

# CARDWELL TROPICAL MOUNTAIN BIKE TRAIL PROJECT FEASIBILITY REPORT

PREPARED BY WORLD TRAIL PTY LTD

FOR CASSOWARY COAST REGIONAL COUNCIL

AUGUST 2021



WORLDTRAIL

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*World Trail acknowledges the Traditional Owners of Country throughout Australia and recognise their continuing connection to land, waters and culture. World Trail pays respect to their Elders past, present and emerging.*

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# 1 INTRODUCTION

World Trail was engaged by the Cassowary Coast Regional Council (CCRC) to evaluate Cardwell, Tropical North Queensland, for its potential to host a world class mountain bike trail system that would generate significant economic benefits to the region through mountain bike tourism. Through a feasibility assessment, World Trail has developed a concept trail system across three (3) locations, engaged consultants to perform desktop ecology values and economic benefits assessment, assisted the CCRC and Queensland State Government representatives to engage and consult with the Girramay Traditional Owners and their regional representative Giringun Aboriginal Corporation, the Project Control Group (PCG) and Cardwell local residents.

World Trail representatives, Glen Jacobs, Dylan Jeffries and Rhys Jones, travelled to the project area on a number of occasions to evaluate the proposed mountain bike development site and contribute to consultation with key groups.

## 2 BACKGROUND

The seaside town of Cardwell has endured periods of economic growth and hardship. Cardwell went through rapid economic growth during the development Port Hinchinbrook, a resort style residential development during the 1990s. The onset of the Global Financial Crisis (GFC) in 2009 and the devastating effects of Cyclone Yasi in 2011 resulted in significant economic decline for Cardwell and surrounding areas within the Cassowary Coast Regional Council area. Tourism, investment and economic growth suffered as a result of these events.

More recently, Cardwell has experienced declines in the services sector, such as banks, hospitality and retail, as they have been consolidated to larger towns and cities. The decline in these services, in conjunction with sources of economic decline (Yasi and GFC), have created hardships in the local economy of Cardwell. This has forced Cardwell residents to continue to look for alternative economies to help maintain services and prosperity for town.

CCRC have been working diligently with community members to investigate projects to boost the local economy. A proposed project is to turn Cardwell into a world class “Tropical Mountain Bike Trail” destination. This, combined with the Queensland State Government’s regional development priorities for the region, means the project is well resourced and backed.

Increased visitation from this type of tourism could lead to an economic recovery and create new employment and investment opportunities for Cardwell as well as the Cassowary Coast Region. A mountain bike project in this area would complement the cultural and natural assets of the area; World Heritage Areas of Wet Tropics Rainforest, the Great Barrier Reef and Hinchinbrook Island. Leveraging from this, other tourism opportunities have the potential to become viable and operate in these locations.

The Cardwell area may present unique ‘constraints’ with use of State land, National Parks land, consideration of Wet Tropics environmental assessment and management requirements as well as ensuring appropriate Native Title engagement and collaboration. Prior to the commencement of this feasibility study, the CCRC undertook preliminary discussions with government agencies (e.g. Queensland Parks and Wildlife Service, Wet Tropics Management Authority and Department of Innovation and Tourism Industry Development) which were encouraging and led to support for the for Cardwell Tropical Mountain Bike Project.

### 2.1 PROJECT OBJECTIVES

The primary objective of this feasibility assessment is to investigate if Cardwell is a viable location for a world class mountain bike trail network and if that network might support sustainable economic growth benefits within the area. To ensure a viable mountain bike product can be situated at Cardwell, the following developments require positive outcomes:

- Develop a concept mountain bike trail network that has inputs for Traditional Owners as well as other key stake holders from the area, local government and state government bodies;
- Develop a concept mountain bike trail network that originates and finishes at the town of Cardwell in the Cassowary Coast Region;
- Develop a concept trail network that is able to provide a range of mountain bike trail experiences for riders of different skill levels making use of the Cultural Heritage values and scenic beauty of the area including Wet Tropics Rainforest locations;
- Develop a concept trail network that is balanced between cost effectiveness in terms of its construction and operation and the expected economic and social benefits that it may bring to Cardwell and the region as a whole;

- Develop a concept trail network that adequately identifies key land tenure, terrain, potential environmental values impacts and Cultural Heritage assessment;
- Develop estimated trail-specific construction and operating costs for a concept trail network;
- Develop a concept mountain bike trail network that is able to be practicably staged in a manner to account for realistic funding requirements as well as ensure sufficient interest can be maintained to grow a local mountain bike economy;
- Development of a mountain bike concept plan and feasibility investigation that is consistent with State and Federal tourism and environmental management policy and general funding application support requirements.

The project is specifically intended to have a small environmental footprint and complement the local natural and Aboriginal cultural environments – especially within any protected areas (i.e. National Park land). Specifically, any track work that may be required is to be designed, including at the Concept Design Stage, to protect any substantive native trees and other important vegetation. Where possible, existing trails should be utilised and tracks and trails are to be consistent with QPWS standards.

Specific community benefits that the project should seek to achieve include:

- Create direct regional employment in the Cardwell area and potential for employment and businesses in surrounding locations;
- Generate additional regional investment providing for additional commercial services;
- Increased visitor stays in CCR by providing additional adventure-based activities and contributing positively to Queensland Gross Regional Product (GRP);
- Contribute to improved capital land values in the Cardwell location and act as a catalyst to additional investment attraction, both directly and indirectly associated with mountain bike activity;
- Contribute to population growth in Cardwell or at least minimise any further population decline;
- Provide for greater economic diversity and regional resilience;
- Complement and further strengthen regional nature-based tourism in Far North Queensland (FNQ) and Queensland;
- Benefit other nearby mountain bike projects by providing a significant contribution and focal point to a regional mountain bike destination network across Tropical Queensland leading to extended visitor stays; and
- Provide greater attraction to FNQ's natural scenic beauty and improve visitor numbers to QPWS parks in the region and contributing to greater revenue for national parks investment.

## 2.2 TRADITIONAL OWNER ENGAGEMENT

Traditional Owner engagement was managed by CCRC and Queensland State Government representatives. Traditional Owner Elders and other representatives of the Girramay People, with support of their regional representative Giringun Aboriginal Corporation, have been involved with all aspects of this project proposal to date through a State/CCRC funded process that directly engaged Girramay and Giringun personnel. Where required, World Trail has provided input into consultation and engagement. This process has proven successful whereby the Girramay/Giringun Elders, Board Directors and other representatives have a full understanding of, and have provided input to, the project deliverables and desired outcomes.

A desktop Aboriginal Cultural Heritage Assessment was performed by Girramay/Giringun which resulted in the identification of no known areas of Aboriginal Cultural Significance to date. This is due to the Cardwell area being largely unmapped from an Aboriginal Cultural Heritage point of view. The Cardwell Tropical Mountain Bike Project presents an opportunity for Aboriginal Cultural Heritage mapping to occur in the project area during the design phase. This is an activity Girramay/Giringun are excited about and is an important process the project must consider in the business case and undertake should the project proceed.

The project presents an excellent opportunity for the Girramay Traditional Owners to be involved in all stages of the project. The design phase presents a pathway for Aboriginal Cultural Heritage mapping to occur and the Girramay People's values, artwork and culture to have an influence on design aspects such as experiences, branding and signage. During construction there are opportunities for members of Girramay/Girringun to be employed and potentially become skilled-up maintainers of the mountain bike trails. Once operational, the trails also present employment and business options for Girramay/Girringun and consideration should be taken early of their capability and capacity development investment needs to ensure timely opportunities are leveraged.

As a result of this engagement and consultation process, the project proposal has gained full support from Girramay/Girringun. A branding line has been created by the Girramay Elders which will be adopted by the project governance team.

*"Ride where our ancestors once walked. Girramay Country"*

## 2.3 SITE DESCRIPTION

The town of Cardwell is a two and a half hour drive south of Cairns and one and a half hours north of Townsville. Cardwell is situated within the Cassowary Coast Region of Tropical North Queensland.



**Figure 1 – Cassowary Coast Project Area**

Cardwell is located on the Coral Sea Coast in Tropical North Queensland. Cardwell was established in the 1860's and the 2016 census recorded 1,300 residents. The town is supported by the local tourism, eco-based tourism, fishing and agriculture markets.



There is a small mountain bike community in Cardwell where existing and disused fire breaks, logging trails and commercial pine forest access routes are used. Cardwell has hosted a number of small mountain bike race events in the past.

## 2.4 KEY STAKEHOLDERS

Key stakeholders associated with the Cardwell Tropical Mountain Bike Project include, but are not limited to:

- Cassowary Coast Regional Council Councilors and staff;
- Girramay People Aboriginal Corporation RNTBC;
- Giringun Aboriginal Corporation;
- Department of Tourism, Innovation and Sport (DTIS);
- Department of State Development Manufacturing Industry and Planning (DSDMIP);
- Wet Tropics Management Authority (WTMA);
- Queensland Parks and Wildlife Service (QPWS);
- HQ Plantations;
- Kirrama Range Trails Group;
- Cardwell Futures Forum and Chamber of Commerce;
- Tropical Coast Tourism (TCT); and
- Cassowary Coast Multisport Club Inc.

Key individuals from the stakeholder groups above formed the “Project Control Group” (PCG) which acted as a steering committee for the project and provided feedback to constituents within their respective entities. This project proposal has full support from all levels of government, the Girramay Traditional Owners and the local community.

## 3 DESTINATION ASSESSMENT

### 3.1 RIDE DESTINATION OVERVIEW

World Trail is the mountain bike industry leader in identifying and developing Ride Destinations. We continuously develop and refine what defines a destination, based on the work we undertake around Australia and worldwide.

There are six underpinning elements which make a successful Ride Destination:

1. Connectivity to markets via air travel, creating an experience with minimal separation of culture, proximity from trailheads, significant populations, airports. Strive to achieve a Ride In – Ride Out, start and finish with a smile. This is similar to the theory behind ski in – ski out ski resorts.
2. Quality Trails are the key element to creating a Ride Destinations. Quality and quantity of trails needs to be the main draw card to entice riders to visit the Ride Destination. Trails need to be designed and constructed to cater to the majority of rider capability and skill set while allowing rider progression. Market share is the 15/70/15 model – being 15% are beginner riders, 70% intermediate ability, 15% advanced riders. However, more recently with the explosion in popularity in the sports, some destinations are recognising the needs for more beginner or “green” style of trails.
3. Progressive Expansion needs to be accounted for to allow the Ride Destination to grow as popularity increases.
4. Natural Features will enhance the rider experience. Lakes, rivers, waterfalls, mountains, escarpments, lookouts, ecotones, flora and fauna will showcase the destination and feed into social media sharing and advertising streams.
5. Pubs and Accommodation speaks for all things food, beverage and accommodation. Riders travelling to a Ride Destination will enjoy parking the car and taking in all the offerings of the destination. Start with a Coffee – Finish with a Beer.
6. Event Overlays allow for competitions to be successfully held in the Ride Destination further enhance the exposure to the rest of the state, country or the world.

Ultimately the trails define a destination. There are three categories for success which must be weighted toward one or all of the three categories. The aim is to reach all three categories in one exercise which will result in the perfect ride. This allows users, government agencies of all levels and private enterprises a successful outcome.

1. Community – foster the one hour of power (before or after work ride for example) locals will enjoy, as well as the long stay visitors; create an emotional attachment to the destination while promoting fitness, culture and health.
2. Competitive – Create a training facility for all levels of skill, from beginner to professional through trail design that promotes skills progression through no forced risk, skills schools or professional development. Promote events from club to national to international levels. Create signature events.
3. Tourism – Create employment, branding, economic stimulation, regional to international significance and cross-pollinate with other products in the area.



Figure 2 - Six Elements of a Ride Destination



Figure 3 - Three Critical Layers

## 3.2 ASSESSMENT FINDINGS

Using the key principles outlined in the previous section, World Trail has developed a Destination Assessment Tool to measure a site's potential to become a Ride Destination. It assesses the site against a range of primary and secondary criteria, which relate to the site's characteristics and how well the site could meet the wants and needs of the mountain bike tourism market.

World Trail applied its Destination Assessment tool to Cardwell by evaluating the site in its current state and the if proposed concept trail network was in place.

The following pages contain findings from the audit, broken into Primary and Secondary Audits. The Primary Audit focuses on critical criteria which form key components of a Ride Destination. These include accessibility to/from the destination, volume, variety and quality of trails that exist or could exist and supporting facilities such as accommodation and dining options. The Secondary Audit focuses on supporting aspects of a destination.

Each criterion is assessed against the current situation (i.e. 'As Found') and the potential future situation once the recommendations of the report have been implemented (i.e. 'Post Implementation'). This provides a measure of how a Ride Destination could be assessed in the future. Note, some criteria do not have both 'As Found' or 'Post Implementation' states. Criteria that have the same scores generally mean they cannot be changed with the implementation of a Ride Destination (e.g. changing the population proximity).

Section 9.1 – Appendix 1 contains the criteria descriptions and commentary for each. The following charts provide graphical representation of the assessment outcomes.

### 3.2.1 Cardwell Destination Assessment

Section 4 contains information about the concept trail network. Section 9.2 – Appendix 2 contains bench mark destination assessments.

**Table 1 – Cardwell Destination Assessment Weighted Scores**

ASSESSMENT TYPE	AS FOUND	POST IMPLEMENTATION
Primary Assessment Weighted Scores	37 / 100	76 / 100
Secondary Assessment Weighted Scores	27 / 50	48 / 50

**Table 2 – Cardwell Destination Assessment Summary Points**

SCORES WELL WITH	SCORES POORLY WITH
<ul style="list-style-type: none"> <li>➤ Volume and variety of trails;</li> <li>➤ Cultural significance of the project area;</li> <li>➤ Natural features of the Cardwell are amazing and will be a significant drawcard;</li> <li>➤ Varying eco tones of the area</li> <li>➤ Constructability and soil conditions;</li> <li>➤ Ability for Cardwell to expand the trail network with more than 50 additional kilometers</li> <li>➤ Ability for access via shuttle road to 7 Sisters and Attie Creek;</li> <li>➤ Economic and investment opportunities;</li> <li>➤ Elevation;</li> <li>➤ Population Proximity.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Disconnection between the trail head and Attie Creek. An element of disconnection with 7 Sisters and Lookout Hill (Gravity Connectivity and Rider Support);</li> <li>➤ Event type capability;</li> <li>➤ Event sites;</li> <li>➤ Existing trail products;</li> <li>➤ Number of, quality and variety existing accommodation and food/beverage options.</li> </ul>

Cardwell scores very well for a significant Ride Destination. Like other Ride Destinations, there are always positive and negative lead indicators.

A notable point of difference for Cardwell, which is worth highlighting separately, is the Aboriginal Cultural significance of the region as well as the involvement of the Girramay Traditional Owners in the project. In comparison to other destinations, the involvement and input Traditional Owners can provide in the project is significant. CCRC have engaged with the Traditional Owners from the project onset, providing an opportunity for direct input, involvement and buy-in to many aspects of the project. These include:

- Girramay's involvement has allowed them to be fully informed of all aspects of the project proposal;
- The process has allowed Girramay to feel confident the project will be successful and because of this, Girramay fully support the project;
- Girramay branding can be incorporated in many aspects of the project during the design phase(s);
- Girramay artwork and culture can be integrated into signage, train heads and merchandise (for example);
- Investment, employment and commercial operation potential – shuttle operators, merchandising, accommodation and services (for example);
- Land management and trail maintenance opportunities.

Compared to other Ride Destinations, the Aboriginal Cultural significance is a highly positive point of difference and will provide the proposed project extra tourism attractiveness. This will also complement the environmental and natural significance of the Cassowary Coast region.

The lists of additional positives for Cardwell are excellent. Cardwell is a town with established services and accommodation. These will grow and improve over time once the trails become established and visitation grows. The natural beauty and Cultural Heritage of the area will be a significant draw card for the area. These will create a point of difference to other destinations around Australia.

The disconnection between the Attie Creek network and the town/main trail head is the most noteworthy issue the project faces. It is important to negate this as much as possible by ensuring there is adequate, dedicated mountain bike access trails to and from these locations. World Trail comprehensively considered all locations around Cardwell and the Attie Creek location has extensive benefits to the overall mountain bike product despite its location relative to Cardwell and the main trail head. These linkage trails require careful design to ensure they are enjoyable to use and add value to the overall product.

