Kentish Mountain Bike Trails

MASTER PLAN

June 2015

The Kentish Mountain Bike Trails Master Plan was prepared by TRC Tourism and World Trails for Kentish Council. Date Prepared: June 2015

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The information and recommendations provided in this report are made on the basis of information available at the time of preparation.

While all care has been taken to check and validate material presented in this report, independent research should be undertaken before any action or decision is taken on the basis of material contained in this report.

This report does not seek to provide any assurance of project viability and TRC Tourism and World Trails accept no liability for decisions made or the information provided in the report.

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Photos Courtesy of Tourism Tasmania

1 Introduction

1.1 BACKGROUND

Mountain biking has become an increasingly popular way for people to enjoy and appreciate natural areas. In many parts of the world mountain biking trail networks have become significant visitor destinations which attract international visitors and contribute to economic sustainability and recreational opportunities for local and regional communities.

Tasmania is an emerging mountain biking destination with some high profile trail networks and many high quality but less known formal mountain bike trails. Kentish Shire in North West Tasmania has the potential to offer a network of world class trails. Located on the door step of the iconic Cradle Mountain National Park and World Heritage wilderness area, the region's scenic landscapes, varied terrain, natural and cultural tourism attractions and transport infrastructure provide a strong basis for building mountain biking experiences attractive to a range of visitors. The intention is to create distinct mountain bike experiences that complement the trail network under development in North East Tasmania. Together these trail networks will offer visitors world class mountain biking experiences and contribute to Tasmania's efforts to become an international mountain biking destination.

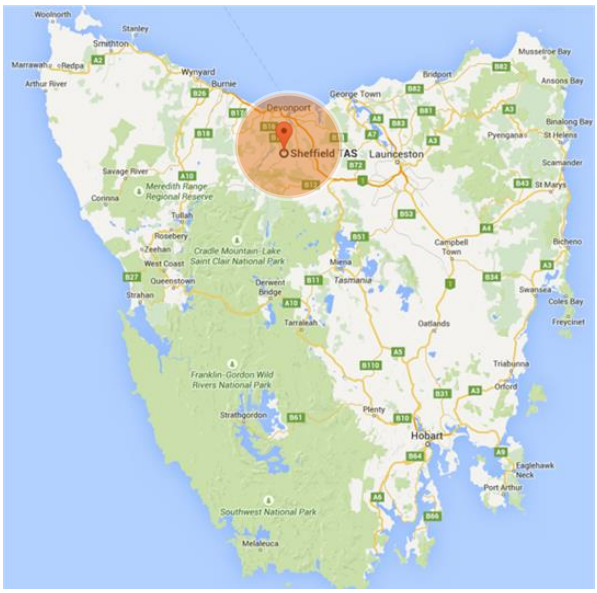
The Kentish Mountain Bike Trails Master Plan (the plan) is a blue print for world class trail development in the region. The plan aims to provide a range of trail types and experiences that will appeal to a wide range of visitors as well as local residents in the region. The network of trails will link adjacent towns of Sheffield, Latrobe, and Railton and will connect with trails to Devonport and Ulverstone.

The plan has been designed to maximise:

- the protection of the region's significant biodiversity, natural resources and natural and cultural values
- development of experiences that appeal to the range of local, domestic and international mountain biking markets and provide opportunities for immersion in the region's unique environment
- the delivery of benefits to local and regional communities and contribution to the tourism experiences available in the region and to Tasmania.

The plan aims to provide opportunities for the private sector to develop products that support mountain biking, and bring significant social and economic benefits directly to the region. Once constructed it is envisaged that the Kentish Mountain Bike trail network will host state and national mountain bike and multi-sport events that provide local economic benefit and raise the profile of the Devonport-Kentish-Cradle region as an adventure-based experiential wilderness destination.

Figure 1. Kentish Mountain Bike Trail Network - North West Tasmania



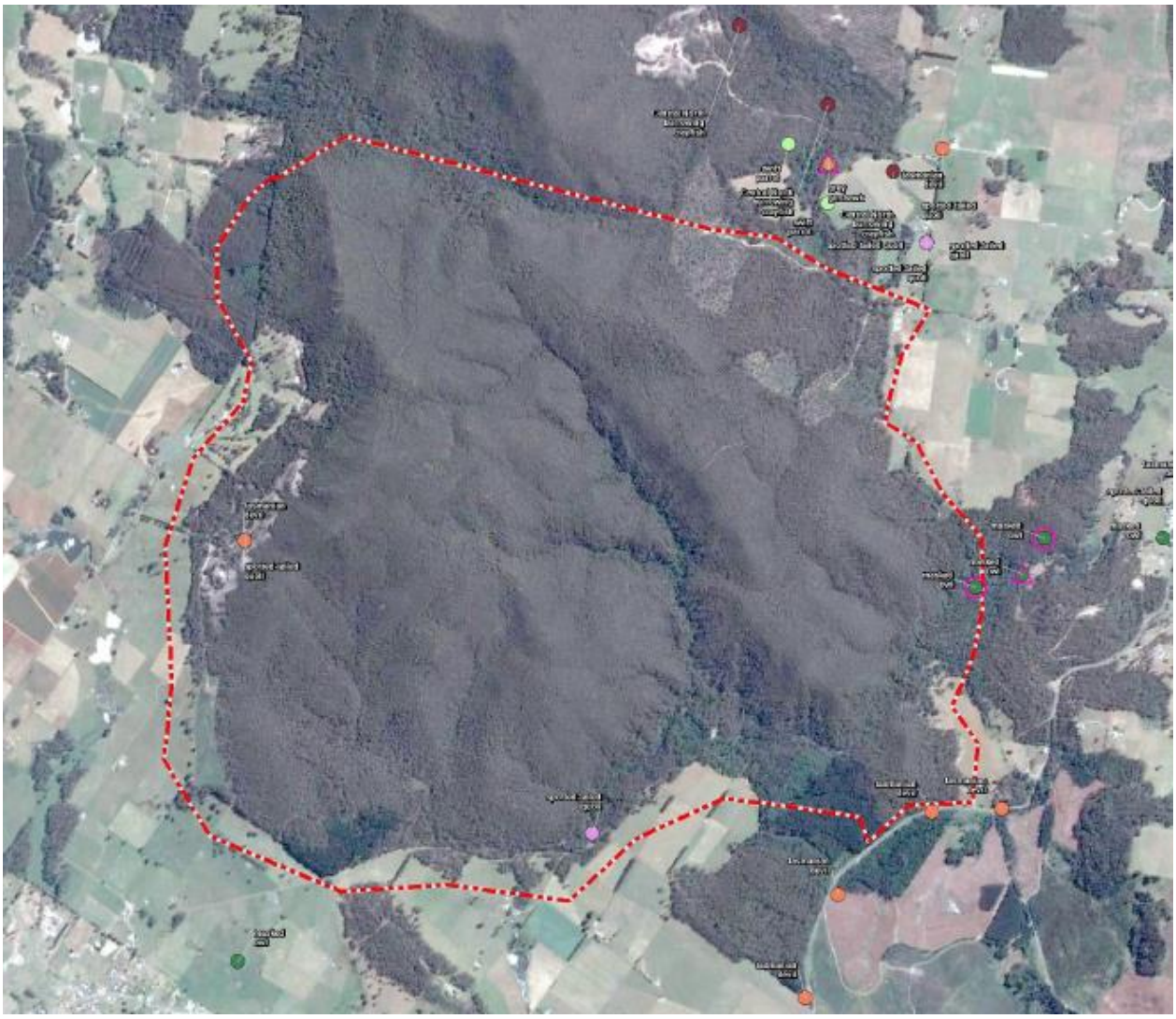
1.2 THE STUDY AREA

The proposed location of the Kentish Mountain Bike Trail Network is located in Kentish Municipality on the southern reaches of Badgers Range, located between the townships of Sheffield to the south-west and Railton to the north-east. The Badgers Range provides spectacular views to Mt Roland which looms over Sheffield and rises to 1234 metres and further afield to the high plateau of Cradle Mountain World Heritage Area (see Figure 2). The range provides a strong element of 'place 'and is a significant element of the regional landscape. The area offers a range of recreation opportunities including bush walking, bike riding, rock climbing and horse riding and is a popular stop over for visitors to Cradle Mountain.

The Tasmanian Trail runs adjacent to the study area and is a long distance, multi-purpose recreational trail extending from Devonport on the northern coast of Tasmania to Dover in the south. The Trail is intended for use by walkers, mountain bikers and horse riders.

The area is managed by the Tasmanian Parks & Wildlife Service (PWS) as a reserve under the Nature *Conservation Act 2002* (Tasmania) and was transferred from Forestry Tasmania as part of the Tasmanian Forests Intergovernmental Agreement of 2 May 2013. Some forestry operations continue in areas adjacent to the study area.

Figure 2. Map of the study area



1.3 METHODOLOGY

The development of the master plan has involved five stages as outlined below.

1.3.1 Literature Review

This stage of the project involved a review of the relevant plans and strategies relating to economic development, tourism and specific recreation activities relevant to the study area. These reports were reviewed to identify any specific recommendations relating to proposed infrastructure developments or other opportunities relevant to the study area.

1.3.2 Site Analysis

The consultants undertook three field trips to the study area to assess the potential opportunities for a trail network and to gather technical and environmental information.

1.3.3 Stakeholder Consultation

Consultations were undertaken with a range of stakeholders including local MTB riders, local and State Government representatives, public and private land managers, local governments, tourism associations, user groups and clubs, event organisers and tour operators. The primary focus of the consultation process was to gather local information relating to the feasibility of the various loops and trails in the study area and preferences of local riders.

1.3.4 Concept Planning

Following the initial site visit, the project team prepared a concept plan for the site. This initial concept was amended on feedback from Kentish Council, eventually expanding the concept to an estimated 50km of trails.

Following approval of the concept from Kentish Council, the trail alignments were then ground-truthed (i.e. the exact location of the trails was determined in the field), during two separate field visit in March and April 2015. The ground-truthed alignment of each trail were marked with orange flagging tape in the field and recorded using a hand-held GPS in the field.

1.3.5 Assessment of development opportunities and report preparation

The final stage of the project involved compiling the findings from the previous stages of the project into a draft master plan for consideration and discussion with key stakeholders and the community. The master plan was the finalised following feedback from stakeholders and Kentish Council.

1.4 REPORT STRUCTURE

The remainder of this report is structured as follows:

Section 2	provides an overview of the regional context for the Kentish MTB Master Plan
Section 3	presents an overview of other mountain bike destinations in Australia and elsewhere
Section 4	scopes market demand and incorporates findings from secondary data sources
Section 5	provides details of the master plan and identifies key features, potential constraints. This section also includes the estimated costs of construction and maintenance
Section 6	presents a summary of environmental considerations and an ecological and cultural overview of the site including a risk assessment
Section 7	presents the findings from the socio economic analysis and includes an assessment of the net community benefits and the economic impacts on the local economy.

2 Regional Context

2.1 OVERVIEW

The Kentish municipality is a traditionally rural, regional district of 6312 people[1] located in North West Tasmania, bordering the Tasmanian highlands and Cradle Mountain-Lake St Clair National Park. Kentish municipality is bounded by Devonport municipality to the north, Latrobe municipality to the north-east, Meander Valley municipality to the south-east, small borders with each of the Waratah-Wynyard and West Coast municipalities to the south-west, and Central Coast municipality to the west.

The two largest population/commercial centres within the municipality are Sheffield (pop. 1538[2]) and Railton (pop 1231[3]) and each has its own distinct cultural and physical identity. About 60% of the municipality's population live outside of these towns. The majority of the population are aged over 35, and are mostly aged between 45 and 54 years. The average age is 43.

The region's largest population centres, and primary employment hubs are Devonport, Ulverstone and Latrobe. Small business is the main driver of the Kentish economy. In 2011, the municipality featured 154 businesses that employ more than the proprietor, and 341 that employ only the proprietor[4].

2.2 THE VISITOR ECONOMY

The Kentish municipality has, for many years, benefited from the drawing power of Cradle Mountain which is the most popular natural attraction in the state (excluding Mount Wellington) attracting over 200,000 visitors each year.

Tourism is now the largest employment sector in Kentish employing 400 people[5] and is also the largest industry by number of businesses[6]. The next largest employer sector is agriculture at 181[7]. The total value of tourism to the region's economy is estimated at up to $617.4 million. This economic output is estimated to support 4,349 jobs in the region. Major events are important for the regional economy and include Mural Fest, Steamfest, Taste of the North-West, Kentish Arts Festival, Targa Tasmania, Triple Top Mountain Run, and the Tour of Tasmania (cycling).

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[1] ABS, 2011
[2] Ibid
[3] Ibid
[4] Kentish Council, Kentish Economic Development Strategy 2014
[5] Ibid
[6] ABS 2012
[7] ABS 2011

The electorate of Lyons, in which Kentish is located, is the eighth most tourism-dependent economy in Australia, as 2892 people, or 7.1% of the employed population, works in the tourism sector[8]

Sheffield is a popular stop for visitors on route to Cradle Mountain. The Kentish Visitor Information Centre attracts receives around 70,000 visitors per annum. Many people stop to enjoy the murals and local shops and cafes before heading up to Cradle Mountain.

Railton is also a point for interest for visitors. Railton's economy is dominated by Cement Australia, as measured by industrial output and employment. It also has a small retail community, some agriculture in surrounding districts, and small business, primarily in trades and engineering. It has developed a potentially popular tourism attraction through the Town of Topiary project, however the town needs further investment to attract visitors.The Kentish Economic Development Strategy and the North-West Economic Development Plan (refer Appendix 1) view the tourism industry as a key component in the region's economic future. The North-West Destination Management Plan, completed for Cradle Coast Authority in 2014, identifies the need to diversify tourism product and identifies adventure tourism, including mountain biking, as a significant growth opportunity.

The Kentish Tourism Plan, prepared as part of the Kentish Economic Development Strategy seeks to:

- explore and support development of an adventure hub in Kentish
- develop international standard mountain bike facilities in Kentish
- network existing operations to create an adventure tourism hub and attract new adventure based experiences
- assist to attract new adventure tourism experiences in Kentish.

A summary of the strategic planning documents relevant to the development of Kentish Mountain Bike Trail network is presented in Appendix 1.

2.2.1 Tasmanian tourism trends

Tasmania has been experiencing recent increases in domestic and international visitation, partly driven by the availability of more and cheaper flights from mainland Australia. This has also contributed to a growth in visitors from younger demographics (under 35 years)[9]. Interstate day visitation decreased 2% between 2013 and 2014, although expenditure in this market increased by 4%. The dispersal of visitors to regional Tasmania, away from the main destinations of Hobart and Launceston, has also been increasing. Table 1 summarises the latest trends published by Tourism Tasmania.

Table 1: Tasmanian visitation 2014[10]

	Numbers	% change 2013-2014	Nights	% change 2013-2014	Spend	% change 2013-2014
Interstate Overnight	892,600	+2%	7,080,000	+3%	$1,475 million	+13%
Interstate Day	26,000	+14%	N/A	N/A		
Intrastate Overnight	1,270,000	+12%	3,055,000	+10%	$368 million	-2%
Intrastate Day	4,649,000	-2%	N/A	N/A	$517 million	+4%
International [11]	167,800	+8%	2,924,000	+2%	$254 million	+13%

8 Tourism Tasmania, 2013

9 Tourism Tasmania (2014), *Strategic Scan 2014*, www.tourismtasmania.com.au

10 Sourced from Tourism Tasmania (2015), *Tasmanian Tourism Snapshot - Year ending December 2014*. Tourism Tasmania (TT) derives visitor data from its Tasmanian Visitor Survey and from Tourism Research Australia's (TRA) National and International Visitor Surveys. The TT and TRA surveys use different sampling and weighting methods, so results differ and are unlikely to tally if added together.

11 The International Visitor Survey results for the year ending September 2014 have been used because the December 2014 results will not be published until July 2015.

2.2.2 Tourism to Kentish and the North West

Data from the Tasmanian Visitor Survey indicates that visitor numbers to the North West of Tasmania (which includes the Kentish Municipality) have increased in all years since 2011 except for 2012. Total North West region visitation for 2014 exceeded 400,000 people, of which 30% visited Sheffield and 45% visited Cradle Mountain. Trends for destinations in and near the Kentish Municipality have been variable.

- Total 2014 visitation to the town of **Sheffield** remains at about 2011 levels after falls in 2012 and 2013. However, overnight visitors staying in Sheffield have seen significant growth in 2013 and 2014.
- **Cradle Mountain** (a major destination for visitors travelling through the Kentish Council area) also saw visitation decreases in 2012 and 2013 followed by a strong recovery in both total and overnight visitors in 2014.
- **Devonport** has experienced declining total visitation since 2011, although overnight visitor numbers exceeded 2011 levels in 2013 and 2014.

Table 2 summarises visitor trends for the region and local area derived from the Tasmanian Visitor Survey.

Table 2. Visitation to the North West, 2011 to 2014[12]

		2011	2012	2013	2014	% change 2013-2014
Sheffield	**Total**	123,008	115,942	116,348	123,434	+6.1%
	Overnight	14,077	11,069	16,251	19,474	+19.8%
Cradle Mountain	**Total**	161,876	153,057	154,836	180,188	+16.4%
	Overnight	98,124	88,839	89,478	110,885	+23.9%
Devonport	**Total**	253,680	248,017	249,076	242,568	-2.6%
	Overnight	68,199	63,025	71,729	70,024	-2.4%
North West	**Total**	368,344	260,176	387,650	405,442	+4.6%
	Overnight	239,162	233,732	253,507	283,629	+11.9%

Based on data from the National Visitor Survey and the International Visitor Survey, Tourism Research Australia estimates that in 2013 the Kentish Municipality received[13]:

- 109,000 domestic overnight visitors who stayed an average of 2.3 nights and spent an average of $198 per night
- 84,500 domestic day visitors who spent an average of $60 per trip
- 18,400 international visitors who stayed an average of 3.1 nights and spent an average of $183 per night.

The main sources of international visitors were the United Kingdom, the United States and Germany.

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[12] Sourced from Tasmanian Visitor Survey Data Reports, www.tvsanalyser.com.au – reports on *Places Stayed Overnight*; *Places Visited on This Trip*.
[13] Tourism Research Australia (2014), *Tourism in Local Government Areas 2013 – Kentish, Tasmania*.

2.2.3 Relevant State and Regional Strategies

The Kentish Economic Development Strategy and the North-West Economic Development Plan view the tourism industry as a key component in the region's economic future. The North-West Destination Management Plan, completed for Cradle Coast Authority in 2014, identifies the need to diversify tourism product and identifies adventure tourism, including mountain biking, as a significant growth opportunity.

The Kentish Tourism Plan, prepared as part of the Kentish Economic Development Strategy seeks to:

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The development of Kentish MTB trail network is supported by the a number of state-wide and regional development strategies as presented in Table 3 below and summarized in Appendix 1.

Table 3. Strategic alignment of trail/cycle tourism development in the region

	State or regional strategy	Purpose	Relevance to Kentish MTB Master Plan
Regional Development	**Tasmanian Economic Development Plan**	Aims to improve the prosperity of all Tasmanians through economic development which is socially and environmentally sustainable. The plan identifies tourism as one of its priority sectors of the Tasmanian economy.	High
	Kentish Strategic Plan 2014-2024	Aims to build a strong local economy with improved local employment opportunities and a broader range of services, facilities and infrastructure to the benefit of both the business and residential sectors.	High
	Kentish Economic Development Strategy	The Kentish Economic Development Strategy views the tourism industry as a key component in the region's economic future. It sees mountain biking as a development and economic opportunity.	High
Tourism	**Kentish Tourism Development Strategy, 2014-19**	Mountain biking (as part of adventure tourism) is one of the 5 pillars or visitor experience types identified to grow and diversify tourism in Kentish – art, food, wilderness, history and adventure tourism.	High
	Cradle Coast Destination Management Plan: Towards 2020, 2014	The DMP points out that many tourism products in the region are reaching a mature stage and that rejuvenation through new visitor experiences, re-positioning and customers and greater use of the digital economy is needed to prevent tourism decline. Adventure (soft and hard), which includes mountain biking, is one of the main themes identified for regional tourism experiences.	High
Mountain Biking	**Tasmanian Mountain Bike Plan, 2009**	Aims to guide development of a world-class, diverse and sustainably-managed range of mountain bike riding experiences in Tasmania for local, national and international market.	High
	Mountain Bike Tourism Potential in Northern Tasmania	Northern Tasmania is well placed to become a national and potentially international MTB destination.	High
	Mount Roland: Developing a Destination, 2011	Assessed tourism opportunities for the Mount Roland area south of Sheffield. The report concluded that there is a need for more diversity in the Kentish tourism offer. Priority tourism developments considered to have the greatest potential for tourism in Kentish are an adventure tourism hub, a must-see destination for recreational campers and a world-class mountain biking and family cycling park.	High
Land Use	**Cradle Coast Regional Land Use Strategy 2010-2030**	The Strategy is a statutory planning instrument applicable to the Cradle Coast Region under the Tasmanian Resource Management and Planning System and has been approved by the Minister for Planning under section 30C of the *Land Use Planning and Approvals Act 1993*	High
	Kentish Interim Planning Scheme 2013	The Kentish Interim Planning Scheme, developed under the Cradle Coast Regional Land Use Strategy sets out general objectives for the use and development of land, requirements for development approval and prescriptions for development in specific zones. It also sets out codes for management and development of areas with particular attributes or hazards (such as bushfire or landslip hazards). The general area for mountain bike trail development at Study Area is designated an Environmental Management Zone. The purpose of an Environmental Management Zone (s. 29 of the Planning Scheme) is: to provide for the protection, conservation and management of areas with significant ecological, scientific, cultural or aesthetic value, or with a significant likelihood of risk from a natural hazard to allow only for complementary use of development where consistent with any strategies for protection and management.	High

3 Growth and Trends in Mountain Biking

3.1 DEVELOPMENT OF MOUNTAIN BIKING

Mountain biking has rapidly increased in popularity in recent decades. Mountain biking has developed from a fringe, extreme sport to a mainstream activity with a number of different genres and organised competitions and events. It has been facilitated by technical improvements in bicycles, the organisational efforts of mountain bike enthusiasts and the development of purpose-built mountain biking trails and facilities. Cross-country mountain biking is now an Olympic Games and Commonwealth Games sport.

Mountain bike trail networks and bike parks offering a range of trails and events attracting local, domestic and international visitors have been developed in many locations around the world. These include iconic international destinations such as Whistler (British Columbia, Canada), 7Stanes (Scotland) and Rotorua (New Zealand). In Australia, popular mountain bike destinations include the trail networks and associated facilities at Melrose (South Australia); Mount Buller, Forrest and the You Yangs (Victoria); Thredbo (NSW); Stromlo Forest Park (ACT) and Atherton and Smithfield near Cairns (Queensland). In Tasmania, recent developments include trails in Hollybank Forest Reserve and the Blue Tier as well as around Derby.

Tasmania has a relatively high density of mountain bike experiences when compared to population size, in fact the state is now considered by many as an emerging mountain bike destination.

Mountain biking clubs and organisations have emerged at the local, national and international level to advocate for the sport, assist in building and managing trail networks and organise events. The International Mountain Bicycling Association (IMBA) has guidelines for trail design and construction. The peak body for mountain biking in Australia is Mountain Bike Australia (MTBA), which is affiliated with IMBA. MBTA is linked to Cycling Australia and the Union Cycliste Internationale (UCI), the international governing body for cycling. Membership of MBTA provides insurance, which allows members to compete in MTBA affiliated/organised events and to earn points that are recognised by the UCI.

The economic impact from mountain biking has been measured at a small number of destinations. In New Zealand, the direct output (expenditure) from mountain biking in Rotorua was estimated at $10.2 million per annum. At Lake Taupo (less than an hour drive from Rotorua), cycling activity is worth in excess of $8.3 million per annum of which mountain biking accounts for approximately $3 million. In a town of 25,000 residents there are five bike shops and over 200km of trails. In Queenstown, mountain biking is anecdotally considered to generate in excess of $5 million per annum in direct expenditure. The proven benefits to communities from mountain biking include employment, transport, retail, bike hire, food and accommodation businesses.

3.1.1 The global MTB market

Mountain biking is an increasingly popular activity throughout the world. As an indication, IMBA has individual members who live in the US, Canada and 30 other countries[14]. The countries with the highest mountain biking participation rates are thought to be Canada, the US, European countries, Australia and New Zealand.

[14] IMBA website – www.imba.com

Estimation of the size of the mountain biking population or the participation rate in particular countries or localities is inhibited by incomplete data. National sport participation and tourism surveys tend only to provide data on general cycling participation and do not distinguish mountain biking from other forms of cycling. Mountain biking survey results also vary because of different interpretations of mountain biking. The number of people participating in or attending competitions is an indication of mountain biking popularity, but does not show the total number of participants. Like other outdoor activities (such as hiking, climbing, surfing) mountain biking is predominantly unstructured and geographically diverse, with only a percentage of participants focussing on competitions.

Estimates of participation at iconic international mountain biking destinations are:

- *Whistler, British Columbia, Canada* – Whistler Mountain Bike Park is an iconic mountain biking destination, particularly for downhill and cross country MTB. It offers 200 kms of trails and 1,200 metres of vertical drop together with extensive service facilities and competitions. A summer destination (as it is a ski resort in winter), bike park visits grew from 18,583 in the 2000 season and reached 100,000 in 2008[15]. Over 60% of riders come from outside Canada.
- *Squamish, British Columbia, Canada*. This region (ranked among the top 25 MTB destinations by Mountain Bike Magazine) has about 200 kms of varied MTB trails which are used by both local residents and visitors. Traffic counts and visitor surveys show that trail use quadrupled from an estimated 591 riders a week to 2006 riders a week in 2013[16]. 40% of visitors stayed overnight and stayed an average of 2.5 nights
- *7stanes, Scotland* –7stanes is a network of 7 mountain bike locations spread throughout the south of Scotland and providing a wide range of MTB trails and facilities. A 2007 study estimated that just under 400,000 visits annually to the total 7stanes network. Most trail users come from the UK, with an estimated 8% international visitors[17]
- *Rotorua, New Zealand* – A network of trails through 50 hectares of the Whakarewarewa Forest caters for a wide range of riders from beginners and family groups to experts. In 2007, mountain biking accounted for 85,000 of the 282,000 recreational visits. Over half of mountain bike visitors to Rotorua came specifically to go mountain biking
- *Taupo, New Zealand* – A network of over 200km of trails spread around Lake Taupo, the Waikato River, Wairakei Thermal Resort and Craters of the Moon Reserve. Over 50,000 riders are using the Great Lake Trail after -just three years of operation?
- *Queenstown, New Zealand* – Over 50,000 riders per annum are estimated to be using the Queenstown Trails Network (in excess of 100 km). The Skyline Gondola alone attracts over 75,000 rides (descents) per annum.

Cycle tourism (which includes mountain biking) is considered to be increasing globally. The Adventure Travel Trade Association (ATTA) conducted a benchmark survey of cycle tour companies worldwide[18] in 2014 which estimated that:

- cycle tour companies saw a 59% increase in profits over 2013
- Europe, Asia and North America are the leading cycling destinations
- the Pacific, including Australia, is a small part of the global market
- mountain bike tours form 20% of total cycle tours – 13% on dirt tracks/roads and 7% on single track
- mountain bikes are provided by 57% of tour companies – suggesting there are unsealed road/track components in non-mountain bike specific tours. The survey indicated that 14% of trips were on gravel roads.

[15] www.whistler2020.ca
[16] Squamish Off-Road Cycling Association (2014), *Economic Impact of Mountain Biking in Squamish*.
[17] EKOS Limited (October 2007), *7 Stanes Phase 2 Evaluation*, Report for Forestry Commission Scotland.
[18] ATTA (2014), *Bicycle Tourism – 2014 Survey*, www.adventuretravel.biz

3.1.2 Types of mountain biking

Mountain bike riders can be broadly divided into core and non-core riders:

- *Core mountain bikers* tend to be more experienced riders who may differentiate into one or more different genres. They tend to have high levels of mountain bike participation, are high spenders on gear and equipment, are willing to travel to mountain biking destinations and have a high likelihood of participating in competitive events
- *Non-core mountain bikers* who include novices, families seeking safe enjoyable places to ride away from cars, school groups (often guided by tour operators), off-road bike tourers (from rail trails to trails in steeper and more difficult terrain) and people seeking a different outdoor experience or adventure (such as undertaking a guided experience or hiring a bike while on holiday).

Anecdotal observations and profiles of core or experienced mountain bikers compiled in Tasmania suggest that the majority of experienced mountain bikers (excluding the younger group of dirt jump riders and extreme downhill riders) in Australia (and likely in other countries) are primarily male, aged between 20 and 40 years, tend to have above average incomes and are willing to travel for quality mountain biking experiences. A summary of mountain biker characteristics compiled from a range of studies in Tasmania[19] is provided in Table 4.

Table 4. Characteristics of 'Core' Mountain Bikers

International and Australian Riders
» Predominantly male - though increasing female participation.
» Range in age from the mid-20s to mid-40s, with a high percentage in the mid-30s.
» Have tertiary level education.
» Have higher than average incomes and professional or technical backgrounds.
» Ride on a regular basis – one to 2 or 3 times a week.
» Tend to travel to destinations within half a day to a day from home, but will travel further for unique experiences or competitions
» Tend to travel in small groups of 2 or 3 people.
» Access information about destinations by word of mouth or the internet.
» Consider important attributes of a mountain biking experiences to be: (a) fitness/exercise (b) spectacular scenery (c) local culture (d) accessibility.

Non-core riders are a much broader market and can, by their activity, generally be assumed to overlap with tourism markets in a destination.

[19] Sport and Recreation Tasmania (2009), *Tasmanian Mountain Bike Plan: Main Report*, Department of Economic Development, Tourism and the Arts, Hobart.

Activities undertaken by core mountain bikers have evolved into a range of mountain biking types or genres, each with different characteristics, trail/facility requirements, bicycle equipment and competitive circuits. Currently, the core mountain biking types or genres can be described as:

- Cross-country
- Downhill / Freeriding
- All Mountain / Gravity Enduro
- Dirt Jump / Pump Track
- Trials

Cross-country mountain biking (the oldest type of mountain biking) remains the most popular type of mountain biking activity. It can be undertaken in a variety of places and terrain, from management trails to shared trails to purpose-built single track. The next most popular activity that has emerged more recently is *All Mountain / Gravity Enduro*. This type of riding is characterised by long, moderately steep (5-15% grades on average) descents, with some short uphills along the way. On well-designed trails, this type of riding can appeal to both experienced riders and inexperienced riders. It is currently attracting a lot of attention from riders and in social media. While competitions are held, many enthusiasts have little aspiration to participate in races.

The different types or genres of mountain biking are summarised in Table 5.

Table 5. Mountain biking types or genres

Type/ Genre	Description	Key Elements Appealing to Participants	Estimated Participation[20]	Specific Needs
Cross-country	Cross-country mountain biking is the oldest discipline within the sport and is analogous to cross-country running or skiing. It involves riding across all types of terrain and slopes. Cross-country mountain bikes are lightweight, with many gears, including extremely low gearing for steep hills and generally have front suspension and often rear suspension. Cross-country trails are similar to walking trails – narrow singletrack corridors through the bush, only slightly wider than a set of handlebars, although they can be as wide as a vehicle trail. Cross-country racing consists of a number of formats: » Olympic format – the most traditional form of cross-country race, consisting of multiple laps (the number of laps depends on the skill category) of a 4-6km loop. Each lap generally takes in a wide variety of terrain, with climbs, descents and numerous technical features » Short course format – this is a relatively new format, comprising a 500-1000m loop with numerous technical features. This format is generally intended to provide good spectator and media opportunities and races are intended to be short, fast and intense » Marathon format – this format has increased in recent years. Courses may comprise a set distance (50km or 100km are popular) or a set duration (8, 12 or 24 hours are popular), with either shorter, multiple laps or longer, single laps.	Challenge Fitness Nature appreciation Thrills/adrenaline Racing Solitude Self-sufficiency Socialising	84%	• Equal mix of climbing and descending over generally hilly terrain • Predominantly singletrack • Mix of trails from easy to difficult • Race courses should include some wider and flatter sections to allow for rests, drinking, eating and overtaking
Downhill / Freeride	Analogous to downhill skiing, **downhill mountain biking** is a speed-oriented sport, where participants start at the top of the hill and ride down. As downhill bikes are not designed for riding up hills, transport is required to get riders and their bikes back to the top of the hill. Downhill tracks are often located in ski resorts and use the ski lifts during the summer. Downhill trails are by definition point to point trails, and require a fairly large amount of space and downhill slopes, with access top and bottom.	Thrills/adrenaline Racing Social Challenge Fitness	38%	• Transportation back to the top of the hill. This could take the form of a chairlift, commercial vehicle shuttle service, or self-organised shuttling using public roads. • Steep gradients • Difficult and challenging obstacles and features

[20] Estimated participation rates come from a survey of approximately 1,300 mountain bikers conducted by World Trail in 2013.

Type/ Genre	Description	Key Elements Appealing to Participants	Estimated Participation[20]	Specific Needs
	Downhill bikes have both front and rear suspension, are heavy and generally have fewer gears than cross-country bikes. As downhill often involves high speeds and crashes are more common, participants wear full-face helmets and extensive body armour to protect themselves. Downhill trails are generally more technically difficult than cross-country trails and may include drop-offs, jumps, narrow bridges, rough terrain and steep gradients. Due to the high speeds, heavy bikes and rider preferences for steep gradients, downhill trails are more subject to erosion than cross-country trails. Careful design and construction, including close attention to gradients and corners is essential to reduce the environmental impacts of downhill trails. **Freeride** is a closely related genre. While focussed on downhill riding, it is largely non-competitive. There are some high-profile freeride competitive events, but these emphasise advanced level mountain biking, creative riding, extreme manoeuvres and high risks rather than the fastest rider to reach the bottom. Freeride bikes are similar to downhill bikes – heavy, robust and with front and rear suspension.			• No/minimal climbs • Top to bottom runs should take longer than 3 – 10 minutes • On self-shuttling downhill runs, a sealed road is ideal, with safe, dedicated off-road drop-off and pick-up points top and bottom • Predominantly singletrack
All-Mountain/Gravity Enduro	This category is difficult to define, borrowing elements from all genres. While it is primarily about descending a slope, it has less focus on speed and steepness than downhill riding. Competitive events in this category typically include long descents with some uphill sections, which typically are not timed. Riders win based on their cumulative time for all the descending sections. All-Mountain / Gravity Enduro bikes typically feature front and rear suspension, but are generally not as heavy as downhill bikes. This type of riding is currently showing very strong growth and seems to be running in parallel with the evolution of 'all purpose' mountain bikes capable of a variety of uses Similar to cross-country mountain biking, it requires an ethos of self-sufficiency and preparedness and an affinity for wilderness and exploring back-country areas.	Thrills/adrenaline Racing Fitness Challenge Socialising Nature appreciation Self-sufficiency and exploration	57%	• Long descents, greater than 10 minutes. Can be broken up with climbing sections, but the main focus is still on descending • Transportation back to the top of the hill. This could take the form of a chairlift, commercial vehicle shuttle service, or self-organised shuttling using public roads • On self-shuttling downhill runs, a sealed road is ideal, with safe, dedicated off-road drop-off and pick-up points top and bottom • Predominantly single track.

