Te Kopahou Reserve Track Network Planning Process – Assessment of Track Feasibility and Appropriateness.

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Prepared for: Wellington City Council, October 2021

DOCUMENT CONTROL

Version	Date	Notes
1.0	3 Aug	Framework and headings
1.1	23 Aug	Begin adding text and building model
1.2	1 Sep	Mostly complete for new tracks (except 20b) and 4WD tracks (except Track 8) and the Thrill network
2.0	10 Oct	Introduction and Executive Summary
2.1	12 Oct	Check calculations and edit
2.2	13 Oct	Combine Track 5 and 18 into one and rewrite
2.3	21 Oct	Re-ordering of Introduction and methodology/standards material. Final edits
3.0	30 Oct	Reorder main Parts to more geographical structure

Acknowledgments
Thanks to rangers Frank and Tom for their time and their 4WD skill. Thanks to Bec Ramsay and Cheryl Robilliard for their openness, patience and support.

Warranty and disclaimer
This is a subjective work, based on our experience and our understanding of best practice in track management and planning in protected areas. Limited but sufficient time was available for field work but we stand by this work as a good solution for our client to implement in Te Kopahou Reserve, given its status and character. Every track concept, alignment and measurement in the report should be confirmed on the ground before committing to the construction phase with stakeholders, and track alignments should be laid out completely before construction.

CONTENTS

EXECUTIVE SUMMARY

Te Kopahou Reserve is a rugged natural area on Wellington's South Coast, where a network of old farm tracks provides for recreational use by a range of visitors. Wellington City Council is conducting a planning exercise to establish a plan for a better network. This has attracted a large amount of public interest.

The Council has hired Envisage New Zealand to consider the feasibility and appropriateness of the (25) tracks in a Draft Track Network Plan (the Plan) in light of the Reserve's terrain, status and values, and in light of current and potential use patterns.

Whole of Reserve-Level Findings

There is indeed significant untapped potential in Te Kopahou Reserve. A revamped track network could provide substantially greater benefits to users and the city. However, not all of the tracks in the Plan are both feasible and appropriate.

Grading of off-road cycling trails

The Plan focuses on Grade 3 as the target difficulty grade for the main cycling trails in the Reserve. This is technically feasible in most cases and it is the current grade of the tracks in nearby Polhill Reserve. However, the riding in Te Kopahou Reserve is sufficiently remote and physically demanding that it is beyond the skills of most 'Intermediate' riders and is more like 'Advanced' riding – Grade 4. Grade 4 trails are also narrower than Grade 3 ones and about 30% shorter for the same height gained. They are cheaper to build and maintain, and they have less impact.

Grade 4 is the most suitable grade for off-road cycling trails in Te Kopahou, but with six degrees as the average for uphill slopes, not seven, which is the nominal maximum.

User Conflict and riding style

There is some user conflict in the Reserve but dual use is certainly envisaged by the Plan. Te Kopahou provides a very good opportunity for relatively quiet, exploratory forms of recreation, whose proponents are sensitive and who are adversely affected by speed-focused activities and large groups of other users.

Walking and trail running are very simple activities but off-road cycling is more complex and splits into several types. Each of these has specific needs and terrain requirements which cannot be met in all parts of the Reserve. Some are not suitable in certain parts of the Reserve for safety reasons, or because they can impact other users, or the style of trail required can create significant environmental impacts in an ecologically important protected area that is slowly regenerating.

The Importance of the Signature Trail designation

The concept of a 'Signature Trail' is a new and important one in the City's future track Network, and something different to the existing tracks, especially on a bike. While the Signature brand is not a formal, standardised one, it does imply a high level of service; it supports the idea of upgrading the Red Rocks Track in its current location and indicates a shelter and bridges there are warranted. It will likely lead to higher numbers of slightly less competent visitors than are seen on the rest of the tracks. The portion of this trail that is within the Reserve should mirror that portion that is not in order to give a consistent experience, both by bike and on-foot.

South of the Radome

Uphill riding from the south coast and the 42km loop

The idea of a new connection facilitating easier uphill travel from the coast up to the Radome area is a good one (Track 22 or 24). This concept relies on the ability to build a

suitable track up through the lower Hāpe Stream gorge. This looks to be nigh-on impossible for biking due to the terrain and difficulties posed by a history of quarrying. It is still worth doing for on-foot users.

A potentially important loop track

There are essentially no loop experiences in the Reserve, other than very long, demanding ones using old vehicle tracks. Upgrading Track 12 would create a significant, nine-kilometre loop experience for on-foot visitors, achievable in a half-day from Te Kopahou carpark.

Satisfaction for technical- and trill-style riding

This part of the Reserve seems unlikely to provide satisfying riding for technical and thrill-seeking cyclists. These riders normally prefer multiple trail options in one place, with easy repeat riding. Furthermore, while there is nominally plenty of steep terrain in the Reserve, average gradients of tracks will be well below what these riders usually seek.

Realigning Red Rocks Track or building a new one

The Red Rocks Track, with its ridge-top position is the best place for the Signature Trail designation and for enjoyment by all users. Shared use should be possible in the right conditions and occurs in many other places. However, the current track has nine difficult sections that spoil the experience for some members of all user groups: these sections should be eliminated, mainly with bypasses. Building a new track instead would have a narrower audience and would not have the grand views of the Red Rocks Track. It would impose cost and have at least some environmental impact.

North of the Radome

Duplicating Carparts Extension and Barking Emu

North of the Radome, between the Tip Track and the top of Zealandia, is a critical nexus between Te Kopahou and other track Destinations. The Signature Trail passes through this area but is currently missing a vital connection to the sanctuary fenceline; this connection should be built.

The current tracks here are nominally for shared use and are relatively flat ones where bike speeds are limited. However, they lack width and good visibility, and their layout and signage makes them difficult to understand, especially for walkers. If these matters are resolved and the connector mentioned immediately above was built, this area should be able to be shared like other parts of the Skyline Track. This would eliminate the need to build Track 17 in the Plan to duplicate Carparts Extension and Barking Emu.

Careys Gully

There is a potential opportunity to create a sub-network of downhill-focused off-road cycling tracks in Careys Gully, from the Wind Turbine Carpark down to Happy Valley Road. Track 16 in the Plan would be part of this but should not proceed until legal access to Happy Valley Road has been negotiated that allows that entire sub-network to proceed.

In the East

A fairly obvious improvement is available

A very narrow strip of Reserve land joins the bulk of Te Kopahou to Happy Valley Road and provides a strategically important entry/exit point for visitors. Currently, the very steep Tip Track is the only access, but a series of low-impact proposals in the Plan (Tracks 20a and 20b initially but then Tracks 21 and 23 too) would provide a much more diverse and pleasing set of options for all users. These would provide some user separation, a lookout area and 1-3-hour loop walk, and both climbing and descending options for biking.

1. INTRODUCTION

1.1. Background and history

Te Kopahou Reserve is a rugged, regenerating natural area extending from the western part of the Wellington's south coast up the high ridges around the Zealandia Sanctuary and the Brooklyn wind turbine carpark. Much of the reserve was once a farm and the old farm vehicle tracks are now used by a range of mostly fit and experienced recreational visitors.

The old tracks do not provide the best walking or off-road cycling experience currently. There is some user conflict on them and there is both an opportunity and a need for a better Network. The Reserve is a protected area though. It is slowly regenerating and contains some interesting and high-value native flora, as well as two complete, unspoilt waterways. The Reserve is part of the Wellington Outer Green Belt and there are plans afoot to introduce kiwi there.

Wellington City Council is undertaking a planning process for the track Network in the Reserve and has produced a Draft Track Network Plan, which has been out for submissions in a non-statutory process. A large number of submissions have been received and a public hearing of them held, along with other meetings and field trips. There has been some media interest and there are differing views.

In light of the values of the Reserve and the differing views on the track Network there, Wellington City Council has asked Envisage New Zealand to provide an independent assessment of the 25 track possibilities in the Draft Track Network Plan.

1.2. Brief/assignment

The brief for this work is primarily to consider:

- the construction feasibility of the tracks in the Draft Track Network Plan, especially the implications of particular track grades (for off-road cycling) and track types (for walking).
- the compatibility and suitability of different recreational activities with each other and with the character and status of the Reserve.
- the track network in connected areas, the connections between them, their purposes and their service levels and branding.
- The experiential value and the upgradeability (or not) of the existing tracks.

1.2.1. Scope

The scope of the work is all of those (25) tracks in the Draft Track Network Plan. The Plan is the key document but an alternative plan, by the Brooklyn Trail Builders group, is in the public arena and includes some different ideas that also require consideration. The most important tracks to consider are the proposed new ones, those where the two plans differ and the ones that might be built in either very rugged or high-value areas.

1.3. Nomenclature

A number of terms used in this report have specific meanings that require explanation. First, we will refer to the plan that Council has consulted on as the Draft Track Network Plan or the Plan. Any other plan document will be referred to with a lower case 'p'. The terms 'trail' and 'track' are largely used interchangeably and with a lower case 't'. Where we refer to a specific track or one in the Plan we will use capitals (Track 18, the Red Rocks Track etc.). Where the report refers to a Route, this refers to a foot track with the Route classification under the relevant standard. With a lower case 'r', route simply means the connection between two points.

We use the term 'slope' when discussing the steepness of a trail rather than 'gradient' or 'angle'. When discussing slope, we generally use degrees but may sometimes refer to a rate of climb or fall such as one in X.X or 1:X.X or -1 in X.X, meaning that a track climbs or falls one metre for every X.X metres forward it moves. We don't use slope percentages.

When discussing a specific trail grade we will use capitals (Grade 3, Grade 6 etc.) but a lower case 'g' will be used where trail grade is referred to generally. We might refer to a difficulty-describing adjective for each trail grade as well as the number. The terms we use are Beginner (for Grade 1); Novice (Grade 2); Intermediate (Grade 3); Advanced (Grade 4); Expert (Grade 5); Extreme (Grade 6). We use these terms because they can all describe trails, riders or the riding a trail provides. We prefer not to use the terms 'Easiest' (for Grade 1) or 'Easy' (for Grade 2) as most systems and providers do. This is because those words are less flexible and we prefer to reserve them (with lower case first letters), along with hard/difficult/harder etc for general use.

1.3.1. Off-road cycling and a riding typology

We will refer to the activity of riding a bike on off-road trails as 'off-road cycling' rather than 'mountain biking'. We do this because the latter term is sometimes misinterpreted by non-cyclists and used too narrowly by the activity's advocates.

Trail grades differentiate tracks but it's equally important to distinguish different types of riding so as to understand and cater for different types of rider. We recognise four different types of riding that might be sought by cycling visitors to Te Kopahou:

Cruise/Leisure riding

Most of this riding is on Grade 1 and 2 trails that are wide and smooth. Interest in scenery, nature and heritage is usually high, as is the demand for ancillary services such as food, bike hire and transport. Group size is often large and the social element is important. Rides are half or full-day ones with few/small hills but may include overnighting, usually not in the back country.

Bikes will be heavy, often with an urban-style, very upright geometry, and usually with road-friendly tyres that are not much good on natural or rough surfaces. There will be a high prevalence of e-bikes. Riders generally have low technical skills levels and low levels of independence; they sometimes lack a good understanding of outdoors etiquette.

Adventure/Exploration riding

This type of riding is also critically dependent on the place it occurs rather than the trail or the riding itself. Riders seek adventure and discovery. Most riding is Grade 3 to 5 where it's on discernible tracks but journeys will often involve non-graded segments like roads beaches and vehicle/farm tracks. The technical skills needed are not necessarily high but riders' fitness and outdoor skill levels are usually very high. The experiences sought usually take at least several hours and are tens of kilometres long with plenty of hills both up and down; they might last for days and involve self-supported overnighting.

Adventure/Exploration riding is usually done in small groups (2-4) that have little impact on others. Bikes are light, with cross-country geometry and are comfortable (but not great) on roads. They may have attached bags for carrying equipment. E-bikes are not common.

Technical riding

In this kind of riding, the track and the riding itself are vitally important. It generally occurs in accessible places where multiple tracks are available. Most riding is Grade 4 to 6. Riders' technical skill levels are very high, especially the ability to cope with tight corners, narrow trails uneven surfaces and high speeds. Climbing and road riding are minimised but not particularly shunned, while shuttles are popular.

Individual rides are generally quite short (0.5-5km) but might be repeated or combined with other, similar rides over several hours. Bikes are almost all fully suspended with a 'slack' frame geometry good for going downhill and tyres that handle rough surfaces but are not much use on roads. Riders will often ride with knee pads and perhaps a full-face helmet; group size can be large and this type of riding can be intimidating to others.

Thrill(-seeking) riding

These riders are also vitally interested in the track itself and the riding it provides. Staying in control, and high levels of commitment and concentration are critical, so the importance of place is diminished. Indeed, this riding style is generally not seen in protected areas. The technical skill level required for thrill-seeking on a bike is very high – most riding is Grade 4 to 6. There's usually lots of time in the air and some trails are barely formed. Individual rides are generally short but might be repeated, often from a single carpark and/or shuttle drop-off point. Uplift facilities (chairlifts, gondolas or shuttles) are important and will be found at all of the premier destinations.

Thrill seeking riders often ride in groups and can 'take up a lot of space' at Network hubs and carparks, with a consequent impact on sensitive others. Bikes are fully suspended and with a slack (to very slack) frame geometry. They are extra strong and heavy, with tyres that poor on roads. The prevalence of e-bikes for this kind of riding is growing. Riders will usually ride with pads and probably a full-face helmet.

1.3.2. Experience Hierarchy and Management Units

We use a specific hierarchy of concepts in all our work relating to the planning, provision and management of visitor experiences. This hierarchy is Experience > Destination > Network. In the context of this report:

Experience means a discrete (usually named) whole visitor experience – an individual trail or track comprising physical assets and understandable intangible features or services.

Destination means a place where people may go for a single or repeat visit to enjoy at least one Experience. Most Destinations will have more than one Experience. For the purposes of this report, the Destination level is essentially Te Kopahou Reserve.

Network means a larger and complete collection of Experiences, considered in their Destinations within the sphere of interest of a specific stakeholder (in this case, Wellington City Council).

These three concepts we consider to be useful units of measurement, especially the discrete Experiences (Tracks) that appear in the Plan and are discussed in this report. When we refer to these terms with the meanings above, we will capitalise them. However, we will also use them more generally – and with a lower case first letter – to describe, say, the experience delivered by a specific discrete Experience or available in a particular place; most references to a 'network' in the report will be referring to the tracks in the Plan and/or Te Kopahou Reserve, rather than in the wider city Network.

1.4. Methodology

1.4.1. Best Practice approach

The methodology applied has essentially been a best practice approach to assessing the Experiences envisaged in the Plan in light of the current network and its use, the Reserve and its character, and the range of opportunities in the Networks of Wellington City, the wider region, and the whole nation. We have brought to bear our experience from similar projects elsewhere, and extensive experience in track and recreation management in protected natural areas.

More specifically, we have applied our understanding of the different types of on-foot and by-bike visitor that might be found in a place like Te Kopahou. We've considered their differing preferences and requirements, and the extent to which their activities are compatible with each other and appropriate in the Reserve. We have applied our knowledge of the framework for managing walking and off-road cycling tracks in New Zealand, gathered over many years working with it, including in recent track grading work for councils in Nelson, Tasman, Rotorua and Wellington City.

1.4.2. Assessment process

The process undertaken to complete our field work involved several days in the Reserve in good weather in late July 2021. In this time, we walked, drove or rode nearly every track in the Reserve and Plan. Some of this was done with a Wellington City Council ranger but mostly alone, so there was time to make measurements, consider options, observe other users and take photographs. In a few places, we were also able to walk the possible alignments for proposed tracks to consider natural values, construction feasibility and possible impacts. Many of these observations are included in the report.

Our time on the ground included a fine, calm weekend during which we made observations of users and the terrain on the Red Rocks Track, the south coast, several popular Mākara Peak Tracks and in Polhill. We rode the northern half of the Skyline Track to Johnsonville in order to understand how it compares to that part of the Skyline Track in Te Kopahou Reserve. We also rode the foreshore cycleway and roads to Eastbourne and took a ferry across the harbour to fully understand the Wellington cycling experience. On a separate (but still recent) trip we have spent time riding and observing other users while conducting grading assessments at other Destinations: Mount Victoria, Miramar and Polhill.

After the field work phase, we conducted an amount of research into the way outdoor experiences are presented in Wellington but a thorough assessment was not in scope. We attended online meetings with Council staff and Trails Wellington trustees and watched online the entire hearing session for submissions on the Draft Track Network Plan (at the Wellington City Council Pūroro Rangaranga (Social, Cultural and Economic Committee) meeting on 5 August 2021).

The process undertaken to complete this report involved synthesising our observations and experience into the analysis and recommendations presented below in Parts 2-5 of this report. This involved a lot of work seeking to understand how track options would fit into the landscape, both practically and in terms of their possible impact. We also considered how a reconfigured track network would change use patterns and could both generate additional benefits but also create issues such as user conflict or user displacement.

Our scope did not include any form of economic analysis but we are certainly aware of the economic potential of cycling for tourism regions, having ridden and/or worked on nearly all the 22 current Great Rides. As such, we have considered the economic and tourism aspects of different track options.

1.4.3. Off-road cycling track standards

While there is (essentially) only one set of symbols, colours, grade names and descriptors for marketing off-road cycling tracks in New Zealand, there are currently three 'standards' in place for the tracks themselves:

- *New Zealand Mountain Bike Design & Construction Guidelines.* (Recreation Aotearoa, 1st edition, 2018). These guidelines are currently under review.
- *Cycle Trail Design Guide* (New Zealand Cycle Trail, 5th edition, 2019).
- *Cycle Track Service Standard* (Department of Conservation, 1st edition, 2021)

This makes for a somewhat difficult situation for providers, managers, advocates and others in the industry. Fortunately, the level of consistency between the three standards is very high for most track features as shown in Figure 1:

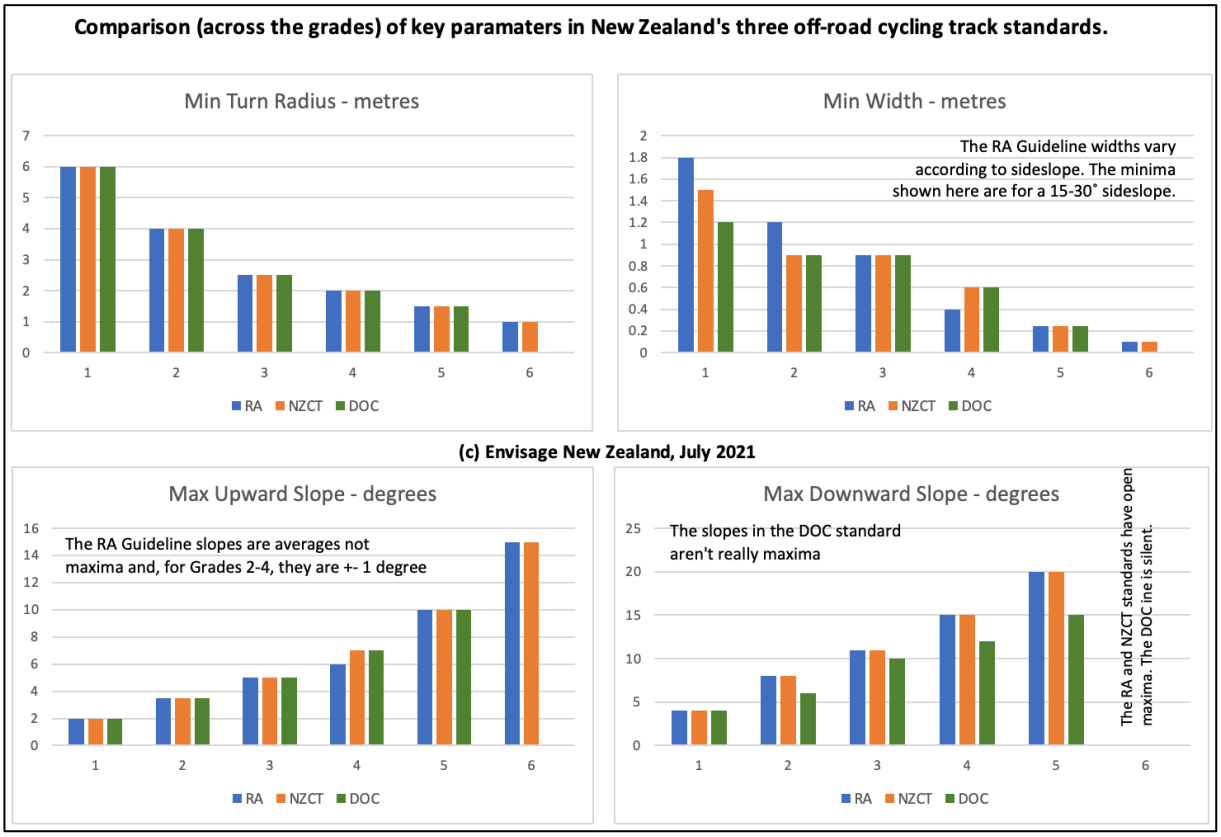


Figure 1. Comparison graphs for crucial trail features from New Zealand's three off-road cycling standards. While there are plenty of exceptions criteria and subtle differences in the standards' texts, these graphs show just how similar the three standards are: identical for turn radius and nearly so for uphill slope. The DOC standards (green bars) are a conservative outlier for downhill slope.