The outputs of the Destination Assessment can be used for defining the areas that require focus and may need additional design work or infrastructure, for example, to determine solutions to mitigate their impacts to the project.

### 3.2.2 Benchmark Destination Assessment Data – Derby and St Helens, Tasmania

World Trail have recently developed two iconic, successful Ride Destinations in Tasmania – Derby and St Helens. They make compelling benchmark case studies to demonstrate the positive impact a Ride Destination (initially through the design and construction of mountain bike trails) on a town. Tables 3 and 4 below provide summary scores from the Derby and St Helens Destination Assessments. Figures 4 and 5 on the following pages provide further detail on the breakdown of these scores.

Both Derby and St Helens are now in the ‘Post Implementation’ state. They are fully operational, have established maintenance teams, established tourism and destination marketing and have experienced regional growth from mountain bike tourism. Both destinations have over 120km of trails and were constructed over a number of stages.

**Table 3 - Derby Tasmania Destination Assessment Scores**

DERBY, TASMANIA		
ASSESSMENT TYPE	AS FOUND	POST IMPLEMENTATION
Primary Assessment Weighted Scores	34 / 100	84 / 100
Secondary Assessment Weighted Scores	10 / 50	41 / 50

**Table 4 - St Helens Tasmania Destination Assessment Scores**

ST HELENS, TASMANIA		
ASSESSMENT TYPE	AS FOUND	POST IMPLEMENTATION
Primary Assessment Weighted Scores	40 / 100	76 / 100
Secondary Assessment Weighted Scores	31 / 50	46 / 50

Section 9.2 – Appendix 2 contains additional benchmarking data from Derby and St Helens and demographic data from the 2020 ‘Dirt on Derby’ Survey. ‘Dirt on Derby’ survey available on request.

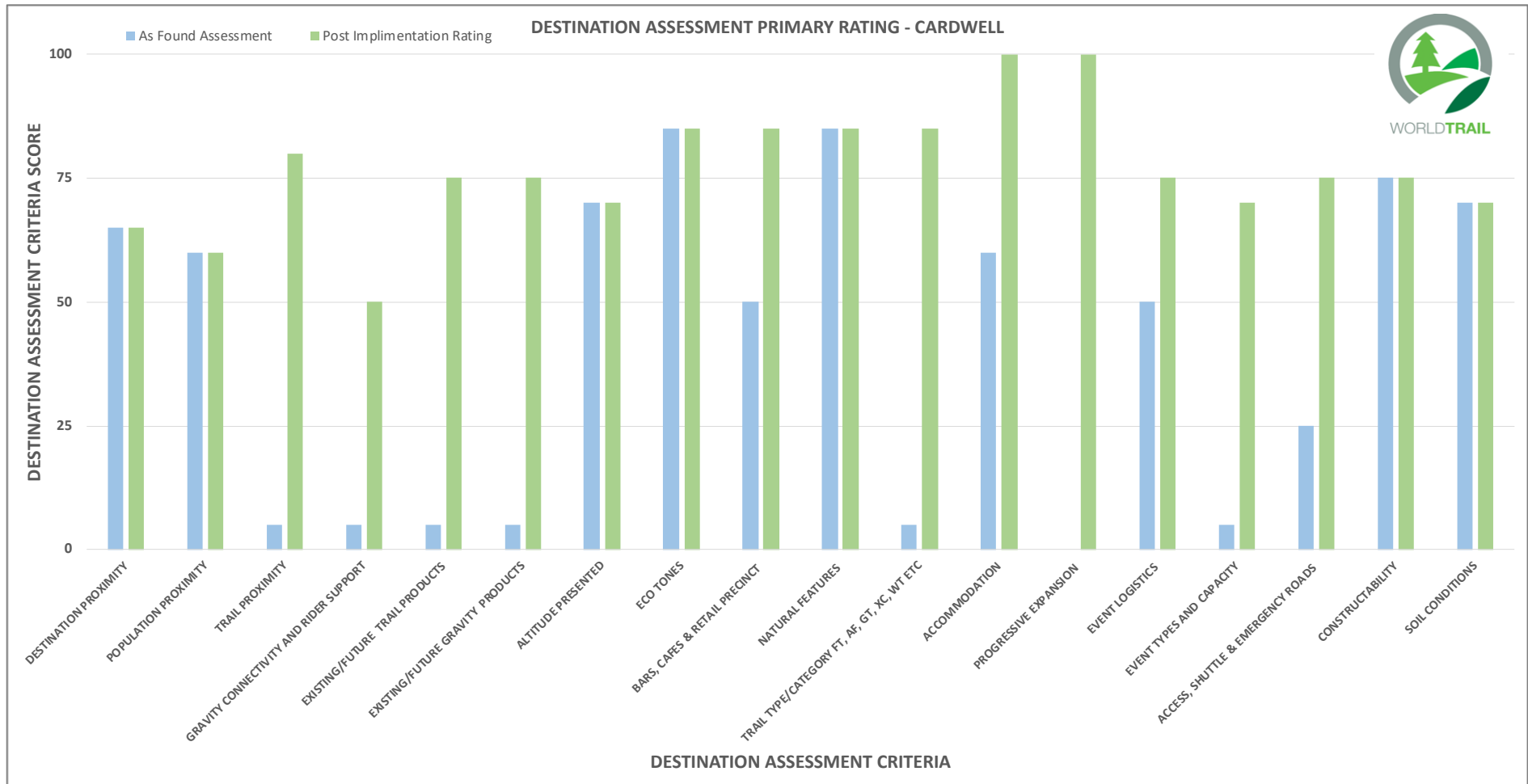


Figure 4 - Cardwell Destination Assessment – Primary Rating

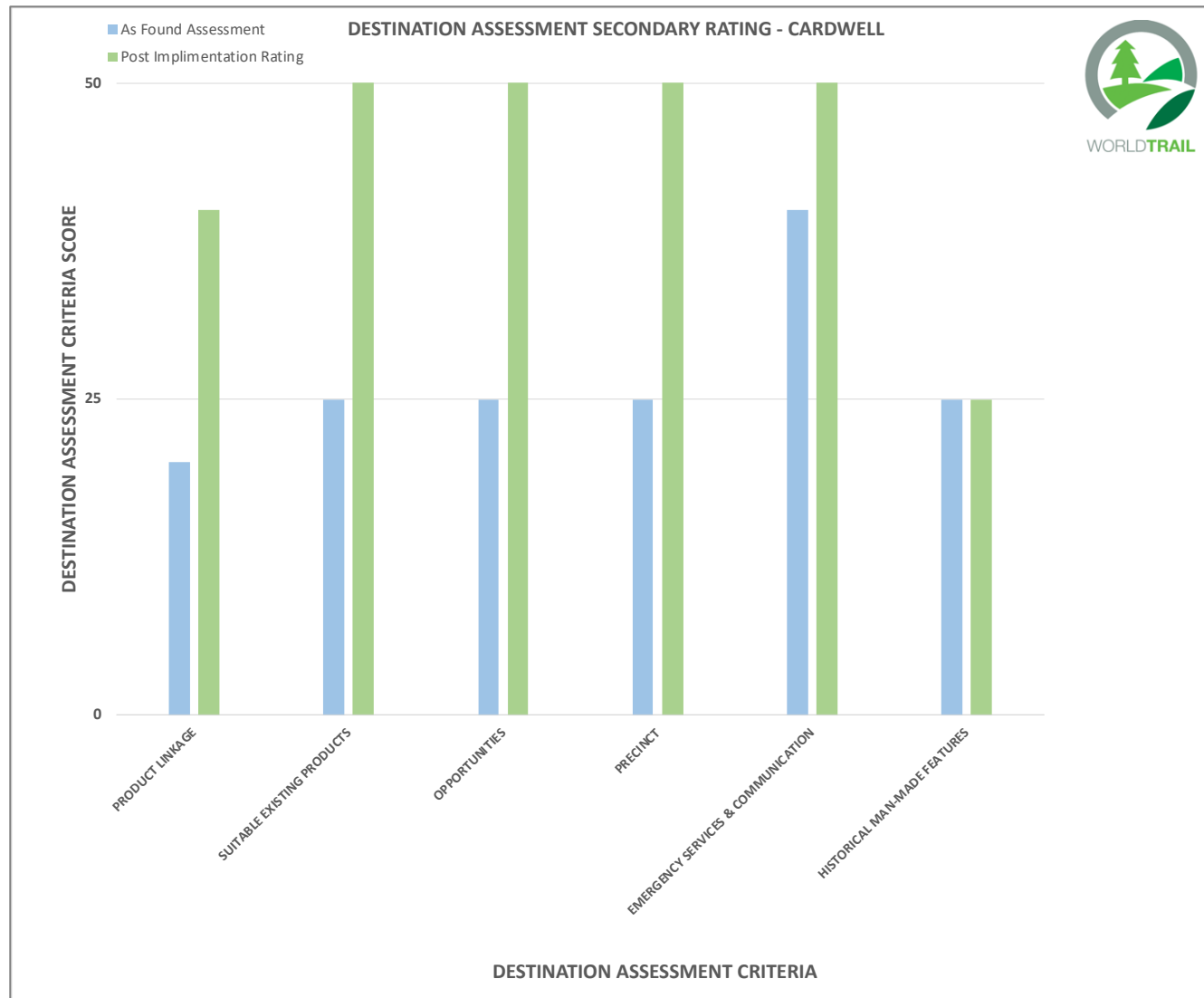


Figure 5. Cardwell Destination Assessment – Secondary Rating



## 4 PROPOSED TRAIL NETWORK

### 4.1 PROPOSED TRAIL NETWORK SUMMARY

During numerous visits to Cardwell to engage in community consultation and collect site specific data, World Trail undertook a desktop assessment of Cardwell.

To create a world class mountain bike destination, ideally over 85km of trails are developed, comprised of different trail styles such as wilderness, adventure, air flow, gravity and varying difficulties. Appropriately designed, quality-built trails with supporting infrastructure such as shuttle access is essential to ensure the success and popularity of these trails. World Class destinations such as Derby and St Helens in Tasmania have approximately 120km of trails each and experience 30,000 to 50,000 visitors a year.

World Trail has integrated these types of trails into the Cardwell concept design, leveraging the elevation presented by the Attie Creek area, 7 Sisters and the Lookout Hill. These three locations provide the geographical make-up of the concept design.

The 7 Sisters, also known as Elphinstone Range, and Lookout Hill are located close to the proposed trail head and Cardwell Township. Attie Creek is approximately 3.5km as the crow flies from Cardwell.

Readers of this report can log into a web-based ArcGIS “Client Viewer” to view the trails individually or in whole. The login details:

**Web Address:** <https://world-trail.tgs-apps.com/ccrc>

**Username:** WT\_ccrc\_viewer

**Password:** C4ssC0stV!ew3r

**Note:** you will be prompted to login twice. Please do the same each time



Figure 6 - Client Viewer Login Screen

## 4.2 PROPOSED TRAIL NETWORK LAYOUT



Figure 7 - Cardwell Trail Network Reference Map

## 4.3 PROPOSED CONCEPT TRAILS – SEVEN SISTERS

The 7 Sisters, also known as the Elphinstone Range, is located close to the Tully Street Trail Head and the town of Cardwell. The 7 Sisters has a mixture of Adventure, Wilderness and Gravity style trails. This location is intended to contain beginner and intermediate difficulty rated trails as it is located close to town, has easier access (compared to Attie Creek) and has approximately 130m of elevation.

There is a disused road to the Fire Watch Tower summit which was used when the watch tower was in service. This road requires re-activation to allow shuttle access to the summit for riders to complete repeat runs of the gravity trails. Re-activation of this access road for a shuttle access road is supported by the PCG.

The terrain in this area is open coastal scrub with pockets of dense scrub, gullies and escarpments. There are a number of locations which will have amazing views across to Rockingham Bay and Hinchinbrook Island. The soil is mostly decomposing granite with granite rocks scattered across the area. There will be some challenges with the soil types presented in this area to ensure the trails are not affected by rainfall. Careful design considerations to trail grade in problem areas and construction techniques incorporating careful drainage and water management are required.


The following trail information is provided based on desktop-based concept designs and evaluations, supported by site inspections. Trail difficulty rating, length and style may change during the detailed design process.

Refer to Appendix 5 for trail style descriptions




Figure 8 – 7 Sisters Trail Network Map


### 4.3.1 Trail 1

TRAIL SUMMARY INFORMATION	
<b>Overview</b>	<p>Originating at the proposed trail head at Tully Street, Trail 1 is intended to be a beginner loop that may contain skill development features. Using Trail 1, riders can access the remainder of the trail network.</p> <p>Trail 1 has some ecology concerns associated with the parcel of land it is situated on. A decision is required whether to pursue an approvals course of action to construct the trail as proposed or pursue alternative options to construct a trail through this area. See Section 5.1.2.</p>
<b>Trail Difficulty Rating</b>	 Easy
<b>Length (metres)</b>	1,226
<b>Trail Style</b>	Adventure Beginner Trail


### 4.3.2 Trail 2

TRAIL SUMMARY INFORMATION	
<b>Overview</b>	Trail 2 is a single direction link trail. It starts at the rear of the 5 Ways that allows riders to access the 7 Sisters trail network or access Trail 11 which allows riders to access the Attie Creek trail network.
<b>Trail Difficulty Rating</b>	 Easy
<b>Length (metres)</b>	1,360
<b>Trail Style</b>	Adventure Trail


### 4.3.3 Trail 3

TRAIL SUMMARY INFORMATION	
<b>Overview</b>	<p>Trail 3 starts and finishes at a proposed shuttle pick up/secondary trail head zone for the 7 Sisters. It is the first of a number of stacked loops allowing riders to access a number of peaks along the 7 Sisters.</p> <p>Trail 3 will provide a gradual easy climb to where it meets with Trail 4 to then gradually descend back to the 7 Sisters shuttle pick up zone.</p>
<b>Trail Difficulty Rating</b>	 Easy
<b>Length (metres)</b>	2,189
<b>Trail Style</b>	Adventure Trail


#### 4.3.4 Trail 4

TRAIL SUMMARY INFORMATION	
<b>Overview</b>	<p>Trail 4 allows riders to further access up the 7 Sisters. It will be a similar style to Trail 3 but the additional altitude and side slope could potentially create a slightly more challenging ride.</p> <p>There is potential for a lookout site along this trail and the eco tones may become denser along portions of this trail.</p>
<b>Trail Difficulty Rating</b>	 Easy/Intermediate
<b>Length (metres)</b>	4,422
<b>Trail Style</b>	Adventure Trail




#### 4.3.5 Trail 5

TRAIL SUMMARY INFORMATION	
<b>Overview</b>	<p>Trail 5 provides a direct linkage from Trail 4 to the main trail summit at the Watch Tower peak. Linking Trails 3, 4 and 5 provides the shortest climb to this summit.</p> <p>Trail 5 has the potential to be a challenge with a number of switchbacks creating a fast ascent. As a consequence, Trail 4 has been graded Easy/Intermediate.</p>
<b>Trail Difficulty Rating</b>	 Easy/Intermediate
<b>Length (metres)</b>	3,313
<b>Trail Style</b>	Adventure Trail


### 4.3.6 Trail 6

TRAIL SUMMARY INFORMATION	
<b>Overview</b>	<p>Trail 6 has been designed to be a Wilderness style of trail. It is accessed from Trail 4 and finishes at the Watch Tower summit. This trail will take riders on a long ride traversing the eastern side of the 7 Sisters and then follow the ridgeline to the south toward the Watch Tower summit.</p> <p>Trail 6 climbs around and to the summit of three peaks along the 7 Sisters. Feedback from local QPWS Rangers suggests there is an amazing view location along this trail which will provide 180-degree views of Rockingham Bay and Hinchinbrook from 190m of elevation.</p>
<b>Trail Difficulty Rating</b>	 <p>Intermediate</p>
<b>Length (metres)</b>	10,246
<b>Trail Style</b>	Wilderness Trail