Type/ Genre	Description	Key Elements Appealing to Participants	Estimated Participation[20]	Specific Needs
Dirt Jump/ Pump Track	This genre borrows heavily from BMX riding and could be considered as a non-competitive offshoot of BMX – indeed dirt jumps and pump tracks can be ridden on BMX or mountain bikes. This activity tends to appeal strongly to younger people and has a strong urban focus. Dirt jumps and pump tracks are highly modified track types, entirely constructed from dirt/soil/aggregate. Dirt jumps are large mounded jumps built up above the natural ground surface. The jumps often feature a gap between the take-off and landing points. Pump tracks are short circuit tracks, featuring rollable dirt mounds and berms in series. They are designed to be ridden without pedalling, riders generating speed by pumping the bike – i.e. pushing the bike down into the dips and pulling the bike up over the mounds. Any mountain bike or BMX bike can be used on pump tracks, but dirt jump bikes are usually heavily built to withstand jumping, usually have front suspension only and may have fewer gears than cross-country bikes.	Thrills/adrenaline Social Challenge	18%	• Generally located in high visitation areas, near -facilities and services • Should be close to public transport and parking • Should feature mix of difficulty levels, to cater for children through to experienced riders • Doesn't require large amounts of space or vertical elevation. Flat sites are ideal • Urban, man made landscapes • Should include passive, spectating areas
Trials	Trials is an activity with relatively low popularity that involves manoeuvring a bike over an obstacle course without putting a foot down. Courses usually combine natural and man-made features. Trials bikes look more like BMX bikes than mountain bikes, with very low seats, small wheels, small frames and large volume tyres and no suspension. The primary skills required for trials are balance and the ability to 'hop' the bike up onto obstacles that are too large or steep to be able to pedal or roll onto. Trials courses typically require only a small area. The activity is attractive for spectators.	Thrills/adrenaline Challenge Social	Less than 1%	• Trials courses can be constructed from a variety of natural and artificial materials • Urban, man made landscapes • Should include passive areas for spectators
Off-Road Touring	Short, day, overnight and multi-day tours on off-road trails, either existing management trails, rail trails and other shared trails or purpose-built trails. Undertaken by a variety of people of different levels of skill and experience, including novices, families, school groups, tour groups and people seeking immersive experiences and adventures (from the relaxing to the challenging). There is overlap with some cross-country riders who may participate in social rides with friends and family.	Relaxation Nature appreciation An immersive experience – food, wine, culture, other attractions combined with cycling	Difficult to estimate, but considered in major destinations to make up more than 60% of all visitors who ride mountain	• Mix of routes from easy to more challenging and of differing length • Location in areas with natural and/or cultural attractions • Information on routes and linked activities and accommodation and service options • Potential packaging of experiences through cooperation with tourism operators

Type/ Genre	Description	Key Elements Appealing to Participants	Estimated Participation[20]	Specific Needs
	Often associated with other activities, attractions and accommodation which may be packaged to form a total experience. Examples of a range of touring trails include: • short or long distance touring on the Munda Biddi Trail which traverses forest, rural areas and towns between Mundaring and Albany in Western Australia. Accommodation can be at on-trail campsites or off-trail through local accommodation providers. • day riding along a high country river on the shared Thredbo Valley Track in Kosciuszko National Park • the iconic Otago Central Rail Trail which offers a range of attractions and accommodation suitable for day and multi-day touring through historic gold mining areas and towns in the South Island of New Zealand • easy cycling between Clare Valley wineries and other attractions on the Riesling Trail, South Australia • country wine, dining, gourmet produce and culture experiences on the Murray to Mountains Rail Trail in Victoria • day trips from Melbourne along the Yarra River Valley on the Lilydale to Warburton Rail Trail, Victoria Also undertaken more informally on management and other trails in conservation, forest and recreation areas.	Social activities with friends or family Journeying in/ exploring a natural area Solitude	bikes. 22% of respondents in the 2013 World Trail survey participated in 'cycle touring including rail trails'. Note the survey related to Warburton, where people used the rail trail to access MTB trails.	• Services – bike hire, transport to and from trailheads, luggage storage, guided tours or self-guided packages

4 Demand Analysis

4.1 THE AUSTRALIAN MTB MARKET

To understand the activity size, patterns and needs of the Australian mountain biking market it is useful to divide it into local and tourist markets based on the definition of day and overnight visitors in the National Visitor Survey:

1. **Local mountain bikers** – who live within a 40 km radius (the local area) of a MTB destination
2. **Mountain bike tourists** – who travel to a destination to undertake mountain biking.

4.1.1 The local market

The local mountain biking market includes all mountain bikers in a local area. There are limited sources available for estimating the level of participation in mountain biking in Australia, as cycling participation data is not usually differentiated into cycling types. The main sources from the Australian Bureau of Statistics (ABS) are:

- the annual ABS Australia-wide Participation in Sport and Recreation. The 2013-14 report estimates that 2.2% of Australians participate in 'cycling/BMX' with 0.2% participating in 'trail riding'
- a study on Leisure and Cultural Participation in Tasmania conducted in 2000, which estimates that 4.2% of the Tasmanian population participated in 'off road cycling or mountain bike riding'

In order to estimate the potential number of mountain bikers in Australia it is assumed that the likely participation rate lies between 0.2% and 4.2% calculated in the above studies.

An average value of the above values has been adopted with an estimated national average of 3.5% calculated using these adjusted averages. For Tasmanian residents the participation rate has been estimated at 4.2%.

It is estimated that the resident Australian mountain bike market is around 831,500 residents who undertake 14.6 million mountain bike trips a year.

The Australian resident mountain bike market is estimated to be around 831,500 people who undertake 14.6 million trips per annum

4.1.2 Mountain bike tourist trends

Cycle Tourism

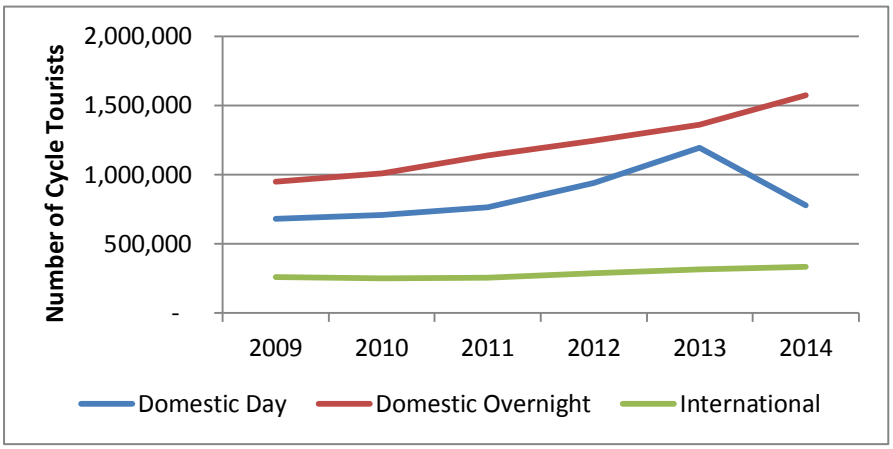
Cycle tourism is a growth market in Australia (refer Figure 3). In 2013-14 the National Visitor Survey and International Visitor Survey[21] estimated:

- 1.411 million domestic overnight visitors participated in cycling during their trip – about 2% of total overnight visitation.
- 976,000 domestic day trips included cycling – 6% of all domestic day trips. Domestic day trip cycling increased by 33% in the period 2005-06 to 2012-13, but experienced a 10% decrease between 2012-13 and 2013-14
- 325,789 international visitors participated in cycling on their trip – 5% of all international visitors to Australia.

This represents a 13% average per annum growth in the domestic overnight cycle market and a 6% average per annum growth in the international cycle market.

[21] Tourism Research Australia (2014), Data on cycle tourism supplied from the National Visitor Survey and International Visitor Survey.

Figure 3. 5 Year cycle tourist trends by market type



Similar to ABS, Tourism Research Australia (TRA) examines cycle tourism under the broad activity category of 'cycling' and does not refer specifically to mountain biking. A 2014 bicycle tourism survey by the Adventure Travel Trade Association (ATTA) indicates that mountain biking comprises around 20% of all cycling trips.

Using this information, the following assumptions have been applied to the mountain bike tourist market for the purposes of this report.

- There is an even distribution of visitor markets across the cycling activity category (i.e. domestic day, domestic overnight and international visitor proportions remain the same across all cycle segments); and
- Although MTB tourist participation proportions are similar to those of the ATTA Bicycle trends survey (20%), it is more likely that this value is at least half in Australia, as Australia is not as established a MTB destination compared to other countries. Therefore the participation rate is estimated at 10%. Using this adjusted value, it is estimated that the Australian MTB tourist market is comprised of nearly 300,000 visitors.

Table 6. The estimated Australian MTB tourist market[22] (YE Sept 2014)

Market Segment	Total
Cycle Tourists (TRA Actuals)	2,963,035
Estimated MTB Share of Cycle Tourists	10%
Estimated MTB Tourists	**296,304**

The Australian mountain bike tourism market is estimated to be around 300,000 visitors per annum (equivalent to 36% of all mountain bike riders also ride on their holidays and take trips over 40km from home to ride).

Of all trips (over 40 km away from home) taken in Australia it is estimated that 1.1% involve cycling as an activity on that trip. Of these it is estimated that 10% are mountain bike riders on trails and 90% are other forms of cycling. That equates to 0.14% of all trips taken in Australia being mountain bike trips. It is important to note that riders may or may not have ridden a mountain bike in each location of their most recent stay. Therefore the mountain bike market is defined as the potential market, rather than an actual market size as the TRA surveys do not indicate where the mountain bike activity took place on a trip.

[22] The Australian MTB tourist market is defined as domestic day, domestic overnight and international visitors. 'Day Trip' visitors are defined as those who have travelled for a round trip distance of at least 40km and are away from home for at least 4 hours.

4.1.3 Estimated mountain bike visitation

Using the information about the local (i.e. resident population) and the estimated visitor markets from the previous section, it is estimated that the potential market for mountain bike trails in NW Region is estimated at around 14,700 visitors or 82,184 mountain bike trips each year, comprised of:

a) approximately 1,425 residents (within a 40km radius) who participate in mountain bike-related activities approximately 20 times per year

b) an intrastate visitor market of 10,100 (residents of Tasmania outside 40km radius) who participate in bike activities 5 times per year

c) an interstate/international visitor market of approximately 3,184 (including, overnight and international visitors) who would mountain bike while on their trip.

Table 7. Estimated MTB Market For Kentish

	Locals	Domestic Intrastate	Domestic Interstate	International	TOTAL
Visitors	1425	10,100	3000	184	14,709
Visits per year	28,500	50,500	3000	184	82,184
Total Spend[23]	$855,000	$3 million	$594,000	$15,272	$4.5M

[23] Spend figures are based on Tourism Research Australia estimates for the NW region (2012/13 Domestic Overnight $198, Domestic Day $60, International $183). It is assumed that locals would spend half of what a day trip visitor would normally spend.

5 Creating a mountain bike destination

5.1 CHARACTERISTICS OF SUCCESSFUL MTB DESTINATIONS

A range of factors combine to make world class mountain biking destinations that attract both core and non-core mountain bikers and other visitors who might undertake a casual mountain biking experience as part of their holiday.

While a destination may have world class trails within it, it is the combination of trails plus the overall visitor experience of the destination that combine to create a world class destination.

The following characteristics have been drawn from successful international and Australian mountain bike destinations. They can be divided into:

- the trail infrastructure, design, support facilities and management
- the wider tourism/visitor experience offered, both on and off trail.

5.1.1 Trails and support facilities

The key attractant for the range of mountain bikers is the trail network. Its ability to attract visitors relies upon the quality and quantity of trails, its accessibility and the challenges and interest it poses. Critical factors are summarised below.

- High quality, sustainable trail infrastructure
- Diversity of trail types and styles for a variety of users
- Sufficient riding opportunities to fill 2 to 3 days
- Range of different difficulty levels
- IMBA recognition
- Provision of transport
- Accessibility
- High quality pre-trip information
- High standard trailhead or nearby facilities
- Sustainable management of trails and infrastructure
- Events

5.1.2 The visitor experience

The off-trail experience will also be important to mountain bikers who will spend a proportion of their time at a destination doing other activities. They will help to bring the destination to life. A strong overall destination experience is also needed to attract non-core mountain bikers and other visitors to undertake mountain biking and support commercial mountain biking products and services. Central aspects of a mountain biking tourism/visitor experience are summarised below.

- An attractive landscape, natural beauty and cultural attractions
- Range of bike-friendly accommodation options
- Cafes, food, beverage and retail businesses
- Supporting bike-related services
- Quality commercial tours (guided and self-guided)
- Community engagement and support
- Strong positioning as a mountain bike destination
- Coordinated destination marketing and promotion.

Case studies of best practice international and Australian mountain biking destinations are provided in Appendix 2.

5.2 THE POTENTIAL OF THE REGION

In a state-wide context North West Tasmania has an excellent opportunity to establish additional mountain bike facilities and leverage the proximity of the recently developed trails in North East Tasmania. With a number of existing and developing mountain bike experiences in and around Launceston, the Kentish Trail Network will be an additional drawcard for visitors as a stand-alone destination or as part of a trip to Cradle Mountain World Heritage Area and the North West region.

5.2.1 Access

The site is accessed via high-quality sealed roads from the city of Devonport and Launceston and the East Coast. The region is serviced by two airports with regular flights to Melbourne, Sydney, and Brisbane.

Launceston Airport is located approximately 1 hour from Sheffield by car and is the main air gateway to northern Tasmania. Qantas, Virgin, Jetstar and Tiger offer regular daily flights to and from Melbourne, Sydney and Brisbane.

Devonport Airport is located 30 minutes from Sheffield by car, accessed via high-quality sealed roads. Many visitors will arrive via the Spirit of Tasmania ferry, allowing travellers to bring their own car and bike from the mainland to the trail network in Kentish. This is a significant opportunity for Kentish to promote a “boat and bike” experience allowing riders to travel from Melbourne on the Spirit of Tasmania and ride to the Kentish trail network without having to bring their own vehicle and pay for vehicle transport.

The nearest international airport to the site is Melbourne, a 45-minute flight from the Devonport or Launceston Airport. Melbourne Airport services all major international destinations, offering a significant volume of flights to/from most major destinations.

5.2.2 Accommodation

The municipality's accommodation offer is dominated by mostly bed and breakfasts and three-star accommodation. However the close proximity of high-end accommodation at Cradle Valley and a range of accommodation options in Devonport make it easy for visitors to find accommodation to suit their needs. Occupancy rates are high in peak season, with very low occupancy rates outside at other times. The development of the Kentish trail network will help iron out seasonal variances in accommodation occupancy.

5.2.3 Food and Beverage services

Located on the Cradle to Coast Tasting Trail there are many vineyards, cafes and restaurants in the region. There are many farm gate purchase opportunities, paddock-to-plate experiences, as well as boutique breweries and spirits distilleries with a particular concentration in the Kentish and Latrobe municipalities. These unique offerings would appeal to the mountain bike market and potentially increase length of stay and spend in the region.

5.2.4 Basic Services

As well as having a range of unique shops Sheffield and Railton provide basic services to visitors through general store, pharmacy, supermarket, service station and food services.

5.2.5 Proximity to other mountain bike hubs

The proximity of other mountain bike opportunities available in Tasmania offers visitors to extend their stay for a variety of riding experiences. The trail network in Kentish will compliment these experiences and strengthen northern Tasmania's offering (refer Table 8).

Table 8. Mountain Bike Facilities in Tasmania

Tasmanian Region	Facility	Trail type and facilities
North West Tasmania	Trial Harbour-Granville Harbour	Cross country/all-mountain
	Sterling Valley	Cross country/all-mountain, downhill
Southern Tasmania	Glenorchy MTB Park	Cross country, downhill, four cross, dirt jumps
	North South Track/ Mount Wellington	Cross country/all-mountain, downhill
	Clarence MTB Park/ Belbins Road	Cross country, downhill, four cross, dirt jumps
	Tangara Trail	Cross country
	Kingborough MTB Park	Cross country, downhill, dirt jumps, pump track, skills development
North East Tasmania	Kate Reed	Cross country
	Trevallyn	Cross country/all-mountain, downhill
	Blue Tier	Cross country/all-mountain, downhill
	Hollybank	Cross country, downhill

5.2.6 Complimentary activities and services

There is an unusual diversity of natural attractions in close proximity (e.g. mountains, rivers, lakes, wilderness, open areas) suitable for extreme & adrenaline pursuits which may be attractive as a complimentary experience for riders. Several commercial adventure operators also offer adventure tourism experiences. The region offers a number short walks (walking only no bikes permitted), which are listed in the 60 Great Short Walks of Tasmania and may be of interest for non-riding travel companions.

5.3 WHAT IS THE POTENTIAL OF THE REGION TO BECOME A WORLD CLASS MOUNTAIN BIKE DESTINATION?

Trail infrastructure	
High quality, sustainable trail infrastructure	With refinement of trails and some additions plus links between hubs, the region can have outstanding trail infrastructure. Ensuring long term sustainable management at the same high standard will be critical to the long term success of the destination.
Diversity of trail types and styles for a variety of users	With different standards of riding and promotion of existing mountain bike hubs in Tasmania's north east, Kentish will be an attractive destination for riders
Sufficient riding opportunities to fill 2 to 3 days	There will be enough opportunities for the majority of riders to fill 2 days.
Range of different difficulty levels	There will be a good mix of all levels of difficulty across the network.
IMBA recognition	There is potential to apply for IMBA recognition as a ride centre once the recommended trail system is developed.
Provision of transport	There is some transport available. Options to resolve this include: • commercial sector providing shuttle services • improvements to public transport to allow bikes • continuation of current private transport where suitable roads exist.
Accessibility	Kentish mountain bike hub is readily accessible to Devonport (airport and sea port) as well as Launceston and Hobart airports.
High quality pre-trip information	Additional high quality information is required including pre trip and on site orientation. Downloadable apps and maps with GPS data to readily locate trails needs to be combined with signage on site.
High standard trailhead or nearby facilities	Trailhead facilities are inadequate to match the world class status. Toilets, water supply, car parking and trailhead information are all essential at key hubs and visitor nodes.
Sustainable management of trails and infrastructure	Effective governance structure and appropriate resourcing for capital improvements and ongoing maintenance.
Events	With high quality trails, the opportunity to leverage major cycling events will be strong particularly when linked with the other mountain bike destinations on the Tasmanian circuit.
The tourism/visitor experience	
An attractive landscape, natural beauty and cultural attractions	This exists and is the backdrop of the trail network. Creating the linkages and positioning of the Kentish as a place where you can enjoy bike riding and other adventure activities in the Cradle Mountain World Heritage Area will be important.
Range of bike-friendly accommodation options	There is a need to work with tourism industry to create an awareness of what bike riders need and to extend the accommodation options including guest houses, pubs and camping.
Cafes, food, beverage and retail businesses	As rider numbers grow it is likely additional businesses will become established and these are essential to a vibrant mountain bike destination.
Supporting bike-related services	There is a need to work with the tourism industry to create an awareness of what bike riders need including bike hire, transport and shuttle services, bike equipment and repair shops, car rental companies that provide bike racks, bike storage, bike wash down facilities.
Quality commercial tours (guided and self-guided)	A small number of operators currently exist, and form a good base for supporting growth in guided and supported activities. Additional operators are likely to become established as the market grows and diversifies.
Community engagement and support	Ongoing engagement of the community and the tourism industry and commercial sector to ensure recognition of the benefits and value of mountain biking will be essential to a successful destination
Strong positioning as a mountain bike destination	Leveraging the adventure experiences in Cradle Mountain World Heritage Area and other mountain bike opportunities available in Northern Tasmania as part of the broader positioning will be critical to the success of the Kentish trail network.
Coordinated destination marketing and promotion	Individual operators, peak bike groups, land managers and regional tourism will all need to work effectively to position Kentish as world class mountain bike destination. This will require an effective marketing strategy.

6 Environmental Planning Considerations

The protection of the region's significant biodiversity, natural resources and natural and cultural values is a fundamental principal for the development of the Kentish Mountain bike trail network. Understanding the values of the area is a prerequisite to ensuing their protection and the development of sustainable trails. The following summary provides an overview of the environmental values of the study area. A full analysis of the environmental conditions for the site is presented in Appendix 6.

6.1 ZONING AND OVERLAYS

The site is located within a large area of land zoned Environmental Management in the Kentish Planning Scheme 2013. Under the Kentish Planning Scheme 2013, Environmental Management Zones are areas designated for protection of significant ecological, scientific, cultural and aesthetic values. The scheme allows for development only where these values are complimented and protected.

The study area is surrounded by land zoned Rural Resource, aside from the townships of Sheffield and Railton, where areas of General Residential and associated zoning occur. The Sheffield Golf Club is located on the north-west of the study site and is zoned Recreation. The Sheffield Pistol Club is located to the south of the study area.

6.2 GEOLOGY AND SOILS

The soils on site are part of the Upper Owen Sandstone Formation of the Cambro-Ordovician Period. They are comprised of thin-bedded quartz sandstone with interbedded siltstone and minor granule- pebble conglomerate[24].

6.3 VEGETATION

Eucalyptus obliqua dry forest covers the majority of the site which is recognised by its dominant eucalypt canopy with a dry shrubby and/or heathy understorey[25]. There is also a large area of *Eucalyptus regnans* forest which is more common in the north-east and central south of Tasmania; this tallest of eucalypts is associated with a wet sclerophyll or rainforest understorey[26]. This is interspersed with small areas *Acacia dealbata* forest which is a successional community suggesting past disturbance and is often associated with riparian or wet areas[27].

There is a substantial patch of *Eucalyptus amygdalina* a vegetation community listed as threatened under the Nature Conservation Act 2002; forest and woodland on sandstone, with one smaller patch on the southern border of the site. This species is listed as vulnerable and is identified by a more open canopy with smaller eucalypt Black Peppermint *E. Amygdalina* trees that are not often over 25m. This vegetation community may also support co-dominant eucalypt species such as *Messmate E. obliqua* or White Gum E. *vimminalis*. It is differentiated from other E. *amygdalina* dominated vegetation communities mainly due to the sandstone substrate, here supported by the geological mapping for the area. The understorey can contain a diverse array of small shrubs depending of soil type and disturbance history[28].

[24] LISTmap 2014
[25] Harris and Kitchener 2005
[26] Ibid
[27] Ibid
[28] Ibid

6.4 STATE OR NATIONALLY SIGNIFICANT FLORA

Two species of significance, Snug Greenhood *Pterostylis atriola* and Spike Centuary *Schenkia australis* have been recorded in the study area.

The Snug Greenhood is listed as rare under the Tasmanian *Threatened Species Protection Act* 1995 (TSP Act). There is a large group of records for this species on the northern border of the site with further recordings in the Railton area.

Six species of state significant flora are predicted to occur within a five kilometre radius from the centre of the study area. These are Native Wintercress *Barbarea australis*, Tailed Spider-orchid *Caladenia caudata,* South Esk Heath *Epacris exserta*, Clover Glycine *Glycine latrobeana* and Tapered Leek-*orchid Prasophyllum apoxychilum.*

There is potential for at least some of the flora species mentioned above to occur at the study site. In determining this 'likelihood of occurrence' and utilisation of the study site by these national or state significant flora, the following factors were taken into consideration in the design of the trails:

- the conservation status of the species and its distribution
- previous recordings of species in the local area from EPBC records and previous studies
- the habitat requirements of individual species
- the nature of the site and surrounding areas.

The likelihood of these threatened species occurring at the site is considered to be low for the Tailed Spider-orchid, South Esk Heath and Clover Glycine and Tapered Leek-orchid; however there is a medium chance of the presence of Native Wintercress with records to the north-west and south of the study area. Given the presence of known records for the Snug Greenhood and Spike Centuary to the north of the study site, these species are considered to have a high likelihood of occurring on site. Mitigation measures will be required during construction.

6.5 STATE OR NATIONALLY SIGNIFICANT FAUNA

A total of twenty-two state, or nationally significant fauna species are recorded within a five- kilometre radius of the study area. In determining this 'likelihood of occurrence' and utilisation of the study site by national or state significant fauna, the following factors were considered:

- the conservation status of the species and its distribution
- previous recordings of species in the local area
- the habitat requirements of individual species, including their association with specific types of vegetation and required food sources
- the physical attributes of the site, such as trees with intact canopies and/or hollows and the presence of a logs on the ground etc.; and the nature of the site and surrounding areas.

Several significant species are considered to have a 'high', 'medium' or 'low' likelihood of using the habitat on-site due to the number of local records and the habitat structure available.

There are four threatened bird species with a high likelihood of utilisation of the study site, they are the Grey Goshawk (white Morph) (State status: endangered), the Tasmanian Wedge-tailed Eagle (National and State status: endangered), Swift Parrot (National and State status: endangered) and Masked Owl (National status: vulnerable and State status: treated as vulnerable). Local records and the presence of suitable habitat for these species are strong indicators; they may utilise the site for foraging, breeding or both.

Three mammal species also have a high probability of using the site with a high number of local recent recordings. The Tasmanian Devil (National and State status: endangered) and the Spotted-tail Quoll (National and State status: vulnerable) may both use the site for both denning and foraging with strong habitat values present. The Eastern Barred Bandicoot (National status: vulnerable) is more likely to use the site perimeter where the dense vegetation present provides shelter and nearby pastures providing food resources.

The probable presence of aquatic species such as the Giant Freshwater Crayfish (National and State status: vulnerable), the Central North Burrowing Crayfish (National and State status: endangered) and the Hydrobiid Snail (State status: rare) is also supported by the high number of local records.

Growling Grass Frog (National and State status: Vulnerable) has a moderate chance of occurrence. While there are no local records, there is a good chance of suitable habitat being present. There are no local records for Latham's Snipe. The likelihood of occurrence for this migratory species is low to moderate given the suitability of habitat within the study site. The White-bellied Sea Eagle (National and State status: endangered) is more likely to be a fly-over rather than a habitual user of the area.

6.6 ABORIGINAL HERITAGE

An Aboriginal Heritage Desktop Analysis has highlighted two sites within/on the boundary of the study area. This suggests that there is a high likelihood that further sites may be located in the surrounding area. An Aboriginal heritage investigation is therefore required which must be undertaken by a Consulting Archaeologist and Aboriginal Heritage Officer in order to identify possible impacts on Aboriginal heritage and to offer mitigation advice.

6.7 WEEDS

NVA Database mapping within 500m shows the site to be relatively weed free, with records only at the site periphery; these are Blackberry *Rubis fruticosus*, Ragwort *Senecio jacobaea* and Gorse Ulex *europaeus.* All three of these species are listed under the Tasmanian Weed Management Act 1999. Five kilometre mapping shows a marked increase in listed weed species present, in line with the agricultural usage of the surrounding landscape. Spanish Heath *Erica lusitanica*, Perforated St. Johns- wort *Hypericum perforatum subsp. veronence,* Blackberry, Ragwort and Gorse make up the bulk of these records.

6.7.1 Biosecurity risk within 1000m

Water Mould or Cinnamon Fungus *Phytopthora cinnamomi* has been recorded on the site . Phytopthora is an introduced water borne pathogen that many native plants are susceptible to, particularly Banksias and Grasstrees. Infestations tend to enlarge in localised areas through water transport with human activities being the predominant vector for the pathogen into new areas

Phytopthora hygiene measures will need to be incorporated into all construction plans. Measures to combat the spread of Phytopthora should include a range of control measures such as the cleaning of machinery used, taking care to ensure that any gravel used is 'clean' of Phytopthora, dry and preferably local and are constructed in a manner that ensures adequate run-off and rapid drying.

6.8 RELEVANT ENVIRONMENTAL POLICY AND LEGISLATION

The following section explores relevant policy and legislation pertaining to ecology and bushfire from the national level through to the local level.

6.8.1 Tasmanian Threatened Species Act 1995

The Tasmanian Threatened Species Act 1995 (TSP Act) provides for the protection and management of threatened native flora and fauna and to enable and promote the conservation of native flora and fauna. The TSP Act provides a number of ways to help achieve its objectives including:

» listing of threatened taxa, communities of flora or fauna and potentially threatening processes, and creation of Listing Statements and Recovery Plans for all listed taxa communities of flora or fauna and processes declaration of a Critical Habitat if the habitat is critical for the survival of a species or a community of flora or fauna. If listed as Critical Habitat, the Minister for Environment may then make an Interim Protection Order (IPO) to conserve the Critical Habitat protection of flora and fauna through listing offences such as penalties relating to not following an IPO and taking, trading in, keeping, moving or processing protected flora without a license, although this does not apply to taking listed flora species from private land.

The Department of Industry, Parks, Water and Environment is the referral authority for matters under the TSP Act. Eleven fauna species of State significance have been recorded within five kilometres of the study site; five of these have been recorded within 500m of the study site.

The impacts on threatened species or communities listed under this Act will need to be assessed as part of the planning application for the trail network.

6.8.2 Environment Protection and Biodiversity Conservation Act

The EPBC Act 1999 applies to sites where proposed developments or projects may have a significant impact on matters of national environmental significance.

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

Five species of flora of national significance have been recorded within a five kilometre radius from the centre of the study area. Nineteen species of fauna of national significance were detected within the same search area. While all of the EPBC listed flora species are deemed to have a 'Low' or 'Nil' likelihood of occurring within the study area, thirteen of the fauna species listed are deemed to have a 'High' to 'Moderate' likelihood of occurrence.

Given the high number of threatened species recorded for the study site, the type and scope of the proposed development has the potential to have a significant impact on matters of environmental significance protected under this Act and the proposal may be considered a 'Controlled Action'.

6.9 DEVELOPMENT IMPLICATIONS

The environmental surveys were completed and track route planned to protect environmental values and enhance interpretation. Areas of significance have been avoided in order to minimise the loss of significant vegetation and threatened species habitat as presented in Figure 4 in section 7 and as follows:

- Aspect –the south facing slopes are quite wet and are not suitable for building sustainable trails for year-round use. These areas have been avoided.
- Soil types – The trails have been located in areas where soil type and vegetation within the area identified are the most suitable for the construction. The nature of the thin-bedded quartz sandstone with interbedded siltstone and minor granule-pebble conglomerate soils present is prone to erosion. This will require amelioration measures and has been incorporated into the design of the proposed trails where necessary.
- Vegetation - *Eucalyptus amygdalina* forest and woodland on sandstone have been avoided. There are numerous records for the Snug Greenhood to the north east of the study site, and the proposed trail alignment have avoided any direct impact on this species and other threatened species in this area. As a precaution it is recommended that an environmental consultant be engaged during trail construction to identify and avoid any potential impact on significant species.
- Gradients – Trails have been planned to avoid the south facing valley, instead locating the southernmost trails either side of an existing track high on the ridge line.
- Aboriginal Heritage - Two Aboriginal Heritage sites of high significance have been located in the study area and have been avoided. An Aboriginal heritage investigation is required prior to construction.
- Fauna - The development of the trail network is not considered a significant hindrance or impact to the listed threatened mammals that are highly likely to utilise the study site. Both Tasmanian Devils and Spotted-tailed Quolls are known to use tracks and roads to their advantage when foraging. The trails have avoided potential denning habitat including rocky outcrops, rock crevices, rock piles, hollow logs, caves or large areas of debris.[29]
- As there will not be large areas of vegetation removed for the trail network, impact on threatened bird species such as the Grey Goshawk, Tasmanian Wedge-tailed Eagle and Swift Parrot should be minimal. Nesting habitat for the Masked Owl has been avoided. Tree hollows for nesting birds and arboreal mammals will not be removed.
- Because aquatic species such as the Giant Freshwater Crayfish, Central North Burrowing Crayfish and the Hydrobiid Snail may occur in and surrounding waterways and damp areas, it will be critical to minimise disturbance and avoid erosion in these areas during construction.
- The confirmed presence of Cinnamon Fungus Phytophthora will require hygiene measures to be incorporated into construction plans.

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[29] Strahan 1995

7 Kentish Trails Master Plan

7.1 VISION

Kentish mountain bike trail network will offer mountain bike experiences for a range of cycling markets that will add to the region's adventure tourism offering and strengthen tasmania's positioning as a world class mountain bike destination

7.2 GUIDING PRINCIPLES

The following guiding principles will underpin the Kentish Trails Master Plan:

Respecting values

The natural, cultural, social and landscape values will be respected in expanding, managing and maintaining the trail network. The trails will showcase the natural beauty of region, and promote and protect the unique environmental qualities of Kentish.

Collaboration

All stakeholders (State and local government, tourism industry, users and the community) will work in a collaborative way to implement the priority actions. Achieving an environmentally, socially and economically sustainable mountain bike destination will include opportunities for public and private sector investment

User focus

The trail network will be consumer focused – address a range of market needs across a range of tenure – and staged to optimise market growth

Community benefits

The community and recreational user groups will play a role in the planning and management of infrastructure and services for Kentish and will achieve economic and social benefits

7.3 PROPOSED TRAIL NETWORK

Figure 4 provides an overview map of the proposed trail network. Each trail is shown in a different colour on the map, simply for identification purposes. The key features of the proposed trail network are:

1. 18 individual mountain biking trails
2. With the exception of Trail 11, each trail is single-directional. The proposed direction of travel is clockwise
3. The total length of the core, mountain biking trail network is approximately 47.16km
4. The total length of the proposed 'transition trails' is 16.82km
5. The majority of the trail network can be ridden in one long continuous loop, without doubling up or missing large sections of trails.

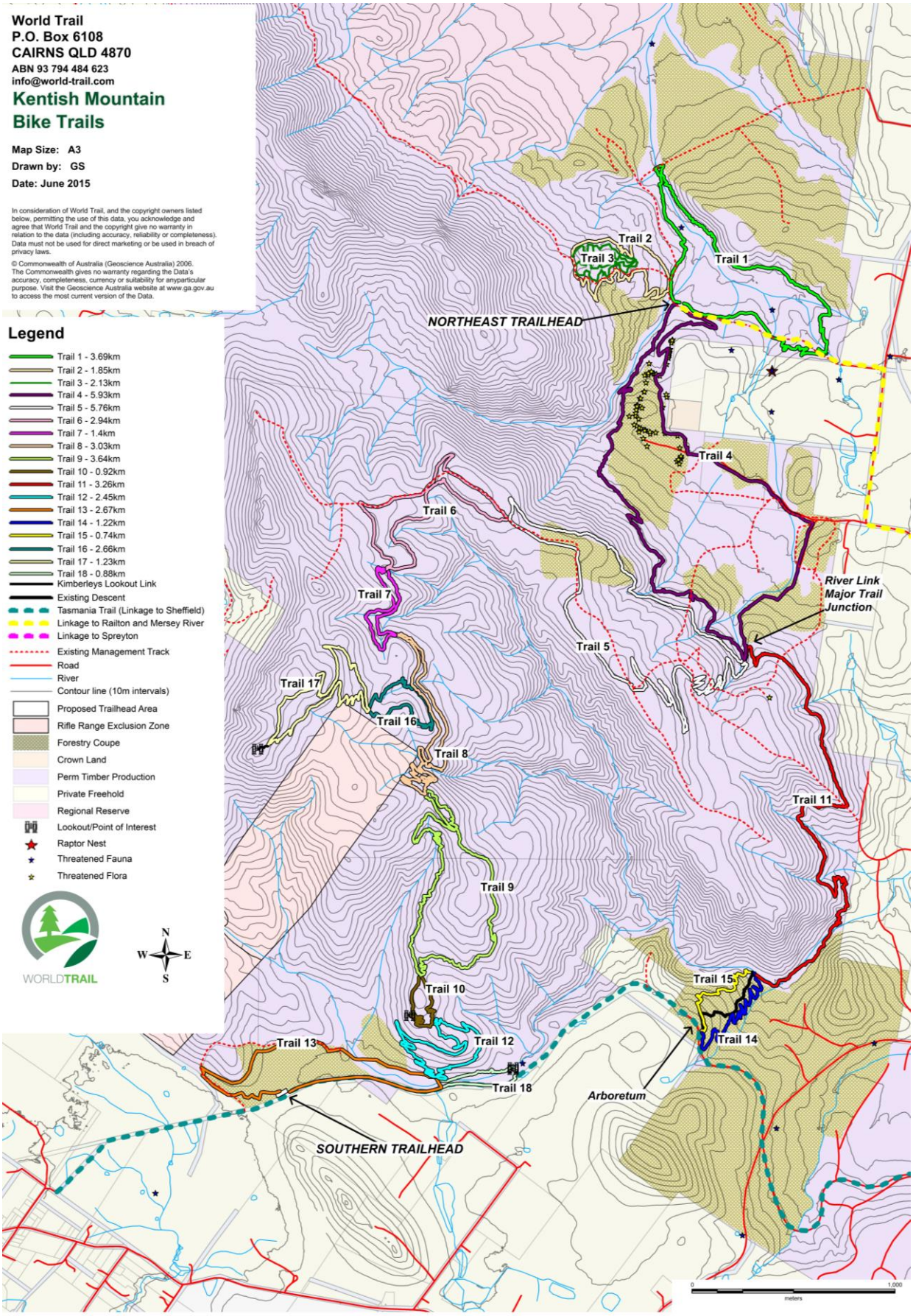
Table 9 provides the distance and the proposed trail difficulty rating[30] for each trail. The IMBA Trail Difficulty Rating System is presented in Appendix 4. An explanation of mountain bike trail design terms used in this section are provided in Appendix 5.

Table 9. Distances and difficulty ratings for trails

Trail	Length (km)	Difficulty Rating
1	3.69	Easy
2	2.13	More Difficult
3	1.5	Very Difficult
3A	0.35	Extremely Difficult
4	5.93	More Difficult
5	5.76	More Difficult
6	2.94	More Difficult
7	1.4	More Difficult
8	3.03	More Difficult
9	3.64	More Difficult
10	0.92	More Difficult
11	3.26	Easy
12	2.45	More Difficult
13	2.67	Easy
14	1.22	Easy
15	1	More Difficult
15	0.4	Very Difficult
15	0.1	Extremely Difficult
16	1.23	More Difficult
17	2.66	More Difficult
18	0.88	Easy
Linkage to Railton and the Mersey River	13.82	Easy
Linkage to Sheffield	3	Easy
Total	63.98	

[30] World Trail recommends the use of the International Mountain Bicycling Association's (IMBA) Trail Difficulty Rating System (TDRS). For a detailed description of the TDRS, see Appendix 4.

Figure 4. Proposed Kentish Trail Network



7.4 TRAILHEAD LOCATIONS AND INFRASTRUCTURE

A trailhead serves many purposes:

1. It is the starting and finishing point for all non-local riders. As such, it is also the place where groups will meet to begin their ride and socialise afterwards. It is also a location that can be signposted or advertised so that travelling mountain bikers can find it easily
2. It is the key information point about the trails. Signage must adequately convey all the necessary safety and risk information about the trails, but also provide enough guidance that riders can plan their ride before leaving the trailhead
3. It should provide all the essential pre-ride needs of mountain bikers – water, toilets, information and car parking. In addition however, it should encourage positive social use of the site. Many riders will have non-riding companions who may want to wait at the trailhead, so the trailhead should be an enjoyable place to wait, which means considering additional infrastructure such as seating, shelters, landscaping etc.
4. It should be a safe place to leave a vehicle while riding.

Two separate locations are proposed as trailheads for the Kentish mountain bike trail network. These are:

- Northeast Trailhead – Located in the northeast of the site, accessible via Newbed Road from Railton
- Southern Trailhead – Located in the south of the site, accessible via the Tasmania Trail continuing from the northern end of Johnson Street, Sheffield.

Both trailhead locations are shown in Figure 5 and Figure 6.

