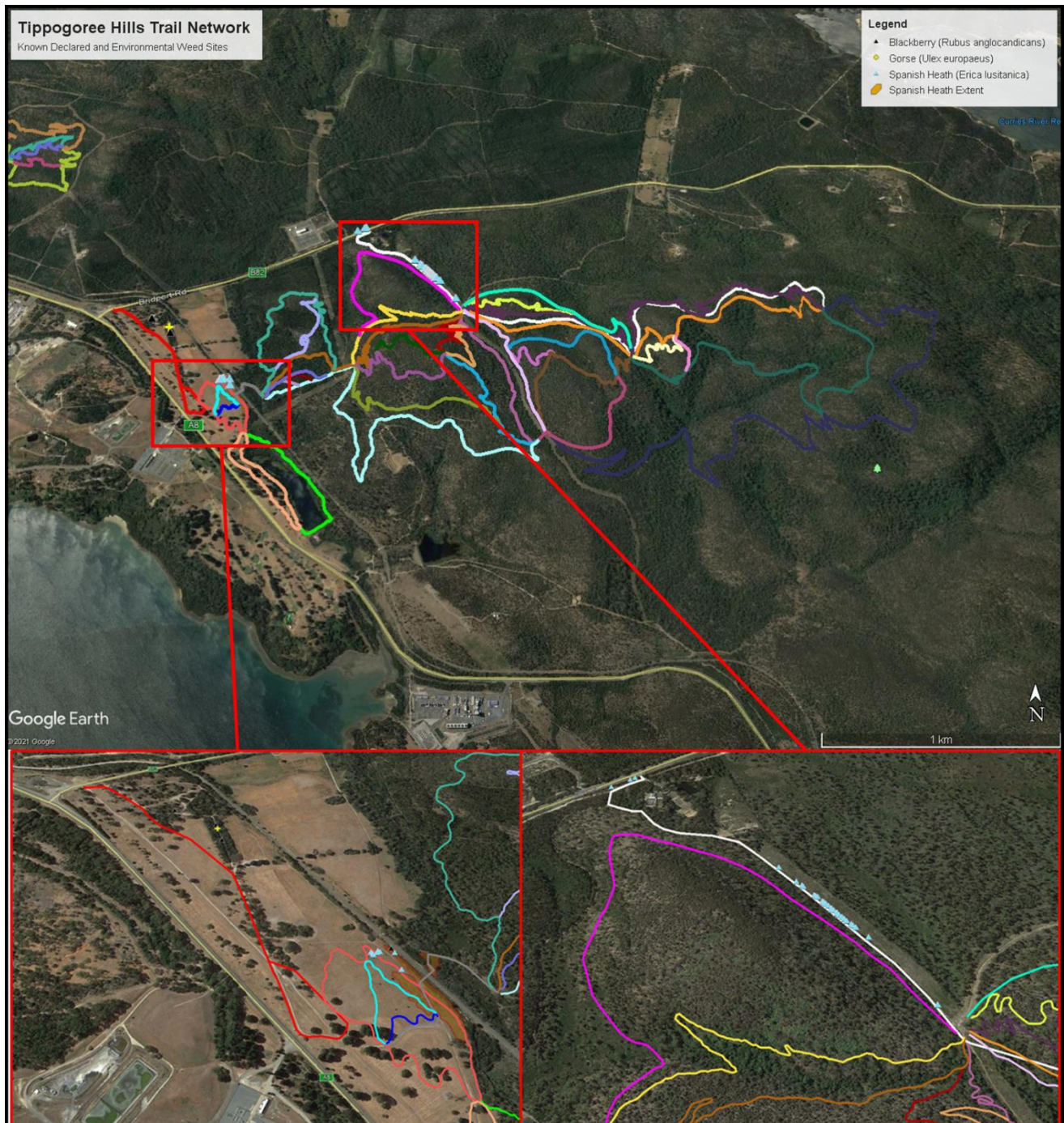
- ✦ Eucalyptus amygdalina forest and woodland on dolerite (TASVEG code: DAD);
- ✦ Eucalyptus obliqua dry forest (TASVEG code: DOB);
- ✦ Eucalyptus ovata forest and woodland (TASVEG code: DOV);
- ✦ Eucalyptus amygdalina-Eucalyptus obliqua damp sclerophyll forest (TASVEG code: DSC);
- ✦ Eucalyptus obliqua forest with broad-leaf shrubs (TASVEG code: WOB);
- ✦ Allocasuarina verticillata forest (TASVEG code: NAV);
- ✦ Bursaria-Acacia woodland and scrub (TASVEG code: NBA);
- ✦ Melaleuca ericifolia swamp forest (TASVEG code: NME);
- ✦ Broad-leaf scrub (TASVEG code: SBR);
- ✦ Extra-urban miscellaneous (TASVEG code: FUM);
- ✦ Permanent easements (TASVEG code: FPE);
- ✦ Plantations for silviculture-hardwood (TASVEG code: FPH);
- ✦ Unverified plantations for silviculture (TASVEG code: FPU);
- ✦ Weed infestation (TASVEG code: FWU); and
- ✦ Water, sea (TASVEG code: OAQ).

3.2 Recorded Weed Species

The natural values assessment undertaken by ECOtas on the project area included the identification and recording of declared and environmental weed species.

The map below indicates the locations of weed species observed in the project area.

Image 3: Known Declared and Environmental Weed Sites



3.2.1 Declared Weeds

Declared weeds in Tasmania are plants that have been declared under the Weed Management Act 1999. The legislation requires that these species be contained or eradicated according to the relevant statutory management plan.

Three plant species classified as declared weeds within the meaning of the Tasmanian Weed Management Act 1999 were detected from within and adjacent to the project area and have been listed in the table below.

Table 3: Existing Declared Weeds

Declared Weeds	Notes
Blackberry (<i>Rubus anglocandican</i>)	Isolated occurrences near the proposed trail head access road.
Gorse (<i>Ulex europaeus</i>)	Isolated occurrences at proposed trail head and along trail corridor.
Spanish Heath (<i>Erica lusitanica</i>)	Widespread infestations through the municipality along roadsides.

3.2.2 Environmental Weeds

Although many common weeds are not listed under legislation and are therefore not legally required to be controlled, they have the potential to pose a threat to the ecological and agricultural assets present in the project area, and interfere with different stages of the development.

No non-declared and potentially invasive environmental weed was detected within the project area, and have been listed in the table below.

Table 4: Existing Environmental Weeds

Environmental Weeds	Notes
N/A	None found

3.2.3 Weeds of National Significance

Weeds of National Significance (WoNS) are a list of the most problematic plant species found in Australia based on an assessment on their invasiveness, potential for spread and environmental, social and economic impacts

One WoNS detected within the project area although only in small occurrences, and has been listed in the table below.

Table 5: Existing Weeds of National Significance

Weeds of National Significance	Notes
Blackberry (<i>Rubus anglocandican</i>)	Isolated occurrences near the proposed trail head access road

3.2.4 High-Alert Weeds

High-alert weeds is in an internally referenced title applicable to the project, and refers to declared weeds that, whilst are not located within the project area, have infestations occurring throughout the municipality. A summary of deemed high-alert weeds has been provided in the table below.

Table 6: Existing High-Alert Weeds

High-Alert Weeds	Notes
All other declared weeds species	No occurrences within the project area, but some infestations occur in other parts of the municipality.

3.3 Recorded Diseases or Symptoms

No disease, pathogens or recorded symptoms were observed within the project area, a summary of which has been provided in the table below.

Table 7: Diseases and Pathogens the Area Was Assessed For

Recorded Diseases / Symptoms	Notes
<i>Phytophthora cinnamomi</i>	Vegetation types in the study area not recognised as being susceptible to <i>Phytophthora cinnamomica</i> , and no evidence of the pathogen was observed. No special management is recommended although weed hygiene measures for construction and maintenance should be implemented.
<i>Myrtle wilt</i>	Only affects <i>Nothofagus cunninghamii</i> , which is entirely absent from the project area. No special management is required.
<i>Myrtle rust</i>	No myrtle rust was noted. No special management required.
<i>Chytrid fungal disease</i>	The project area not known to support frog chytrid disease and there is limited potential habitat for amphibian species within the project footprint (generally very well-drained terrain).

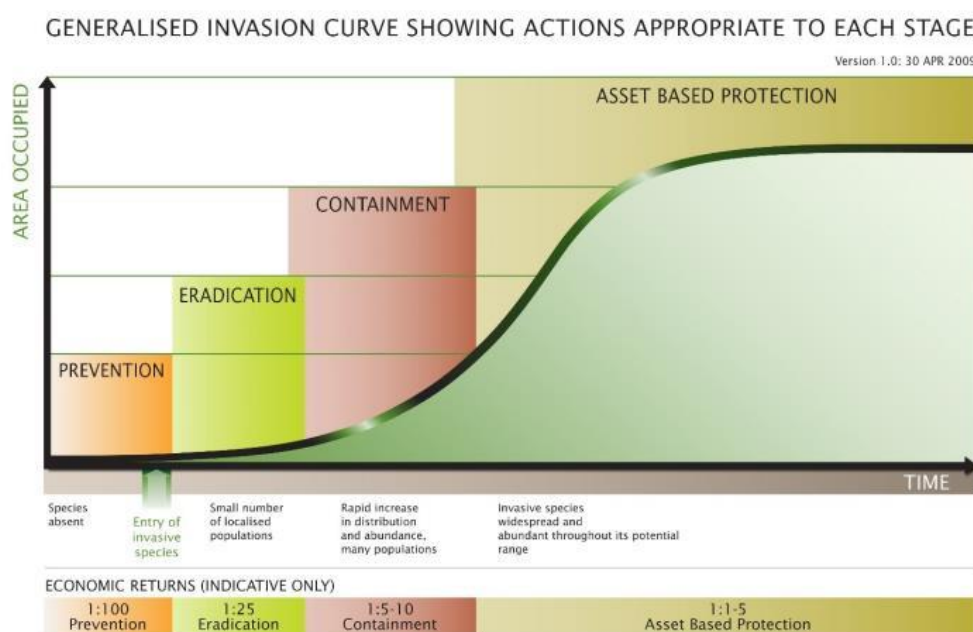
4.0 Identify Management Priorities

The primary principle for all activities during construction and operation of the trail network is to: -

- 🌿 Prevent the spread of existing declared and environmental weeds and diseases;
- 🌿 Control of existing declared and environmental weeds within the project area; and
- 🌿 Prevent the introduction of new weeds and diseases into the project area.

Depending on the degree and rate of weed and disease infestation, a different management priority has been assigned to each weed species noted within the project area. The four management strategies are defined as: Prevention; Eradication; Containment; and Asset Based Protection. The degree of weed and disease infestation that triggers each management strategy can be seen in the image below.

Image 4: Management Strategies in Relation Weed Occurrences (Source: www.dpipwe.tas.gov.au)



The four management strategies have been detailed in the table below.

Table 8: Weed Management Strategies

Management Strategy	Details
Prevention	Most cost-effective form of weed control as weeds are absent and monitoring is the control method
Eradication	Most cost-effective form of weed control for a new introduction of weed species and where weeds are present in small numbers of localised populations. Once eradicated, prevention is the ongoing control method.
Containment	Most appropriate control method to manage the impacts of a rapidly increasing or abundant weed species infestation at risk of spreading into weed free areas.
Asset Based Protection	Most appropriate control method when a weed is widespread and abundant.

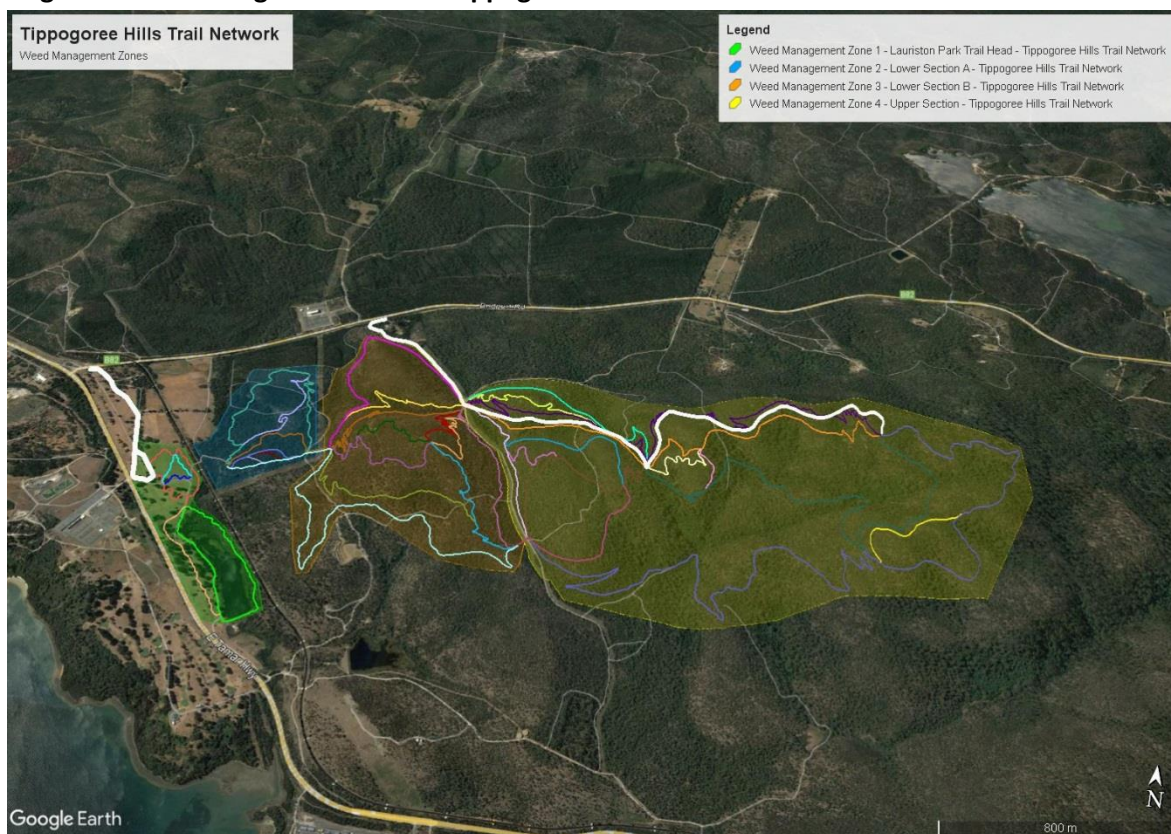
4.1 Weed Management Zones

For the purpose of weed management, the Tippogoree Hills Trail Network has been segregated into four separate weed management zones: -

- 🌿 Weed Management Zone 1 - incorporates the trails, the access road, and the carparking area within the zone, with active weed management strategies applicable to an area of 10m either side of the trail and road centreline, and a 20m perimeter of the carparking and trail head area;
- 🌿 Weed Management Zone 2 - incorporates the trails within the zone, with active weed management strategies applicable to an area of 10m either side of the trail centreline. The zone also included the 20m trail corridor where it crosses the rail line easement, although additional approvals are required before active weed management strategies can occur within the easement;
- 🌿 Weed Management Zone 3 - incorporates the trails within the zone, with active weed management strategies applicable to an area of 10m either side of the trail centreline. The zone also included the 20m trail corridor where it crosses the Basslink transmission tower easement, although additional approvals are required before active weed management strategies can occur within the easement.
- 🌿 Weed Management Zone 4 - incorporates the trails, and the service access road within the zone, with active weed management strategies applicable to an area of 10m either side of the trail and road centreline.

A map indicating the weed management zones is provided in the image below.

Image 5: Weed Management Zones - Tippogoree Hills Trail Network



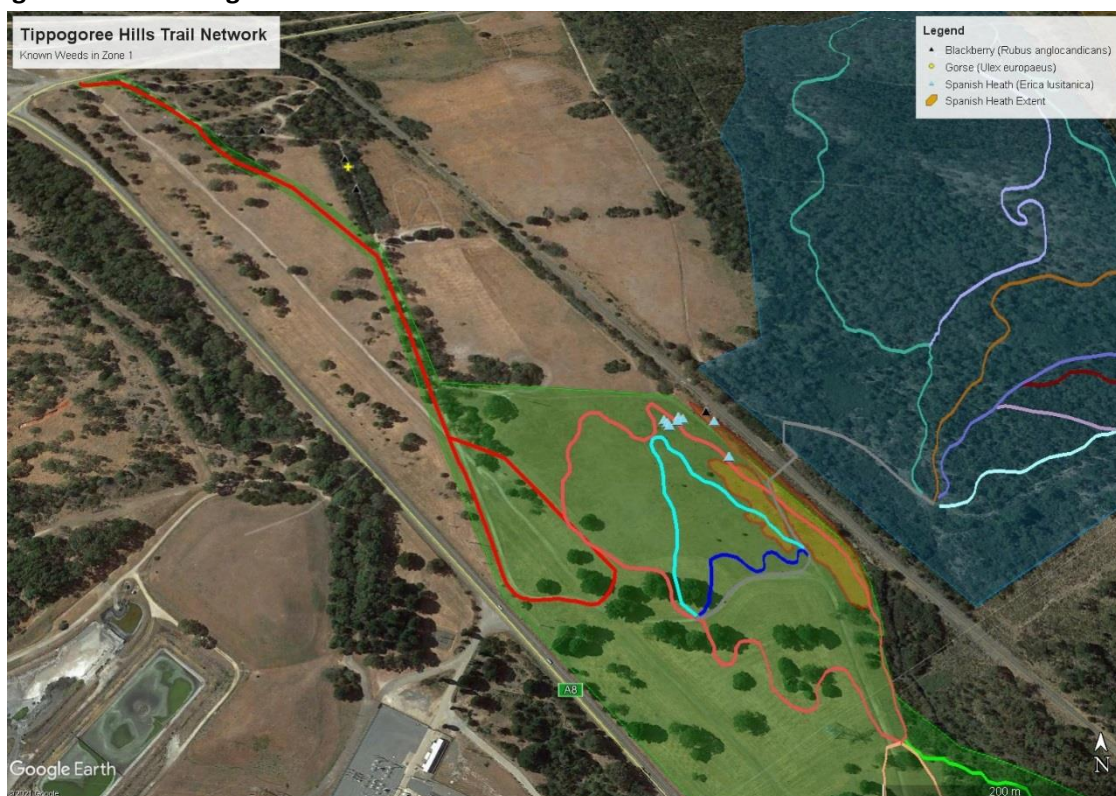
In the following sections, each Weed Management Zone within the Tippogoree Hills Trail Network has been detailed with the weeds present, prescribed management strategy, and determined priority. Specific weed and site management controls will be further detailed in section 5.0.

4.1.1 Management Zone 1 - Lauriston Park Trail Head

Weed Management Zone 1 incorporates the trails, the access road, and the carparking area within the zone, with active weed management strategies applicable to an area of 10m either side of the trail and road centreline, and a 20m perimeter of the carparking and trail head area. It is the only zone where public vehicular access is possible, and where users other than those using the trail network can interact with the trail network infrastructure.

A map of Weed Management Zone 1 and the weeds contained within the zone boundaries can be seen in the image below.

Image 6: Weed Management Zone 1 - Lauriston Park Trail Head



Weed Management Zone 1 contains three identified weed species within the project area. The zone represents the primary access point for users of the mountain bike trails, and therefore presents as a higher risk area for the introduction of weeds to weed free areas. It is worth noting that not all users accessing Lauriston Park will also be accessing the trail network.

The zone neighbours the railway easement for the Bell Bay Rail Line, owned and managed by TasRail, which contains a very heavy infestation of weed species which appear to have spread into the project area.

A list of the weeds identified within the area are listed in the table on the next page, along with statutory management requirements (if applicable), and localised management strategies.

Table 9: Weed Management Zone 1 Strategies

Weed Present	Notes	Statutory Requirements	Management Strategy	Priority
Declared Weeds				
Spanish Heath (<i>Erica lusitanica</i>)	Isolated occurrences within project area, but heavy infestation in neighbouring land.	George Town Council is in Statutory Weed Management Zone B for Spanish Heath stipulating Containment.	Zone B municipalities - containment: Containment is the most appropriate management objective for Zone B municipalities which have problematic infestations but no plan and/or resources to undertake control actions at a level required for eradication. The management outcome for Zone B municipalities is ongoing prevention of the spread of Erica from existing infestations to areas free or in the process of becoming free of Erica.	High
Blackberry (<i>Rubus anglocandican</i>)	Isolated occurrences.	George Town Council is in Statutory Weed Management Zone B for Blackberry stipulating Containment.	Zone B municipalities - containment: Containment is the most appropriate management objective for Zone B municipalities which have problematic infestations but no plan and/or resources to undertake control actions at a level required for eradication. The management outcome for Zone B municipalities is ongoing prevention of the spread of blackberry from existing infestations to areas free or in the process of becoming free of blackberry. Blackberry is also a Weed of National Significance (WONS).	High
Gorse (<i>Ulex europaeus</i>)	Isolated occurrences.	George Town Council is in Statutory Weed Management Zone B for Gorse stipulating Containment.	Zone B municipalities - containment: Containment is the most appropriate management objective for Zone B municipalities which have problematic infestations but no plan and/or resources to undertake control actions at a level required for eradication. The management outcome for Zone B municipalities is ongoing prevention of the spread of gorse from existing infestations to areas free or in the process of becoming free of gorse.	High
Environmental Weeds				
N/A	N/A	N/A	N/A	N/A
High-Alert Weeds				
All other declared weeds species	No occurrences within the project area, but some infestations occur in other parts of the municipality.	<i>Various</i>	Prevention should be a primary focus, achieved through continuous monitoring.	Low

4.1.2 Management Zone 2 - Lower Section A - Tippogoree Hills Trail Network

Weed Management Zone 2 refers to the trails that occur within land owned by Bell Bay Aluminium. Active weed management only occurs within the 20m trail corridor (10m either side of the trail centreline). The zone also includes trails that pass-through rail line corridor, which require additional permits from TasRail before any weed management can commence within the rail line corridor boundaries.

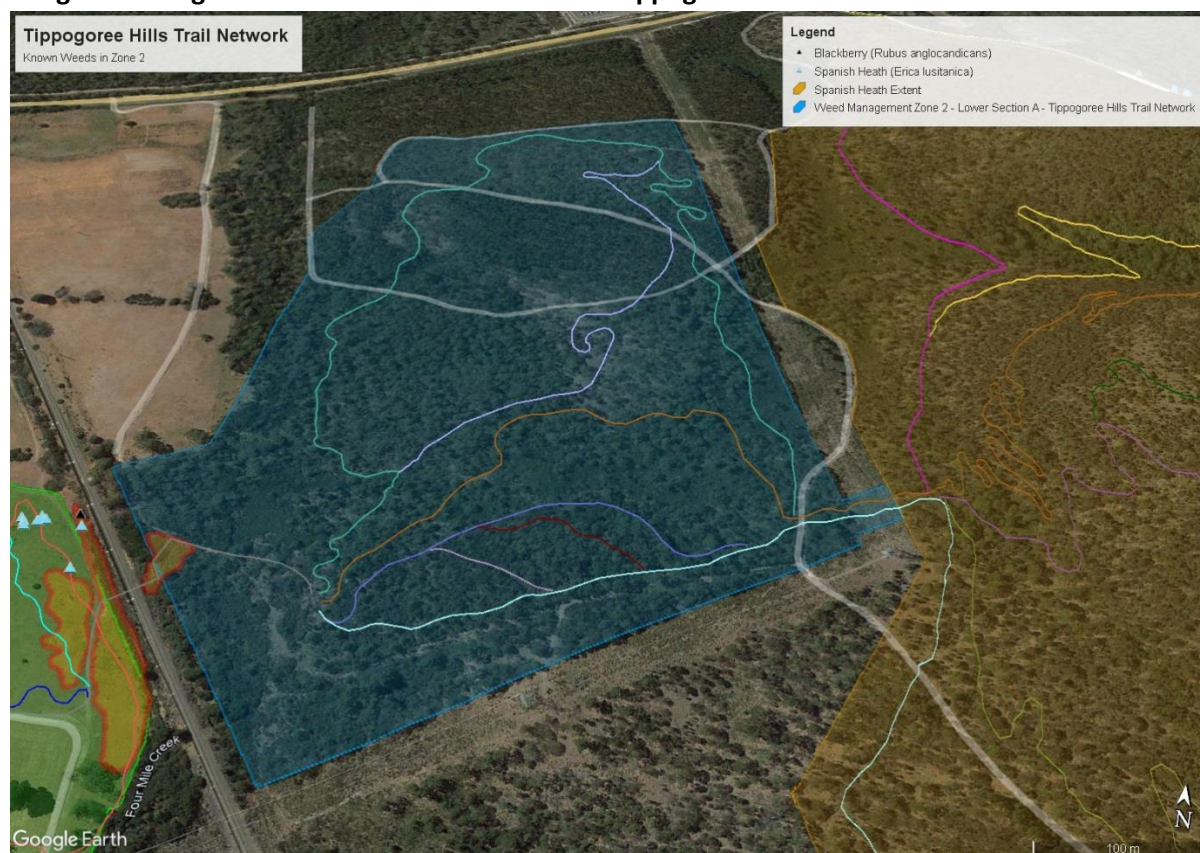
Weed Management Zone 2 contains an identified weed species within the project area. The area contains a heavy infestation of spanish heath immediately the east of the Bell Bay Rail Line.