### 4.3.7 Trails 7, 8 and 9

TRAIL SUMMARY INFORMATION			
<b>Overview</b>	<p>Trails 7, 8, and 9 are gravity inspired flow or airflow style of trails. Detailed design will dictate their final style and grading. Nominally, Trail 7 is an Easy trail, Trail 9 an Easy Intermediate trail and Trail 8 an Intermediate trail. The intent is for these trail gradings and styles to promote rider progression.</p> <p>The elevation and slope are extremely conducive to short, fun trails which will be very popular. These trails require the support of a shuttle road, identified as the disused access road to the former Fire Watch Tower location.</p>		
<b>Trail Difficulty Rating</b>	 <p>Easy (Trail 7)</p>	 <p>Easy/Intermediate (Trail 9)</p>	 <p>Intermediate (Trail 8)</p>
<b>Length (metres)</b>	<p>Trail 7 – 4,808</p> <p>Trail 8 – 2,761</p> <p>Trail 9 – 2,939</p>		
<b>Trail Style</b>	Flow or Airflow Trails		


### 4.3.8 Trail 10

TRAIL SUMMARY INFORMATION	
<b>Overview</b>	<p>Trail 10 provides a link from Trail 7 to Trail 11 to access the Attie Creek network. It also offers a return climb from Trail 11 back to Trail 7. This gives riders at the Attie Creek network a return to Cardwell option by descending Trail 15 to Trail 26, which will be dual direction.</p> <p>Trail 10 will have gravity inspired flow elements to it which will continue the fun from Trail 7 down to Trail 11. Given Trail 7 is an Easy trail, the same grading will apply to Trail 10 which will make this loop usable for all skill ranges.</p>
<b>Trail Difficulty Rating</b>	 Easy
<b>Length (metres)</b>	2,441
<b>Trail Style</b>	Adventure Trail

### 4.3.9 Trail 11

TRAIL SUMMARY INFORMATION	
<b>Overview</b>	<p>Trail 11 is used by riders to bypass the 7 Sisters trail network to access the Attie Creek trail network via Trail 26 and Trail 15. Trail 11 is intended to be single direction whereas Trail 26 will be dual direction.</p>
<b>Trail Difficulty Rating</b>	 Easy
<b>Length (metres)</b>	1,104
<b>Trail Style</b>	Adventure Link

4.3.10 Trail 26

TRAIL SUMMARY INFORMATION	
<b>Overview</b>	Trail 26 has been designed to be a dual direction trail. This will allow riders using Trail 11 to travel towards the Attie Creek network. In the reverse direction, riders at Attie Creek can travel down Trail 15, up Trail 26 to access the climb of Trail 10 to return to the Main Trail Head via Trail 7 and Trail 1. Due to the dual direction nature of this trail, the trail width will need to be wide enough to allow riders to pass each other.
<b>Trail Difficulty Rating</b>	 Easy
<b>Length (metres)</b>	597
<b>Trail Style</b>	Dual Direction Link



## 4.4 PROPOSED CONCEPT TRAILS – LOOKOUT HILL

Lookout Hill, is located close to the Tully Street Trail Head and close to the town of Cardwell. The Lookout Hill Trails are Adventure style trails. This location is intended to be a location for beginner and intermediate difficulty rates trails as it is located close to town, has easier access (compared to Attie Creek) and has approximately 120m of elevation.

Riders will access the Lookout Hill via a dedicated trail (Trail 12), allowing riders to access two loops. Riders will be able to use the existing lookout facility, however it is proposed a second lookout is installed at the eastern end of the hill to allow riders and walkers to take in views toward Hinchinbrook Island.

The terrain in this area is open coastal scrub with pockets of dense scrub, gullies and escarpments. The soil is mostly decomposing granite with granite rocks scattered across the area.


The following trail information is provided based on desktop-based concept designs and evaluations, supported by site inspections. Trail difficulty rating, length and style may change during the detail design process.

Refer to Appendix 5 for trail style descriptions




Figure 9 – Lookout Hill Trail Network Map


#### 4.4.1 Trail 12

TRAIL SUMMARY INFORMATION	
<b>Overview</b>	Trail 12 gives riders access to and from the Lookout Hill. Starting at the rear of the 5 Ways, riders will follow an existing road way then gradually climb the north face of the Lookout Hill. Trail 14 can be accessed from Trail 12 and riders can also access Trail 13 where Trail 12 connects to the Lookout Hill access road. Riders depart the Lookout Hill via Trail 12 which will take riders to the north and link in with the last 800m of Trail 16.
<b>Trail Difficulty Rating</b>	 Easy
<b>Length (metres)</b>	3,872
<b>Trail Style</b>	Adventure Trail

#### 4.4.2 Trail 13

TRAIL SUMMARY INFORMATION	
<b>Overview</b>	Trail 13 starts and finishes at the Lookout Hill carpark. It wraps around the hill travelling past the proposed lookout on the east end of the hill. The whole eastern end of the Lookout Hill will provide glimpses toward Hinchinbrook Island.  Trail 13 can also be used to access Trail 14. This trail will take riders past some unique granite boulder outcrops and native vegetation. This trail will contain gradual climbing sections as well as fun flowing descending sections of trail.
<b>Trail Difficulty Rating</b>	 Easy
<b>Length (metres)</b>	2,126
<b>Trail Style</b>	Adventure Trail

### 4.4.3 Trail 14

TRAIL SUMMARY INFORMATION	
<b>Overview</b>	Trail 14 is similar to Trail 13, however it is intended to be a slightly more difficult trail with some more challenging climb sections and faster flowing descending sections.
<b>Trail Difficulty Rating</b>	 Easy/Intermediate
<b>Length (metres)</b>	3,489
<b>Trail Style</b>	Adventure Trail

## 4.5 PROPOSED CONCEPT TRAILS – ATTIE CREEK

The Attie Creek trail network is located furthest from the Tully Street Trail Head. Attie Creek has a mixture of Adventure, Wilderness and Gravity inspired trails. This location is intended to contain trails more for intermediate and advanced riders. As it is quite removed from Cardwell, riders will need to ride via the link trails to/from Attie Creek. Attie Creek presents a unique level of elevation where riders reach elevations of 640m and descend up to 470m.

There is a disused vehicle track running up the ridgeline above the Dead Horse Creek carpark which was used to access a Tin Mine during Cardwell's mining days. This road is in fair condition and can be re-activated to provide shuttle access for riders to the Attie Creek descending trails. These descending trails have the potential to be of high-level race standard. In order to host races at Attie Creek, an event and car parking zone has been provided as a part of this feasibility report. Refer to Section 4.6.4 for more information.

The terrain in this area is open wooded scrub with pockets of dense scrub, dense rainforest at higher elevations and rocky gullies and creeks. There are a number of locations which will have amazing views across to Rockingham Bay and the northern end Hinchinbrook Island from elevations as high as 640m above sea level. Attie Creek falls will be amazing to see during the wet season and the trail network allows riders to also access Dead Horse Creek. The soil is a mix of decomposing granite, organic-based top soils and clays.

The following trail information is provided based on desktop-based concept designs and evaluations, supported by site inspections. Trail difficulty rating, length and style may change during the detailed design process.

Refer to Appendix 5 for trail style descriptions

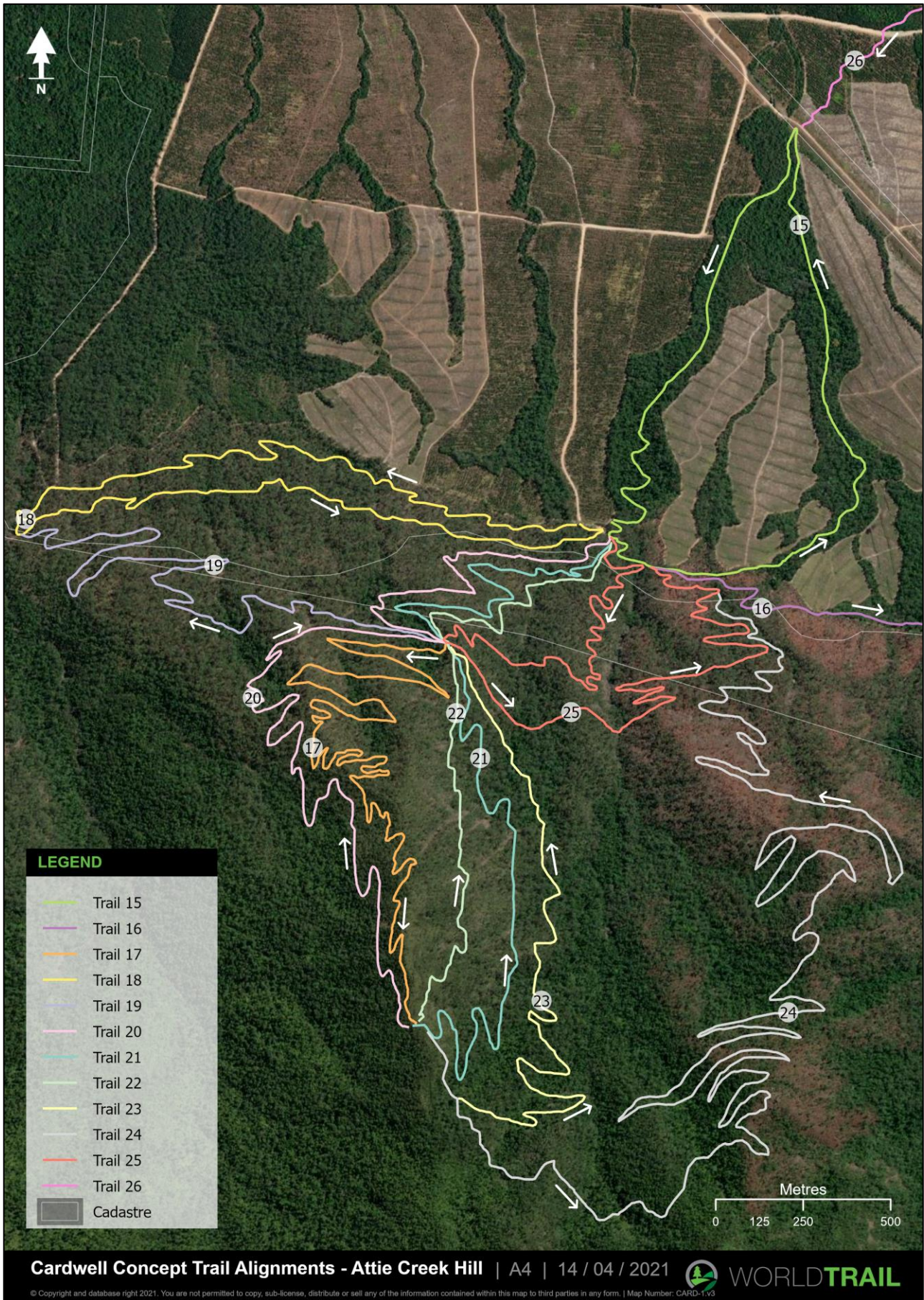




Figure 10 – Attie Creek Trail Network Map


### 4.5.1 Trail 15

TRAIL SUMMARY INFORMATION	
<b>Overview</b>	Trail 15 is a loop trail where one side will be a climb and the other will be a fun flowing descending section. Riders who ride to Attie creek from Cardwell will use this trail to access the Attie Creek car park/event zone. This trail is situated in native forest which lines Attie Creek and a parallel tributary.
<b>Trail Difficulty Rating</b>	 Easy
<b>Length (metres)</b>	3,868
<b>Trail Style</b>	Adventure Trail


### 4.5.2 Trail 16

TRAIL SUMMARY INFORMATION	
<b>Overview</b>	Trail 16 is the main Attie Creek to Cardwell return trail. This trail, conceptually, has been designed to make the 4km return ride to Cardwell as enjoyable as possible. This minimises the effort required to ride home after a fun day riding at Attie Creek where 3.5km of trail gradually descends toward the 5 Ways.
<b>Trail Difficulty Rating</b>	 Easy
<b>Length (metres)</b>	4,269
<b>Trail Style</b>	Adventure Trail


### 4.5.3 Trail 17

TRAIL SUMMARY INFORMATION	
<b>Overview</b>	<p>Trail 17 is a climbing trail allowing riders to access the upper summit of the Attie Creek Trails. Given this trail’s length and its 300m climb it will have an intermediate difficulty rating.</p> <p>As riders ascend this trail, they will have the privilege of taking in views to the north toward Cardwell, Rockingham Bay and the north end of Hinchinbrook Island.</p>
<b>Trail Difficulty Rating</b>	 Intermediate
<b>Length (metres)</b>	4,539
<b>Trail Style</b>	Adventure Trail


### 4.5.4 Trail 18

TRAIL SUMMARY INFORMATION	
<b>Overview</b>	<p>Trail 18 is an Adventure trail providing a return ride from the Attie Creek car park/event zone to Dead Horse Creek. Dead Horse Creek is another spectacular rocky creek which has many pools providing riders the opportunity to take a cool swim.</p> <p>The trail has been designed to maintain separation between the main Dead Horse Creek day use area and mountain bike riders.</p>
<b>Trail Difficulty Rating</b>	 Easy
<b>Length (metres)</b>	4,345
<b>Trail Style</b>	Adventure Trail


#### 4.5.5 Trail 19

TRAIL SUMMARY INFORMATION	
<b>Overview</b>	Trail 19 is a short link trail allowing riders to access Dead Horse Creek from the Attie Creek Mid Way Trail Junction. This will negate the need for riders to return to the Attie Creek car park/event zone to access Dead Horse Creek.
<b>Trail Difficulty Rating</b>	 Intermediate
<b>Length (metres)</b>	2,995
<b>Trail Style</b>	Adventure Trail


#### 4.5.6 Trail 20, 21, 22 and 23

TRAIL SUMMARY INFORMATION	
<b>Overview</b>	<p>Trails 20 to 23 are designated to be the Attie Creek gravity inspired trails. These trails will either be gravity, flow or the extremely popular air flow style of trails. Detailed design will determine the final trail style.</p> <p>These trails start at the Attie Creek summit, at 542m, and descend 300 to 400m in elevation. This level of elevation is world class and will be one of the main attractions of the Cardwell Mountain Bike Trails.</p> <p>These trails can be accessed via a climb trail, however riders will make use of a proposed shuttle service operating on the old Tin Mine Track.</p>
<b>Trail Difficulty Rating</b>	 Intermediate
<b>Length (metres)</b>	Trail 20 – 4,410 Trail 21 – 3,698 Trail 22 – 2,284 Trail 23 – 2,663
<b>Trail Style</b>	Gravity, Air Flow or Flow

#### 4.5.7 Trail 24

TRAIL SUMMARY INFORMATION	
<b>Overview</b>	<p>Trail 24 has been designed to be the signature trail of the Cardwell Mountain Bike Trails. Accessed via shuttle or the Attie Creek climb trail (Trail 17), Trail 24 will take riders on a gravity epic where the trail initially starts with a short climb from the shuttle drop off (540m) to 640m of elevation then descends 480m over course of approximately 9km.</p> <p>Trail 24 will present riders with world class views of the Cardwell area as they descend through dense rainforest, crossing ridgelines and gullies.</p>
<b>Trail Difficulty Rating</b>	 <p>Intermediate</p>
<b>Length (metres)</b>	9,604
<b>Trail Style</b>	Gravity Epic

#### 4.5.8 Trail 25

TRAIL SUMMARY INFORMATION	
<b>Overview</b>	<p>Trail 25 is a loop starting at the Attie Creek car park/event zone taking riders on a round trip beside Attie Creek and the Attie Creek Falls. Lookout locations along the ride will allow riders to take in views of the falls. If riders wish it access the falls directly, they will need to use the existing walking trail as the Attie Creek gorge is too steep to construct a mountain bike trail directly to the falls.</p> <p>There is a potential for Trail 25 to be shared use (mountain bikers and walkers) for the climbing portion of the trail. However, a return trail from the Attie Creek Mid Way Junction is required for walkers. In addition to this, there is potential for a feature bridge, suspension or similar, for riders and walkers to cross Attie Creek near the car park. This will create a unique feature to the overall experience.</p>
<b>Trail Difficulty Rating</b>	 <p>Easy</p>
<b>Length (metres)</b>	4,458
<b>Trail Style</b>	Adventure Trail



## 4.6 PROPOSED TRAILHEAD, EVENT ZONES, SHUTTLE ACCES AREAS

### 4.6.1 Proposed Trailhead – Tully Street

During site visits to Cardwell and subsequent discussions with CCRC, it was determined the most suitable location for the main trail head was at Tully Street. This location is an existing sports field located adjacent to Trail 1. The centre of Cardwell, along the foreshore park lands would be the most ideal location however the available space, car parking and facilities is limited. The main foreshore parkland area can contain some aspects of a mountain bike trail head such as signage and information directing riders to Tully Street.