These two trailhead locations have been identified as being the best available sites, however they both have some disadvantages. Table 10 below discusses the advantages and disadvantages of each site.

Another option for the north east trail head to be located at Goliath Park in central Railton. The park already has car parking, shelters, BBQs, toilets and a big space for hosting groups and events, and is easily accessible by bus. Kentish Council is currently negotiating with the private landholder who owns the land between the proposed north-east trail head and Goliath Park. There are several considerations if this option is to be progressed by Council. These are:

- The link trail across the private property would need to be approximately 3km long in order to achieve sustainable gradients and keep the gradient low enough for all ability levels;
- Given the vertical elevation change from the top to the bottom is approximately 100m, the link trail will make for a great descent back down to Goliath Park. However, this also means it is not suitable for two-way usage. Instead, and separate up and down trails would be required, resulting in around 6km of trail on this private property. The landowner would need to agree to up to 6km of trails being built on their land.
- This would also create an option for a new loop trail directly adjacent to town and Goliath Park, which should be designed for an 'Easy' rating. Further design is required to determine suitable alignments for this new trail.

Table 10. Trailhead advantages and disadvantages

Trailhead	Advantages	Disadvantages
Northeast Trailhead	1. Good proximity to Railton 2. Pleasant setting, with tall Eucalypt forests and creeks 3. A long downhill ride to the finish 4. Good access road into the site 5. Potential option to link to Goliath Park	1. Clearing required to create space for carpark and trailhead 2. Access from Railton is via narrow roads with steep gradients, which is not ideal for riders commuting to/from trailhead.
Southern Trailhead	1. Excellent proximity to Sheffield 2. Excellent views of Mt Roland to the south 3. Located within a recently harvested forestry coupe, providing ample open space for event staging, skills development areas, car parking and other infrastructure.	1. Access from Sheffield is via the Tasmania Trail, which is currently in poor condition and includes a number of farm gates 2. Coming from Sheffield, the Tasmania Trail passes adjacent to a rifle range. Additional precautionary measures will need to be put in place.

Figure 5. Northeast trailhead location near Railton (Option 1)

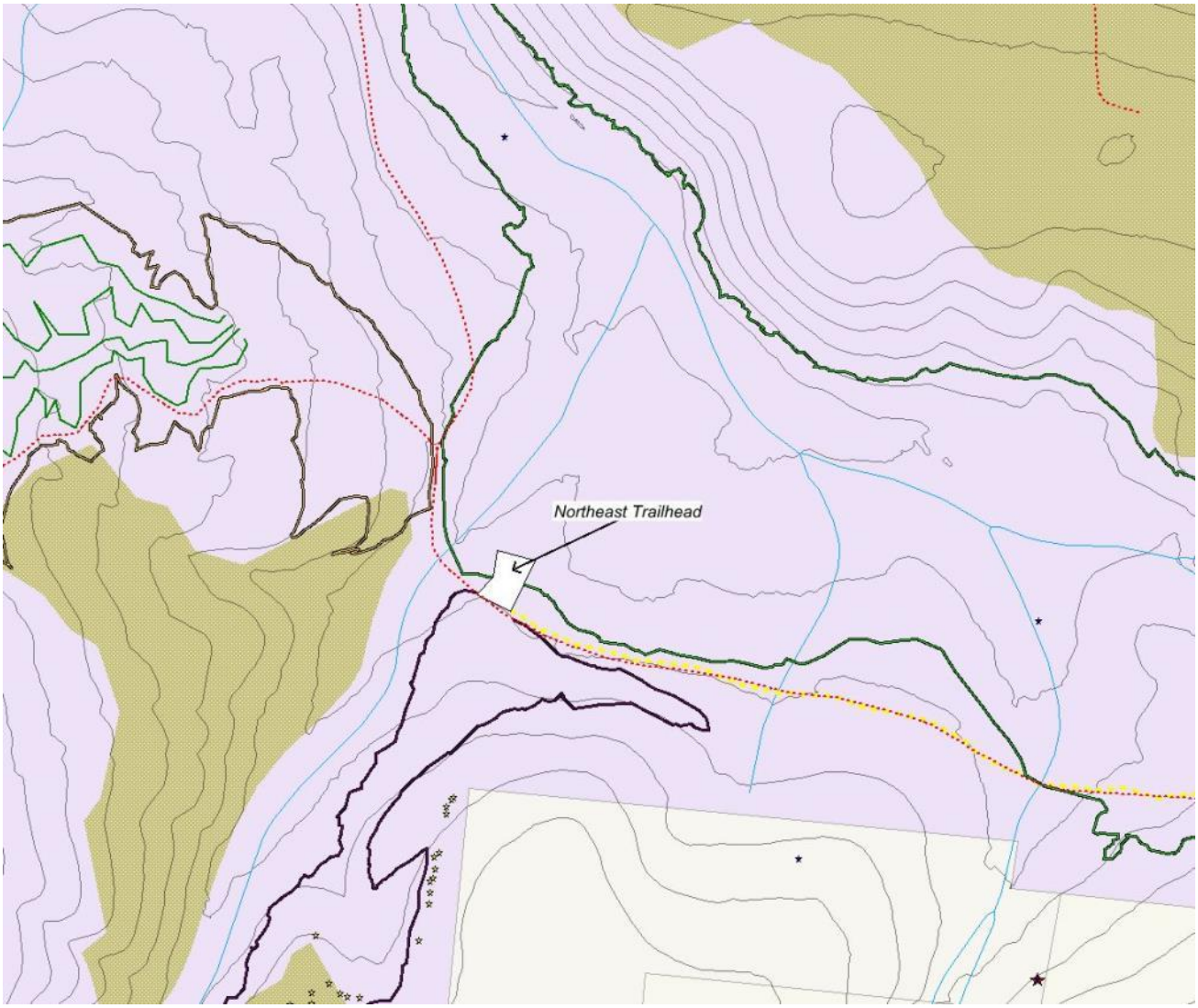
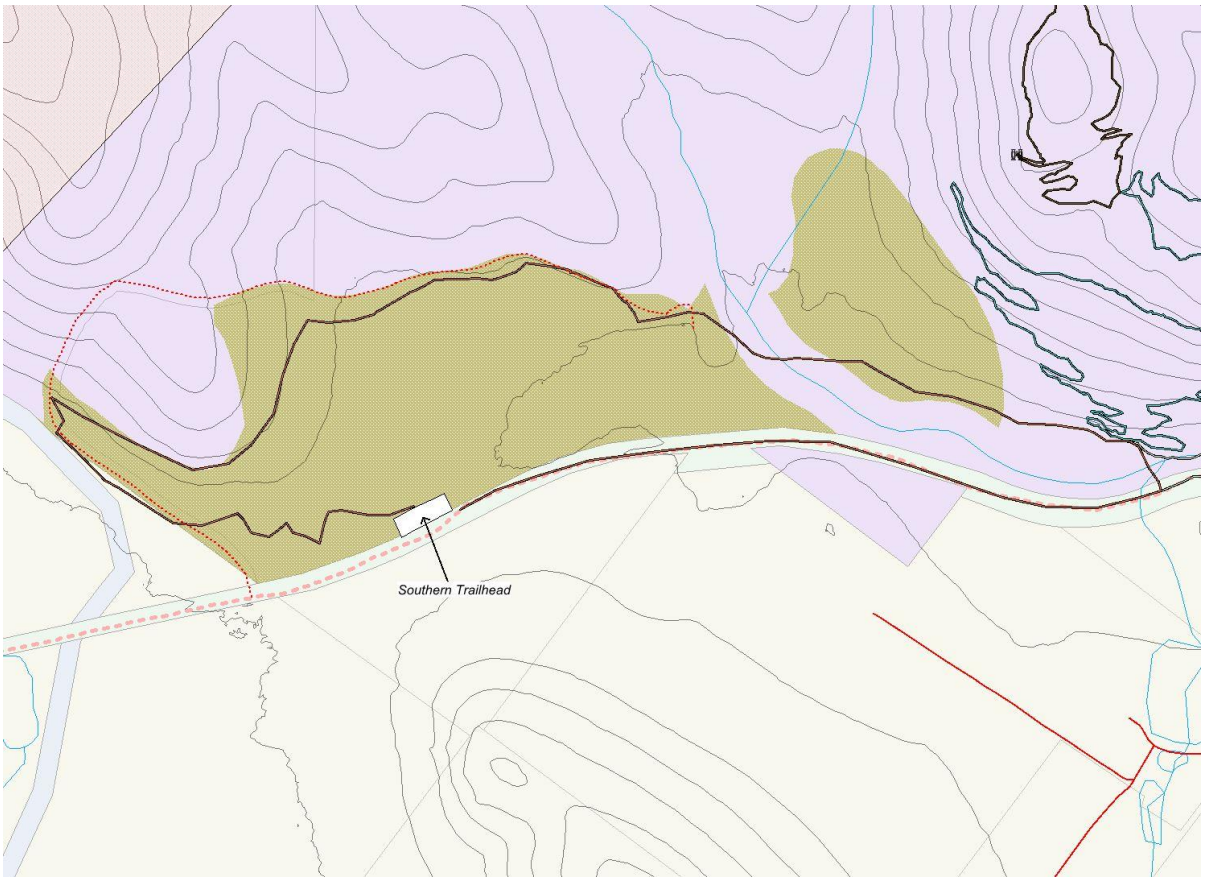


Figure 6. Southern trailhead location near Sheffield



7.5 TRAILHEAD INFRASTRUCTURE

In order to fulfil its various functions and roles, a trailhead needs infrastructure. The nature and extent of the infrastructure depends largely on the available budget, but there are certain items that must be included at a trailhead.

In a survey of approximately 1300 mostly Victorian mountain bikers in 2013, World Trail asked what facilities and infrastructure should be present at a mountain bike trailhead. The responses are provided below, ranked in priority order:

Facilities and infrastructure – MTB Trailhead	Ranking
1. Car parking	96.38%
2. Maps	86.11%
3. Toilets	80.98%
4. Drinking water	72.14%
5. Picnic tables	46.97%
6. Shelter	45.03%
7. Notice board	42.51%
8. BBQ	32.74
9. Café	28.28%
10. Bike wash facilities	16.75%
11. Local business advertisements	16.50%
12. Bike shop	14.81%
13. Bike racks:	12.04%
14. Change room	7.24%
15. Shower	5.05%

Based on the survey results, items 1-4 should be considered essential, items 5-8 preferred and items 9-15 as optional.

7.6 TRAIL DESCRIPTIONS

The final ground-truthed alignments of the proposed trails showcase the natural beauty of the area – dense forests, tall Eucalypts, clear streams and creeks and some excellent views of distant Mt Roland and other surrounding areas. The ground truthing process is outlined in Appendix 3.

Despite some concerns over the 'erosiveness' of some of the soils within the study site, the conditions for building appear to be generally very good. An example of badly eroded existing four-wheel drive track encountered on site is shown in Figure 7 below.

Where it was difficult to avoid areas of potentially 'erosive' soils, the potential for erosion has been minimised by:

1. Reducing the gradient of the trail alignment through such areas
2. Aligning trails on side slopes to ensure water runs across the trail, rather than diverting it.

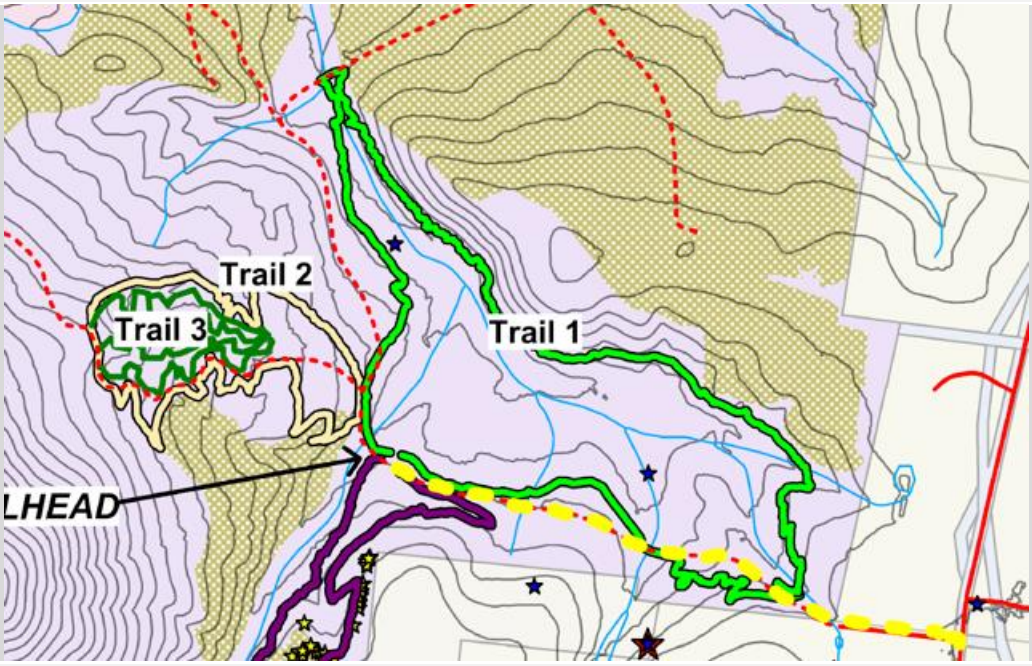
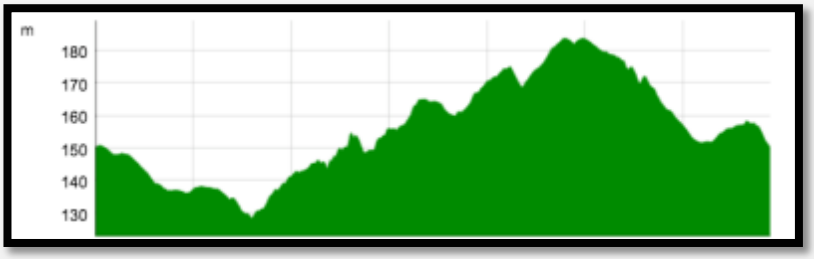
Figure 7. Badly eroded existing four-wheel drive track in the eastern region of the study site.

Several areas within the study site were also found to have extremely steep side slopes. These areas have been largely avoided by the ground-truthed trail alignments. Some trails have been ground-truthed with moderately steep side-slopes, however all ground-truthed alignments are feasible for construction using normal, machine-built trail construction techniques. For each trail that has been ground-truthed, the following section provides trail summary information on:

- Difficulty
- Length
- Elevation profile
- Average gradient
- Infrastructure required (including creek crossings)
- Description.

7.7 TRAIL 1

7.7.1 Trail Summary Information

Trail 1 Summary Information	
Trail difficulty Rating:	Easy
Reference Map:	
Approximate Length:	3.69km
Proposed Surface:	Natural Surface
Width:	900mm (+/- 300mm)
Composition:	New singletrack: 3.5km Existing vehicle access track: 0.19km
Elevation Profile:	
Infrastructure Allowance:	» 20m of rock armoring; » One small, low, 3.6m bridge; » 50 lineal metres of imported 'rubble', approximately 600mm wide and 100mm deep.

7.7.2 Trail 1 Description

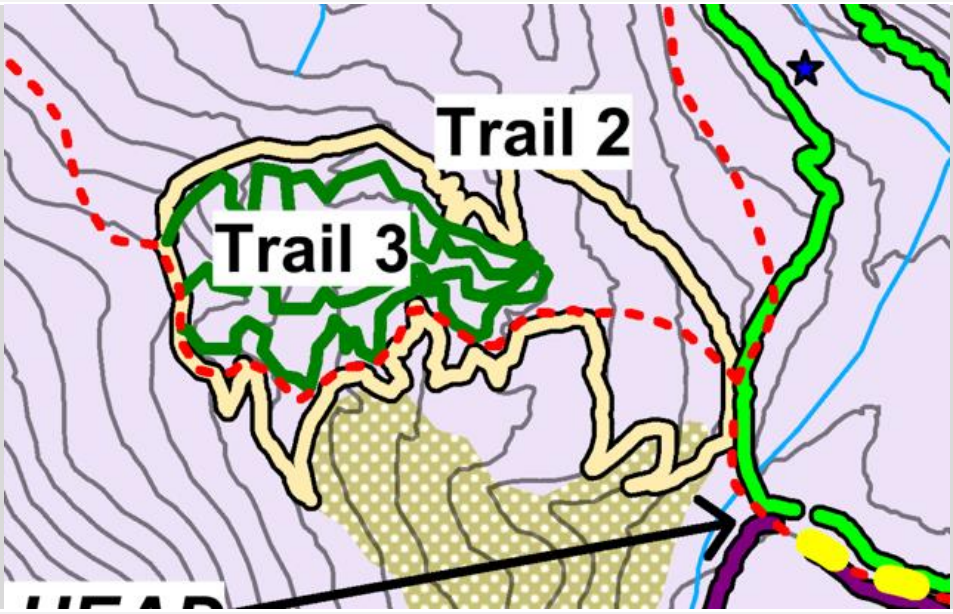
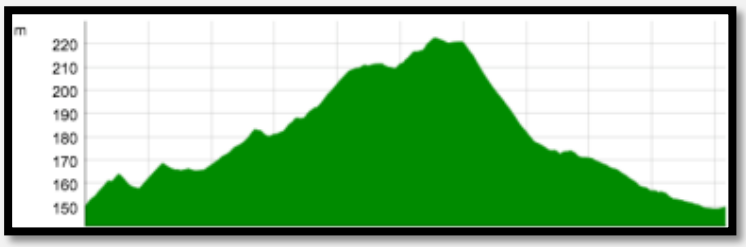
The route can be described as:

- Begins from the northeast trailhead, departing the car park towards the west on a short section of trail that joins the existing road
- Travels approximately 100m along the road utilizing an existing river crossing to reach the other side of the valley, before entering the bush towards the north east
- The trail gently descends to river level, with several options for lookout points that enjoy views along the river valley
- Crossing the river (again, using a short section of existing track), the trail begins a long, gentle climb on the northern side of the valley
- At an altitude of approximately 184m, the trail crosses the main, north east access road and begins to descend on what will be a swooping, flowing descent for the next 650m
- Exiting the bush to once again cross the main access road, riders will amble through a flat, 350m section to finish back at the north east trailhead.

Figure 8. Typical vegetation found on the Trail 1 alignment

7.8 TRAIL 2

7.8.1 Trail Summary Information

Trail 2 Summary Information	
Trail difficulty Rating:	More Difficult
Reference Map:	
Approximate Length:	2.13km
Proposed Surface:	Natural Surface including rock.
Width:	900mm (+/- 300mm)
Composition:	New singletrack: 2.0km Existing vehicle access track: 0.13km
Elevation Profile:	
Infrastructure Required:	» 20m rock armouring

7.8.2 Trail 2 Description

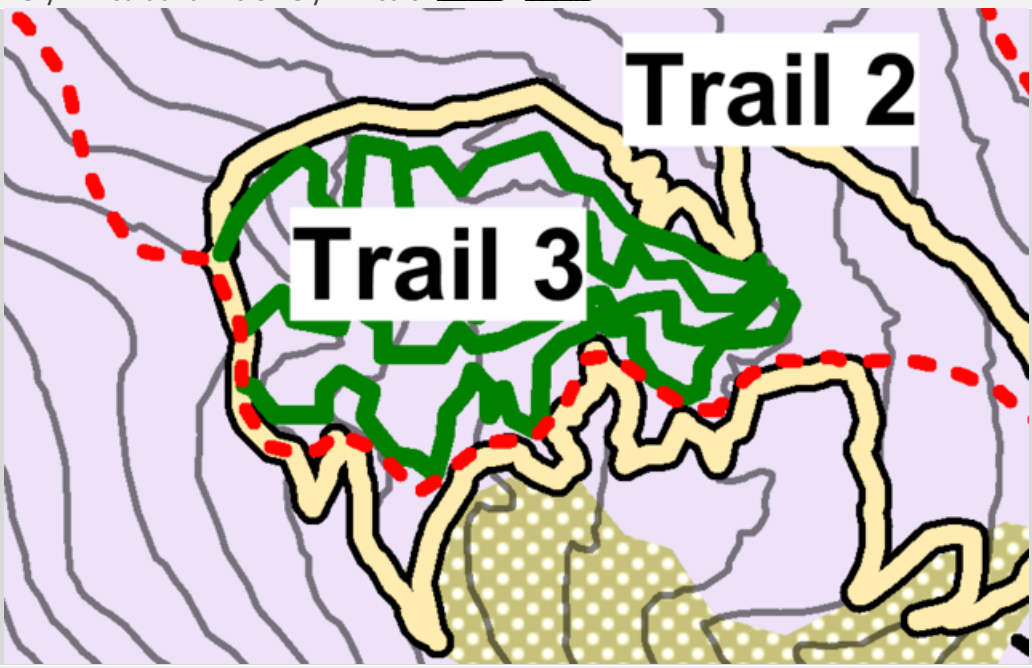
The route can be described as:

- Shortly after departing the northeast trailhead towards the west, and crossing the river using the existing road crossing, Trail 3 enters the bush and commences a gentle climb west of the river
- Switching back and forth amongst towering gums, the trail makes its way up to a disused quarry site
- Meandering in and out of open, formerly quarried areas, and continuing an undulating climb, Trail 3 eventually reaches an existing four-wheel drive trail at its highest point
- It is at this point that riders will choose one of three options:
  - Continuing on Trail 2, descending back to the northeast trailhead via a flowing, bermed descending trail
  - Descending via the more challenging gravity descents of Trail 3
  - Continuing via the existing four-wheel drive track towards the northwest boundary of the study site and beyond[31].

[31] Note – this four-wheel drive trail could possibly be used as a possible linkage to the northwest boundary of the study site and beyond towards Spreyton. This is discussed further in Section 7.25

7.9 TRAIL 3

7.9.1 Trail Summary Information

Trail 3 Summary Information	
Trail difficulty Rating:	Very Difficult and Extremely Difficult 
Reference Map:	
Approximate Length:	Up to 1.85km
Proposed Surface:	Natural surface within an old quarry
Width:	600mm (+/- 300mm)
Composition:	New singletrack: 1.85km
Elevation Profile:	Due to the heavily disturbed nature of this old quarry site, elevation data was unreliable. The proposed alignments will all descend steeply, at the trail builder's discretion. As per IMBA guidelines for very difficult and extremely difficult trails, and using best practice construction methods for optimal sustainability, the gradient for these trails may exceed 40%, with an average grade of up to 20%.
Infrastructure Required:	» Allow 30m of elevated structures; » Allow 100m of rock armoring.

7.9.2 Trail 3 Description

Trail 3 is comprised of 2-3 different gravity descents within the footprint of a highly disturbed and modified old, disused quarry (see Figure 9 below).

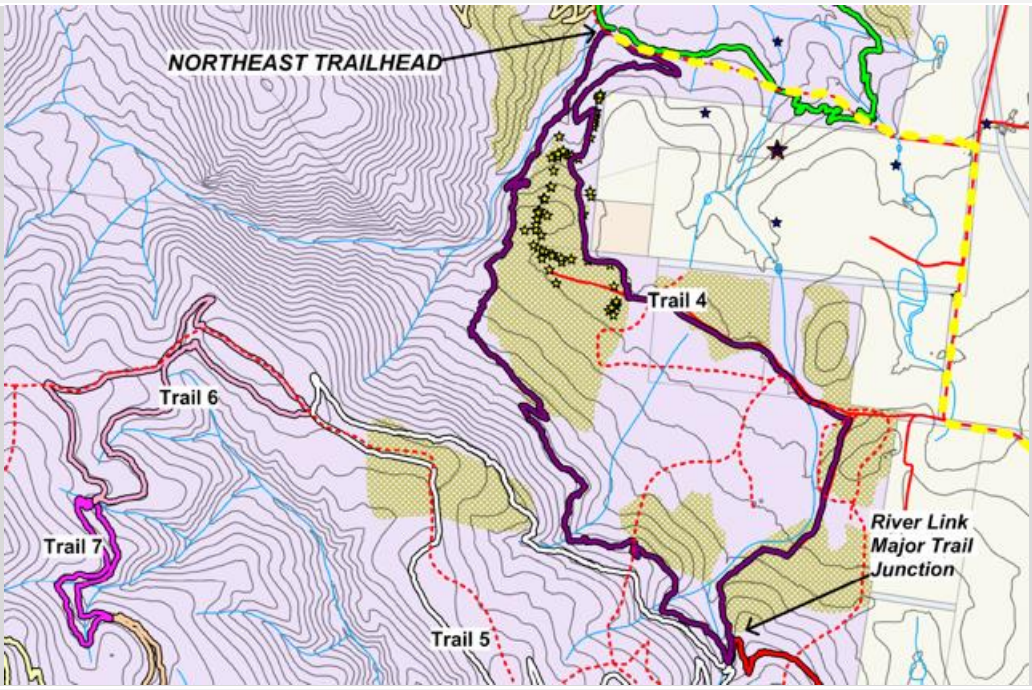
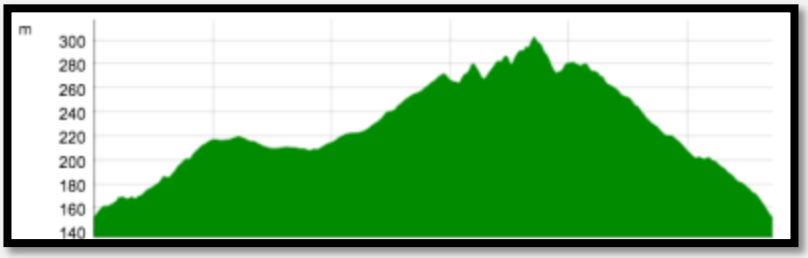
These gravity descents have not been mapped on the ground, as the final alignment for these trails should be determined on the ground during construction by the trail builders. While an indicative alignment for these trails has been shown on the reference map above, the final alignments will be at the discretion of the trail builder, to enable the optimal interpretation of the landscape. The trail builders should be encouraged to have an ambitious vision for these trails, designing and building trails that will be iconic and 'extreme', catering to only the most skilled of riders. Trails should include large jumps, rock gardens and numerous other challenging features.

An existing road beside the quarry will, with some rectification works, enable riders to be shuttled by four-wheel drive vehicle to the top of these descents.

Figure 9. Quarry site

7.10 TRAIL 4

7.10.1 Trail Summary Information

Trail 4 Summary Information	
Trail difficulty Rating:	More Difficult
Reference Map:	
Approximate Length:	5.93km
Proposed Surface:	Natural Surface
Minimum Width:	900mm (+/- 300mm)
Composition:	New singletrack: 4.3km[32] Existing vehicle access track: 1.63km
Elevation Profile:	
Infrastructure Required:	» Several low creek crossings were encountered along this route, however all can be treated using rock armoring. A total of 20m of rock armoring should be allowed for Trail 2. » 50 lineal metres of imported 'rubble', approximately 600mm wide and 100mm deep.

[32] Note that 'new singletrack' may include existing forestry tracks that require rectification and shaping to be suitable for mountain biking.

7.10.2 Trail 4 Description

The route can be described as:

- Trail begins from north east trailhead, where riders will cross the southern side of the main access road and immediately commence a gentle climb towards the east
- After 200m, the trail turns towards the southwest and continues to gently climb on a mixture of new singletrack and existing trails (currently used by horse riders and walkers) before reaching a well formed gravel road, onto which riders will turn left. Note that this road section has been included to avoid building singletrack through a low lying, flat area that is not suitable for sustainable trail construction. This unsuitable area is shown in Figure 10.
- The route follows this section of gravel road for approximately 900m, before making a 90-degree right hand turn onto an old forestry track. This track is approximately 450m long, and climbing at an average gradient of approximately 7% along the edge of a recently logged forestry coupe. Works will be required to ensure this alignment is sustainable and provides the required experience
- The trail climbs gently on the eastern banks of a shallow creek bed, to a major junction130m south of the forestry coupe. This junction has been referred to as the 'River Link Major Trail Junction' and is significant as it is the point at which riders will choose to either:
  - Continue on Trail 2 back to the northeast trailhead
  - Commence climbing on Trail 5 towards the southern trailhead near Sheffield (possibly via Kimberleys Lookout; or
  - Turn onto Trail 11 and head towards the Arboretum[33] in the southeast.

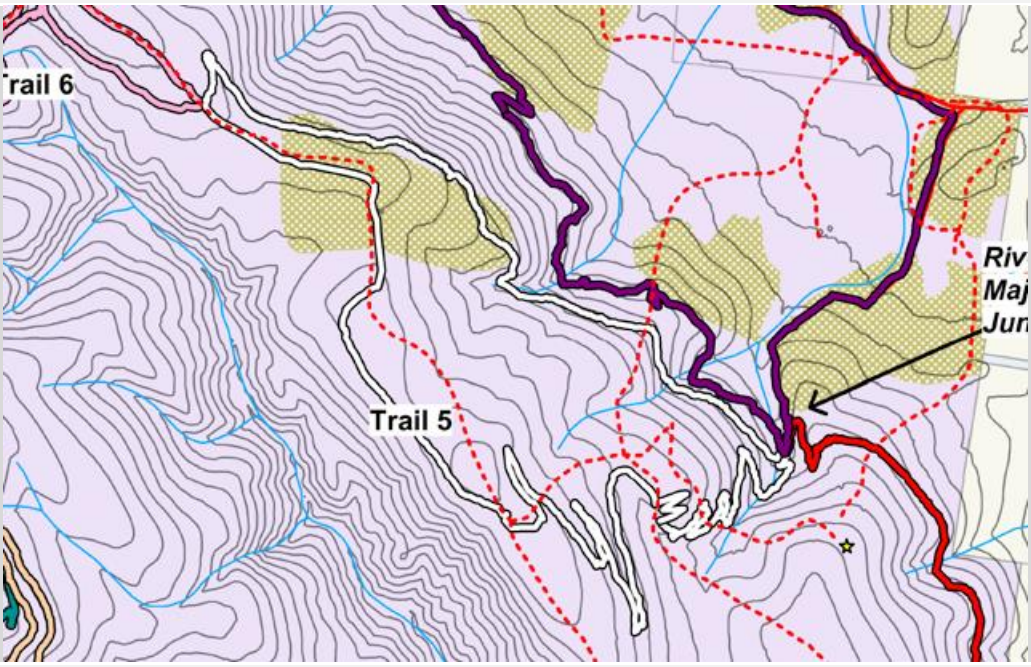
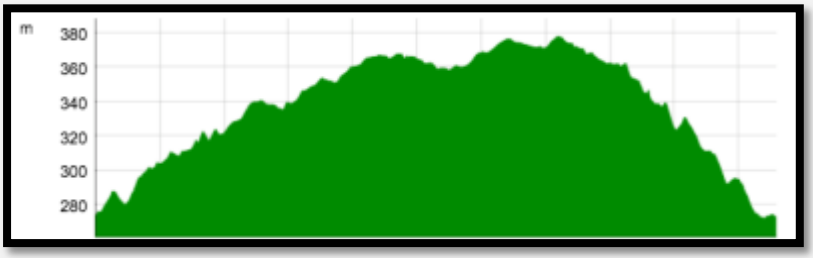
Continuing on the Trail 2 alignment from the major junction, riders will enjoy an undulating climb for a further 800m, before reaching the high point of the trail and commencing an exhilarating descent that drops consistently for over 2km at a gradient of approximately 7%. Numerous, unique terrain features exist throughout this alignment that will enable creative trail building, and will make the Kentish trails a 'must ride' destination for visiting mountain bikers. The trail ends opposite the northeast trailhead at the base of this descent.

Figure 10. Low lying, flat area, unsuitable for trail construction.

[33] There is an Arboretum in the southeast corner of the site, located on the main road between Sheffield and Railton. It contains many large stands of exotic tree species. It is quite a unique landscape and offers great opportunities for mountain biking, but otherwise has very limited visitor facilities.

7.11 TRAIL 5

7.11.1 Trail Summary Information

Trail 5 Summary Information	
Trail difficulty Rating:	More Difficult
Reference Map:	
Approximate Length:	5.76km
Proposed Surface:	Natural Surface
Minimum Width:	900mm (+/- 300mm)
Composition:	New singletrack: 5.16km Existing vehicle access track: 0.6km
Elevation Profile:	
Infrastructure Required:	» Either two small, 3.6m bridges, or rock armor approximately 12m

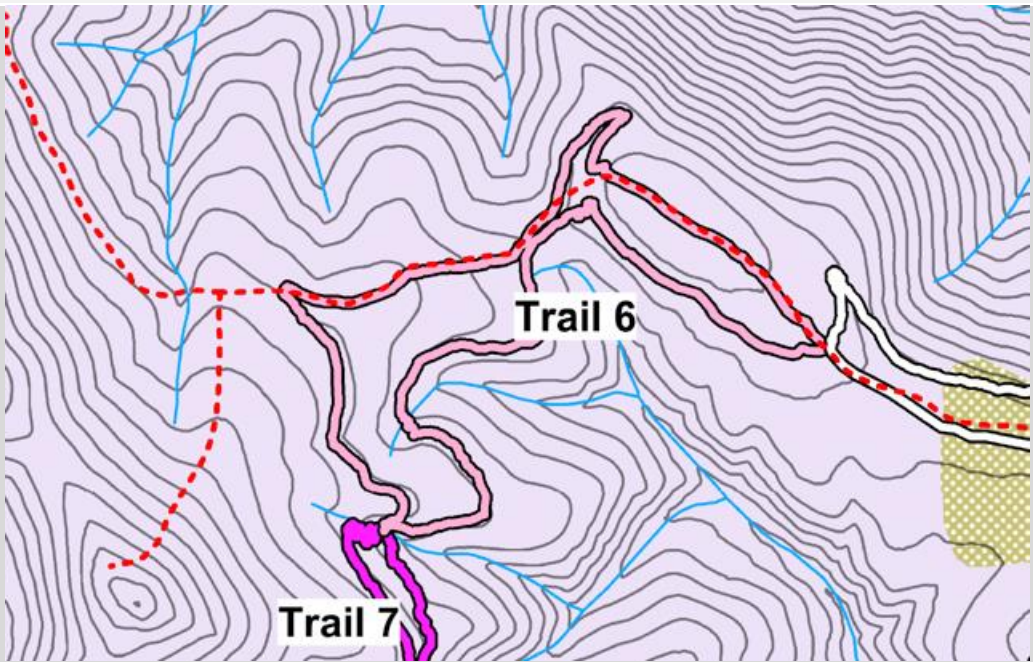
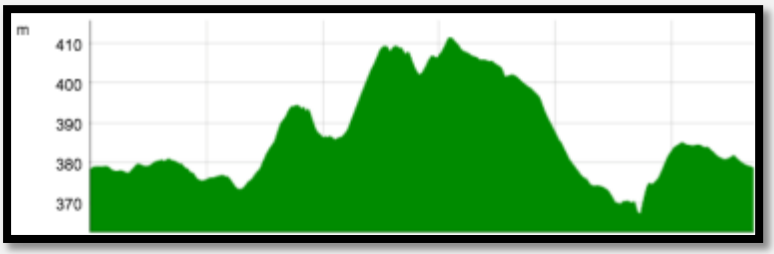
7.11.2 Trail 5 Description

The route can be described as:

- Beginning from the River Link Major Trail Junction at an altitude of approximately 270m, Trail 5 climbs for approximately 2.4km to an elevation of approximately 370m on a high ridgeline towards the southwest. The trail follows this ridge for approximately 1.5km
- Turning off the ridge to the north, Trail 5 descends for 1.8km back to the River Link Major Trail Junction. This descent, much like the Trail 4 descent, provides a fantastic opportunity to build an iconic section of trail that will entice mountain bikers from all over to visit the Kentish Trails.

7.12 TRAIL 6

7.12.1 Trail Summary Information

Trail 6 Summary Information	
Trail difficulty Rating:	More Difficult
Reference Map:	
Approximate Length:	2.94km
Proposed Surface:	Natural Surface
Width:	900mm (+/- 300mm)
Composition:	New singletrack: 2.64km Existing vehicle access track: 0.3km
Elevation Profile:	
Infrastructure Required:	» 6m rock armouring » Allow 30 lineal metres of imported 'rubble', approximately 600mm wide and 100mm deep.