However, for vertical features like steps, jumps and drops, the standards differ more. This means that a trail given a particular grade under the Recreation Aotearoa Guidelines could be given a higher Grade under the other two standards. Figure 2 shows just how much more variation there is between standards on these 'vertical features'.

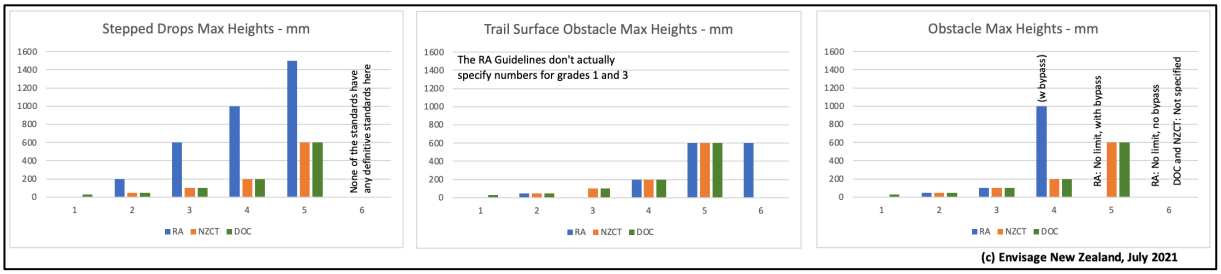


Figure 2. Comparison graphs for 'vertical trail features' from New Zealand's three off-road cycling standards. This set of comparison is a lot less clear than those in Figure 2 because of difficulty interpreting the Recreation Aotearoa Guidelines and since the other two standards only provide a single measurement for vertical feature that the Recreation Aotearoa guidelines nominally provide three measurements for. The much-greater progressivity of the Recreation Aotearoa Guidelines is clear to see in these graphs even if the detail is not.

We use the New Zealand Cycle Trail standards in our work but have found useful elements in all three that will be referred to throughout this report. In particular, we use the idea of

average slope targets for each grade from the Recreation Aotearoa guidelines and we use DOC's method of measuring trail width, which requires specified clearances on either side of the maintained riding surface. We also note that tracks that are walkable by relatively low-capability walkers can be completely unusable even by expert riders due to steps or steepness. This means that cycling track standards should be used by managers rather than walking track ones where tracks are (planned to be) shared[1]. It also means that most references to specific, measurable features of tracks will come from the cycling track standards not the walking one.

1.4.4. Standards applied for foot tracks

Tracks for on-foot use (walking, tramping, running) are easier to classify than off-road cycling ones and less controversial. The activity itself is different and doesn't require the highly detailed specification needed to ensure passage of wheeled vehicles: walkers can step over things that cannot be ridden over. Walkers are furthermore not moving fast enough to hurt anyone and, while experience and fitness play a part in activity selection, walking does not lend itself to difficulty- or technicality-based grading as cycling does.

Managing and planning for walking tracks is made additionally straightforward by the existence of just a single standard, the Standards New Zealand Handbook, *Tracks and Outdoor Visitor Structures*. This standard was developed by the Department of Conservation in 2004 but deliberately not as an internal standard only. The Department has always encouraged its use by Councils and Wellington City is among those who have done so.

1.5. Limitations and assumptions

The key limitation in our work is the time we had on site. Vegetation was also sometimes a barrier to fuller exploration. We have however, sighted most of the tracks discussed in the Draft Track Network Plan in reasonable detail. We are satisfied with the time we had in the Reserve but there are certainly several places where further investigation is recommended.

We have not formally surveyed Reserve users but have generally spoken to or observed them as much as practicable. Comprehensively researching the full range of visitor information sources or social media posts about the Network or the Plan was out of scope. This work is not a full Destination-level report, or a full audit of any Experience.

1.6. Report layout

Below this Introduction, the report is in four Parts, each consisting of a Section for each trail that is shown in the Plan. Tracks 5 and 18 are combined into a single Section so they can be compared. Track numbering (and therefore Section numbers in the report) is as per the Draft Track Network Plan. However, the Brooklyn Trail Builders plan uses different numbers for the same trails and the two plans show different tracks numbered 16 in close proximity. This makes the discussion of Track 16 (Section 4.5) somewhat complex.

[1] . This is explicit in the DOC standard (p7).

2. SOUTH OF THE RADOME – NON-VEHICLE TRACKS

This Part of the report deals with proposals in the Draft Track Network Plan that relate to non-vehicle accessible tracks in Te Kopahou Reserve south of the Radome, in the catchments of the Hāpe and Waipapa Streams. Some are completely new tracks and some are existing ones. For each track, there is some descriptive and analytical information, leading to some form of conclusion about feasibility and appropriateness, followed by recommendations. A lot more detail is provided where a track has high strategic importance or the issues are more difficult.

2.1. Track 11 – WW2 Observation Bunkers Track

Track 11 leads from the shoreline near the mouth of Waipapa Stream up to a remnant set of buildings that acted as an observation point during the Second World War. It's much more like an (unmarked) route than a track. It is very steep and is possibly not formally recognised as a discrete Experience: it doesn't appear on Council's *Wellington Walks Webmap* and there is no official entry sign at its start point beside one of the south coast baches.[2]

<u>Access on foot</u>

Historic features like these bunkers are important but certainly not unique. They are found in other coastal cities, including elsewhere in Wellington and, while some are road-accessible and fully developed for visitation, some are not. It is easy to envisage people wanting to visit these bunkers given their history and the view their site provides. A Short Walk- or Walking Track-standard track would usually be indicated but the case for such a track is very limited. Just getting to the starting point involves a demanding 3-kilometre beach walk[3] from the nearest roadend at Te Kopahou Visitor Centre – there's no point providing an easy, appreciation-type walk if the access to it is not easy too.

Furthermore, the terrain here is very steep; it essentially requires hand-over-hand scrambling. The current route is intimately involved with a small creek and rerouting in this terrain would be impactful and very difficult. At the gradient required for an appreciation-type walk, the track would go from the current c700m in length to something in the order of 1000m and from 2-500mm wide to at least 750mm.

<u>Access by bike</u>

Track 11 is currently visible on Trailforks, under the name 'Ribs Exit', as a Grade 5 mountain bike trail. Much of it is, however, essentially unrideable, and there is feedback saying so on the Trailforks entry. Ribs Exit does currently provide a way out of the Network for the (surely very small number of) riders who ride beyond the Radome, to the end of Hawkins Hill Road then southwards along tracks 6 and 10, which themselves are very steep. The prohibitive terrain makes a rideable track even more difficult to envisage than an easy foot track. Additionally, and as described above for foot use, the merits of providing a riding trail here are reduced by the difficulty of the stretch of coastal riding needed to access it.

<u>A loop track option (see also Section 2.4, Track 19 (p21))</u>

A new route (Track 19) to the observation bunkers is mooted in the Plan. Working in conjunction with Track 11, it would make a loop, which is good idea for access to a significant point. Track 19 is discussed separately below but a key point to make here is that it the entire loop should be built to the same standard for it to be useful to visitors (on foot or by bike).

[2] There is an informal sign but the whole experience feels very minimal in its development.
[3] On 6 out 7 days each week, vehicle access is available but it essentially requires a 'proper' 4WD vehicle.

Feasibility and appropriateness

Creating a new, much easier track up to the historic observation bunkers is barely feasible, especially if intended to facilitate riding. It would become even less feasible if uphill riding was sought (requiring more length) or two-way or dual use (requiring more width as well). It hardly seems necessary to develop an easy accessway to the site either, given the effort required to get to the start and the existence of other, fully developed World War 2 sites elsewhere in the City.

Recommendations

- We recommend Track 11 be left unchanged, except where it might be realigned so users are not directly in the watercourse
- Track 11 should be properly signposted and recognised in official information sources, but as a route rather than a track.
- We recommend some research into the origins of the Track 11 route. The alignment itself would be of some historic note if it was used by those who staffed the bunkers during their war service.

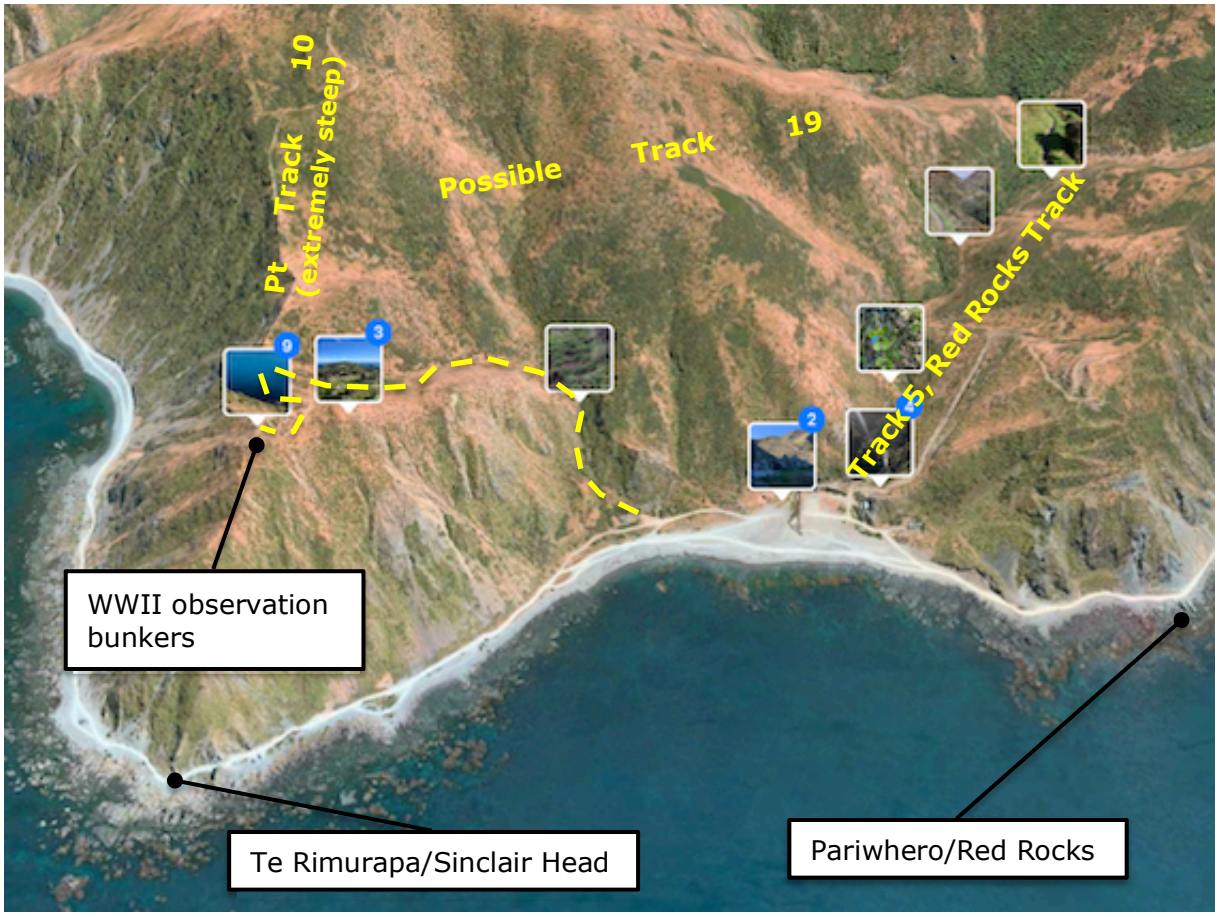


Figure 3. The Pariwhero/Red Rocks and Te Rimurapa/Sinclair Head area showing Track 11 (yellow dashed line) and other features.

2.2. Track 12 – Hāpe Track

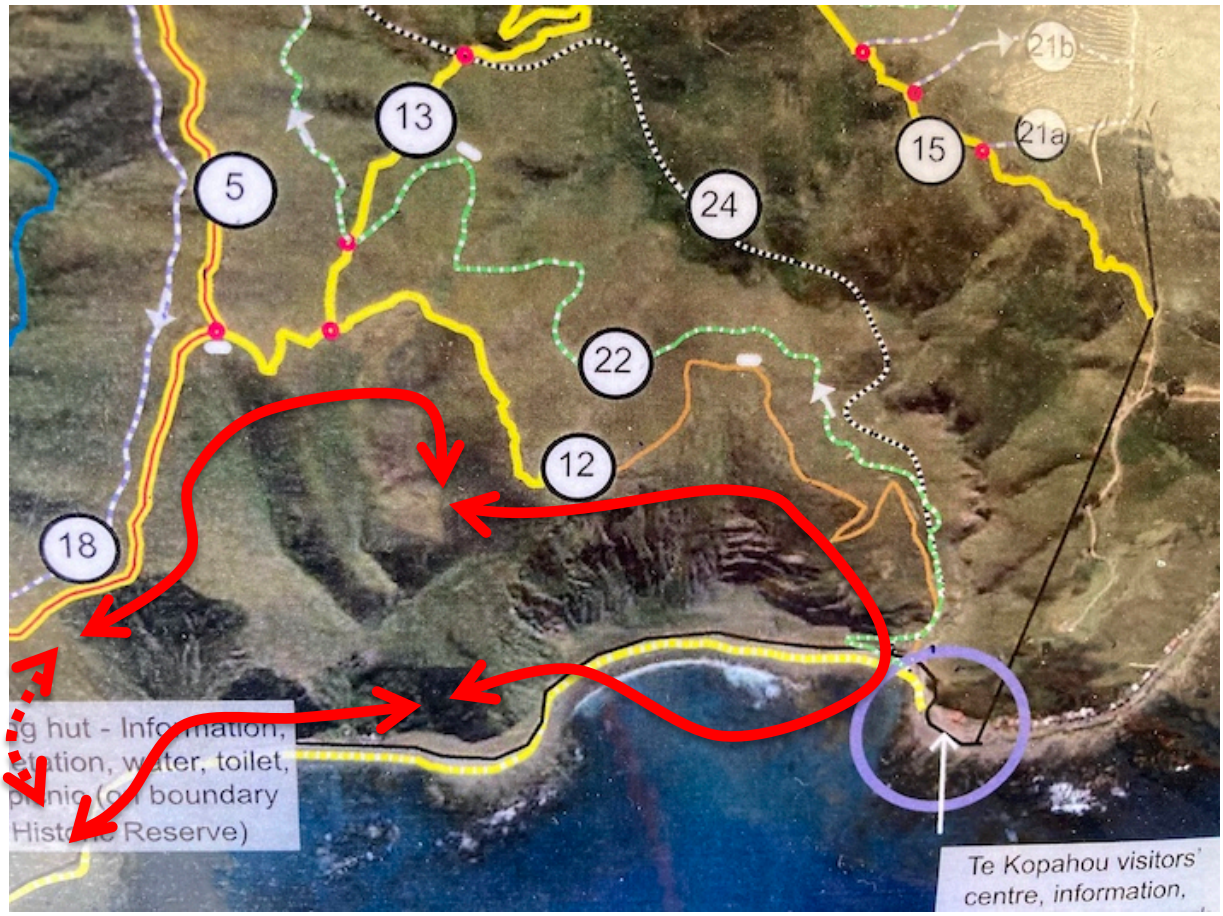
2.2.1. Introduction

Track 12 is discussed here even though it is partly a 4WD track. We were unable to view the entirety of this track but consider it has both the most opportunity and the most challenge of any in the current network.

Track 12 links Track 5 – the Red Rocks Track – to the south coast, essentially running downhill along a spectacular ridge and, in its lower half, the headwall and other remnant formations of the abandoned Owhiro Bay Quarry. Its altitude profile is from 325m to about 5m above sea level. Its length is not known precisely but is estimated to be 2120m. This would give an average slope of 1:6.64 or 8.57 degrees, which for off-road cycling is Grade 5 uphill and Grade 3 down. These are very steep averages and there are numerous segments (both up and down) that would easily exceed the Grade 5 maximum.

Figure 4. The general layout of Track 12 from the Draft Track Network Plan. The yellow part is 4WD track. Most of the orange part seems to have once seen vehicle or quarry machinery but is now a foot track. Track 12 is considered to start at the Track 5 junction (the Red Rocks Track, where there is a 'Hāpe Track' sign) and not at Track 13.

The red line represents a possible loop track from Te Kopahou Visitor Centre carpark.



2.2.2. Current experience and visitors

Track 12 is difficult currently, due to steep slopes, the (in-places) slippery surface, gorse and a lack of marking. It would be near-impossible to ride on a bike. Currently, Track 12 provides few benefits because only the hardiest users are able to use it. We would go a little further and say that while Track 12 is challenging, and therefore likely to be satisfying for a small number, it's not really 'enjoyable' in the normal sense.

2.2.3. Analysis

There are two potential experience enhancements on offer here.

1 The alignment of Track 12 provides a shorter route from the Radome area to the Te Kopahou Visitor Centre (and Owhiro Bay Parade roadend) than what is offered by Track 5: from the point where Track 12 first leaves Track 5 (see Figure 4), it is 2.1km to the roadend using Track 12, but 6.5km via Track 5 and the 3 kilometre stretch along the shoreline. By virtue of being so much shorter (4.4km), Track 12 might be attractive to those with less time or fitness. It could also play something of an emergency exit role in bad weather and would be less prone to coastal erosion.

2 Along with part of Track 5 and the track along the south coast, Track 12 is currently part of a doable but not recognised 8.7km loop experience that begins and finishes at the Visitor Centre/carpark. Track 12 is one quarter of this loop, which has good potential to be a named, discrete Experience for keen visitors, taking 2–5 hours at 1.8-4.5 kilometres per hour. With rest breaks, this is a decent half-day experience that could be extended further by including tracks 8, 10 and 11. It could even be an overnight experience with a hut in place at the proposed site on Track 5.

<u>A difficult upgrade</u>

To fulfil the potential of Track 12, it will require upgrading so that the entire loop (all three legs) is more or less presented at the same standard. This will likely cause some consternation since some of its current (very specialised) appeal will be eliminated. The upgrade will be a challenging one, even for just foot access. It will be even more challenging to make it safely accessible for bikers, especially for riding uphill.

The suggestion is essentially that the steepest sections of the track be bypassed with new sections of track. A fuller investigation is required to establish what is possible and worthwhile to achieve: can a track be installed that cyclists and walkers can safely use together? Could it be 2-way? In places, the existing 4WD track – including some currently gorse-covered bits – might be the best alignment, and just vegetation clearance will be required. Elsewhere, realignment is suggested. This should be done to the same standard (Grade 4 with a 6-degree average slope) as the bypasses recommended for Track 5 (see Section 3.1 and Appendix 3) but the exact specifications will depend on decisions made about user groups (bikes or not) and direction (2-way or 1-way).

Whatever is decided, the last 115 metres of vertical descent will be particularly difficult; the current track does this in just 375 metres, which is a -17-degree <u>average</u> slope. That is nominally a Grade 5 descent but it is much more challenging than that. Even on foot, it is intimidating, especially where it is established in what feels like an unstable trench (Point E in Figure 6) or on what seems to be bed rock exposed by past quarrying. To achieve a safer and lower-angled track would require a much greater length of track, as shown in the table below (Figure 5). This could be somewhat tedious for walkers and would likely take them away from the sea views. However, there may be an option to provided separate walking and cycling tracks in this area (Figure 7) if this can be done safely in light of the ground conditions.

Figure 5 only covers the slope of the critical part of the Track 12 alignment and gives an indication of the length. The other key trail parameters are width and turn radius. There won't need to be many turns but width will be very problematic with very steep side slopes, hard rock outcrops and erosion potential. The terrain is so steep in this area generally that barriers to protect visitors from falling seems very likely to be required which can reduce the track width but which adds expense and would require Building Consent.

Description – key target slope parameter for the bottom of Track 12	AVERAGE Slope of track	Length req'd to descend 115m
Current situation	-17.05° (-1:3.26)	375m
Grade 4, target average downhill slope •	10°, 1:5.67	652m
Grade 4, maximum downhill slope #	15°, 1:3.73	429m
Grade 3, uphill nominal max ^	5°, 1:11.43	1315m
Grade 4, uphill nominal max ^	7°, 1:8.14	936m
Grade 4, uphill maximum (sections up to 200m) ^	9.5°, 1:5.98	687m
Grade 4, uphill maximum (sections up to 20m) ^	11.5°, 1:4.92	565m

Figure 5. If the change in height is known (115m in this case), it is possible to calculate an average slope angle from a known track length or to calculate a track length from a target angle. This table shows the length of track required to achieve different slope maxima for different track grades.