The Tully Street location has a number of advantages which make it suitable location:

- Close to the main energy locations of Cardwell – the foreshore and retail precinct;
- Plenty of room for expansion as the trails gradually open and grow in popularity;
- Backdrop of the mountains will enhance a trail entry archway;
- Room for a pump track and skills area;
- Availability of existing change rooms, toilet and shower facilities;
- Adjacent football field can be used as event space and/or overflow carparking;
- Closing down a section of Tully Street and St Albans Way will create a rider only zone where an entry arch can be constructed before riders access Trail 1;
- Skate park located on the opposite side of the field;
- Onsite community hall can be used for event co-ordination or similar.



Figure 11 - Proposed Trail Head in Relation to Cardwell Town Centre



**Figure 12 – Proposed Tully Street Trail Head Location**

Secondary trail head locations would be positioned at the individual trail networks of 7 Sisters, Lookout Hill and Attie Creek. These locations would be scaled versions of the main trail head. Signage would be the critical element at these locations

#### 4.6.2 7 Sisters

The concept design has included a shuttle pick up and drop off zone at the 7 Sisters. The start and finish of Trail 3 is at this location and Flow Trail 7 and 9 finishes in this area. Consideration to signage, shelter, bike racks and seating in this location should be given. This area should be set up purely for shuttle turnaround and should have no designated parking to discourage parking in this area. This area could also be utilised as an event hub or staging area. During detailed design, consideration should also be given to consolidating this area into the main trail head. An assessment of the pros and cons for riders returning to the trail head from a gravity rollout point of view also requires assessment.

To access the Watch Tower summit, there is an existing access road in place which requires re-activation. Reinstatement of drainage, whoa-boys, entry points, re-surfacing and turn around point at the summit is required. Cultural Heritage and ecology assessments will also need to be completed.

### 4.6.3 Lookout Hill

Secondary trail head and event zone/shuttle pick up drop off requirements for the Lookout Hill are minimal. Signage for the mountain bike trails is all that is required at this location.

### 4.6.4 Attie Creek

From a geographical point of view, Attie Creek's location is quite removed from the main trail head. As such, this area may require additional facilities that a secondary trail head may not normally have. The trails at Attie Creek have the capability to host high-level race events, require shuttle turnaround to service the Attie Creek gravity trails and will experience a high level of visitation. The following facilities should be considered:

- Shuttle turnaround (essential);
- Trail information and maps (essential);
- Shelter and seating (essential);
- Increased parking capacity (essential);
- Events zone with room for start/finish area, event staging and management (essential);
- Space for food vans during peak times (recommended);
- Ablution Block (recommended);
- Potable Water (recommended).

World Trail envisages the event zone needs the capability to have a gravity trail runout area and suitable room allowed for event staging and management.

In order to access the summit at Attie Creek, an existing but disused access track located at Dead Horse Creek is being proposed. This track was used to access mining operations during Cardwell's mining era. The track is currently overgrown and requires re-establishment of drainage and surfacing.

The track is located within the World Heritage managed area at Attie Creek. A number of factors need to be considered:

- Only the original alignment can be used;
- Only disturbed areas can be cleared. No new clearing;
- The track needs to remain within the existing envelope;
- Gate fitted at entry points to manage access;
- Relative approvals sought with WTMA;
- Ecology and Cultural Heritage assessments and approvals apply;
- Seek other purposes for this track for organisations such as QPWS and Girringun Rangers for land management and maintenance purposes.

## 5 ECOLOGY AND ECONOMICS ASSESSMENTS

The scope of works for this feasibility assessment included completing desktop-based Ecology Values and Economics assessments to confirm the viability of the project from these points of view. World Trail engaged two separate consulting firms to undertake these assessments. Cultural Heritage assessment and Traditional Owner engagement were managed by representatives from CCRC and the Queensland State Governments. However, World Trail provided input and consultation in to this process.

### 5.1 ECOLOGICAL ASSESSMENT

World Trail engaged Trend Ecology to perform the Ecology Values Assessment for the Cardwell Tropical Mountain Bike Trails project area. Emily Krunes, Director and Principal Ecologist, performed the assessment. Emily is a local resident of the Cardwell area and has an intimate knowledge of the project area. The project area contains sensitive ecological areas of forest, wetland and wildlife habitat. Some trails are located in QPWS and WTMA managed areas. Both these parties have been involved throughout the development of the concept trail design process and are supportive of what has been proposed.

Trend Ecology's report outlines a number of constraints, mitigations, recommendations and approvals requirements so that a clear understanding can be gained of the potential impacts on ecological values and the recommended future activities required to ensure a successful project. Trend Ecology's report is included in Section 9.6 – Appendix 6. However, this section will summarise the main findings and the actions required to be undertaken moving forward.

World Trail and Trend Ecology recommend that infield ecology assessment occurs. This is the only way to determine the presence and the extent of flora and fauna habitats to make a determination of the impacts the proposed project will have on ecological values. Once the extent of these habitats is determined, mitigation and management plans can be drawn up and appropriate approvals sought. From a timing point of view, detailed ecology assessment preparations can occur prior to detailed design or ground truthing of the mountain bike trails. The infield assessments can only occur once the trails have been ground truthed. Typically, a ten metre (10m) buffer zone is assessed either side of the trail alignment to give the construction activity some flexibility to move. This buffer zone is factored into the approval applications.

#### 5.1.1 Wetlands and Watercourses

Most of the project area, and as such the trails, is located outside riverine wetland and watercourse areas. Riverine wetlands are protected by the State Vegetation Management Act (VMA) to address loss and degradation of wetland systems that results in declining water quality and loss of biodiversity. The VMA is triggered on specific land tenures outside of National Parks and State Forest areas. At the time the ecology report was written, Trails 10 and 11 passed through a wetland area. The concept alignments were revised with Trail 10 and 11 (Part of Trail 11 is now superseded by Trail 26) being re-aligned to avoid this wetland area.

Watercourses are protected by the Queensland Water Act 2000 and are considered a Matter of State Environmental Significance (MSES). The Water Act is applicable regardless of land tenure and is triggered when any disturbance occurs to a mapped watercourse. This includes clearing vegetation, placing fill or erecting structures within this area. Trails 2, 7 and 11 (Part of Trail 11 now superseded by Trail 26) in the 7 Sisters area were realigned to avoid a mapped watercourse. Similar realignments were made to Trail 12 within the Lookout Hill network and Trails 15 and 16 within the Attie Creek networks.

Comparisons of trails on Trend Ecology maps 8 to 11 and the concept trail network proposed in this report will highlight the changes made to trails to avoid the wetland and watercourse areas. Trail 12 still crosses a

mapped watercourse but the design intent is for the trail to make use of the existing road to pass over the watercourse. A watercourse passes through the 5 Ways. Trails 2, 7 and 16 have been designed to pull up short of the watercourse. Riders will need to cross the watercourse using existing roads or disturbed areas (rear of 5 ways). Trails 10, 15 and 26 avoid the wetland and watercourse.

### 5.1.2 Protected Flora

Native vegetation is protected and regulated by the Queensland VMA. Mapped ecosystems of concern and endangerment have increased levels of protection compared to areas on least concern. Areas of concern and endangerment are likely to require offsets or significant mitigation measures put in place. Like the Wetland areas, the VMA applies to land tenures outside of National Parks and State Forest areas. Trail 1 is located on a land tenure that is not controlled by National Parks or State Forest and is therefore subject to the requirements of the VMA. Trail 1 requires further investigation into mitigation options and the approvals process to be followed. The ecology report includes mitigation options for consideration. It should be made clear; it is essential to support the trail network and the viability of the proposed trail head at Tully Street that Trail 1 as per the concept design or a re-designed version to suit approvals processes is included. Without Trail 1 there is no dedicated mountain bike linkage between the entire network and the trail head. There is an existing, semi-cleared path through the patch of vegetation where a dual direction link could be aligned. Consideration to road easements can also be factored into alternative designs.

Regulated vegetation maps identified that most of the project area contains Remnant Vegetation (Category B), Non-Remnant (Category X) and Watercourse Regrowth (Category R). Each of these areas contain vegetation that is classified as least concern, of concern, or threatened. Whilst the VMA may not apply in these areas due to the land being managed by National Parks or State Forest, threatened ecological communities are protected by the Federal Environmental Protection and Biodiversity Conservation (EPBC) Act.

The project area contains twelve (12) threatened ecological communities of vegetation which were determined to be “recorded”, “unlikely”, “likely to occur” and “possible to occur” within 5km of the project area. Any threatened species (flora and fauna) are protected by state and federal legislation and have the potential to cause constraints to the project. Their presence can only be fully determined during field ecological surveys meaning the desktop report only indicates likelihood of their presence. Outcomes of the infield assessments will determine potential mitigation and approvals requirements.

### 5.1.3 Protected Fauna

Similar to protected flora, protected fauna has similar or the same assessment and approvals requirements. They have state and federal protection from the Environmental Protection and Biodiversity Conservation (EPBC) Act and the Nature Conservation Act. Likelihood of occurrence assessments provide an indication of what threatened fauna species are likely to occur.

Desktop assessments returned twenty four (24) threatened fauna species within the project area of which were found to be “recorded”, “likely”, “potentially” or “possible” to occur within the project area. A large volume of migratory species was found to be within 5km of the project area. Eighteen (18) migratory birds considered special least concern were identified in the project area. In addition to this, forty five (45) migratory marine birds, marine species, terrestrial species and wetland species were identified as potentially occurring. Biomaps indicate the project area contains core habitat for the endangered Southern Cassowary and the Mahogany Glider. Both these species are protected by the NC and EPBC acts.

Presence of these species across the project area can only be determined during field assessments. Some assessments may need to occur during specific times of the year for migration and seasonal patterns.

### 5.1.4 Wet Tropics Area

A small portion of the Attie Creek trails are situated inside the Wet Tropics boundary. Trails within this area are subject to Wet Tropics World Heritage Protection and Management Act 1993 and Wet Tropics Management Plan 1998. This Act and Plan are in place to manage activities that have the potential to affect World Heritage Values. Activities are regulated through a zoning and permit scheme. A permit will have prescribed conditions placed on construction activities to minimise the impact to the Wet Heritage Area (WHA). A WTMA Permit will be required to construct these trails. The process to apply for a permit involves extensive community consultation and well as consultation and assessments with the relative governing bodies.

Representatives from WTMA (and QPWS) have been involved with the project since the inception and commencement of this feasibility assessment by sitting on the Project Control Group. These representatives are supportive of the project and will continue to provide advice and guidance.

The trails situated in the Wet Tropics area are considered essential to the success of the mountain bike product for the Cardwell Tropical Mountain Bike Project. Successful, World Class, mountain bike destinations are supported by shuttle services which provide riders with vehicle uplift access to gravity trails. During site inspections and discussions with members of the PCG and local community, a disused access road was identified at Dead Horse Creek as a potential shuttle access. This road was used to access a mine during the Cardwell's early mining days and is presently used for hiking and dirt motorcycles. This road was used as a basis for designing trails from a location along this road at approximately 540m above sea level. The eastern face of the ridgeline this road runs up, has features which are conducive to creating world class gravity trails. Removal of the shuttle access road will detrimentally affect the overall mountain bike product for Cardwell.

The Attie Creek trail network will be very difficult to design (and construct) to the east of Attie Creek itself given there is no feasible shuttle access. This will have flow on affects to investment and business generation potential the proposed concept trail network will have.

### 5.1.5 Ecological Values Field Assessments, Plans and Approvals

Given the proposed project area contains significant ecological values, the assessment of the impacts the mountain bike will have on these values and subsequent follow up assessments, management plan generation, referrals and approvals could be a large undertaking. The following dot points summaries some of the assessment, planning and application requirements.

- Infield assessments of the trails including a main survey event in spring and potentially two (2) follow up surveys in May and June;
- Targeted species surveys;
- Species management plans;
- MNES/MSES reporting and EPBC referral and offset requirements;
- Approvals applications; and
- Construction monitoring and reporting

Costs and durations need to be factored into the business case as well as tendering, design and construction time frames. Section 6.2.5 contains estimated costs for these activities.

## 5.2 ECONOMIC ASSESSMENT

World Trail engaged MacroPlan to complete a study into the economic benefits that a world class mountain bike destination would bring to Cardwell and the Cassowary Coast Region. The economic and social benefits this project could potentially produce are significant and far reaching.

It is expected the investment of \$5.5m to construct the trails<sup>1</sup> will bring the following benefits. Economic benefits have been based on an assumed trail visitation of 30,000 riders per annum. It is expected peak visitation will occur after a ramp up period after the completion of construction. This in turn will provide a ramp up in the expected economic benefits from this project.

- Generation of \$9.9m of economic benefit during the initial construction phase;
- \$18.13m of revenue post construction and ramp up of visitation phase;
- Increased demand for accommodation, food/beverage and tourism experiences in the region;
- Creation of new business opportunities in the form of bike shops, shuttle services, tour operators;
- Increased investment into the region in the accommodation, services, retail and facilities space;
- Generation of 5 FTE jobs during construction and 97 FTE jobs during operation for the CCRC LGA;
- Generation of local jobs has a flow on affect to create additional jobs for Queensland as a whole;
- Increased health and social benefits to all walks of like in the Cardwell and surrounding regions;
- Reinvigoration of Cardwell's tourism industry to complement mountain bike tourism;
- Recognition of Cardwell as a mountain bike destination across Australia and the globe.

This study supports the investment into the project to bring significant tangible benefits to Cardwell and the Cassowary Coast Region. An influx of visitors to Cardwell will result in additional investment into the accommodation and services sector to support up to 30,000 visitors a year to ride the trails. This volume of visitors is expected to result in 36,000-night stays.

Tourism services directly and indirectly associated with the mountain bike trails will grow. Riders will enjoy a rest day to take on other tourism products and enjoy the world class natural beauty of the area. This will in turn be inviting to regular tourist visitors (non-mountain bike riders). Cardwell and the surrounding area has established tourism products such as cultural art and craft, fishing, walks/hikes, white water rafting, Hinchinbrook Island and the Great Barrier Reef.

Another aspect a world class mountain product has the potential to attract is race events. Cardwell has the potential to host national, international or signature race events. While these events run over a short period of time, the economic injection is significant and more importantly the national or international exposure is priceless. The Cassowary Coast region already hosts world class events such as the Red Bull Defiance race and there is no reason why similar events cannot be hosted within the Cardwell Tropical Mountain Bike Trails. One of Australia's largest event organisers has expressed interest in following this project and has identified exciting potential for the future.

Section 9.7 – Appendix 7 contains the Cardwell Mountain Bike Strategy Economic Advice report.