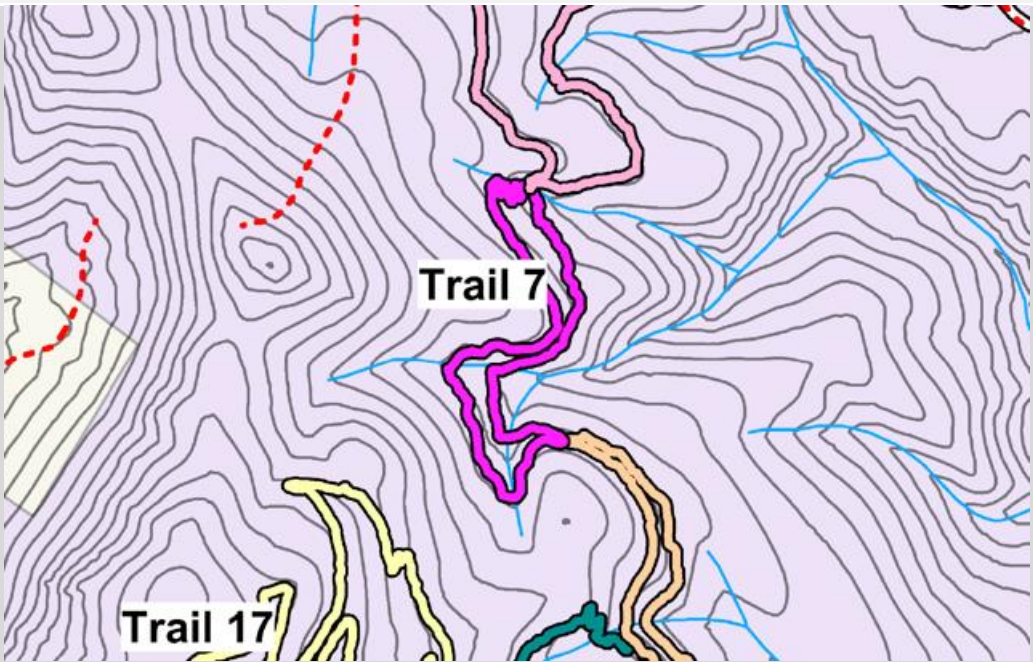
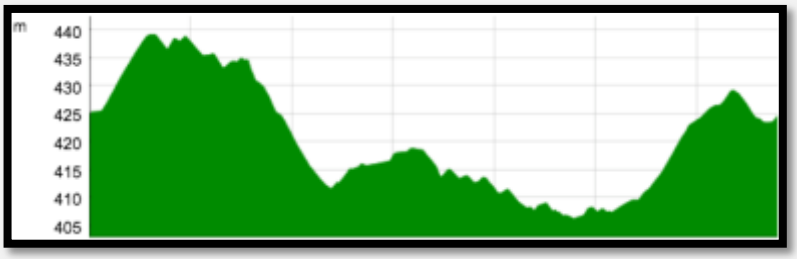
7.12.2 Trail 6 Description

Trail 6 is one of several trails that form a link between the northern and southern boundaries of the entire study site and the two proposed trailheads. The route can be described as:

- Beginning on an open, relatively flat ridge, Trail 6 departs from the top of the Trail 5 climb, undulating towards Kimberley's Lookout
- Passing a junction adjacent to a steep river valley, Trail 6 climbs away from the river at first, before leveling out and heading north towards an existing alignment
- Trail 6 runs roughly parallel to the existing alignment, continuously weaving in and out of the bush and only occasionally using the existing track
- The trail eventually heads north to avoid an unsustainably steep part of the existing alignment, before turning back, and running parallel to the existing track once more until it returns to the junction with Trail 5.

7.13 TRAIL 7

7.13.1 Trail Summary Information

Trail 7 Summary Information	
Trail difficulty Rating:	More Difficult
Reference Map:	
Approximate Length:	1.4km
Proposed Surface:	Natural Surface
Width:	900mm (+/- 300mm)
Composition:	New singletrack: 1.4km
Elevation Profile:	
Infrastructure Required:	Note that while this alignment is feasible for construction and all care was taken in the field to identify the best route, significant challenges exist due to wet areas and dense vegetation. Figure 11 and Figure 12 on the next page show examples of typical vegetation encountered within this alignment. Further field investigations during construction may identify an alternate route that avoids lengthy wet areas. Based on the route shown above, the following will be required to 'harden' the trail surface: » Up to 200 lineal metres of elevated structures[34], or a similar distance of imported 'rubble', approximately 600mm wide and up to 200mm deep; » 20m rock armouring.

[34] Typically constructed with a Fibre Reinforced Plastic decking and a timber or galvanized steel sub-frame. Recommended dimensions being 600-900mm wide, with an approximate height of 200-400mm.

7.13.2 Trail 7 Description

As per Trail 6, Trail 7 is one of several trails that form a link between the northern and southern boundaries of the study site and the two proposed trailheads. The route can be described as:

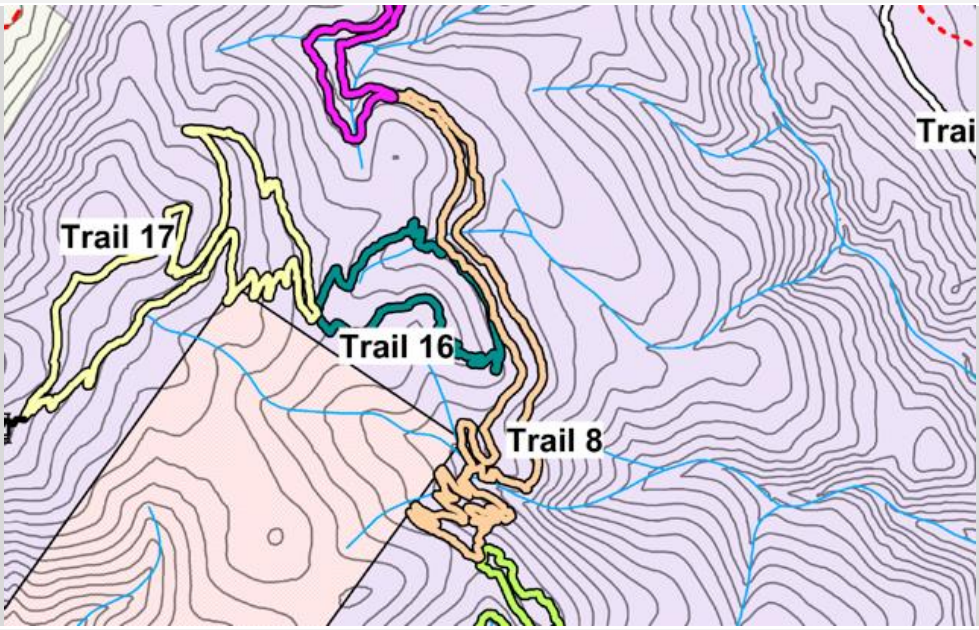
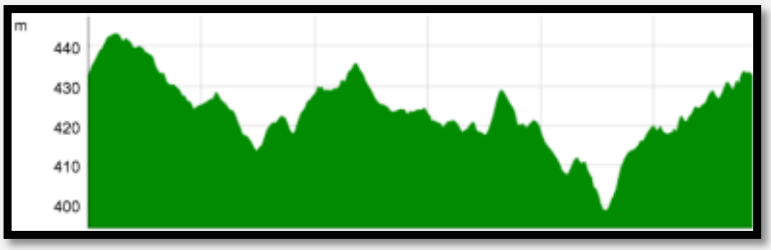
- Departing Trail 6, and crossing a steep sided valley, Trail 7 passes roughly on contour through dense vegetation until reaching a wide river valley
- Crossing this wide valley, Trail 7 climbs to a junction point where it passes trail 8, then continuing to climb, returns through the wide river valley through similar terrain
- Before ending back at the junction with Trail 6, Trail 7 descends beside a steep valley via a series of fast berms.

Figure 11. Dense vegetation encountered during ground-truthing

Figure 12. Wet grasslands found in wide valleys

7.14 TRAIL 8

7.14.1 Trail Summary Information

Trail 8 Summary Information	
Trail difficulty Rating:	More Difficult
Reference Map:	
Approximate Length:	3.03km
Proposed Surface:	Natural Surface
Width:	900mm (+/- 300mm)
Composition:	New singletrack: 3.03km
Elevation Profile:	
Infrastructure Required:	Note that while this alignment is feasible for construction and all care was taken in the field to identify the best route, significant challenges exist due to the density of the vegetation and wide, wet valleys that need to be crossed. Further field investigations during construction may identify an alternate route that avoids lengthy wet areas. Based on the route shown above, the following will be required to 'harden' the trail surface: » Up to 300 lineal metres of elevated structures, or a similar distance of imported 'rubble', approximately 600mm wide and up to 200mm deep; » 40m rock armouring.

7.14.2 Trail 8 Description

As per Trail 6 and Trail 7, Trail 8 is one of several trails that form a link between the northern and southern boundaries of the study site and the two proposed trailheads. The route can be described as:

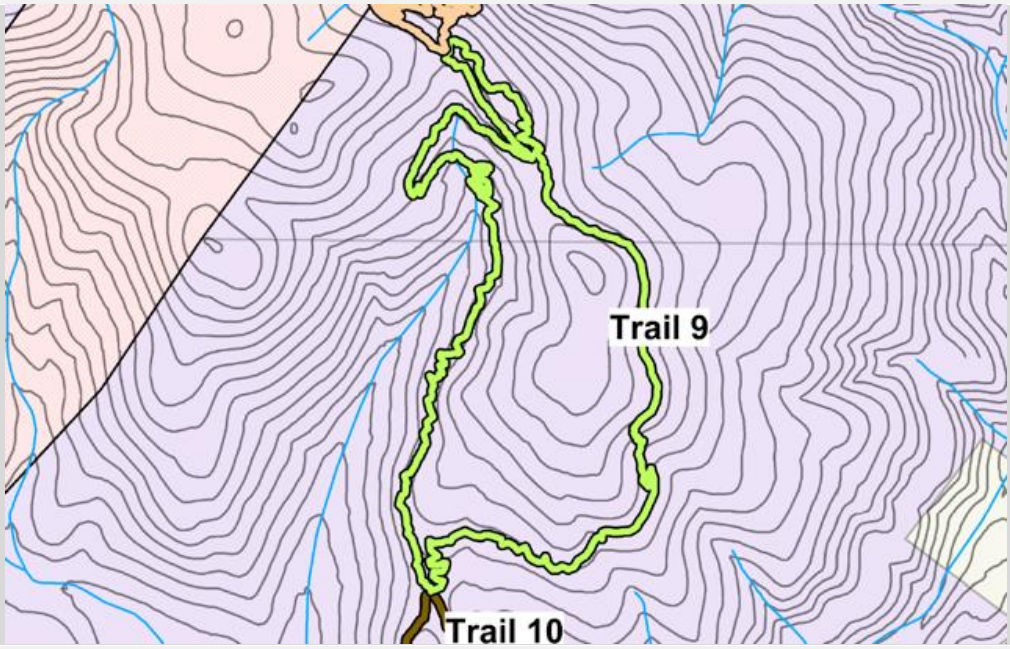
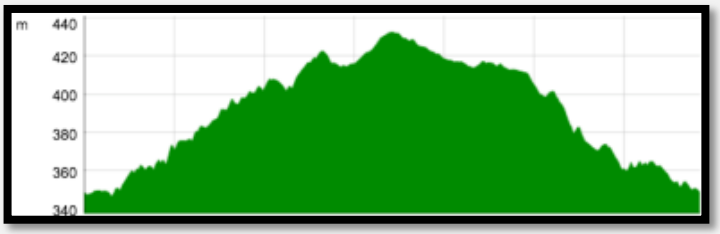
- Beginning from the junction with Trail 7, Trail 8 traverses on a gentle side slope through dense vegetation for 350m before crossing a moist, grassy riverbed
- Continuing on contour, Trail 8 eventually begins to open up, before descending into a steep valley via some rocky areas that will make for challenging, yet exciting trail building
- The trail crosses a wide creek-bed before commencing to climb through rocky terrain that becomes more open as it climbs into a high saddle where it meets Trail 9

» The return journey to Trail 7 is very similar to the outward journey, running roughly parallel to the trail described above. This higher line was chosen to avoid descending into the deepening river valley to the east, where excessive rocks and steep side slopes would make trail building difficult. Unfortunately, there are two issues that this creates:

1. The trail must cross a lengthy (~150m), shallow, wet river valley
2. The trail briefly crosses the boundary into the theoretical 'Rifle Range Exclusion Zone'. It is recommended that this exclusion zone be formally investigated, as the section in question is estimated to be over 2.4km from the rifle range, and is shielded by a large hill in between.

7.15 TRAIL 9

7.15.1 Trail Summary Information

Trail 9 Summary Information	
Trail difficulty Rating:	More Difficult
Reference Map:	
Approximate Length:	3.64km
Proposed Surface:	Natural Surface
Width:	900mm (+/- 300mm)
Composition:	New singletrack: 3.4km Existing vehicle access track: 0.24km
Elevation Profile:	
Infrastructure Required:	» Up to 10 lineal metres of elevated structures. » 100m of imported 'rubble', approximately 600mm wide and up to 100mm deep.

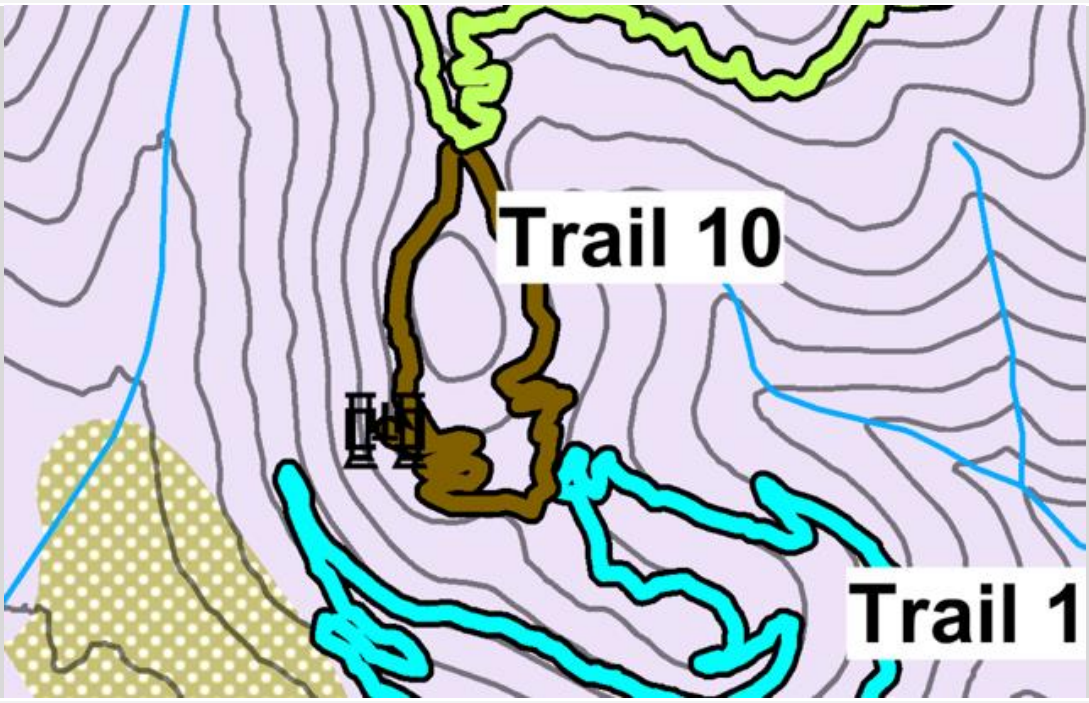
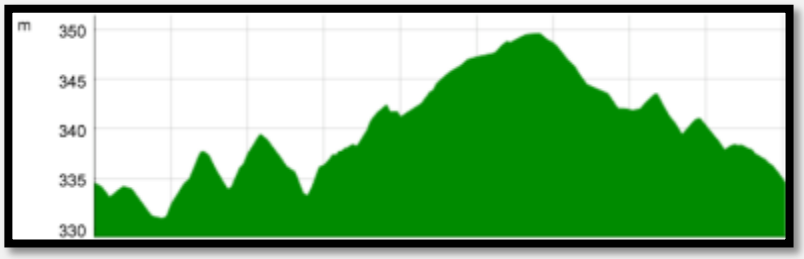
7.15.2 Trail 9 Description

The route can be described as:

» Beginning from the south at the junction with Trail 12 (brown), Trail 9 climbs steadily towards the north, enjoying fantastic valley views towards the west
» After around 850m, the trail crosses the valley to enjoy a slightly different perspective of the surrounding environment
» Climbing out of the valley to a saddle, Trail 9 meets the junction with Trail 8
» Exiting the junction towards the south, Trail 9 follows an existing alignment for a short time before peeling off to the left and beginning the descent back to where it began.

7.16 TRAIL 10

7.16.1 Trail Summary Information

Trail 10 Summary Information	
Trail difficulty Rating:	More Difficult
Reference Map:	
Approximate Length:	0.92km
Proposed Surface:	Natural Surface
Minimum Width:	900mm (+/- 300mm)
Composition:	New singletrack: 0.82km Existing vehicle access track: 0.1km
Elevation Profile:	
Infrastructure Required:	» 30m of imported 'rubble', approximately 600mm wide and up to 100mm deep.

7.16.2 Trail 10 Description

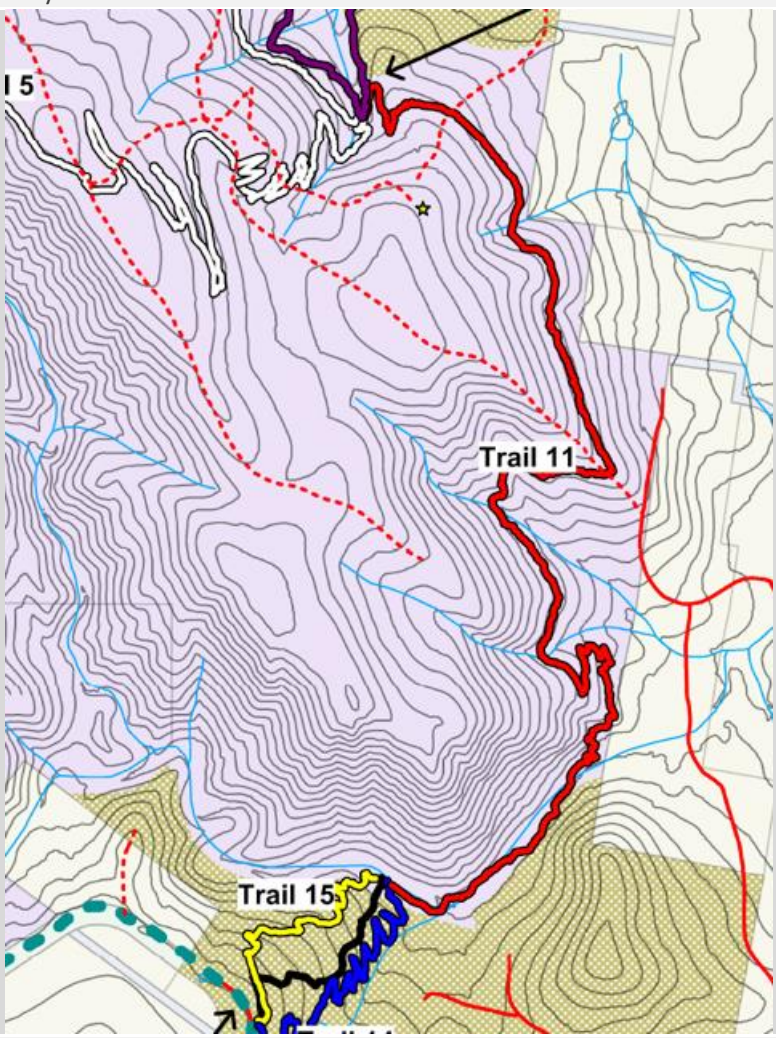
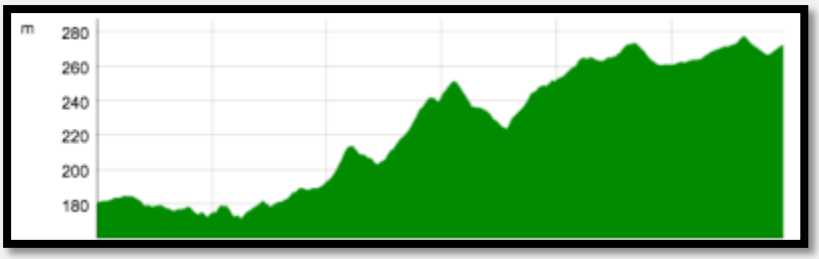
The route can be described as:

- The starting point for Trail 10 is at the junction with Trail 12 (pale blue) in the south
- From here, the trail meanders through open country to a beautiful, rocky lookout point that enjoys views to the south and west (see Figure 13 below)
- From the lookout point, the trail begins a short, 250m climb to the junction with Trail 9, before returning via a mixture of existing trail and new single-track. Note that while the trail here is mapped in an existing corridor, gradients here are not acceptable for sustainable trail construction. The new, constructed alignment will therefore need to be extended to reduce these gradients.

Figure 13. Lookout point on Trail 10

7.17 TRAIL 11

7.17.1 Trail Summary Information

Trail 11 Summary Information	
Trail difficulty Rating:	Easy
Reference Map:	
Approximate Length:	3.26km
Proposed Surface:	Natural Surface
Minimum Width:	900mm (+/- 300mm)
Composition:	New singletrack: 3.26km
Elevation Profile:	
Infrastructure Required:	» 15m of rock armoring; » 100 lineal metres of imported 'rubble', approximately 600mm wide and 100mm deep.

7.17.2 Trail 11 Description

Trail 11 is a dual-directional linear trail, rather than a loop. It runs basically north-south, with the northern end being at the River Link Major Trail Junction at an elevation of 270m, and the southern end sitting at an elevation of approximately 180m. It is the only dual-directional trail proposed within the Kentish Mountain Bike Trails, with the exception of the existing Tasmania Trail.

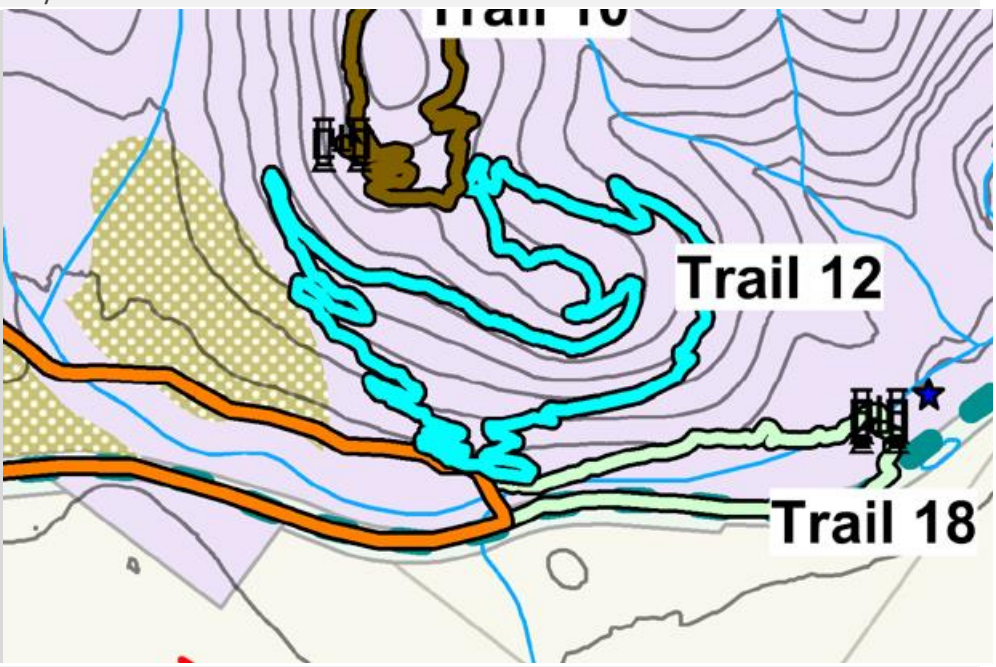
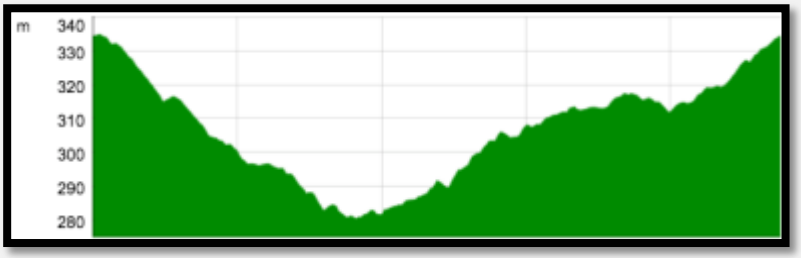
The entire Trail 11 alignment is picturesque, however the most outstanding feature is found in the south, where the trail follows a creek for some 700m (see Figure 14) providing some spectacular views along the waterway. This part of the alignment will provide iconic images to support marketing of the trails, and will again be a highlight for visitors, particularly those from interstate and overseas.

Due to the ecological value of the site, the entire alignment through this 700m section adjacent to the creek has not been flagged It is recommended that this section only be ground-truthed in the presence of the ecological consultants who will approve the alignment. This should take place shortly before construction.

Figure 14. Scenic creek adjacent to Trail 11

7.18 TRAIL 12

7.18.1 Trail Summary Information

Trail 12 Summary Information	
Trail difficulty Rating:	Easy
Reference Map:	
Approximate Length:	2.45km
Proposed Surface:	Natural Surface
Width:	900mm (+/- 300mm)
Composition:	New singletrack: 2.45km
Elevation Profile:	
Infrastructure Required:	» 10m rock armouring » 100 Lineal metres of imported 'rubble', approximately 600m wide and 100mm deep.

7.18.2 Trail 12 Description

The route can be described as:

» Trail 12 will be a particularly popular trail with beginner to intermediate riders for the following reasons:

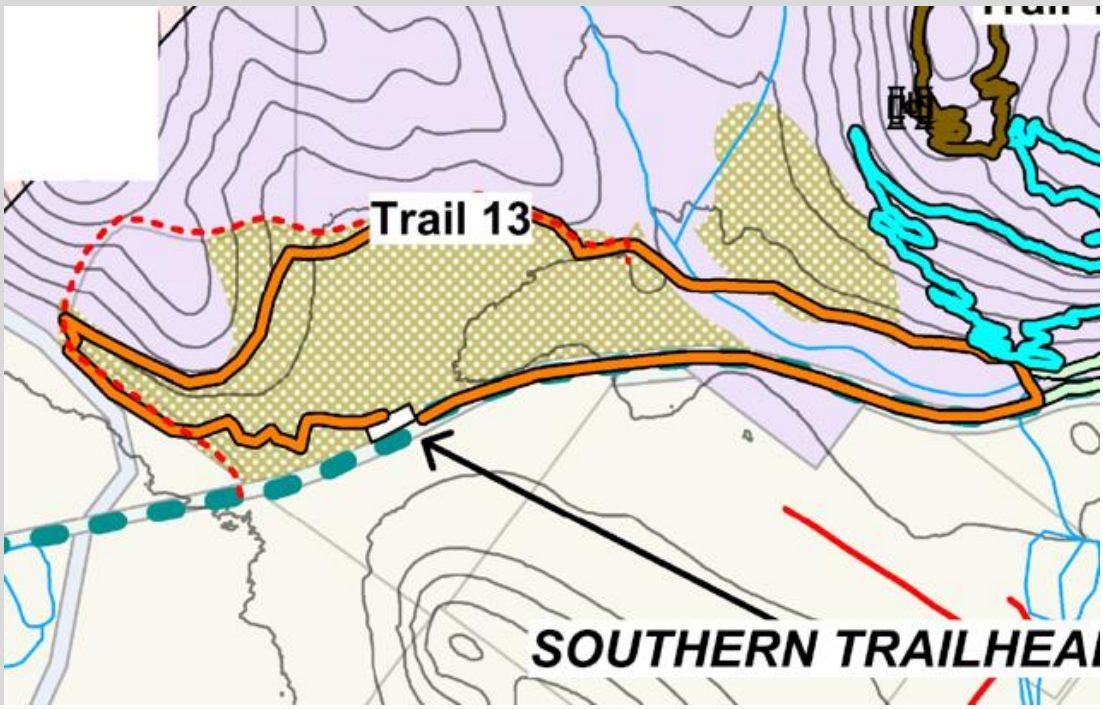
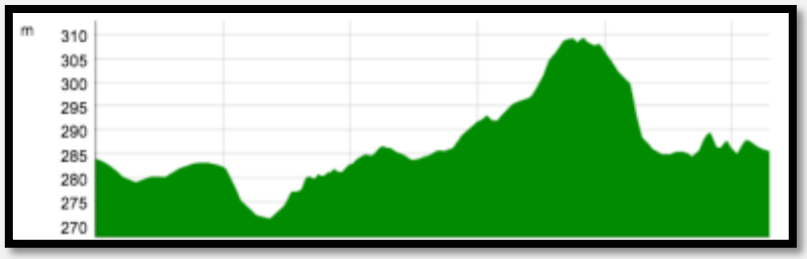
- It is easily accessed from the southern trailhead
- Climbing gradients are gentle
- It is an access route to the lookout point on Trail 10
- It will include an exhilarating descent back to either the Tasmania Trail, or onwards to the cave and waterfall found on Trail 18.

» The alignment for Trail 12 includes good soils and rocky areas for fun trail features.

» Trail 12 was mapped from the junction with Trail 10 (shown in brown), despite riders being most likely to access this route via Trail 13 (shown in orange).

7.19 TRAIL 13

7.19.1 Trail Summary Information

Trail 13 Summary Information	
Trail difficulty Rating:	Easy
Reference Map:	
Approximate Length:	2.67km
Proposed Surface:	Natural Surface
Minimum Width:	900mm (+/- 300mm)
Composition:	New singletrack: 1.0km Tasmania Trail: 0.78km Existing track requiring rectification: 0.97km
Elevation Profile:	
Infrastructure Required:	» 2 new bicycle gates through the fence adjacent to the Tasmania Trail » 1 low bridge approximately 6m long, 1,200mm wide and 400mm high.

7.19.2 Trail 13 Description

Trail 13 is an easy loop that starts and finishes at the southern trailhead.

The route can be described as:

» Leaving from the trailhead, the trail climbs gently to the rim of a wide, natural amphitheatre. From here, riders will enjoy views over the trailhead area, towards Mt Roland in the south (see Figure 15 below);

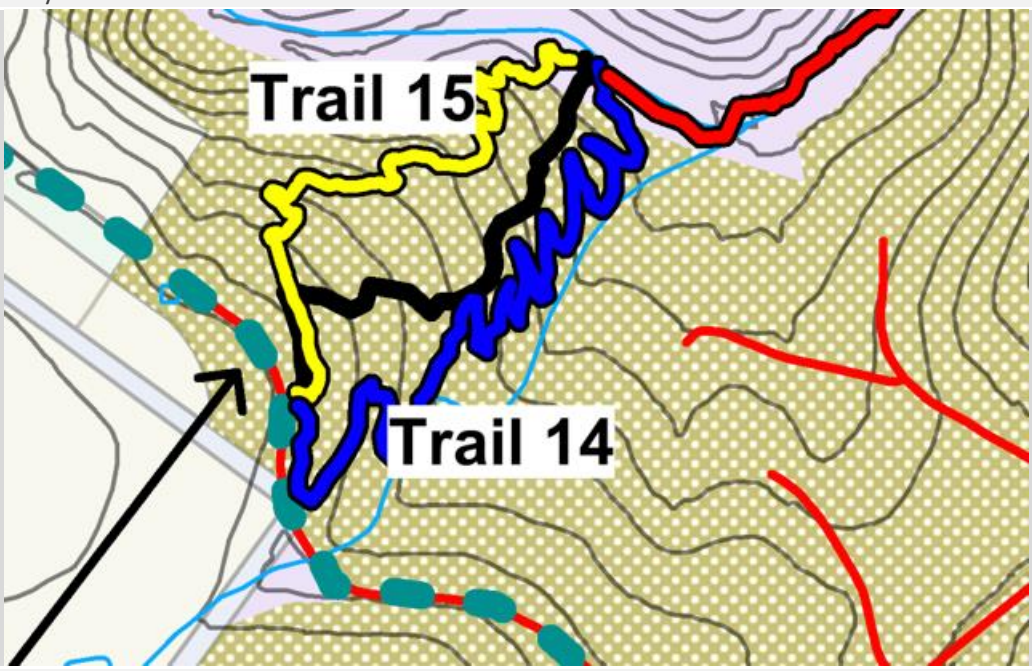
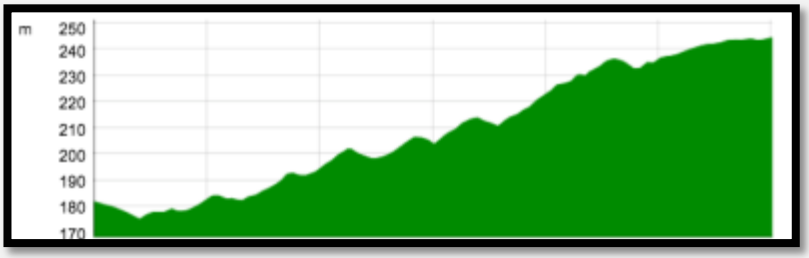
» Using an existing management access trail, Trail 13 then makes its way to the junction with both Trail 12 and Trail 18. At this point, riders will have the option to either:

- Climb to the lookout point on Trail 10 (and beyond to Kimberley's Lookout, and ultimately Railton should they wish)
- Turn onto Trail 18 to visit the waterfall and cave
- Turn onto the Tasmania Trail to return to the southern trailhead and/or Sheffield.

Figure 15. View of Mt Roland from Trail 13

7.20 TRAIL 14

7.20.1 Trail Summary Information

Trail 14 Summary Information	
Trail difficulty Rating:	Easy
Reference Map:	
Approximate Length:	1.22km
Proposed Surface:	Natural Surface
Minimum Width:	900mm (+/- 300mm)
Composition:	New singletrack: 1.22km Existing vehicle access track:
Elevation Profile:	
Infrastructure Required:	» Nil

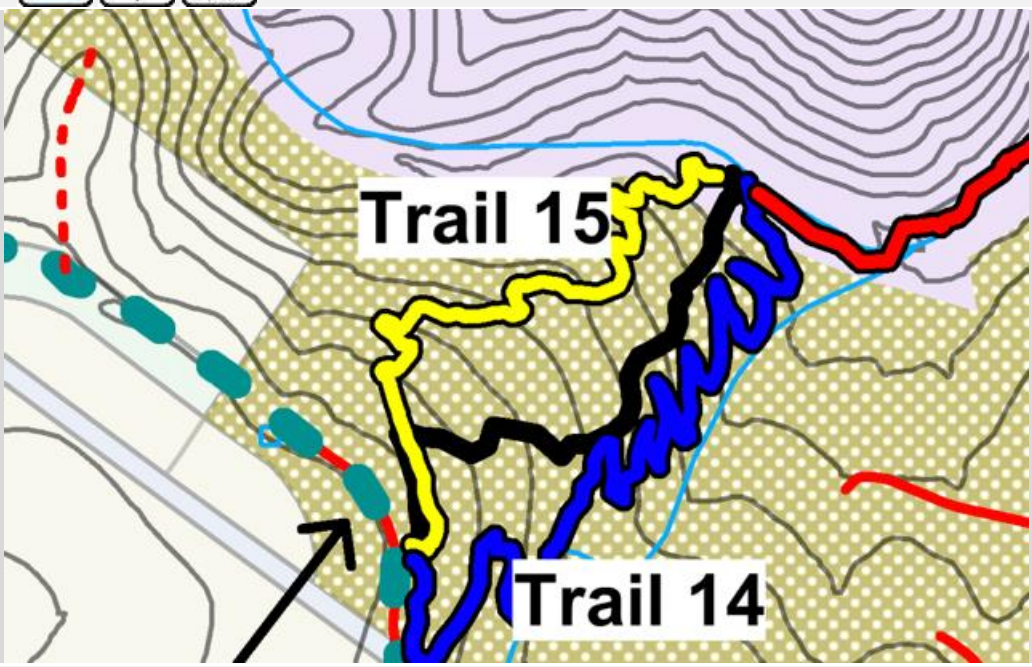
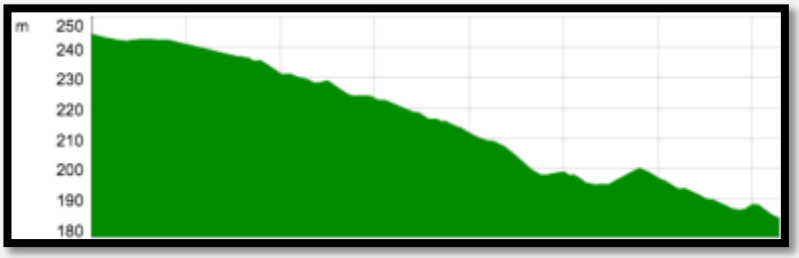
7.20.2 Trail 14 Description

The route can be described as:

» Trail 14 (shown in blue above) climbs on a gentle gradient, meandering through the magnificent Arboretum. This trail will be used either as a return to the trailhead for those enjoying the descending trails within the Arboretum, or as a link to the Tasmania Trail for people travelling from the Northeast Trailhead.

7.21 TRAIL 15

7.21.1 Trail Summary Information

Trail 15 Summary Information	
Trail difficulty Rating:	More Difficult (and possibly Very Difficult and Extremely Difficult) 
Reference Map:	
Approximate Length:	0.74km as shown above. Note that total trail length is estimated at approximately 2km as per description on the following page.
Proposed Surface:	Natural Surface
Minimum Width:	900mm (+/- 300mm)
Composition:	New singletrack: 1.5km Modifications to existing singletrack: 0.55km
Elevation Profile:	
Infrastructure Required:	» 20m rock armoring. » Technical trail features as required.

7.21.2 Trail 15 Description

The Arboretum has a number of existing descending mountain bike trails, built by local mountain bikers (see 15 below). Many of these trails are unsustainable, but could be significantly improved using appropriate machinery and best practice construction techniques. Trail 15 (shown in yellow) is a new alignment that would be extremely popular with local users. It descends steeply from top to bottom, through idyllic soils and terrain.