Key:
- • *Only the Recreation Aotearoa Guidelines actually specify a target average downhill slope.*
- # *All three standards have the same downhill maxima (and no exceptions criteria).*
- ^ *The three off-road cycling standards vary on the slope maxima and exceptions criteria.*

Recommendations

- The enhancement of Track 12 is recommended, especially so a loop track can be promoted incorporating it, Track 5 and the shoreline.
- Further investigation is recommended before embarking on this work. Before even the investigation stage, goal-setting is recommended to establish the key parameters for the upgraded track: users, direction, grade.
- In a former quarry where ground conditions are uncertain, a geotechnical assessment is recommended to establish whether the parameters established following goal setting are achievable.

2.2.4. Figures for Track 12

The bottom portion of Track 12 – the exit to the coast from Hāpe Stream – is so important that several images and maps are provided to support decision-making. Information in the captions is not necessarily repeated in the text above; the captions will refer to several specific places, which are shown initially in Figure 6. The following key is provided:

Point A Natural landing point at c120m above sea level – potential starting point for the final descent of Track 12.
Point B Junction with the Coast Track, c5m above sea level.
Point C Visitor Centre and carpark (2WD roadend).
Point D Unspecified Point on Track 12 where Track 22/24 might begin.
Point E The top (at c79m asl) of a steep-walled, intimidating trench with a bare rock floor in which Track 12 sits currently.
Point F A spot on the current track with a slope and surface change beside a rock corner.
Point G A relatively flat resting point at the bottom of the trench (c30m asl) where departure from the current route might be possible.
Point H A steep ridgeline accessed via very steep side-slopes from Point G.
Point I A second steep ridgeline accessed via extremely steep side-slopes from Point H.
Point J The farthest point visited during field work (it was unsafe to go beyond here).

Figure 6. Specific points in the lower section of Track 12 (key on previous page).

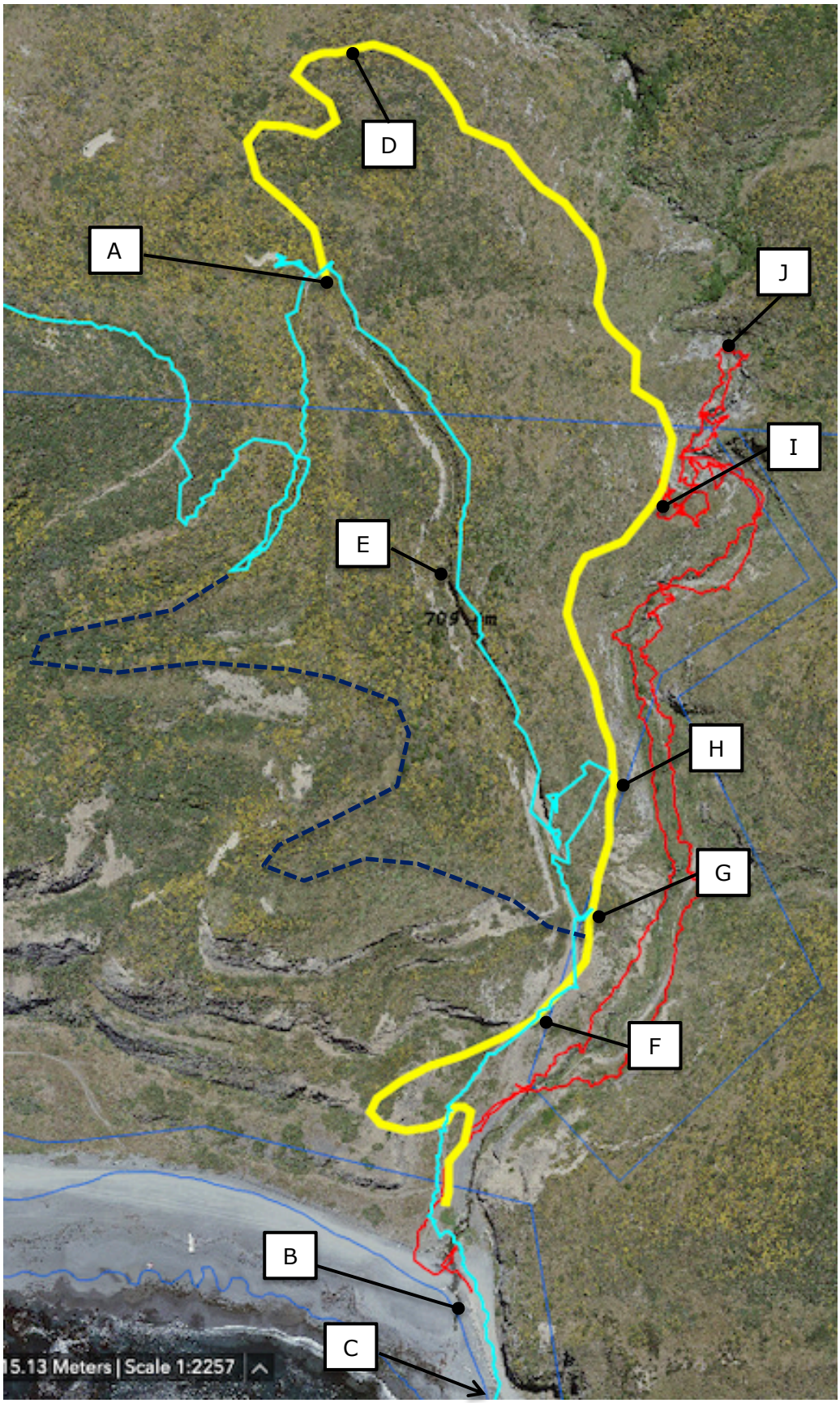


Figure 7. Points A-J are as per the key on p13. The teal and red lines show the routes taken during field work and the yellow line is a possible track from Point A to point B that is 710m long. This is twice the length of the current track but, with an average slope of 9.01 degrees, it's still Grade 5 uphill (Grade 3 down). The dark blue dashed line is a steeper alternative line for walkers.

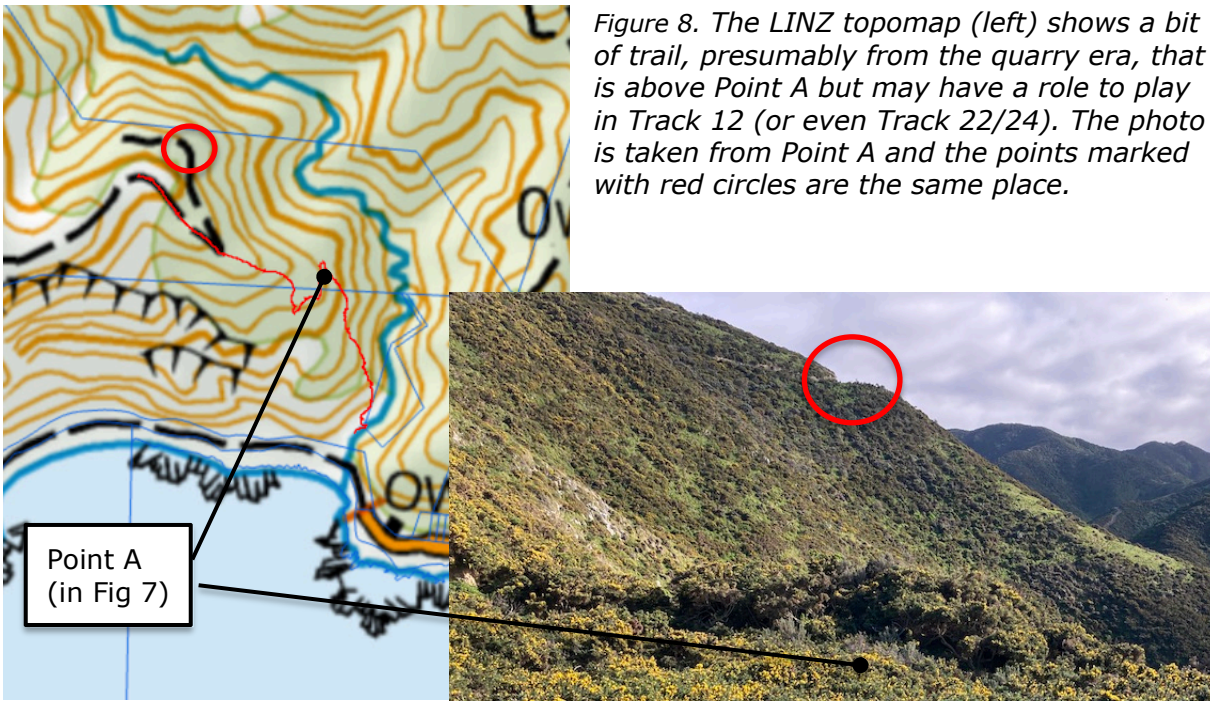


Figure 8. The LINZ topomap (left) shows a bit of trail, presumably from the quarry era, that is above Point A but may have a role to play in Track 12 (or even Track 22/24). The photo is taken from Point A and the points marked with red circles are the same place.

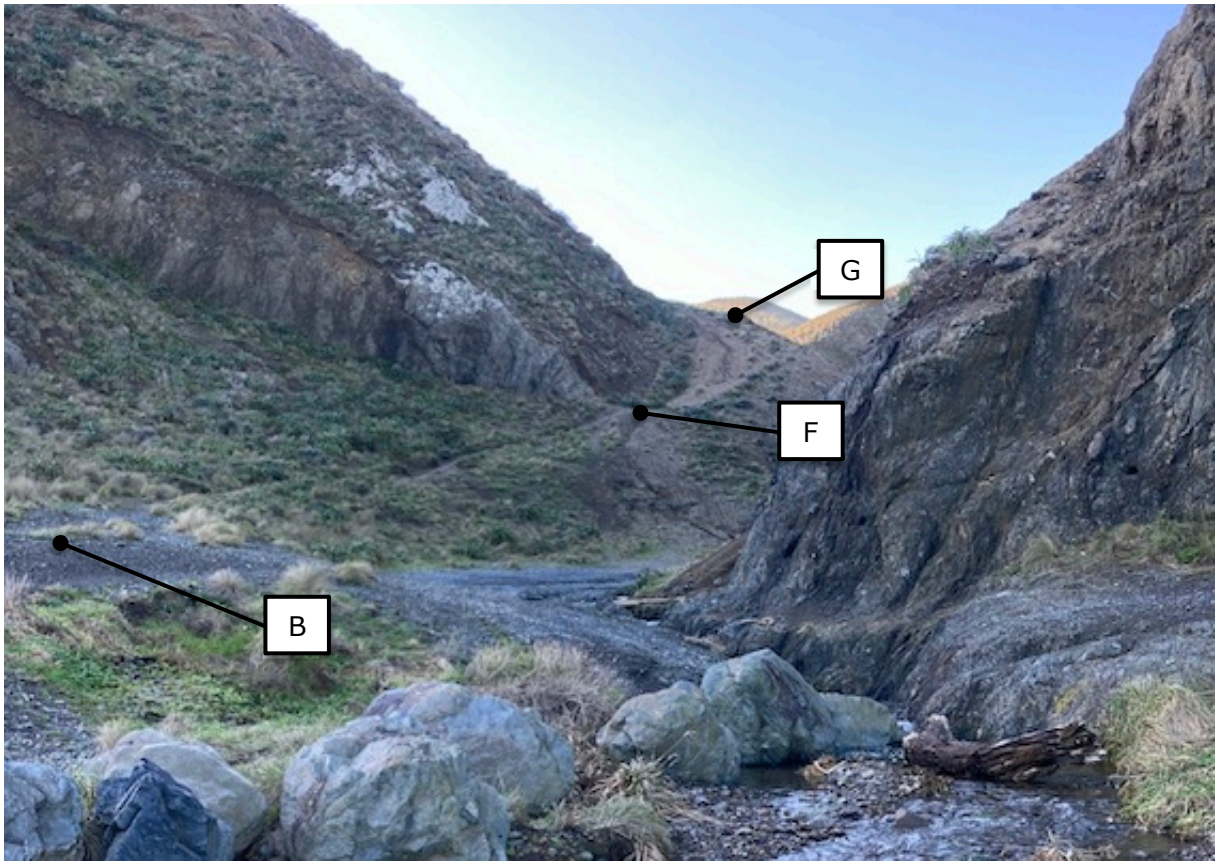


Figure 9. The challenge of establishing a track suitable for riding uphill begins almost at sea-level. The slopes between B and F, and F and G are prohibitively steep. The space available to achieve gentler slopes is limited by the rocky spur at Point F and the unusual ground conditions from there up to Point G (which is part of the reason why a geotechnical assessment is recommended).

Note that if staircases were provided above Point G they would likely not be visible from the coast where this photo was taken.

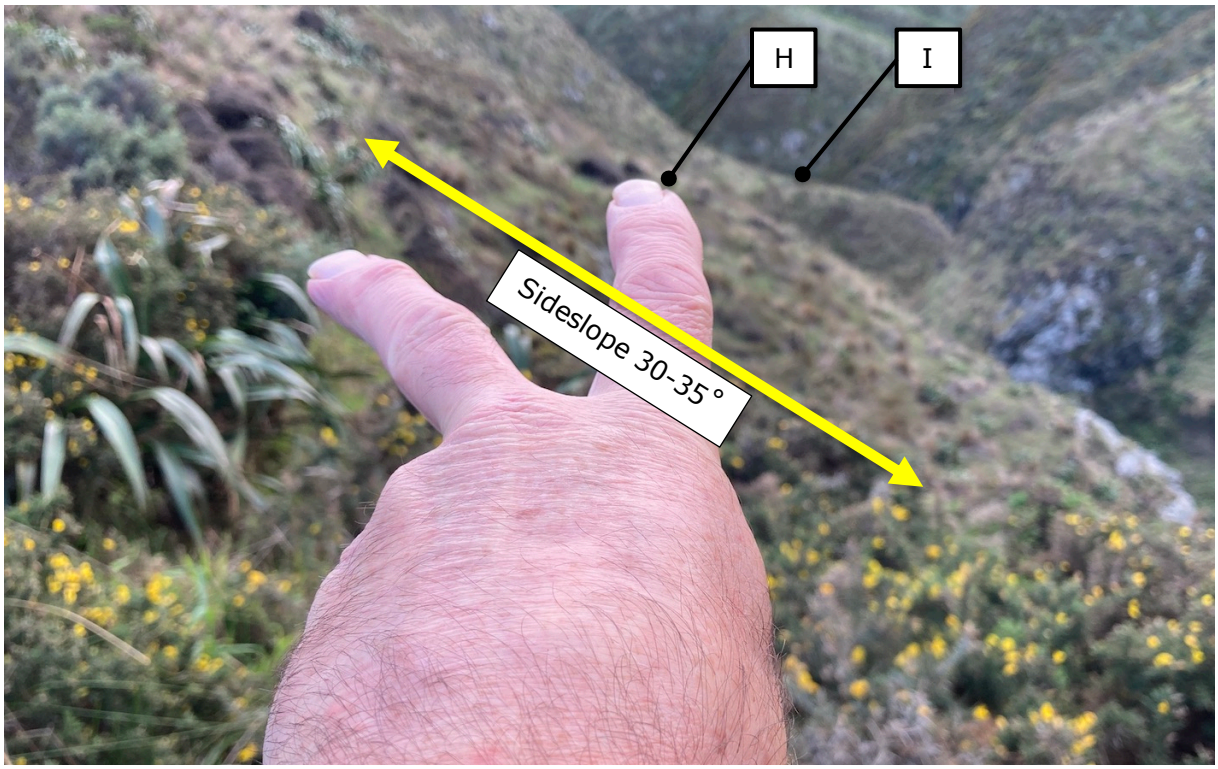


Figure 10. View from Point G towards Point H and I.

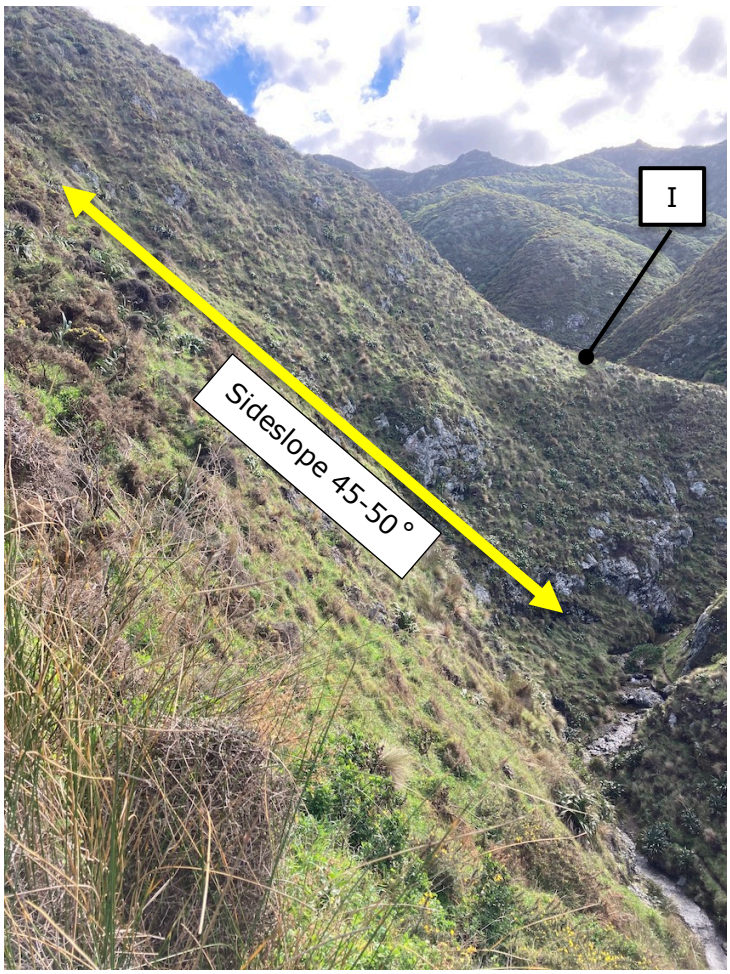


Figure 11. View from Point H on to Point I, which have about the same altitude (see Figures 12 (the reverse view), 13 (a vertical view) and 14 (a graphical view)).

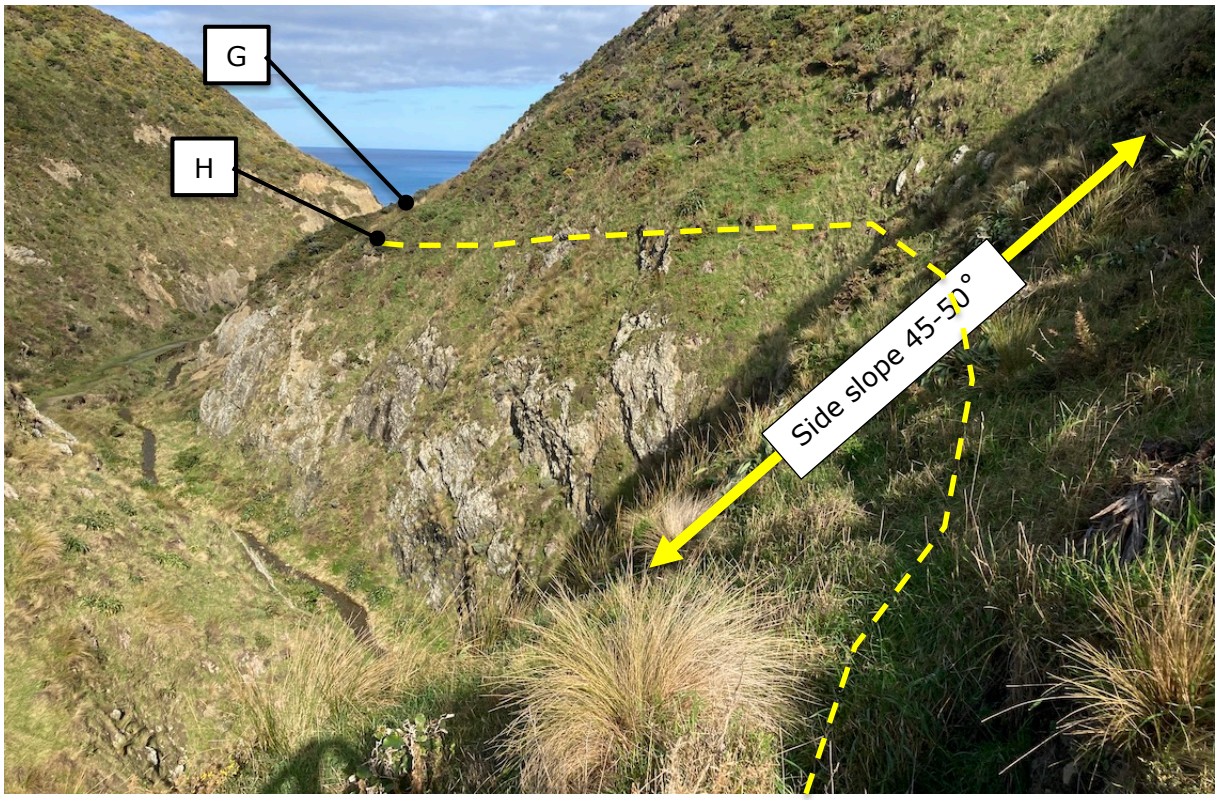


Figure 12. View back from I to H (the reverse view to that in Figure 11). The side slope is not just very steep – it's also likely very rocky. Achieving the usual minimum width will be hard – a narrower width is indicated, with a fall barrier.