The zone neighbours the railway easement for the Bell Bay Rail Line owned and managed by TasRail, which is known to contain a very heavy infestation of weed species which have spread into the project area, and presents as an ongoing risk for the spread of weeds into weed free areas.

The zone also neighbours the Bass Link transmission easement which contains heavy infestation of weed species on the northern end near Bridport Road and the western end where it meets the rail line easement. Whilst there are no signs of weed species spreading into the project area, it does present as an ongoing risk for the spread of weeds into weed free areas.

A map of Weed Management Zone 2 and the weeds contained within the zone boundaries can be seen in the image below.

Image 7: Management Zone 2 - Lower Section A - Tippogoree Hills Trail Network



A list of the weeds identified within the area are listed in the table below, along with statutory management requirements (if applicable), and localised management strategies.

Table 10: Weed Management Zone 2 Strategies

Weed Present	Notes	Statutory Requirements	Management Strategy	Priority
Declared Weeds				
Spanish Heath (<i>Eric lusitanica</i>)	Heavy infestation immediately east of the Bell Bay rail Line easement.	George Town Council is in Statutory Weed Management Zone B for Spanish Heath stipulating Containment.	Zone B municipalities - containment: Containment is the most appropriate management objective for Zone B municipalities which have problematic infestations but no plan and/or resources to undertake control actions at a level required for eradication. The management outcome for Zone B municipalities is ongoing prevention of the spread of Erica from existing infestations to areas free or in the process of becoming free of Erica.	High
Environmental Weeds				
N/A				
High-Alert Weeds				
All other declared weeds species	No occurrences within the project area, but some infestations occur in other parts of the municipality.	<i>Various</i>	Prevention should be a primary focus, achieved through continuous monitoring.	Low

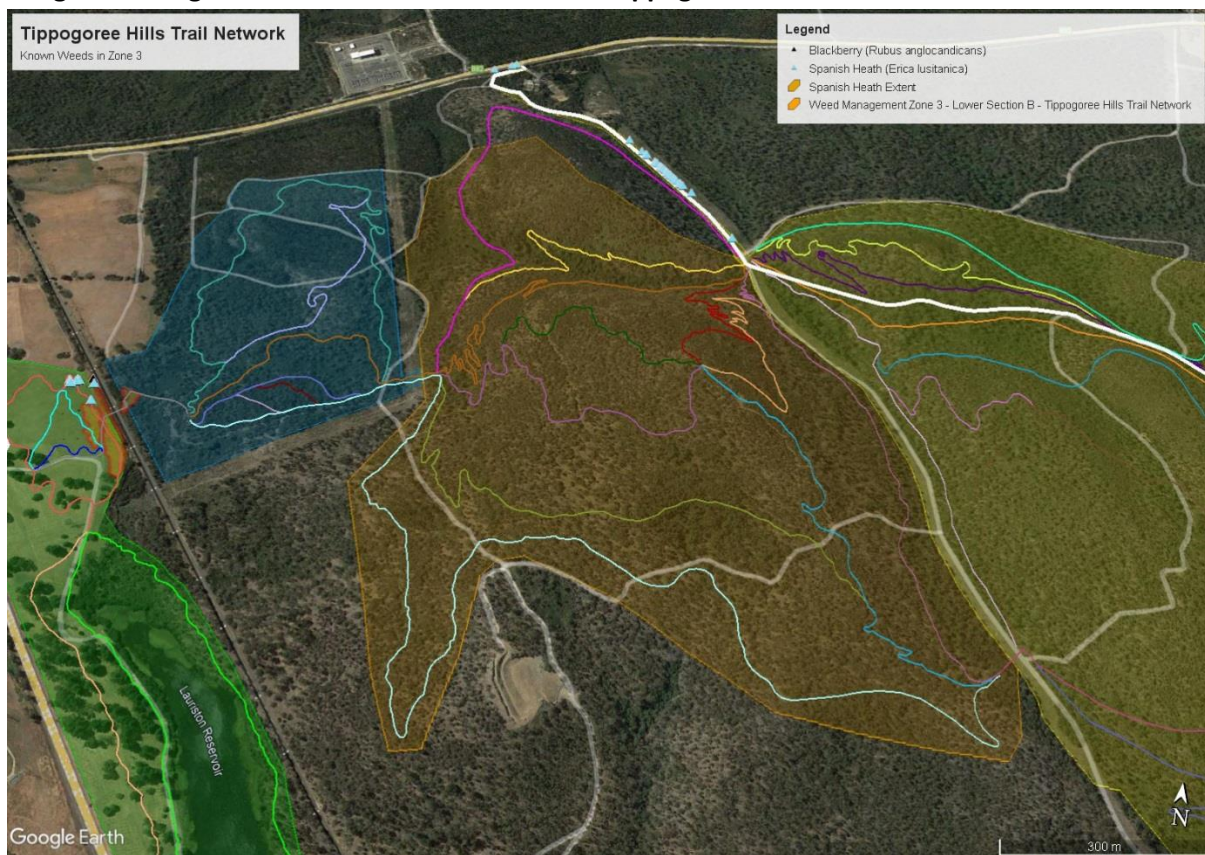
4.1.3 Management Zone 3 - Lower Section B - Tippogoree Hills Trail Network

Weed Management Zone 3 refers to the trails that occur within land owned by Rio Tinto Aluminium (Bell Bay) Limited. Active weed management only occurs within the 20m trail corridor (10m either side of the trail centreline).

Weed Management Zone 3 contains no known weed species, highlighting the importance of keeping the area free of weed occurrences.

A map of Weed Management Zone 3 and the weeds contained within the zone boundaries can be seen in the image below.

Image 8: Management Zone 3 - Lower Section B - Tippogoree Hills Trail Network



A list of the weeds identified within the area are listed in the table below, along with statutory management requirements (if applicable), and localised management strategies.

Table 11: Weed Management Zone 3 Strategies

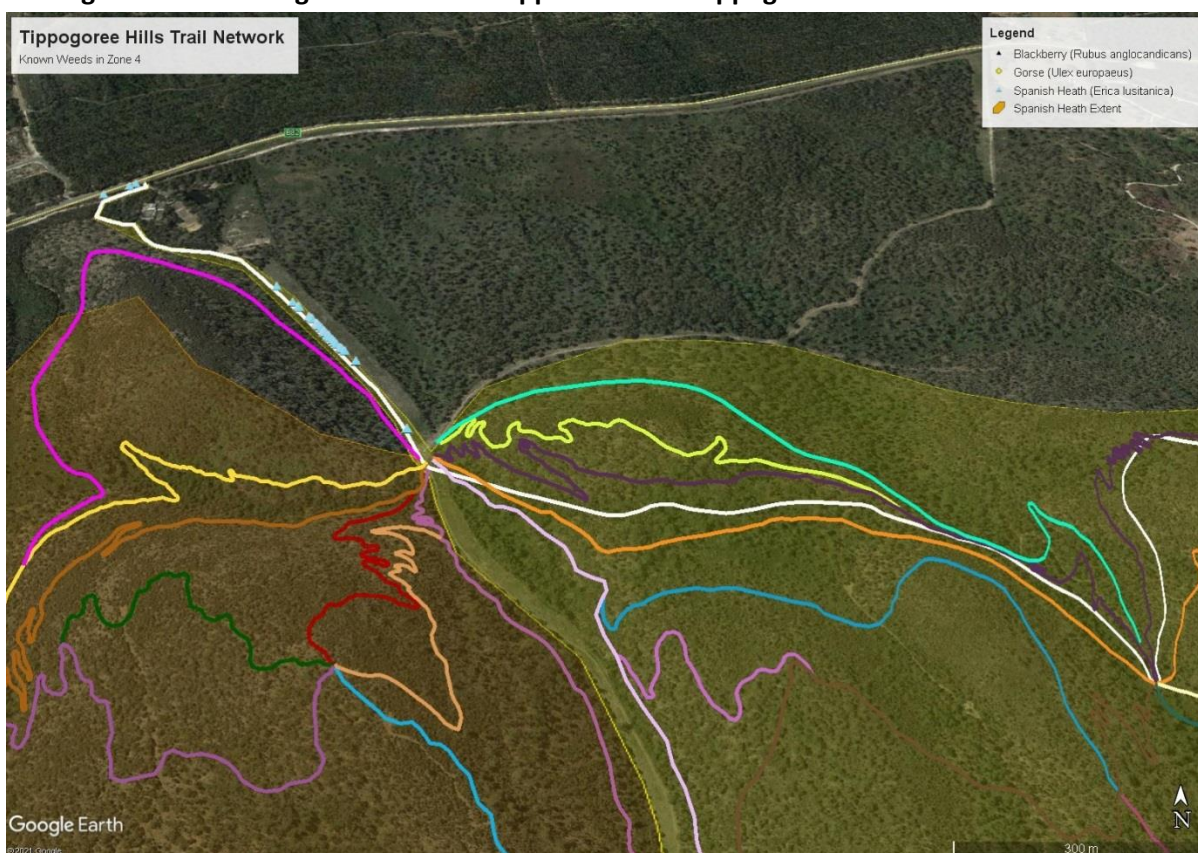
Weed Present	Notes	Statutory Requirements	Management Strategy	Priority
Declared Weeds				
N/A				
Environmental Weeds				
N/A				
High-Alert Weeds				
Spanish Heath (<i>Eric lusitanica</i>)	No occurrences within the project area, but significant infestations occur in other parts of the municipality and in neighbouring zones of the trail network.	George Town Council is in Statutory Weed Management Zone B for Spanish Heath stipulating Containment.	Prevention should be a primary focus, achieved through continuous monitoring.	High
All other declared weeds species	No occurrences within the project area, but some infestations occur in other parts of the municipality.	Various	Prevention should be a primary focus, achieved through continuous monitoring.	Low

4.1.4 Management Zone 4 - Upper Section - Tippogoree Hills Trail Network

Weed Management Zone 4 refers to the trails that occur within land owned by Rio Tinto Aluminium (Bell Bay) Limited and Parks and Wildlife Services. Zone 4 also includes the entirety of the service access road, including the existing firebreak that travels northwards towards Bridport Road. Active weed management only occurs within the 20m trail corridor (10m either side of the trail and roadway centreline).

A map of Weed Management Zone 4 and the weeds contained within the zone boundaries can be seen in the image below.

Image 9: Weed Management Zone 4 - Upper Section - Tippogoree Hills Trail Network



Weed Management Zone 4 contains infestations of spanish heath along the firebreak, particularly the lower sections nearer to Bridport Road. This presents as an ongoing risk for the spread of weeds into weed free areas.

A list of the weeds identified within the area are listed in the table on the next page, along with statutory management requirements (if applicable), and localised management strategies.

Table 12: Weed Management Zone 4 Strategies

Weed Present	Notes	Statutory Requirements	Management Strategy	Priority
<i>Declared Weeds</i>				
Spanish Heath <i>(Eric lusitanica)</i>	Occurrences along the lower parts of the existing fire break.	George Town Council is in Statutory Weed Management Zone B for Spanish Heath stipulating Containment.	Zone B municipalities - containment: Containment is the most appropriate management objective for Zone B municipalities which have problematic infestations but no plan and/or resources to undertake control actions at a level required for eradication. The management outcome for Zone B municipalities is ongoing prevention of the spread of Erica from existing infestations to areas free or in the process of becoming free of Erica.	High
<i>Environmental Weeds</i>				
N/A	N/A	N/A	N/A	N/A
<i>High-Alert Weeds</i>				
All other declared weeds species	No occurrences within the project area, but some infestations occur in other parts of the municipality.	<i>Various</i>	Prevention should be a primary focus, achieved through continuous monitoring.	Low

5.0 Management and Control of Weeds and Diseases

5.1 Construction Activities

5.1.1 Risk

Construction activities will involve removal of vegetation, excavation, drainage installation and placement of imported materials within the trail and road corridors. These activities bring more significant risks of introducing and spreading weeds and diseases.

5.1.2 Mitigation

Pre-Construction Weed Treatments

Before the construction phase commences, a pre-construction weed treatment program will be undertaken to treat as many weeds as possible from the heavily weed-infested areas within Weed Management Zone 1, Weed Management Zone 2, Weed Management Zone 4, and the neighbouring easements and areas where possible.

Pre-construction weed treatments for the identified weed site have been detailed in the below.

Table 13: Pre-Construction Weed Treatments

Weed Management Zone (localised)	Weed Species	Treatment	Site-Specific Details
Zone 1	Spanish Heath (Erica lusitanica)	Selective spraying with follow up	Occurrences within the 20m construction corridor will be selectively sprayed by an approved herbicide. For larger infestations that extend greater than the 20m construction corridor will be selectively sprayed by an approved herbicide. Occurrences within neighbouring easements will be treated in accordance with the landowner / manager to ensure that the risk of spreading into the project area is appropriately mitigated.
Zone 1	Blackberry (Rubus anglocandicans)	Selective spraying with follow up	Occurrences within the 20m construction corridor will be selectively sprayed by an approved herbicide. For larger infestations that extend greater than the 20m construction corridor will be selectively sprayed by an approved herbicide.
Zone 1	Gorse (Ulex europaeus)	Selective spraying with follow up	Occurrences within the 20m construction corridor will be selectively sprayed by an approved herbicide. For larger infestations that extend greater than the 20m construction corridor will be selectively sprayed by an approved herbicide.
Zone 2	Spanish Heath (Erica lusitanica)	Selective spraying with follow up	Occurrences within the 20m construction corridor will be selectively sprayed by an approved herbicide. For larger infestations that extend greater than the 20m construction corridor will be selectively sprayed by an approved herbicide. Occurrences within neighbouring easements will be treated in accordance with the landowner / manager to ensure that the risk of spreading into the project area is appropriately mitigated.
Zone 4	Spanish Heath (Erica lusitanica)	Selective spraying with follow up	Occurrences within the 20m construction corridor will be selectively sprayed by an approved herbicide. For larger infestations that extend greater than the 20m construction corridor will be selectively sprayed by an approved herbicide. Occurrences within neighbouring easements will be treated in accordance with the landowner / manager to ensure that the risk of spreading into the project area is appropriately mitigated.

Construction and Environmental Management Plan (CEMP)

All contractors undertaking construction activities during construction will be required to produce a CEMP detailing weed and disease management controls, or adopt controls stipulated by Council. Further conditions may be stipulated by landowners.

World Trail, the contractors undertaking the trail construction, have developed a CEMP specific to construction of the Tippogoree Hills Trail Network which meets or exceeds provisions of this WDMP. World Trail's CEMP forms a key component of this plan.





All trail alignments and all known site-specific environmental matters discussed in the CEMP have been incorporated into the World Trail GIS platform, which all World Trail staff can access at all times on their phones. A unique reference ID number is allocated to each known site-specific environmental matter, which can be cross-referenced against the GIS platform.

World Trail's CEMP will apply for the duration of the construction phase, with monitoring of construction activities will be undertaken by council to ensure compliance.

Weed and Disease Washdown Protocols

Before the project commences, all vehicle and machinery require pre-construction washdown at a dedicated cleaning facility to the satisfaction of council. During the construction phase, washdown is required when vehicles and machinery are moving between Zones with known weeds and diseases present.

When conducting weed and disease hygiene washdown, the following planning manuals will be used to guide wash down procedures: -

-  Allan, K. & Gartenstein, S. (2010). Keeping It Clean: A Tasmanian Field Hygiene Manual to Prevent the Spread of Freshwater Pests and Pathogens. NRM South, Hobart;
-  Rudman, T., Tucker, D. & French, D. (2004). Washdown Procedures for Weed and Disease Control. Edition 1. Department of Primary Industries, Water & Environment, Hobart;
-  DPIPWE (2015). Weed and Disease Planning and Hygiene Guidelines - Preventing the Spread of Weeds and Diseases in Tasmania. Department of Primary Industries, Parks, Water & Environment, Hobart; and
-  Rudman T. (2005). Interim Phytophthora Cinnamomi Management Guidelines. Nature Conservation Report 05/7, Biodiversity Conservation Branch, Department of Primary Industries, Water & Environment, Hobart.

Links to access these documents electronically have been provided in Appendix A.

Vehicle, machinery and equipment washdown instructions and checklists have not been provided in the Appendix B and Appendix C.

Imported Surfacing Materials

Any imported surfacing material used will be sourced from a certified clean quarry to ensure there is no introduction of any weeds or pathogens.

Ecological Assessment Report Considerations

Consideration will be given of the order of construction of trail sections, and the direction in which construction occurs, ideally working towards and within the most heavily weed-infested area last. This provides the means for minimising the risk of introducing weeds to other parts of the project area network presenting as weed free.

5.2 Operational Maintenance







5.2.1 Risk

Trail maintenance will involve removal of vegetation, excavation, drainage installation and placement of imported materials within the trail corridors, albeit at a much lessor level than construction activities. However, these activities still constitute significant risk of introducing and spreading weeds and diseases.

5.2.2 Mitigation

Standard Maintenance Activities

Weed monitoring, identification and removal will be part of the standard operational maintenance activities. All maintenance personnel will be trained in: -

-  Plant identification - particularly the identification of declared and environmental weeds;
-  Safe handling and use equipment;
-  Correct and appropriate use of personnel protection equipment;
-  Vehicle and equipment washdown and hygiene protocols;
-  Specific instruction on how to undertake allocated tasks; and
-  Correct and appropriate handling and application of fuels, chemicals, and herbicides.

When a new weed is identified with the trial corridor, it will either be immediately mechanically removed, bagged and disposed of off site where possible, or be noted for treatment at a later date. Once the weed is removed, the site will be noted for ongoing monitoring for a period of six months to determine the site as being once again weed free.

Construction and Environmental Management Plan (CEMP)

All contractors undertaking construction activities during the operational phase will be required to produce a CEMP detailing weed and disease management controls, or adopt controls stipulated by Council. Further conditions may be stipulated by landowners.

Ongoing Monitoring

A crucial objective during operational maintenance will ongoing monitoring to identifying new weeds spreading into the trail network area. Weed and diseases symptom monitoring will be performed as part of the Trail Maintenance Plan, initially operating on monthly inspections, with treatments of weeds occurring as part of trail maintenance activities.

Weed and Disease Washdown Protocols

As with the construction phase, all vehicles and equipment used for trail maintenance require weed and disease washdown before entering the trail network area, and moving between sites with known weeds and diseases present.

The following planning manuals will be used to guide wash down procedures: -

- 🌿 Allan, K. & Gartenstein, S. (2010). Keeping It Clean: A Tasmanian Field Hygiene Manual to Prevent the Spread of Freshwater Pests and Pathogens. NRM South, Hobart;
- 🌿 Rudman, T., Tucker, D. & French, D. (2004). Washdown Procedures for Weed and Disease Control. Edition 1. Department of Primary Industries, Water & Environment, Hobart;
- 🌿 DPIPWE (2015). Weed and Disease Planning and Hygiene Guidelines - Preventing the Spread of Weeds and Diseases in Tasmania. Department of Primary Industries, Parks, Water & Environment, Hobart; and
- 🌿 Rudman T. (2005). Interim Phytophthora Cinnamomi Management Guidelines. Nature Conservation Report 05/7, Biodiversity Conservation Branch, Department of Primary Industries, Water & Environment, Hobart.

Links to access these documents electronically have been provided in Appendix A.

Vehicle, machinery and equipment washdown instructions and checklists have not been provided in the Appendix B and Appendix C.

Imported Surfacing Materials

Any imported surfacing material used will be sourced from a certified clean quarry to ensure there is no introduction of any weeds or pathogens.

5.3 Public Usage

5.3.1 Risk

Users of shared use trails, and in particular mountain bike riders, are unlikely to unintentionally leave the formal trail alignment. Nor do users directly interact with the adjacent vegetated areas of the trail corridors. Therefore, the risk of weeds or diseases spreading as a result of intended usage is considered rare and unlikely.

The greatest risk from users is triggered when obstacles or defects (such as muddy sections or fallen trees) are present, and users leave the trail alignment to circumnavigate the obstacle. Doing so impacts the surrounding vegetation, disturbs the ground, and provides opportunity for the spread of weeds and diseases.

Other trail users such as shuttle bus operators, tour service providers, private drop off vehicles, and event spectators may pose some risk once the trail network is operational.




Parts of the land in which the trails are being constructed has been and may continue to be accessed by unintended users for the (often illegal) purpose of rubbish dumping, wood collecting, four-wheel driving, and motorbike riding. This use of the land can negatively impact on the environmental values through vegetation damage, soil erosion, and contribute to the spread of weeds and diseases.

5.3.2 Mitigation

Trail Network Users

Given the minimal occurrences of weed infestations throughout the trail network area, the controllability of access points, and the minimal risk that mountain bikers pose to the spread of weeds, the primary mitigation tool will be user education.

User education on weed hygiene and bike cleanliness will be via three channels: -

-  Trail head and access point signage;
-  Brochures and handouts available at information centres and events; and
-  Information pages on the trail network website.

Collateral focusing on mountain biking specific weed and disease hygiene already exists and is available from NRM South. Examples of these can be found in Appendix D.

Routine trail inspections will occur under the Trail Maintenance Plan to rectify any obstacles or defects present on trails that may cause users to stray from the trail alignment. Whilst the intent is to identify and rectify any defects before the user, in some instances the user may encounter a defect before a routine inspection does. Instructions and details for users to report a defect will be displayed on the trail head information board for users to report a trail defect. When a defect is reported, council will record the details electronic and forward to the maintenance personnel to be incorporated into the routine inspection and maintenance schedule.

Commercial Operators

Commercial operators that operate a service within the trail network will need to adhere to weed and disease hygiene protocols, with specifics negotiated on a case by case basis dependant on the level of interaction and risk of contributing to the spread of weeds and diseases.

Illegal Activities

Efforts will be undertaken to manage impacts caused by illegal use of trails by motorised vehicles (motorbikes, or 4WD vehicles). As part of the Trail Maintenance Plan, defects caused by illegal activity will be reported to the landowner, and rectified as soon as possible. If possible, the entry point should be identified and blocked.

Council cannot be held solely responsible for the potential weed and disease risks associated with these external and illegal uses. However, promoting the intended activities can act as a deterrent to illegal activities.

5.4 Weed Control Techniques

A full list of weed control techniques can be found in Appendix E.

Care should be taken to use the right technique for the right weed at the right time.

Before undertaking any control techniques, the relevant weed guidelines should be thoroughly consulted to ensure the control is effective.

5.5 Specific Management of Spanish Heath (Erica lusitanica)

Specific consideration has been given to initial and ongoing management for the heavy infestations of Spanish Heath (Erica lusitanica) along the proposed service access road alignment, and the rail line corridor adjoining Lauriston Park.