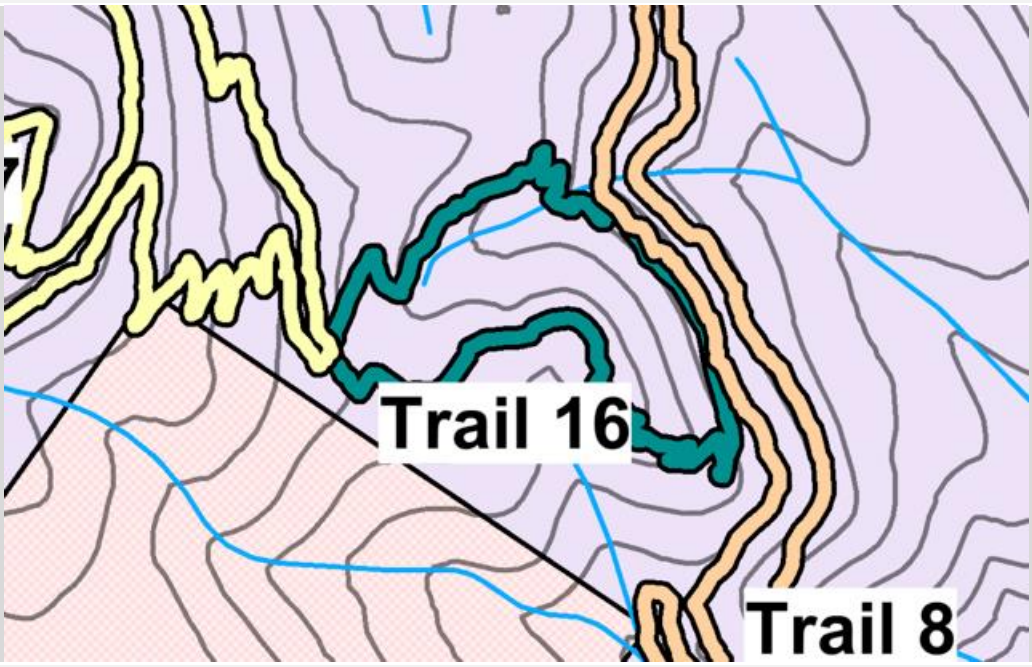
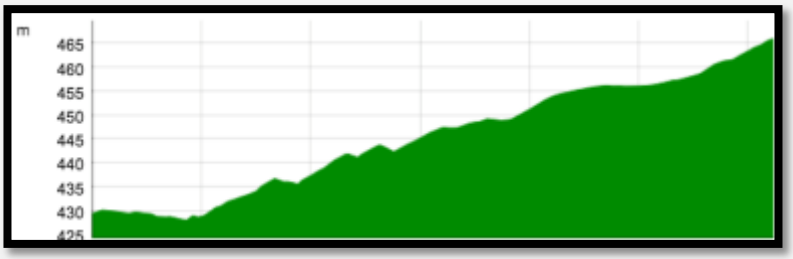
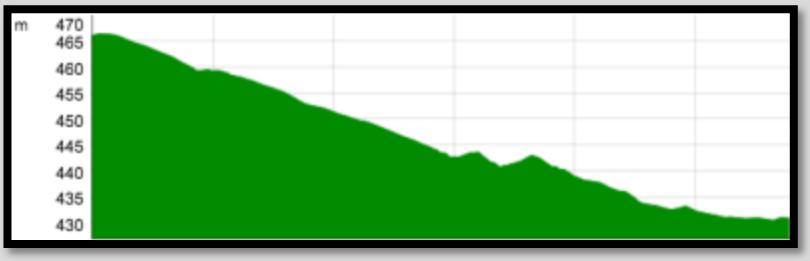
While the alignment for Trail 15 has been mapped as 0.74km long, the total amount of trail to be constructed in this area could be much longer, by constructing a number of optional, parallel descents, possibly including Very Difficult and Extremely Difficult options. For the purposes of budgeting, it is recommended that approximately 2km of descending trails be allowed for within the Arboretum (excluding the climbing trail 14).

Note – novice riders travelling from the Southern Trailhead along the Tasmania Trail to this point will need to continue along the Tasmania Trail towards the east and Railton. Trail 15 is proposed to be rated as 'More Difficult' (with options for Very Difficult and Extremely Difficult descents), and as such is not suitable for novice riders (as is the Trail 11 beyond it). While this is not ideal, the terrain in this area is too steep for the construction of an Easy trail.

Figure 16. Existing, informal trail within the arboretum

7.22 TRAIL 16

7.22.1 Trail Summary Information

Trail 16 Summary Information	
Trail difficulty Rating:	More Difficult
Reference Map:	
Approximate Length:	1.23km
Proposed Surface:	Natural Surface
Width:	900mm (+/- 300mm)
Composition:	New singletrack: 1.23km
Elevation Profile (Climb):	
Elevation Profile (Descent):	
Infrastructure Required:	» 15m of rock armoring » 220 lineal metres of imported 'rubble', approximately 600mm wide and 100mm deep.

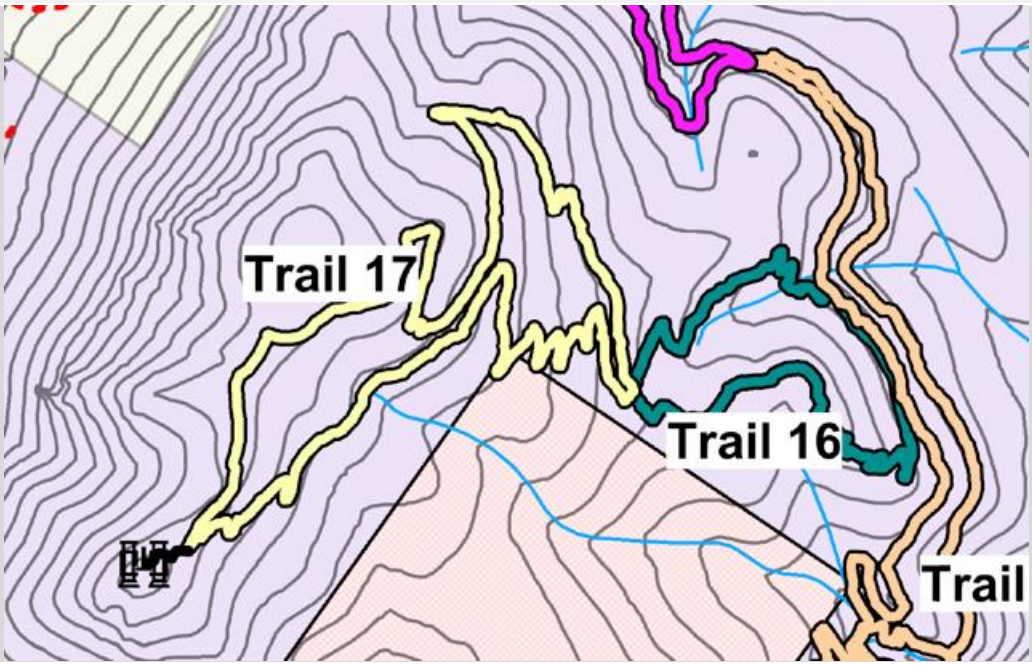
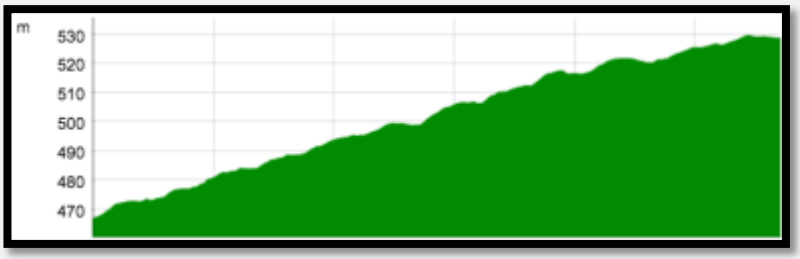
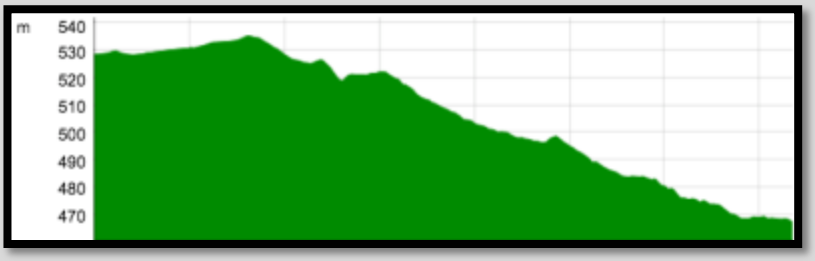
7.22.2 Trail 16 Description

A short, fun climbing and descending trail that can be included en-route to Railton from Sheffield, without needing to climb all the way to Kimberley's Lookout.

The 600m descent will include a series of bermed corners, built to enable a wide range of users to ride them safely.

7.23 TRAIL 17

7.23.1 Trail Summary Information

Trail 17 Summary Information	
Trail difficulty Rating:	More Difficult
Reference Map:	
Approximate Length:	2.66km
Proposed Surface:	Natural Surface
Width:	900mm (+/- 300mm)
Composition:	New singletrack: 2.66km
Elevation Profile (Climb):	
Elevation Profile (Descent):	
Infrastructure Required:	» 15m of rock armoring » 300 lineal metres of imported 'rubble', approximately 600mm wide and 100mm deep.

7.23.2 Trail 17 Description

Trail 17 climbs to, and descends from, Kimberley's Lookout, through a variety of vegetation including open eucalypt forest, dense tea trees and grassy valley.

Kimberley's Lookout sits at an altitude of approximately 530m. To reach the top, riders will climb either:

» 245m from the Southern Trailhead (elevation 285m)

» 375m from the Northeast Trailhead (elevation 155m).

There are two obvious reasons to climb to Kimberley's Lookout:

1. To enjoy the view
2. To enjoy the ride back down.

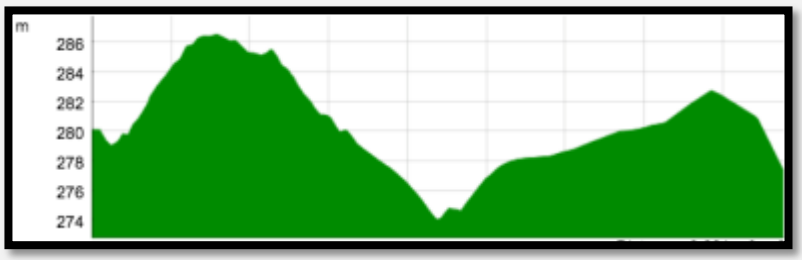
The view to the south and north from Kimberley's Lookout can be seen in Figure 17 and Figure 18 respectively.

Figure 17. View towards the south over Sheffield from Kimberley's Lookout

Figure 18. View towards the north from Kimberley's Lookout along the Badgers Range

7.24 TRAIL 18

7.24.1 Trail Summary Information

Trail 18 Summary Information	
Trail difficulty Rating:	Easy
Reference Map:	
Approximate Length:	0.88km
Proposed Surface:	Natural Surface
Width:	900mm (+/- 300mm)
Composition:	New singletrack: 0.5km Tasmania Trail: 0.38km
Elevation Profile:	
Infrastructure Required:	» One new gate through fence adjacent to Tasmania Trail. Note that there is already a gate in place, however the height of the existing gate is unsuitable » One low bridge up to 6m long, 1,200mm wide » 20 lineal metres of imported 'rubble', approximately 600mm wide and 100mm deep.

7.24.2 Trail 18 Description

Trail 18 is an easy trail that forms an extra loop close to the southern trailhead. This alignment will be popular with all visitors to the Kimberly's Lookout area, as it takes in a very picturesque waterfall and cave found close to the Tasmania Trail, north east of Sheffield.

The rock formation surrounding the cave entrance and nearby waterfall are shown in Figure 19 and Figure 20.

Figure 19. Cave on Trail 18

Figure 20. Waterfall on Trail 18

7.25 OTHER ROUTES AND LINKAGES

7.25.1 Transition Trails

The *Kentish Mountain Bike Trail Master Plan* aims to provide 'transition trails' that link the Kentish trails to the nearby towns, enabling people to ride directly to the trail network from these towns. The specific links required are:

1. Linkage to Spreyton, via the Badgers ridgeline
2. Linkage to Railton and the Mersey River
3. Linkage to Sheffield.

The map 'Other Routes and Linkages' as shown in Figure 21 shows possible routes to achieve these linkages. These routes are discussed in the following pages. Total cost of transition trails in Kentish municipality is estimated to be $460,000[35].

The notion of being able to ride between the trail network and local towns is undeniably a good one. Ideally, the best arrangement to realise the tourism benefits of mountain bike trails is to place the trailhead for the trails as close as possible to the centre of local towns.

A key distinctive element of the Kentish-Latrobe mountain bike trail network will be the use of overland trails to link local towns along the trail network. Many world-class mountain bike trails are not directly linked to towns, or the facilities within them, and this feature will create a distinctive element to the Kentish-Latrobe network that will make it internationally notable.

It is proposed to provide a 52km overland loop from Devonport via Latrobe, Railton, Sheffield, and return to Latrobe and Devonport. This loop will also link those towns directly to the trail clusters at Kentish (between Railton and Sheffield) and Warrawee Reserve (5km south of Latrobe). The purpose of this loop is to:

1. Provide an off-road link between the two trail clusters, at Kentish and Warrawee Reserve
2. Connect the mountain bike experience to the main population centres of the region;
3. Provide a distinctive mountain bike experience that includes towns and that connects mountain bikers to services and facilities enjoyed in towns;
4. Provides an additional distinctive experience, diverse from the all-terrain trails featured in the Kentish and Warrawee trail clusters. The routes include mountain top views, riverside trails, some small climbs and descents suitable for all rider experience levels, interpretation points and lookouts that feature local flora and fauna of significance, and local cultural and historical interpretation;
5. Allow local residents to ride from their homes into the trail network without the need to use a vehicle (especially important for younger riders who don't drive);
6. Allow mountain bike tourists to access the hospitality services of the surrounding towns without vehicles;
7. Enable mountain bikers to get off the Spirit of Tasmania and ride to Latrobe, Railton and Sheffield and return to Devonport, via a total trail network in excess of 100km, without ever riding on a road;
8. Create a diverse, multi-faceted mountain bike experience by breaking down the overall experience into "legs'' so younger, or less fit users, can ride just from one town to another, or do different sections on different days, which is intended to drive multiple visits by local and Tasmanian users, to experience the different sections on different visits

The overland link trail system comprises three parts:

1. the Latrobe-Railton leg is proposed to follow the existing Tasmania Trail from Warrawee Reserve at Latrobe, along the stunning Mersey River, to Railton;
2. a "return leg'' from Sheffield to Latrobe via The Badgers range to Coal Hill Rd, just west of Latrobe, from where a roadside cycling path will be constructed for the final 2km to the centre of Latrobe township;
3. a 5.3km off-road cycling path to connect Latrobe to the main regional population centre of Devonport (pop 25,000) via the picturesque River Rd.

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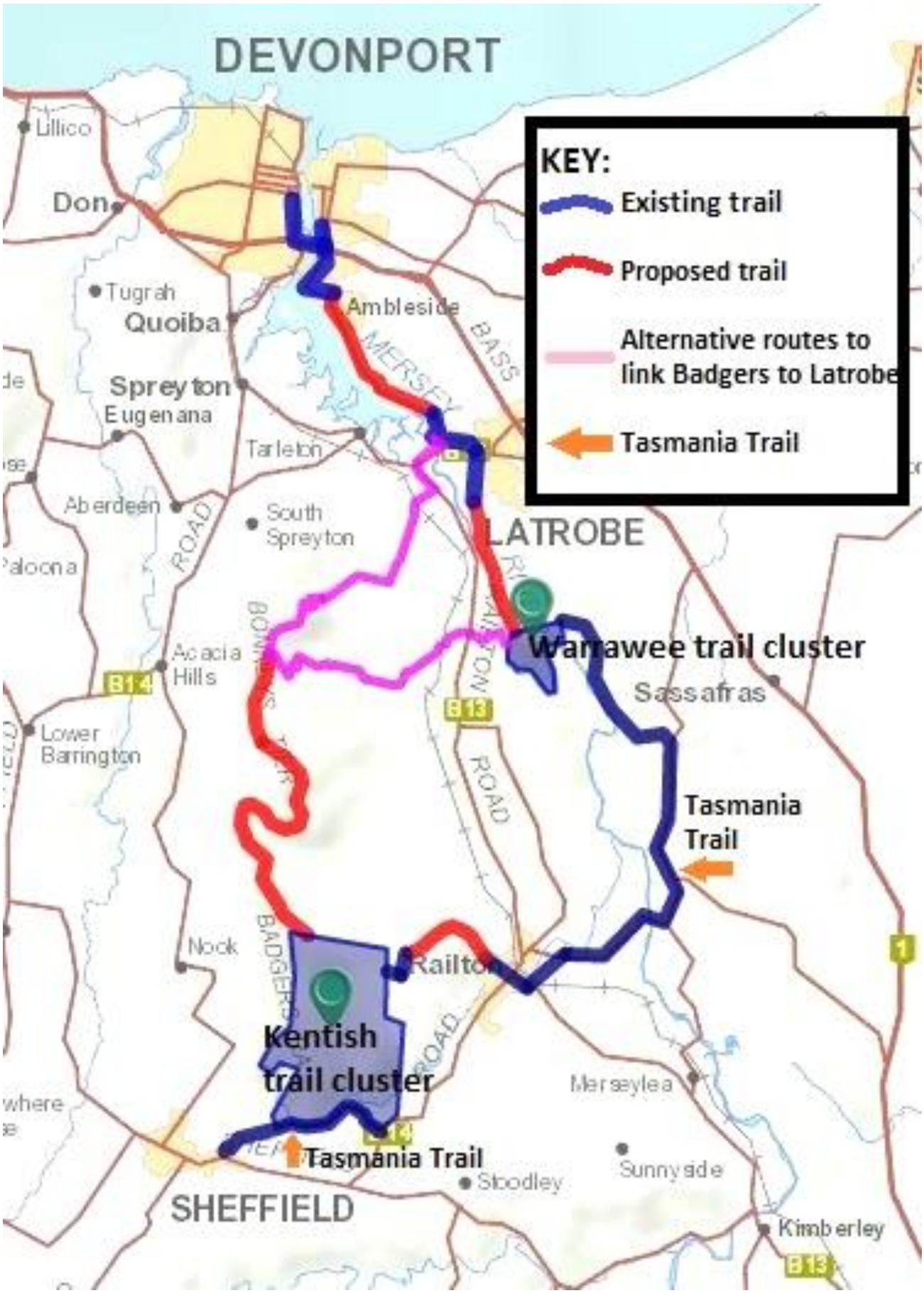
[35] Kentish Council estimate 2015

Figure 21. Map Other Routes and Linkages



7.25.2 Latrobe-Railton via Tasmania Trail

The existing but underutilised Tasmania Trail was developed about 10 years ago and provides a walking, horse riding and cycling trail from Devonport to Dover – making it possible to walk from one side of the island to the other. Kentish Council propose to use the 14.5km Latrobe-Railton section of this trail as the route from Latrobe to Railton, as it is already developed, agreements have already been reached with affected private landholders, and it is a picturesque and suitable path for mountain biking, with a diversity of terrain and is relatively flat, while it also significantly reduces costs by using an existing path. This trail would create an ideal leisurely Green Grade trail, suitable to novices and less fit or experienced riders. It would include interpretation of significant local points of interest, such as flora and fauna and cultural and historic sites of interest, as well as lay-offs at picturesque riverside points and lookouts.

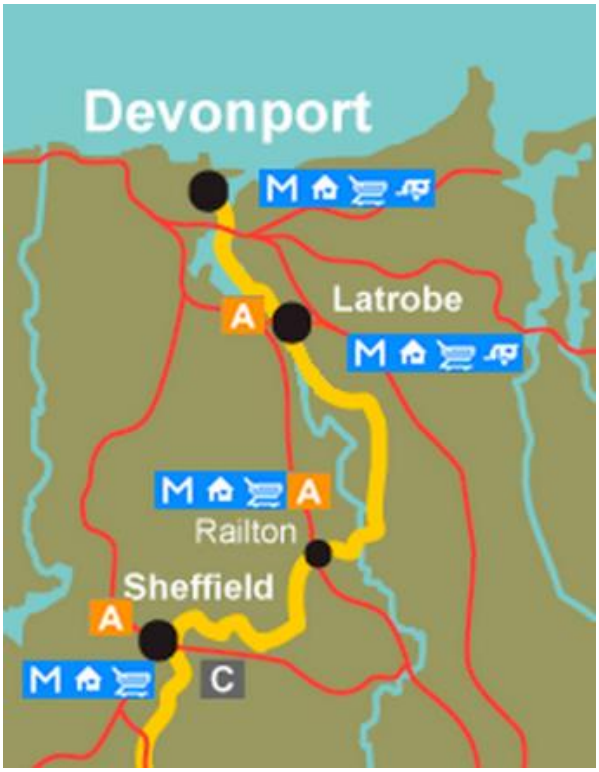
Usage of the Tasmania Trail currently is not known, but anecdotally appears to be very low. No evidence of any recent trail use was seen during fieldwork. On ground signage for the trail is very limited. Some minor upgrades and works would be required, such as improved directional signage, and approximately three "bike gateways'' that enable mountain bikers to pass over property boundary fences without the need for opening, closing and locking gates, as is present practice on Tasmania Trail.

Tasmania Trail is a multi-use trail that encourages use by horse riders and walkers as well as cyclists. This multi-use aspect would be retained on this link, and would in no way affect horse riders or walkers who intend to use this trail. Signage would be erected on this section of trail to alert cyclists to the fact this leg of the experience is multi-use and they may encounter walkers and horse riders.

This route begins on land managed by Parks & Wildlife Service, for which in-principle agreement has been secured. It includes some private held land, for which public access has already been agreed between the landholders and the Tasmania Trail Management Committee.

Given that most of this trail is on existing formalised trails through public and private property, little trail work is required, except improving the surface on some low-lying sections or areas prone to minor puddling after heavy rains. Some "bike gates'' are required to assist users to pass over fences without requiring a key to unlock gates (which is the present practice on Tasmania Trail). It is proposed to use a thin bike-and-rider incline over fences. The timber and metal-constructed ramp is too thin for livestock or trail bikes to negotiate, but wide enough for a mountain bike and rider. The total cost of the Latrobe – Railton Upgrade has been estimated by Kentish Council to be $112,700.

Figure 22. Tasmania Trail from Sheffield to Devonport



7.25.3 Sheffield-Latrobe via The Badgers

A multi-direction single-use overland trail is proposed by Kentish Council to follow The Badgers range from the Kentish trail cluster between Sheffield and Railton, to Latrobe, completing a trail system in excess of 100km (52km of linking trails, 52km of trail in the Kentish trail cluster and about 10km of trails at Warrawee Reserve near Latrobe.

The Sheffield-Latrobe link is intended to be a Blue Grade overland trail featuring an extensive 3.5km descent into Latrobe, which will be of significant enjoyment to cyclists at the end of their journey.

The route includes spectacular hilltop views that take in almost the entire northern Tasmanian coastline, from the Furneaux Group islands off the north-east tip of Tasmania, to Table Cape, near the north-west tip. It also includes 360 degree views that include Mt Roland, Cradle Mountain, the Western Tiers, the rolling agricultural pastures in the foreground, extensive coastal views, and bird's eye views of the towns linked in the trail network. It also includes sections of forest protected for their environmental values and interpretative signage is intended to promote knowledge of the environmental values in the area.

A conceptual route has been designed by Kentish Council, though discussions with one affected private landholder are ongoing (they should be completed by July 30 2015). Therefore, two exit points have been proposed: Plan A requires the agreement of the outstanding landholder (agreement will be resolved before the Latrobe Master Plan is completed and this exit point will be detailed in that plan). Plan B involves a diversion before this private property is reached, and passes through Forestry Tasmania managed land from The Badgers, across Railton Rd to the only orchid reserve in Australia (Henry Somerset Orchid Reserve) and crosses the Mersey River by either suspension bridge of flying fox, to Warrawee Reserve.

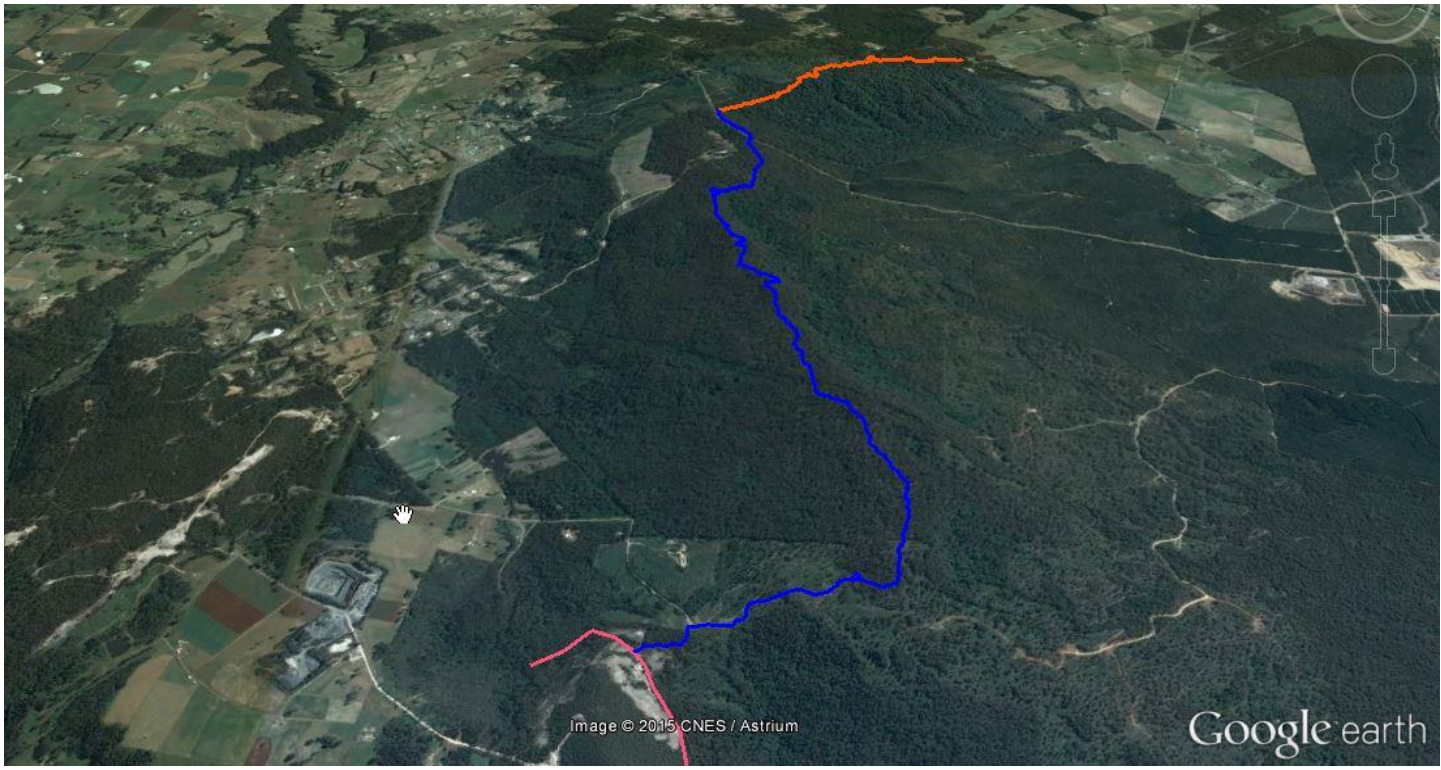
This route almost entirely crosses land managed by Forestry Tasmania, with which in-principle support has been agreed. The northern end (near Coal Hill Rd) crosses properties owned by two private landholders. Agreement has been reached with one landholder for a trail to cross a section of their property. Negotiations are continuing with the other affected landholder. If negotiations fail, a Plan B route has been identified, to include only the Forestry Tasmania land, and instead of terminating at Coal Hill Rd, the route would avoid privately held land by crossing Railton Rd near Henry Somerset Orchid Reserve and reconnect to the trails at Warrawee Reserve, via a bridge or flying fox across Mersey River.

The proposed route follows existing informal tracks for most of the southern end, which will require little upgrading, except for the portion near The Badgers summit, which is rockier and will require some benching and trail surfacing. Work at the northern end of this trail depends on the final route chosen. Option A would require considerable benching on a steep section near Coal Hill Rd, and a bike lane (or passing bays) added to the pedestrian path on Miles Ford Bridge crossing the Mersey at Latrobe. Option B (crossing Railton Rd and Mersey River) would require some additional benching on the descent from the summit, some surfacing of existing informal routes through Forestry Tasmania land, and a flying fox or suspension bridge to cross the Mersey to Warrawee Reserve.

Both Options A and B are in the Latrobe Municipality, not Kentish, and they are therefore detailed in the Latrobe Mountain Bike Master Plan, presently being completed. The costs for the Kentish-Latrobe transition trail as far as the municipal border have been estimated by Kentish Council as $285,000.

Full details and costs of the final 8km of this leg, comprising the Latrobe terminus, are contained in the Latrobe Mountain Bike Master Plan. Figure 23 illustrates the proposed routes currently being considered by Kentish Council. The blue line indicates confirmed route to Kentish-Latrobe municipal boundary. The orange line denotes "Option 1'' route via Coal Hill Rd to Latrobe. An alternative may be to develop trail off northern end of blue line, directly east to Mersey River (these alternatives will be determined in the Latrobe Mountain Bike Master Plan.

Figure 23. Sheffield-Latrobe transition trail proposed route.



7.25.4 Latrobe link

It is proposed that Latrobe township will be connected to Warrawee Reserve via a 2.5km off-road 2m wide multi-use dual-direction cycling-walking path from Gilbert St in Latrobe (the main street) via Hamilton St-Shale Rd to Warrawee Reserve. This route will be detailed in the Latrobe Mountain Bike Master Plan, presently being developed by Latrobe Council. This route will be signposted to denote to cyclists that on this part of the trail they may encounter walkers. Details and costs of this short link are contained in the Latrobe Mountain Bike Master Plan.

7.25.5 Devonport link

It is proposed to develop a 2m wide multi-use dual-direction cycling-walking path along the picturesque and flat route of River Rd, from East Devonport to Latrobe. This would provide an ideal route for families, young riders and tourists to travel from Devonport to Latrobe to access the main trail clusters. It would also enable enthusiasts to ride the 80km return loop, leaving the Spirit of Tasmania ferry terminal and riding via Latrobe, Warrawee trail cluster, Railton, Kentish trail cluster and return via The Badgers overland ride to Latrobe and then to Devonport, without ever riding on a road. This section of track will be signposted as multi-use. Details and costs of the Devonport-Latrobe link are contained in the Latrobe Mountain Bike Master Plan.

7.25.6 Linkage to Sheffield

Kentish Council propose to link the Southern Trailhead to the town of Sheffield via the existing Tasmania Trail, a distance of approximately 3km right into the centre of Sheffield. The Tasmania Trail offers a good route for mountain bikers to access the trails to/from Sheffield. It will need to be widened, improved and upgraded to allow for vehicle access into the Southern Trailhead and existing farm gates will need to be removed, but it is otherwise flat and direct and easy to navigate. Kentish Council has estimated the cost to upgrade this trail to be in order of $60,000.

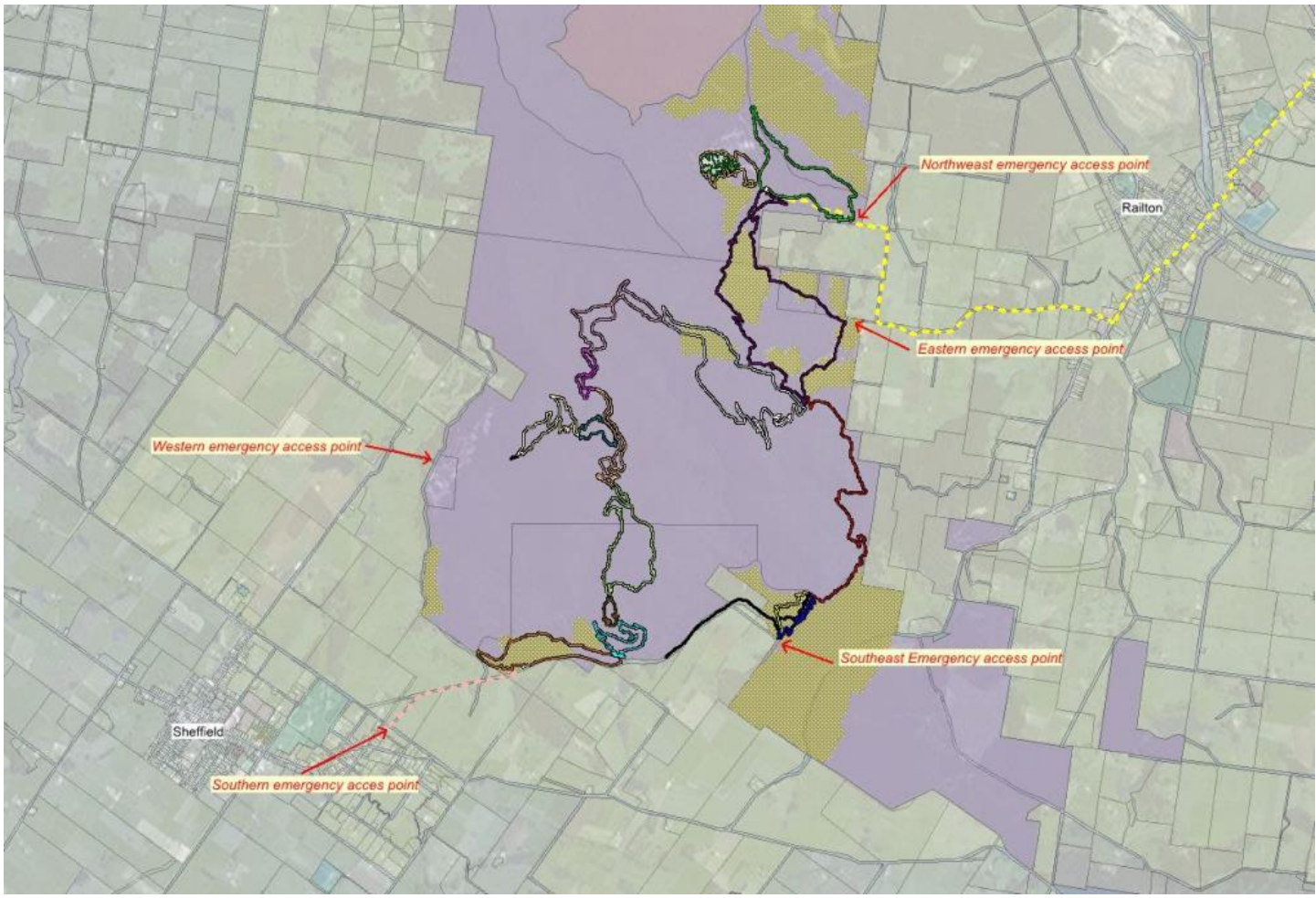
7.25.7 Emergency Services access

The proposed Kentish mountain bike trails are located in remote areas. While there is a network of management tracks throughout the site, many are overgrown, very steep and eroded, low lying, wet and boggy. Overall, access for emergency services is difficult.

Figure 24 below shows the nearest emergency access points that can be accessed by road. These are:

- Northeast – A well formed road (currently key access) to the northeast trailhead via Newbed Road, Railton, can be used to access all the way to the quarry trails (Trails 2 and 3)
- Eastern – Via Newbed Road, Railton. Further access can be achieved from this point for about 1km towards the northwest, using a well formed management road (key required) along Trail 4
- Southeast – Turning off the Sheffield Road (B14) onto the Tasmania Trail alignment, access is available to the top of the descending trails in the arboretum. Access is also proposed to the base of these descents via logging roads, once forestry works have been completed in this area
- Southern – Available via the Tasmania trail to the southern trailhead
- Western – Available to the base of the Kimberleys Lookout walking track. Note that there is no vehicle access into the site, and this steep walking trail should only be attempted on foot.

Figure 24. Emergency access points



7.25.8 Construction Staging

The 19 proposed new mountain bike trails have been grouped together into a two-stage construction program. While this is an ambitious program, it will deliver the finished trail network in a short timeframe, allowing for the quickest return on investment.

Table below shows a proposed construction order for Stage One of the Kentish mountain bike trails. The order has been selected to achieve the following in Stage One:

- Focus on the easier trails close to trailheads
- Link Sheffield and Railton, then Kimberley's Lookout
- Provide trails for all skill levels.

Table11. Stage One construction order

Construction Priority	Trail Number/Name	Length	New	Existing
1	13	2.67	1	1.67
2	18	0.88	0.5	0.38
3	12	2.45	2.45	0
4	10	0.92	0.82	0.1
5	14	1.22	1.22	0
6	15	0.74	1.5	0
7	11	3.26	3.26	0
8	4	5.93	4.3	1.63
9	1	3.69	3.5	0.19
	Total	21.76	18.55	3.97

Stage Two of construction would see all remaining trails completed in the order shown in Table below.

Table 12. Stage two construction order

Construction Priority	Trail Number/Name	Length	New	Existing
10	9	3.64	3.4	0.24
11	8	3.03	3.03	0
12	16	1.23	1.23	0
13	17	2.66	2.66	0
14	7	1.4	1.4	0
15	6	2.94	2.64	0.3
16	5	5.76	5.16	0.6
17	2	2.13	2	0.13
18	3	1.85	1.85	0
19	Existing Descent	0.55	0	0.55
	Total	25.19	23.37	1.82

7.26 CONSTRUCTION COST ESTIMATES

This section provides indicative costs for the construction of the trails identified within the trail master plan.

The conditions for construction vary a great deal, with some areas providing good soils and open vegetation, and other areas with lengthy sections of extremely dense vegetation and wet soils.