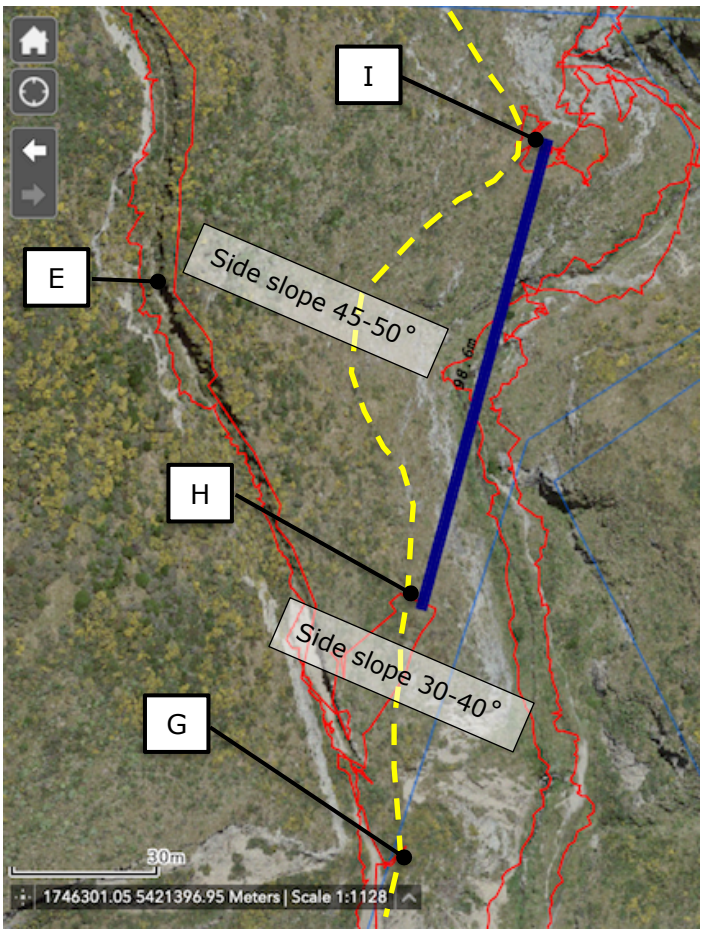


Figure 13. Plan/vertical view of the Hāpe Stream gorge between points G and I, showing side slopes and the possible track alignment. The blue line is a 98-metre, straight line option – presumably bridgeable but very expensive.

2.2.5. *Summary, Implications and Conclusion*

All our investigation work in the lower Hāpe can be summarised in this chart:

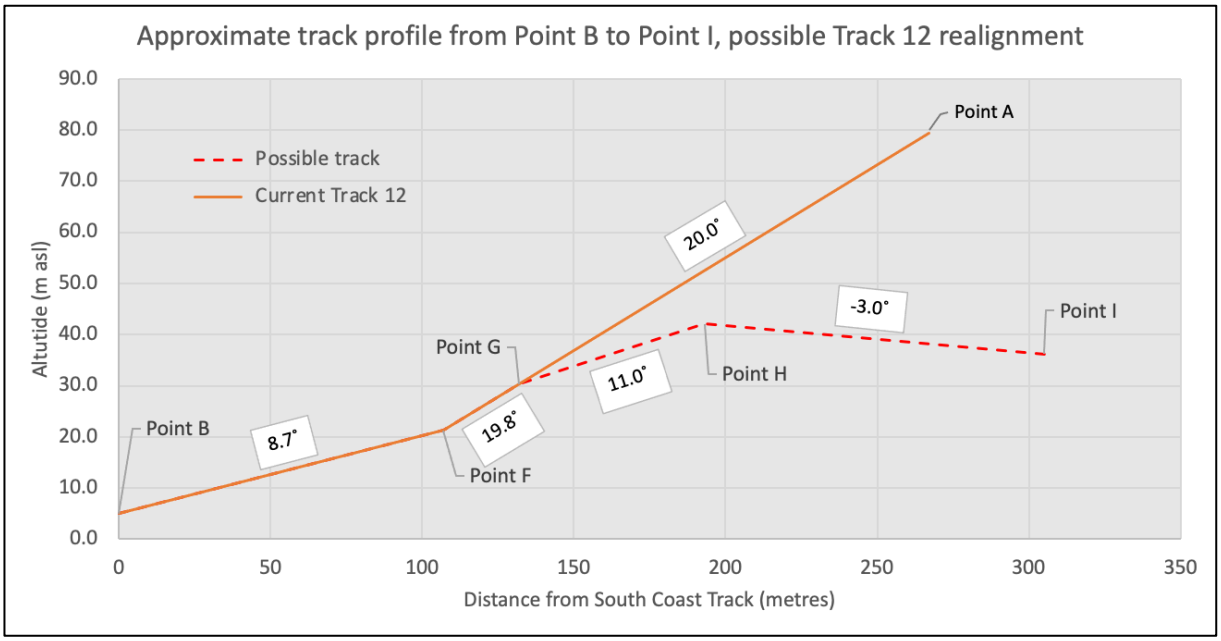


Figure 14. This chart shows the elevation profile for the current Track 12, from the Hāpe Stream crossing up to the top of a very steep trench (solid line). The dashed line is the profile for a possible new alignment beyond Point G that is less steep but still much steeper than the 6-degree average we recommend for climbing trails (and it's in rocky terrain with steep side slopes). All of the slope angles shown are averages and there are certainly many steeper bits, especially between Points G and A of the current track, where cycling is barely possible even downhill and the bulk of walkers would likely prefer steps.*

* *The horizontal and vertical scales are not the same, which exaggerates the slopes.*

While we were strongly moved by the potential of a loop track from the Te Kopahou Visitor Centre carpark involving Track 12, the challenge of developing it to a reasonable standard should not be underestimated. The terrain of lower the Hāpe Stream gorge, including an old quarry where ground conditions are hard to read, perhaps explains why a more 'doable' track has not been developed already.

Our sense is that this part of the Reserve is pivotal to establishing what the best track network is for the entire southern portion of the Reserve; the Hāpe Stream mouth provides the key for unlocking more of the Reserve's recreational potential. This sense is heightened by the fact that, unlike journeys up or down the Waipapa, journeys into or out of the Hāpe do not start with a somewhat difficult, three-kilometre strip of storm-prone coast in an era of rising sea-levels.

We suggest a hierarchical, outcome-focused approach to building a track into the Hāpe. A two-way, dual use track is the recommended best outcome since this would support some of the main outcomes sought in the Plan. If uphill cycling proves to be too hard to cater for – with six degrees the recommended average slope – the second-best outcome would be a two-way track for walkers that was descent-only for bikers. There is nominally a 'window of average slopes options' for this, between six and ten degrees, with ten degrees being a good average downhill slope for Grade 4 trails and 6 degrees being the recommended average uphill slope. In this outcome however, descending cyclists would be sharing a fairly steep track with ascending walkers.

The third best outcome from our investigations in this area would be a walking-only track. In this outcome, there is no maximum slope[4] but, at 20 degrees in places and with a tricky surface, we consider it too difficult currently even for walking. Staircases would be acceptable as part of a track here, and these can be up to 37 degrees, with landings every four vertical metres[4].

Staircases would not be out of place on a track like this and there many precedents nationally; they would barely be visible from the coast (see Figure 9, p16). However, 10-15 individual staircases would be required to complete 40 to 60 vertical metres of climbing in the critical part of this track, and ground conditions suggest 'specific design' might be required given the history of quarrying.

As part of a staircase, a channel can be provided for bikes and again, this in not unprecedented. However, we consider it likely there would be too many staircases to make this worthwhile for cyclists. Pushing any bike up multiple, steep staircases would be very difficult, even an e-bike with a 'walk mode'. Coming down would be difficult too, and heavy e-bikes would likely present a significant danger to all users.

<u>What if uphill cycling can't be provided?</u>

We consider it will not be possible to implement an option that will works well in the uphill direction for cyclists. It is also unlikely that downhill riding at a suitable slope will be possible either and if a too-steep track was provided, it would only have appeal for a type of riding that likely to create conflict with other users.

In our opinion however, enhanced on-foot use by walkers and runners would be sufficient justification to improve Track 12 in order to make possible the 9-kilometre loop track discussed above. We make this statement subject to the recommended geotechnical investigation confirming that the area is safe and will support staircases, and that the number of staircases required is acceptable.

The other implication of uphill cycling not being possible from the Hāpe mouth is that two significant outcomes of the planning process would not be achievable:

1. The hoped-for marathon-length loop experience will not be realised.
2. There will be no uphill riding option from the south coast at all, requiring riders to ride back to homes or start points, or arrange transport.

The 42-kilometre, marathon-length distance is not a symbolic one for off-road cycling but would still be available for running. With respect to the lack of a climbing option from the coast, we consider that the Waipapa valley might provide this and the option of putting a climbing line in that valley should be retained prior to committing to any works or final decisions regarding Track 5 or Track 18 (see Section 3.1). Track 18 could be designed to be a climbing track and the recommended changes to Track 5 are all climbable on a bike. However, we did not consider the entirety of Track 5 with uphill riding in mind.

Finally, we consider that Track 22, slated as it is to include uphill riding for cyclists, should not proceed at all if riding is not possible all the way up from the coast. Track 22 would not be worth building for on-foot visitors only since Track 5 will be available to them and leads up to the same point.

[4] These specifications come from the Standards New Zealand Handbook *Tracks and Outdoor Visitor Structures*, which is essentially the national standard for foot tracks in New Zealand. The staircase specifications would apply to both a Tramping Track and an Easy Tramping Track as would the unlimited maximum slope. The maximum slope for a Walking Track would be fifteen degrees but staircases can still be 37 degrees.

2.3. Proposed Track 18 – a track parallel to the Red Rocks Track

This track is proposed as a purpose-built downhill off-road cycling track that would run nominally parallel to the existing Red Rocks Track (Track 5). Because they have the same start and finish points, they are discussed together in Section 3.1.

2.4. Proposed Track 19 – a second access and loop option for the observation bunkers

This track is a proposed one, a Grade 3 trail between the lower part of Red Rocks Track and the WWII observation bunkers above Te Rimurapa/Sinclair Head. While it is not clear in the plan, it presumed this trail is intended to be two-way and dual use. Four conceivable uses can be identified for it:

1. It is primarily intended to provide access up to the WWII observation bunkers for off-road cyclists where there is effectively none currently.
2. If it allows downhill riding, it will provide a way down to the south coast from the observation bunkers, other than the impossibly rugged Track 11, for bikers who have come down from Hawkins Hill Road via tracks 6 and 10.
3. As shown in the plan, it provides the critical link from the coast up to a proposed Track 25 (see Section 2.7), which in turn is intended by its advocates to make the long climb up the eastern side of the Waipapa Stream valley to the track hub at the Tip Track/Red Rocks Track/Barking Emu junction.
4. Track 19 would simply provide additional options for walkers, especially by creating a loop track, together with Track 11 (see Section 2.1).

<u>Analysis</u>

The case for building Track 19, at least as it is shown in the plan, relies heavily on building Track 25 up the Waipapa (number 3 above). This track is discussed in full in Section 2.7 below and not considered appropriate in the Network. For this and a variety of other reasons, we consider Track 19 should not be built as proposed in the plan:

First, it simply seems unlikely many riders would seek to make the climb up to the bunkers from the coast or from the lower reaches of Track 5. Despite what has often been said historically about off-road cyclists, they do value the outdoors, natural areas and heritage areas as part of their chosen activity. However, in a challenging environment like Te Kopahou, we suggest that heritage appreciation will be a low priority for the targeted riders who will be undertaking long, quite demanding experiences. A track up to this site – spectacular and historic as it is – does not seem like it will be widely welcomed by cyclists.

Furthermore, riding to the bunkers site from Hawkins Hill Road currently, via Tracks 6 and 10, is difficult and extremely steep downhill (technically, Grade 6). The hardest part of this ride is the descent on Track 10 just above the bunkers themselves. According to Trailforks, it has slopes of up to 90% downward – nearly 40 degrees and twice the Grade 5 maximum. In the reverse direction (climbing back to the north), this would make even pushing a bike difficult. In light of this, and the impossibility of riding down Track 11, Track 19 is limited to being an up-and-back-down ride that arguably achieves little for the investment required.

Finally, and as discussed in Section 2.1 above (Track 11), little would be gained in adding a distinct loop track for walkers who will (mostly) have already walked three kilometres from the Te Kopahou roadend. Loop tracks to heritage sites are much more appropriate where people can more easily access them, and they are usually built completely to a single, fairly high standard rather than having two radically different components as a Track 11/Track 19 loop would, if Track 19 was built as per the Plan.

There is one potential application for a track in this area that seems worthy, and again it relates to the extreme steepness of Track 10. A track starting on Track 10 (before it drops over its own high point down towards the bunkers) and descending to Track 5, would be a useful addition to the overall Network, allowing riders to complete a full loop of the Reserve. This track need only be Grade 5 but should be technical in nature rather than a gravity or speed/thrill trail, so it is consistent for those who came down the steep and treacherously rubbly Track 6. Figure 15 shows how this would look.

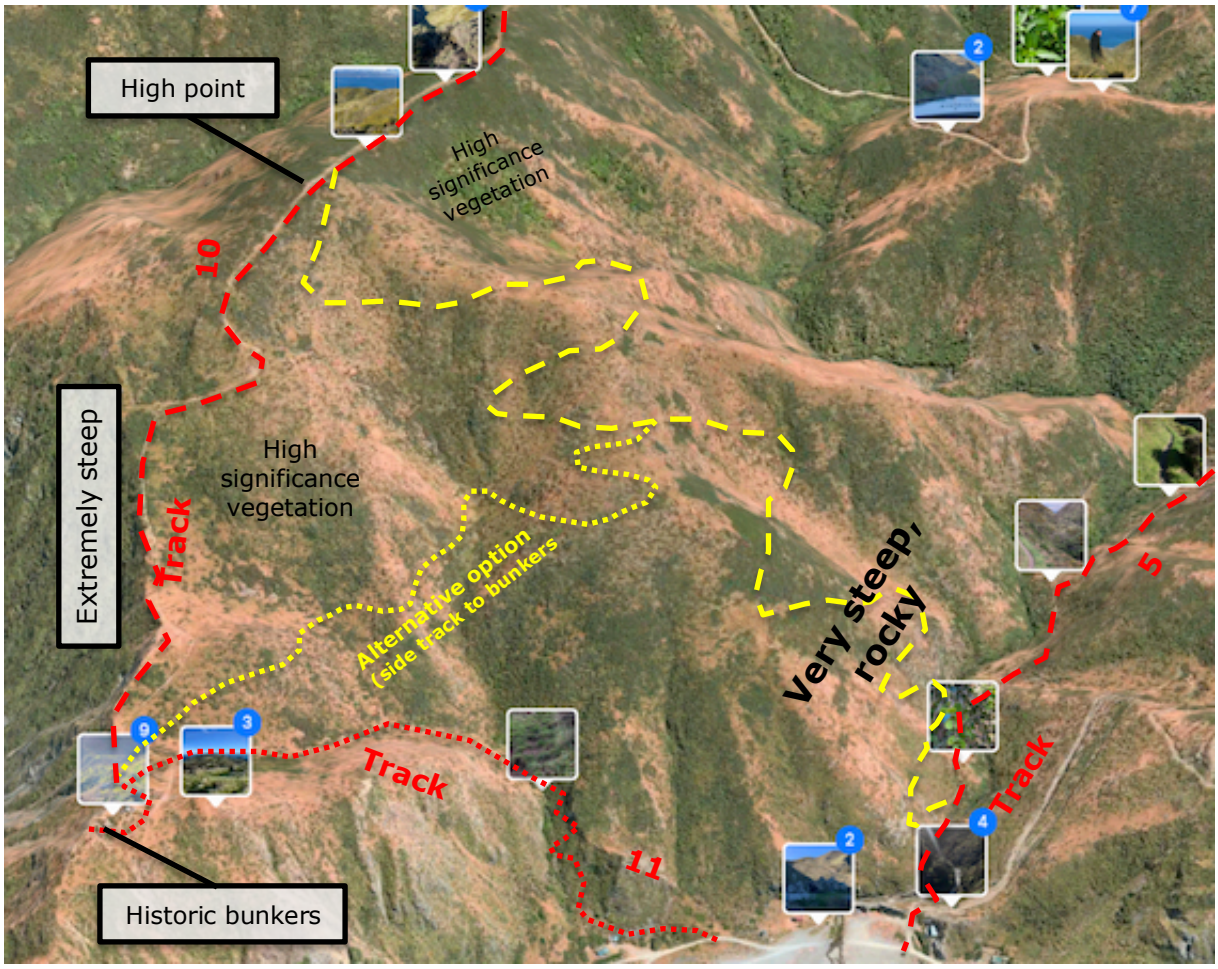


Figure 15. An oblique photomap showing an approximate alignment for Track 19 (yellow dashed line), mainly designed to link Tracks 10 and 5 rather than providing access to the historic bunkers.

Building this track north of the Track 10 high point would effectively mean most riders would bypass the bunkers site. On the face of it, this sounds like a significant loss. However, riders would gain the ability to ride all the way from Hawkins Hill Road to the south coast rather than dismounting to get down Tracks 10 and 11 as they do currently.

Another advantage of building Track 19 is that it provides further justification for keeping the small segment of Track 5 on the true right of the Waipapa Stream and bridging that stream rather than cutting new track around a very steep, rocky hill in that area (see Section 3.1.7). There is a potential issue to resolve with Track 19 though: there was insufficient time during the field work phase of this project to consider its likely route properly, especially at the bottom. Here, the slopes are very steep, with plenty of rock outcrops (See Figure 15). It would be very desirable for Track 19 to 'land' on Track 5 where the latter has already crossed over to the true right of Waipapa Stream. This would avoid adding a third bridge (although for riders of the skill level anticipated here, an unbridged crossing would be adequate presuming the impact of a stream crossing was acceptable).

An Alternative option

An alternative is offered here (see Figure 15) in case the wider community is particularly determined to provide a riding track to the historic bunker site. In this case, the principal track should still extend from Track 10 to Track 5, but with a c.400-metre side-track to the bunkers. This would still provide a fully rideable descent of the eastern flank of the Reserve but would also open the bunker site up to riders. If this option was chosen, the side-track would be two-way and dual use, so it would have increased width, a lesser slope and thus an increased length.

Feasibility and appropriateness

Track 19 is potentially feasible as shown on the Plan or as described here, although as it is shown on the Plan it climbs too steeply from the Track 10/11/19 junction and through some high-value vegetation (see Figure 15). It also descends very rapidly to track 5 and even at the suggested Grade (5), a suitable route still needs to be proven. We didn't look closely at this part of the Reserve during our field work but aerial photos suggest it will be difficult terrain in which to add any rideable track.

A form of Track 19 certainly seems to be appropriate and of strategic merit in this part of the Reserve. However, Grade 3 (as shown in the Draft Track Network Plan and the Brooklyn Trail Builders plan) is not the right grade: the likelihood of achieving Grade 3 in this location seems very slim and there is no benefit in provided such an 'easy' trail where it can only be reached by much harder trails.

Recommendations

- Subject to finding a suitable route, a track connecting Track 10 (north of its high point) to Track 5 is commended as a good addition to the Network. The route should ideally join Track 5 where that track is on the true right of Waipapa Stream (where it is currently).
- The recommended key parameters for Track 19 are that it be built as a Grade 5 downhill track, and be technical rather than thrill-oriented, and dual use. Different parameters would be recommended for any side-track option built to give bike access to the bunkers site since that will be two-way.
- If a suitable route for this track cannot be found, a Route-standard walking option should be created instead, to complement Track 11 and make possible a loop experience.
- Full investigation and/or further research are recommended to ensure any track built here takes into account the identified high-value vegetation areas and any archaeological features or cultural sites.