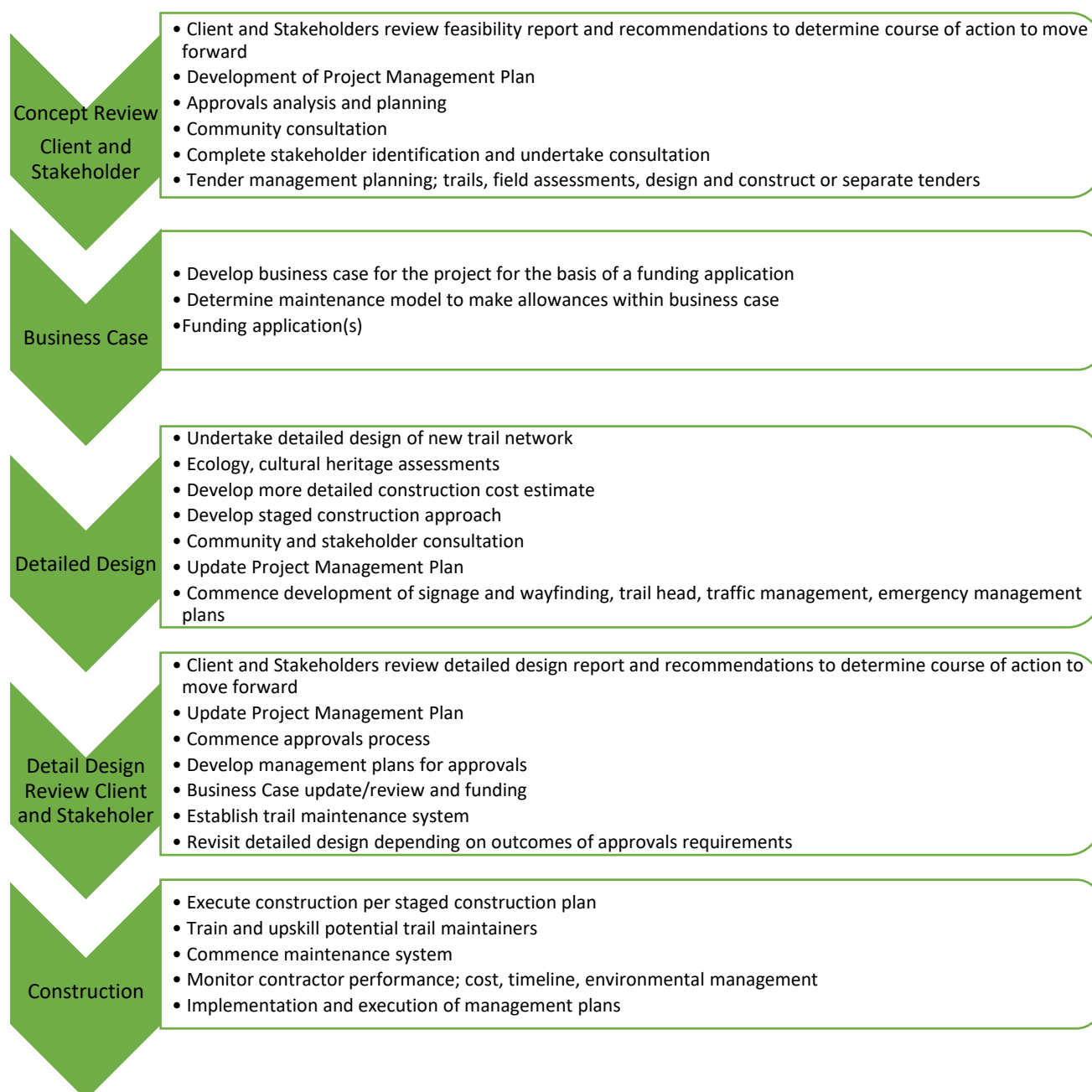
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<sup>1</sup> Trail construction cost only without contingency. Exclusions and separate costing items per Section 6.2

## 6 IMPLEMENTING THE CONCEPT

### 6.1 NEXT STEPS

World Trail recommends the following staged process be undertaken going forward. Ultimately, the stakeholder group needs to determine the best course of action for continuation of this project. A project management plan or similar could be created to map out the process to be undertaken, identify the approvals and funding requirements and develop a business case to justify funding applications.





## 6.2 DESIGN AND CONSTRUCTION COST ESTIMATE

### 6.2.1 All Trails – Ground Truthing (Trail Design)

**Table 5 – All Trails Ground Truthing Costs**

TRAIL NAME	LENGTH (M)	DESIGN COST
7 Sisters		
Trail 1	1226	\$ 1,226
Trail 2	1360	\$ 1,360
Trail 3	2189	\$ 2,189
Trail 4	4422	\$ 4,422
Trail 5	3313	\$ 3,313
Trail 6	10246	\$ 10,246
Trail 7	4808	\$ 4,808
Trail 8	2761	\$ 2,761
Trail 9	2939	\$ 2,939
Trail 10	2441	\$ 2,441
Trail 11	1104	\$ 1,104
Trail 26	597	\$ 597
Lookout Hill		
Trail 12	3872	\$ 3,872
Trail 13	2126	\$ 2,126
Trail 14	3489	\$ 3,489
Attie Creek		
Trail 15	3868	\$ 3,868
Trail 16	4269	\$ 4,269
Trail 17	4539	\$ 4,539
Trail 18	4345	\$ 4,345
Trail 19	2995	\$ 2,995
Trail 20	4410	\$ 4,410
Trail 21	3698	\$ 3,723
Trail 22	2284	\$ 2,284
Trail 23	2663	\$ 2,663
Trail 24	9604	\$ 9,604
Trail 25	4458	\$ 4,458
Report		\$ 15,000
ArcGIS Work		\$ 3,000
Accom/Transport/Incidentals		\$ 25,000
<b>Total</b>		<b>\$ 137,053</b>
<b>Total (with 10% contingency)</b>		<b>\$ 150,758</b>

**Table 5 Notes:**

Costs are representative of ground truthing only. They exclude trail head and event area design, ecology and Cultural Heritage assessments, land tenure analysis and any required acquisitions, stakeholder and community consultation, negotiation or engagement, applications for permits and approvals. These costs are indicative and developed based on previous projects. This estimate excludes any engineering design required (bridges for example), the creation of any engineering drawings or standard project specific drawings. Refer to Section 6.2.6 for more information.

## 6.2.2 7 Sisters – Construction Cost Estimate

**Table 6 - 7 Sisters Construction Costs**

TRAIL NAME	LENGTH (M)	CONSTRUCTION COST LOW	CONSTRUCTION COST HIGH	COMMENTS
Trail 1	1,226	\$ 42,903	\$ 55,161	Trail Head start loop
Trail 2	1,360	\$ 47,600	\$ 61,200	5 Ways to 7 Sisters Link
Trail 3	2,189	\$ 76,614	\$ 98,503	7 Sisters Easy Loop
Trail 4	4,422	\$ 154,767	\$ 198,986	7 Sisters Easy Loop
Trail 5	3,313	\$ 115,970	\$ 149,104	Watch Tower Hill short climb
Trail 6	10,246	\$ 358,617	\$ 461,079	7 Sisters wilderness loop
Trail 7	4,808	\$ 216,351	\$ 264,429	Watch Tower Hill Gravity - Flow or Airflow
Trail 8	2,761	\$ 124,263	\$ 151,877	Watch Tower Hill Gravity - Flow or Airflow
Trail 9	2,939	\$ 132,266	\$ 161,658	Watch Tower Hill Gravity - Flow or Airflow
Trail 10	2,441	\$ 85,442	\$ 109,854	Link off Trail 7. Will have Flow elements
Trail 11	1,104	\$ 38,643	\$ 49,684	7 Sisters to Attie Link Trail
Trail 26	597	\$ 20,891	\$ 26,860	Shared Use Trail. No surfacing
Trail Construction Total	37,407	\$ 1,414,327	\$ 1,788,396	
Construction Management Plans		\$ 20,000	\$ 25,000	CMP, WHSE, CEMP
Surface Treatments (10%)		\$ 141,433	\$ 178,840	Rock armour, surfacing, rock walls
Vegetation Clearing		\$ 187,035	\$ 374,069	Clearing of trail corridor
Signage & Branding (5%)		\$ 70,716	\$ 89,420	Trail wayfinding and signage. Not trail head signage
Project management (5%)		\$ 70,716	\$ 89,420	Offsite based project management. Site supervision included
Mobilisation/Demobilisation (5%)		\$ 70,716	\$ 89,420	Site establishment and de-establishment, containers and temp fencing hire
Accommodation/Incidentals (5%)		\$ 70,716	\$ 89,420	Crew accommodation and meals. Assumed to be within 30 mins
<b>Total</b>	<b>37,407</b>	<b>\$ 2,045,660</b>	<b>\$ 2,723,984</b>	

### 6.2.3 Lookout Hill – Construction Cost Estimate

**Table 7 - Lookout Hill Construction Costs**

TRAIL NAME	LENGTH (M)	CONSTRUCTION COST LOW	CONSTRUCTION COST HIGH	COMMENTS
Trail 12	3,872	\$ 135,512	\$ 174,229	Lookout Hill access loop
Trail 13	2,126	\$ 74,426	\$ 95,691	Lookout Hill loop trail
Trail 14	3,489	\$ 122,113	\$ 157,002	Lookout Hill loop trail
Trail Construction Total	9,487	\$ 332,051	\$ 426,922	
Construction Management Plans				Included in Table 6
Surface Treatments (10%)		\$ 33,205	\$ 42,692	Rock armour, surfacing, rock walls
Vegetation Clearing		\$ 47,436	\$ 94,872	Clearing of trail corridor
Signage & Branding (5%)		\$ 16,603	\$ 21,346	Trail wayfinding and signage. Not trail head signage
Project management (5%)		\$ 16,603	\$ 21,346	Offsite based project management. Site supervision included
Mobilisation/Demobilisation (5%)		\$ 16,603	\$ 21,346	Site establishment and de-establishment, containers and temp fencing hire
Accommodation/Incidentals (5%)		\$ 70,716	\$ 89,420	Crew accommodation and meals. Assumed to be within 30 mins
<b>Total</b>	<b>9,487</b>	<b>\$ 533,215</b>	<b>\$ 717,944</b>	

## 6.2.4 Attie Creek – Construction Cost Estimate

**Table 8 - Attie Creek Construction Costs**

TRAIL NAME	LENGTH (M)	CONSTRUCTION COST LOW	CONSTRUCTION COST HIGH	COMMENTS
Trail 15	3,868	\$ 135,372	\$ 174,049	Attie Creek access loop trail.
Trail 16	4,269	\$ 149,404	\$ 192,090	Attie Creek to Cardwell return link
Trail 17	4,539	\$ 181,575	\$ 226,968	Attie summit climb
Trail 18	4,345	\$ 173,798	\$ 217,248	Attie to Dead Horse loop
Trail 19	2,995	\$ 119,813	\$ 149,767	Attie to Dead Horse link
Trail 20	4,410	\$ 198,433	\$ 242,530	Summit to Attie descent
Trail 21	3,698	\$ 166,426	\$ 203,410	Summit to Attie descent
Trail 22	2,284	\$ 102,769	\$ 125,606	Summit to Attie descent
Trail 23	2,663	\$ 119,849	\$ 146,482	Summit to Attie descent
Trail 24	9,604	\$ 432,198	\$ 528,242	Epic trail, short climb, 9km descent
Trail 25	4,458	\$ 178,333	\$ 222,916	Attie Falls Loop. Suspension bridge
Trail Construction Total	47,134	\$ 1,957,968	\$ 2,429,307	
Construction Management Plans				Included in Table 6
Surface Treatments (10%)		\$ 195,797	\$ 242,931	Rock armour, surfacing, rock walls
Vegetation Clearing		\$ 329,937	\$ 589,173	Clearing of trail corridor
Signage & Branding (5%)		\$ 97,898	\$ 121,465	Trail wayfinding and signage. Not trail head signage
Project management (5%)		\$ 97,898	\$ 121,465	Offsite based project management. Site supervision included
Mobilisation/Demobilisation (5%)		\$ 97,898	\$ 121,465	Site establishment and de-establishment, containers and temp fencing hire
Accommodation/Incidentals (5%)		\$ 70,716	\$ 89,420	Crew accommodation and meals. Assumed to be within 30 mins
<b>Total</b>	<b>47134</b>	<b>\$ 2,848,114</b>	<b>\$ 3,715,226</b>	

### 6.2.5 Total Project Costs – Trail Design and Construction Only

**Table 9 - Total Design and Construction Costs**

ALL TRAILS	LENGTH (M)	CONSTRUCTION COST LOW	CONSTRUCTION COST HIGH	COMMENTS
<b>Total Costs (All Trails)</b>	<b>94,028</b>	<b>\$ 5,426,989</b>	<b>\$ 7,157,155</b>	

Notes for Tables 6, 7, 8 & 9:

Construction cost high is considered to be construction cost low with contingency. Ground Truthing will better determine ground conditions and allow for more accurate construction costs to be determined. Costs for each trail are derived using a cost per metre rate. Cost per metre is determined by the constructability of the soil, manipulation of rock and trail style (air flow, flow, adventure) which is determined during ground truthing or from site inspection design and construct tender. Air Flow trails for example, contain features that require additional time to construct and the use of larger machines. Selection of cost per metre rate for creating an estimate is based on concept development site investigations. Some line items do not have defined scope and quotes have not been obtained. The line items above may not be all encompassing of the final construction scope. The construction cost estimate has the following assumptions and exclusions. Some of these items are determined during the ground truthing and design phase:

- Trail treatments such as rock armoring, specialised surfacing, rock walling (10% allowance);
- Engineering solutions such as bridges, retaining walls over 1000mm (Section 6.2.6);
- Project preliminaries (5% allowance);
- Project management (5% allowance);
- Signage and wayfinding (5% allowance);
- Trail head design and construction (Section 6.2.6);
- Branding and marketing development (Section 6.2.6);
- Mobilisation and demobilisation, accommodation, daily incidentals (allowance and shown where applicable);
- Approvals and permits (Section 6.2.6).

## 6.2.6 Additional Project Proposal Costs

**Table 10 – Additional Costs**

ITEM	COST ALLOWANCE	COMMENTS
Main Trail Head Civil and Facilities Upgrades	\$ 250,000	Allowance only
Main Trail Head Signage and Entry Arch	\$ 100,000	Allowance only
7 Sisters Shuttle Pick Up/Turn Around Area and Shuttle Road Re-activation Civil Works	\$ 150,000	Allowance only
7 Sisters Shuttle Pick Up/Turn Around Area and Shuttle Road Signage	\$ 15,000	Allowance only.
Attie Creek Event Zone and Shuttle Pick Up/Drop Off Civil Works	\$ 200,000	Allowance only
Attie Creek Event Zone and Shuttle Pick Up/Drop Off Facilities (Toilets etc)	\$ 150,000	Allowance only
Attie Creek Shuttle Road Re-Activation Civil Works	\$ 250,000	Allowance only
Attie Creek Event Zone and Shuttle Pick Up/Drop Off Signage	\$ 15,000	Allowance only
Ecology Assessments and Approvals	\$ 370,000	Based on an estimate provided by Trend Ecology
Traditional Owner Engagement		No scope, cannot make an allowance. Completed during design and construction phase. Often managed by clients
Community Consultation	\$ 100,000	Allowance only
Suspension Bridge (or similar) for Attie Creek Crossing	\$ 150,000	Derby suspension bridge \$300k
HQ Plantation Land/Commercial Plantation engagement and planning	\$ 150,000	Allowance only
Marketing and Branding	\$ 100,000	Allowance only
Management Plan creation (operational state)	\$ 100,000	Allowance only
Engineering Solutions D&C (low level bridges, retaining walls)	\$ 250,000	Allowance of 200m of low-level bridges and retaining walls. Identification occurs during design phase and completed during the construction phase.
Project Management (15%)	\$ 352,500	
<b>Sub Total</b>	<b>\$ 2,702,500</b>	
<b>Total (with 20% contingency)</b>	<b>\$ 3,243,000</b>	

## Notes for Table 10:

The line above items do not have defined scope and quotes have not been obtained. World Trail do not specialize in some of the above line items and in the absence of a design process, a scope and a quote from subcontractor, values are to be treated as assumed values only. The above line items may not be all encompassing of the project's requirements for design and construction phases. 20% contingency allowed for as scope and quotes have not been provided.

### 6.2.7 Summarised Project Cost Estimate

**Table 11 - Summarised Project Design and Construction Costs**

<b>ALL TRAILS</b>	<b>COST w/o CONTINGENCY</b>	<b>COST w/ CONTINGENCY</b>
<b>Ground Truthing</b>	<b>\$ 137,052</b>	<b>\$ 150,758</b>
<b>Construction</b>	<b>\$ 5,426,989</b>	<b>\$ 7,157,155</b>
<b>Additional Costs</b>	<b>\$ 2,702,500</b>	<b>\$ 3,243,000</b>
<b>TOTAL</b>	<b>\$ 8,266,541</b>	<b>\$ 10,550,913</b>



## 6.3 APPROVALS AND PLANNING

### 6.3.1 Recommendations for Approvals and Planning

The next phases of the project will require the most planning and approvals. The commencement of the design phase will trigger the start of Ground Truthing (trail alignment design), ecological and Cultural Heritage assessments (amongst others). Prior to this, funding revenues need to be sought and project planning is required.