To arrive at a cost estimate to construct this trail network, a 'construction difficulty' score has been applied to each trail, and then applied a cost per metre rate for each construction difficulty rating. The construction difficulty, and subsequent construction cost estimates, takes into account a number of variables that can impact on the construction of natural surface, machine-built, 1m wide, mountain bike trails, including the extent of vegetation clearing required, soil types, the proposed IMBA difficulty rating of each trail and the general topography. While mountain biking trails can also be built by hand, most professional trail construction contractors build trails using excavators, as it is more cost effective and provides better outcomes for quality control. This methodology for pricing, while subjective, is an appropriate tool to estimate the likely costs of trail construction at this early planning stage.

The matrix used to calculate construction costs is shown in Table 13 below.

Table 13. Construction Difficulty and Cost Matrix

Construction Difficulty Rating (1-5)	Cost Per Metre ($)
1	$10.00
2	$20.00
3	$30.00
4	$37.50
5	$45.00

As an example, a construction difficulty score of 1 might be applied to an old logging track that is overgrown, requiring some simple brush cutting and clearing to reopen, with no need for any excavation. At the opposite end of the spectrum, a trail with a construction difficulty rating of 5 would involve substantial amounts of rock armouring, frequent berms, switchbacks, jumps or rollers (requiring extensive earthworks) and heavy vegetation clearing.

The construction difficulty score for each of the proposed *new* trails within the Kentish Mountain Bike Park is shown in Table below, along with the resultant cost estimate to build each individual trail.

Table 14. New Trail Construction Cost Estimates

Trail	Length of New Trail (km)	Construction Difficulty Rating	Cost Estimate
1	3.5	3	$105,000.00
2	2	3	$60,000.00
3	1.5	3	$45,000.00
3A	0.35	4	$13,125.00
4	4.3	3	$129,000.00
5	5.16	3	$154,800.00
6	2.64	3	$79,200.00
7	1.4	4	$52,500.00
8	3.03	4	$113,625.00
9	3.4	4	$127,500.00
10	0.82	3	$24,600.00
11	3.26	3	$97,800.00
12	2.45	3	$73,500.00
13	1	3	$30,000.00
14	1.22	2	$24,400.00
15	1	3	$30,000.00
15A	0.4	3	$15,000.00
15B	0.1	4	$3,750.00
16	1.23	4	$46,125.00
17	2.66	3	$79,800.00
18	0.5	3	$15,000.00
Total	**41.92**		**$1,319,725.00**

Some trails identified in the master plan will include some sections of existing trails. Some of these existing trails require works to improve sustainability and ensure they meet the required standard for proposed trail difficulty ratings. Table 15 below provides estimates for improvements to existing trails, applying the same construction difficulty rates used above.

Table 15. Cost Estimates for Upgrades to Existing Trails

Trail	Length of Upgrades (km)	Construction Difficulty Rating	Cost Estimate - Trail
4	1.63	2	$32,600.00
5	0.6	2	$12,000.00
6	0.3	2	$6,000.00
9	0.24	2	$4,800.00
10	0.1	2	$2,000.00
Existing Descent	0.55	4	$16,500.00
Total	3.42		$73,900.00

Individual trail descriptions within the master plan include an allowance for infrastructure for each trail. It is recommended that when engaging a construction company to build the Kentish trail network, contractors be requested to provide a rate per metre for each infrastructure item recommended. This rate should be applied on an 'as needs' basis, and works invoiced as a variation. For the purposes of estimating construction costs, the following rates for the variation items have been applied:

- Rock armoring (per metre) - $250
- Ballast importation and spreading (per metre) - $50
- Bridges and elevated structure construction (per metre) - $575

Table 16 below applies the above rates to the allowances estimated in each individual trail description, to provide a cost estimate for variations during construction.

Table 16. Variation Costs per Trail

Trail	Rock Armouring (m)	Roack Armouring Cost	Ballast Import (m)	Ballast Import Cost	Elevated Structures (m)	Elevated Structure Cost	Total Per Trail
1	20	$5,000.00	50	$2,500.00	3.6	$2,070.00	$9,570.00
2	20	$5,000.00					$5,000.00
3	100	$25,000.00			30	$17,250.00	$42,250.00
4	20	$5,000.00	50	$2,500.00			$7,500.00
5	12	$3,000.00					$3,000.00
6	6	$1,500.00	30	$1,500.00			$3,000.00
7	20	$5,000.00			200	$115,000.00	$120,000.00
8	40	$10,000.00			300	$172,500.00	$182,500.00
9			100	$5,000.00	10	$5,750.00	$10,750.00
10			30	$1,500.00			$1,500.00
11	15	$3,750.00	100	$5,000.00			$8,750.00
12	10	$2,500.00	100	$5,000.00			$7,500.00
13					6	$3,450.00	$3,450.00
14							$0.00
15	20	$5,000.00					$5,000.00
16	15	$3,750.00	220	$11,000.00			$14,750.00
17	15	$3,750.00	300	$15,000.00			$18,750.00
18			20	$1,000.00	6	$3,450.00	$4,450.00
Total	**313**	**$78,250.00**	**1000**	**$50,000.00**	**555.6**	**$319,470.00**	**$447,720.00**

Table 17 below provides summarises the three previous tables, adding the cost estimates for new trail construction, cost estimates for upgrades to existing trails and the estimated variation costs, to calculate a total overall cost per trail. Note that all cost estimates provided above are indicative estimates only. They should not be treated as quotes for construction.

These rates include all labour and the provision of the necessary equipment and machinery to construct the trails. Other costs are estimated to be up to $250,000 (subject to detail design) and are likely to include:

- GST
- Contractor expenses (i.e. mobilisation and accommodation costs)
- Any costs associated with obtaining permits or approvals
- Any further design or consulting costs
- Signage fabrication and installation costs
- Trailhead design and construction costs
- Improvements to existing roads and construction of car parks
- Other infrastructure costs – shelters, picnic tables, toilets, boardwalks etc.

Table 17. Summary of trail construction costs

Trail	New Trail Construction	Upgrades to existing Trails	Variation Allowances	Total
1	$105,000.00		$9,570.00	$114,570.00
2	$60,000.00		$5,000.00	$65,000.00
3	$45,000.00		$42,250.00	$87,250.00
3A	$13,125.00			$13,125.00
4	$129,000.00	$32,600.00	$7,500.00	$169,100.00
5	$154,800.00	$12,000.00	$3,000.00	$169,800.00
6	$79,200.00	$6,000.00	$3,000.00	$88,200.00
7	$52,500.00		$120,000.00	$172,500.00
8	$113,625.00		$182,500.00	$296,125.00
9	$127,500.00		$10,750.00	$138,250.00
10	$24,600.00	$4,800.00	$1,500.00	$30,900.00
11	$97,800.00	$2,000.00	$8,750.00	$108,550.00
12	$73,500.00		$7,500.00	$81,000.00
13	$30,000.00		$3,450.00	$33,450.00
14	$24,400.00		$0.00	$24,400.00
15	$30,000.00		$5,000.00	$35,000.00
15A	$15,000.00			$15,000.00
15B	$3,750.00			$3,750.00
16	$46,125.00		$14,750.00	$60,875.00
17	$79,800.00		$18,750.00	$98,550.00
18	$15,000.00		$4,450.00	$19,450.00
Existing Downhill		$30,000.55		$16,500.00
Additional costs				$250,000
Total	**$1,319,725.00**	**$87,400.55**	**$447,720.00**	**$2,104,845**

7.27 TRAIL MAINTENANCE

Maintenance of trails is dependent on many variables:

- initial alignment and design
- rate of vegetation growth/encroachment
- level of use
- commitment to regular inspection/audits and repair before problems escalate
- natural hazards such as storms and bushfires.

Annual maintenance costs are estimated to be around 3% of construction costs. This figure has been adopted for the purpose of this analysis and therefore maintenance will cost approximately $56,000 per annum.

Typically, an annual allowance of 2% of total track value will cover basic maintenance – applying to anything that can be done with hand tools in a reasonable period (eg 2hrs). These tasks could include: pruning, minor water shedding, small rock picking and clearing, clearing trail of debris and fallen limbs. Other tasks such as reconstruction of damaged structures, drainage works, and minor realignment are considered to be repair rather than maintenance and will need a separate capital budget.

7.28 SUPPORTING VISITOR FACILITIES AND SERVICES

A range of experiences that are attractive for a range of markets is essential if the region is to strengthen its tourism offering. When visiting a mountain biking destination, most mountain bikers will spend a large proportion of their time off the bike and off the trails. This time may be spent at their accommodation, at local cafes/restaurants/bars/wineries or at other attractions. The needs of the riders are widely variable and dependent on income, cultural background and whether they are visiting with non-riding companions.

The attraction of Kentish will, for many tourists, lie in its proximity and ease of access from Devonport, Launceston and Hobart and proximity to Cradle Mountain and the integrated tourism offering. The natural environment and food and wine experiences will be attractive to many.

Strategies

Strategy	Description
1	Work with the tourism industry to encourage new mountain bike products, services and partnerships that will support the positioning of the region as a mountain bike destination integrated with the broader tourism offering.
2	Provide advice to the tourism industry and community on mountain bike consumer needs and encourage businesses (cafes, wineries, accommodation etc.) to become bike friendly.
3	Work with State Government and tourism industry to implement a range of transport options (bus, commercial shuttles) that enable riders to undertake one way journeys.
4	Recognise the range of complementary cycling experiences that exist in the region and incorporate as appropriate in promotion of Kentish, but recognise the importance of appropriate strategies and tactics for the international and interstate mountain bike market.

7.29 POSITIONING AND MARKETING

As the reputation of the North West region as a mountain bike destination grows, international and interstate visitors that go there specifically for the mountain bike offering will grow. In the short term, greater growth must be expected in people seeking a broader holiday that includes mountain bike experiences, and in the local and intrastate markets.

Positioning the region and state as a world class mountain bike destination needs to be done through partnerships with existing tourism organisations and integrating the mountain bike experiences with other offerings.

In addition to destination marketing, word of mouth, social media and online presence are critical channels to market for mountain bike markets. Ensuring consistent messaging and high quality product are essential to ensure positive messages and promotion though these channels.

Strategies

Strategy	Description
5	Work with Tourism Tasmania and the regional tourism organisations to (i) integrate the mountain bike positioning with destination brand (ii) implement collaborative marketing including the use of hero trail experiences as the core of the imagery and messaging about the destination for mountain biking (iii) ensure the agreed positioning and messages are applied at every touch point for the visitor across the destination (from pre trip to post trip).
6	Identify the positioning and images to be used to promote the Kentish mountain bike trails network, and how this needs to be applied across all tenures (maps, signage, collateral, webpages).
7	Establish a user friendly web portal that flows through to trails, hubs, maps, tours, recommended loops and accommodation etc. with links to strava segments of the actual trails. Portal to incorporate photos, elevation profiles, time required for trails, drive time to destinations, how to get there and cam camera footage of trails

7.30 SUSTAINABLE MANAGEMENT AND FUNDING

In the short, medium and long term, funding will be required to ensure the trails are maintained to a high standard. It is intended that Kentish Council will be the land manager and/or lease holder for the land, and ultimately responsible for ongoing maintenance and upgrades of the trails and associated facilities. It will do so by establishing a "Management Trust'' that includes council, the land owner (PWS) and other stakeholders, and supported by an annual future maintenance budget. The intent is to use this annual budgeted amount to work with local work skills groups, the local mountain bike fraternity volunteers, local service groups, government-funded projects (such as Green Army), Parks & Wildlife Service and Forestry Tasmania (and if necessary professional mountain bike construction firms) to regularly maintain the trail to the standards expected of a world-class facility.

A proven model used in locations such as Taupo, Queenstown, Rotorua and recently Nelson (all in New Zealand) where multiple tenures and stakeholders are involved, is to form an independent trails or biking trust. Success factors include:

(i) having role clarity for the trust, councils, parks and other agencies for trail development and maintenance
(ii) having the right mix of skills on the trust (business/commercial, biking, community engagement, governance, marketing)
(iii) working agreements with partner organisations
(iv) full-time or part-time staff working for the trust.

Strategies

Strategy	Description
8	Investigate a sustainable management model for the trails network that enables the range of land managers to (i) work towards the agreed priorities (ii) develop framework to formalise or close informal trail networks (iii) attract additional funding and (iv) facilitate professional trail maintenance programs across the range of trails
9	Investigate other opportunities for the private or community sectors to offer services for mountain bike riders at key locations with percentage return to infrastructure Consider commercial sponsorship opportunities for trails, bike parks or maintenance programs

8 Socio economic benefits

The socio-economic impact of the proposed Kentish Trail Network to Tasmania has been estimated based on an assessment of likely demand from residents and visitors. It is an assessment of the trail network with a total construction cost of $2,104,845.

It is important to note that the impact of the trail cannot be calculated from simply the number of visitors who use the Kentish Trail network multiplied by their total expenditure in Tasmania. Whilst this is often used as a simplistic measure for determining economic impacts the approach is incorrect as it:

» Assumes that the trail network is the sole purpose of visitation by all users of the trail – regardless to whether it is or not

» Ignores the broader impact of the trail network such as its impact on increasing Tasmania's profile as a cycling or adventure destination as a whole.

Instead the impact of the trail network has been calculated as the additional expenditure undertaken as a consequence of the new trail network. Many other factors other than market demand and average expenditure are considered within this assessment. All assumptions accompany the assessment results.

8.1 ECONOMIC IMPACT:

The economic impact has been determined at two different stages:

1. During construction of the trail network (over a five year period)
2. At 10 years post-construction of the trail network

8.1.1 Construction period

It is estimated that the construction of the trail will support employment of 7.5 full-time equivalents (FTEs)[36] across Tasmania during the five year period of trail construction. It is believed the majority of this employment would be local to the North West Tasmania region given the nature of the construction activities.

8.1.2 Post-construction period

The annual economic impact of the trail network has been estimated at a period of five years post construction. This is shown in Table 18.

At five years post construction it is estimated the trail network would increase direct tourism expenditure in the region by $4.5 million per annum. The flow-on impacts of this expenditure are significant and total output is expected to increase across Tasmania by $7.7 million per annum and will also increase and gross state product (GSP) by $13.8 million per annum. This increase in economic activity is estimated to support 51 jobs (measured as full-time- equivalents, FTEs). This activity represents a significant economic impact, especially considering much of this activity is likely to occur in Kentish and La Trobe Shires where the trails are located.

Table 18. Estimated economic impact of the Kentish trail network 10 years after construction

Time period (years post construction)	Direct expenditure*	Indirect expenditure*	Total output	GSP	Jobs (FTE)
5 years	$4.5 million	$3.2 million	$7.7 million	$13.8 million	51

*Direct expenditure refers to the immediate effect of expenditure made by tourists or the amount visitors spent in the region. **Indirect expenditure refers to expenditure that occurs from other industries not in direct contact with tourists (TRA, 2010).

[36] It is estimated that 1 FTE is supported per annum for every $250,000 in construction expenditure in the region. »85% of employment is generated is local to the region (i.e. within 'North West Tasmania'), with the remaining 15% from other areas of Tasmania. Construction of Stage 1 and Stage 2 is completed over a five year period.

Notes on the calculations:

- The GVA multiplier for Tasmania is not known. The multiple applied by Tourism Research Australia throughout Australia to determine indirect GVA at a national level (TRA, 2010) has been applied.
- For every dollar of direct expenditure by visitors in the North West, the broader local economy is estimated to benefit by a further $0.73 once flow-on industrial and consumption effects are taken into consideration. This can also be expressed as a tourism output multiplier of 1.73[37].
- Expenditure is provided in real terms.
- The expenditure behaviour of trail network users is representative of average expenditure behavior of total visitors to Tasmania[38].
- 80% of Interstate / International users of the trail users extend their stay by 1 night due to the trail network. This is comparable to the purpose of visitation to competitor trails.
- Assumed that 50% of intrastate users visited the region due to the trail network. Also assumed that only 24% of this market stayed overnight (for an average of 1.4 nights) – this is reflective of total travel behavior for the intrastate market in Tasmania[39].
- "Locals" use the trail network as a day visit only. Their expenditure per visit as a result of the trail network is $30– this is comparable to the local markets expenditure on other comparable trails
- In general the impact of the trail network on Tasmania's profile influences on average 0.02% of tourism expenditure in the region by visitors who undertake a cycling or bushwalking activity during their stay.
- Every $1 million of direct tourism expenditure supports 11.4 FTE jobs[40].

8.2 OTHER IMPACTS

8.2.1 Employment

In particular the employment impact of the Trail Network will be significant for the communities of North West Tasmania given that a large proportion of the jobs created would be within the local region. Employment opportunities in remote or regional areas can be limited and the trail network may provide a well needed boost to these communities.

There are significant social benefits from employment opportunities for local workers. This includes reducing the commuting time for workers who previously may have been required to travel to larger centres such as Launceston or Hobart.

Following construction the jobs created from the trail network will be primarily in the hospitality, accommodation and food and services industries. However, the employment benefits can be far reaching and impact other trades and services. This is illustrated in Figure 25.

8.2.2 Health and lifestyle benefits for the community

Riding on the trail network offers many social, health-related and cultural benefits to residents and visitors alike. Often it is difficult for these benefits to be quantified in market economy terms. However this does not detract from the importance of these benefits that highlights the purpose of their provision; long term health, leisure, family, community, wellbeing and societal benefits to be gained by all. The Kentish Community Health Needs Assessment report[41] includes among its recommendations future investment in expanding walking and bike riding facilities to improve community health outcomes. The recommendations are based on research including interviews with local residents and input from service providers. The research revealed the existing recreational facilities most used by the community include the bike park and informal existing mountain bike tracks. Among the recreational and health facilities the community seeks most to improve health and wellbeing outcomes, mountain bike trails were listed as a priority alongside a swimming pool and walking tracks, and ahead of a gym, skate park and activities for children.

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[37] REMPLAN Economic Impact Analysis Tourism in Tasmania's North West, Report Prepared for Tourism Tasmania and the Cradle Coast Authority June 2013
[38] IVS 2013, NVS 2013
[39] NVS, 2013
[40] Tourism Research Australia, 2010
[41] Auckland, S, Wild, A, Eyles, K and Woodroffe, J *Kentish Community Health Needs Assessment Project: Final Report*. University of Tasmania Centre for Rural Health 2015

The participation rate in cycling in the North West may increase with the development of the trail network. This has the capacity to increase social morale as well as providing health benefits for the local population.

"The possible new mountain bike track which is being developed at The Badgers [will] have great potential. We should be a healthier community – we have it all sitting on our doorstep"

An increased profile for the North West as a result of the trail network may also contribute towards enhancing regional pride within the local communities. Other regional locations in Australia have successfully increased community participation and spirit through similar tourism-related projects. It could be expected that the project will help to mobilise the local community and provide optimism and energy across the local economy and communities.

There is a significant communal benefit to trails in regional and remote areas. Importantly, they assist in connecting people to places, and people to people, bringing 'new faces' into small rural communities and enhancing social interaction.

An increase in visitation and economic activity in the region is likely to also increase investment and development of service and support industries such as in hospitality. This may give local residents more choice and variety of cafés or restaurants.

8.2.3 Investment attraction and regional stimulus

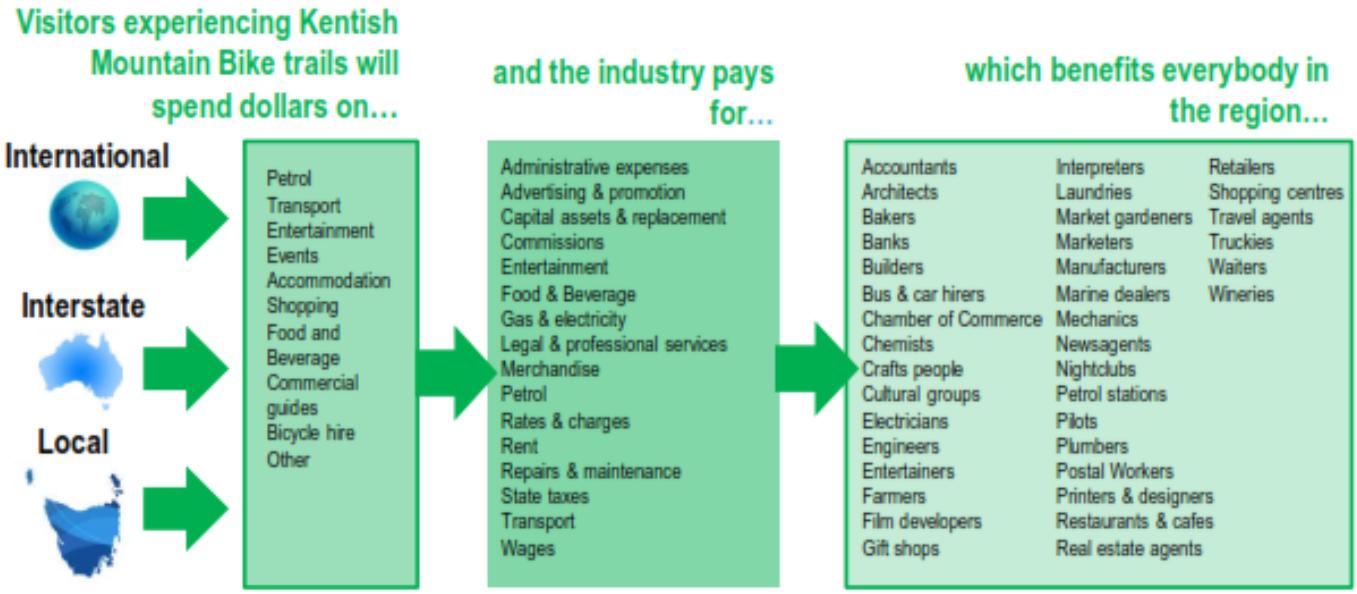
Increased visitation and expenditure in the region as a result of the trail network is also likely to attract further investment within North West Tasmania. The trail network presents an opportunity for entrepreneurs to develop products and services to meet the needs of visiting riders. This could include transport, merchandise, accommodation, food and beverages, and other ancillary services.

There are existing operators in the region that will also stand to benefit considerably from the increase in visitation. They are likely to capitalise on this opportunity and provide additional services, products and experiences for the trail users.

The increased expenditure will also provide significant stimulus to the regional communities of North West Tasmania. There will be increased expenditure particularly within the accommodation and food services industry. An increased length of stay for existing markets will improve the occupancy rate of accommodation facilities and may also result in investment in new accommodation infrastructure to meet market needs.

The project will also contribute towards enhancing the profile of Tasmania as a mountain bike destination and more broadly as an adventure tourism destination. This is aligned to the strategic goals of Tourism Tasmania and the region.

Figure 25. Enhanced profile of North West Tasmania as a mountain bike tourism destination



9 .Conclusion

Tasmania is an emerging mountain biking destination with some high profile trail networks and many high quality but less known formal mountain bike trails. Kentish Shire in North West Tasmania is well suited to offer world class mountain biking trails. Located on the door step of the iconic Cradle Mountain National Park and World Heritage wilderness area, the region's scenic landscapes, varied terrain, natural and cultural tourism attractions and transport infrastructure provide a strong basis for building mountain biking experiences attractive to a range of visitors. The intention is to create distinct mountain bike experiences that complement the trail network under development in North East Tasmania. Together these trail networks will offer visitors world class mountain biking experiences and strengthen Tasmania's positioning as an international mountain biking destination.

The Kentish Mountain Bike Trails Master Plan (the plan) is a blue print for world class trail development in the region. The plan aims to provide a range of trail types and experiences that will appeal to a wide range of visitors as well as local residents in the region. The network of trails will link adjacent towns of Sheffield, Latrobe, and Railton and will connect with trails to Devonport and Ulverstone.

Investment of $2.1 million in the proposed Kentish Mountain Bike Trail Network will provide a major tourism and recreational product of state significance, capable of generating new and complimentary tourism investment in North West Tasmania and contributing to the economic growth of the wider region.

The short to medium term benefits that are likely to arise from the construction of the trail network are:

- creation of short term jobs through trail design and construction
- creation of demand for secondary services throughout region as construction progresses
- creation of community, government, and business engagement
- employment growth directly related to the trail network
- employment growth indirectly related to the investment in mountain bike trail development across Tasmania, as well as the, in the tourism, accommodation and services sectors
- regional investment in the trail network and related businesses
- increased complementary benefits for Tasmanians such as active transport, recreation, health, social and cultural experiences
- Diversification of the state and region's tourism product mix
- increased international awareness of the Tasmania through branding and marketing
- greater attraction of a high value and fast growing segment of Tasmania's visitor market (increase in mountain bike visitors).

Longer term benefits are likely to be:

- increased employment and economic development opportunities for regional economies
- increased employment and economic development opportunities for the state economy
- enhanced Tasmania's reputation as a national and international cycle tourism destination.

Appendix 1. Strategic Planning Documents

The Tasmanian Economic Development Plan

The Tasmanian Economic Development Plan, released in August 2011, aims to improve the prosperity of all Tasmanians through economic development which is socially and environmentally sustainable. The plan has the following goals:

- to support and grow businesses in Tasmania
- to maximise Tasmania's economic potential in key sectors
- to improve the social and environmental sustainability of the economy
- to support and grow communities within regions.

The Plan identifies the Tasmanian tourism industry as a priority sector. It recognises that the importance of tourism to Tasmania goes beyond the economic impact of the sector itself, highlighting that tourism leads to increased purchasing of Tasmanian goods and services, investment in Tasmania, establishment of businesses or business connections, and migration to the state. The Economic Development Plan also identifies tourism as a driver of regional and community development through investment in infrastructure, the conservation of natural and cultural resources, and the encouragement of social development and understanding amongst communities.

The Plan is supported by three subordinate regional economic development plans. The North West Regional Economic Development Plan is the most relevant to the study area.

Appendix 1 summarises the main strategic directions of this Plan to the study area.

Cradle Coast Regional Land Use Strategy 2010-2030

The *Cradle Coast Regional Land Use Strategy 2010-2030*[42] has been agreed to by each of the 9 municipal councils comprising the Cradle Coast Region to provide a coordinated and consistent policy foundation for the local planning scheme for each municipal area. The Strategy is a statutory planning instrument applicable to the Cradle Coast Region under the Tasmanian Resource Management and Planning System and has been approved by the Minister for Planning under section 30C of the *Land Use Planning and Approvals Act 1993*.

The Strategy is underpinned by objectives for sustainable growth and development to protect the environment, improve energy efficiency and meet economic and social requirements and for improving the liveability of the region. Policies relevant to the proposed Kentish MTB Trails are:

- maintaining the region's separate settlement centres
- improving economic and social opportunities in local centres
- prioritising use of existing and planned infrastructure over new and expanded systems
- protection of 'irreplaceable and strategic' economic, natural and cultural assets, including wilderness, agricultural land, mineral deposits, productive forest, water, scenic and biological resources be protected against consumption and conflict by urban and other uses.

Guidelines for sustainable tourism are provided in section 3.3.5 of the Strategy:

a. facilitate tourism operations and facilities in locations that -
   i. leverage attraction and uniqueness of authentic experience in natural and wild places, including iconic destinations
   ii. integrate with other economic activity, including agriculture and mining
   iii. capitalise on natural and cultural heritage and landscapes
   iv. provide choice and diversity in character, distribution and scale

[42] The Strategy is part of Cradle Coast Regional Planning Initiative (2009), *Living on the Coast: The Cradle Coast Regional Land Use Planning Framework*.

b. protect attributes which attract and enhance tourism experience in the vicinity of designated tourist trails, identified points of interest and high value environmental, cultural and scenic sites
c. promote nature based and cultural tourist orientated development in conservation and natural value locations
d. promote tourism incidental to resource, industrial and settlement activity
e. are environmentally and socially sustainable with appropriate standards for transport, water supply and waste water infrastructure
f. integrate tourist experience and infrastructure into settlement centres to support and reinforce economic function
g. avoid alienation and displacement of local communities and significant change in local character, function and identity
h. ensure regulatory requirements and approval processes do not unduly direct or restrain the location, nature and flexibility of tourism operations and visitor accommodation.

Kentish Interim Planning Scheme 2013

The *Kentish Interim Planning Scheme*, developed under the Cradle Coast Regional Land Use Strategy, was approved by the Minister on 16 October 2013 and came into operation on 19 October 2013.

The Planning Scheme sets out general objectives for the use and development of land, requirements for development approval and prescriptions for development in specific zones. It also sets out codes for management and development of areas with particular attributes or hazards (such as bushfire or landslip hazards).

The zoning and planning overlay maps are on the Tasmanian Government's 'The List' map site - http://maps.thelist.tas.gov.au/listmap/app/list/map?bookmarkId=16242#.UuCUBDwP93I.email.

The general area for mountain bike trail development at The Badgers is designated an Environmental Management Zone. The purpose of an Environmental Management Zone (s. 29 of the Planning Scheme) is:

» to provide for the protection, conservation and management of areas with significant ecological, scientific, cultural or aesthetic value, or with a significant likelihood of risk from a natural hazard

» to allow only for complementary use of development where consistent with any strategies for protection and management.

Use of development of land in an Environmental Management Zone must be in accordance with relevant laws and agreements with the Commonwealth Government, any reserve management plan and with best practice principles for protection and conservation of significant ecological, scientific, cultural or aesthetic value. There must be minimal clearing of native vegetation and modification of natural topography. Uses should be self-sufficient in provision of a water supply and for drainage and disposal of sewage and stormwater.

Sports and recreation are permitted in this zone if dependent on an attribute of the site. *Tourist operations* are permitted if complementary to an environmental management purpose of the land in the zone or based on a building, area or place of regulated scientific, aesthetic, architectural or historic interest or otherwise of special cultural value. *Visitor accommodation* is permitted if it is for patrons of a conservation, sports and recreation or tourist operation use on land in the zone.

There are several areas designated as Landslip Hazard Areas within The Badgers. Section E6 of the Planning Scheme sets out procedures for assessing the level of natural hazard risk of a proposed use.

Kentish Strategic Plan 2014-2024

The *Kentish Strategic Plan 2014-2024*[43] includes the aim of building a strong local economy with improved local employment opportunities and a broader range of services, facilities and infrastructure to the benefit of both the business and residential sectors.

[43] Kentish Council (2014), *Kentish Council Strategic Plan: A Strategic Direction 2014-2024*.

Broad objectives to promote, develop and support tourism include:

- improving visitor information services
- actively promoting Kentish as a visitor destination
- assisting the private sector in developing new visitor attractions and improving visitor experiences.

The development and improvement of community facilities such as walkways and bikeways is envisaged.

Kentish Tourism Development Strategy, 2014-19

The *Kentish Tourism Development Strategy*[44] is part of the *Kentish Economic Development Strategy*[45] *2014-2019*. Mountain biking (as part of adventure tourism) is one of the 5 pillars or visitor experience types identified to grow and diversify tourism in Kentish – art, food, wilderness, history and adventure tourism. Development of an international mountain biking facility is identified as an action under this Strategy. Creation of an adventure tourism hub in Kentish and the implementation of the recommendations of tourism the 2011 *Mount Roland: Developing a Destination* report (see below) are also envisaged.

Other actions include improvements to the accessibility and quality of visitor information about the Kentish tourism experience before and during a visit – including information on attractions, accommodation, facilities and services and an improved online presence for Kentish.

Mount Roland: Developing a Destination, 2011

The *Mount Roland: Developing a Destination* report[46] was prepared by the University of Tasmania to assess tourism opportunities for the Mount Roland area south of Sheffield. The report concluded that:

- there is a need for more diversity in the Kentish tourism offer
- Kentish is well located for tourism access due to its location near population centres, entry points to Tasmania and the main route to Cradle Mountain
- the loop road system in the municipality creates opportunities for day trips
- priority tourism developments considered to have the greatest potential for tourism in Kentish are an adventure tourism hub, a must-see destination for recreational campers and a world-class mountain biking and family cycling park.

The mountain bike park location envisaged in this report is in the Mersey Valley and Beulah areas, with potential extensions to the Tasmania Trail and Mount Roland. It is envisaged as:

- appealing to a range of competitive and recreational mountain bikers and local families
- filling a gap in accessible mountain biking facilities in Tasmania
- potentially attracting visitation through international, national and state mountain biking events and multi-sport events.

Subsequently the *Mount Roland Recreation Precinct Blueprint for Development*[47] was completed in February 2013 for the Mt Roland Strategic Plan Steering Committee. The Blueprint proposes options for family, cross-country and downhill mountain bike trails adjacent to Mount Roland.

Cradle Coast Destination Management Plan: Towards 2020, 2014

The *Cradle Coast Destination Management Plan* (DMP)[48] prepared for the Cradle Coast Authority in May 2014 sets strategic directions aimed at developing and extending a sustainable and cooperative visitor economy across the region. The DMP points out that many tourism products in the region are reaching a mature stage and that rejuvenation through new visitor experiences, re-positioning and greater use of the digital economy is needed to prevent tourism decline.

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[44] Kentish Council (2014), *Tourism Development Strategy: A 5-7ear Action Plan, 2014-2019*.
[45] Kentish Council (2014), *Kentish Economic Development Strategy, 2014-2019*.
[46] The Institute for Regional Development (May 2011), *Mount Roland: Developing a Destination*. A report prepared by the Institute for Regional Development, Cradle Coast campus, University of Tasmania May 2011 for the Mount Roland Steering Committee.
[47] Urbis Pty Ltd (8 February 2013), *Mount Roland Recreation Precinct Blue Print for Development*.
[48] SEPIA Consulting Pty Ltd (May 2014), *Cradle Coast Destination Management Plan: Towards 2020*. Report prepared for the Cradle Coast Authority.

Adventure (soft and hard), which includes mountain biking, is one of the main themes identified for regional tourism experiences. A marketing campaign to showcase adventure activities is earmarked as a medium term action in the Plan. Facilitation of targeted tourism experiences is to be provided by improvements in visitor access, including through ferry transport and drive route packages and theme-based short break packages.

MOUNTAIN BIKE PLANNING

Tasmanian Mountain Bike Plan, 2009

The *Tasmanian Mountain Bike Plan*[49] was issued by the Tasmanian Government in 2009 to provide a framework for coordinated development, management and marketing of mountain biking opportunities in Tasmania. The Plan was developed after two background studies[50] and the Trails Tasmania Strategy 2007 identified:

- a growing demand for mountain bike trails among Tasmanian mountain bikers
- opportunities to cater for the visitor mountain bike market through trails, bike parks and events
- a lack in provision of trails and facilities to meet demand throughout the State
- a need to management mountain biking to ensure its sustainability in terms of impacts, access, liability and safety.

An online survey of Tasmanian mountain bike riders was undertaken to build a profile of the State's mountain bike riders. Consultation was held with mountain bike riders, land managers and other stakeholders to identify opportunities and priorities.

The Tasmanian Mountain Bike Plan identified a concentration of mountain biking infrastructure in the south of the State near Hobart, a lesser concentration near Launceston and a significantly smaller supply in the northwest. Overall there was a limited supply of authorised purpose-built mountain biking trails (as most riding took place other tracks and trails, legally and illegally), support facilities and amenities and connectivity between trails.

The Plan aims to guide development of a world-class, diverse and sustainably-managed range of mountain bike riding experiences in Tasmania for local, national and international market.

Major strategies and recommendations in the Plan include:

- a hierarchy of mountain bike trails (and products and events) throughout the State to cater for differing locations and the needs and expectations of local, intrastate, interstate and international riders and different riding styles and disciplines. Potential opportunities and infrastructure identified for North west Tasmania are:
  - regional trail hubs and bike parks in the Burnie/Ulverstone/Devonport area aimed mainly at local and Tasmanian riders
  - a potential iconic wild ride in the Cradle Mountain area, aimed at interstate and international riders
  - a potential mountain bike adventure centre in the Waratah area aimed at a range of markets.

The Plan does not mention mountain bike infrastructure in the Sheffield area:

- adoption of the IMBA Australia Mountain Bike Classification system to provide consistent standards for all mountain bike trails
- trail signage showing trail difficulty classifications, distance, use and restrictions, emergency contacts, a network map and any significant hazards
- adoption of the sustainable trail design and construction guidelines in *Trail Solutions: IMBA's Guide to Building Sweet Singletrack*.

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[49] Sport and Recreation Tasmania (2009), *Tasmanian Mountain Bike Plan: Main Report*, Department of Economic Development, Tourism and the Arts, Hobart.
[50] Ryan, K (July 2005), *Mountain Biking in Tasmania: A summary of current trends and future opportunities*. Sport and Recreation Tasmania, Department of Economic Development. Inspiring Place (Dec 2008), *Mountain Bike Tourism Market Profile for Tasmania*. Prepared for Tourism Tasmania.

Appendix 2. Case studies

WHISTLER TRAILS NETWORK, BC, CANADA

Whistler is located in British Columbia on Canada's west coast. Mountain biking began to emerge during the 1990s, with riding and trail building developed organically in an unstructured and unplanned manner. Whistler started to gain recognition as a mountain bike destination in the early 2000s. Vancouver was already on the mountain biking radar with the Northshore of Vancouver creating a new genre of riding (e.g. free riding) and trails (e.g. Northshore style). Whistler Blackcomb in the late 1990s began experimenting with lift-accessed mountain bike riding on the ski slopes. They invested heavily with little return initially. However, over a relatively short period of time they created a market for ski-lift accessed biking and a new style of trail design (e.g. the famous A-line) and by 2008 were attracting 100,000 biker visits to the park.

At the same time as the resort was building the Bike Park product, the Resort Municipality of Whistler was developing other infrastructure such as the paved Valley Trail and Lost Lakes Trails that complemented the park's riding options. The municipality, with the assistance of the Whistler Off Road Cycling Association (WORCA), also started to develop new routes such as Comfortably Numb (photo opposite) and improve and maintain select trails in the valley.