The George Town municipality is located within Statutory Weed Management Zone B for Spanish Heath which stipulates Containment as the required level of management. However, the heavy infestations of Spanish Heath (Erica lusitanica) will be managed as if located within Statutory Weed Management Zone A, which stipulates Eradication.

In practice, the management strategy will be executed in three stages, with eradication being the primary objective, and targeting the infestations located within the 20m trail and road construction corridors. Where the infestations continue into the adjoining land not within the 20m trail and road construction corridors, the infestations will be managed to the greatest extent as practicably possible to protect and prevent re-infestation to inside the construction corridors.

The three stages of the management strategy are: -

- Pre-construction - initial treatment with an approved herbicide to serve as reduction in active growth, with follow up treatment of an approved herbicide within six months or after spring growth has occurred;
- Monitoring every three months during the construction phase, with follow up treatment of an approved herbicide as necessary; and
- Ongoing monitoring throughout the operational phase as trail maintenance inspections, with follow up treatment of an approved herbicide applied as necessary.

It is thought that ongoing monitoring with treatment as needed will be the most effective means of keeping the heavy infestations of Spanish Heath (Erica lusitanica) from spreading into the weed-free areas of the proposed trail network.

6.0 Communication and Reporting

6.1 Construction Activities

During construction, reporting and communication systems have been factored as part of World Trail's CEMP. Information will include reporting on the status of weeds and diseases discovered within the trail corridors, and near the access points, and hygiene practises undertaken.

Instructions and checklists for machinery, vehicle and equipment wash downs have been provided in Appendix B and Appendix C. The checklists will be kept on file so they can be referred to in the future.

6.2 Operational Maintenance

Weed inspection as part of maintenance activities are to be recorded as they are undertaken, to assist the trail maintenance team and landowners to develop a long-term record of new weed and disease occurrences.

Instructions and checklists for machinery, vehicle and equipment wash downs have been provided in Appendix B and Appendix C. The checklists will be kept on file so they can be referred to in the future.




A Weed Inspection Record Sheet can be found in Appendix F, and is also located in the Trail Maintenance Plan.

Once complete, the record sheets should be filed logically, so they can be accessed and referred to at future dates. Filing of record sheets should correspond with electronic record keeping in an Excel sheet of inspections, weed control treatments, and washdown activities undertaken. This data will assist in developing long-term monitoring of new weed and disease occurrences.

6.3 Public Usage

Signage will be the primary communication tool, aiming to educate users on weed hygiene and bike cleanliness.

This will be achieved utilising three communication channels: -

-  Trail head and access point signage;
-  Brochures and handouts available at information centres and events; and
-  Information pages on the trail network website.

Collateral focusing on mountain biking specific weed and disease hygiene already exists and is available from NRM South. Examples of these can be found in Appendix D.

Instructions and details for users to report a defect will be displayed on the trail head information board for users to report a trail defect. When a defect is reported, council will record the details electronically and forward to the maintenance personnel to be incorporated into the routine inspection and maintenance schedule.

7.0 Monitoring

An important part of weed management is monitoring of the trail network to identify new weed sites, monitor already identified weed sites, and review effectiveness of weed management controls. Monthly trail inspections are typical for trail networks, however, during construction inspections may occur more frequently, especially in areas of heavy infestations.

7.1 Weed Inspections

Post-construction monitoring is essential where there has been soil disturbance, importation of materials (water, soil, gravel, sand, etc.), changes to drainage patterns, or removal of vegetation. Any of these actions can lead to the germination of dormant seed, or to the establishment of wind-blown weeds/seeds on recently exposed soil. Importation of materials can also result in the establishment of pathogens.

The timeframe for monitoring will vary depending on factors such as the presence of soil seed banks, the possibility for complete eradication of infestations and the likelihood of re-infestation from adjoining areas. The key point is that the responsibility to control weeds (and in particular declared weeds) does not finish when the construction phase has been completed.

Regular weed inspections will form a critical component of the routine trail inspection program as part of the Trail Maintenance Plan, with inspections initially occurring on a monthly basis. When inspections are conducted, the presence of a weed species should be assessed based on the likelihood of that weed spreading from use by the intended user. The risk rating guide in the table below provides the risk profile and the associated timeframes for rectification works to occur.




Table 14: Weed Inspection Risk Ratings

Risk Ratings	
Low	Weed located outside the 20m trail corridor or 15m perimeter of the trail head areas. Treatment required within 4 weeks (20 working days).
Medium	Weed located within the 20m trail corridor or 15m perimeter of the trail head areas. Treatment required within 2 weeks (10 Working days).
High	Weed located within 1.5m of the trail tread or high-trafficked area (bike, pedestrian or vehicle). Treatment required within 1 week (5 Working days).
Extreme	Weed located within the immediate trail tread or high-trafficked area (bike, pedestrian or vehicle). Treatment required immediately.

In some cases, the stated timeframe for treatment may not be possible due to the recommended treatment for that particular weed species (e.g. don't treat during flowering), however, scheduling in treatment to occur at a later date can be considered as being effectively treated.

Treatment can sometimes be appropriately undertaken at the time of inspection, by chipping, grubbing or spraying weeds on the trail edges or surface. If removal is done by mechanical chipping (e.g. rake-hoe) care should be taken not to damage the trail surface. The actual ride lines will typically be kept clear by the mechanical shearing action of riding over any germinating weeds.

Where spraying is used to treat weeds, care should be taken to: -







-  Use herbicides registered for use near waterways (where relevant);
-  To avoid spraying in windy conditions; and
-  Avoid collateral damage to surrounding vegetation.

Names and details of herbicides used for weed control can be found in Appendix H.

7.2 Maintenance Personnel

When carrying out any weed treatment works or inspections, all necessary safety precautions should be taken. Appropriate Personal Protective Equipment (PPE) is to be used for all tasks, and any tasks requiring machinery operation (excavator, brushcutter, chainsaw etc) must only be undertaken by suitably qualified and licenced individuals. All works should be undertaken to a thorough, professional, industry level standard.

All personnel undertaking weed treatment tasks, whether they are council employees, subcontractors or volunteers will be fully trained in skills pertaining to: -

-  Plant identification - particularly the identification of declared and environmental weeds;
-  Safe handling and use equipment;
-  Correct and appropriate use of personnel protection equipment;
-  Vehicle and equipment washdown and hygiene protocols;
-  Specific instruction on how to undertake allocated tasks; and
-  Correct and appropriate handling and application of fuels, chemicals, and herbicides.

All weed treatment activities will be conducted in team of two, with one team member acting in a supervisory capacity to ensure compliance with workplace health and safety.

Safe Operating Procedures (SOP) will be developed for specific tasks to be undertaken to outline safe work practices for maintenance work on the trail network.

Material Safety Data Sheets (MSDS) will be available on site whenever chemicals are to be used with all appropriate handling and application risks identified in the particular Safe Working Method Statement.

Reference councils **Safe Operating Procedure Register** for specific documents prior to undertaking allocated tasks.

8.0 Conclusion

Importantly, whilst this document details the processes and protocols for weed and disease management, the process is dynamic and will need to be flexible in approach and methods. This document should be continually reviewed and updated to ensure the most appropriate protocols are in place.

Appendices

Appendix A: Weed and Disease Hygiene Washdown Planning Manuals Links

Title: -

Keeping It Clean: A Tasmanian Field Hygiene Manual to Prevent the Spread of Freshwater Pests and Pathogens. Allan, K. & Gartenstein, S. (2010). NRM South, Hobart.

Link: -

https://dpiipwe.tas.gov.au/Documents/15130802_52keepingitcleanspreadswe.pdf

Title: -

Washdown Procedures for Weed and Disease Control. Edition 1. Rudman, T., Tucker, D. & French, D. (2004). Department of Primary Industries, Water & Environment, Hobart.

Link: -

<https://dpiipwe.tas.gov.au/Documents/Washdown-Guidelines-Edition-1.pdf>

Title: -

Weed and Disease Planning and Hygiene Guidelines - Preventing the Spread of Weeds and Diseases in Tasmania. DPIIPWE (2015). Department of Primary Industries, Parks, Water & Environment, Hobart.

Link: -

<https://dpiipwe.tas.gov.au/Documents/Weed%20%20Management%20and%20Hygiene%20Guidelines.pdf>

Title: -

Interim Phytophthora Cinnamomi Management Guidelines. Rudman T. (2005). Nature Conservation Report 05/7, Biodiversity Conservation Branch, Department of Primary Industries, Water & Environment, Hobart.

Link: -

<https://dpiipwe.tas.gov.au/Documents/Interim-Phytophthora-Management-Guidelines.pdf>

Appendix B: Hygiene Protocols for Vehicles and Heavy Machinery

Extract from: - Keeping It Clean: A Tasmanian Field Hygiene Manual to Prevent the Spread of Freshwater Pests and Pathogens. Allan, K. & Gartenstein, S. (2010). NRM South, Hobart.

Link: - https://dpiwwe.tas.gov.au/Documents/15130802_52keepingitcleanspreadswe.pdf

Background

Passenger vehicles and heavy machinery (including trucks, tractors, mowers, slashers, trailers, backhoes, graders, dozers, excavators, skidders and loaders) are major vectors for the spread of soil borne fungal diseases such as *Phytophthora cinnamomi* (root rot) and terrestrial weeds.

As a minimum, apply the standard Check Clean Dry protocols to all your clothing, footwear, equipment, vehicles and heavy machinery before going into the field. Vehicles and heavy machinery that stay on formed and sealed roads have a low risk of spreading disease and weeds and on-site cleaning is not essential. However on-site vehicle washdown is particularly important when using vehicles and machinery off (sealed) roads.

Apply rigorous planning and hygiene protocols that include Disinfection when working in *Phytophthora* Management Areas, areas with endemic or threatened frog species or remote areas and where it is not possible to thoroughly dry vehicles, heavy machinery and equipment between sites. Ensure you Check, Clean, and Disinfect before you arrive and between sites.

Before going into the Field

- Consult with the relevant land manager to identify any specific hygiene protocols that apply to vehicles and machinery.
- Inspect vehicles and heavy machinery for mud, soil, plant material and debris and ensure they are clean and dry. Pay particular attention to the underside, tracks, rollers, tyres, wheel arches, guards, blades, bucket, other attachments, spare tyres, chassis, engine bay, radiator and grill, tray, cabin, foot wells, pedals, mats and seats.

Selecting a Field Washdown Site for Vehicles and Machinery

Vehicle/heavy machinery washdown is most effective where access can be controlled and entry points, roads or tracks are not open to general use. When selecting a washdown site, consider the following: -

- Washdown should be done at the point of departure from a previous operation, preferably at a designated washdown facility with a well-drained hard surface.
- Where there are large quantities of effluent or there is a risk of extensive run-off (e.g. during road construction), the washdown area should be bunded i.e. an impervious spill area constructed.
- Washdown at the edge of (or near) any areas where pests, weeds or pathogens need to be contained. Ideally choose a site where the land slopes gently away from the washdown area and back into the potentially infected area, or into an adjacent area not susceptible to the problem (e.g. a paddock).
- Select a site where the run-off will not enter a watercourse, waterbody or roadside drain: A buffer of at least 30m is required.

- Select a mud-free site (e.g. well grassed, rocky, gravel, bark or timber corded).
- Avoid sensitive vegetation or wildlife habitat e.g. remnant native vegetation and areas with threatened species.
- Mark or record washdown sites for the land manager to enable subsequent monitoring and weed control.

General Hygiene Procedures

For general vehicle/machinery cleaning, the following standards apply.

- Elevate heavy machinery with boom arm to enable underside to be accessed. Tyres can be placed under equipment to allow underside to dry.
- Remove any guards, covers or plates that can quickly and easily be removed and replaced.
- Check the vehicle inside and out for any lodged mud, soil, seeds, algae, plant and other debris or substrate material.
- Knock off large clods of dirt with a crowbar or stiff brush.
- Clean with a high-pressure hose and stiff brush or crowbar to further remove clods, starting from the top of the vehicle and working down to the bottom. Remember to clean undersides, tracks, rollers, tyres, wheel arches, guards, blades and buckets, chassis, engine bays, radiator and grill, tray, spare tyres and other attachments.
- When spraying with disinfectant solution be sure to only use the minimum amount of water needed to adequately disinfect all equipment and only add the amount of disinfectant required. Before adding disinfectant to tank release any surplus water (present in tank).
- Allow the disinfectant solution to remain in contact with surfaces for at least 1 minute and wherever possible allow vehicles and equipment to drip dry.
- Avoid driving through any cleaning water/waste,
- Clean the interior (including floor, foot wells, mats, pedals, seats, under seats), air cleaners, radiator grills and engine bays with vacuum, compressed air device or brush off.

No clods of dirt or debris should be present after washdown. If smeared soil stains or soil lodged in difficult-to-access areas remain then ensure these areas have been thoroughly treated with disinfectant solution and allowed to drip dry.

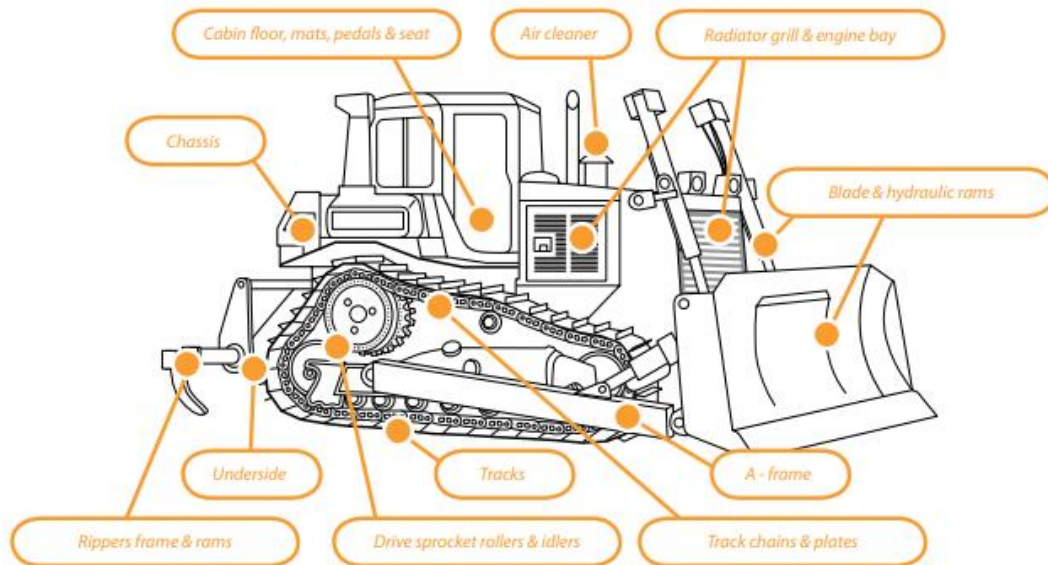
Portable Vehicle/Machinery Washdown Units

Mobile washdown units and/or small self-assembled systems are one option. A pump and high-pressure hose is the best means to remove all dirt and debris, particularly from places that are difficult to access. A shovel, crowbar and stiff brush are also needed to remove stubborn dirt. A blowdown device, compressor or portable blower can also be used along with a small brush to remove dry dirt (e.g. from air cleaner and radiators).

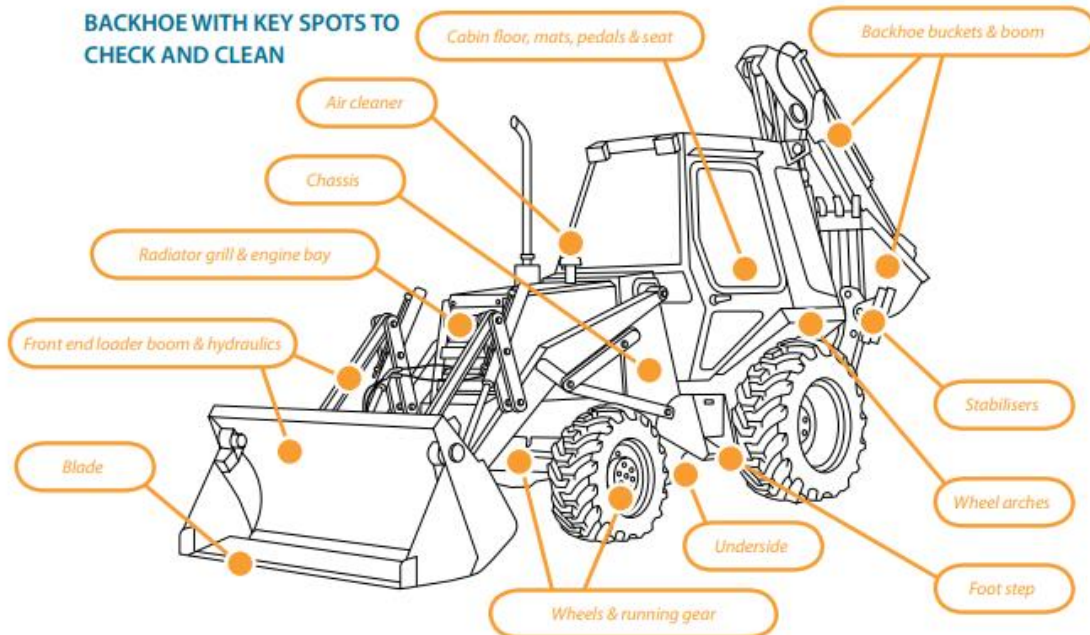
Designated Washdown Facility

Purpose built wash bays are the best option for cleaning large vehicles or machinery. These washdown facilities should have a well-drained hard surface and include effective effluent management systems to protect the environment. Commercial washdown facilities are available for vehicles and small trucks at most large towns. However onsite checking and cleaning of vehicles should be undertaken first, especially after working in contaminated.

BULLDOZER WITH KEY SPOTS TO CHECK AND CLEAN



BACKHOE WITH KEY SPOTS TO CHECK AND CLEAN



Appendix C: Inspection and Washdown Checklists

Vehicle Inspection and Washdown Checklist				
Date:		Site:		
Vehicle:		Rego / Vehicle ID		
Area	Contamination Point	Inspected	Cleaned	Method
Engine Bay	Front grill			
	Radiator and other cooling cores or fins			
	Grill or recess under wipers			
	Engine mounts			
	Top of gearbox			
	Battery recess/tray			
	Any recesses on engine or manifold			
	Air cleaner (including element)			
Cabin	Footwells			
	Carpets and mats			
	Seats and seat covers			
	Tool boxes			
	Air Vents			
Wheels and Arches	Tyre treads			
	Rims and wheel caps			
	Wheel arches			
	Mud flaps and brackets			
	Brakes			
Tray	Body of tray (especially recesses)			
	Framework (especially hollow tubing)			
	Around fuel caps			
	Tailgate cover			
Undercarriage	Chassis rails			
	Struts and stabilisers			
	Steering components			
	Axels and differentials			
	Spare tyre and mounts			
	Guards			
	Fuel tanks(s)			
Attachments	Bull bar			
	Winch			
Cleaning methods:	Mechanical (M) High Pressure Water (HPW)	Compressed Air (CA) Low Pressure Water (LPW)	Vacuum (V)	
Inspected By:		Signed:		
Cleaned By:		Signed:		

Excavator Inspection and Washdown Checklist				
Date:		Site:		
Vehicle:		Rego / Vehicle ID		
Area	Contamination Point	Inspected	Cleaned	Method
Engine Bay	Engine bay floor			
	Fan shroud and radiator core			
	Air filters (shake or tap filters to determine if clean)			
	Glacier plate			
Cabin	Footwells			
	Carpets and mats			
	Seats and seat covers			
	Tool boxes			
	Air vents			
Excavator Body	Hollow sectioned chassis channels			
	Hose channels			
	Counterweight void spaces			
	Removable track adjuster guards and lubrication points			
	Turret pivot area			
	Arms/boom pivot points			
	Tracks			
Bucket/blade	Between teeth of adapters			
	Wear plates			
Rear blade (stabiliser)	Wear plates			
	Hollow sectioned arms			
	Hollow sectioned blade			
Cleaning methods:	Mechanical (M) High Pressure Water (HPW)	Compressed Air (CA) Low Pressure Water (LPW)	Vacuum (V)	
Inspected By:		Signed:		
Cleaned By:		Signed:		

Wheeled Loaders and Compactors Inspection and Washdown Checklist			
Date:		Site:	

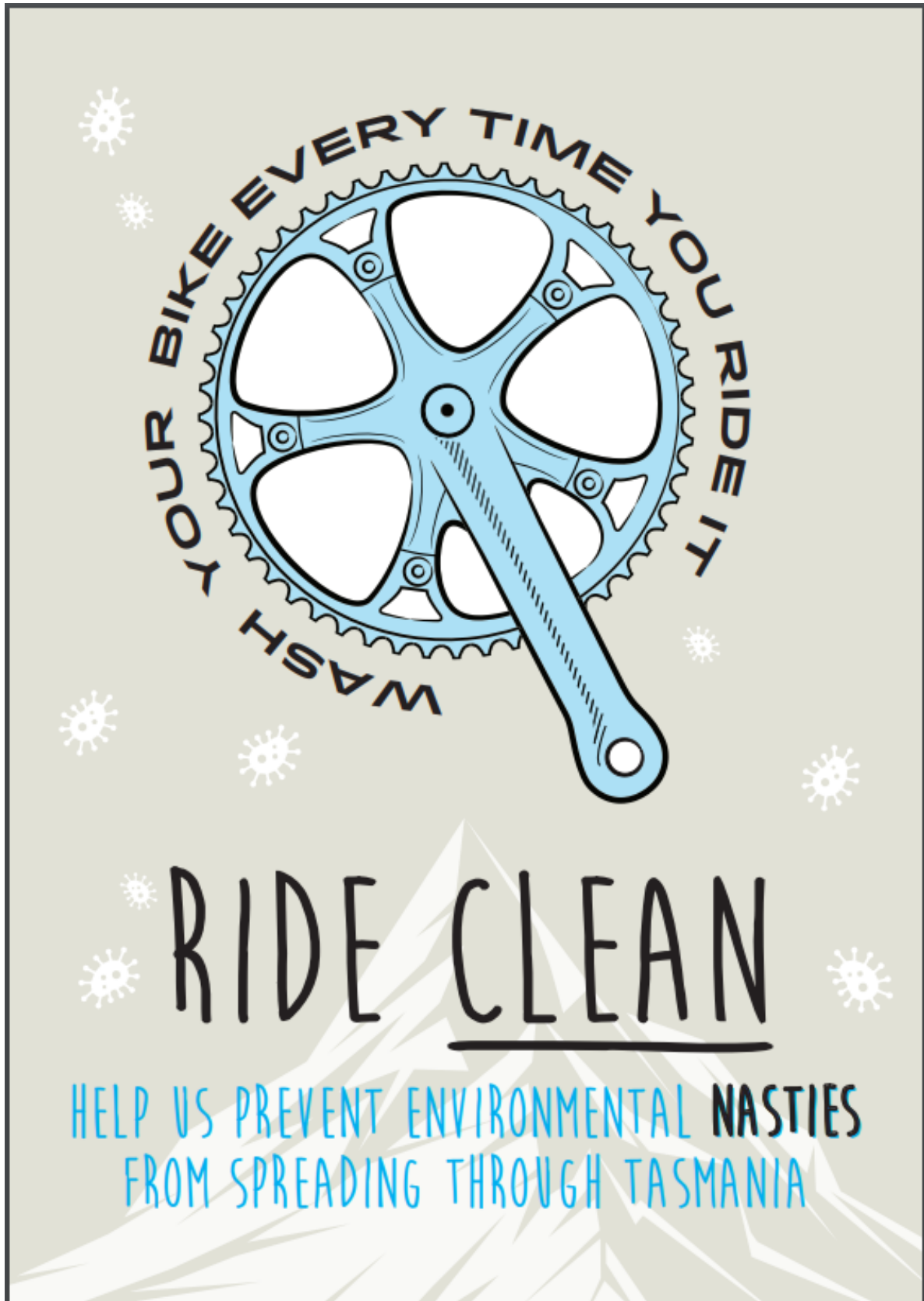
	residues.			
	Remove and check the air filter/cleaner (these often require destruction where they are clogged with QRM).			
	Check carefully the void space between the oil and radiator cores.			
	Battery Box - Lift/remove the battery to check for contamination (battery box may be at side/rear or under seat).			
Cabin	Check externally under and around driver's cab.			
	Check under mats in cab.			
	Remove/lift seat; remove/lift floor pans to allow checking to top of transmission.			
	Check air conditioner filter (if fitted) – shake/tap filter to check if clean.			
	Check externally under and around driver's cab.			
	Check under mats in cab.			
Body	Belly plates should be removed to allow inspection and cleaning.			
	Rear plates at back of dozer should be removed to allow inspection and cleaning.			
	Hydraulic cover plates should be removed to allow inspection and cleaning.			
Tracks / Track Frame	Examine tracks carefully.			
	Ensure inspection/cover plates are removed to allow inside track area.			
	Check idler wheels (these support the tracks).			
Fuel Cells	Are removable therefore dirt etc can pack between the tank and the frame.			
Blade	Ensure that edge of blade top/bottom is not split – this allows soil to be packed very tightly in the hollow.			
	Check cutter points/wear blades			
	Check carefully the pivot points and adaptors at the rear of the front blade – these allow the blade to change height and angle. Sometimes soil has compacted and is difficult to dislodge.			
	Check trunction arms			
	Check all hollow sections			
Ripper Support	Frame is usually hollow. Check carefully if any contaminants have entered this section. The tynes may need to be removed.			