2.5. Track 22 – a track up the Hāpe valley

Proposed track 22 would traverse the length of the Hāpe Stream valley, joining the south coast to the Radome area. Track 22 would achieve two of the sought-after outcomes in the Draft Track Network Plan by providing a climbing route from the south coast to complement the south-bound and downhill routes and by closing a marathon-length, all-off-road loop track from Aro Valley.

In the Draft Track Network Plan, Track 22 is shown extending all the way from the coast up to the Red Rocks Track/Tip Track junction. However, it is defined here only as the section of new track that would run between Tracks 12 and 20b, as shown in Figure 16:

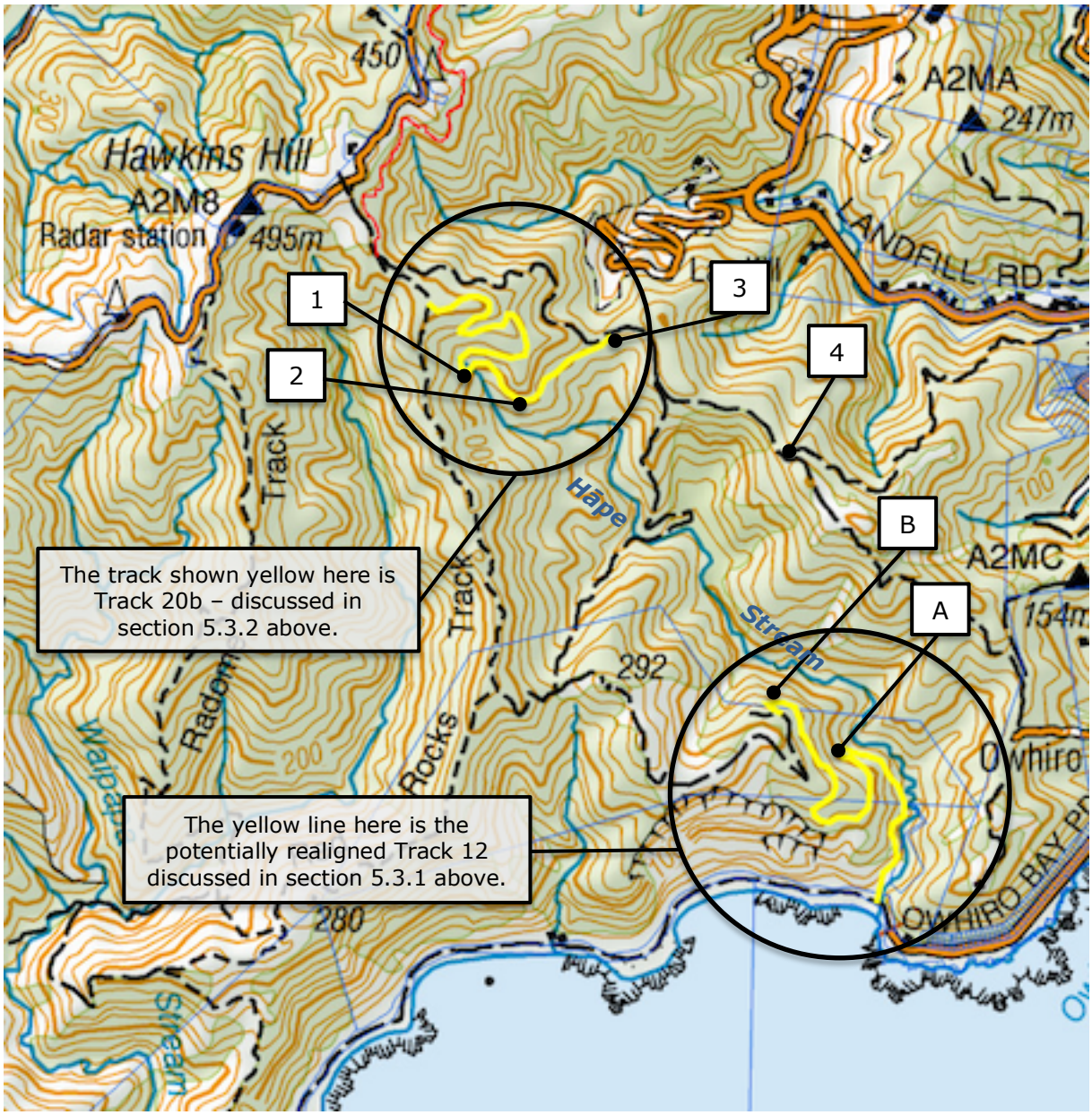


Figure 16. Track 22 (or Track 24, see Section 2.6) would run through the Hāpe stream valley, likely connecting Point A or B (on Track 12) to Point 1 or 2 on Track 20b, or perhaps Point 3 or 4 on the Tip Track.

<u>Experience and audience</u>

Track 22 will be a simple trail that climbs gradually as it makes its way northwards. The Plan indicates it will be for all users and uphill-only for cycling. This seems logical to ensure the trail can be narrower and less impactful, and to eliminate conflict. Downhill riding will be available from near enough to Tracks 22's high point on Track 5 (Red Rocks Track) and/or Track 18 (proposed).

Both the Draft Track Network Plan and the Brooklyn Trail Builders plan list Track 22 as a Grade 3 trail. There is definitely enough terrain to achieve that Grade since the track's total climb will be in the order of 150-200 vertical metres. A Grade 3 trail will invoke a maximum slope of 5 degrees, giving a track length of 1,715 metres to climb 150 metres or 2,286 metres to climb 200 vertically. Such a trail would also need a rideable width of 900mm for 90% of its length.

However, while Grade 3 is achievable, in keeping with our analysis elsewhere in this report, we consider Grade 4 to be a better target grade for off-road cycling tracks in Te Kopahou Reserve. Off-road cycling in the Reserve is more akin to Advanced (Grade 4) riding than Intermediate (Grade 3) riding due to the ruggedness and scale of the terrain, an element of remoteness, and the skills, equipment and fitness required. Grade 4 trails are also significantly cheaper and less impactful to build, being nominally only 2/3 as wide and, by virtue of being lees steep, just 70% as long.

Route options

The route shown for Track 22 in the Draft Track Network Plan is a good one, including because it mostly passes through vegetation of low ecological significance. There is a natural weakness in the landform in the valley at the 200-metre contour that would make an interesting and relatively easy place to put the track. The following figures show how the route might look.

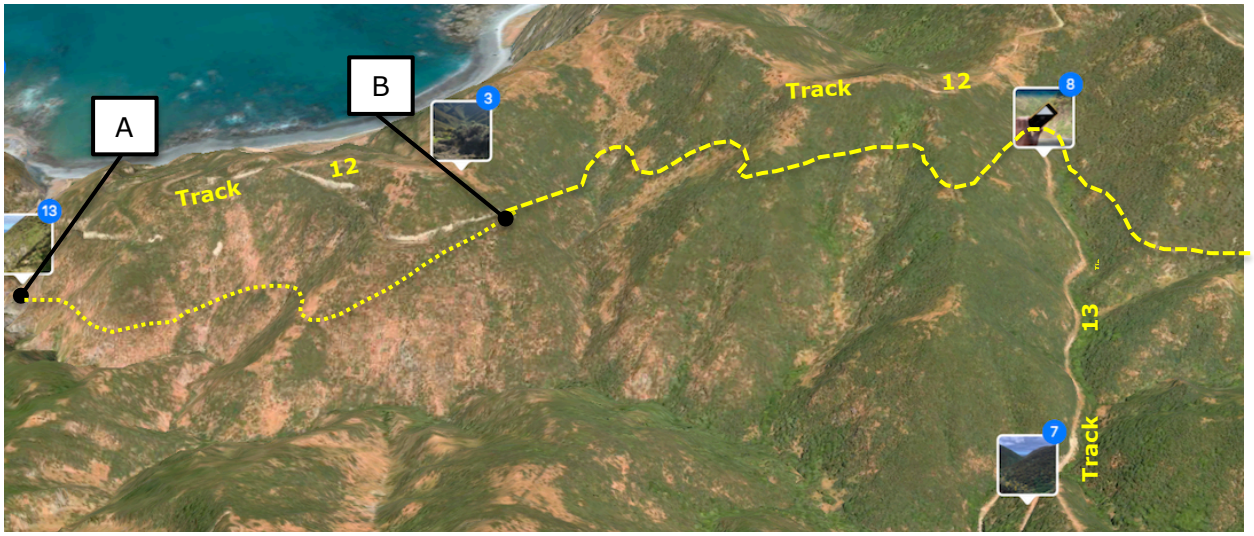


Figure 17. A possible route for the lower half of Track 22, from Point A or B in Figure 25 up to the Track 13 crossing.

Figure 18. The side slopes above Track 13, where Track 22 would cross it, are very steep.

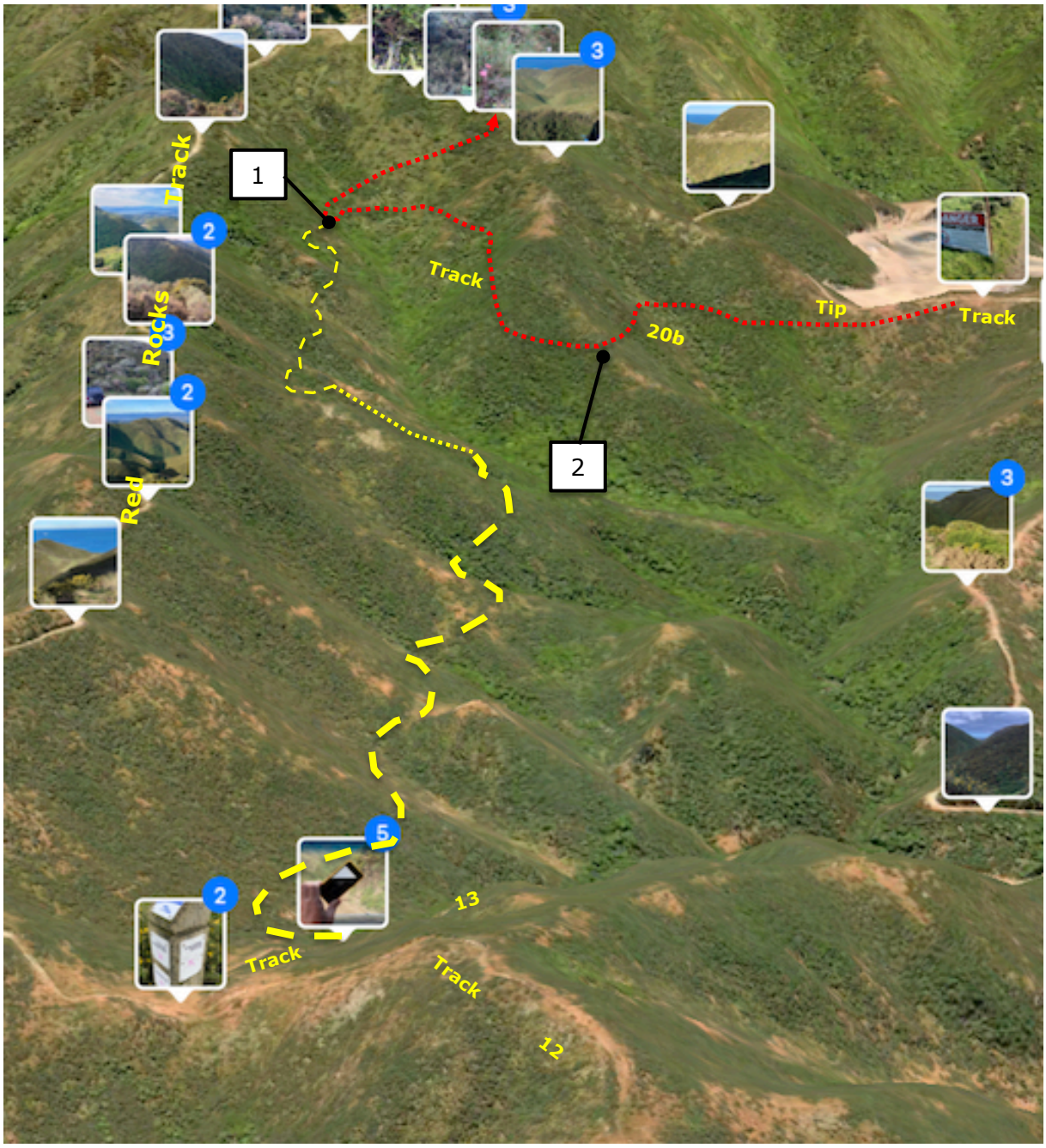


Figure 19. The possible route and route considerations for Track 22, from its Track 13 crossing up to Track 20b at Points 1 or 2 as per Figure 25. The thicker dashed line sits more or less on the 200-metre contour line, where there is a pleasing landscape feature. At the dotted line, the track is out of view and would climb before sidling to Point 1.

Feasibility

Track 22 is an eminently understandable one that would significantly improve the overall track network if it went ahead. However, it is crucially dependant on the trail above it – Track 20b – being built and the one below it – Track 12 – being upgraded. While there seems to be little to prevent Track 20b going ahead, Track 12's upgrade, at the mouth of the Hāpe Steam, is much less certain.

A hierarchical approach to resolving the upgradability of Track 12 is presented fully in Section 2.2 and summarised here as it affects Track 12. We consider it unlikely that a track can be built up through the Hāpe gorge that would allow uphill riding, in which case the principal benefits of Track 22, as planned, would not be realised. Downhill riding might be

possible though, which would reverse the principal direction for Track 22 and require another location to be found for uphill riding (this could be Track 18 or possibly Track 5 (Red Rocks Track), subject to further investigation). Finally, if the bottom (gorge and elevator shaft) section of Track 12 can only be enhanced for on-foot activities, then Track 22 offers little improvement to the network since walkers would still have access up to Track 5, where they could then make their way northwards towards the Radome and Turbine carpark, or southwards and down to the coast.

Recommendations

- We recommend the construction of Track 22 as a Grade 4 trail, with uphill cycling as the key outcome, provided uphill riding is available all the way from the coast after consideration of the upgrade possibilities for Track 12.
- If only downhill riding was possible on the lower section of Track 12, we consider that Track 22 would not be necessary.
- If it turns out that only walking is possible on the lower section of Track 12, we consider Track 22 is not necessary.

2.6. Track 24

Track 24 was proposed for the planning process by a community group and has been included for discussion in the Draft Track Network Plan. This is despite it not being supported by Council staff because it passes through relatively high-value vegetation and, while the exact route is not known, it also runs much closer to the watercourse than Track 22 does, including crossing it, which Track 22 does not.

Track 24 is in the Draft Track Network Plan as a Grade 3 off-road cycling track. It is shown in the Plan, running up the Hāpe valley parallel to proposed Track 22 (see Section 2.5 above). The two tracks have similar, possibly even identical start and finish points. They would mainly provide uphill mountain bike riding but would also act as the uphill leg of the mooted 42-kilometre (marathon-length) running loop described in the Plan. Like Track 22, this track is only feasible if a suitable track can be built up through the gorge section of Hāpe Stream just above the coast (Track 12, see Section 2.2).

Feasibility and appropriateness

Critically, no track is feasible in the Hāpe unless a satisfactory track option (width, slope, stability, turn radius etc.) can be built up through the lower gorge from the sea. The rest of the track is presumed to be feasible but the valley appears to be very steep-sided with little floodplain and plenty of rock outcrops. The feasibility of the trail is reduced by the proposed track grade (3, Intermediate), which adds length and width, and therefore impact. A higher grade is more feasible but Grade 5 is probably narrower and/or steeper than would be ideal for the kind of rider envisaged.

A track up the Hāpe is commendable concept. The proposed nominal route of Track 24 lacks the outlook and topographic interest of Track 22. Insofar as it is located deep in the valley, it also runs through a more sensitive area ecologically than Track 22 does (see Figures 20 and 21).

Recommendations

- Track 22 is recommended as a better option for a track in the Hāpe valley than Track 24.

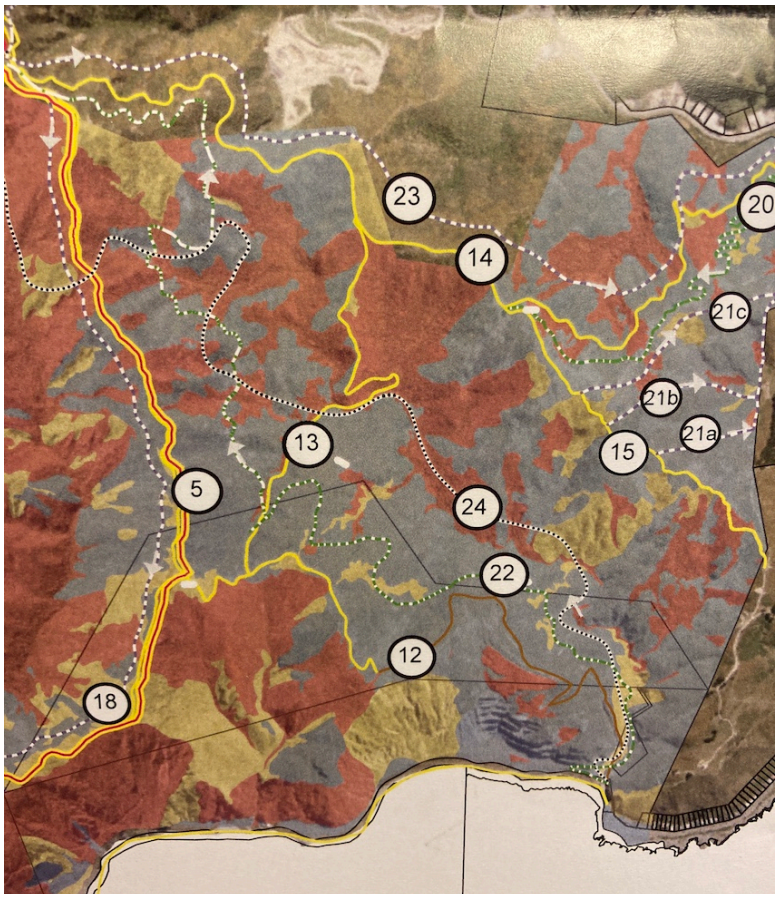


Figure 20. Tracks 22 and 24, as shown on a vegetation significance map. There is a lot more significant vegetation (red areas) on the true left of the Hāpe where Track 24 is shown.

Figure 21. This is a satellite photo view of the same area, in the mid-Hāpe valley, showing the stark difference in the vegetation. The right hand (true left) side of the stream, where Track 24 is shown in the Plan, is much further along the regeneration process than the left hand (true right side).

The impact of construction would be higher on the true left and construction route-finding would be more difficult.

2.7. Track 25

Like Track 24, Track 25 was proposed for the planning process by a community group. It, too, has been included for consultation in the Draft Track Network Plan despite not being supported by Council staff because it passes through relatively high-value vegetation. Track 25 is not proposed to be part of the mooted 42-kilomtere loop, although it could be. No travel direction is included in the Plan, although the proposing group sees it as a (presumably) downhill part of a smaller (25-kilometre) loop of the bulk of the Reserve.

The precise route for Track 25 is not known but it appears that it would be about 7 kilometres long – the longest track in the Reserve. It would thus have a very low average slope and take quite a while to ride. It would sidle around some huge ridges, and into and out of some very big basins, especially that of the north branch of the Waipapa Stream.

This track is mooted to be a Grade 3 one in the Plan. Grade 4 is more realistic for the terrain and type of riding and rider anticipated there. A Grade 4 trail can also be narrower – 600mm vs 900mm nominally – and therefore cheaper and less impactful to build. Grade 4 trails are usually also shorter than a Grade 3 ones that have the same start and finish altitudes. However, in this case, Track 25's start and finish points are so far apart that it will have the same length irrespective of grade: if it climbed 150 or 200 metres over 7 kilometres, its average slope would be 1.2 or 1.6 degrees, both of which are Grade 1.

<u>Feasibility and appropriateness</u>

Track 25 is nominally feasible, but so long that its construction seems like it would be a major project that would generate a significant maintenance commitment, especially at the mooted grade (3). The appropriateness of Track 25 is considered low, partly due to its sheer scale but mainly because it goes through what could otherwise be the largest untracked part of the Reserve. This is a space with a complex mosaic of vegetation that is regenerating and it is likely to have kiwi released into it.

<u>Recommendations</u>

- Track 25 should not proceed because of its scale and impact, and because numerous other tracks will provide similar experiences with less impact.

3. SOUTH OF THE RADOME – FORMER FARM/VEHICLE TRACKS

This Part of the report deals with the several tracks in Te Kopahou Reserve that were vehicle tracks for farm purposes in the farming era. While a number of these are named and known as public tracks, they still see vehicle use for management purposes. They are also used four-wheel drive club members, for trap servicing; their activity is both management and recreational in nature.