Over the last decade Whistler has worked hard to develop its summer product and mountain biking has been the cornerstone of this. Summer visitation now exceeds winter visits and mountain biking has surpassed golf as the key driver for room nights in the resort over the summer months.

The Trails

Today Whistler offers a complete mountain bike experience, from the paved three metre wide 40 km Valley Trail, to the Lost Lake Cross Country trails both suitable for families and novices. It also offers all mountain epics like the technically demanding Comfortably Numb (23 km) and the 100km of lift accessed trails in the Whistler Bike Park.

Whistler businesses have also adapted and capitalised on mountain biking and now cater to bikers by providing bike friendly amenities such as bike stands, bike washes, rentals, guiding services, secure storage and holiday packages.

Whistler has not only planned for mountain bike tourism, but also recreation and commuter cycling to ensure that the benefits of cycling infrastructure can also benefit local residents.

The Resort Municipality of Whistler published the Whistler Trail Standards in 2002, which were designed to review, sign, maintain and manage the network of trails that had developed (some illegally) throughout the Whistler Valley. The document was not a "how-to" on building or maintaining trails, but rather a standard by which the trails would be managed.

The Market

The summer market in Whistler has evolved significantly over the last decade. In early 2000 Whistler's summer visitor numbers exceeded their winter numbers for the first time and the resort now views summer as the growth area as skier visits remain relatively flat. In 2009, Whistler received 814,000 winter visitors and 1,300,000 summer visitors.

Since 2000 mountain biking has contributed significantly to driving summer visitation, some are calling mountain biking "the new golf". The Whistler Bike Park attracts 63% of riders from outside Canada, with 89% of non-resident riders staying overnight. The average stay is 5 nights and 80% of Bike Park riders were motivated to travel to Whistler for riding.

Trail maintenance

Outside the Whistler Bike Park, managed by Whistler Blackcomb Resort, the trails are maintained by the Resort Municipality of Whistler in partnership with the Whistler Off Road Cycling Association (WORCA). WORCA, with over 1,000 members represents over 10% of the town's permanent population. The trails are maintained with regular volunteer days (well attended) and evenings throughout the season, and by hiring a contractor with member fees and grants. Special grants also enable large scale trail projects with a variety of different partners.

Economic Benefits

The economic benefits for mountain biking in Whistler are driven by the Whistler Bike Park, which contributes C$16.5 million in non-resident expenditures. However, the trails on municipal land in the valley, managed and maintained by the municipality and WORCA, contribute an additional C$6.6 million to the local economy. In addition to the trails, events like Crankworx also serve as a key catalyst for tourism and economic development. The 2006 event attracted 55,000 unique visitors, of whom more than 23,000 travelled solely to attend the festival and added a further C$11.5 million in non-resident expenditures.

Management

Whistler is an excellent example of collaborative management of the trail network. The key players include Whistler Blackcomb Resort, the Resort Municipality of Whistler, WORCA and a host of local and regional businesses. The municipality has taken a leadership role in recognising the value of mountain bike trails and subsequently putting the systems in place to plan for their ongoing maintenance and management.

The Whistler Cycling Committee was established to address the biking-related challenges and opportunities faced by the resort. It is comprised of three key working level groups:

1. Trails Planning
2. Tourism & Services
3. Transportation

Plans have been developed for each sector and the groups continue to work on various initiatives to enhance the biking experience for residents and visitors alike. One of the keys to a successful committee is developing a clear and concise Terms of Reference for the participants.

Sources: First hand knowledge of Whistler supplemented with Internet research, Tourism Whistler, Mountain Bike Tourism (Tourism BC, 2008). $1.00 CAD = $1.00 AUD 31/5/12.

ROTORUA – NEW ZEALAND'S SPIRITUAL HOME OF MOUNTAIN BIKING

Background

The Whakarewarewa Forest located on the edge of Rotorua township was designated a forest park in 1975. The forest has since become the recreational hub of the community. Numerous groups including walkers, runners, mountain bikers, horse riders, dog walkers, and picnickers now use the forest.

The growing number of events in the forest has significantly increased the cycling visitor numbers to Rotorua. The 2006 UCI World Mountain Bike Championships served as a catalyst and affirmed Rotorua's reputation as a world-class mountain bike destination. This has also lead to the growth of bike related businesses in the town.

However, Rotorua's success can also be attributed to the fact that it was already an established tourism destination with a wealth of other activities available to visitors. This gives it a broad appeal to a large market. It is also well located in the centre of the North Island.

The Trails

The trails are compressed into around 50 hectares of forest and cater to everyone - from beginners and family groups through to the experts. They are generally pretty mellow, but have enough challenge if riders increase their speed to keep expert class riders coming back.

Riders can put together a 2.5 hour ride without any repeated sections, while never getting further than about 2 kms in a straight line from the trailhead. Even when the carpark is full, the mainly one-way system keeps the forest from feeling crowded.

The Market

Mountain biking accounted for 85,000 of the 282,000 recreational visits to the Whakarewarewa Forest in 2007. Just over half of all mountain bikers in the forest are visitors, 48% domestic and 3% international visitors. Over half (54%) of bikers in a recent survey came to Rotorua specifically to go mountain biking.

Rotorua also maintains an excellent one stop website that has all the information riders need for a visit to the trails (http://www.riderotorua.com).

Economic Impact

Overall, mountain bike-related spending in Rotorua was estimated to be around $7.4 million in 2007. Visitors to the region account for 35% or $2.6 million.

The biking trails in Rotorua have created opportunities for businesses to capitalise on this growing market segment. The town now has seven full service bike shops, three of which also hire bikes, as well as a bike shop located at Whakarewarewa Forest. Several accommodation properties cater predominately to mountain bikers and there are guiding and bike shuttle companies operating on a full time basis.

Southstar Adventures runs a mountain bike shuttle service for bikers in the forest. The business has grown from one bus to three since 2006. The company now has an hourly rider capacity of 180 and undertakes over 20,000 rider trips annually.

Trail maintenance

The costs of building and maintaining the Whakarewarewa Forest trails are informally shared by the Rotorua Mountain Bike Club's (Inc) volunteer efforts, charitable trust funding to pay contracted part-time trail-builders, the Department of Corrections who organizes Periodic Detention work crews and Rotorua District Council.

Management

The Forest is managed by Kaingaroa Timberlands on Crown Forest Licence land. On July 1, 2009 ownership of the forest was transferred to the Central North Island Iwi Collective. There is a legal right of access for recreational activities but forestry management goes well beyond this to make the Redwoods a great place to ride. The Visitor Centre is managed by the Rotorua District Council.

Sources: First hand knowledge of Rotorua, http://www.riderotorua.com, Recreational Use and Economic Impact of Whakarewarewa Forest: 2009 Update. Rotorua District Council/Apr 2009

MELROSE, SOUTH AUSTRALIA – AN EMERGING MTB DESTINATION

Background

Bike South Australia was looking for areas to develop more singletrack, in conjunction with Troy Rerrick (OTE Sports, Fruita, USA) who was contracted to them on mountain bike development. Both the Melrose and the Mawson area were identified as potential areas.

Richard Bruce moved to Melrose in 2006 to manage the Northstar Hotel. In 2008 he met Troy Rerrick and by chance decided to set up OTE Sports Melrose with Troy's help in a vacant shop in town. Melrose is a small country town with a population of 200, located in the Flinders Ranges approximately 270km north of Adelaide. At the same time the shop was established they also won the contract to build the Melrose trails, which helped keep the business afloat until it was more established.

In 2008 the town was in decline with property values falling. The shop and the development of mountain biking in the area have turned the town's economy around.

The Trails

The network started with the concept of building the types of trails that the team at OTE Sports liked to ride. As their riding has progressed, so has their trail development. The trails continue to evolve and now include features such as berms, small jumps and rollers. Getting the gradient right is also critical so riders also have a good experience on uphill sections and maintenance costs are minimised.

They have realised that easy riding opportunities are very important, as many people just want to enjoy riding off-road and the landscape, but are not keen on riding technical singletrack. They have also provided riding opportunities for families and children with the development of a rail trail, which has been very popular with users.

A network of ten kilometres is considered a good starting point, however that is not enough to hold riders' attention for long and will not encourage repeat visitation. Melrose now has approximately 75 kms of trails that can keep riders occupied for 1 to 2 weekends a year, making it an attractive weekend and overnight destination. Riders are also constantly looking for new trails or new features/sections, so planning and staging of trail development can be important.

The Market

Melrose has a small local ridership with an increasing number of youth and women becoming interested in riding. Melrose also has regular weekly visits from riders in nearby (within 1 hours drive) towns. Melrose also attracts riders from further afield with the majority from Adelaide, then Victoria, Queensland, NSW followed by Western Australia.

OTE Sports believes the Australia mountain bike market is still maturing and in some respects is quite race orientated. Many of them, particularly racers, do not spend a lot of dollars in communities.

Melrose aims to provide a more accessible riding experience that caters to a broader market segment including novices, families and older riders. It is about fun and the social aspect of biking. Melrose events reflect this focus with an emphasis on festivals as opposed to attracting national mountain bike races. The key Melrose target market is riders over 30 years old who generally have more time and money to spend.

Trail maintenance

The current situation is quite dependent on the OTE Shop, largely because of their leading role in creating the trails. There is a mountain bike club in town that is now in charge of maintaining trails, which was set up by the shop, but there is still a lot of crossover between the two entities.

The challenge within the community is to create a feeling of ownership for the trails. While there are usually high levels of enthusiasm for building new trails, this is not replicated for maintaining trails. So while there is acknowledgement that the trails provide benefits for the community, dealing with the ongoing maintenance of trails can still be a challenge.

The South Australian Tourism Commission provided the initial grant over three years to the Southern Flinders Ranges Development board for the development of the Melrose trails.

Since the initial funding there has only been limited dollars from the local council. The club and bike shop organise weekly Saturday morning building sessions to try and encourage regular trail maintenance. Recreation and Sport South Australia have encouraged Melrose to bid for grants but to date they have been unsuccessful.

Management

The Melrose trail network is located on private land. The land owners are not keen to allow any further trails to be built on their property. There are more opportunities to expand the network at Bartagunyah but the land is located 4 kms out of town.

Mount Remarkable National Park is located adjacent to the township, but mountain biking is not currently permitted.

Insurance is provided through a mixture of property owners (at Bartagunyah) and through South Australia Recreation and Sport (Melrose).

Sources: Internet research, knowledge of OTE Sports Fruita history and May 2012 interview with Richard Bruce, OTE Sports Melrose.

MT BULLER, VICTORIA

Background

Mountain biking has been happening on Mount Buller (which is a ski resort area) since the 1990s. It started out in an ad- hoc manner with no formal trails. The network developed and expanded year on year, with a particular focus on downhill trails. Over the 2002/2003 summer the trails were closed by resort management (the Council) due to environmental issues caused by mountain biking.

Talks started around this time on developing a formal, directed plan for mountain biking in the area. This was also influenced by the 2020 Strategy for Mount Buller which pushes for the area to be a year-round destination. World Trails was employed over 2004 and 2005 to create a master plan for mountain biking in the resort. Trail building began in 2006/2007. This was supported by a grant from Regional Development Victoria. Trail building in the resort is limited to a short season between December and April for environmental reasons.

The Trails

Buller Ski Lifts builds and maintains the downhill trails on the mountain. The resort (Mount Buller) builds and maintains the cross country trails. There is a wide variation of trails in the area, ranging from easy to very difficult and catering for all abilities. The majority of trails are aimed at intermediate riders.

The resort's strategy for staging trail development was to start with intermediate trails and then build beginner trails followed by harder, more technical trails. They have now switched their focus back to easier trails to cater for the beginner/family experience. They aim to have the easier trails as the most accessible/closest to town and the more difficult trails further out, but accessed via the beginner/intermediate trail network.

Their goal was to have enough trails in the region so that they could not all be ridden in one day. Tourists would then have to stay the night and continue riding the next day. They suggest that the tipping point is approximately 30 kms of trails.

They have also developed a new trail called Copperhead, which they believe is a new type of trail called a "flow down". It can be ridden on a downhill or cross-country (XC) bike. It is generally suitable for a beginner downhill rider or intermediate XC rider, but riders of all levels can enjoy different features.

The Market

Ten percent of the market is downhill riders. The rest is made up of cross-country riders with varying abilities. The biggest proportion of the market is middle age professionals who are looking for an adventure experience (similar to the downhill ski/snowboard market). These types of riders generally fall in the intermediate category. The resort aims to cater for all visiting tourists and would not invest solely in one area and certainly not only for downhill riding.

Approximately 70% of their market is made up of interstate tourists. Interest is generated predominately by word of mouth. They have experienced an 18.5% increase in visitors this year compared to last year for mountain biking.

Appendix 3. Ground Truthing Process

Ground-truthing is the process by which the final proposed alignment of a trail is determined on the ground. It assumes that the conceptual alignment of the proposed trail has already been determined and approved by the landholder.

Ground-truthing is done using a GPS and clinometer (to measure gradient) and keeping in mind the intended difficulty rating of the trail. It is at this point that local environmental conditions are assessed and the trail is designed accordingly. For example, if there is a creek to be crossed, the alignment is chosen so as to cross the creek at the narrowest point, or if there is a low-lying boggy area, the trail is aligned so as to avoid the boggy section. Once complete, the trail is mapped by GPS and marked in the field using coloured flagging tape.

Once ground-truthed, the GPS file of the track can be submitted to any relevant authorities for planning consent. In seeking approval to construct any of the trails proposed herein, World Trail advises that approval be sought for construction of the trail within a 20m wide corridor (i.e. 10m either side of the ground-truthed alignment). This 20m wide corridor is required to provide flexibility for the trail builders to respond to any unforeseen circumstances that may occur. For example, prior to construction, it may appear that the soil is deep and excavation will be easy, but once construction commences, it soon becomes apparent that there is a large slab of rock just beneath the surface.

All the trails discussed herein have been ground-truthed. Their alignments have been recorded as a 'track log' with a handheld GPS as well as any relevant points of interest. Each trail alignment has also been tagged in the field by tying small strips of brightly coloured (orange) flagging tape to trees/shrubs along the trail alignment.

When attempting to follow a trail alignment in the field, World Trail recommends:

- Loading the GPS file of the recorded 'track' into a handheld GPS and using it to follow the 'track' in the field
- Taking a hard copy map, showing the proposed trail alignments
- Looking for the coloured flagging tape in the field.

In relation to the flagging tape, the following protocols should be understood:

- The flagging tape indicates roughly the middle of the proposed trail alignment
- Generally, each strip of flagging tape should be visible from the next/previous one, but this should not always be relied on as they can be removed by weather/animals. In thick vegetation, flagging tape will be placed more frequently and in sparse vegetation, tape will be used more sparingly
- Where the trail performs a sharp turn or switchback, three pieces of tape tied around a single trunk or branch are generally used to indicate the apex of the turn (see **Error! Reference source not found.** on next page)
- Switchbacks are often used in close succession to each other to help a trail climb up or descend a steep slope. In these situations, there can be multiple 'legs' of the trail running roughly parallel to each other. Anyone attempting to follow the proposed trail alignment needs to be aware of where these switchbacks might be (using a GPS and map) and ensure that they look forward along the contour to locate the next piece of flagging tape
- Where the trail is proposed to follow an existing road flagging may be sporadic.

While the length of the trail as recorded during ground-truthing is more accurate than any trail lengths estimated during the conceptual phase, it may still not be 100% accurate to the actual final constructed trail. It is likely that the final constructed trail length may be up to 10% longer than the length recorded during ground-truthing. This is caused by the inability of handheld GPS devices to pick up small twists and turns and minor direction changes.

Figure A. Triple taping to indicate switchback corner

Appendix 4. IMBA Trail Difficult Rating System

Rating	Very Easy	Easy	Intermediate	Difficult	Extreme
Symbol					
Description	Likely to be a fire road or wide single track with a gentle gradient, smooth surface and free of obstacles. Frequent encounters are likely with other cyclists, walkers, runners and horse riders.	Likely to be a combination of fire road or wide single track with a gentle gradient, smooth surface and relatively free of obstacles. Short sections may exceed these criteria. Frequent encounters are likely with other cyclists, walkers, runners and horse riders.	Likely to be a single trail with moderate gradients, variable surface and obstacles. Dual use or preferred use Optional lines desirable	Likely to be a challenging single trail with steep gradients, variable surface and many obstacles. Single use and direction. Optional lines XC, DH or trials	**Extremely difficult trails will incorporate very steep gradients, highly variable surface and unavoidable, severe obstacles. Single use and direction Optional lines XC, DH or trials**
Trail Width	2100mm plus or minus 900mm	900mm plus or minus 300mm for tread or bridges.	600mm plus or minus 300mm for tread or bridges.	300mm plus or minus 150mm for tread and bridges. Structures can vary.	**150mm plus or minus 100mm for tread or bridges. Structures can vary.**
Trail Surface	Hardened or smooth.	Mostly firm and stable.	Possible sections of rocky or loose	Variable and challenging.	**Widely variable and unpredictable.**
Average Trail Grade	Climbs and descents are mostly shallow. Less than 5% average.	Climbs and descents are mostly shallow, but may include some moderately steep sections.	Mostly moderate gradients but may include steep sections. 10% or less	Contains steeper descents or climbs. 20% or less average.	**Expect prolonged steep, loose and rocky descents or climbs. 20% or greater**
Maximum Trail Grade	Max 10%	Max 15%	Max 20% or greater	Max 20% or greater	**Max 40% or greater**
Level of Trail Exposure	Firm and level fall zone to either side of trail corridor	Exposure to either side of trail corridor includes downward slopes of up to 10%	Exposure to either side of trail corridor includes downward slopes of up to 20%	Exposure to either side of trail corridor includes steep downward slopes or freefall	**Exposure to either side of trail corridor includes steep downward slopes or freefall**
Natural Obstacles and Technical Trail Features (TTFs)	No obstacles.	Unavoidable obstacles to 50mm (2”) high, such as logs, roots and rocks. Avoidable, rollable obstacles may be present. Unavoidable bridges 900mm wide. Short sections may exceed criteria.	Unavoidable, rollable obstacles to 200mm (8”) high, such as logs, roots and rocks. Avoidable obstacles to 600mm may be present. Unavoidable bridges 600mm wide. Width of deck is half the height. Short sections may exceed criteria.	Unavoidable obstacles to 380mm (15”) high, such as logs, roots, rocks, drop-offs or constructed obstacles. Avoidable obstacles to 1200mm may be present. Unavoidable bridges 600mm wide. Width of deck is half the height. Short sections may exceed criteria.	**Large, committing and unavoidable obstacles to 380mm (15”) high. Avoidable obstacles to 1200mm may be present. Unavoidable bridges 600mm or narrower. Width of bridges is unpredictable. Short sections may exceed criteria.**

Appendix 5. Trail Design Terms

Singletrack
Singletrack is a narrow mountain biking trail that is approximately the width of the bike. It contrasts with double track or fire road which is wide enough for four-wheeled off-road vehicles. In addition it is frequently smooth and flowing, but it may also exhibit technical rocky sections and may be criss-crossed with tree roots. Some trails are winding and flowing, while others are bumpy and challenging.

Switchback
A switchback is a trail up a steep hill or mountain that is like a zig-zag pattern instead of a straight trail. Switchbacks help prevent erosion because they help keep the trail at a consistent gradient.

Rock armouring
Rock armouring is a technique that is used to harden the trail surface in situations where it might otherwise be prone to damage caused by skidding or water. It is best suited to rocky areas, where there is an abundance of locally available rock.

Some examples in which rock armouring might be used include:

- To harden steep eroded chutes on existing trails, when realignment is not an option
- At the exit to a steep drop-off or jump, where riders exit at high speed and brake suddenly
- At the entry and/or exit to bridges
- As crossings on small, ephemeral streams or drainage lines or in wet, boggy areas. The use of rock as the base in these crossings prevents them becoming muddy or boggy

Grade reversal
A grade reversals is where the trail has to be briefly reversed (i.e. a climb briefly goes down, or a descent briefly goes up) to help divert water off the trail. A trail along a steep slope may require grade reversals every 10-15 metres, depending on soil type and rainfall. Incorporating grade reversals will avoid the need to build water-diversion devices later. They also break up a climb or descent and can provide recovery sections for users. Regular changes in grade will also assist in controlling excessive speeds by mountain bike riders. Grade reversals are also beneficial before and after steep sections, with smooth transitions between different grades; and at the approach to a watercourse, to disperse water and silt away from the watercourse.

Appendix 6. Practical Ecology Report

PRACTICAL ECOLOGY
ecological restoration & consulting

Desktop Ecological Assessment, Kentish Mountain Bike Trail DFAFT

November 2014

Desktop Ecological Flora and Fauna Assessment, Kentish Mountain Bike Trail.

November 2014

Report by Joy MacDonald
Mapping by Colin Broughton
Cover Picture from cradleinfo.com.au

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0.1	5/11/14	Michelle Savona		
1.0				
2.0				
2.1				

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1. INTRODUCTION

Practical Ecology Pty Ltd was commissioned by TRC Tourism to complete a Desktop Ecological Assessment for the Kentish Mountain Bike Masterplan Project.

The area defined in the brief as the MTB Precinct – Kimberleys Lookout, sits between the townships of Sheffield to the south-west, and Railton to the north-east, on the southern reaches of Badgers Range. This area is named for William Kimberley (1796-1861), a prominent early Tasmanian Sheep farmer who utilised high places (Kimberleys Lookout) to identify areas with good pasture potential. The township of Kimberley sits fifteen kilometres to the east of Sheffield.

The information presented in this document have been completed in accordance with the following stages:

- a **desktop review** of relevant planning and ecological information to help identify and map ecological values that may influence the design and placement of trails incorporating the principles of avoiding and minimising the loss of significant vegetation and threatened species habitat; and a
- a **report** detailing the findings of the desktop review to describe and quantify the site's ecological values.

1.1 Zoning and Overlays

The site is located within a large area of land zoned Environmental Management, which basically consists of Badgers Range. This Range is surrounded by land zoned Rural Resource, aside from the townships of Sheffield and Railton, where areas of General Residential and associated zoning occur. There is a rectangular block of land on the north-west of the study site zoned Recreation which consists of the Sheffield Golf Club.

Under the Kentish Planning Scheme 2013, Environmental Management Zones are areas designated for protection of significant ecological, scientific, cultural and aesthetic values. The scheme allows for development only where these values are complimented and protected.

1.2 Aboriginal and European Heritage

An EPBC Protected Matters Search Report indicates that no World Heritage Places or National Heritage places are located within the study site. However, an Aboriginal Heritage Desktop Analysis has highlighted two sites within/on the boundary of the study area including an occupied rockshelter and an ochre quarry (See Map 1). As these are highly significant site types, their presence suggests that there is a high likelihood that further sites may be located in the surrounding area. An Aboriginal heritage investigation is therefore required which must be undertaken by a Consulting Archaeologist and Aboriginal Heritage Officer in order to identify possible impacts on Aboriginal heritage and to offer mitigation advice.

1.3 Geology and soils

The soils on site are part of the Upper Owen Sandstone Formation of the Cambro-Ordovician Period. They are comprised of thin-bedded quartz sandstone with interbedded siltstone and minor granule-pebble conglomerate (LISTmap 2014).

1.4 Vegetation

The study site supports several TASVEG Vegetation Communities. DOB – *Eucalyptus obliqua dry forest* covers by far the majority of the site which is recognised by its dominant eucalypt canopy with a dry shrubby and/or heathy understorey (Harris and Kitchener 2005). There is also a large area of WRE – *Eucalyptus regnans forest* which is more common in the north-east and central south of Tasmania; this tallest of eucalypts is associated with a wet sclerophyll or rainforest understorey (Harris and Kitchener 2005). The WRE is interspersed with small areas of NAD – *Acacia dealbata forest* which is a successional community suggesting past disturbance and is often associated with riparian or wet areas (Harris and Kitchener 2005).

There is a substantial patch and of a vegetation community listed as threatened under the *Nature Conservation Act 2002*; DAS – *Eucalyptus amygdalina* forest and woodland on sandstone, with one smaller patch on the southern border of the site (See Figure 2). DAS is listed as *vulnerable* (DPIPWE and is identified by a more open canopy with smaller eucalypt Black Peppermint *E. Amygdalina* trees

that are not often over 25m. This species has the characteristic small leaves of peppermint species and persistent bark (Harris and Kitchener 2005). This vegetation community may also support co-dominant eucalypt species such as Messmate *E. obliqua* or White Gum *E. vimminalis*. It is differentiated from other *E. amygdalina* dominated vegetation communities mainly due to the sandstone substrate, here supported by the geological mapping for the area (see Geology section 1.2) (Harris and Kitchener 2005). The understorey can contain a diverse array of small shrubs depending of soil type and disturbance history (Harris and Kitchener 2005).

Refer to the TASVEG maps below in regards to the distribution of the abovementioned vegetation types within the study site. It should be noted that the spatial scale utilised for differentiation of vegetation types may not be highly accurate and may require groundtruthing (DPIPWE 2014 online).

There is a large disturbed area along the western aspect of the site that has been rehabilitated after quarrying activities (Mineral Resources Tasmania 2002) shown as FUM – *Extra-urban miscellaneous* on the TASVEG map below and Map 2 – Appendix 3.

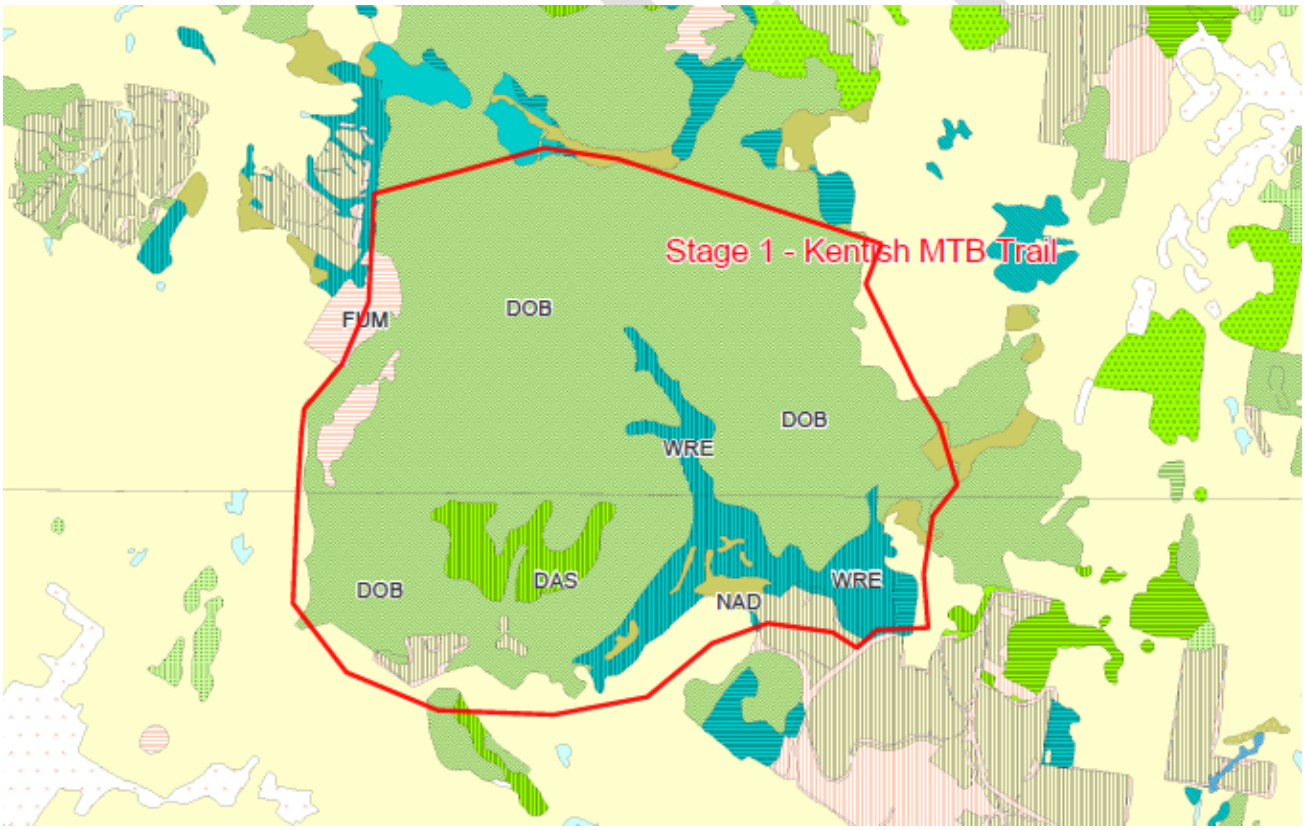

Figure 1. Study site: Stage 1 Kentish MTB Trail – TASVEG Classification (Source: LISTmap)

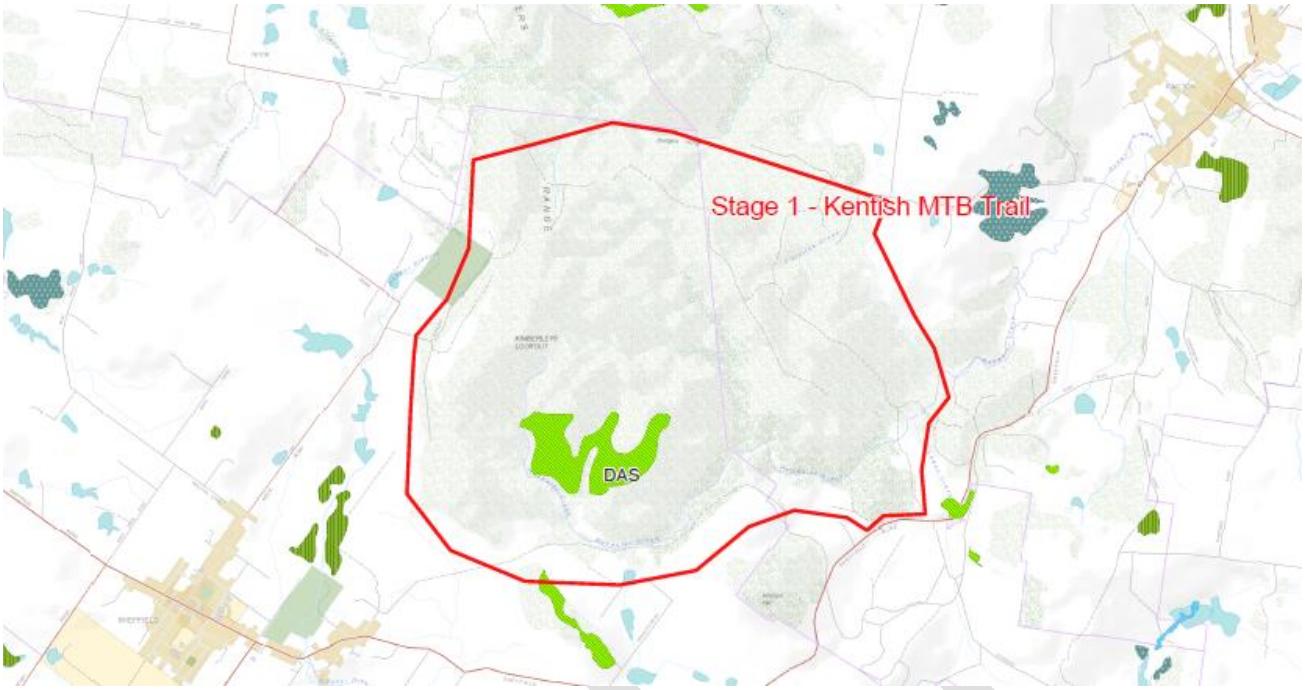

Figure 2. Study site: Stage 1 Kentish MTB Trail – TASVEG – Threatened Communities (Source: LISTmap)

1.5 State or nationally significant flora

Seven species of state or national significance were listed in database searches. Searches included DPIPWE's online Natural Values Atlas (NVA), Forest Practice Authority's *Biodiversity Values Database* (BVD) and the federal Environment Protection and Biodiversity Conservation (EPBC) Act Protected Matters Search Tool regarding flora and fauna species distribution records.

The NVA search listed two species of significance, Snug Greenhood *Pterostylis atriola* and Spike Centuary *Schenkia australis*. These species are listed in detail within Appendix 1.

The Snug Greenhood is listed as rare under the Tasmanian *Threatened Species Protection Act 1995* (TSP Act). There is a large group of records for this species on the northern border of the site with further recordings in the Railton area. Refer to Map 2 in Appendix 3.

Pterostylis atriola
Photo by David Tng

The Snug Greenhood is a multi-flowered tall orchid, it has small green and white, inward facing, narrow flowers with brown petals (Jones *et al.*1999). It is found in diverse habitats such as lowlands and hinterland areas in the north and east of Tasmania and up to 600m in the south (TSP Listing Statement 2001). It generally occurs on stony soil on substrates such as Jurassic dolerite and Devonian granodiorite (TSP Listing Statement 2001. It is found in dry sclerophyll forest such as *Messmate* forest and shrubby/Heathy Black Peppermint forest (TSP Listing Statement). The Snug Greenhood appears to react favourably to disturbance with populations on Snug Plans located on poorly maintained 4WD tracks, although it is not reliant on disturbance in order to persist in a given area (TSP Listing Statement).

The snug greenhood flowers in late January to April and reproduces only from seed in association with mycorrhizal fungi (TSP Listing Statement). It can be confused with 3 other *Pterostylis* species; *P. aphylla*, *P. parviflora* and *P. uliginosa* none of which are listed as threatened.

Spike Centuary was formerly known as *Centaurium spicatum* or *Centaurium australe*; it is a hairless annual herb, 10-45cm in height (TSP Notesheet). Flowers pink to magenta November to March. Spike Centuary is found throughout Australia and New Caledonia (TSP Notesheet 2003). It has been recorded in rainforest/wet sclerophyll forest, heathland and cleared forest pasture (TSP Notesheet 2003). Although listed as rare, there is some chance that this species may be introduced; if this is found to be so it may be delisted. One record of this species has been mapped in the north east of the study area.

Six species of state significant flora are predicted to occur within a five kilometre radius from the centre of the study area according to a Protected Matters Search for species listed under the federal *EPBC Act 1999* database. These are Native Wintercress *Barbarea australis*, Tailed Spider-orchid *Caladenia caudata*, South Esk Heath *Epacris exserta*, Clover Glycine *Glycine latrobeana* and Tapered Leek-orchid *Prasophyllum apoxychilum*. These species are also listed in Appendix 1 along with information on the habitat types in which they are known to occur.

There is potential for at least some of the flora species on database records from the various sources mentioned above, to occur at the study site. In determining this 'likelihood of occurrence' and utilisation of the study site by these national or state significant flora, the following factors were taken into consideration:

- the conservation status of the species and its distribution;
- previous recordings of species in the local area from EPBC records and previous studies;
- the habitat requirements of individual species; and
- the nature of the site and surrounding areas.

The likelihood of these threatened species occurring at the site is considered to be low for the Tailed Spider-orchid, South Esk Heath and Clover Glycine and Tapered Leek-orchid; however there is a medium chance of the presence of Native Wintercress with records to the north-west and south of the study area. Given the presence of known records for the Snug Greenhood and Spike Centuary to the north of the study site, these species are considered to have a high likelihood of occurring on site.

1.6 State or nationally significant fauna

A total of twenty-two state, or nationally significant fauna species are recorded within a five-kilometre radius of the study area in the NVA and the EPBC PMST (Department of the Environment 2014). Details of these species are given in Appendix 2.

In determining this 'likelihood of occurrence' and utilisation of the study site by national or state significant fauna, the following factors were considered:

- the conservation status of the species and its distribution;
- previous recordings of species in the local area;
- the habitat requirements of individual species, including their association with specific types of vegetation and required food sources;
- the physical attributes of the site, such as trees with intact canopies and/or hollows and the presence of a logs on the ground etc.; and
- the nature of the site and surrounding areas.

Several significant species are considered to have a 'high', 'medium' or 'low' likelihood of using the habitat on-site due to the number of local records and the habitat structure available. These species and their associated likelihood of occurrence is listed in Table 1 below.

Table 1. Threatened Fauna records for the study site

Scientific name	Common name	Source database	Total no. local records	Likelihood occurrence	Likelihood Reasoning
Accipiter novaehollandiae	Grey Goshawk (White Morph)	NVA	8	High	Suitable habitat is present along with local records.
Aquila audax subsp. fleayi	Tasmanian Wedge-tailed Eagle	EPBC/ NVA	13	High	Suitable habitat is present along with local records.
Astacopsis gouldi	Giant Freshwater Crayfish	EPBC/ NVA	3	High	Suitable habitat present along with local records.
Beddomeia turnerae	Hydrobiid Snail (minnow river)	NVA	5	High	Suitable habitat present along with local records.
Dasyurus maculatus subsp. maculatus	Spotted-tailed Quoll	EPBC/ NVA	13	High	Suitable habitat present along with local records.
Engaeus granulatus	Central North Burrowing Crayfish	EPBC/ NVA	15	High	Suitable habitat present along with local records.
Lathamus discolor	Swift Parrot	EPBC/ NVA	6	High	Suitable habitat present along with local records.
Perameles gunnii	Eastern Barred Bandicoot	EPBC	3	High	Suitable habitat present along with local records.
Sarcophilus harrisii	Tasmanian Devil	EPBC/ NVA	27	High	Suitable habitat present along with local records.
Tyto novaehollandiae castanops	Masked Owl	EPBC/ NVA	20	High	Local records suggest suitable habitat present.