Tynes	Tynes need careful inspection. Contamination may often be removed by water blasting, but tynes may need to be removed in some cases.			
Ripper Points	A pin holds on the ripper points. Dirt can compact under the ripper points.			
All Areas	Check if any sections or channels are hollow and determine if there is a possible entry point for contamination. Check if plates are covering a compartment or space that may have collected dirt/trash.			
Cleaning methods:	Mechanical (M) High Pressure Water (HPW)	Compressed Air (CA) Low Pressure Water (LPW)	Vacuum (V)	
Inspected By:		Signed:		
Cleaned By:		Signed:		

Small Engine Tools, Hand Tools, and Clothing Inspection and Washdown Checklist				
Date:		Site:		
Area	Contamination Point	Inspected	Cleaned	Method
Motorised Wheelbarrows	Inside the tub foil soil residues			
	Around tyres and wheels or tracks			
	Underneath tub			
	Axles and running gear			
	Air filter / intake			
	Handles			

Chainsaws	Bar and chain			
	Bumper spikes			
	Side casing			
	Front and rear handles, and chain brake			
	Base plate			
Brushcutters	Cutting blade / head			
	Underneath guard			
	Air filter / intake			
	Handles			
	Underneath engine housing			
Rake Hoes and Shovels	Check blades / head			
	Connection of handles with head (small cavities can fill with soil)			
	Handles			
Hand Saws, Secateurs, Loppers	Handles			
	Blades and hinges			
Clothing	Boots			
	Gaiters			
	Socks			
	Pants / Trousers			
	Shirts and jackets			
	Gloves			
	Hat			
Cleaning methods:	Mechanical (M) High Pressure Water (HPW)	Compressed Air (CA) Low Pressure Water (LPW)	Vacuum (V)	
Inspected By:		Signed:		
Cleaned By:		Signed:		

Appendix D: Ride Clean Collateral (NRM South)





WHEN YOUR BIKE IS COVERED IN MUD IT'S
A NO-BRAINER THAT WASHING IT WILL
MAKE IT RUN BETTER AND LAST LONGER.



But there's a bigger picture to consider. Mud can carry a whole bunch of microscopic nasties - pests, pathogens and weeds seeds that have the potential to devastate the bushland areas we love to ride in.

In fact, one drop of contaminated moisture from your bike is enough to put a pristine area at risk. There's a fungus called Chytrid that kills entire frog populations. An introduced algae called Rock Snot has already destroyed waterways in New Zealand. And a water mould called Phytophthora kills the roots of plants.

If you stick to the one area all the time then there's little risk of spreading unwanted organisms elsewhere. But if you're into long rides, or dragging your bike to different trails by car, then it's crucial that you don't unwittingly carry an unwanted hitchhiker between rides. Make sure your bike and gear are spotless each time you ride in a new place.

I'M NOT A MONSTER - HOW DO I DO MY BIT?



1.

Wash your bike using a gentle water spray and a biodegradable detergent.

(Don't use high-pressure spray - it can ruin your delicate seals). Pay attention to all the nooks and crannies, including under the saddle, cable guides, wheel hubs, suspension mounts, pedal clips, brake and gear levers, water-bottle holder ... Use a chain-cleaning brush to get into the spaces between the chain rings, and make sure the chain itself is clean. Don't forget your shoes, gloves, backpack, and anything else that can collect mud.

2.

Ask yourself whether the bike is likely to dry out completely before your next ride.

Most of the organisms we're worried about can't live without water, so the longer you give your bike to dry out the better. If you're likely to ride again before your bike can dry, spray the bike with F10, a non-toxic biodegradable veterinary disinfectant. Tackle all the little hidey-holes where water is likely to get stuck.

3.

Re-lube your chain and cassette.

A clean drive train repels mud and is easier to clean after a ride. Make sure your pedal threads and saddle post have a smidge of grease too.

KEY SPOTS TO CHECK & CLEAN





TO BE REALLY SURE, DISINFECT!

To get hold of some F10 – a non-toxic biodegradable disinfectant – visit www.nrmsouth.org.au/biosecurity



Appendix E: Weed Control Techniques

The most cost effective and successful weed control is achieved through an integrated weed control program, using a number of complementary methods together to achieve sustainable, long-term weed control.

Chipping

Chipping with a mattock or similar tool to manually chip out weeds is very effective for smaller weed infestations. When chipping, it is important to minimise soil disturbance to avoid stimulating the weed seed bank. Ideally, chipping should be undertaken when weeds are not in seed to minimise accidental spread. Chipped weeds are normally left to rot in the paddock.

Hand Pulling

Hand pulling weeds can be done at any time of the year, however, it is easiest when the soil is soft just after rain. Care needs to be taken to extract the whole plant and root system because many plants can regenerate from root fragments left in or on the ground. Hand-pulled weeds can be disposed of in the same way as chipped weeds.

Cultivation and Ploughing

Cultivation and ploughing are effective means of weed control and are usually used as a preparation for sowing or planting pastures and crops.

Grooming

Grooming is carried out by a specialised machine or an attachment on an excavator. Groomers are commonly used to mulch large woody weed infestation, such as gorse and hawthorn, minimising soil disturbance and the use of chemicals. This technique is usually followed up with spot-spraying of any regrowth. Ideally, this technique should be undertaken in stages and the weed infestation substituted with native vegetation in order to replace lost habitat for native animals.

Brush-cutting / Slashing

Brush-cutting or slashing is used primarily to reduce overall weed cover or as a short-term measure to stop seed-set on a particular weed. Any resulting re-growth will need to be followed up with weed control, e.g spraying, grazing.

Chemical Treatment

Used correctly, herbicides can be a very effective tool to control weed infestations. It is important to select the most appropriate chemical for your circumstances. Selective herbicides only target weeds with a certain characteristic, e.g. broad leaves, leaving grasses unaffected. This is very useful when dealing with broadleaved weeds in pasture or areas of native grass. Non-selective herbicides will control a wide variety of weeds.

There are a variety of chemical application techniques used for weed control. It is important to consider the target weed and desired outcome before selecting your technique. Be aware that the risk of weeds developing herbicide resistance is increased if the same chemical is used repeatedly on the same weed in the same location. It is advisable not only to vary the herbicide used but also the control method as part of an integrated control program. Spot spraying can be undertaken using a

hand-held spray unit, backpack, or large or small tanks fitted to a quad-bike, ute or trailer. An applicator such as a gun or a wand is used to direct the spray onto the target plant.

Spot Spraying: Spot spraying is suitable for small outbreaks of weeds or when applying herbicide amongst desirable plants such as improved pasture or native vegetation. Foliar spraying is a form of spot spraying typically used on larger woody weeds such as gorse, blackberry and hawthorn (this weed is mainly cut & paint, or drill/fill) Perhaps use Broom species or Spanish Heath.

Boom Spraying: Boom spraying requires specialised equipment fitted to a quad-bike or tractor, and is used for the application of herbicide on dense infestations of weeds or on large areas of weed infestation. Boom spraying is often undertaken prior to pasture renovation or cropping.

Cutting and Painting: Cutting and painting is generally performed on trees and shrubs with smaller trunks and stems using secateurs, loppers, handsaw or chainsaw. The main stem of the plant must be cut as close as possible to ground level to prevent potential suckering. To ensure the plant takes up the herbicide, paint the stump with undiluted herbicide within 15 seconds of the initial cut. If this procedure takes longer or the surface becomes contaminated with dirt, it may be necessary to re-cut or scrape the cut surface before applying the herbicide. A paint brush, atomiser or sponge can be used to apply the herbicide.

Drilling, Frilling and Filling: Drilling, frilling and filling is generally performed on trees and shrubs with thick trunks or where habitat for fauna needs to be maintained. Using a cordless, electric drill or hand drill, holes are made into the trunk on an angle 2-3cm deep and 5-10cm apart around the circumference. Alternatively, a hammer and chisel, an axe or tomahawk can be used to create wounds around the trunk. This technique is called 'frilling and filling'.

Within 15 seconds of the holes being drilled, or the frills being made, undiluted herbicide is injected/poured into each hole. To avoid suckering, the holes must be as close to the base of the plant as possible. It is important to treat every stem/trunk originating from the ground to prevent re-growth. Large multi-stemmed trees may also require the main branches to be drilled/frilled and filled. Deciduous trees should only be treated when they are actively growing, i.e. during spring and summer to ensure the plant takes up the herbicide.

Stem Scraping: Stem scraping is a technique that is often used on vines or when trees are growing horizontal to the ground, preventing drilling or frilling around the entire trunk. Simply scrape back the bark using a chainsaw or hand-tools, then apply herbicide as described for 'cutting and painting'. There are a variety of non-chemical and nonmechanical weed control methods which can be used as part of a sustainable, integrated weed control program.

Solarisation

Solarisation involves laying sheets of black plastic over weed infestations and letting the sun effectively 'cook' the plants. Best results are achieved on weeds growing in full sun; however, the sheet of plastic will need to remain securely in place for some time.

Mulching

Mulching with a 10 cm layer of mulch will help reduce the chance of weed seeds germinating. Securely placed old carpet or underlay, or a thick layer of newspaper, pre-soaked in water, can also be an effective way to smother weeds.

Biological Weed Control

Biological weed control using a biological control agent is an effective way to reduce the size and density of large weed infestations. Biological control should be viewed as a long-term weed control method that must be used in conjunction with other control techniques for an effective outcome. Results can sometimes take long periods of time before they become obvious.

Biological control has the benefit of reducing the amount of chemicals required, minimising environmental impacts and reducing costs. All biological control agents must undergo stringent testing to ensure there are no detrimental impacts on agriculture or the environment.

Fire

Fire can be used to control and suppress weeds, however, should only be used as a last resort because of the inherent risk of using fire. It generally does not kill the targeted weed, but is primarily used to reduce the overall cover of weeds and the need for large amounts of chemical.

Fire can also be used to deliberately stimulate germination of weed seeds in the soil. The resulting new weed growth must then be controlled with follow-up weed control. It is important to note that using fire as a weed control technique may risk damaging or destroying all vegetation, including desirable plants, and can result in re-invasion of weeds.

Competition or Replacement

One of the most effective weed control techniques is to prevent or minimise weed invasion by providing competition with desirable plants, e.g. pasture or native vegetation. Implementing replacement and management techniques is a long-term, cost effective and sustainable approach to weed management, and can enhance and protect natural resources. Providing competition will also ensure valuable resources such as water and nutrients are unavailable to weeds.

Revegetation

When controlling large infestations of weeds, particularly woody weeds such as gorse and blackberry, it is important to undertake it in stages. This allows the woody weeds to be substituted with native vegetation, replacing valuable habitat for native animals. Replacing woody weeds also provides valuable competition against re-invasion of weeds.

Follow-up

To achieve successful weed control, regular monitoring of treated areas must be undertaken for any re-growth or new germinations of weeds. New outbreaks of weeds must be controlled before they have a chance to reproduce and re-infest the site. Monitoring and follow-up weed control may need to occur for many years in order to eliminate an infestation completely.

Appendix F: Weed Inspection Record Sheet (Draft) (also in the Trail Maintenance Plan)

Weed Inspection Record Sheet						
Date		Inspected By	Landowner			
			GTC	BBA		
			PWS	Crown		
Trail Name	Weed Identified (or suspected)			Repair / Solution / Required Tools		
Location on Trail						
	Risk Rating	Low	Medium	High	Extreme	
Date		Inspected By	Landowner			
			GTC	BBA		
			PWS	Crown		
Trail Name	Weed Identified (or suspected)			Repair / Solution / Required Tools		
Location on Trail						
	Risk Rating	Low	Medium	High	Extreme	
Date		Inspected By	Landowner			
			GTC	BBA		
			PWS	Crown		
Trail Name	Weed Identified (or suspected)			Repair / Solution / Required Tools		
Location on Trail						
	Risk Rating	Low	Medium	High	Extreme	
Date		Inspected By	Landowner			
			GTC	BBA		
			PWS	Crown		
Trail Name	Weed Identified (or suspected)			Repair / Solution / Required Tools		
Location on Trail						
	Risk Rating	Low	Medium	High	Extreme	
Date		Inspected By	Landowner			
			GTC	BBA		
			PWS	Crown		
Trail Name	Weed Identified (or suspected)			Repair / Solution / Required Tools		
Location on Trail						
	Risk Rating	Low	Medium	High	Extreme	

Risk Ratings	
Low	Weed located outside the 20m trail corridor or 15m perimeter of the trail head areas Rectification required within 4 weeks (20 working days).
Medium	Weed located within the 20m trail corridor or 15m perimeter of the trail head areas. Rectification required within 2 weeks (10 Working days).
High	Weed located within 1.5m of the trail tread or high-trafficked area (bike, pedestrian or vehicle). Rectification required within 1 week (5 Working days).
Extreme	Weed located within the immediate trail tread or high-trafficked area (bike, pedestrian or vehicle). Rectification required immediately.

Appendix G: Generic CEMP (Construction and Environmental Management Plan)

(Not yet developed)

Appendix H: Herbicides for Weed Control

Source of Information

All information listed in Appendix D was collected from <https://dpiwwe.tas.gov.au/invasive-species/weeds/weeds-index>

Disclaimer

These herbicide recommendations are made subject to the product being registered for that purpose under relevant legislation. It is the user's responsibility to check that registration or an off-label permit covers the proposed use. Always read the herbicide label.

If in doubt, check with the Registrar of Chemical Products - 1300 368 550 (local call cost in Tasmania).

Wetting agents

Most herbicides require a wetting agent for best results. Carefully consult the product label for specific directions regarding any adjuvants.

Waterways and wetlands

Be careful! Many herbicides can cause damage to waterways and wetlands. Check the herbicide label directions carefully before use near waterways and wetlands. For more information see Guidelines for Safe and Effective Herbicide Use Near Waterways.

Herbicide brands

Herbicides are referred to by the active chemical ingredient in the following tables. Information on available brands containing the herbicide you require should be obtained from a reputable herbicide supplier.

Herbicides for Weed Control - Gorse				
Herbicide (active ingredient)	Commercial products (concentration of active ingredient)	Rate of commercial product per litre of water	Withholding period	Comments
Foliar (leaf) application				
Triclopyr+ **Picloram + Aminopyralid	Grazon Extra (300 g/L + 100 g/L + 8g/L)	2.5 ml (bushes 1-1.5 m tall) 3.5 ml (bushes > 1.5 m tall) 5 ml	nil	Use in spring to early summer treatments only: add a 100% concentrate non-ionic surfactant at 1ml per litre of water for best results. Autumn Treatment: add a 100% concentrate non-ionic surfactant at 1ml per litre of water for best results. Winter treatment only: Brownout may not be complete until summer. Add a 100% concentrate non-ionic surfactant at 1ml per litre of water for best results. **Picloram is soil-residual, hindering the re-establishment of clovers and other broadleaved plants for up to twelve months. In dense stands, access paths should be cleared to allow complete coverage. Regrowth needs to be around 50 - 100 cm high before follow-up treatment. Does not affect grasses, will damage clovers and other broadleaved plants including surrounding trees.
Triclopyr + **Picloram	Grass-up™ (300g/L + 100g/L)	2.5 ml (bushes 1-1.5 m tall) 3.5 ml (bushes > 1.5 m tall)	nil	Use in spring to early summer treatments only: add a 100% concentrate non-ionic surfactant at 1ml per litre of water for best results. Autumn Treatment: add a 100% concentrate non-ionic surfactant at 1ml per litre of water for best results. Winter treatment only: Brownout may not be complete until summer. Add a 100% concentrate non-ionic surfactant at 1ml per litre of water for best results. **Picloram is soil-residual, hindering the re-establishment of clovers and other broadleaved plants for up to twelve months.

		5 ml		In dense stands, access paths should be cleared to allow complete coverage. Regrowth needs to be around 50 - 100 cm high before follow-up treatment. Does not affect grasses, will damage clovers and other broadleaved plants including surrounding trees.
Triclopyr	Garlon 600 (600 g/L)	1.7 ml - 3.4 ml	nil	Apply from spring to mid-summer. Does not affect grasses, will damage clovers and other broadleaved plants including surrounding trees. Use the higher rate on older plants. Preferred to triclopyr + **picloram mixture in urban or horticultural areas, and near waterways/wetlands.
*Metsulfuron-methyl	Brush-Off (600 g/Kg)	0.1 - 0.15 g	nil	APVMA Off-Label permit - PER84775. Suitable for bushes up to 2 m tall. Does not affect grasses, will damage clovers and other broadleaved plants including surrounding trees. Metsulfuron-methyl is soil-residual, hindering the re-establishment of clovers and other broadleaved plants for up to twelve months.
Glyphosate	Roundup Biactive (360 g/L) Glyphosate 360 (360 g/L)	10 - 15 ml	1 day	Apply all year round but only if actively growing. Non-selective and will affect grasses, clovers and most broadleaf plants.
Ammonium thiocyanate	Amitrole T® (220 g/L)	20 ml	Orchards and vines - 56 days Other areas - nil	Apply during summer or before full flowering. Non-selective and will affect grasses, clovers and most broadleaf plants. Use in restricted spraying areas. Apply to bushes up to 2 m tall. Respraying will be necessary.
Glyphosate+Metsulfuron-methyl	Trounce® (835 g/L + 10 g/L)	1.7 g	nil	Actively growing (except spring). Use in restricted spraying areas. Use surfactant as directed by label.

**Note: picloram remains active in soil for extended periods and may leach into groundwater

Source: - <https://dpiwwe.tas.gov.au/invasive-species/weeds/weeds-index/declared-weeds-index/gorse/gorse-herbicides-for-control>

Cut-stump application

Herbicide (active ingredient)	Commercial products (concentration of active ingredient)	Rate of commercial product per litre of	Withholding period for use	Comments
----------------------------------	---	--	-------------------------------	----------

		water	in pasture	
Glyphosate	Roundup Biactive (360 g/L) Glyphosate 360 (360 g/L)	1 litre	nil	Use when plants are actively growing. Apply immediately (within 15 seconds) after top growth removal.
*Triclopyr	Garlon 600 (600 g/L)	1:60 in diesel	nil	For cut-stump treatment. Apply immediately (within 15 seconds) after top growth removal; (APVMA Off-Label permit - PER84775).
**Picloram	Vigilant® Herbicide Gel 43 g/kg	3 - 5 mm thick layer 5 mm	nil	Stems up 20 mm diameter. Stems greater than 20 mm diameter. In the case of multi-stem plants treat at least 80% of stems including main stems.

**Note: picloram remains active in soil for extended periods and may leach into groundwater.

*These products are not registered for this application method in Tasmania and will not be mentioned on product labels, however Permit Number – PER84775 issued by the Australian Pesticides & Veterinary Medicines Authority has been issued for this specific use. If using this method and herbicide you will require a copy of this off-label permit.

Source: - <https://dpiwwe.tas.gov.au/invasive-species/weeds/weeds-index/declared-weeds-index/gorse/gorse-herbicides-for-control>

Herbicides for Weed Control - Boneseed

Foliar spray application

Stage of Growth	Herbicide (active ingredient)	Example of commercial product (concentration of	Application rate of commercial product	Withholding period	Comments
-----------------	-------------------------------	---	--	--------------------	----------

		active ingredient)			
Seedlings	Bromoxynil		160 mL per 100 L water Plus adjuvants in accordance with label as required	14 days	Pastures, Roadsides and Right-of-Ways Seedlings only. Apply when actively growing. Ensure an overall spray coverage.
Actively growing to mature	Glyphosate 360 g/L	Roundup® 360 g/L	Knapsack 75 mL or 150 mL in 15 L or high volume 500 mL or 1000 mL / 100 L of water		Non-agricultural areas (refer label). Spray to wet all foliage. Use higher rate on bushes over 1.5m tall. Do not spray during periods of drought. Best treated at peak flowering during winter.
	Glyphosate * 360 g/L (where product has an aquatic registration)	Weedmaster Duo® 360 g/L Roundup Biactive® 360 g/L	10-13 ml/L Plus adjuvants in accordance with label as required		Non-cropping and bushland In accordance with APVMA Permit PER84775 Spot spraying Use lower rate on young bushes. Spray to wet all foliage. Do not spray during hot, dry conditions.
	Glyphosate	Roundup Power Max® 540 g/L	330 - 660m L/L of Water		Non-agricultural areas (around buildings, commercial and industrial areas, domestic and public service areas, right-of-ways). Higher rate to bushes over 1.5 m. Apply as a thorough foliage spray when bushes are in full leaf and actively growing
	Metsulfuron-methyl,	Associate®, Brush-off® 600 g/Kg	10 g in 100 L water		Native pastures, rights of way, commercial and industrial areas Legumes in the pasture will be damaged Add surfactant/ wetting agent in accordance with product label. Apply to point of run-off. Minimise contact with desirable plants.
	Metsulfuron-methyl, *	Associate®, Brush-off® 600 g/Kg	10 g in 100 L water		Non cropping and bushland In accordance with APVMA Permit PER84775 Spot spraying / knapsack Add surfactant/ wetting agent in accordance with product label.
	Metsulfuron- methyl + glyphosate*	various concentrations	10g Metsulfuron-methyl & 200mL Glyphosate 360 per 100 L		Non cropping and bushland In accordance with APVMA Permit PER84775 Spot spraying / knapsack Add surfactant/ wetting agent in accordance with product label.

	Triclopyr, * Picloram **	Conqueror® (300 g/L, 100 g/L)	Foliar spray 350 - 500 mL/ 100 L of water		Non cropping and bushland Spot spray / knapsack application In accordance with APVMA Permit PER84775
	Triclopyr*	Garlon 600 (600 g/L)	170 mL/ in 100 L of water		Non cropping and bushland Spot spray / knapsack application In accordance with APVMA Permit PER84775

**Note: Picloram remains active in the soil for extended periods and may leach into groundwater.

<https://dipwe.tas.gov.au/invasive-species/weeds/weeds-index/declared-weeds-index/boneseed/boneseed-herbicides-for-control>

Drill axe, cut stump and basal bark application

Stage of Growth	Herbicide (active ingredient)	Example of commercial product (concentration of active ingredient)	Application rate of commercial product	Withholding period	Comments
Actively growing to mature	Glyphosate* 360 g/L (where product has an aquatic registration)	Weedmaster® Duo 360 g/L Roundup Biactive® 360 g/L	drill axe 2 ml undiluted per hole/cut		Non cropping and bushland In accordance with APVMA Permit PER84775

	Glyphosate* 360 g/L (where product has an aquatic registration)	Weedmaster® Duo 360 g/L Roundup Biactive® 360 g/L	cut stump 1:5 - undiluted.		Non cropping and bushland In accordance with APVMA Permit PER84775 Trees and shrubs generally. Undiluted for blackberry, bulbs and hard to kill weeds.
	Picloram ** 43g/kg.	Vigilant® Herbicide gel	cut stump Direct application of gel as per label		Home use: native vegetation, conservation areas, gullies, reserves and parks Do not use if rain likely to fall within 12 hours of application. Avoid use over or near desirable plants, or in areas where their roots may extend or where the chemical may be washed or moved to their roots.
	Triclopyr*	Garlon 600® (600 g/L)	cut stump 1:60 with diesel distillate		Non cropping and bushland In accordance with APVMA Permit PER84775 Cut stump method: Apply immediately after cut is made.
	Triclopyr * 240 g/L, Picloram ** 120 g/L.	Access	cut stump 1 litre per 60 litres diesel distillate		Non cropping and bushland In accordance with APVMA Permit PER84775 Cut stump method: Apply immediately after cut is made.