Prior to detailed design, a project plan is required to establish the steps required to undertake the project from feasibility to design, construction and operation. The following aspects require consideration (please note they may not be all encompassing):

- Determination of funding requirements and applications;
- Action plan to resolve constraints (refer to Section 6.4);
- Tendering plan for assessments (ecology etc.), subsequent approvals, detailed design of trails and trail construction elements;
- Signage and Way Finding plans;
- Trail Head plan;
- Marketing and branding;
- Funding and revenue generation plans;
- Updating town planning schemes;
- Community and Traditional Owner engagement plans;
- Operational Plan including maintenance, traffic management, park management (weather, fire), emergency management;

The items above may require action at different stages of the project hence why it is necessary for an overarching project plan is required. Some items can be condensed into larger contract packages to simplify the management of the project.

The project will pass through a number of approvals toll gates. Similar to the planning aspects, the required approvals need to be determined and incorporated into the project plan. Sufficient funding and time allocation need to be made to ensure project funding and time frames are appropriate. Significant approvals processes include:

- Relevant ecological and Cultural Heritage approvals. These will evolve during the course of the project once these aspects are further understood and can potentially consume significant amounts of time. Approvals in this area may extend to federal level;
- Approvals from relative land managers including WTMA, QPWS, HQ Plantations and CCRC. Each entity will have their own approvals requirements;
- Funding applications and subsequent approvals to cover forthcoming project stages;
- Relevant local government planning and development approvals.

### 6.3.2 Design and Construction Staging

World Trail recommends a design phase incorporating mountain bike trail ground truthing, infield ecological assessments and Cultural Heritage mapping are grouped together as a single process. Other complimentary activities may also be attached to this phase. It may be prudent to separately fund this step as there are a number of unknowns associated with the outcomes of the ecological and Cultural Heritages assessments. These outcomes may have a significant impact on the timing for the commencement of construction and will also allow for the business case to be more accurately detailed for construction funding.

1. Trail Ground Truthing and Reporting – 12 Weeks<sup>2</sup>
2. Ecology Assessments – 6 to 8 months due to seasonal fauna movements<sup>3</sup>
3. Ecology Approvals – 6 months<sup>4</sup>
4. Cultural Heritage Mapping – 6 months<sup>5</sup>

A staged construction approach is recommended for the Cardwell Tropical Mountain Bike Project. This will allow a progressive opening of trails which will in turn create a ramp up of visitation. Gradually opening trails can also allow for “teasing” of what is to come and generate interest for perspective visitors. A staged construction approach is recommended to be undertaken following these steps. Indicative construction time frames have been provided which are for trail construction only. Supporting infrastructure may be completed in parallel with trail construction and may not add extra duration. The following time frames assume clear access, no seasonal impacts on construction and no impacts to standard construction methodology from ecology and Cultural Heritage requirements.

1. 7 Sisters – 37 weeks
2. Lookout Hill – 10 weeks
3. Attie Creek – 47 weeks

Constructing the 7 Sisters initially will open some shuttle assisted gravity trails with a complimentary set of Adventure and Wilderness trails that will be suitable for beginner and intermediate riders. This will generate interest from a regional point of view, attracting riders locally, from Townsville, Cairns and potentially from other parts of the state. This opportunity will also allow for supporting businesses to initiate their investments in the town on a smaller scale. At this time, a small trail maintenance team to commence operation.

The completion of the Attie Creek trail network supported by shuttle access will signify the project’s completion and unlock the full potential for Cardwell to be an internationally recognised ride destination. At this point, the destination will start to experience an influx from intrastate, interstate and international visitors.

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<sup>2</sup> Subject to availability. Only accounts for initial trail alignment design and does not account for re-alignments

<sup>3</sup> Subject to seasonal access to flora and fauna species. May or may not account for targeted species assessments

<sup>4</sup> Assumed duration only

<sup>5</sup> Assumed duration only

## 6.4 POTENTIAL CONSTRAINTS AND OPPORTUNITIES

### 6.4.1 Potential Constraints

#### 6.4.1.1 Ecology and Cultural Heritage

Cardwell is surrounded by a pristine and significantly valuable ecosystem with Cultural Heritage aspects. The Trend Ecology Ecological Values report highlights the significance of the ecology in the area and this is something that cannot be taken lightly. It must be assumed this could impose potential constraints on the project. To get a true understanding of the impacts the Cardwell Tropical Mountain Bike Project has on ecology values, extensive infield assessments must be undertaken during the detailed design phase. There is an element of risk to the project that may arise from these investigations that may lead to timeline and funding slip. It is important for the project control group to understand these potential risks and ensure they are approached with due diligence. Findings from infield assessments may result in trail alignment changes and/or reductions to minimise impacts. Specific construction measures and constraints may be imposed to ensure impacts are minimised.

Traditional Owners, Girramay/Girringun, have indicated that there are no identified cultural heritage sites within the project area. This is primarily because there has been no mapping activities undertaken in the past. They have clearly expressed that the project cannot proceed without “on Country” assessments along the trail alignments. Similar to the ecology aspect, significant Cultural Heritage finds may result in additional assessments, approvals, alignments changes or removal. This has the potential to have an effect on the project timeline and budget.

The constraints that may arise from ecology and Cultural Heritage assessments should be treated as opportunities as offsetting, mitigating and minimising issues and constraints can be seen to be ensuring the project is ecologically and culturally sensitive. This will add value to the product’s sustainability and success.

#### 6.4.1.2 HQ Plantations

The project area exists over an area of commercial tree plantations that are managed by HQ Plantations. The plantation or Plantation License Area (PLA) is situated between the township of Cardwell and three trail locations around the Cardwell trail network. All trails at Lookout Hill are within PLA. Access through the PLA for mountain bike riders can be via unsealed roads or dedicated mountain bike trails. The concept trail network contains a number of mountain bike trails that traverse the PLA to provide linkage between the 7 Sisters, Lookout Hill and Attie Creek. These trails are essential to ensure the success of the mountain bike product. The destination assessment highlights an area of concern for the Cardwell Tropical Mountain Bike Project where there is significant separation between the town and Attie Creek Trail locations. The most successful mitigation of the impact from this separation is to ensure the linking trails are designed in a fashion to ensure the best and most enjoyable experience for mountain bike riders. Removing these trails will result in riders being forced to ride along unsealed roads or short cutting along PLA headlands and access tracks. Additional vehicles in the PLA used by riders to access trails is an undesirable outcome. Lastly, riders may not be necessarily be arriving in Cardwell in their own or rented vehicles. Therefore, they may not have the ability to drive themselves around the network. The most successful outcome for the Cardwell Tropical Mountain Bike Project is a ride-in, ride-out trail network.

A consultation and negotiation process with HQ Plantations needs to occur to establish an understanding, a set of controls and management oversight for trails and riders traversing the PLA. At different times, parts of the PLA will need to be closed off to mountain bike riders whilst plantation management activities are undertaken. This is to ensure the safety of both plantation workers and mountain bike riders. Plantation operations (particularly harvest and re-establishment) will result in damage to trail infrastructure

constructed within the plantation area. This needs to be considered in the design and construction of the trail network. Successful ride destinations such as Rotorua (New Zealand) have trails situated within commercial plantations. This location operates successfully with commercial operations and mountain bike riders, noting that there are periods when access to the trails is restricted and there are works required to rehabilitate or reconstruct after operations. It is an important criterion for HQ Plantations that the trails do not negatively impact on the ability to carry out plantation management operations (including negative community perception where trails are required to be closed due to operations, or potential increased costs to prevent trail users from accessing worksites while HQ Plantations operations are in progress). Where the construction of the trails or associated infrastructure results in a loss of plantation area (such as is proposed for the Attie Creek trail head), or increased maintenance or management costs, there will be a requirement for compensation to be met. A management plan for these activities needs to be drawn up to define how this is to be managed and involve input from HQ Plantations.

#### **6.4.1.3 Fire and Extreme Weather**

During periods of extreme adverse weather, the trail network will need to be closed. Fire management activities, fuel reduction burning and potential for wildfires in the area is well understood by local land managers and responsible agencies including HQ Plantations, QPWS and Queensland Fire and Emergency Services. Where fire management activities or the threat of wildfire has the potential to impact on the trail network, it will need to be closed. How the trails respond to wet weather will be a learned exercise once they initially open. Well managed mountain bike trail networks will close after certain amounts of rain fall during a set period of time to manage damage to the trails as well as rider safety. Management plans setting out the actions and responsibilities need to be drawn up so ensure these events are managed correctly.

#### **6.4.2 Opportunities for Cardwell and the Cassowary Coast Region**

Mountain bike tourism from internationally recognised ride destinations can generate significant financial, social and well-being improvements to the local and surrounding areas. Cardwell is enduring reduced tourism to the local area in the wake of the Global Financial Crisis (GFC) and Cyclone Yasi. While these events happened over a decade ago, the area has not regained the tourism, investment and financial stimulation experienced prior to these events.

It is envisaged the proposed concept has the potential to draw in 30,000 mountain bike visitors per annum. These visitors range from day trippers from the local catchment areas (Cairns and Townsville), overnight stays and multi night stays. Typically, riders who travel to ride destinations do so in groups; as a family or group of friends. Mountain bike riders also typically travel with their bikes and suitcase therefore are more than likely to source meals and drinks from cafes, restaurants, convenience stores, boutique breweries and pubs. Accommodation needs to be suitable for all budgets and styles. Typically house or cabin (multi-bed) style accommodation is preferred for travelling groups, however hotels and motels will also benefit from this tourism.

Improvements in the local economy as well as investment into reinvigorating existing and new offerings in Cardwell will generate employment opportunities. An additional 30,000 mountain bike visitors along with the existing tourism and drive through visitation will require additional staffing.

The existing tourism market in the Cardwell and Cassowary Coast region will also significantly benefit from the additional visitation. The mountain bike product will complement other tourism offerings and vice versa. Mountain bike riders will travel to Cardwell first and foremost to ride, then partake in other recreational activities during a day or afternoon off. Visitors coming to Cardwell for other reasons, will have an impressive mountain bike offering to try. This is where bike hire and/or tours will flourish.

The Economic Report attached contains further detail on the economic benefits the project will bring to the area, along with supporting facts and numbers.

## 7 OPERATIONAL PHASE

### 7.1 MANAGEMENT / MAINTENANCE PLANNING

Mountain bike trails designed and constructed to a high level will not require significant ongoing maintenance. Other factors such as soil types, length and variety of trails, annual rain fall, volumes of riders and events can dictate how trails will perform from a maintenance point of view.

World Trail recommends the following maintenance model:

- Identify and recruit members of the local area and/or Traditional Owner organisations into the trail construction teams;
- Upskill people during the construction process;
- Integrate people into the local council or through Traditional Owner organisations on an FTE basis to undertake trail maintenance and stewardship.

For example, maintenance on the Blue Derby trails in Tasmania is managed by the local council, Dorset Council. The council currently employ 4 FTE's who are part of a core council maintenance team are dedicated to the mountain bike trail maintenance program. They are assigned blocks of time to perform trail maintenance on a routine or as-needs basis. When they are not maintaining the trails, they are absorbed back into the larger council maintenance team. If additional labour is required on the trails (for example after a race or significant weather event), labour is drawn from the larger maintenance group to support the trail maintainers. More recently, due to the popularity of the Blue Derby trails, these FTE's are full time dedicated to trail maintenance. An additional benefit to using the local council for maintenance purposes is the upstart costs are minimal given they will have significant infrastructure, maintenance management systems and equipment.

This model can support a collaborative approach between CCRC and Girramay/Girringun. This model is also an excellent approach to allow Traditional Owners the ability to manage their land through the mountain bike trails. This can extend to management of other facilities and attractions. The model above is funded by the local council using revenue streams generated by mountain bike tourism.

Costs for a council or a collaboration with a Traditional Owner organisation, based on two (2) full time equivalents (FTE's) initially can be summarised as the following. These values are indicative values.

- Salary for two FTE's initially employed at \$60,000pa each (\$120,000pa total);
- One-off purchase of work vehicle with accessories \$60,000;
- One-off purchase of tooling and equipment – container, power carrier, chainsaws (estimate only) \$30,000; and
- Ongoing annual cost (training, annual tooling replacements, consumable materials (surfacing, fuel etc), utility costs and potentially sub-contractors) allowance \$50,000 pa from year two (2) onwards.

The ongoing costs equate to approximately \$1800 per kilometre, per annum for 94km of trails.

As the trails will be gradually opened, two (2) FTE's engaged to work part time on trails is envisaged to be the likely scenario. Once the trail network is fully opened and popularity gradually ramps up, these two FTE's may become full time on the trails and/or potentially go to three FTE's. Blue Derby, for example, has recently taken on a fourth FTE to be 100% dedicated to trail maintenance for the 125km of trails.

An alternative option is to fully engage a contractor to undertake the maintenance activity. Indicative costs can be summarised as follows;

- Two skilled trail maintainers \$312,000 pa (based on hourly rates);
- One work vehicle \$25,000pa;
- One maintenance container with tooling and equipment \$30,000pa.

Revenue streams for maintenance funding require identification from an early point in time. These need to be substantial and robust enough to support employment of approximately three to four employees and ensure continuity of a maintenance and stewardship program including recruitment, training, equipment and asset procurement. Case study areas such as Derby and St Helens in Tasmania approach revenue generation to fund maintenance of the trails in different fashions.

- Ambassador programs for businesses to sign up as Platinum, Gold and Silver Sponsors of the trails;
- Advertising through destination specific websites for businesses in the area;
- Recovery of revenue through economic growth, property value increases and investment in the area;
- No obligation “Tap to Donate” (\$5 per tap for example) points for donations toward trail maintenance;
- Royalties from use of branding through merchandising, souvenirs, imagery, publications;
- Licensing for commercial operators to operate in the mountain bike trail network;
- Data collection of trail performance and visitation can be documented and made available, commercially, to interested parties.

Models such as pay to ride to fund maintenance programs could be considered for this project. However, these programs may deter visitors and could experience poor uptake. It is difficult to manage a system like this due to the geographical nature of any mountain bike trail network as there is often no single entry point every rider must pass through and users can freely come and go, at any time of the day. A program like this would need to be approached where riders voluntarily obtain a trail pass, make a donation or obtain a membership. A yearly pass or membership could be set at \$50 per rider per annum. Assuming 5,000 riders voluntarily obtain a pass or membership, potentially \$250,000 could be generated. A review of similar nature-based products such as National Park walks and hikes could reveal other systems for maintenance revenue generation for these facilities.

It would be wise for the trail managers to consider monitoring trails for visitation. This information can be used support the requirement need for maintenance as well as a variety of other things:

- Creation of business cases for future expansion and/or ongoing maintenance funding;
- Tool for promoting investment into the area;
- Support the initial investment to expand and incorporate additional trails;
- Benchmark against other Ride Destinations;
- Marketing and advertising.

## 7.2 REVENUE GENERATION OPPORTUNITIES

Further to the information provided in the MacroPlan economics report, Ride Destinations are underpinned by services and facilities. These services and facilities also need to be a drawcard for the Ride Destination as much as the trails are. Riders who travel intrastate, interstate or even internationally will appreciate the ability to arrive with just their bikes and rely on the local services to support their stay – and they aren’t afraid to spend money! This makes travel less complicated. Generally, those who travel to Ride Destinations

do so in groups; families and groups of friends. Services and facilities a ride destination require include, but are not limited to:

- Accommodation with suitable quantities of beds and in a variety of options to suit all budgets;
- Food, drink and retail in a suitable variety, price range with appropriate opening hours;
- Shuttle services to support airport runs, gravity products, point to point rides;
- Public restrooms and facilities (access to water and shelter);
- Bike repair, maintenance and wash stations;
- Bike hire and repair shops with selections of spares and merchandise;
- Businesses providing alternatives to mountain bike riding for a rest day or the remainder of the tourist market;
- Branding merchandise for the Ride Destination

Cardwell has established accommodation, food, drink and retail providers. This service will need to grow and expand in size and variety should the Cardwell trails grow in popularity.

World Trail has incorporated gravity trails into the concept design. These products need to be supported by a shuttle service which is essential to viability of the project. In order for a shuttle to access the top of the Watch Tower Peak and Attie Creek Summit, existing access roads requires upgrade to a suitable standard and made available to commercial operators. As a minimum, access is to be suitable for a side by side or a four-wheel drive towing a trailer. This shuttle service can also support a service between Cardwell and the trail network, more importantly Attie Creek.