There are four threatened bird species with a high likelihood of utilisation of the study site, they are the Grey Goshawk (white Morph) (State status: endangered), the Tasmanian Wedge-tailed Eagle (National and State status: endangered), Swift Parrot (National and State status: endangered) and Masked Owl (National status: vulnerable and State status: treated as vulnerable). Local records and the presence of suitable habitat for these species are strong indicators; they may utilise the site for foraging, breeding or both.

Three mammal species also have a high probability of using the site with a high number of local recent recordings. The Tasmanian Devil (National and State status: endangered) and the Spotted-tail Quoll (National and State status: vulnerable) may both use the site for both denning and foraging with strong habitat values present. The Eastern Barred Bandicoot (National status: vulnerable) is more likely to use the site perimeter where the dense vegetation present provides shelter and nearby pastures providing food resources.

The probable presence of aquatic species such as the Giant Freshwater Crayfish (National and State status: vulnerable), the Central North Burrowing Crayfish (National and State status: endangered) and the Hydrobiid Snail (State status: rare) is also supported by the high number of local records.

Growling Grass Frog (National and State status: Vulnerable) has a moderate chance of occurrence. While there are no local records according to the NVA, there is a good chance of suitable habitat being present. There no local records for Latham's Snipe. The likelihood of occurrence for this migratory species is Low to Moderate given the suitability of habitat within the study site. It is considered likely that the lack of records for this species is likely to be the result of a failure to document observations from the local area. The White-bellied Sea Eagle (National and State status: endangered) is more likely to be a fly-over rather than a habitual user of the area.

1.7 Weeds

NVA Database mapping within 500m shows the site to be relatively weed free, with records only at the site periphery; these are Blackberry *Rubis fruticosus*, Ragwort *Senecio jacobaea* and Gorse *Ulex europaeus.* All three of these species are listed under the *Tasmanian Weed Management Act 1999*. Five kilometre mapping shows a marked increase in listed weed species present, in line with the agricultural usage of the surrounding landscape. Spanish Heath *Erica lusitanica*, Perforated St. Johns-wort *Hypericum perforatum* subsp*. veronence*, Blackberry, Ragwort and Gorse make up the bulk of these records.

1.7.1 Biosecurity risk within 1000m

The NVA search revealed one record for Water Mould or Cinnamon Fungus *Phytopthora cinnamomi* (See Map 1). Phytopthora is an introduced water borne pathogen that many native plants are susceptible to, particularly Banksias and Grasstrees. Infestations tend to enlarge in localised areas through water transport with human activities being the predominant vector for the pathogen into new areas (FPA 2009).

It is important to incorporate *Phytopthora* hygiene measures into all construction plans. Measures to combat the spread of *Phytopthora* include a range of control measures such as the cleaning of machinery used, taking care to ensure that any gravel used is 'clean' of *Phytopthora,* dry and preferably local and are constructed in a manner that ensures adequate run-off and rapid drying. It is suggested that the all recommendations listed in FPA 2009 be adhered to.

2. RELEVANT POLICY AND LEGISLATION

The following section explores relevant policy and legislation pertaining to ecology and bushfire from the national level through to the local level.

2.1 Tasmanian Threatened Species Act 1995

The Tasmanian *Threatened Species Act 1995* (TSP Act) was legislated to provide for the protection and management of threatened native flora and fauna and to enable and promote the conservation of native flora and fauna. The TSP Act provides a number of ways to help achieve its objectives including:

- listing of threatened taxa, communities of flora or fauna and potentially threatening processes, and creation of Listing Statements and Recovery Plans for all listed taxa communities of flora or fauna and processes
- declaration of a Critical Habitat if the habitat is critical for the survival of a species or a community of flora or fauna, if listed as Critical Habitat, the Minister for Environment may then make an Interim Protection Order (IPO) to conserve the Critical Habitat
- protection of flora and fauna through listing offences such as penalties relating to not following an IPO and taking, trading in, keeping, moving or processing protected flora without a licence. Although this does not apply to taking listed flora species from private land.

The Department of Industry, Parks, Water and Environment is the referral authority for matters under the *TSP Act*.

Eleven fauna species of State significance were identified in the NVA database search as having been recorded within five kilometres of the study site; five of these have been recorded within 500m of the study site.

Recommendations have not been given in this report for considerations regarding impacts on threatened species or communities listed under this Act as the scope of works to be undertaken is yet to be decided.

2.2 Environment Protection and Biodiversity Conservation Act

The *EPBC Act 1999* applies to sites where proposed developments or projects may have a significant impact on matters of national environmental significance.

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

Five species of flora of national significance were detected on a Protected Matters Search (EPBC 1999) within a five kilometre radius from the centre of the study area, nineteen species of fauna of national significance were detected within the same search area. While all of the EPBC listed flora species are deemed to have a 'Low' or 'Nil' likelihood of occurring within the study area, thirteen of the fauna species listed are deemed to have a 'High' to 'Moderate' likelihood of occurrence. See Table 2 Below.

Recommendations have not been given in this report for considerations regarding impacts on threatened species or communities listed under this Act as the scope of works to be undertaken is yet to be decided. However, given the high number of threatened species recorded for the study site, the type and scope of the proposed development has the potential to have a significant impact on matters of environmental significance protected under this Act and the proposal may be considered a 'Controlled Action'. It should also be noted that the federal government has recently instituted a cost recovery process for projects where a 'Controlled Action' is required. For further information please refer to the government website at: http://www.comlaw.gov.au/Details/F2014L01205

3. DEVELOPMENT IMPLICATIONS

Given the high incidence of local records for significant fauna that are likely to utilise the study site, along with the potential presence of significant flora and probable presence of a threatened Vegetation Community, it is recommended that habitat preferences for these species be given a high level of consideration when defining track placement. Design should incorporate the principles of avoiding and minimising the loss of significant vegetation and threatened species habitat.

While outside Practical Ecology's area of expertise the nature of the thin-bedded quartz sandstone with interbedded siltstone and minor granule-pebble conglomerate soils present may need to be taken into consideration given that it may be prone to erosion. This may require amelioration measures to be incorporated into the design and advice should be sought by an expert in this field.

Two Aboriginal Heritage sites of high significance have been located in the study area indicating that an Aboriginal heritage investigation will be required.

Groundtruthing of the mapping of DAS - *Eucalyptus amygdalina* forest and woodland on sandstone is suggested; if found to be present it should be avoided. There are numerous records for the Snug Greenhood to the north east of the study site, and this area should also be avoided (see Maps 1 & 2). Although the species is known to disturbed sites it should be avoided if found to be present. It is recommended that a survey of the general area in which the track is to be established take place prior to a detailed design during the flowering season for this species, which is January to April. Personnal communication with Mark Wapstra of of Ecotas indicates that the population of Snug Greenhood to the north-east of the study site has been the subject of robust survey effort and it is likely that the majority of individuals have been surveyed. Mark Wapstra is happy to provide GPS data and believes that it will be quite possible to plan a track through the site at a micro level if required when the final design is being placed. This may be the best way forward as survey relies on being undertaken during the flowering and post-flowering stage (e.g. Feb through April) and that not all individuals may flower each year so it is possible that a particular route will impact on an unknown number of individuals, although that number is likely to be a minor proportion of the total local population (M.Wapstra *Pers Com* 2014).

This can aim to ensure that the final placement of the track avoids this and other significant flora species that may be present. Flowering season for Spike Century is November to March; this species may be less likely to be observed given that there has only been one record in the area which was in 1994.

The presence of a Mountain Bike Trail is not necessarily a significant hindrance or impact to the listed threatened mammals that are highly likely to utilise the study site. Both Tasmanian Devils and Spotted-tailed Quolls are known to use tracks and roads to their advantage when foraging. More importance should be given to avoiding potential denning habitat including rocky outcrops, rock crevices, rock piles, hollow logs, caves or large areas of debris (Strahan 1995). The Eastern Barred Bandicoot, is more likely to be utilising the forest edge and nesting in grassy undergrowth (Strahan 1995). All of these mammals are nocturnal and provided that their nesting/denning habitat is undisturbed are not likely to be negatively impacted.

Assuming that there will not be large areas of vegetation removed for the bike trail, impact on threatened bird species such as the Grey Goshawk, Tasmanian Wedge-tailed Eagle and Swift Parrot should be minimal. Nesting habitat for the Masked Owl is critical and must be avoided. . Any tree hollow is seen as critical habitat for nesting birds and arboreal mammals and should not be removed.

Aquatic species such as the Giant Freshwater Crayfish, Central North Burrowing Crayfish and the Hydrobiid Snail may occur in and surrounding waterways and damp areas. Care must be taken to minimise disturbance and avoid erosion in these areas.

The confirmed presence of Cinnamon Fungus *Phytophthora* provides a strong reminder for a high level of hygiene measures to be incorporated into construction plans.

At this preliminary stage of the development of the Kentish Mountain Bike Master Plan, specific management measures to avoid and mitigate impacts on ecological values cannot be provided beyond general recommendations. However, it is recommended that a flora and fauna survey of the general areas within which the track is proposed to traverse be undertaken as the next step in the planning process to ensure that issues raised for the threatened species recorded on the site to be taken into consideration during detailed design work for the trail.

4. CONCLUSION

This desktop analysis for the subject site has revealed a strong presence of significant flora and fauna species and the likely presence of a threatened Vegetation Community. This report provides mapping that shows specific areas best avoided in order to incorporate the principles of avoiding and minimising the loss of significant vegetation and threatened species habitat.

An Aboriginal Heritage survey of the site will be required.

Two state significant species of flora have a high likelihood of occurrence on the site; six nationally significant flora species have a low likelihood of occurrence.

Of twenty-two fauna species of state or national significance recorded for the site, ten have a high likelihood of occurrence on the site.

It is highly recommended that a flora and fauna survey of the general areas within which the track is proposed to traverse be undertaken prior to detailed design in order to ensure minimal impact on threatened species.

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Appendix 1. Occurring and Potentially occurring significant flora species

Status Codes

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

TSP Act 1999
x Extinct Those Taxa presumed extinct
e Endangered Taxa in danger of becoming extinct
v Vulnerable Taxa likely to become endangered
r Rare Taxa with small population in Tasmania that are at risk.
px Presumed Extinct Taxa presumed to be extinct
pe Endangered (unofficial) This taxon is protected as endangered

EPBC	TSP Act	Scientific name	Common name	Source	No. records	Date last record	Likelihood of occurrence	Habitat/species notes	Likelihood Reasoning
	r	*Pterostylis atriola*	Snug Greenhood	NVA	77	2011	High	Endiemic. Well drained stony soils – often cold environments such as frost hollows, gorges and exposed ridges. Known in only a few widely separated localities in the north and east to 600m	Species or species habitat 'may' occur within the area (NVA) – abundance of local records in the nearby area.
	r	*Schenkia australis*	Spike Centaury	NVA	1	1994	Medium	Found throughout Australi, in Tasmaina has been recorded in cleared forest pasture, rainforest/wet schlerophyll forest and heathland in the east and north of the state	Only one record in the nearby area.

EPBC	TSP Act	Scientific name	Common name	Source	No. records	Date last record	Likelihood of occurrence	Habitat/species notes	Likelihood Reasoning
EN	e	*Barbarea australis*	Native Wintercress, Riverbed Wintercress	EPBC	0		Medium	Endemic. Prolific seed producer following disturbance such as flooding. Annual to Biannual, often grazed before reaching maturity.	Recorded northwest and south of the study site.
V	v	*Caladenia caudata*	Tailed Spider-orchid	EPBC	0		Low	Endemic. Lowland terrestrial species located in dry heathy woodlands.	No suitable habitat present.
EN	e	*Epacris exserta*	South Esk Heath	EPBC	0		Nil	Endemic. Riparian species known only to three rivers in the north of Tasmania.	Not known to occur in the area.
VU	v	*Glycine latrobeana*	Clover Glycine, Purple Clover	EPBC	0		Low	On the mainland this species occurs in Victoria and South Australia. In Tasmania it is found in dry sclerophyll forest, native grassland and woodland, usually on flat sites with loose, sandy soil. It occurs on the East Coast, in the north, north-west and the Midlands (TPLUC 1996, TSU 2003).	Habitat not suitable.

EPBC	TSP Act	Scientific name	Common name	Source	No. records	Date last record	Likelihood of occurrence	Habitat/species notes	Likelihood Reasoning
E	e	*Prasophyllum apoxychilum*	Tapered Leek-orchid	EPBC	0		Nil	Tapered leek orchid is endemic to Tasmania and is known from four disjunct locations. It is found in coastal heathland or grassy and scrubby open eucalypt forest on sandy and clay loams, often among rocks.	Not known in the area. Habitat not suitable
V		*Pterostylis zeigeleri*	Grassland Greenhood	EPBC	0		Low	Endemic. Known in disjunct habitats, coastal dunes in the north and grassy woodland in the Midlands to 300m	Not known in the area. Unlikely to be located.

Appendix 2. Occurring and Potentially occurring significant fauna species

Status Codes

International Treaty
JAMBA / CAMBA, ROKAMBA and/or Bonn Convention Listed Species
Migratory/Marine (EPBC Act)
M1: Migratory Listed Species under the EPBC Act;
M2: Marine Listed Species under the EPBC Act.
EPBC Act 1999 conservation status
EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant.

TSP Act 1999
x Extinct Those Taxa presumed extinct
e Endangered Taxa in danger of becoming extinct
v Vulnerable Taxa likely to become endangered
r Rare Taxa with small population in Tasmania that are at risk.
px Presumed Extinct Taxa presumed to be extinct
pe Endangered (unofficial) This taxon is protected as endangered

Int Treaty	Mig/Mar	EPBC	TSP Act	Scientific name	Common name	Source database	Total no. local records	Likelihood occurrence	Habitat	Likelihood Reasoning
			e	*Accipiter novaehollandiae*	Grey Goshawk (White Morph)	NVA	8	High	Potential habitat is mature native forest below 600m, particularly along water courses.	Suitable habitat is present along with local records.
		EN	e	*Aquila audax subsp. fleayi*	Tasmanian Wedge-tailed Eagle	EPBC/NVA	13	High	Required habitat comprises of both nesting and foraging areasand include a wide variety of forrested and non-forrested areas with available large trees for nesting. Nests are usually located in sheltered areas in the tallest trees available. Foraging habitat is within 500m to 1km of known nest sites.	Suitable habitat is present along with local records.

Int Treaty	Mig/Mar	EPBC	TSP Act	Scientific name	Common name	Source database	Total no. local records	Likelihood occurrence	Habitat	Likelihood Reasoning
		VU	v	*Astacopsis gouldi*	Giant Freshwater Crayfish	EPBC/NVA	3	High	Endimic. Requires waterbodies with good water quality, a stable thermal regime of relatively low water temperature, snags, pools, undercut banks, and ample canopy cover. Riparian vegetation needs to be predominantly intact and extensive to provide the shading, nutrient, energy and structural inputs required for the species' in-stream habitat.	Suitable habitat present along with local records.
			r	*Beddomeia turnerae*	Hydrobiid Snail (minnow river)	NVA	5	High	Endemic. Potential habitat includes small streams across larger catchments.	Suitable habitat present along with local records.
		VU	r	*Dasyurus maculatus subsp. maculatus*	Spotted-tailed Quoll	EPBC/NVA	13	High	Potential habitat present includes riparian area, wet forest, damp/dry forest with complex understorey. Denning habitat includes any area > than 0.5ha, rocky outcrops, rock crevice, rock pile, burrow with a small entrance, hollow logs, large areas of debris and caves.	Suitable habitat present along with local records.
		EN	e	*Engaeus granulatus*	Central North Burrowing Crayfish	EPBC/NVA	15	High	Potential habitat is all native vegetation within the immediate catchments where the species is known to occur and includes poorly-drained streams, seepages, low-lying flat swampy areas and vegetation, drainage depressions and ditches.	Suitable habitat present along with local records.

Int Treaty	Mig/Mar	EPBC	TSP Act	Scientific name	Common name	Source database	Total no. local records	Likelihood occurrence	Habitat	Likelihood Reasoning
		EN	e	*Lathamus discolor*	Swift Parrot	EPBC/NVA	6	High	The Swift Parrot is a winter migrant to Victoria Leaving their breeding areas in Tasmania during autumn. They are nomadic, and follow the flowering of trees and psyllid infestations. Breeding coincides with the flowering times of E. globulos and E. ovata. Distribution seems to follow the range of these species tending towards the east coast and south of the state. However, there is also some breeding in the north of the state outside the natural range of Blue Gum between Launceston and Smithton. (Swift Parrot Recovery Team 2009).	Suitable habitat present along with local records.
		VU		*Perameles gunnii*	Eastern Barred Bandicoot	EPBC	3	High	Habitat preference is for open grasslands with nearby vegetation to provide cover. Mostly nocturnal.	Suitable habitat present along with local records.

Int Treaty	Mig/Mar	EPBC	TSP Act	Scientific name	Common name	Source database	Total no. local records	Likelihood occurrence	Habitat	Likelihood Reasoning
		EN		*Botaurus poiciloptilus*	Australasian Bittern	EPBC	1	Low	This species is part nocturnal and forages over water in dense cover, sometimes from platforms in wetland vegetation. Habitat is usually tall reedbeds, sedges, rushes, cumbungi or lignum. Also occurs on rice fields, drains in tussocky paddocks and occasionally on saltmarshes and brackish wetlands. Nests are shallow saucers on trampled water plants (Pizzey and Knight 2007).	Limited suitable habitat present
		EN	e	*Sarcophilus harrisii*	Tasmanian Devil	EPBC/NVA	27	High	Despite the decline in numbers since the early 1990s, populations of Tasmanian devils remain widespread in Tasmania from the coast to the mountains. They live in coastal heath, open dry sclerophyll forest, and mixed sclerophyll-rainforest and are also known in agricultural habitats. Potential denning habitat includes well-drained soil or sheltered overhangs such as cliffs, rocky outcrops, knolls, caves and earth banks with at least one entrance. They may have several dens across their home range usually > 1km radius.	Suitable habitat present along with local records.

Int Treaty	Mig/Mar	EPBC	TSP Act	Scientific name	Common name	Source database	Total no. local records	Likelihood occurrence	Habitat	Likelihood Reasoning
		VU	pe	*Tyto novaehollandiae castanops*	Masked Owl	EPBC/NVA	20	High	Requires large trees with large hollow entrance (>15cm?) diameter. Mapped areas include areas with at least 20% mature eucalypt crown cover. Remnant trees in paddocks may also constitute significant habitat.	Local record suggest suitable habitat present.
		VU	v	*Litoria raniformis*	Growling Grass Frog	EPBC	0	Medium	The species often inhabits water bodies with a diverse assemblage of aquatic vegetation, including emergent species such as sedges (Gahnia spp.), submergent species such as curly pondweed (Potamogeton spp.), floating species such as water ribbon (Triglochin spp.) and filamentous algae (Hamer and Organ 2006: Heard et al. 2004). The aquatic vegetation provides sites for male frogs to call from, sites for eggs to be deposited and relatively safe development, and food and shelter for tadpoles. Dense submergent vegetation is especially important to protect eggs and tadpoles from predation (Heard et al. 2004). However, it is also known to occur in ditches, dams and swamps or sheltering under discarded debris near those sites	Suitable habitat present but no local records.

Int Treaty	Mig/Mar	EPBC	TSP Act	Scientific name	Common name	Source database	Total no. local records	Likelihood occurrence	Habitat	Likelihood Reasoning
									(Tyler and Knight 2009, pp. 38-39).	
		EN	e	*Ceyx azureus diemenensis*	Tasmanian Azure Kingfisher	EPBC/NVA	0	Low	Endemic. Occurs in vegetated margins of slow-flowing coastal creek backwaters, drains and swamps, often with dense aquatic macrophytes. Ephemeral sites require seasonal flooding and linkages to other more permanent populations for population replenishment, therefore wetland connectivity may be critical to survival. their core breeding range is the west north-west of the state, observed	Could potentially occur, however, no local records

Int Treaty	Mig/Mar	EPBC	TSP Act	Scientific name	Common name	Source database	Total no. local records	Likelihood occurrence	Habitat	Likelihood Reasoning
									locally along river systems. (Allen et al. 2002: Tasmanian Threatened Species Statement).	
B, C, J, R	M1, M2			*Gallinago hardwickii*	Latham's Snipe	EPBC	0	Low-Moderate	Latham's Snipe is a migratory species. The species migrates to Victoria from breeding grounds in Japan. In Victoria this species is widely distributed in a range of habits including heavily vegetated freshwater swamps, and pools or ditches in heaths or subalpine herblands (Pizzey and Knight 2007). Also occurs in small ephemeral wetlands such as wet depressions after floods recede. Generally roosts in thick vegetation during the day, sometimes under shrubs away from wetlands, and will feed in swamps at night. They are occasionally seen feeding during the day. This species feeds by	Some suitable habitat present, could be under-reported in local area

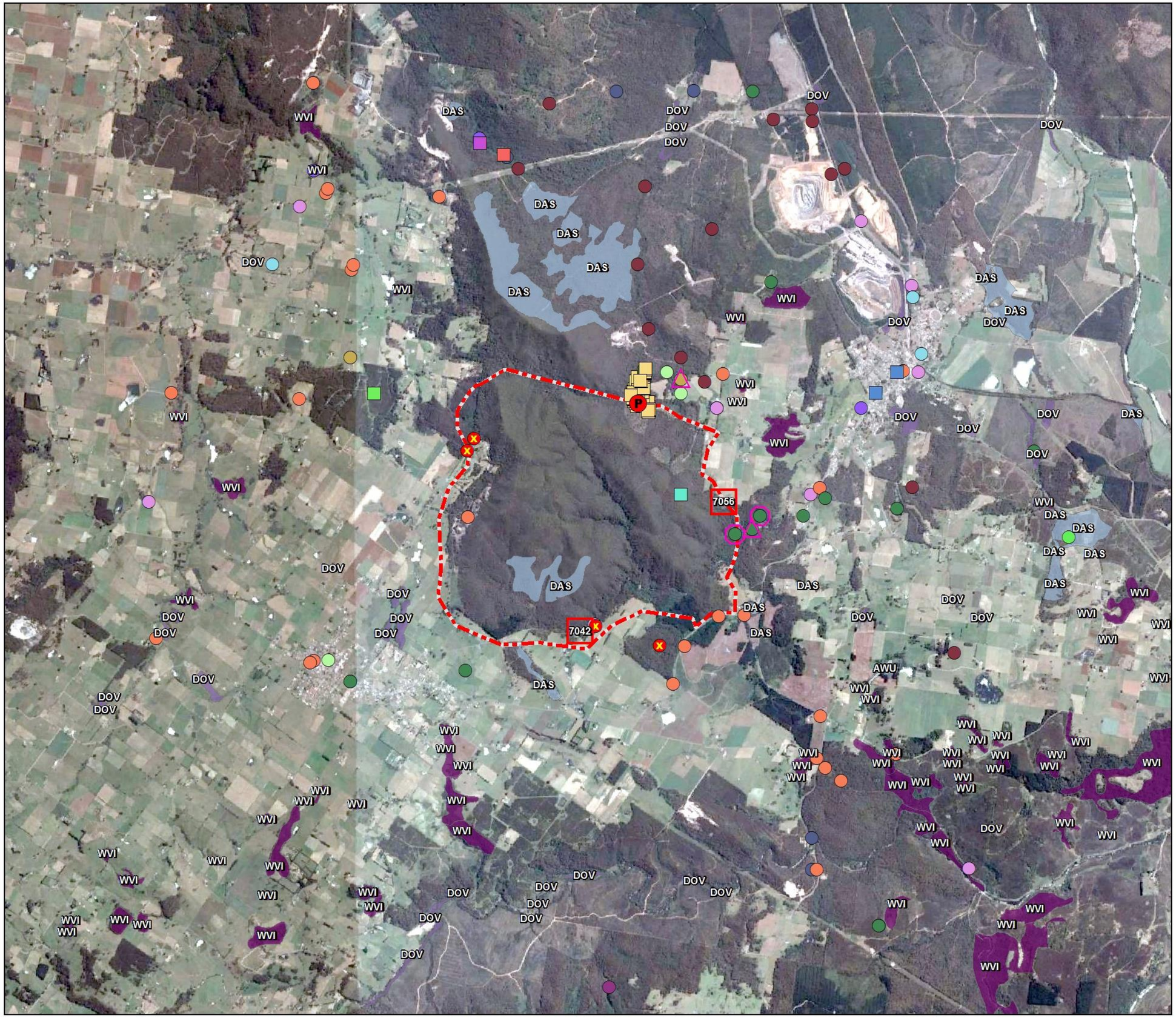
Int Treaty	Mig/Mar	EPBC	TSP Act	Scientific name	Common name	Source database	Total no. local records	Likelihood occurrence	Habitat	Likelihood Reasoning
									probing in soft mud and rarely moves far from concealing vegetation (Higgins and Davies 1996).	
C	M1, M2		L	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	EPBC	0	Moderate	Occurs along the coast, especially forested coasts , on coastal islands, round coastal lakes and along some inland rivers and lakes. Catch prey on, or near, the water's surface and also takes refuse from fishing boats. On land they feed from the ground on carrion or occasionally catch live prey. Clearing of forests and woodlands along the coast, near coastal lakes, and along the rivers, threatens this species.	Suitable habitat present but no local records. More likely an occasional fly over.

Int Treaty	Mig/Mar	EPBC	TSP Act	Scientific name	Common name	Source database	Total no. local records	Likelihood occurrence	Habitat	Likelihood Reasoning
C, J, R	M1, M2			*Hirundapus caudacutus*	White-throated Needletail	VBA/EPBC	0	Low	In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Because they are aerial, it has been stated that conventional habitat descriptions are inapplicable. In Australia, White-throated Needletails almost always forage aerially, at heights up to 'cloud level', above a wide variety of habitats ranging from heavily treed forests to open habitats, such as farmland, heathland or mudflats. Breeds in Asia from Japan westwards through the Himalayas to Siberia. Common migrant to eastern Australia, an uncommon but regular visitor to Tasmania.	Probably does occur more than records suggest, but would only occur above the site, during flyover and/or foraging
		EN		*Isoodon obesulus obesulus*	Goulds Petrel	EPBC	0	Low	Breeding in New Caledonia it disperses into the sub-tropical and tropical pacific ocean. Known to Bass Strait and the eastern seaboard of Tasmania	Marine species. No suitable habitat
C,J,R				*Apus pacificus*	Fork-tailed swift	EPBC	0	Low	Breeds in eastern Asia - it is a spring/summer visitor to Australia.	Limited suitable habitat present, no local records
C,J				*Ardea alba*	Great Egret	EPBC		Low	Swamps, lagoons, estuaries and farm dams. An uncommon but regular autumn/winter visitor to Tasmania.	Limited suitable habitat present, no local records

Int Treaty	Mig/Mar	EPBC	TSP Act	Scientific name	Common name	Source database	Total no. local records	Likelihood occurrence	Habitat	Likelihood Reasoning
C,J				*Ardea ibis*	Cattle Egret	VBA	0	Low	Swamps, lagoons, estuaries and farm dams. A common and regular autumn/winter visitor to Tasmania.	Limited suitable habitat present, no local records
B	M1, M2	VU		*Myiagra cyanoleuca*	Satin Flycatcher	EPBC	0	Low	The Satin Flycatcher is a common summer migrant. It is generally found in many habitat types including wet sclerophyll and woodland particularly along watercourses (Higgins et al. 2006).	Suitable habitat present but no local records
		VU	v	*Prototroctes maraena*	Australian Grayling	EPBC	0	Low	This species only spends part of its life in freshwater streams, Australian Graylings migrate between freshwater streams and the ocean. Streams where this species occur tend to be clear with gravel bottoms and a variety of instream habitat such as pools and riffles. The upstream migration of this species has been effectively terminated in some rivers by dams (Allen et al. 2002).	Unlikely to occur within site

Map 1. Natural Values 5000m

Kentish Mountain Bike Trail



Aboriginal Heritage Sites

Phytophthora cinnamomi

Weeds

Threatened Flora

- blue pincushion
- showy willowherb
- skirted treefern
- slender treefern
- snug greenhood
- spike centaury

Threatened Fauna

- Central North burrowing crayfish
- australasian bittern
- eastern barred bandicoot
- giant freshwater crayfish
- grey goshawk
- hydrobiid snail (minnow river)
- masked owl
- spotted-tailed quoll
- swift parrot
- tasmanian devil
- tasmanian wedge-tailed eagle
- Raptor Nest
- Raptor Sighting

Threatened Vegetation Communities

- AWU
- DAS
- DOV
- WVI
- Study site

Mapping by Colin Broughton 2/12/2014

N

0 500 1,000 1,500 2,000 m

Scale 1:50,000 (Page size A3)

Disclaimer

Practical Ecology bears no responsibility for the accuracy and completeness of this information and any decisions or actions taken on the basis of the map. While information appears accurate at publication, nature and circumstances are constantly changing.

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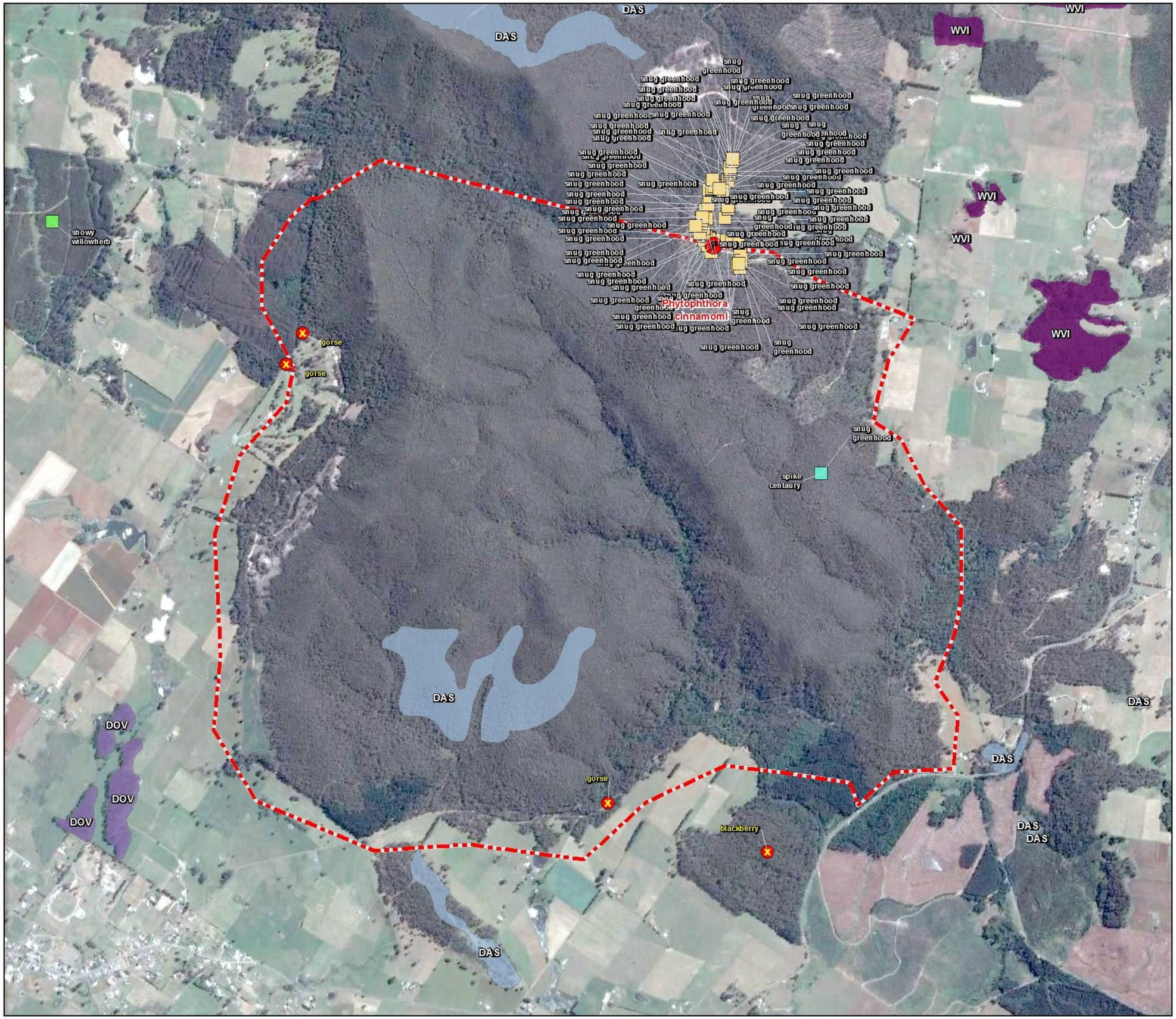
Map 2. Threatened Flora and Vegetation Communities

Kentish Mountain Bike Trail



Phytophthora cinnamomi

Weeds

Threatened Flora

- blue pincushion
- showy willowherb
- skirted treefern
- slender treefern
- snug greenhood
- spike centaury

Threatened Vegetation Communities

- AWU
- DAS
- DOV
- WVI
- Study site

Mapping by Colin Broughton 31/10/2014

N

0 250 500 m

Scale 1:20,000 (Page size A3)

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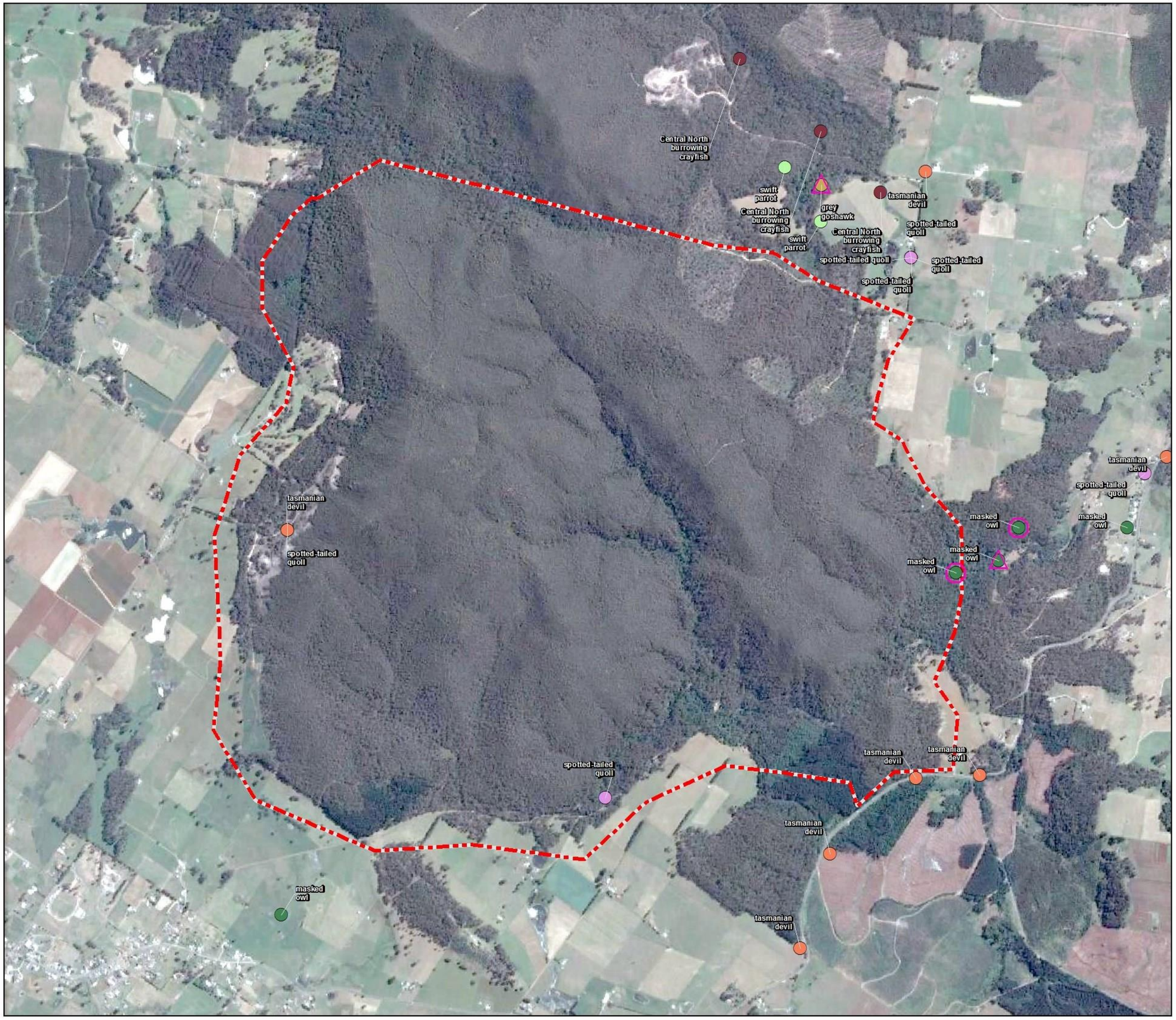
Map 3. Threatened Fauna

Kentish Mountain Bike Trail



Threatened Fauna

- Central North burrowing crayfish
- australasian bittern
- eastern barred bandicoot
- giant freshwater crayfish
- grey goshawk
- hydrobiid snail (minnow river)
- masked owl
- spotted-tailed quoll
- swift parrot
- tasmanian devil
- tasmanian wedge-tailed eagle
- Raptor Nest
- Raptor Sighting
- Study site

Mapping by Colin Broughton 31/10/2014

N

0 250 500 m

Scale 1:20,000 (Page size A3)

Disclaimer

Practical Ecology bears no responsibility for the accuracy and completeness of this information and any decisions or actions taken on the basis of the map. While information appears accurate at publication, nature and circumstances are constantly changing.

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