**Note: Picloram remains active in the soil for extended periods and may leach into groundwater.

* These products are not registered for this application method in Tasmania and will not be mentioned on product labels, however Permit Number - PER84775 issued by the Australian Pesticides & Veterinary Medicines Authority has been issued for this specific use. If using this method and herbicide you will require a copy of this off-label permit.

<https://dpiwwe.tas.gov.au/invasive-species/weeds/weeds-index/declared-weeds-index/boneseed/boneseed-herbicides-for-control>

Unanticipated Discovery Plan

Procedure for the management of unanticipated discoveries of Aboriginal relics in Tasmania

For the management of unanticipated discoveries of Aboriginal relics in accordance with the *Aboriginal Heritage Act 1975* and the *Coroners Act 1995*. The Unanticipated Discovery Plan is in two sections.

Discovery of Aboriginal Relics other than Skeletal Material

Step 1:

Any person who believes they have uncovered Aboriginal relics should notify all employees or contractors working in the immediate area that all earth disturbance works must cease immediately.

Step 2:

A temporary 'no-go' or buffer zone of at least 10m x 10m should be implemented to protect the suspected Aboriginal relics, where practicable. No unauthorised entry or works will be allowed within this 'no-go' zone until the suspected Aboriginal relics have been assessed by a consulting archaeologist, Aboriginal Heritage Officer or Aboriginal Heritage Tasmania staff member.

Step 3:

Contact Aboriginal Heritage Tasmania on **1300 487 045** as soon as possible and inform them of the discovery. Documentation of the find should be emailed to **aboriginal@heritage.tas.gov.au** as soon as possible. Aboriginal Heritage Tasmania will then provide further advice in accordance with the *Aboriginal Heritage Act 1975*.

Discovery of Skeletal Material

Step 1:

Call the Police immediately. Under no circumstances should the suspected skeletal material be touched or disturbed. The area should be managed as a crime scene. It is a criminal offence to interfere with a crime scene.

Step 2:

Any person who believes they have uncovered skeletal material should notify all employees or contractors working in the immediate area that all earth disturbance works cease immediately.

Step 3:

A temporary 'no-go' or buffer zone of at least 50m x 50m should be implemented to protect the suspected skeletal material, where practicable. No unauthorised entry or works will be allowed within this 'no-go' zone until the suspected skeletal remains have been assessed by the Police and/or Coroner.

Step 4:

If it is suspected that the skeletal material is Aboriginal, Aboriginal Heritage Tasmania should be notified.

Step 5:

Should the skeletal material be determined to be Aboriginal, the Coroner will contact the Aboriginal organisation approved by the Attorney-General, as per the *Coroners Act 1995*.

Guide to Aboriginal site types

Stone Artefact Scatters

A stone artefact is any stone or rock fractured or modified by Aboriginal people to produce cutting, scraping or grinding implements. Stone artefacts are indicative of past Aboriginal living spaces, trade and movement throughout Tasmania. Aboriginal people used hornfels, chalcedony, spongelite, quartzite, chert and silcrete depending on stone quality and availability. Stone artefacts are typically recorded as being 'isolated' (single stone artefact) or as an 'artefact scatter' (multiple stone artefacts).

Shell Middens

Middens are distinct concentrations of discarded shell that have accumulated as a result of past Aboriginal camping and food processing activities. These sites are usually found near waterways and coastal areas, and range in size from large mounds to small scatters. Tasmanian Aboriginal middens commonly contain fragments of mature edible shellfish such as abalone, oyster, mussel, warrener and limpet, however they can also contain stone tools, animal bone and charcoal.

Rockshelters

An occupied rockshelter is a cave or overhang that contains evidence of past Aboriginal use and occupation, such as stone tools, middens and hearths, and in some cases, rock markings. Rockshelters are usually found in geological formations that are naturally prone to weathering, such as limestone, dolerite and sandstone

Quarries

An Aboriginal quarry is a place where stone or ochre has been extracted from a natural source by Aboriginal people. Quarries can be recognised by evidence of human manipulation such as battering of an outcrop, stone fracturing debris or ochre pits left behind from processing the raw material. Stone and ochre quarries can vary in terms of size, quality and the frequency of use.

Rock Marking

Rock marking is the term used in Tasmania to define markings on rocks which are the result of Aboriginal practices. Rock markings come in two forms; engraving and painting. Engravings are made by removing the surface of a rock through pecking, abrading or grinding, whilst paintings are made by adding pigment or ochre to the surface of a rock.

Burials

Aboriginal burial sites are highly sensitive and may be found in a variety of places, including sand dunes, shell middens and rock shelters. Despite few records of pre-contact practices, cremation appears to have been more common than burial. Family members carried bones or ashes of recently deceased relatives. The Aboriginal community has fought long campaigns for the return of the remains of ancestral Aboriginal people.

Further information on Aboriginal Heritage is available from:

Aboriginal Heritage Tasmania
Natural and Cultural Heritage Division
Department of Primary Industries, Parks, Water and Environment
GPO Box 44 Hobart TAS 7001

Telephone: **1300 487 045**

Email: **aboriginal@heritage.tas.gov.au**

Web: **www.aboriginalheritage.tas.gov.au**

This publication may be of assistance to you but the State of Tasmania and its employees do not accept responsibility for the accuracy, completeness, or relevance to the user's purpose, of the information and therefore disclaims all liability for any error, loss or other consequence which may arise from relying on any information in this publication.





***TIPPOGOREE HILLS BIKE
TRAIL NETWORK – SHUTTLE
BUS ACCESS OFF BRIDPORT
MAIN ROAD, GEORGE TOWN***

**TRAFFIC IMPACT
ASSESSMENT**

Hubble Traffic

March 2021

Contents

1. Introduction	2
2. Site Description	3
3. Development proposal	4
4. Trip generation at the proposed access	5
4.1. Expected trips generated by the shuttle bus operation.....	5
4.2. Current traffic movements operating at the access	5
5. Existing traffic Conditions	6
5.1. Bridport Main Road	6
5.2. Speed limit and operating speed	7
5.3. Traffic activity along Bridport Main Road	7
5.4. Traffic safety along the route	8
5.5. Horizontal and vertical alignment.....	8
6. Impact from traffic generated by this development	9
6.1. Additional traffic movements operating on Bridport Main Road.....	9
6.2. New access location.....	9
6.3. Available sight distance	10
6.4. Safe Intersection Sight Distance	11
6.5. Stopping sight distance.....	11
6.6. Forward sight distance	12
6.7. Vehicle turning warrant.....	12
6.8. Right turn treatment on Bridport Main Road.....	13
6.9. Upgrade of access	14
7. Construction of internal access road	15
8. Planning scheme	16
8.1. E4.6 Road and Railway Assets Code.....	16
8.2. E6.0 Parking and Sustainable Transport Code	17
8.3. E6.8 Provision for sustainable Transport	17
9. Conclusion	18

1. Introduction

Peter Rickards, Project Manager for the George Town Council, has engaged Hubble Traffic Consulting to prepare an independent Traffic Impact Assessment, to consider the traffic impacts of creating a shuttle bus arrangement to facilitate access to the Tippoogoree Hills Conservation Area, located off Bridport Main Road, Georgetown.

Tippoogoree Hills will contain various mountain bike trails and access will only be via a shuttle bus operation.

This report has considered the amount of traffic currently using the access, and how the expected increase in traffic movements generated by this use will integrate with the Bridport Main Road.

The development site is located within the Tippoogoree Hills Conservation Area, and the developer for this project is the George Town Council.

This report has been prepared to satisfy the requirements of Austroads, Guide to Traffic Management Part 12: Traffic Impacts of Developments, 2019. This assessment has referred to the following information and resources:

- George Town Council Planning Scheme (planning scheme)
- Road Traffic Authority NSW (RTA) Guide to Traffic Generating Developments
- Australian Standards 2890
- Austroads series of Traffic Management and Road Design
 - Part 4: Intersection and crossings, General
 - Part 4a: Unsignalised and Signalised Intersections
 - Part 8: Local street management
 - Part 12: Traffic Impacts of Development
- Department of State Growth crash database
- Google Earth imagery

2. Site Description

The development will utilise an access located on the southern side of Bridport Main Road, approximately 1.6 kilometres east of the East Tamar Highway.

The bike trail development is located on crown land located within the Tippoogoree Hills Conservation Area and on private freehold land (PID 2830796) owned by Rio Tinto Aluminium (Bell Bay) Limited.



2.0 Map – Extract from Google

3. Development proposal

As part of the Tippogoree Hill Trail Network, a shuttle bus access road is to be constructed from the Bridport Main Road to a high point in the Tippogoree Hills.

The purpose is to allow access to a shuttle bus service (12 seater mini bus and trailer) to transport mountain bikers to the high point.

The developer has advised, the shuttle bus access road will be gated with a lock to control access; and during peak season the maximum number of vehicular movements will be limited to 60. At peak operating periods, traffic movements will be generated by three commercial shuttle buses, undertaking a round trip every hour. This service is expected to be operating seasonally; likely to operate every day during the summer school holidays, and three days a week outside of this period.

The shuttle buses will commence operating from George Town, travel east along Bridport Main Road to the proposed access point, negotiate the shuttle access road to drop the mountain bikers at the high point, then return to George Town.

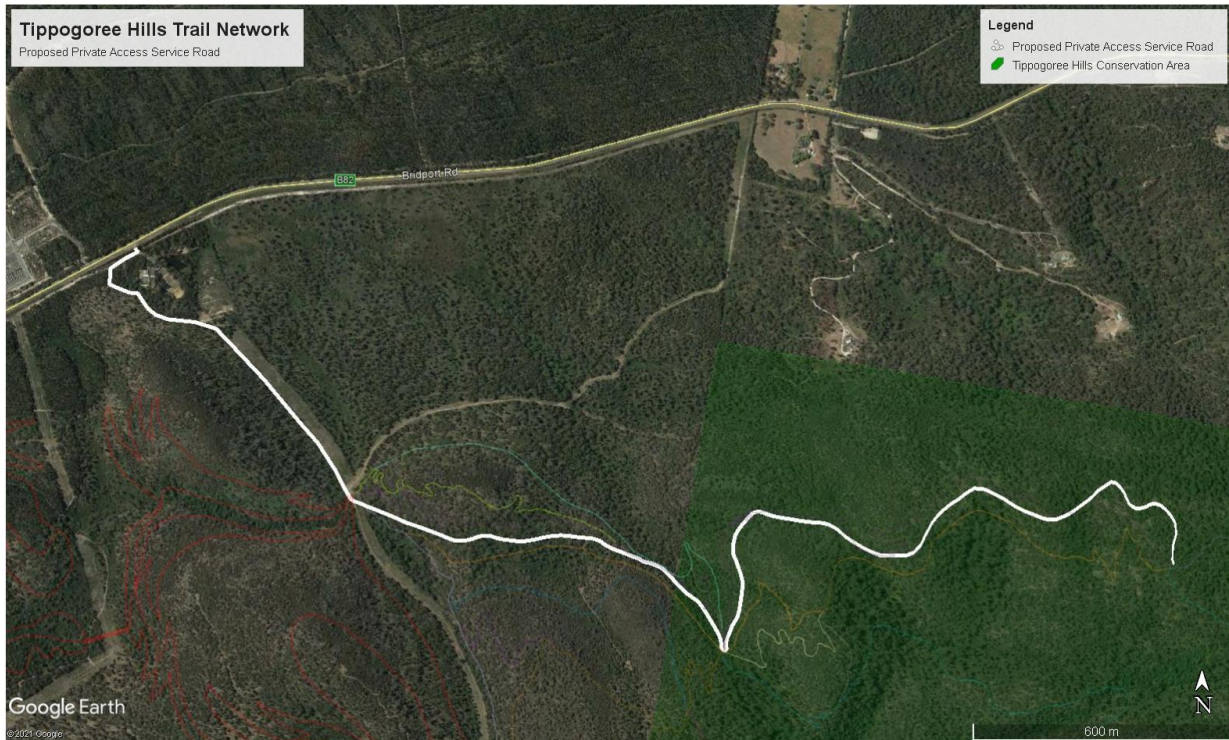


Diagram 3.0A – Layout of development site

4. Trip generation at the proposed access

A trip in this report is defined as a one way vehicular movement from one point to another, excluding the return journey. Therefore, a return trip to and from a land use is counted as two trips.

To determine the number of trips likely to be generated by this development, information has been sourced from the developer:

4.1. Expected trips generated by the shuttle bus operation

Three shuttle buses will operate at peak times on an hourly rotation, with the maximum number of traffic trips 60 per day.

Based on this information, the buses are expected to generate three right turn movements off the Bridport Main Road, and three left turns onto the Bridport Main Road per peak operational hour.

4.2. Current traffic movements operating at the access

The current gravel access point generally has a low frequency of traffic movements; used at the weekend by the local Black Powder Gun and Pistol Clubs; and expected to generate some 40 trips on the weekend, during the day.

The access can also be used by service vehicles accessing both the Bell Bay Aluminium and Basslink, on an infrequent basis.

5. Existing traffic Conditions

The shuttle buses will travel to the development site along the Bridport Main Road from George Town and return to George Town, which will entail a right turn movement off Bridport Main Road onto the access road, and a left turn off the access road towards George Town. The shuttle buses will not turn right out of the access road.

This section of the report will examine the current traffic flow and conditions.

5.1. Bridport Main Road

Bridport Main Road is part of the State Road Network managed by the Department of State Growth (the Department), and under the Tasmanian State Road Hierarchy is classified as Category 2 – Regional Freight Road.

Regional Freight Roads link major production catchments to the Trunk Road network, are designed to accommodate heavy inter-regional and sub-regional freight movements and provide safe and efficient access for passenger and tourist vehicles.

Bridport Main Road is a limited access road, and creation of a new access is not permitted unless the access is gazetted as a public road; for this reason, an existing access is being used for this development.

At the proposed access point, Bridport Main Road is a two-way rural road with three metre wide traffic lane in each direction, with gravel shoulders. The road is line marked by a centreline and there are guide posts located along the side of the roadway. The adjacent land-use in the vicinity of the proposed access is undeveloped land.

5.1 Photograph of the typical road standard



5.2. Speed limit and operating speed

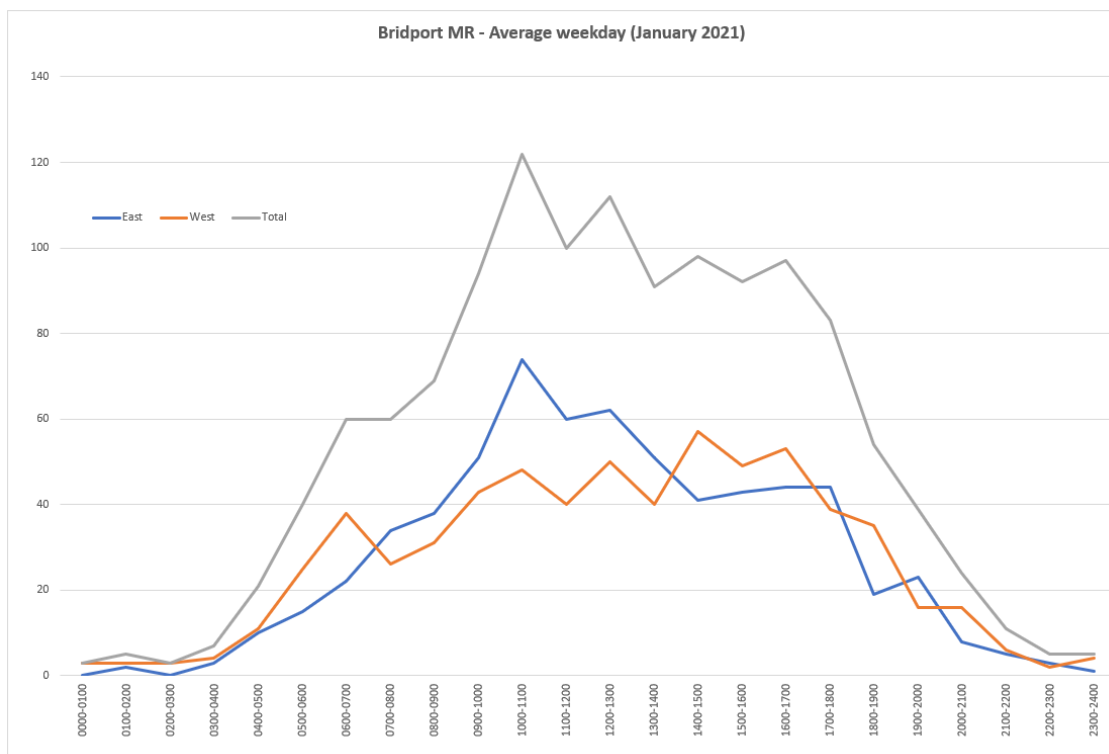
Bridport Main Road, between the East Tamar Highway and Bridport, operates under the general rural default speed limit of 100 km/h. The road characteristics within the proposed access point suggests 100km/h is likely to be the operating speed of vehicles.

5.3. Traffic activity along Bridport Main Road

The Department maintains a database of traffic flows for the State Road Network, and interrogation of the traffic data station east of the proposed access point provided the following traffic flows:

- Highest eastbound traffic flow is less than 80 vehicles per hour.
- Average two-way traffic flow of 100 vehicles per hour.
- Weekday and weekends had similar traffic flows.

Graph 5.3 – Average weekday directional traffic flow for January 2021



With the Category 2 road status, the number of freight vehicles is expected to be a significant proportion of the traffic flow. The vehicle data collected at the traffic station classifies each vehicle based on wheel base and axle numbers. From this data, it can be determined the type of vehicles using the roadway, with this data represented in the following table.

Table 5.3 – Vehicle classification

Vehicle class	Number of vehicles	Classification	Type of vehicles	Total	%
1	25741	Short vehicles	Passenger vehicles	28099	76%
2	2358				
3	2309	Medium vehicles	Buses and two or three axle trucks	3300	9%
4	471				
5	520				
6	131	Long vehicles	Semi-trailers	3166	9%
7	463				
8	415				
9	2157				
10	2387	Medium combination	B-Double	2400	6%
11	13				
Total	36965			36965	

As expected, buses and heavy vehicles represents 24 percent of the traffic flow, with 15 percent of these being long vehicles, such as semi-trailers and B-Doubles.

5.4. Traffic safety along the route

The Department maintains a database of reported road crashes. A check of this database found one reported crash within one kilometre either side of this access location in the last five years. This was a single vehicle driving west, that lost control when the road surface was wet, while negotiating a slight left-hand curve, and the occupant received minor injury.

This low number of reported crashes indicates motorists are not encountering any difficulties while travelling through this road section.

5.5. Horizontal and vertical alignment

Generally, the horizontal alignment along Bridport Main Road is straight. There is a vertical crest located west of the proposed access point, and this crest can limit available sight distance. The impact of the vertical crest is discussed in section 6.3 of this assessment.

6. Impact from traffic generated by this development

As determined in section 4 of this assessment, this development has the potential to generate a maximum of 60 daily traffic movements when the development is operating. This would involve six traffic movements per hour, comprising of three right turns off and three left turns onto Bridport Main Road, within an hour.

6.1. Additional traffic movements operating on Bridport Main Road

Given the operation, trips generated from this development will be new trips.

The average hourly directional (eastbound) traffic flow operating along the Bridport Main Road is less than 80 vehicles per hour, and this represents a volume to capacity ratio, of five percent of the lane capacity.

The increase in traffic flow generated by this development, will have no adverse efficiency impact to the traffic flow along the Bridport Main Road.

6.2. New access location

The developer has identified an existing gravel access located approximately 1.6 kilometres east of the East Tamar Highway, as the preferred site for the shuttle buses to leave and re-enter the Bridport Main Road, as it connects with existing hinterland tracks.

Photograph 6.2 – Proposed access location.



6.3. Available sight distance

The proposed access is located east of a vertical crest, and on-site measurements were taken between a driver leaving the access and approaching vehicles. The eye height of the driver was 1.1 metres high, with the approaching vehicle at 1.2 metres high.

For a driver looking west towards vehicles approaching from the East Tamar Highway, the available sight distance measured 170 metres as shown in photograph 6.3A. While in the opposite direction the available sight distance exceeds 300 metres and is shown in photograph 6.3B.

Photo 6.3 A – View for drivers looking left of approaching vehicles from East Tamar Highway



Photo 6.3B – View for drivers looking right of approaching vehicles from Bridport.



6.4. Safe Intersection Sight Distance

It is important that motorists leaving the access have suitable sight distance to enter and leave Bridport Main Road in a safe manner, without impacting other motorists.

The planning scheme table E4.7.4 prescribes the Safe Intersection Sight Distance (SISD), and for a speed limit of 100 km/h the required SISD is 250 metres.

The SISD can be influenced by vertical grades of the approaching roadway, as a vehicle travelling on a downhill grade will need longer distance to stop, due to the weight and momentum of the vehicle, while the opposite occurs for a vehicle travelling uphill.

Austrroads Guide to Road Design provides guidance on grade correction for steep grade. The vertical crest located east of the proposed access location creates a six percent uphill grade, and this represents a reduction of sight distance of 22 metres for this approach.

The revised SISD with grade correction is 228 metres for vehicles approaching from a westerly direction (East Tamar Highway).

The intersection sight distance enables a turning vehicle to pick a gap in the traffic stream and complete their manoeuvre without impacting other road users. In this case, a shuttle bus approaching the access from a westerly direction (East Tamar Highway) and undertaking a right hand turn off the roadway. The driver of the shuttle bus will have adequate intersection sight distance (300 metres) of a vehicle approaching in a westerly direction from Bridport.

Similarly, a shuttle bus leaving the proposed access will turn left onto Bridport Main Road heading towards George Town, with the driver having adequate intersection sight distance of vehicles approaching from a westerly direction.

The vertical crest is marked with a double barrier centreline, prohibiting vehicles from overtaking.

Shuttle buses will not be allowed to exit the access point and turn right towards Bridport.

Based on the shuttle bus turning manoeuvres, available sight distance will exceed the minimum Safe Intersection Sight Distance.

6.5. Stopping sight distance

It is important to recognise that Safe Intersection Sight Distance is the preferred parameter for vehicles entering a major roadway, as it allows for the turning vehicle to enter the roadway without disrupting other road users. The Stopping Sight Distance is the minimum sight distance where an approaching vehicle will see a turning vehicle enter the roadway, and the approaching driver has sufficient distance to react, stop, to avoid a collision.

Austrroads provides guidance on Stopping Sight Distance. With the parameters of a driver having a reaction time of 2.5 seconds (unalert due to the prevailing road environment), on a six percent uphill grade, and travelling 100 km/h, the corresponding Stopping Sight Distance is 163 metres, and is less than the available 170 metres sight distance.

6.6. Forward sight distance

This is the distance for an approaching driver to see a stationary object or vehicle on the roadway ahead, and have sufficient time to react, stop, to avoid a collision. For a stationary vehicle turning right off the roadway, the approaching driver should be able to see the vehicles tail lights which is 0.65 metres above the road surface, with the driver eye height being 1.1 metres above the road surface.

Available forward sight distance for eastbound vehicles was measured on sight, and found to be 170 metres.