For each track, there is some descriptive information and analysis of its Network contribution in light of the Draft Track Network Plan, leading to conclusions about feasibility and appropriateness. For most of these tracks, little change is envisaged by the Plan and the contribution they make to the Network is easy to understand. A lot more detail is provided where significant change is proposed or could be strategically important.

3.1. Track 5 (and Track 18) – connecting Barking Emu and the Tip Track to the Coast

Finding the best options for track(s) from the Radome area to the coast will be one of the most important outcomes of the entire planning process. There are two main options: using the Red Rocks Track – Track 5 in the Plan – or building a completely new track, shown as Track 18 in the Plan. Two more options might be considered: building both tracks or improving the Red Rock Track.

3.1.1. Description

Track 5, the Red Rocks Track

This is probably the most important track in the Reserve, following its central spine from near its high point down to the shoreline near Pariwhero/Red Rocks. According to Trailforks and the on-site signs, the track starts at the southern (uphill) end of Barking Emu, at its junction with the Tip Track – the 280m of (ex-vehicle) track leading up to Hawkins Hill Road is part of the Tip Track and not part of the Red Rocks Track[5].

The Red Rocks Track extends from that point – 415m above sea level – down to about 10m in 4.74 kilometres. This means its average downward slope is -4.88 degrees – right on the target average for a Grade 2 downhill trail. It does have several very steep downhill sections and a number of climbs, totalling about 50m according to Trailforks.

Track 18

This proposed new track would have essentially the same start and finish points as Track 5. The altitude profile of the two tracks is also the same, although Track 18 would likely be longer and thus even less steep (on average). The exact length is very much route dependent. The two tracks would be in-common at the bottom, for 500-1200 metres.

3.1.2. Service Level, track type and off-road cycling Grade

Track 5.

As an on-foot experience, the current Red Rocks Track reads like a Tramping Track. It appears on the Trailforks website as a Grade 3 (Intermediate) off-road cycling track that is primarily ridden downhill. Grade 3 is very commonly used for presenting the off-road cycling experience provided by a vehicle track, and this one certainly does not meet the relevant standard. It is clearly Grade 5 instead and there are three main reasons for this:

[5] Hawkins Hill Road is, however, certainly a *de facto* entry point to Track 5 currently. One of the issues that the Reserve planning process seeks to resolve is the tendency for visitors – walkers especially – to use that road for access to and from the Reserve and tracks. Although the road is effectively private, vehicle use of it is growing as more homes are built in the area, making pedestrian use of it increasingly unsafe.

1 The several steep sections are much steeper than the maximum downhill slope for a Grade 3 trail (11 degrees[6]).
2 The bottom, single track section is, at c3-500mm wide, too narrow for even the Grade 4 specification (600mm average or 400mm minimum).
3 That same section has several turns with a turn radius well below the Grade 3 minimum (2.5m, with more preferred).

The Red Rocks Track has been slated for branding as part a regional 'Signature Trail' – the Skyline Track. This is a 40km-plus walk, ride or run Experience that starts in Johnsonville and finishes on the south coast. While the Signature Trail is not fully in place yet or a nationally recognised 'product' like a Great Walk, it does imply a higher level of service than an ordinary track. Like a Great Walk, it can be presumed to be more popular than neighbouring unbranded tracks. It will also likely appeal to a larger and more diverse use groups with higher expectations and a lower level of risk tolerance.

Track 18

The grade, type and service level options for Track 18 are not decided. Indeed, it is presented in quite different ways in different plans or media. In the Draft Track Network Plan, it is described as "a new long downhill [Grade 4] mountain bike track to the coast" for mountain bikers. It is also part of a proposed 42-kilometre loop experience from near Wellington's CBD to the south coast and back.

A trail with similar start and finish points is shown in a separate plan and map by Brooklyn Trail Builders as a 6-kilometre "mountain bike priority Grade 4/5 descent to the south coast" that eliminates the pinch climbs on Track 5 and provide better user separation on that track. The same group have described the track differently, on their Facebook page (27 August 2021), as an "epic G5[7] 485 vertical metre downhill from Radome to Red Rocks".

3.1.3. Use and pattern of use

Track 5

Track 5 the Red Rocks Track is steep in places and mostly a former vehicle track. It now only sees vehicles for management purposes but not in the bottom c1.1km. It is popular and seemingly widely valued by walkers, runners, horse riders and off-road cyclists, all of whom mostly travel in the downhill direction (southwards towards the coast). In the reverse (uphill) direction, it is a demanding climb by any method and by bike, barely manageable.

There are many ways to experience the Red Rocks Track. For many visitors – walkers especially – following it right down to the coast is a full day's outing, probably requiring transport assistance. Loop experiences are possible but the longer ones are really only practicable for bikers or runners. The shorter loops involve other steep old vehicle tracks (9, 8, 7, 6, 10 and/or 13), which are challenging to walk up and difficult to even push a bike up.

A major junction about one third of the way along the track allows people to peel off eastwards and drop down to the roadend at Te Kopahou Visitor Centre. This is Track 12, which is extensively discussed in Section 2.2 and which has, in conjunction with the Red Rocks Track, good potential as a walking loop doable in a day from Visitor Centre carpark.

Most riding on Track 5 is likely to be part of a half or full day trip and is largely adventure/exploration focused rather than being particular technical. Riding on this track

[6] In fact, these slopes mostly exceed the Grade 5 maximum. All three off-road cycling trail standards have idential maximum downhill gradients which is helpful. However, they are all simple maxima with no provision for specified lengths to be steeper and no way of accounting for the entry or exit difficulties of such lengths.
[7] Grade 5

seems likely to be the source of some user conflict, despite it being very wide and fairly open, which gives good visibility and lots of passing space.

Track 18

The way in which Track 18 would be used depends significantly on how it is built: which grade and what style. In all three of 'visions' described for the Track in 4.1.2 above, it is essentially a one-direction (downhill) biking track. Nowhere it is suggested that it could provide for uphill use, but this should be retained as an option if it proves impossible to create a good climbing track from the coast anywhere else.

Track 18 would likely be bike-priority but not bikes-only and it would certainly appeal to trail runners. This is unlikely to create significant conflict issues and indeed, the provision of this track would remove some riders from Track 5, although not from the last kilometre or so.

3.1.4. The Experience

Track 5

The principal experience provided by Track 5 is that of an adventurous day out with exhilaration and wonder provided by fantastic views in a regenerating natural area. This is a place where the environment and surroundings are crucial; the track is a means of access rather than being an experience in itself. We consider this track to be essentially unique in New Zealand because of the combination of its coastal aspect and back country feel, with immediate proximity to a city.

The width of the track provides a social element by allowing side-by-side enjoyment and likely helps reduce conflict. Track 5 the Red Rocks Track does provide some challenge, both equipment- and fitness-wise, and with an element of remoteness in a robust climate. However, this is not huge, and while the track requires some focus here and there – on foot or by bike – it largely lacks a technical component. For cyclists, the bottom 1.1 kilometres is something of an exception to this, being quite narrow with tight turns, a tricky surface and a modicum of exposure on the outside edge.

Track 18

Again, the experience would depend greatly on the grade and style of the final product. As a Grade 3 trail, it would be fairly straightforward to ride. At a higher grade, it would be narrower and/or rougher and/or steeper and/or faster. The combination of these factors could make it a technical challenge – probably Grade 4 or 5 – or a more wild ride with a thrill component – Grade 5 or even Grade 6. At any grade, Track 18 would not have the spectacular views available from Track 5 and, at the higher grades especially, the track itself and the riding increase in importance in the overall experience compared to the place and its values.

3.1.5. Analysis and Issues

Track 5

The major strength of the current track is that it already exists. Its ridge-top location is its key attraction and feature. As it stands, the Red Rocks Track is essentially adequate for an ordinary track and for use by low numbers of quite experienced users. However, the experience is spoiled somewhat – for all users – by its steep sections. Its importance and popularity suggest a more consistent and smooth experience should be provided, including to cater for a somewhat less experienced walking audience than might be found on the other old vehicle tracks. On foot and by bike, the steep sections of the Red Rocks Track and its in-places loose surface, should be eliminated.

The predominance of the downhill direction mean bike speeds on the Red Rocks Track can be high, which brings the risk of conflict and collision. However, this seems unlikely to be

an insurmountable problem given that the track is well known as a shared one. Furthermore, the riding surface and the remoteness of the destination suggest that the track is not particularly attractive to speed- or thrill-focused riders.

The Red Rocks Track is very exposed to the often-wild Cook Strait weather. This requires good equipment and a moderately high level of experience from all users. Our sense is that the average foot users of this track might be a bit less experienced and more risk-averse than those using the other tracks, something likely to increase with publicity and Signature Trail branding.

These features of the track and its users lead us to consider that some form of shelter (and probably a toilet too) would be a good addition (See 3.1.7 below), and they also explain why we consider an upgrade to Track 12 is required (See Section 2.2). The latter development would facilitate both a very doable 9km loop walk experience (Coast Track-Track 5-Track 12) and provide an emergency exit in case of bad weather, injury, storm surge etc. An upgraded Track 12 might even be better placed to carry the Signature Trail designation (for walkers) than Track 5.

<u>Track 18</u>

Track 18 has some key advantages. First and foremost, as a new build it has the potential to provide a kind of riding that Track 5 does not. By virtue of effectively being bike priority, it will also enhance user separation along that part of Track 5 that is not in-common with it, although it could actually worsen user conflict on in-common sections. Finally, as a new track, it would be purpose-built rather than re-purposed from a previous use.

It is difficult to assess the issues with this trail since it has multiple possible identities, as discussed above (see 3.1.2). However, we consider there are some significant issues with the Track 18 proposition. These are:

a) As a new track where there is already a connection, it means duplication. This brings additional construction, maintenance and carrying costs.
b) Its location off the ridgetop makes it inconsistent with the bulk of the Skyline track, with its important 'Signature' designation. We consider that the cycling portion of Signature Trail users would prefer the ridge-top location and will be seeking the same expansive, scenic, point-to-point experience as the walkers, rather than a single track ride. We note that 'in-forest', single track riding is much more readily available than the type of riding offered on the skyline.
c) Track 18 would have a narrower audience than Track 5, especially at the highest grade mooted for it – Grade 5 – or with a gnarlier reputation.
d) Depending on how Track 18 was built and presented, it could lead to user conflict, both on the lower section, where it would be in-common with the Red Rocks Track, and on those trails that feed the Red Rocks Track but which are still part of the Skyline Track – Barking Emu especially.
e) The middle portion of the track – where it would be distinctly separate from Track 5 – would pass through some high-significance vegetation.

All of these issues are likely to be acceptable if the track creates a strong, strategically important experience. However, we consider the proposition of Track 18 is weakened by a number of factors.

a) Out of the possible total length of 6km, the top kilometre or so traverses areas of medium and high ecological significance. Furthermore, access to this uppermost part of the track would require riding up Hawkins Hill Road, something which the planning exercise seeks to discourage. Indeed, most riders would start Track 18 after riding up the Tip Track or Barking Emu, rendering any track above that point somewhat redundant.

b) The potential total length of Track 18 is further reduced because the bottom c1.1 kilometres would be in-common with Track 5, which would necessarily be shared rather than bike-priority.
c) In light of a) and b) above, only the middle portion (c3.3km) of the track would remain to act as a purpose-built bike track. While this stretch of terrain lacks the consistently high-value vegetation of the portion immediately below the Radome, it also lacks the necessary height loss to satisfy the riding sought by some, especially if an 'epic', thrill or technical track is the aim (see 3.1.2).
d) Track 18 would lead riders down the coast where, if it proves unfeasible to cater for return riding up the Hāpe Stream, they would have no return option except the beach and the road. While this may not trouble adventure-style riders seeking long-experiences on cross-country bikes (where road riding is OK), it won't be so appealing to riders on heavy bikes not suited to road travel.

Our biggest concern with Track 18 is that it would create conflict in the Reserve if built and marketed as a technical trail, or a thrill-type trail or in a way that might be considered to be 'epic'. This would spoil the experience available to others, especially those attracted to the area by its current renown and future Signature Trail branding.

We consider such as trail would be less than satisfying for riders seeking more demanding off-road experiences, which we would normally expect to have road access for easy repeatability and to occur in clusters like the one proposed for Careys Gully (see Section 4.5).

3.1.6. Analysis and Conclusions

<u>Track 5 or Track 18…</u>

We consider the most important outcome in this part of the Reserve to be the one that enhances the experience of the ridge-top location of the current Red Rocks Track. That location is so spectacular and unique that it is the best place to facilitate use by all user groups. It is the best location for the development and fruition of the Signature Trail concept and it can provide an experience, for all users, that provides reasonable consistency all the way from Johnsonville to the south coast.

Track 18, however it is built, would not be the right location to carry the Signature Trail brand since it does not have the Ridge-top position of Track 5 and is not consistent in character with that part of the Signature Trail north of Makara Saddle. While it would be more appealing for some types of riding, it would have a narrower appeal than Track 5 and limited appeal for those seeking 'epic' or hard riding given its isolation and lack of road access. It represents a kind of riding that is already very well catered for compared to the extensive, point-to-point riding that the Signature Trail promises.

While we consider Track 5 to be the better location for all users, it is less than ideal currently because of nine difficult sections we identified in our field work. Most of these are steep pieces of former vehicle track, sometimes with a loose surface or erosion that requires careful attention from all users. One is a much younger piece of single track that reads like a bike track but is shared, and which is very narrow with very tight turns. We recommend these nine difficult sections be eliminated by bypasses or widening work to improve the experience and enhance the benefits this track can produce. These bypasses are described in detail in Appendix 3.

These bypasses should be shared-use, which will be achieved by providing plenty of width, limiting slopes to control speed, keeping obstacles small and minimising the use of turns. They need not be designed with uphill riding in mind (but see note re uphill riding in 3.1.7 below). The bypasses should be similar to the ones already provided on the Mākara-Kaukau section of the Signature Trail (although those are currently incomplete, narrow and rough).

The overall effect would be to provide a consistent experience along a much bigger proportion of that Trail than is seen in the present situation.

The suggested specifications are more like a Grade 3 trail than a Grade 4 one. However, the latter is still the recommended presentation Grade since the overall experience will still demand a high level of skill and self-dependence in a semi-remote area, and the bottom kilometre or so (discussed as Steep Sections 8 and 9 in Appendix 3) will remain quite challenging – distinctly narrower and tighter-cornered than a compliant Grade 3 trail.

More detail of the suggested specifications for the bypasses is provided here:

- There is no recommended **average** downhill slope. Each is unique and some will be flat. Slopes should be fairly constant and in the range of 6-10 degrees.
- the recommended minimum width **for the riding surface** is 900mm, irrespective of side-slope, with an additional 150-300mm clearance on both sides (depending on terrain) to allow for passing.
- full (180°) turns should be avoided[8] to retain the interest of walkers but, where they are provided, the recommended radius is 2.0m, **measured to the outside of the rideable area** (but allowing for some inward creep of the batter due to erosion). To minimise construction work, impact, and riding speed, berms should not be provided.
- The surface should be natural with no roots – a cut bench is required as opposed to the track sitting on the surface. The recommended height for all obstacles (avoidable and non-) is 200mm.

…or both?

The above analysis does not mean Track 18 should not be built at all – just that it is a lower priority than the Track 5 upgrade with a more limited purpose and appeal by virtue of its specialty nature and limited outlook. Track 18 may still provide benefits, but should be built as a non-technical, non-thrill (and not 'epic') trail so that it doesn't encourage a style of riding likely to conflict with the walkers and adventure-focused users attracted to this part of the Reserve by the beauty and natural quiet of the place itself.

Grade 4 would be the most appropriate grade Track for 18. To minimise environmental impact, a 'straight-sided track' is recommended, one with a fairly constant width and no berms, since they require lots of earth to be moved and more trees to be removed. A fully benched track is recommended too, in order to avoid alternative paths developing or the leaving behind of tree roots, which become gnarly and unsightly over time. The overall effect should be to provide a 'patient' and fairly slow track, rather than a 'wild' one, again in order to discourage a riding style that would create conflict below the junction with the Red Rocks Track and the final descent to the coast.

3.1.7. Some other considerations

Some specific other aspects of the tracks in this part of the Reserve warrant discussion.

The idea of a hut

We consider the idea of providing a back country hut in Te Kopahou Reserve is an intrinsically good one; it would probably be the closest hut to any CBD in any city in New Zealand, and accessible without driving anywhere. However, building a hut would tie up a lot of capital and its popularity and proximity might lead to issues of crowding, pollution and vandalism. We would certainly recommend the addition of a shelter on Track 5 and a toilet, providing a good solution is available for waste management. The sheltered location shown on the plan has lots of merit, although the topography suggests some instability. A higher location might be better for a shelter, closer to the Track 5/Track 12 junction.

[8] This won't be possible on the bypass of Steep Section 8 due to the terrain. However, connections between new the riding line and the current track will be possible and some improvements to the latter should allow a good solution to be built (see "Steep Section 8" in Appendix 3).

Uphill or down?

If it ultimately proves impossible to provide a climbing track up the Hāpe Stream (Track 12, see Section 2.2) but an uphill trail is still desired, then Track 5 or Track 18 may be able to perform this function. This would be difficult to achieve at a good slope for climbing by bike. Track 18 would likely be better than Track 5 for this purpose because the new parts of it could be constructed to the desired specifications from scratch. However, some parts of Track 5 (the lower 1.1 kilometres or so) would still be required and, even with widening and some realignment, these would be quite steep ridden uphill.

Appendix 3 describes the suggested bypasses of steep sections on Track 5 in detail but assumes Track 5 would be for downhill riding only. Some information is provided should they be required for uphill riding instead.

The Stream Crossings on the lower Red Rocks Track

A specific issue is raised by the two unbridged stream crossing at the bottom of Track 5, the Red Rocks Track. We consider the current situation is not fit-for-purpose on such a popular track because the crossings should be bridged so the expected users can keep dry and cross safely[9].

There are two options for resolving this matter. The first involves avoiding the stream crossings by installing new track on the true left of the stream. The second involves installing two bridges and retaining the current track. These two options almost have perfectly opposed advantages and disadvantages: building new track would have more impact but building bridges is probably more expensive. Our view is that adding new bridges and (largely) retaining the current alignment is the better option, primarily because of the impact of constructing new track and the difficult of doing so in the terrain involved. Furthermore, we consider that if long-enough bridges are installed and they are high enough over the stream, they will not be particularly flood-prone. They will also help eliminate two particularly difficult pieces of track.

3.1.8. Recommendations

- Track 5 – The Red Rocks Track – is recommended as a better option than proposed Track 18 in this part of the Reserve because of ridge-top location and wider appeal.
- While Track 5 is considered the better location for the track, especially one carrying the Signature Trail brand, it has several difficult sections. We recommend providing bypasses and/or re-alignments to eliminate these.
- If Track 18 is built, the start (top) point should be on the Tip Track at the southern end of Barking Emu, and not at the Radome.
- If Track 18 is built, we recommend it be marketed as a Grade 4 trail to minimise construction cost and impact and to be consistent with the other trails in the Reserve. We recommend the style of riding targeted should be adventure/exploration rather than technical or thrill to reduce the potential for user conflict.
- We recommend provision of a shelter on the upgraded Red Rocks Track
- We recommend provision of two bridges across the stream at the bottom and the retention of the section of track on the true right there.

3.2. Track 6 – Te Kopahou Track

As it is presented on the map in the Plan, Track 6 extends from the very top of the Tip Track (on Hawkins Hill Road) down to a junction (with tracks 8 and 10) high above the Waipapa Stream. Track 6 is the westernmost track in the Reserve, indeed, a substantial part of it relies on an easement across some private land. It is in two distinct parts, with

[9] Section 2.6.3.3 of the *Track and Outdoor Visitor Structures* refers – under the 'Easy Tramping Track' standard, these crossings would require bridges. Under the 'Tramping Track' standard (see 2.7.4.3), bridges would arguably not be indicated. The critical consideration is the number and type of visitors and, even though it is not defined, the high service level implied by the Signature Track brand.

the northern two thirds of its length doubling as a low-use private road. The southern third is in the Reserve and mostly behind a locked gate; it's a vehicle track that is still used for reserve management purposes.

The section of Track 6 inside the Reserve is very steep in both directions and by any means of transport: it's difficult to even walk given the loose stones on it and rain-formed channels. From its southern end point, there is currently no easy exit to anywhere, especially with a bike or horse. Both the options there (track 10 and 11 or track 8 and 5) include some very difficult slopes on their journeys out to the south coast. Returning to the north via tracks 8, 9 and 7 or 8 and 5 would also be very demanding.

Trailforks shows this track and track 10 as one track ("Ribs") with a Grade 5 designation. Its slopes far exceed both the uphill and downhill Grade 5 maxima although it's not really what most riders would think of were it reclassified Grade 6.