Another revenue generation opportunity is alternative activities to mountain biking. Riders who travel to a destination may appreciate something to do on a day off riding their bikes. This may include tours, fishing trips, reef trips, walks and hikes. Cardwell has an abundance of natural beauty and some existing tourism products to support this. These products will in turn grow from mountain bike riders and regular tourists to lift the tourism market in the Cardwell area.

### 7.3 SIGNAGE AND WAYFINDINGS

The development of signage and wayfinding is a significant exercise in its own right. It is important to get this designed correctly prior to the opening of any trails. While signage and wayfinding design can be very simple, the difficulty and challenges come from developing branding, artwork, trail names and pictograms.

Trail head signage need to be simple yet detailed enough to provide riders with sufficient information to make informed decisions about their ride. Signage doesn't end at the trail head; signage needs to be located throughout the network at:

- Secondary trail heads;
- Trail junctions and hubs;
- Trail merges;
- Road crossings;
- Shuttle pick up and drop off locations; and
- Along the trails (emergency).

An essential part of the process associated with detailed design or prior to, is the development of a Signage and Way Finding Plan. This will determine the exact signage requirements for the project, styles, colours, art work and branding associated with signage. Coupled with this is an Emergency Management Plan which will outline emergency signage requirements throughout the network. World Trail recommended trail designers and constructors undertake the development of these plans in conjunction with the client and stakeholders.





Figure 13 – Example Trail Head Signage – Atherton, Queensland



Figure 14 - Example Trail Head Signage - St Helens, Tasmania



Figure 15 - Trail Map on Trails - Melrose, South Australia



Figure 16 - Example Emergency and Crossing Signage - St Helens, Tasmania



Figure 17 - Example Way Finding Signage - Derby, Tasmania

## 8 CONCLUSION

The outcomes of this feasibility assessment support the Cardwell Tropical Mountain Bike Project being a viable project which will provide significant benefit to the Cassowary Coast Area.

A thorough consultation process was initiated as a part of this feasibility assessment. This included many stakeholders from the surrounding Cardwell area, members from Local and State Government, commercial operators (HQ plantations) as well as community representatives and they community itself. Through this process, there is strong support for the proposed project and a sense of enthusiasm the benefits a project like this will bring to the region.

A significant stakeholder and contributor to the proposed project's progress thus far is the Girringun/Girramay Traditional Owners. Through a consultation and engagement process co-ordinated by CCRC and members of the State Government, the project has full support from Girringun/Girramay. This feasibility process has identified many prospects for Girringun/Girramay including the opportunity to initiate Cultural Heritage mapping within the project area, employment avenues, investment potential and the ability to further share their Cultural Heritage values with visitors to the trails and the region.

85km of trails is recommended to support the vision to become an international Ride Destination. World Trail has conceptually designed 94km of mountain bike trails in this feasibility which originate and finish at Cardwell. The Cardwell trail system has the potential to grow to support over 130km of trails. This may include trails located at or on the Kirrama Range which could be operated as a guided or self-guided tours. Cardwell has the right attributes, elevation, natural beauty and access to support the construction of mountain bike trails to make Cardwell an attractive Ride Destination.

Cardwell is set on the door step of significant World Heritage sites such as the Great Barrier Reef, Hinchinbrook Island and parts of Girringun National Park. This indicates the significance of the natural ecological and Cultural Heritage values of the area. A desktop ecological values assessment was performed as a part of this feasibility study. The report highlights the significance of these values as well as the need to undertake diligent field assessments to get a full understanding the trail construction will have on flora and fauna. These field assessments will also inform the approvals requirements which may escalate to state and/or federal levels and what management plans are required to gain these approvals.

A desktop economics assessment has proved the project will generate significant return on investment to the Cassowary Coast Region as well as the state of Queensland as a whole. An additional 30,000 mountain bike visitors will significantly stimulate the local economies which will in turn generate investment and employment opportunities to the area. Improvements in the services and accommodation areas will be needed to support an additional 36,000 night stays in the area as well as other tourism offerings for mountain bike riders to partake in. Existing tourism offerings will flourish by leveraging the mountain bike tourism market and vice versa. A range of social wellbeing improvements will be generated through increased property values, employment, additional sports and recreation and an increase in the retail offerings in Cardwell.

The process from this point requires definition. World Trail can only recommend a process to follow; the Project Control Group needs to define the sub processes such as approvals requirements and funding trigger points. The key phases from here are:

- Review of recommendations from this report and development of a plan to move forward i.e. create an agreed project plan;
- Develop a business case for the project;
- Define funding and approvals requirements for each phase;

- Seek approval to continue to project as proposed in this feasibility report;
- Complete ground truthing and in field assessments and investigations process;
- Continue the funding and approvals process;
- Undertake construction activities;
- Develop and implement operational aspects of the project

## 9 APPENDICES

### 9.1 APPENDIX 1 – DESTINATION ASSESSMENTS

#### 9.1.1 Cardwell – Primary Criteria Notes

NUMBER	CRITERIA	DESCRIPTION	DESTINATION SPECIFIC NOTES
1	Destination Proximity	How far is the destination from a major airport?	Cardwell is 2.5 hours from Cairns and 1.5 hours Townsville.
2	Population Proximity	How large is the population base within the region?	Combining the greater Townsville and Cairns regions it is anticipated a population of 400,000 within 3 hours of Cardwell. Cairns and Townsville are popular mountain bike towns with local and regionally significant trail networks
3	Trail Proximity	How far is the current or proposed trail head from the centre of town?	Proposed trail head at Tully Street is very close to town. <1km
4	Gravity Connectivity and Rider Support	How far is the final run out from the mountain to shuttle point to shuttle points, town centre, trail head?	There is a large disconnect from the town/main trail head to Attie Creek. The connection from Lookout Hill and 7 Sisters is closer. It is essential that Trails 11, 15 and 26 (7 Sisters to Attie Creek) and Trail 16 (Return from Attie Creek) are constructed. Without these the product will be significantly affected as riders will be forced to ride to and from the Trail Head to Attie Creek via the existing dirt roads. This presents unacceptable hazards; vehicle interaction and dust.
5	Existing/Future Trail Products	What is the quality and quantity of any existing trail products? What is the quality and quantity of future trail products?	No formal existing Trails. Currently mountain bike riders use existing dirt roads, pine plantation headlands and disused logging trails. Future trails are 94km with potential to go to 130km plus.
6	Existing/Future Gravity Products	What is the quality and quantity of any existing trail products? What is the quality and quantity of future trail products?	No existing gravity products. Concept has 8 gravity products serviced by shuttle roads and climb trails
7	Altitude/Elevation Presented	Is the altitude of usable hill sides or mountains fit the model for idea elevations for future trails?	There is approximately 400m of usable elevation at Attie Creek and 130m at 7 Sisters. Highest points at Attie Creek are approximately 640m above sea level.

NUMBER	CRITERIA	DESCRIPTION	DESTINATION SPECIFIC NOTES
8	Eco Tones	Is there varying changes in the landscape that create a aesthetically pleasing trail system or is it monotone? I.e. bush/forest types, rocks, boulders, escarpments	The eco tones presented are pristine and diverse, ranging from dense rain forest to open forested areas. Some areas have large granite boulders, large grass trees, rocky outcrops.
9	Bars, Cafes and Retail Precinct	Is there a precinct that contains bars, cafes, variety of food/dining options, mini mart, entertainment?	Existing facilities in Cardwell are good but the volume and variety is lacking. If Cardwell grows in popularity, the verity of choices for visitors will need to grow and opening hours change to suit.
10	Natural Features	Is there a variety if natural features that will enhance the rider's experience such as waterfalls, vistas, lakes, rivers, escarpments, forests?	The natural features the trails are situated on and are close to are World Class. These include World Heritage Wet Tropics areas, National Parks, water falls, natural spas, rainforest, open wooded forest areas, rainforest lines creeks. Cardwell has a significant X factor in the Cultural Heritage space.
11	Trail Type/Category - DH, GT, FT etc	How diverse are the existing and future trails in terms of trail types? Downhill, gravity, air flow, cross country, adventure trails, wilderness trails	Existing trail offerings are XC style of trails. The proposed concept network covers all trail types including an asphalt sealed pump track.
12	Accommodation	How many beds are available within 10km	It is assumed Cardwell has approx. 200-250 existing beds. This can and will grow to be over 300 with popularity
13	Progressive Expansion	If the destination becomes a success, is there room to grow into adjoining areas?	Cardwell has the potential for approx. 60-70km of additional trails to the concept trail volume.
14	Event Logistics	Is there an area close to town that has the potential contain an event village?	The main trail head has the potential to be used for major events however this would be limited to XC or Enduro style events. Gravity events will require staging at 7 sisters or Attie Creek.
15	Access, Shuttle & Emergency Roads	Are there sufficient access roads that can be used for shuttles, emergency access and maintenance?	There is an existing, but disused trail to the top of 7 Sisters and the top of Attie Creek. It is envisaged these roads are re-habilitated to become shuttle roads. All areas of the Cardwell network have excellent vehicle access roads.
16	Constructability	Is the soil/ground conditions conducive to trail construction? Is there some challenges? Is larger or special machinery required? Are the trails accessible?	The ground conditions present good constructability based on the site inspections undertaken during the development of the concept.
17	Soil Conditions	Do the soil conditions create the ideal trail surface?	Soil conditions presented have variety and will create good conditions, particularly with the right amount of moisture. There may be some challenges with some sections of trails during wet weather events but these can only be evaluated during the design and construction phase.

### 9.1.2 Cardwell – Secondary Criteria Notes

NUMBER	CRITERIA	DESCRIPTION	DESTINATION SPECIFIC NOTES
18	Product Linkage	Are there other mountain bike products/destinations nearby, shuttles to/from airports, is the destination on a major Tourist drive?	Currently no nearby mountain bike products. Closest significant products are Townsville or Cairns. No shuttles servicing gravity products or airports. Cardwell is located on the Bruce Highway therefore access is excellent. The noted services can be established
19	Suitable Existing Products	Are there other products/activities to do on a day off/rest day nearby? Winery, tours, rafting, ballooning, luge, bungy	Alternative activities to mountain bike riding are limited due to the tourism industry in Cardwell being affected by the GFC, Cyclones. It is envisaged that a significant mountain bike product like what is presented in this concept will trigger re-investment in the original tourism industry; fishing charter, reef/island trips, rainforest tours, white water rafting. This will provide many complimentary activities to mountain bike riding
20	Opportunities	Is there opportunity to create economic/new business ventures at the destination? i.e. food/drink services, accommodation, activity, bike hire, tours, bike shops	Cardwell has exiting, but limited in variety accommodation and services. These will grow in time. Bike shops will open, shuttle companies will start up, tours will start operating. The economics report highlights significant opportunities for the Cardwell area from an economics and social well-being point of view.
21	Precinct Area	Is there an existing or an area available to create a precinct suitable for retail growth?	The existing main street is the precinct for Cardwell and has capacity to expand. This will be enhanced by the existing parkland on the ocean side of the Bruce Highway.
22	Emergency Services and Communications	Are there any medical clinics, hospitals, ambulance, chiropractor, massage services at the destination or nearby?	There are limited medical facilities in Cardwell. Nearest hospital service is Ingham (30 minutes away) and serious issues will be referred to Townsville or Cairns Hospitals. There is Ambulance and Fire response services in Cardwell.
23	Historical Man-Made Features	Are there any historical features and/or experiences to be had at the destination?	There are limited historical man-made features in Cardwell. However, this is negated by the significant natural beauty of the area.



## 9.2 APPENDIX 2 – COMPARATIVE DESTINATION ASSESSMENT DATA – DERBY AND ST HELENS

### 9.2.1 Cardwell vs Derby, Tasmania

Where does Cardwell do better than Derby?	Where does Cardwell fall short in comparison to Derby?	Neutral Aspects
Food, Beverage and Retail Offerings. Cardwell has more of these offerings compared to Derby's current state	Trail proximity to main trail head and town. Derby township is 100m from the main trail head. All trails either funnel back to the trail head or directly in town. It is a 4km ride from Attie Creek back to the Cardwell main trail head	The population proximity within 3 hours of Cardwell is approximately 400,000. Derby has approx. 450,000 – 500,000; almost all of Tasmania's population
Progressive Expansion. Derby has gone through 2 stages of expansion and is currently approx. 120km. Derby is at a point where they need to increase maintenance staff to cover any additional trails	Gravity connectivity. A number of Derby gravity style trails feed directly into the trail head and the town. The 7 Sisters gravity trails in directly feed into the main trail head. Attie Creek gravity trails will feed into a remove shuttle pick up/event zone	Both Derby and Cardwell have a similar volume of gravity specific trails
Activities to do on a day off. Cardwell already has a large variety of day off type of activities including fishing, rain forest walks, reef, islands, rafting. Derby is very limited in comparison	Cardwell in the current concept has less trails than Derby. However, bear in mind Derby is operational has gone through a second expansion. Cardwell has capacity to expand to a similar or greater volume.	Attie Creek gravity trails and the Blue Tier trail at Derby have similar altitude elevation drop offerings for riders
Emergency services in Cardwell include ambulance and fire. Derby has none	Soil conditions in Derby are some of the best conditions available. Cardwell will have some challenging soil conditions	Both destinations have their own unique eco tones and natural features which provide significant value to the mountain bike products
	Derby's accommodation far succeeds the current accommodation offerings in Cardwell. Derby has a variety of budget group style accommodation through to award winning eco lodges. Cardwell has capacity to rival the accommodation options of Derby	Event logistics at both areas have some challenges as well as the types of events each location has capacity to host. The Derby trail head is small and events have to be co-ordinated from the camping and day parking area. The Cardwell trial head has large amounts of room for event space however is removed from the trail network
		The Cardwell trail networks have been designed around the re-instatement of two access roads. These will be the corner stone of the success of the Cardwell product. Derby also has shuttle road access.

### 9.2.2 Cardwell vs St Helens, Tasmania

Where does Cardwell do better than St Helens	Where does Cardwell fall short in comparison to St Helens?	Neutral Aspects
Trail proximity to main trail head and town is very close for Cardwell. The St Helens trail head is 6km from town. It is a long ride to/from the trails or a car drive. It is worth noting, St Helens have mitigated this issue a small amount by providing ablutions and a small retail outlet at the trail head.	Gravity connectivity. All gravity trails at St Helens feed into the main trail head which is also the shuttle pick up point.	The population proximity within 3 hours of Cardwell is approximately 400,000. St Helens has approx. 450,000 – 500,000; almost all of Tasmania’s population
Progressive Expansion. St Helens has gone through an expansion process and is currently approx. 120km. St Helens has limited space to expand. Cardwell, at this point in time, has more opportunity to expand		Food, beverage, retail and accommodation offerings are similar in both locations
The concept trail network for Cardwell has more gravity products than what is on offer at St Helens		Activities to do on a day off. Cardwell already has a large variety of day off type of activities including fishing, rain forest walks, reef, islands, rafting. Derby is very limited in comparison
Soil conditions in Cardwell are far more conducive. Where Cardwell experience soil condition problems, is in areas where the alignments can be designed and constructed to be much flatter.		Both destinations have their own unique eco tones and natural features which provide significant value to the mountain bike products
The Cardwell trial head has large amounts of room for event space however is removed from the trail network. This area is also very close to town. All events held at the St Helens trail head will have a 6km separation from the town itself		Both Cardwell and St Helens are limited to what types of events they can host. Both have capacity for XC, Enduro and Marathon style mountain bike races. Cardwell may give consideration to a Downhill Trail during detailed design.
		The Cardwell trail networks have been designed around the re-instatement of two access roads. These will be the corner stone of the success of the Cardwell product. St Helens also has shuttle road access.

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### 9.3 APPENDIX 3 – RIDE DESTINATION DEMOGRAPHICS SNAPSHOT

In May and June 2020, World Trail conducted an online survey to understand people's experiences at Rider Blue Derby, Tasmania. 3073 responses were received. Most survey participants have been in Derby in the 12 months prior to the survey, with over half visiting in the past 6 months. Some limitations in the findings need to be considered when analysing this data; not every respondent answered all questions in the questionnaire and the survey was voluntary therefore the views of the entire mountain bike visitation may not be entirely reflected.