Austrroads provide guidance on forward sight distance, for a 100 km/h speed environment, the recommended forward sight distance is 163 metres for passenger type vehicles. While drivers of heavy vehicles require longer forward sight distance, due to reduced deceleration performance of heavy vehicles. However, the eye height of a driver in a heavy vehicle is much higher at 2.4 metres above the road surface, compared with a passenger driver being 1.1 metres above the road surface. This means when the road alignment is straight, the heavy vehicle driver can see the stationary vehicle earlier, and the available Stopping Sight Distance for heavy vehicles on approach to this access is considered adequate.

6.7. Vehicle turning warrant

With the development creating additional vehicle movements turning right off the Bridport Main Road, the type of turning treatment must be considered. Austrroads provide guidance of turning treatments, which is based on the number of vehicles turning and the number of vehicles travelling on the roadway.

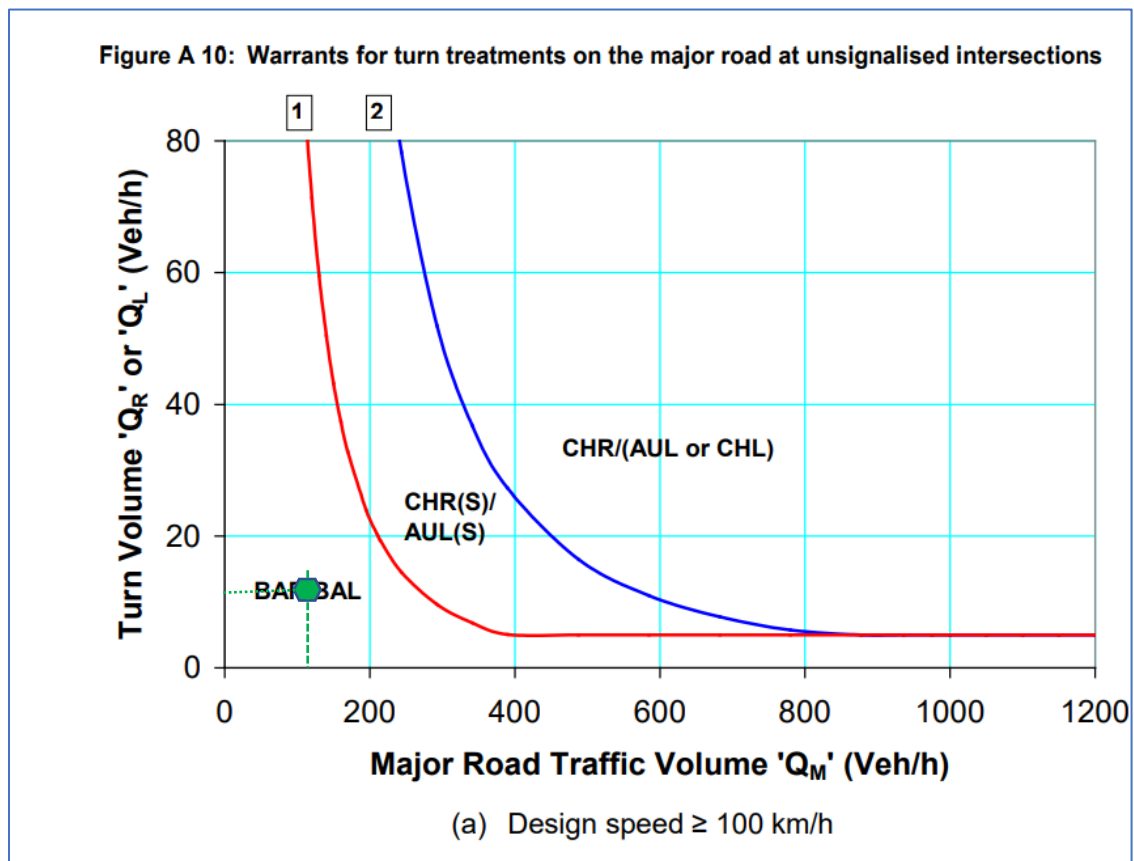
Currently there is no turning treatment at the existing access location.

Although the number of right turn shuttle bus movements per hour is low, having consideration to the current weekend users, it is estimated seven right turn movements per peak hour could be expected, with a traffic flow of 120 vehicles (two-way) along Bridport Main Road. This combination of right turn movements and through traffic requires the provision of a Basic Auxiliary Right (BAR) turn lane, as per Austrroads turning warrant shown in diagram 6.7 below.

However, the Austrroads guide indicates, ***“if a turn is associated with other geometric minima, consideration should be given to the adoption of a turn treatment of a higher order than that indicated by the warrants.”***

Based on the presence of the vertical crest limiting available sight distance for approaching vehicles; consideration of the Category 2 road classification, with the high heavy vehicle content operating on the roadway; shuttle buses capable of carrying 12 passengers; a short marked right turn lane (CHRS) is considered appropriate.

Diagram 6.7 – Austroads turning warrant for 100 km/h speed environment.

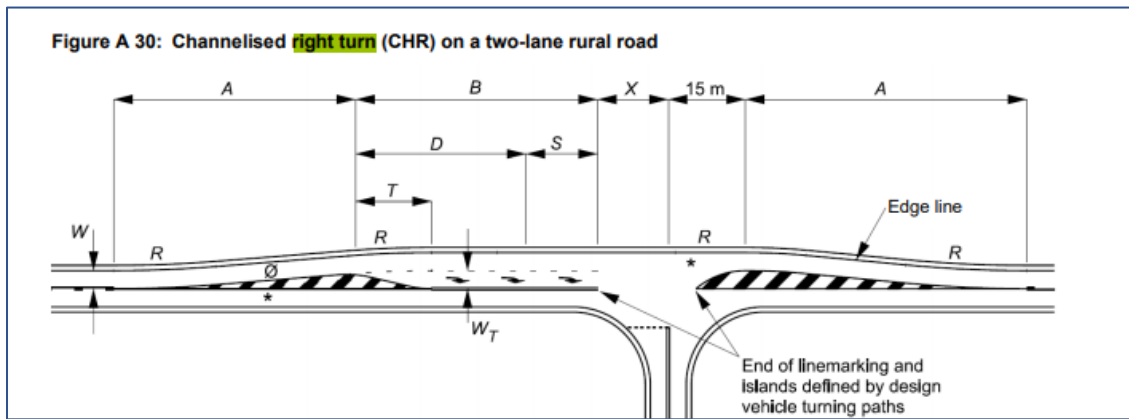


6.8. Right turn treatment on Bridport Main Road

Without the presence of the vertical crest east of the access location, a (BAR) turn lane would be required, which is widening on the shoulder to allow for an approaching vehicle to pass a stationary right turning vehicle on the left at a reduced operating speed.

While, a short right turn lane (CHRS) requires slightly more road widening, it creates a painted area where the stationary right turning vehicle is protected from approaching vehicles, as all through vehicles are directed around the stationary vehicles by appropriate road markings. The passing vehicles can maintain their operating speed, and this type of turning treatment provides a higher level of safety for all road users, and considered appropriate for this road function and classification.

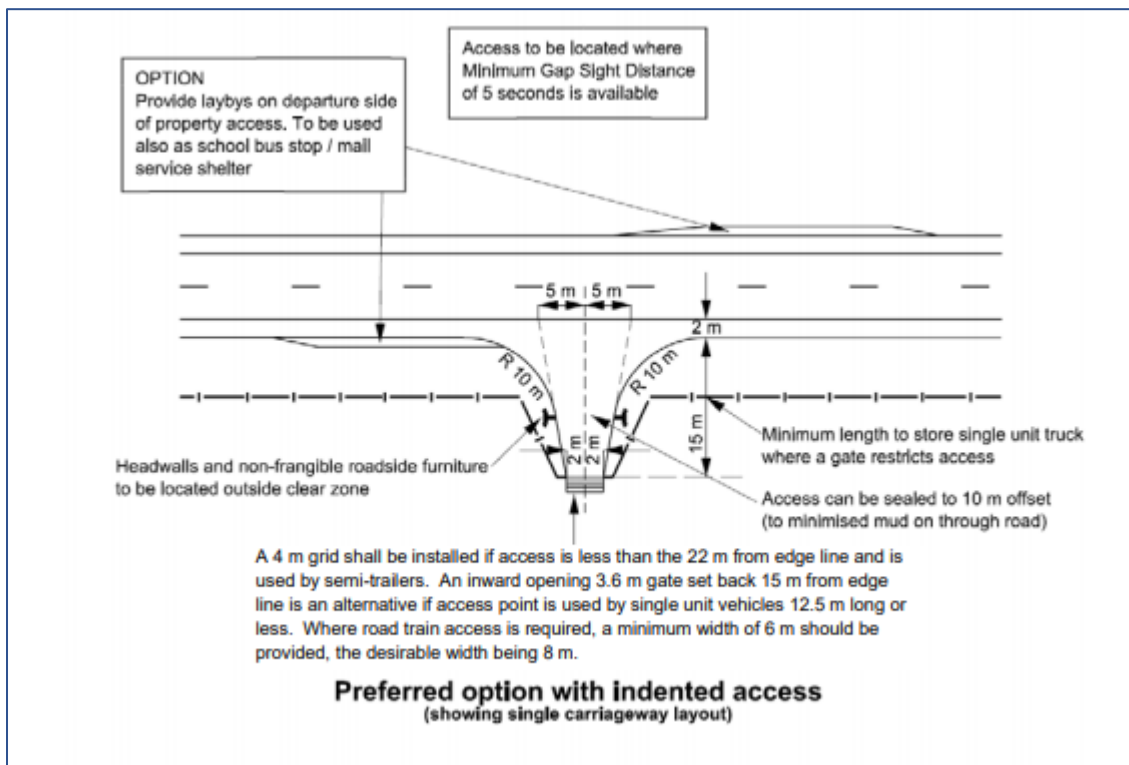
Diagram 6.8 – Austroads marked right turn lane (short)



6.9. Upgrade of access

The access onto the Bridport Main Road will be upgraded to the Department’s standard for a rural access, to accommodate the swept path of a 12.5 metre single vehicle unit (shuttle Bus). The minimum width of the access will be 6 metres wide to facilitate two-way traffic movements, the surface will be sealed from the roadway to the property boundary and driveable endwall, to the culvert underneath the access will be provided if table drains need to be maintained.

Diagram 6.9 – Austroads typical rural property access



7. Construction of internal access road

The development proposal includes the construction of a 3.9 kilometres long internal road, which will be gated for private access only. The Bell Bay Aluminium and Basslink service vehicles, and members of the George Town and District Black Powder and Pistol Club, will continue to have access off Bridport Main Road.

The internal road will serve as an access for mountain bike trail maintenance vehicles and selected commercial shuttle bus operators.

The first 1.1 kilometres of the internal access road will be constructed over the existing fire access road, whereas the remaining 2.8 kilometres will be entirely new.

The developer has advised the internal road will be constructed to design standards stipulated in the George Town Interim Planning scheme table E2 – Standards for Property Access, as shown in the table below.

Table 7.0 – Design elements of internal access road

Element		Requirement
B.	Property access length is 30m or greater; or access is required for a fire appliance to a fire fighting water point.	<p>The following design and construction requirements apply to property access: -</p> <ul style="list-style-type: none"> a) all-weather construction; b) load capacity of at least 20t, including for bridges and culverts; c) minimum carriageway width of 4m; d) minimum vertical clearance of 4m; e) minimum horizontal clearance of 0.5m from the edge of the carriageway; f) cross falls of less than 3 degrees (1:20 or 5%); g) dips less than 7 degrees (1:8 or 12.5%) entry and exit angle; h) curves with a minimum inner radius of 10m; i) maximum gradient of 15 degrees (1:3.5 or 28%) for sealed roads, and 10 degrees (1:5.5 or 18%) for unsealed roads; and j) terminate with a turning area for fire appliances provided by one of the following: - <ul style="list-style-type: none"> i. a turning circle with a minimum outer radius of 10m; or ii. a property access encircling the building; or iii. a hammerhead “T” or “Y” turning head 4m wide and 8m long.
C.	Property access length is 200m or greater.	<p>The following design and construction requirements apply to property access: -</p> <ul style="list-style-type: none"> a) complies with requirements for B above; and b) passing bays of 2m additional carriageway width and 20m length must be provided every 100m

Using the above design elements is expected to ensure the internal access road will be fit-for-purpose for the intended limited use.

8. Planning scheme

8.1. E4.6 Road and Railway Assets Code

E4.6.1 Existing road accesses and junction

This development will intensify traffic movements using an existing gravel access by more than 10 percent per day and therefore must be considered under the performance criteria P3, as the speed limit along Bridport Main Road is 100 km/h.

Performance criteria	Assessment
To ensure that the safety and efficiency of road and rail infrastructure is not reduced by the creation of new accesses and junctions or increased use of existing accesses and junctions.	
a) Access to a category 1 road or limited access road must only be via an existing access or junction or the use or development must provide a significant social and economic benefit to the State or region; and	The development will use an existing access that is currently used by the Bell Bay Aluminium and Basslink service vehicles, and members of the George Town and District Black Powder and Pistol Club. No new access will be created by this development.
b) Any increase in use of an existing access or junction or development of a new access or junction to a limited access road or a Category 1,2 or 3 road must be for the use that is dependent on the site for its unique resources, characteristics or locational attributes and an alternative site or access to a category 4 or 5 road is not practicable; and	The current access is infrequently used, and is expected to generate 40 trips per day during the weekends when the Black Powder or Pistol club is in operation. The new use is expected to generate a maximum of 60 trips per day when operating, and these trips will be service vehicles for trail maintenance or selected commercial shuttle bus operators. The access to the mountain bike trails will be gated to provide a high control of vehicle movements. The access is located 1.6 kilometres east of the East Tamar Highway and will utilise an existing fire access road and is considered the most practicable location to enable access to the high point of the Tippogoree Hills. There is no alternative access point to a road lower in the road hierarchy.
c) An access or junction which is increased in use or is a new access or junction must be designed and located to maintain an adequate level of safety and efficiency for all road users.	The access will be upgraded to meet the Department of State Growth standards for rural access, will be widened to accommodate two-way traffic movements, sealed from the roadway to the property boundary. A formal marked right turn lane will be provided on Bridport Main Road to provide an area where stationary right turn vehicles can shelter from following vehicles, that will be directed around the stationary turning vehicle. This turning lane treatment will significantly improve safety for all users using this access, and is expected not to create any adverse impact to transport efficiency.

E4.7.4 Sight Distance at Accesses, Junction and Level Crossings

The development comprises of a shuttle bus service carrying mountain bike riders from George Town to the top of the Tippogoree Hills, and returning to George Town. The shuttle buses will approach the access location from the west and undertake a right hand turn off the Bridport Main Road using a new marked right turn lane. Shuttle buses returning to George Town will undertake a left turn onto the Bridport Main Road.

Based on these two turning manoeuvres, the available sight distance exceeds the Safe Intersection Sight Distance, as defined in section 6.4 of this assessment.

Vehicles travelling in an easterly direction along the Bridport Main Road approaching a vehicle turning off at the access, will be directed past the vehicle through the use of appropriate road markings, and the driver is expected to maintain their operating speed.

8.2. E6.0 Parking and Sustainable Transport Code

E6.6.1 Car parking numbers

The new use will not generate a parking demand, as all participants will arrive and leave in shuttle buses.

E6.6.2 Bicycle Parking Numbers

The new use will not generate a parking demand from cyclists.

E6.6.3 Taxi Drop-off and Pickup

The new use will not generate a taxi demand.

E6.6.4 Motorbike parking provisions

This new use will not generate a motorcycle parking demand.

8.3. E6.8 Provision for sustainable Transport

The operation of this new use will not generate a sustainable transport demand.

9. Conclusion

From a traffic engineering and road safety perspective, traffic generated by this development use is not expected to create any adverse safety, amenity, or transport efficiency problems, as:

- the amount of traffic generated is considered low, and there is sufficient capacity along the Bridport Main Road to absorb the extra traffic movements,
- the development access will be controlled, with only contracted shuttle bus operators and trail maintenance vehicles provided access to the internal road,
- shuttle bus drivers will be prohibited from turning right out of the access,
- the new development will use an existing access off the Bridport Main Road, and this access will be upgraded to meet the Department of State Growth standard for a rural access,
- the development will undertake off site road improvements to construct a marked right turn lane on the Bridport Main Road, and
- the new use will not create a parking demand.

This Traffic Impact Assessment found no reasons for this development not to proceed.



***LAURISTON PARK
MOUNTAIN TRAIL ACCESS
OFF BRIDPORT MAIN ROAD,
GEORGE TOWN***

**TRAFFIC IMPACT
ASSESSMENT**

Hubble Traffic

March 2021

Contents

1. Introduction	2
2. Site Description	3
3. Development proposal	4
4. Trip generation at the proposed access	5
4.1. Expected trips generated by the mountain bike trails.....	5
5. Existing traffic Conditions	6
5.1. Bridport Main Road.....	6
5.2. Speed limit and operating speed on Bridport Main Road.....	7
5.3. Traffic activity along Bridport Main Road.....	8
5.4. Traffic safety along the route.....	9
5.5. Horizontal and vertical alignment.....	9
6. Impact from traffic generated by this development.	10
6.1. Additional traffic movements operating on Bridport Main Road.....	10
6.2. New access location.....	10
6.3. Configuration of new development access.....	11
6.4. Weigh bridge impact.....	12
6.5. Safe Intersection Sight Distance.....	13
6.6. Risk of right turning vehicles queuing back onto the East Tamar Highway.....	14
6.7. Formation of new development access.....	15
7. Construction of internal access road	16
8. Internal car park layout	16
9. Planning scheme	17
9.1. E4.6 Road and Railway Assets Code.....	17
9.2. E6.0 Parking and Sustainable Transport Code.....	18
10.Conclusion	20

1. Introduction

Peter Rickards, Project Manager for the George Town Council, has engaged Hubble Traffic Consulting to prepare an independent Traffic Impact Assessment, to consider the traffic impacts of creating an access to the Lauriston Park Mountain Bike Trail, located off Bridport Main Road, Georgetown.

Lauriston Park will contain various mountain bike trails, access to an on-site car park will be necessary via an internal access road, which will extend off Bridport Main Road. This assessment has considered the amount of traffic that is expected to use this access and the likely traffic impacts to the surrounding road network.

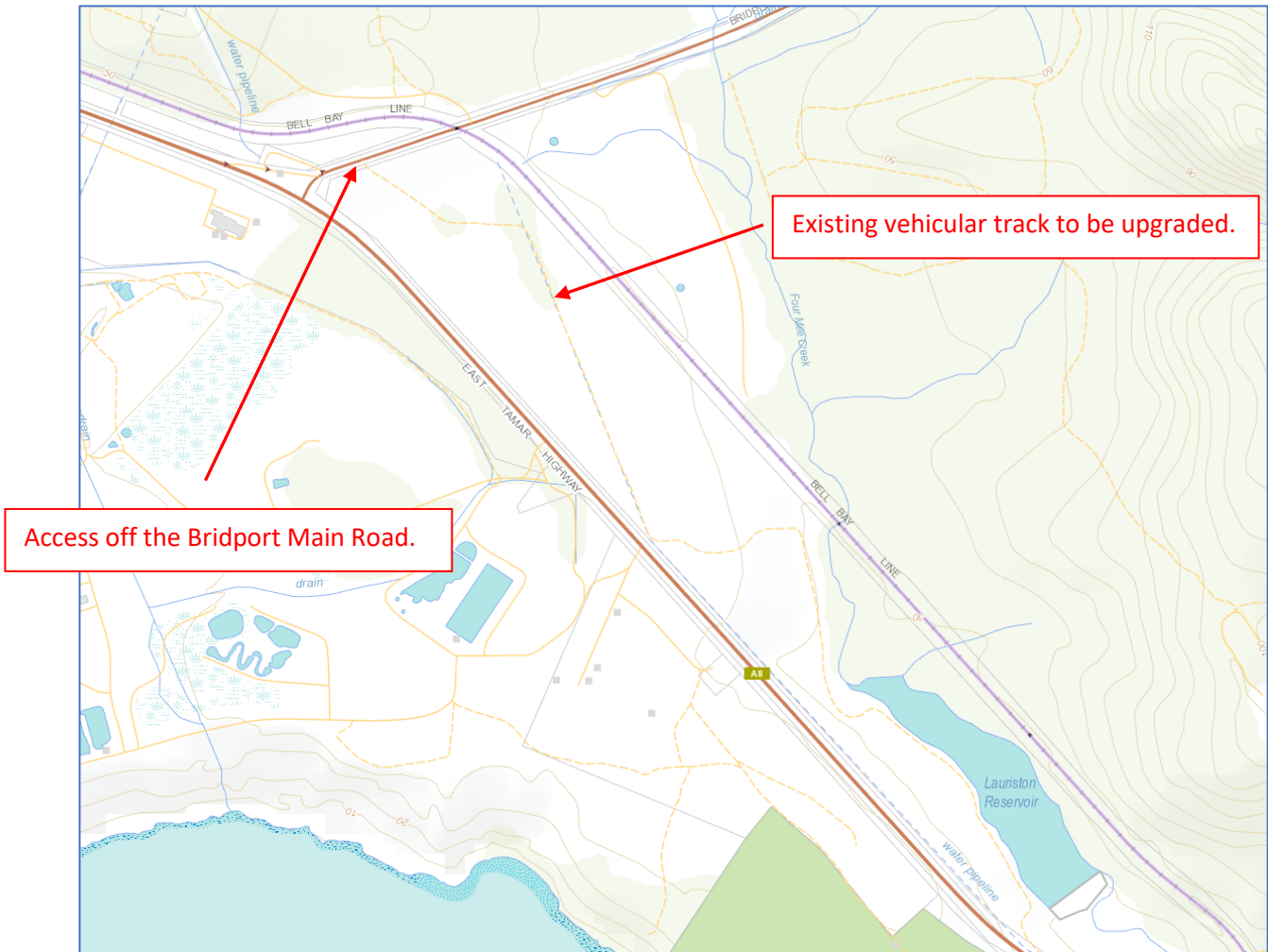
For the purpose of this assessment, the development site is the Lauriston Park Mountain Bike Trails, and the developer is the George Town Council.

This report has been prepared to satisfy the requirements of Austroads, Guide to Traffic Management Part 12: Traffic Impacts of Developments, 2019. This assessment has referred to the following information and resources:

- George Town Council Planning Scheme (planning scheme)
- Road Traffic Authority NSW (RTA) Guide to Traffic Generating Developments
- Australian Standards 2890
- Austroads series of Traffic Management and Road Design
 - Part 4: Intersection and crossings, General
 - Part 4a: Unsignalised and Signalised Intersections
 - Part 8: Local street management
 - Part 12: Traffic Impacts of Development
- Department of State Growth crash database
- Department of State Growth traffic database
- Autoturn on-line vehicle swept path software
- SIDRA 8 Intersection Modelling software
- Google Earth imagery

2. Site Description

The mountain bike trails are located within the hills of Lauriston Park, which is situated on the south east corner of the East Tamar Highway and Bridport Main Road. The most accessible access is using an existing public gravel vehicular track, that is accessed from the Bridport Main Road, immediately east of the East Tamar Highway.