The Experience Available

Being on the edge of the Reserve, Track 6 forms part of the biggest possible loop experiences, with multiple possible start points. The experience provided by this track is one that is very demanding. Track 6 gives a feeling of isolation. This track is not for the faint-hearted, given how steep and rough it is. While it does help form links and nominally accesses the historic observation bunkers, it is unlikely to have the popularity of the easier and more accessible tracks.

Recommendations

- We recommend no physical change to this track but note that it will require on-going maintenance to remain vehicle-accessible.
- We recommend this track be marketed as a Tramping Track and not graded or marketed as an off-road cycling experience.

3.3. Track 7 – Radome Track

This is the only track in the reserve not visited at all during our field work. We understand it is similar to the numerous other tracks that share that history; it's likely to be intimidatingly steep in either direction.

Track 7 appears on Trailforks as a Grade 4 track named Radome. We consider it's much more likely to be Grade 5 or 6 but suggest it's not actually suitable for grading for cycling.

Recommendations

- We recommend this track be classified as a Tramping Track and not have any off-road cycling track grade.

3.4. Track 8

This vehicle track links ridge tracks on either side of the Waipapa valley. It is unnamed but its western half appears on Trailforks as a Grade 3 track called Waipapa West. The eastern half of it, both on signs and in Trailforks, seems to be part of the 'Waipapa Loop' (see Track 9, Section 3.5). It is much more difficult than that Grade suggests.

Track 8 is another remnant track from the farming era that is so steep in either direction that it would be essentially impossible to ride. It is still in use by vehicles for management purposes but includes a difficult stream crossing very close to a particularly significant hot spot for native flora. Use of this track seems likely to be very low.

Recommendations

- Like the other ex-vehicle tracks, we recommend this track be classified as a Tramping Track and not have any off-road cycling track grade.

3.5. Track 9

This is a relatively short track (480m) that provides a linking function between various other tracks, most notably from 8 to 7, which it directly connects. We understand Track 9 is a former vehicle track from the Reserve's farming days but it looks as if it hasn't seen vehicle use for a while, perhaps due to erosion. It certainly doesn't have the same character as the other ex-vehicle tracks and is apparently currently gorse-covered.

This track is also the critical part of the 'Waipapa Loop', or at least the only part of that loop without another possible identity. The Waipapa Loop is signposted on site – certainly at the junction of tracks 8 and 9 – and signs point to it at the junction of Tracks 6, 10 and 8. Trailforks includes the Waipapa loop as a Grade 3 off-road cycling trail but much of it would be unrideable. The Waipapa Loop is something of an anomaly: it is not referred to in the plan, nor on all the signs that should refer to it on-site and such loop tracks normally start from a more accessible place.

We note that one of the submitters at the hearing for submissions on the Plan (5 August 2021) called for Track 9 to be closed. This submitter may have been concerned for the sensitivity of the habitat and flora in the vicinity and the likely future presence there of kiwi. However, closing tracks is difficult: it's very hard to physically stop people using a track, and track closures are generally not well received.

Track 9 could indeed be considered redundant, but little is likely to be gained by closing it or lost by keeping it open. We note that the Waipapa Loop, including Track 9, does includes the site of a possible hut in the Reserve. This could give Track 9 a stronger purpose but also provide a source of risk for the flora in the area and any future kiwi population.

<u>Recommendations</u>

- We recommend consideration should be given to the discontinuing Track 9 and allowing it to overgrow.
- We consider that the Waipapa Loop, if it were retained, needs a stronger identity and would be better shown as a Tramping Track than a graded mountain bike trail.

3.6. Track 10 – Te Kopahou Track

Track 10 continues southwards from Track 6 (see Section 3.2) towards the coast. Indeed, the two are shown as a single Experience ('Ribs') on Trailforks but Track 10 is recognised as discrete one in the Draft Track Network Plan and on at the sign at the junction of tracks 6, 8 and 10. Our analysis of it is very similar to the analysis for Track 6, except that the stretch beyond where vehicle access stops, southwards and down to where it meets track 11 near the observation bunkers, is even steeper than track 6, with an even more difficult surface.

The experience available and type of visitors served are the same as those described for Track 6. However, it would seem unlikely that many mountain bikers would bother following Track 10 all the way to the Observation Bunkers then having to retrace their steps or descend to the coast via Track 11 (see Section 2.1). This perhaps explains why an easier – and rideable – track to the Observation bunkers has been proposed in the Plan. This is Track 19 and it is discussed in section 2.4.

<u>Recommendations</u>

- No physical change is recommended to Track 10.
- We do recommend a reconfiguration of the name and type of this track (and the way it is displayed in media). The final configuration should be determined by the final decisions made regarding proposed Track 19.

3.7. Track 12 – Hāpe Track

This track, which appears on signs and in some media under the name Hāpe Track is partly a 4WD track and partly a foot track. The discussion and analysis of this track is provided in Part 2 of the report above (Section 2.2) instead of here since the main issues and opportunities are at the bottom, on the foot track part.

3.8. Track 13

Track 13 currently appears on Trailforks as a one-way/dead-end 'Access Trail' called Spooky Track. It is yet another very steep 4WD track that is not really slated for any change in the Draft Track Network Plan. We do note that proposed Tracks 22 and 24 both cross Track 13 but unlike Tracks 5 and 14 (Red Rocks Track and Tip Track), no part of Track 13 is gentle enough to be rideable and perform as part of another track.

As it stands, Track 13 performs perfectly adequately for those seeking a particular experience. It also has a role in Reserve management since it provides vehicle access for volunteers checking traps. On the other hand, driving the entire length of this track, from the Track 5/12 junction to Track 14 does involve three crossings of Hāpe Creek, which likely creates some impact on the watercourse.

<u>Recommendations</u>

- There are no recommendations for this track other than to market it as a tramping track and not with an off-road cycling difficulty Grade.

4. NORTH OF THE RADOME

North of the Radome, the landform generally falls gently for a few kilometres then more steeply down regenerating forest slopes to the city. Most of the land is Reserve land designated part of the Town Belt or the Outer Green Belt. There is also a smattering of private land, served by a sealed road – Hawkins Hill Road – that sees limited use and is behind a locked gate (in the Brooklyn Wind Turbine carpark). Much of the land is fenced off and managed and marketed as the renowned Zealandia Sanctuary.

The sanctuary is very important to the city and region. However, while there are plenty of excellent tracks within and on either side of the sanctuary, the location of its perimeter fence limits the space available for connecting tracks from Te Kopahou to Wrights Hill, Mākara and beyond. The Draft Track Network Plan includes two new tracks in this area (Tracks 16 and 17) and has implications for several existing ones (Tracks 1-4). This Part of the report discusses those tracks.

Figure 22. Trailforks map showing the Zealandia Sanctuary and the surrounding tracks and suburbs. The Fenceline and S-bend tracks – the latter highlighted in this map – provide a complete loop of the Zealandia Sanctuary along its boundary fence. The red line is the regional Signature Trail – the Skyline track.

4.1. Track 1, Fenceline Track

The Fenceline Track is a dual use, two-way track that is very important in the City's overall Network, in particular since the Zealandia boundary fence means that part of it is the only track connection between the southern Outer Green Belt (Te Kopahou Reserve) and the rest of the Wellington's western skyline (Mākara Peak and points north). As such, a part of the Fenceline Track is also a critical part of the emerging regional 'Signature Trail' – the 40-kilometre Skyline Track.

The whole Fenceline Track is, according to Trailforks, an 8.3km, near-complete loop of the Zealandia Sanctuary – the loop is closed by a 923-metre track called S Bend, which is a Grade 4 off-road cycling track (see Figures 22 and 23). Fenceline Track is also – and primarily – the maintenance track established (for vehicle use) along the sanctuary's predator-proof perimeter fence. Much of it has a sweeping, roller coaster shape and one part of it carries that name.

Fenceline Track climbs and falls a lot over its length, as shown in Figure 38. Many of these elevation changes are long and very steep. While the trail is not graded on Trailforks (and is instead shown as an 'Access Trail'), the steepest sections would be Grade 5-6 in either direction. Trailforks shows the predominant direction for Fenceline Track as clockwise, as per the profile in Figure 38.

Most of the Fenceline Track is not directly relevant to a consideration of tracks options for Te Kopahou Reserve and the Draft Track Network Plan. However, there are two sections that require some discussion, shown here:

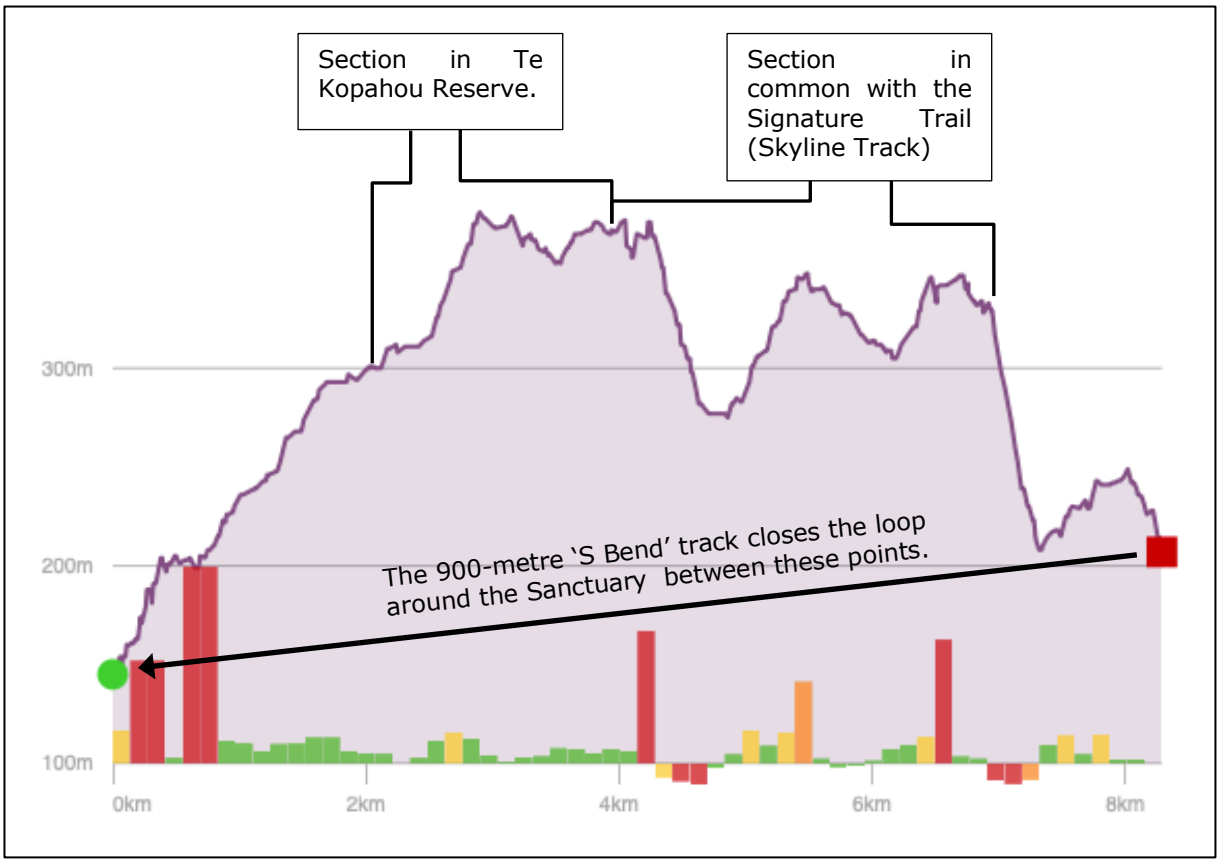


Figure 23. A profile view of the entire Fenceline Track, from Trailforks. While the slopes are hugely exaggerated in a view like this, it's still obvious the track has some lengthy steep sections.

4.1.1. *The piece that is in common with the Skyline Track*

Those walking or riding the Regional/Signature Trail – Skyline Track – use about 3.0 kilometres of the Fenceline Track, from Grant's Track (near the historic Wrights Hill gun emplacement) southward along the Zealandia fenceline to a dip then up a very steep, tightly confined climb to Hawkins Hill Road, at a place that Trailforks calls 'Fenceline Bailout'. Skyline Track users will mostly be travelling anti-clockwise around Zealandia (in the opposite direction to Figure 38 above), as shown here:

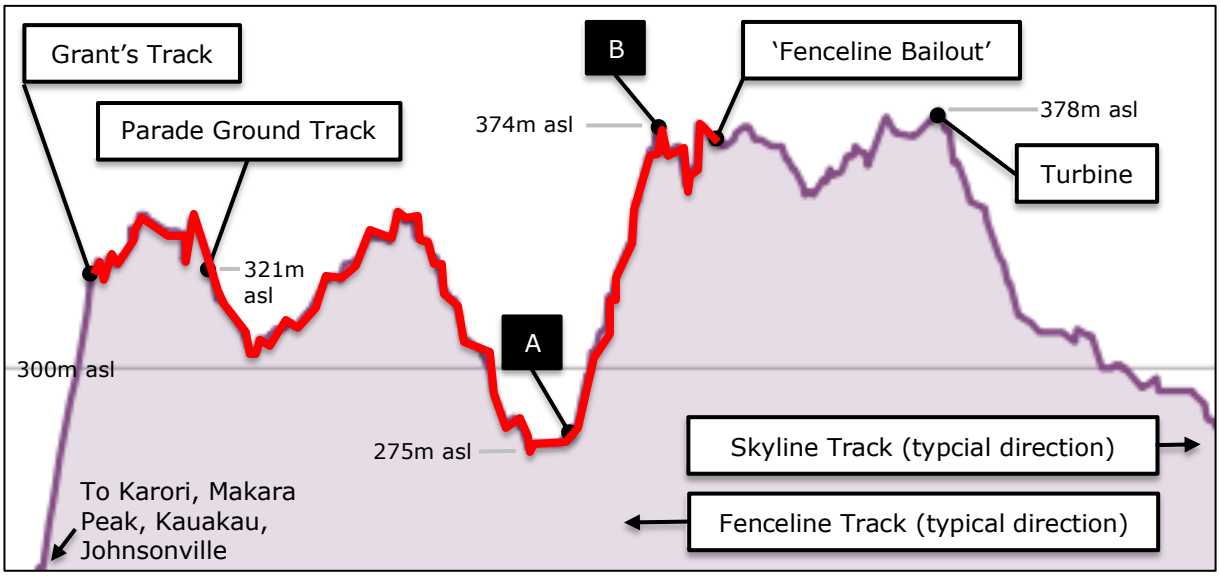


Figure 24. Part of the Fenceline Track profile, shown (left to right) in the direction that most Skyline Track users are expected to travel. The red part of the profile is the part shared by the Skyline Track (with its Signature Trail designation). The section from A to B will be the only 'untreated' steep part of the Skyline Track should the recommended bypasses be installed on Track 5 (the Red Rocks Track) and if bypasses on the Makara-Kaukau section are finished to a similar standard.

The part of the Skyline Track that is in-common with the Fenceline Track is nominally out of scope for this work since it is not in Te Kopahou Reserve. However, the Skyline Track's Signature Trail brand suggests it needs to be considered as a discrete experience with a reasonable level of consistency and high level of useability. We have sought to satisfy this test elsewhere in the report by recommending bypasses to eliminate nine steep sections of Track 5 – the Red Rocks Track. This would make the experience of that track similar to that part of the Skyline Track between Makara Saddle and Kaukau maunga.

Ideally, the same approach should be taken on that very steep part of the Skyline Track/Fenceline Track from A to B in Figure 39. That section climbs c92 metres in c380 metres at an average slope of about 13.5 degrees (Grade 6 uphill (in the principal direction of travel of Skyline Track users)). This is twice the 6-degree average we have applied elsewhere in this report; to achieve that, nearly 900 metres of track would be required.

4.1.2. *The section parallel to Windmill and Carparts Extension*

This part of the Fenceline Track runs from a rest/decision point at the top of the Polhill Tracks up to the southernmost point of the Zealandia fenceline. It splits naturally into two:

<u>That section parallel to Windmill</u>

The bottom part, from (near) the Windmill Track entrance up to the Turbine carpark, runs right beside the fenceline and is dual use. It climbs 72 metres in 900 metres; while this is an average slope of just 4.6 degrees – nominally a Grade 3 climb – it is much steeper in places. It is uncomfortable for walking and too steep for most cyclists, while downhill riders and vehicle present a hazard.

All of these factors probably explain why the Windmill and Carparts Tracks exist. The latter serves as a downhill/exit track for off-road cyclists. The former is the climbing line for cyclists and two-way for walkers. It ascends the same 72 vertical metres, but in 1800 metres – twice the length of track that the fenceline requires for the same climb. This means it has half the slope but it's also much more consistent, and is ideal for cyclists.

Little can be done to improve or change this part of Fenceline Track; Windmill already provides the ideal substitute for cyclists but, while it presumably suits some walkers and runners, it is probably too long for others, especially those undertaking very long hikes. It also lacks the views available along the Sanctuary fenceline and the width to provide side-by-side walking. Both Fenceline and Windmill Tracks have a role to play in the network: they're essentially fit for purpose as they are currently but the entrance to Windmill could be a lot more obvious to walkers. This is discussed in more detail in Section 4.2.

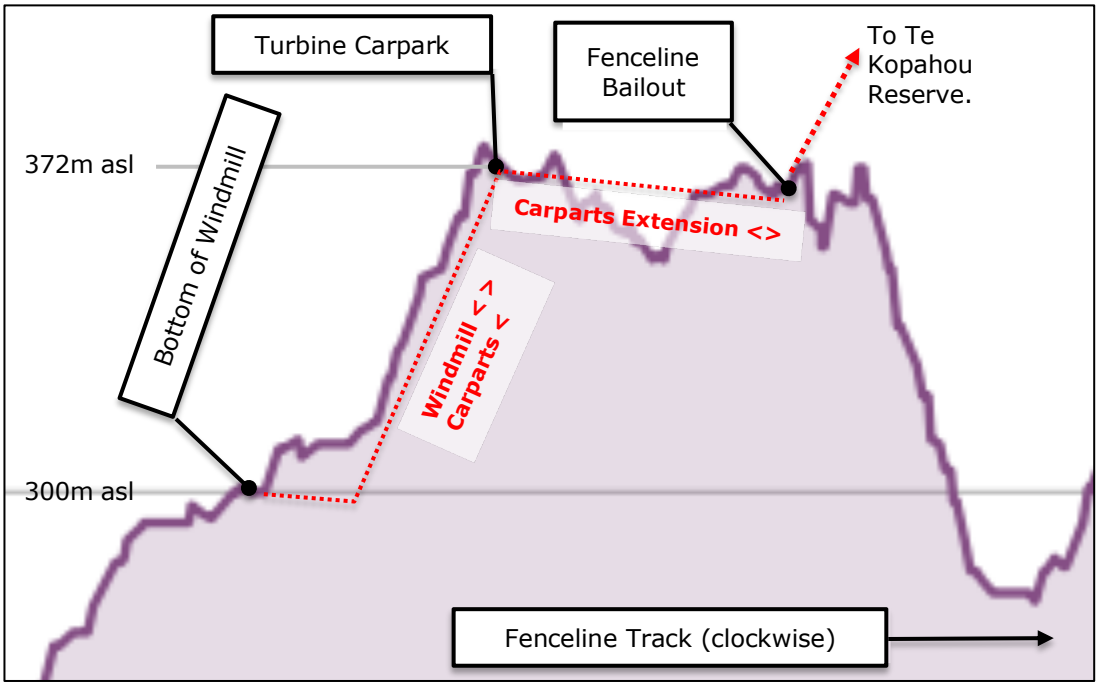


Figure 25. A profile view of that part of the Fenceline Track where there are existing parallel-cum-alternative tracks that people use to get to Te Kopahou Reserve. Beyond (to the right of) the point marked 'Fenceline Bailout', Te Kopahou visitors leave the Fenceline Track and carry on southwards up Hawkins Hill Road. Also beyond that point, the Fenceline and Skyline Tracks are in-common.

<u>The section parallel to Carparts Extension</u>

This section of the Fenceline Track, from the Wind Turbine carpark to 'Fenceline Bailout', is also about 900 metres long. However, its average slope is virtually zero – it loses just 4 metres overall. It does have several steep pinches, both uphill and down, but they are relatively short. Walkers and riders use this part of the Fenceline Track to get to the southernmost point of the Sanctuary fenceline where there is another major choice point: turn north to keep going around the sanctuary (Fenceline Track/Skyline Track towards Karori) or carry on upwards and southwards into Te Kopahou (also the Skyline Track).