- 65% of riders are ages 35 to 54 years of age
- 75% had a household income of >\$150k
- 60% stayed 2 to 4 days on average. 15% stayed 5 or more nights
- 45% travelled with 2 to 5 other riders. Two thirds travelled with kids
- Majority of riders had intermediate ability and prefer Wilderness and Flow Trails
- Riders highly value well designed and maintained trails, finishing with a smile and diversity in style, length and challenge
- A shuttle service was used two to five times


Whilst this data is high level, it demonstrates the demographics of the types of visitors to Derby, the available income to spend while staying there and the durations of their stay. World Trail can provide the full survey findings<sup>6</sup>

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<sup>6</sup> Contact World Trail to discuss avenues to obtain a copy

## 9.4 APPENDIX 4 – MTBA TRAIL DIFFICULTY RATING SYSTEM


### 9.4.1 Very Easy Mountain Bike Trail / Fire Trail

		<b>Technical Description</b> <i>(for land Manager use)</i>	<b>Trail Description</b> <i>(for public information)</i>	<b>Generic Description</b> <i>(for public Information)</i>	<b>Short Classification Key</b>
	Grade of trail	Very easy			
	Description	Likely to be a fire road or wide single track with a gentle gradient, smooth surface and free of obstacles	Likely to be a fire road or wide single track with a gentle gradient, smooth surface and free of obstacles	Wide trail with a gentle gradient smooth surface and no obstacles	Wide trail, gentle gradient smooth surface, no obstacles
<b>Guiding Criteria</b>	Trail Width	2100 mm plus or minus 900 mm	Two riders can ride side by side	Suitable for beginner cyclists with basic bike skills, and most bikes	For beginner cyclists with basic bike skills
	Trail Surface	Hardened or smooth	Hardened with no challenging features on the trail		
	Trail Gradient	Climbs and descents are mostly shallow Ave. trail grade – less than 5% Max. trail grade – 10%	Climbs and descents are mostly shallow		
	Quality of Markings	Trailhead signs and route markers at intersections	Clearly signposted		
<b>Mandatory Criteria</b>	Level of Trail Exposure	Firm and level fall zone on either side of the trail corridor			
	Natural Obstacles and Technical Trail Features (TTFs)	No obstacles	No obstacles		
	Experience Required	Suitable for beginner / novice cyclists with basic bike riding skills Suitable for most bikes	Suitable for beginner / novice cyclists with basic bike riding skills Suitable for most bikes		


### 9.4.2 Easy Mountain Bike Trail

		<b>Technical Description</b> <i>(for land Manager use)</i>	<b>Trail Description</b> <i>(for public information)</i>	<b>Generic Description</b> <i>(for public Information)</i>	<b>Short Classification Key</b>
	Grade of trail	Easy			
	Description	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	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	Wide trail with a gentle gradient smooth surface  Some obstacles such as roots, logs and rocks	Wide trail, gentle gradient, some obstacles  For beginner mountain bikers with basic mountain bike skills
<b>Guiding Criteria</b>	Trail Width	900 mm plus or minus 300 mm	Handlebar width or greater	Suitable for beginner cyclists with basic mountain bike skills, and off-road bikes	
	Trail Surface	Mostly firm and stable	Mostly firm and stable		
	Trail Gradient	Climbs and descents are mostly shallow, but trail may include some moderately steep sections Ave. trail grade – 7% or less Max. trail grade – 15%	Climbs and descents are mostly shallow, but trail may include some moderately steep sections		
	Quality of Markings	Trailhead signs and route markers at intersections	Clearly signposted		
<b>Mandatory Criteria</b>	Level of Trail Exposure	Exposure to either side of the trail corridor includes downward slopes of up to 10%	N/A		
	Natural Obstacles and Technical Trail Features (TTFs)	Unavoidable obstacles to 50 mm high, such as logs, roots and rocks Avoidable, rollable obstacles may be present Unavoidable bridges 900 mm wide Short sections may exceed these criteria	Trail may have obstacles such as logs, roots and rocks		
	Experience Required	Suitable for beginner / novice cyclists with basic bike riding skills Suitable for off-road bikes	Suitable mountain bikers with basic mountain bike skills Suitable for most bikes		


### 9.4.3 Easy / Intermediate Mountain Bike Trail

		<b>Technical Description</b> <i>(for land Manager use)</i>	<b>Trail Description</b> <i>(for public information)</i>	<b>Generic Description</b> <i>(for public Information)</i>	<b>Short Classification Key</b>
	Grade of trail	Easy with Intermediate Sections			
	Description	Likely to be single track with a moderate gradient, variable surface and some obstacles. Short sections may exceed these criteria	Likely to be single track with a moderate gradient, variable surface and some obstacles Short sections may exceed these criteria	Likely to be single track with a moderate gradient, variable surface and some obstacles	Single track, moderate gradient and some obstacles
<b>Guiding Criteria</b>	Trail Width	750 mm plus or minus 200 mm	Handlebar width	Some obstacles such as roots, logs and rocks  Suitable for mountain bikers with mountain bikes	For beginner mountain bikers with basic mountain bike skills
	Trail Surface	Mostly firm and stable	Mostly firm and stable		
	Trail Gradient	Climbs and descents are mostly shallow, but trail may include some moderately steep sections Ave. trail grade – 7% or less Max. trail grade – 20%	Climbs and descents are mostly shallow, but trail may include some moderately steep sections		
	Quality of Markings	Trailhead signs and route markers at intersections	Clearly signposted		
<b>Mandatory Criteria</b>	Level of Trail Exposure	Exposure to either side of the trail corridor includes downward slopes of up to 20%	N/A		
	Natural Obstacles and Technical Trail Features (TTFs)	Unavoidable obstacles to 100 mm high, such as logs, roots and rocks Avoidable, rollable obstacles may be present Unavoidable bridges 900 mm wide Short sections may exceed these criteria	Trail may have obstacles such as logs, roots and rocks		
	Experience Required	Suitable for beginner / novice mountain bikers with basic mountain bike skills Suitable for off-road bikes	Suitable mountain bikers with basic mountain bike skills Suitable for most bikes		

### 9.4.4 Intermediate Mountain Bike Trail


		<b>Technical Description</b> <i>(for land Manager use)</i>	<b>Trail Description</b> <i>(for public information)</i>	<b>Generic Description</b> <i>(for public Information)</i>	<b>Short Classification Key</b>
	Grade of trail	Intermediate	Intermediate	Intermediate	Intermediate
	Description	Single trail with moderate gradients, variable surface and obstacles Dual use or preferred use	Single trail with moderate gradients, variable surface and obstacles	Single trail with moderate gradients, variable surface and obstacles	Single trail, moderate gradients, obstacles and some steep sections
<b>Guiding Criteria</b>	Trail Width	600 mm plus or minus 300 mm	Handlebar width or greater	May include steep sections  Suitable for skilled mountain bikers with mountain bikes	For skilled mountain bikers
	Trail Surface	Possible sections of rocky or loose tread	Possible sections of rocky or loose tread		
	Trail Gradient	Mostly moderate gradients but may include steep sections Ave. trail grade – 10% or less Max. trail grade – 20%	Mostly moderate gradients but may include steep sections		
	Quality of Markings	Trailhead signs and route markers at intersections	Signposted		
<b>Mandatory Criteria</b>	Level of Trail Exposure	Exposure to either side of the trail corridor includes downward slopes of up to 20%	N/A		
	Natural Obstacles and Technical Trail Features (TTFs)	Unavoidable obstacles to 200 mm high, such as logs, roots and rocks Avoidable, obstacles to 600 mm may be present Unavoidable bridges 600mm wide Short sections may exceed these criteria	Trail will have obstacles such as logs, roots and rocks		
	Experience Required	Suitable for skilled mountain bikers with basic mountain bike skills Suitable for mountain bikes	Suitable for skilled mountain bikers with basic mountain bike skills Suitable for mountain bikes		

### 9.4.5 Intermediate / Difficult Mountain Bike Trail


		<b>Technical Description</b> (for land Manager use)	<b>Trail Description</b> (for public information)	<b>Generic Description</b> (for public Information)	<b>Short Classification Key</b>
	Grade of trail	Intermediate with Difficult Sections			
	Description	Likely to be a challenging single trail with moderate gradients, variable surface and obstacles Dual use or preferred use	Likely to be a challenging single trail with moderate gradients, variable surface and obstacles	Suitable for competent mountain bikers, used to physically demanding routes  Expect large and unavoidable obstacles and features	For competent mountain bikers  Large, unavoidable obstacles and features
<b>Guiding Criteria</b>	Trail Width	600 mm plus or minus 300 mm	Handlebar width or greater	Challenging and variable with some steep climbs or descents and loose surfaces	Some steep climbs or descents and loose surfaces
	Trail Surface	Possible sections of rocky or loose tread	Possible sections of rocky or loose tread		
	Trail Gradient	Mostly moderate gradients but may include steep sections Ave. trail grade – 15% or less Max. trail grade – 20%	Mostly moderate gradients but may include steep sections		
	Quality of Markings	Trailhead signs and route markers at intersections	Signposted		
<b>Mandatory Criteria</b>	Level of Trail Exposure	Exposure to either side of the trail corridor includes downward slopes of up to 25%	Exposure to either side of the trail corridor includes downward slopes of up to 25%		
	Natural Obstacles and Technical Trail Features (TTFs)	Unavoidable obstacles to 300 mm high, such as logs, roots and rocks Avoidable, obstacles to 1000 mm may be present Unavoidable bridges 600 mm wide Short sections may exceed these criteria	Trail will have obstacles such as logs, roots and rocks		
	Experience Required	Suitable for competent mountain bikers with good mountain bike skills Suitable for mountain bikes	Suitable for competent mountain bikers with good mountain bike skills Suitable for mountain bikes		



### 9.4.6 Difficult Mountain Bike Trail

		<b>Technical Description</b> (for land Manager use)	<b>Trail Description</b> (for public information)	<b>Generic Description</b> (for public Information)	<b>Short Classification Key</b>
	Grade of trail	Difficult			
	Description	Likely to be a challenging single trail with steep gradients, variable surface and many obstacles Single use and direction Optional lines Suitable for cross country, downhill or trials	Likely to be a challenging single trail with steep gradients, variable surface and many obstacles	Suitable for experienced mountain bikers, used to physically demanding routes	For experienced mountain bikers  Challenging trail
<b>Guiding Criteria</b>	Trail Width	300 mm plus or minus 150 mm for tread and bridges	Can be less than handlebar width	Navigation and personal survival skills are highly desirable	Large, unavoidable obstacles and features
	Trail Surface	Variable and challenging	Variable and challenging		
	Trail Gradient	Contains steep descents and climbs Max. trail grade – 25%	Contains steep descents and climbs	Expect large, dangerous and unavoidable obstacles and features	Long, steep climbs or descents and loose surfaces
	Quality of Markings	Trailhead signs and route markers may be limited	Limited signs		
<b>Mandatory Criteria</b>	Level of Trail Exposure	Exposure to either side of the trail corridor includes steep downward slopes or freefall	Exposure to either side of the trail corridor includes steep downward slopes or freefall	Challenging and variable with long steep climbs or descents and loose surfaces	
	Natural Obstacles and Technical Trail Features (TTFs)	Unavoidable obstacles 380 mm high, such as logs, roots, drop off 's or constructed obstacles Avoidable, obstacles to 1200 mm may be present Unavoidable bridges 600 mm wide Short sections may exceed these criteria	Unavoidable obstacles such as logs, roots, drop off 's or constructed obstacles		
	Experience Required	Suitable for experienced mountain bikers with good skills, used to physically demanding routes Navigation and personal survival skills are highly desirable Suitable for better quality mountain bikes	Suitable for experienced mountain bikers with good skills, used to physically demanding routes Navigation and personal survival skills are highly desirable Suitable for better quality mountain bikes.	Some sections will be easier to walk	

### 9.4.7 Extreme Mountain Bike Trail

		<b>Technical Description</b> <i>(for land Manager use)</i>	<b>Trail Description</b> <i>(for public information)</i>	<b>Generic Description</b> <i>(for public Information)</i>	<b>Short Classification Key</b>
	Grade of trail	Extreme			
	Description	Extremely difficult trails incorporating very steep gradients, highly variable surface and unavoidable, severe obstacles Single use and direction Optional lines Cross country, downhill or trials	Likely to be a challenging single trail with steep gradients, variable surface and many obstacles	Suitable for experienced mountain bikers, used to physically demanding routes	For experienced mountain bikers  Challenging trail
<b>Guiding Criteria</b>	Trail Width	3150 mm plus or minus 100 mm for tread and bridges Structures can vary	Can be less than handlebar width	Navigation and personal survival skills are highly desirable	Large, unavoidable obstacles and features
	Trail Surface	Widely variable and challenging	Widely variable and challenging		Long, steep climbs or descents and loose surfaces
	Trail Gradient	Expect prolonged steep, loose and rocky descents or climbs Max. trail grade – 40%	Expect prolonged steep, loose and rocky descents or climbs	Expect large, dangerous and unavoidable obstacles and features	
	Quality of Markings	Trailhead signs and route markers may be limited	Limited signs		
<b>Mandatory Criteria</b>	Level of Trail Exposure	Exposure to either side of the trail corridor includes steep downward slopes or freefall	Exposure to either side of the trail corridor includes steep downward slopes or freefall	Challenging and variable with long steep climbs or descents and loose surfaces	
	Natural Obstacles and Technical Trail Features (TTFs)	Large committing and unavoidable obstacles to 380 mm Avoidable, obstacles to 1200 mm may be present Unavoidable bridges 600 mm or narrower Width of bridges is unpredictable Short sections may exceed these criteria	Unavoidable obstacles such as logs, roots, drop off 's or constructed obstacles	Some sections will be easier to walk	
	Experience Required	Suitable for highly experienced mountain bikers with excellent skills, used to physically demanding routes Navigation and personal survival skills are highly desirable Suitable for quality mountain bikes	Suitable for experienced mountain bikers with excellent skills, used to physically demanding routes Navigation and personal survival skills are highly desirable Suitable for better quality mountain bikes.		

## 9.5 APPENDIX 5 – TRAIL STYLE DESCRIPTIONS

### ADVENTURE

One of the world's most prolific trail styles, traditionally referred to as cross-country, Adventure Trails are the most popular gateway trail for all levels of mountain bike riders. They have a free-flowing style and maximise use of the natural terrain with contour-hugging designs that allow riders to feel confident, while also providing options and features for extra challenge.

### WILDERNESS

Located in remote settings, Wilderness Trails take advantage of the raw natural beauty of diverse landscapes giving riders a unique, immersive and memorable experience. They are generally narrow, longer-distance trails with a focus on ensuring the trail provides an opportunity for riders to challenge themselves over an endurance distance while finishing with a huge smile and desire to do it all over again.

### FLOW

A descending trail style, Flow Trails offer a constant undulation of groomed rollers, berms, and achievable obstacles. The tyre-hugging trajectory sending riders on a sculptured luge ride through the bush. They create a sensation of speed and rhythm, require minimal decision-making and maximise the ability to feel in control and have fun.

### AIR FLOW

Developed by World Trail, Air Flow Trails combine everything we love about Enduro and Gravity Trails – magnifying pure flow, creating exciting line choices, transfers and safe jumping options. Sculptured jumps, berms, rollers abound, but obstacles are usually rollable, putting the emphasis on rider safety, skill progression and undeniable fun.

### GRAVITY

Offering a mix of Flow, Air Flow and Downhill, Gravity Trails embrace the raw beauty of the terrain in an exciting and challenging descent. They will often provide multiple line choices and a variety of features, and may include occasional short uphill sections.

### DOWNHILL

Of all the trail styles, Downhill Trails are generally the steepest, most raw and challenging. They are the domain of long-travel, design-specific mountain bikes and UCI sanctioned racing. With minimal benching, steep erratic features, off-camber, large transfer and high-risk options, these trails are generally shorter, more aggressive and suited to the more experienced riding.

## 9.6 APPENDIX 6 – PRELIMINARY ECOLOGICAL CONSTRAINTS ANALYSIS

## 9.7 APPENDIX 7 – CARDWELL MOUNTAIN BIKE STRATEGY ECONOMIC ADVICE



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