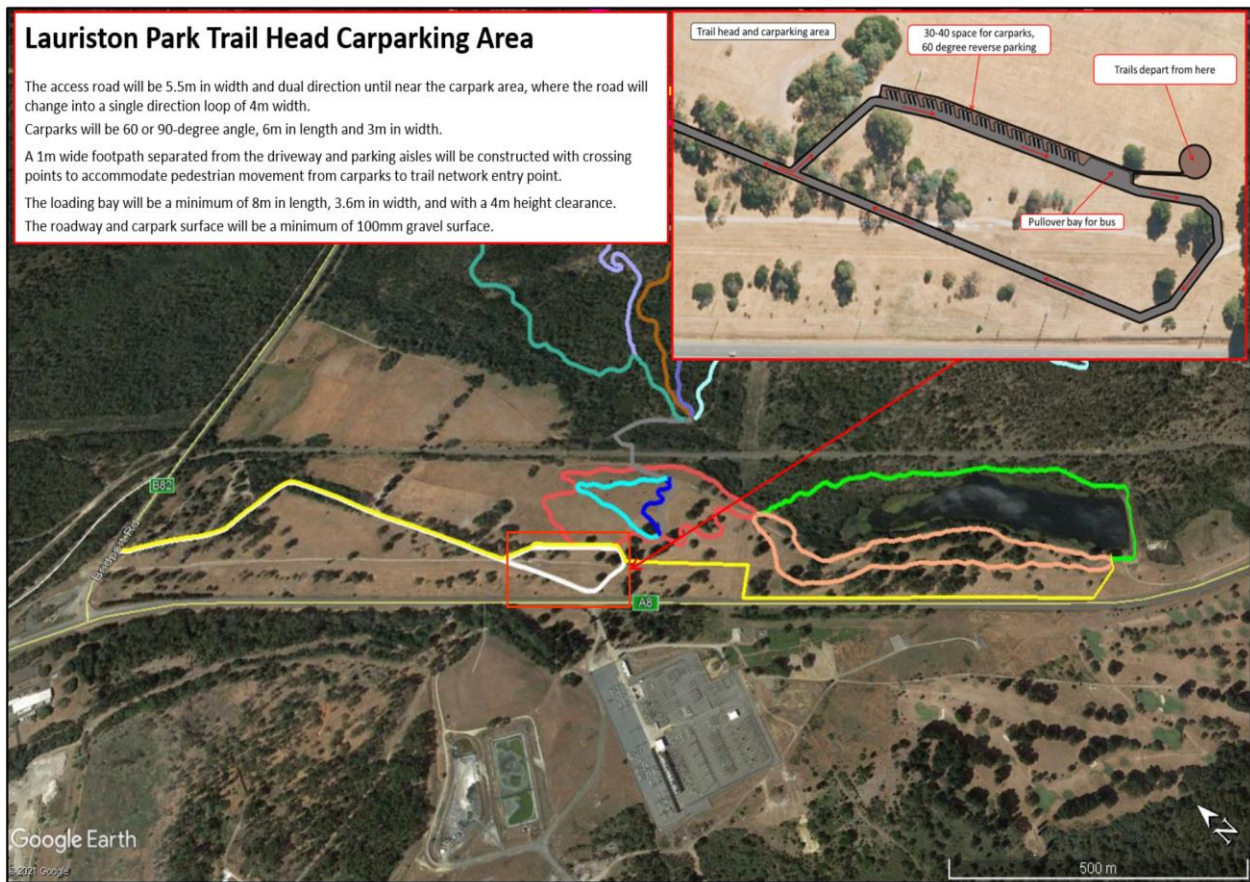
2.0 Map – Extract from Google

3. Development proposal

Development of mountain bike trails within the Lauriston Park reserve.

The proposed access road from the Bridport Main Road is approximately 1300 metres in length, the development will utilise an existing public access road, that will be upgraded. The first 800 metres of the road will provide for two-way traffic movements, and the road will be a minimum of 5.5 metres wide. This will be followed by a 400 metres one-way loop road at 4 metre wide to facilitate on-site parking spaces.

Diagram 3.0 – Layout of development site



4. Trip generation at the proposed access

A trip in this report is defined as a one way vehicular movement from one point to another, excluding the return journey. Therefore, a return trip to and from a land use is counted as two trips.

To determine the number of trips likely to be generated by this development, information has been sourced from the developer:

4.1. Expected trips generated by the mountain bike trails.

Section 3.8 of the RTA guide indicates that the daily vehicle trips for recreational facilities is largely dependent on, site location, type of use, and seasonal variations. It recommends analysis of proposed developments be based on survey data of similar developments.

A traffic survey was undertaken on Sunday 17 January 2021, at the Meehan Range Nature Reserve main trailhead carpark, located at Flagstaff Gully Road Mornington, Hobart to determine the number of vehicles the use generated.

The Mornington facility is located in close proximity to Hobart. When comparing the population of Hobart with George Town, it has been estimated the Mornington facility is likely to generate a higher usage, than the proposed Lauriston Park development.

Table 4.1 – Traffic demand at the Mornington site

Time	Vehicles in	Vehicles Out	Total trips	Number of Vehicles parked
Before 8am				6
8.00 to 8.15am	3	1	4	8
8.15 to 8.30am	5	4	9	9
8.30 to 8.45am	11	2	13	18
8.45 to 9.00am	9	3	7	24
9.00 to 9.15am	2	2	4	24
9.15 to 9.30am	7	2	9	29
9.30 to 9.45am	5	2	7	32
9.45 to 10.00am	10	4	14	38
Total	52	20	72	
Time	Vehicles in	Vehicles Out	Total trips	Number of Vehicles parked
Before 2.30pm				14
2.30 to 2.45pm	7	7	14	14
2.45 to 3.00pm	0	2	2	12
3.00 to 3.15pm	1	0	1	13
3.15 to 3.30pm	2	2	4	13
Total	10	11	21	

Having consideration that the proposed Lauriston Park use will represent 33 percent of the Meehan Range usage, the following trips and parking demand will be used for this assessment:

- Peak hour vehicle trips – 12 per hour (two-way traffic trips).
- Number of vehicles parked at any one time is 12.
- Total average daily trips of 100 (based on 8 hours of operation).

5. Existing traffic Conditions

All traffic accessing the development site will need to turn off from the Bridport Main Road. This section of the assessment will examine the current traffic flow and conditions.

5.1. Bridport Main Road

Bridport Main Road is part of the State Road Network managed by the Department of State Growth (the Department), and under the Tasmanian State Road Hierarchy is classified as Category 2 – Regional Freight Road.

Regional Freight Roads link major production catchments to the Trunk Road network, are designed to accommodate heavy inter-regional and sub-regional freight movements and provide safe and efficient access for passenger and tourist vehicles.

Bridport Main Road is a limited access road, and creation of a new access is not permitted unless the access is gazetted as a public road; for this reason, an existing access is being used for this development.

At the proposed access point, Bridport Main Road is a two-way rural road with 3.2 metre wide traffic lane in each direction, with sealed 1.0 metre wide shoulders. The road is line marked by a centreline and edge lines and there are guide posts located along the side of the roadway. The adjacent land-use in the vicinity of the proposed access is undeveloped land.

5.1 Photograph of the typical road standard



5.2. Speed limit and operating speed on Bridport Main Road

Bridport Main Road, between the East Tamar Highway and Bridport, operates under the general rural default speed limit of 100 km/h. However, due to the presence of the East Tamar Highway junction, vehicles approaching from the east (Bridport) are decelerating, in order to give way at this junction, so their operating speed is reduced.

A hand-held speed survey was conducted on vehicles passing the access point approaching from the east, only vehicles with a headway greater than five seconds were recorded, as these were considered free flowing vehicles. The vehicles speeds are provided in the following table, and 'heavy' denotes the speed from a heavy vehicle.

Table 5.1 – Operating speed for vehicles travelling westbound.

55	72 Heavy	80	84	67
73	60 Heavy	75	62	71
57	69	50 Heavy	63 Heavy	70 Heavy
68	71	64	76	50 Heavy
70	74	67	72	57
60 Heavy	59 Heavy	57 Heavy	84	69
72	94	63 Heavy	71	63
56	93	48 Heavy	61	41
70	75	49 Heavy	57 Heavy	52
66	70	71	71	88
84	66	72	68	82

- Mean operating speed calculated at 67 km/h.
- 85th percentile speed calculated at 76 km/h.
- Mean operating speed for heavy vehicles calculated at 58 km/h.

For the purpose of this assessment the calculated 85th percentile speed of 76 km/h will be used for vehicles approaching the access in a westerly direction.

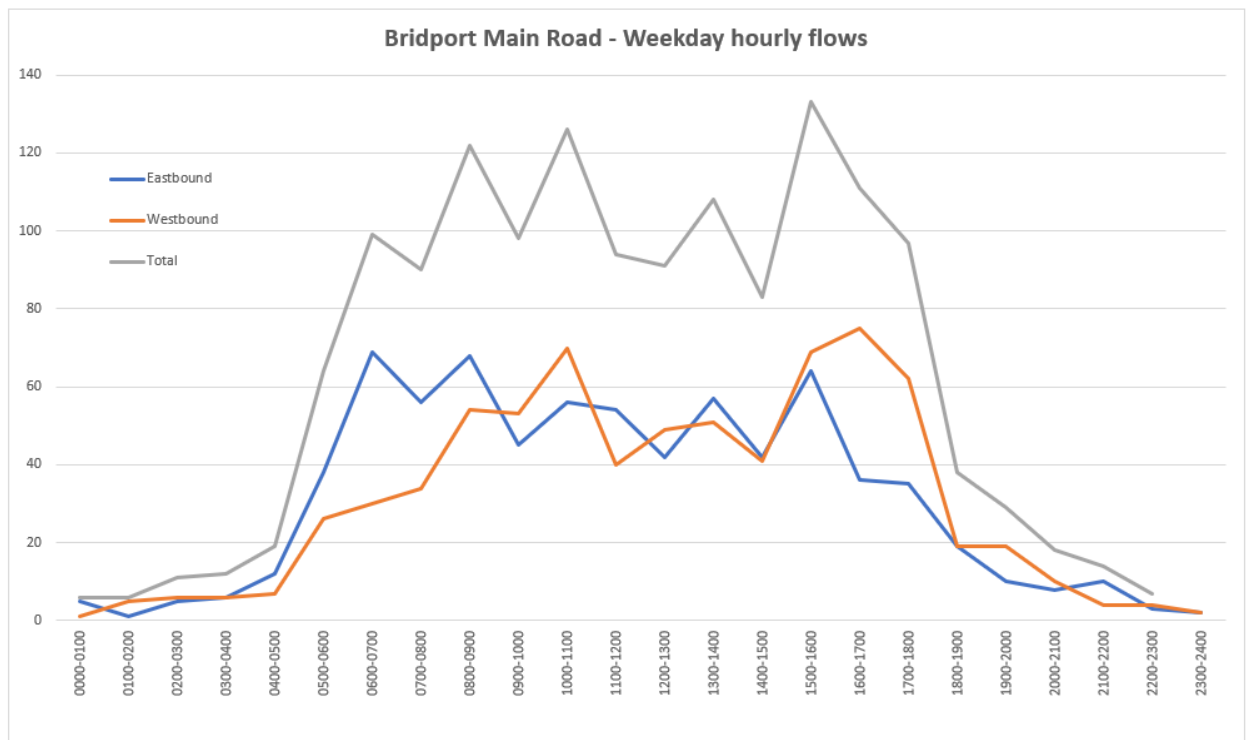
Traffic approaching the access point in an easterly direction from the East Tamar Highway must negotiate a right or left hand turn, which reduces their operating speed to an estimated 40 km/h and this speed will be used in this assessment.

5.3. Traffic activity along Bridport Main Road

The Department maintains a database of traffic flows for the State Road Network, and interrogation of the traffic data station located 316 metres east of the East Tamar Highway, provided the following traffic flows:

- Highest eastbound traffic flow is 70 vehicles per hour in the morning peak.
- Highest westbound traffic flow is 70 vehicles per hour in the afternoon peak.
- Average two-way traffic flow of 120 vehicles per hour.
- Average weekday two-way traffic flow of 1,500 vehicles per day
- Average weekend two-way traffic flows of 850 vehicles per day.

Graph 5.3 – Average weekday directional traffic flow for May 2019



With the Category 2 road status, the number of freight vehicles is expected to be a significant proportion of the traffic flow. The vehicle data collected at the traffic station classifies each vehicle based on wheel base and axle numbers. From this data, it can be determined the type of vehicles using the roadway, with this data represented in the following table.

Table 5.3 – Vehicle classification

Vehicle class	Number of vehicles	Classification	Type of vehicles	Total	%
1	25741	Short vehicles	Passenger vehicles	28099	76%
2	2358				
3	2309	Medium vehicles	Buses and two or three axle trucks	3300	9%
4	471				
5	520				
6	131	Long vehicles	Semi-trailers	3166	9%
7	463				
8	415				
9	2157				
10	2387	Medium combination	B-Double	2400	6%
11	13				
Total	36965			36965	

As expected, buses and heavy vehicles represents 24 percent of the traffic flow, with 15 percent of these being long vehicles, such as semi-trailers and B-Doubles.

5.4. Traffic safety at the access location

The Department maintains a database of reported road crashes. A check of this database found two reported crashes at the junction, with no crashes reported in the vicinity of the current access.

This low number of reported crashes indicates motorists are not encountering any difficulties while travelling through this road section.

5.5. Horizontal and vertical alignment

Generally, the horizontal alignment along Bridport Main Road is straight. There is a vertical crest located west of the proposed access point where the road overpasses a railway line, and this vertical crest reduces available sight distance.

6. Impact from traffic generated by this development.

As determined in section 4 of this assessment, this development has the potential to generate up to 100 daily traffic movements, when the development is operating. This would involve 12 traffic movements per hour, and during the morning period up to eight right turns off Bridport Main Road could be expected to occur within an hour.

6.1. Additional traffic movements operating on Bridport Main Road

Given the proposed development, trips generated from this development would be new trips.

The average hourly directional (eastbound) traffic flow operating along the Bridport Main Road is less than 70 vehicles per hour, and this represents a volume to capacity ratio, of five percent of the lane capacity.

The increase in traffic flow generated by this development, will have no adverse efficiency impact to the traffic flow along the Bridport Main Road.

6.2. New access location

The developer has identified an existing gravel access located approximately 95 metres east of the East Tamar Highway could be used, as this access is licensed under the limited access provisions of the Department.

A check of the sight lines from this access found the vertical crest over the railway bridge limits available sight distance to 160 metres, which is slightly short of the required Safe Intersection Sight Distance (SISD) of 180 metres, for the calculated 85th percentile approach speed, for westbound vehicles travelling at 76 km/h.

Relocating this existing access by 40 metres towards the East Tamar Highway improves the available sight distance to 200 metres and will comply with SISD.

The Department will allow a licensed access to be relocated, as long as the existing access is closed.

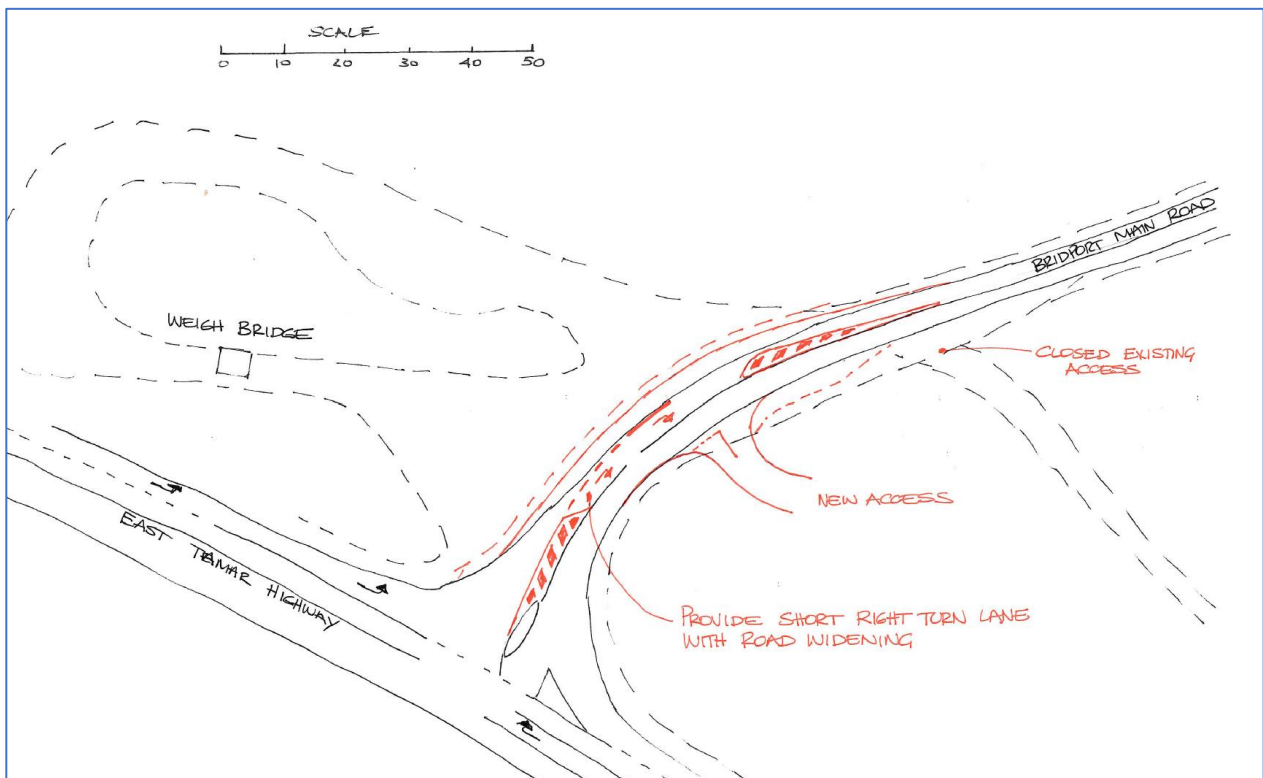
6.3. Configuration of the new development access

To effectively manage the safe right turn movements into the new access location, a short marked right turn lane of 20 metres should be provided to accommodate three standard length vehicles. No deceleration lane to the start of the right turn lane is necessary, as approaching traffic are turning off the East Tamar Highway.

With the right turn lane providing access for passenger type vehicles and operating speeds are low due to the presence of the junction, the width of the right turn lane could be 3.2 metres wide.

Implementing the right turn lane will require additional road pavement to be provided along the northern side to create a new highway through lane. Section of this shoulder area is already formed and caters for the swept path of heavy vehicles using the weigh bridge, so this should provide a reasonable road base for the new asphalt surface.

Diagram 6.3 - proposed access layout with a short right turn lane



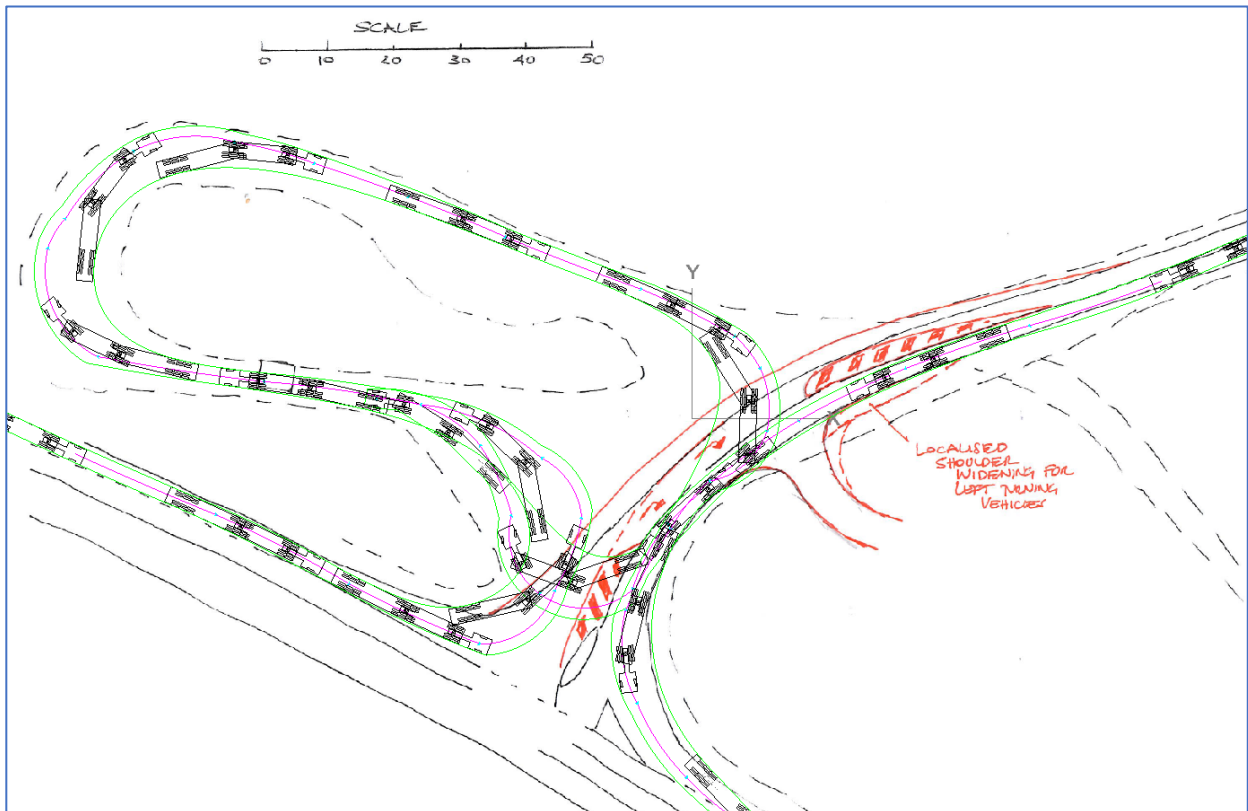
6.4. Weigh bridge operation

Directly opposite of the proposed new development access is a heavy vehicle weigh bridge station, where heavy vehicles operating in the area can be directed to be inspected by the Heavy Vehicle Regulator, including checking the weight of the loads.

The layout of the right turn lane and new development access has been designed having consideration to this weigh bridge operation, and the swept path of B-Double vehicles has been modelled to demonstrate there will be no adverse impact.

The right turn lane will be formed using road markings with no solid traffic islands used, which will ensure the turning facility will have no adverse impact to the swept path of heavy vehicles.

Diagram 6.4 – Swept path of B-Double vehicles



6.5. Safe Intersection Sight Distance

The new development access will be located approximately 55 metres east of the East Tamar Highway and available sight distance to the east of vehicles approaching from Bridport will be 200 metres.

The operating speed of westbound vehicles was measured on-site and the 85th percentile speed calculated at 76 km/h, and for this calculated operating speed, the corresponding Safe Intersection Sight Distance (SISD) is 180 metres.

Drivers leaving the new development access will have available sight distance that exceeds the planning scheme recommended SISD, this means vehicle can enter the Bridport Main Road safely and without disrupting current road users.

Photograph 6.5 – View for drivers leaving the new access looking east.



Drivers leaving the new development access will have good visibility of vehicles approaching from the East Tamar Highway, as these vehicles are turning off the highway, their operating speeds will be relatively low and cause no issue for drivers leaving the access.

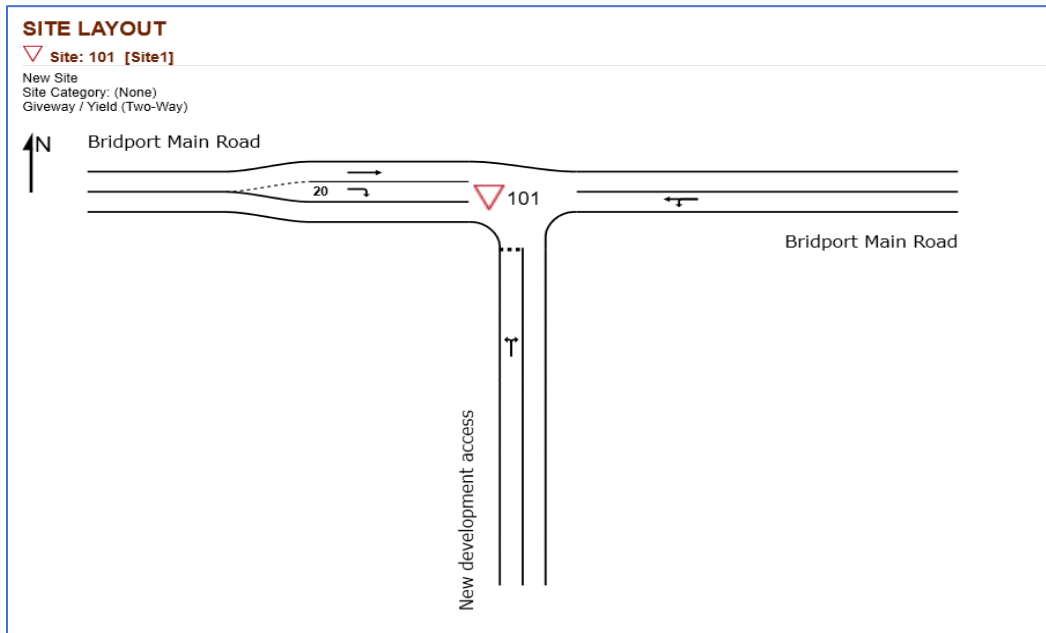
Photograph 6.5A – View for drivers leaving the new access looking west.



6.6. Risk of right turning vehicles queuing back onto the East Tamar Highway

It is important to ensure that right turning vehicles will not queue back to the East Tamar Highway, best method to evaluate this, is using SIDRA 8 Intersection modelling software. The modelling takes into consideration the traffic flow operating on the main road, the expected number of right turning vehicles, and uses gap acceptance methodology to calculate delay and queues.

Diagram 6.6 – Proposed access layout with a 20 metre long right turn lane



The traffic modelling indicates that with the current traffic flows and with the prediction of eight vehicles expected to turn right per hour, there will be no queuing, as the opposing traffic flow is so low, there are plenty of suitable gaps for turning vehicles.

Two further checks that queuing would not be a problem was undertaken:

- All traffic flows were tripled in volume, including the number of right turners, and
- Highway flow double with right turners increased to 40 per hour.

This analysis clearly demonstrates that right turning vehicles will not adversely impact the traffic operation of the East Tamar Highway.

Table 6.6 – Modelling results for the proposed right turn lane

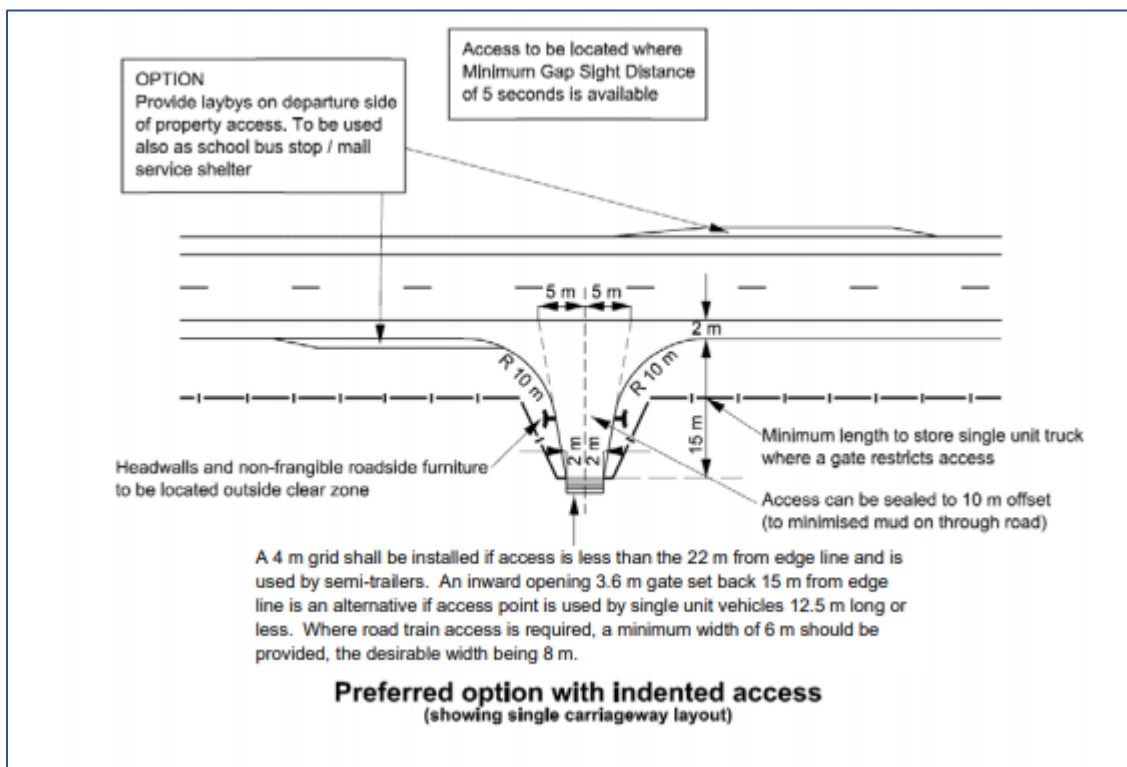
Scenario	Number of vehicles per hour	Average Delay	Level of Service	95 th queue length
Existing traffic flows with 8 right turning vehicles	192 vehicles/hour	5.7 seconds	A	No queue behind the turning vehicle
Triple traffic flows with 24 right turning vehicles	575 vehicles per hour	6.3 seconds	A	No queue behind the turning vehicle
Double highway flow with 40 right vehicles	411 vehicles per hour	6.2 seconds	A	No queue behind the turning vehicle

6.7. Formation of the new development access

The existing license access will be closed and relocated 40 metres in a westerly direction towards the East Tamar Highway. The new development access onto the Bridport Main Road will be provided to the Department's standard for a rural access, to accommodate the swept path of a 12.5 metre single vehicle unit (buses).

The minimum width of the access will be six metres wide to facilitate two-way traffic movements, the surface will be sealed from the roadway to the property boundary and driveable endwalls will be provided to the culvert underneath the access.

Diagram 6.9 – Austroads typical rural property access



7. Construction of internal access road

The development proposal includes the upgrade of the existing access track to a 5.5 metre wide road, suitable to accommodate two-way traffic movements. The pavement will be a hard wearing all weather gravel road surface with appropriate camber to manage surface water. The road will be designed to match the current grades, and culverts will be provided underneath the road surface to maintain any natural water courses.

8. Internal car park layout

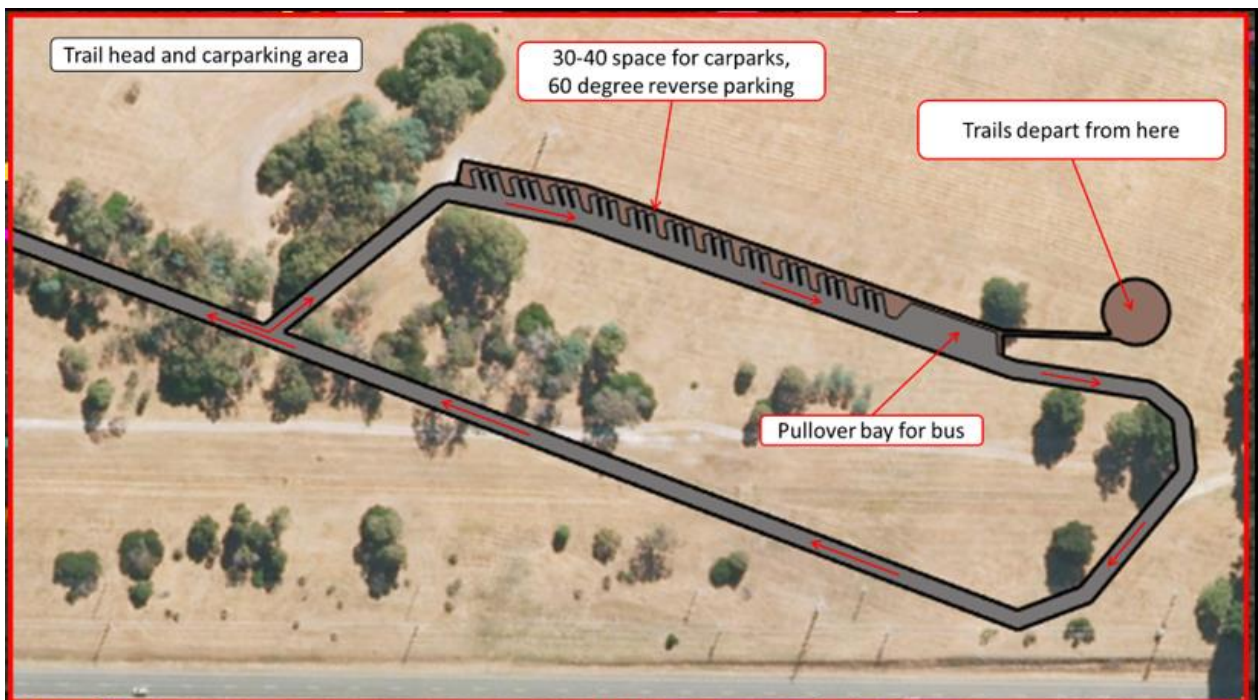
As determined in section 4 of this assessment, the average number of vehicles expected to be parked at any one time is 12. The development is expected to provide some 30 parking spaces located within a one-way traffic arrangement. The spaces will be angled at either 60 or 90 degrees, be a minimum of 6 metres long and 3 metre width. The aisle width of 5.5 metres wide will be provide for 60 degree spaces or 6.2 metres for 90 degree spaces. The parking spaces will be connected to the trail departing area by a one metre wide footpath.

The parking arrangement will incorporate a bus pullover bay in close proximity to the start of the trails.

The parking surface will be a hard wearing all weather gravel surface and grades of the parking spaces are expected to be less than five percent.

This proposed parking design is expected to meet the reasonable parking demand caused by this new use.

Diagram 8.0 – Proposed car park layout



9. Planning scheme

9.1. E4.6 Road and Railway Assets Code

E4.6.1 Existing road accesses and junction

This development will intensify traffic movements using an existing gravel access by more than 10 percent per day and therefore must be considered under the performance criteria P3, as the speed limit along Bridport Main Road is 100 km/h.

Performance criteria	Assessment
To ensure that the safety and efficiency of road and rail infrastructure is not reduced by the creation of new accesses and junctions or increased use of existing accesses and junctions.	
a) Access to a category 1 road or limited access road must only be via an existing access or junction or the use or development must provide a significant social and economic benefit to the State or region; and	The development will utilise an existing licensed access located 95 metres east of the East Tamar Highway. This licensed access will be relocated in a westerly direction to within 55 metres of the highway. Once the access is relocated the previous access will be closed and this will mean no new access will be created by this development.
b) Any increase in use of an existing access or junction or development of a new access or junction to a limited access road or a Category 1,2 or 3 road must be for the use that is dependent on the site for its unique resources, characteristics or locational attributes and an alternative site or access to a category 4 or 5 road is not practicable; and	The current access is infrequently used, and the new use is expected to generate a maximum of 100 trips per day when operating, and these trips will be passenger or recreational vehicles. The new access will connect to an existing access track and provide access to an internal car park, at the start of the mountain bike trails. This new access is considered the most practicable location to enable access to the new development and there is no alternative access point to a road lower in the road hierarchy. Use of this access is necessary to facilitate this new recreational and tourist use.
c) An access or junction which is increased in use or is a new access or junction must be designed and located to maintain an adequate level of safety and efficiency for all road users.	The access will be upgraded to meet the Department of State Growth standards for rural access, will be widened to accommodate two-way traffic movements, sealed from the roadway to the property boundary. A formal marked right turn lane will be provided on Bridport Main Road to provide an area where stationary right turn vehicles can shelter from highway through traffic. This turning lane treatment will significantly improve safety for all users using this access, and is expected not to create any adverse impact to transport efficiency to the surrounding road network. Traffic modelling has demonstrated there is no risk of right turning vehicles queueing back to the East Tamar Highway and the right turn lane is not expected to create any adverse impact to the current weigh bridge operations.

E4.7.4 Sight Distance at Accesses, Junction and Level Crossings

The existing licensed access will be moved 40 metres towards the East Tamar Highway to ensure the available sight distance for drivers, exceed the planning scheme required Safe Intersection Sight Distance, for the prevailing operating speed of approaching vehicles.

This means drivers using the new development access will have sufficient sight distance to enter and leave the Bridport Main Road in a safe manner, without causing any adverse traffic impact to existing road users.

The available sight distance will meet the acceptable solution under the planning scheme.

9.2. E6.0 Parking and Sustainable Transport Code

E6.6.1 Car parking numbers

The planning scheme specifies that any new use must provide parking spaces that meet the reasonable demand, to prevent overflow of parking on to the public road network. Table E6.1 provides parking requirements for various development use, unfortunately the table does not provide any information on mountain bike trails, and the closest use is Sports and Recreation, which is not considered relevant.

A parking demand survey was conducted on a mountain bike facility at the Meehan Range Nature Reserve in Mornington near Hobart. This Mornington facility is more accessible to a large population than the proposed development and is expected to generate a higher usage. For the purpose of this assessment, the new development is estimated at 33 percent of the Mornington facility, and from survey data, it is estimated the parking demand for the proposed development should be a minimum of 12 spaces.

The proposed new internal car park is expected to provide a minimum of 30 spaces, this is expected to meet the reasonable parking demand created by this new use and not expected to generate a parking overflow onto the public road network.

This number of parking spaces complies with the acceptable solution under the planning scheme for on-site car parking.

E6.6.2 Bicycle Parking Numbers

This type of development is not expected to generate a parking demand from cyclists.

E6.6.3 Taxi Drop-off and Pickup

This type of development is not expected to generate a taxi demand, although there will be a bus pullover bay.

E6.6.4 Motorbike parking provisions

This type of development is not expected to generate a parking demand from motorcyclists.

E6.7 Development standards

Development standards	Comment
6.7.1 Construction of car parking spaces and access strips.	The proposed car park layout is expected to conform with the Australian Standards 2890 part 1: Off-street parking. The one-way circulating flow and adequate parking and manoeuvring aisles will introduce efficient and safe traffic flow. The car park surface will be an all-weather hard wearing gravel surface with appropriate drainage.
6.7.2 Design and layout of car parking.	The parking spaces will be a minimum of class 3A for high turnover, ensuring easy manoeuvrability into and out of the spaces. The width of the aisles will be in accordance with the Australian Standard. The gradient of the parking area will be designed for five percent or less. The access road will be a minimum of 5.5 metres in width, to accommodate two-way traffic movements. The layout provides for a turning circle and ensures all vehicles move in a forward direction when entering and leaving.
6.7.3 Car parking access, safety, and security.	The development is for day use, with no night time activity expected. No vehicles are expected to park overnight and the need for security lighting is not considered necessary given the use and location.
6.7.4 Parking for persons with a disability.	This type of use is not expected to create a demand by disable persons.
6.7.5 No standard	
6.7.6 Loading and unloading of vehicles, drop-off and pickup.	This development will not create a demand for deliveries, and special loading and unloading facilities is considered unwarranted.

10. Conclusion

From a traffic engineering and road safety perspective, traffic generated by this development use is not expected to create any adverse safety, amenity, or transport efficiency problems, as:

- the amount of traffic generated is considered low, and there is sufficient capacity along the Bridport Main Road to absorb the extra traffic movements,
- the development will utilise an existing licensed access that will be relocated closer to the East Tamar Highway to maximise available sight lines,
- a short right turn lane will be provided on Bridport Main Road; traffic modelling has indicated the number of right turners is not expected to create any queueing issues, or adversely impact the East Tamar Highway traffic performance,
- the relocated development access and marked right turn lane is not expected to create any adverse impact to the operation of the current weigh bridge site,
- the new development access will be constructed to meet the Department of State Growth standard for a rural access,
- available sight distance at the new development access will exceed the required Safe Intersection Sight Distance, to enable vehicles to enter and leave the Bridport Main Road safely and without disrupting current users,
- there will be more than sufficient on-site parking spaces to meet the reasonable demand without causing any overflow to the public road network,
- the internal access road will be constructed to provide safe and efficient two-way traffic movements between the Bridport Main Road and the on-site car park.

This Traffic Impact Assessment found no reasons for this development not to proceed.



George Town Mountain Bike Trail Development

Trail Mate Opportunity

As part of the Trail Maintenance Funding Program







Introduction

With construction having already commenced, the George Town Mountain Bike Trail Development will provide a unique opportunity for local business, industry and organisations to leverage off the trail infrastructure and gain direct exposure to a booming sector of the Tasmanian tourism market.

The George Town Mountain Bike Trail Development offers two mountain bike network areas; a mini network on the flanks of Mount George offering 16km of heavily featured flow and cross-country trails; and 57km of shuttle-bus-serviced, flow and gravity style trails taking riders deep into the rugged Tippoogoree Hills to enjoy sustained descents and panoramic vistas.

Both networks will cater for all user types focusing on skill progression, accessibility, and most of all fun. With everything the municipality already has on offer, the George Town Mountain Bike Trail Development will sling-shot the region into the tourist destination limelight.



Trail Mate Opportunity

Overview


Our municipality will soon have world-class mountain bike trails right on our doorstep, but if we want our trails to attract riders and their families from all over the state, the nation and the world, we need your support.

Maintaining world-class trails require regular maintenance and improvements. Whilst a professionally designed and constructed trail network should only require minimal maintenance, a formal management program will need to be initiated as soon as the network opens (possibly sooner) to provide a pro-active instead of re-active approach.

Trail maintenance programs are expensive, costing around 2.5-5% of the project's capital expenditure. This ratio can vary, depending on the quality of trail construction, weather conditions, soil and geological conditions, and usage thresholds.

The Trail Maintenance Funding Program aims to provide businesses, industry and organisations the opportunity to connect with, support and leverage off the trails. With local businesses contributing financially to the program, it will keep our trails in world-class condition, ensuring ongoing success.

The Trail Maintenance Funding Program has multiple tiers of opportunity. Each tier corresponds to different levels of financial commitment and recognition. Businesses choosing to participate in the program will earn the prestigious title of "Trail Mate" to the George Town mountain bike trails.



Tiers of the Trail Mate Opportunity

The three core tiers of the program are Gold, Silver, and Bronze, each representing varying levels of financial commitment and recognition. Additionally, a fourth tier - awarding the title of Titanium Trail Mate - represents the highest level of accolade, and is available to those wanting to provide a greater level of financial support in addition to that offered under the basic program.

To become a Trail Mate, applicants choose their preferred level of commitment and apply by completing the Expression of Interest section at the end of this document. Commitment is for a minimum of two years initially, after which will become annually renewable. Payments will incur GST, which may be applicable as a GST credit for your business from the ATO.

Gold and Silver levels are capped to maximise exclusivity, and the level of financial commitment has been kept low to ensure the opportunity is widely accessible to all. Applications will go through an assessment process to ensure the greatest mutual benefits. While this program does not aim to exclude any business from participating based on their location, businesses local to the George Town Municipality will be considered favourably when being assessed.

All funds raised through this program will be directly deposited into a holding account set up solely and specifically for the ongoing maintenance, improvements and management of the trail network.



Tiers of the Trail Mate Opportunity

A summary of Gold, Silver and Bronze Trail Mate levels including benefits associated with each commitment level is provided in the table below and in the following sections.

		Gold	Silver	Bronze
Commitment	Annual subscription for a period of two years (excluding GST)	\$5,000	\$3,000	\$1,000
General	Capped number	15	25	Unlimited
	Exclusive updates	Yes	Yes	Yes
	Newsletter	Yes	Yes	Yes
	Dedicated media releases acknowledging Gold Trail Mates	Yes	-	-
	Notification of significant trail related events	Yes	Yes	Yes
Marketing	Trail Mate Branded Sticker to be displayed at your location	Yes	Yes	Yes
	Mention on the website	Yes + Link via Logo	Yes + Link via Logo	Text only
	Promotion through the trail social media	4 Posts 1 x Welcome Post 3 x Promotional Posts	3 Posts 1 x Welcome Post 2 x Promotional Posts	2 Posts 1 x Welcome Post 1 x Promotional Post
	Use of trail logo in authorised marketing material	Yes	-	-
Recognition	Recognition/advertising on banners and/or relevant promotion at special events	Yes	-	-
	Recognition/advertising plate on the Trail Mate Board at trailheads	Yes - full size (Approx. 148x210mm)	Yes - half size (Approx. 74x105mm)	Text only
Merchandise	Opportunity to sell exclusive approved trail branded merchandise	Yes	Yes	Yes
	Opportunity to sell exclusive approved trail branded merchandise tailored to your business	Yes	-	-



Gold Trail Mate Commitment and Benefits

The top tier of accolade under the basic Trail Maintenance Funding Program, being a Gold Trail Mate requires a financial commitment of \$5,000 (ex GST) per annum for a period of two years initially, then renewable annually. Gold Trail Mates receive the following benefits: -

- Ensured exclusivity in the form of capped numbers of awarded applications;
- Branded “Trail Mate” window sticker for your business door, window or other prominent location;
- Media Releases acknowledging Gold Trail Mates which will be run in the MTB Newsletter and on social media;
- Exclusive updates on everything to do with the trail network, including priority notification of significant events;
- Promotion through social media, mention in the newsletter, and mention, logo and link to business website (via logo) on the on the trail website, advertising the business as a source of information;
- Recognition and advertising on the Trail Mate Board at the trailhead(s), and on banners for special events;
- The opportunity to sell approved trail merchandise on a commission for their business. This merchandise can be tailored (where possible) to suit and reflect your business; and
- Use of the trail logo in authorised marketing material.



Silver Trail Mate Commitment and Benefits

The second tier of accolade under the basic Trail Maintenance Funding Program, being a Silver Trail Mate requires a financial commitment of \$3,000 (ex GST) per annum for a period of two years initially, then renewable annually. Silver Trail Mates receive the following benefits: -

- Ensured exclusivity in the form of capped numbers of awarded applications;
- Branded “Trail Mate” window sticker for your business door, window or other prominent location;
- Exclusive updates on everything to do with the trail network, including priority notification of significant events;
- Promotion through social media, mention in the newsletter, and mention, logo and link to business website (via logo) on the on the trail website, advertising the business as a source of information;
- Recognition and advertising on the Trail Mate Board at the trailhead(s); and
- The opportunity to sell approved trail merchandise on a commission for their business.



Bronze Trail Mate Commitment and Benefits

The third tier of accolade under the basic Trail Maintenance Funding Program, being a Bronze Trail Mate requires a financial commitment of \$1,000 (ex GST) per annum for a period of two years initially, then renewable annually. Bronze Trail Mates receive the following benefits: -

- Branded “Trail Mate” window sticker for your business door, window or other prominent location;
- Exclusive updates on everything to do with the trail network, including priority notification of significant events;
- Promotion through social media, mention in the newsletter and on the trail website, advertising the business as a source of information (text only);
- Recognition on the Trail Mate Board at the trailhead (text only); and
- The opportunity to sell approved trail merchandise on a commission for their business.



Titanium Trail Mate

The Titanium Trail Mate opportunity offers a prestigious solution for businesses seeking to make a substantial contribution of financial support and leave their legacy.

The value and benefits will be negotiated on a case-by-case basis, and can be tailor-made to meet specific circumstances and requirements. While there is no specified amount associated with becoming a Titanium Trail Mate, an initial commitment of a minimum of \$20,000 is required in addition to the \$5,000 contribution as a Gold Trail Mate. There is opportunity for the arrangement to be a one-off contribution to support a specific construction component of the project, or a recurring contribution to the general maintenance, improvements and management fund.

The benefits offered will be relative to the level of financial support, examples include, complimentary passes for the shuttle bus; complimentary guided mountain bike tours; invitations as VIPs to events; and even the opportunity for a trail name associated with your business.

If you are interested in becoming a Titanium Trail Mate, please indicate as such in the Expression of Interest Application form and we will get in touch to discuss options.



How to Apply

To apply, please fill the Expression of Interest Application form at the end of this document and submit to Council. A panel will review each submission and contact the applicant if further information is required.

The Trail Maintenance Funding Program will be open all year round, with no specific closing date for applications. Submissions should be labelled "Trail Mate Program" and can be posted to George Town Council, PO Box 161, George Town, Tasmania 7253, or preferably emailed to council@georgetown.tas.gov.au.

For further information please contact Peter Rickards - Project Manager via email peterr@georgetown.tas.gov.au or alternatively call 03 6382 8800.

Expression of Interest Form

Business Name				
Business Address				
Contact Name		Contact No.		
Email				
Level of Commitment	<i>Titanium</i>	<i>Gold</i>	<i>Silver</i>	<i>Bronze</i>

Briefly describe your business and the services you offer.

How would/could your business promote the George Town mountain bike trail networks?