At the present time, this latter option involves using Hawkins Hill Road for at least 350 metres, as far as the bottom of Barking Emu. This piece of road walking could be eliminated if users heading to Te Kopahou all used Carparts Extension or if a connecting track was provided between Fenceline Track and that trail at a convenient point like the Fenceline Bailout.

We consider that on-foot visitors (and even cyclists on especially long journeys) would be reluctant to use Carparts Extension as an alternative to the Fenceline Track since it is much longer and lacks the views available from the fenceline. A connecting tack seems to be a better option at this important point in the overall Network, especially with the City adopting the Signature Trail concept as a brand for the Skyline Track, and the desire to provide a track alternative to recreational use of Hawkins Hill Road.

A rideable connection from Fenceline Track to Carparts Extension where they are at their closest is commended as an important network addition. It would also need to connect to Track 17 should that go ahead (see Figure 27 and Section 4.6) and account for its designated direction of travel. The recommended Grade for this connecting track is Grade 4. It would require sufficient width to be dual use and two-way, and should be no steeper than the 6-degree maximum recommended throughout this report for uphill Grade 4 trails. It would be about 210 metres long, as per Figure 27.

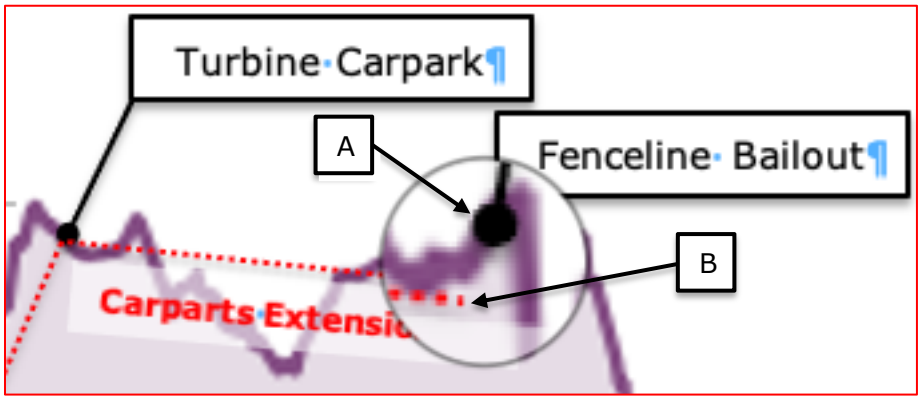


Figure 26. Detail from Figure 40 showing the missing link (A to B) between Carparts Extension and the Fenceline track (not to scale).

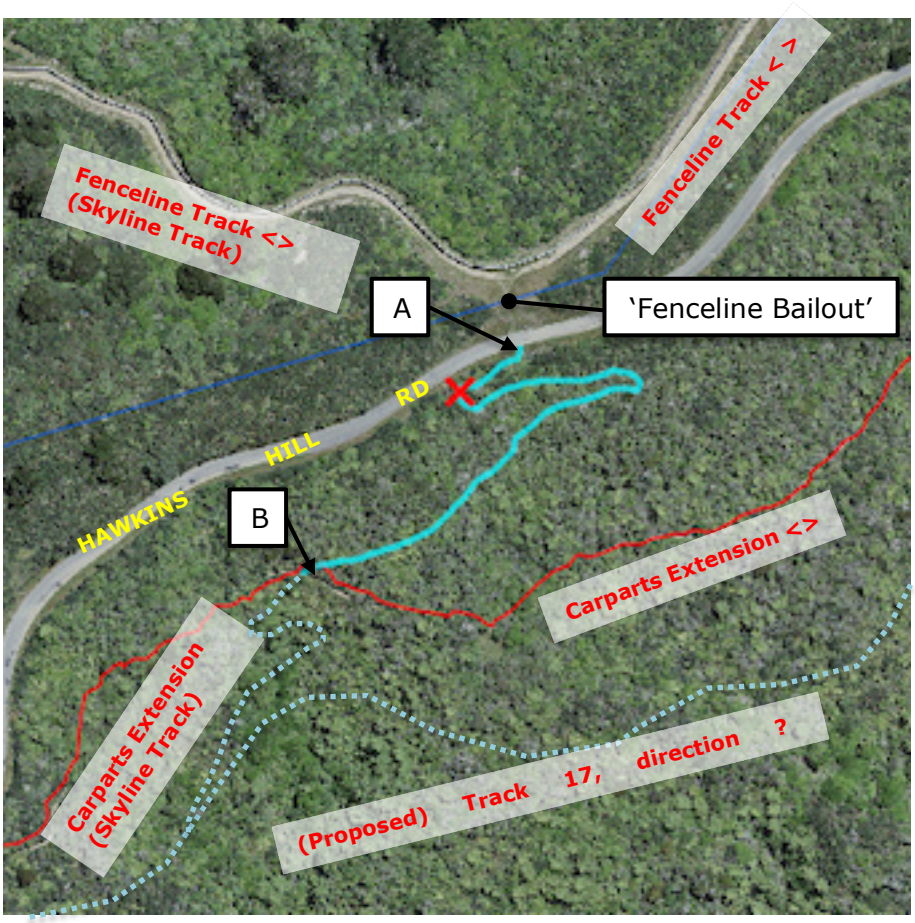


Figure 27. Vertical view of the missing link area (A-B) between Carparts Extension and the Fenceline Track.

The teal-coloured line is close to the recommended, 210-metre length that accounts for the height difference between A and B at the recommended slope of 6 degrees.

Recommendations for the Fenceline Track

These recommendations should be read in conjunction with those made for tracks 2, 3, 4 and 17.

- Construct a connecting track from the Fenceline Track to Carparts Extension as a Grade 4 off-road cycling track allowing for two-way dual use, at a steady six degrees.
- Increase the visibility of the Windmill and Carparts Extension Tracks as two-way options for foot users of the Fenceline Track.
- Simplify and make more welcoming (for foot users) the entrances to Windmill and Carparts Extension.
- The Signature Trail designation of the Skyline Track suggests the very steep section of that track along the Zealandia fenceline (A-B in Figure 39) needs to be realigned so it is rideable uphill (6 degrees is recommended). We recommend this but acknowledge it is currently not feasible.

4.2. Track(s) 2, Carparts/Windmill

These tracks link the top of the Polhill tracks to the Wind Turbine carpark. One (Windmill) is two-way for walkers and a climbing track for cyclists. Carparts is a downhill only, mountain bike-priority track. Both tracks are essentially fit for purpose currently but misgraded[10]: they are currently graded and marketed as Grade 3 trails but their rideable/effective widths are too narrow for that grade and the turns on Windmill are too tight.

Carparts and Windmill provide alternatives to a steep section of the Fenceline Track, a function discussed in detail just above. Both tracks would perform this function better if it was more obvious to walkers that they existed and they were easier and safer to follow, a per the following figures.

Figure 28. The view of the Windmill/Carparts entry/exit from across the (Hawkins Hill) road near the fenceline. The bollard is the only indication walkers have of Windmill's existence. The colour indicates a mountain bike track grade, it's small and it's not actually on the Fenceline Track.

The view across the road gives little reassurance to walkers or first-time visitors, or space to contemplate options; this area needs a makeover (see also Figure 29).

[10] We have grade-assessed these tracks for Wellington City Council and submitted separate, detailed reports suggesting they are both Grade 4 (Advanced) not Grade 3 (Intermediate) in their current condition.

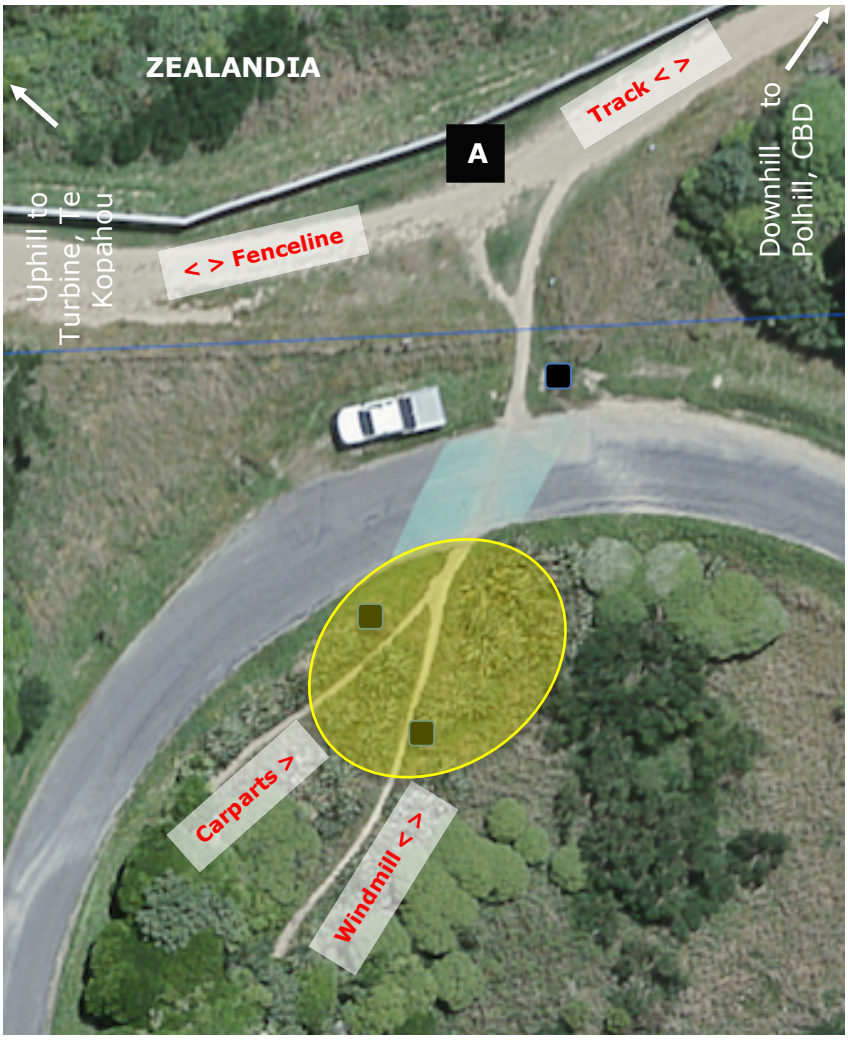


Figure 29. Vertical view of the area where Windmill leaves the Fenceline Track, showing recommended improvements. The black squares are existing bollards that are hard to see and too small – a full direction sign is required at Point A.
The area in the yellow circle could be cleared somewhat to provide improved visibility and space for visitors to congregate and contemplate next steps.

Note: Track 16 (see Section 4.5) would start here, somewhere within the yellow circle.

Figure 30. Entry signage to the tracks at the Turbine Carpark also requires refreshing, especially for walkers (see also Figures 31 and 40).

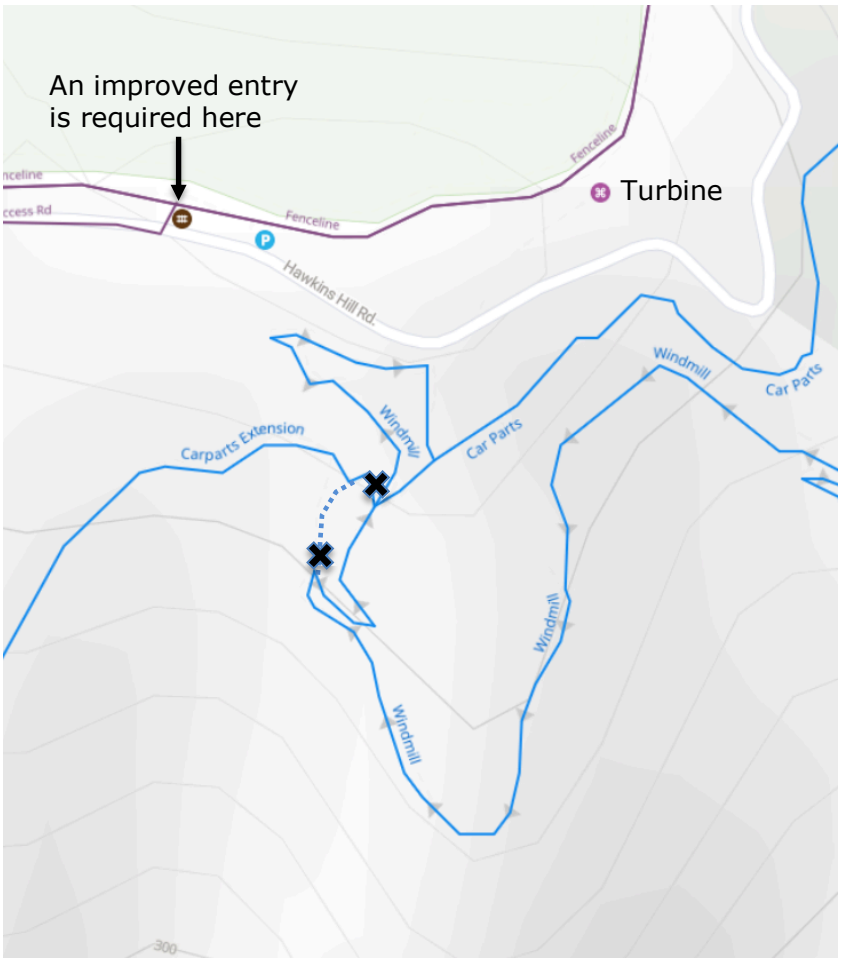


Figure 31. The configuration of tracks at the Wind Turbine carpark, as seen on Trailforks. This is accurate enough, although we have added a small section (dotted line) that is missing. Signs on the ground, especially in the carpark, could be much clearer, there are some confusing junctions and rough sections (marked X), and the overall sense is of a bikes-only place.

<u>Recommendations</u>

- We recommend these tracks be graded a Grade 4 trails
- Additional signage at both the top and bottom of these trails is recommended to help make them (and the other trails at the Turbine carpark) more visible and welcoming, especially to walkers.
- Some landscaping and other works (a drop kerb and non-road signage) is also recommended.
- Consideration needs to be given to the Network configuration at the Turbine Carpark, including the track names and the way the tracks appear in visitor information. The exact outcome will depend on the configuration of Track 17, should that go ahead.

4.3. Track 3, Carparts Extension

Like Carparts and Windmill, Carparts Extension is discussed a little above, insofar as it relates to Fenceline Track (see Section 4.1). Carparts Extension is currently a dual use, two-way track extending southwards from the Wind Turbine carpark towards the Radome and, ultimately, the south coast. However, it is quite difficult for walkers to find (see Figures 30 and 31) and, as described above (4.1.2), seems to be too long to be attractive to them compared to the relevant section of the Fenceline Track.

Like Carparts and Windmill, Extension is essentially fit for purpose but mis-graded, being consistently narrower than the Grade 3 specification. A bigger question for Carparts Extension is whether or not to provide a parallel duplicate track, with the same start and finish points, to enhance the separation of foot and bike users. This model is applied with reasonable success nearby: Transient/Ikigai, Windmill/Carparts. The Draft Track Network Plan includes such an option, which would replicate both Carparts Extension and Barking Emu. It is discussed below as Track 17.

Recommendations

- A higher grade is recommended for Carparts Extension, Grade 4. Little or no work is required on this track if Grade 4 is adopted. Some water control works will reduce ponding here and there.
- Greater clarity, especially for walkers, is required at the northern (Turbine Carpark) end of the track, where there are also some very tight corners and rocky steps that require smoothing and reducing. The exact requirement will depend on whether Track 17 is constructed and when.

4.4. Track 4, Barking Emu

Like Carparts Extension, Barking Emu is another track built by the mountain biking community. It too, is a two-way/dual use track that we have grade-assessed for Council in a separate project. Like Carparts, Windmill and Carparts Extension, it is marketed as a Grade 3 trail but should be Grade 4. Like those other trails, its slopes are gentle enough but its actual rideable surface is too narrow. Unlike the other trails, it is more eroded since it has less canopy cover. For long parts of its 2.3-kilometre length, this erosion is forming an ever-deeper channel that traps riders somewhat and is exposing more and more rocky steps, adding further difficulty and discouraging walkers (see Figure 32).

Figure 32. Examples of the issues common on Barking Emu. In the left-hand image is an unavoidable, uphill obstacle higher than the 200mm maximum for Grade 4. No standards currently provide differing obstacle height maxima for uphill vs downhill trails but this obstacle, demanding in the direction shown, would likely be OK going the other way (down).

The right hand image shows how the track has eroded quite deeply in places. The ditch formed is only about 400-600mm wide (600 is the nominal Grade 3 minimum) and it's not easy to stay in. Erosion is also exposing bedrock that narrows the track still further.

Unlike the other trails, which just require a change in track grade to be fit for purpose, Barking Emu has bigger problems, since the erosion looks likely to worsen and there are some short steep slopes, especially north-bound. We consider it needs significant resurfacing to ensure it provides a similar experience to the other trails and indeed, the Red Rocks Track.

As it is for Carparts Extension, the bigger question for Barking Emu is whether or not to provide a parallel duplicate track with the same start and finish points, with one track being a mountain bike-priority descent while the other serves as a two-way track for walkers and the climbing track for riders. This model is applied with reasonable success elsewhere but is not the only possibility; it is not what is proposed on Red Rocks Track or in existence currently on the Mākara-Kaukau part of the Skyline Track.

The Draft Track Network Plan includes such an option, discussed below as Track 17.

<u>Recommendations</u>

- A higher grade is recommended for Barking Emu, Grade 4.
- Repair work is required to improve rideability, encourage walkers and prevent erosion.

4.5. Proposed Track 16

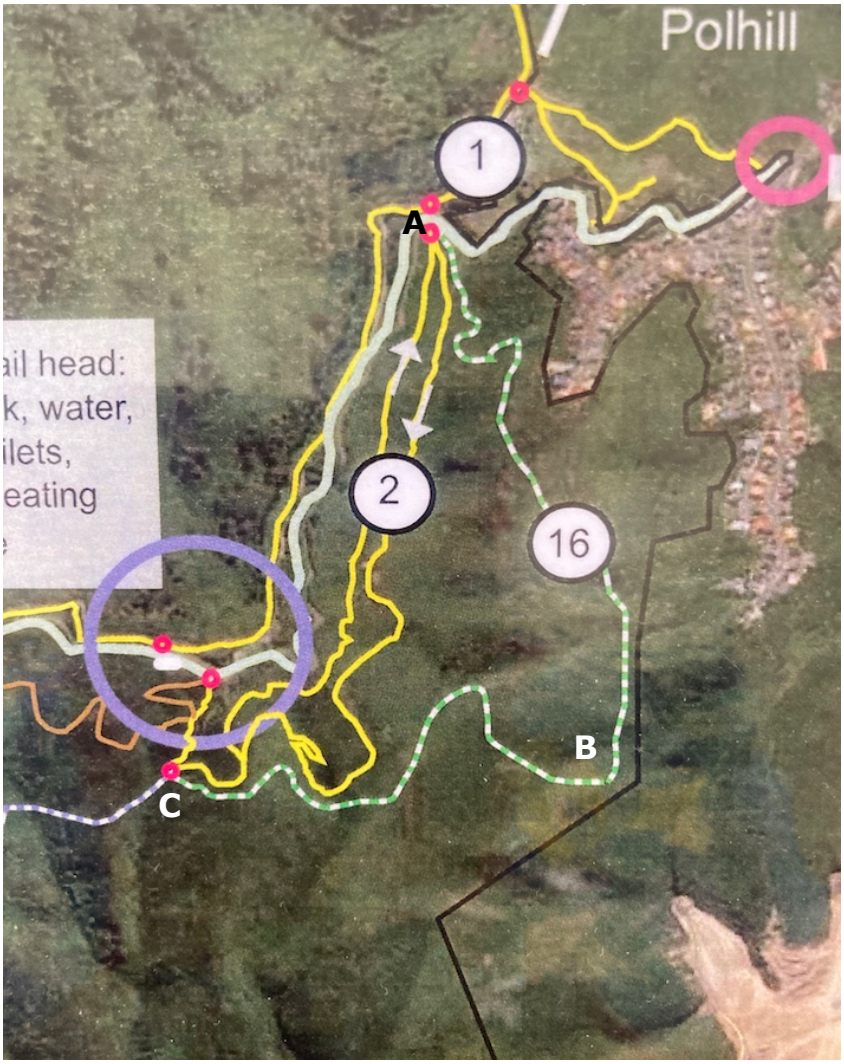


Figure 33. A map from the Draft Track Network Plan showing a nominal route for Track 16 in relation to Carparts and Windmill (Track 2), Fenceline Track (Track 1) and the hub at the Turbine Carpark (the purple circle).

Points A, B and C correspond to the same points in Figure 49.

4.5.1. Track 16 as it appears in the Draft Track Network Plan

Track 16 appears in the Draft Track Network Plan as a stand-alone track that would "enable [the] experience of Careys Gully Forest", which looks from aerial imagery to be a relatively mature forest. The Plan has Track 16 beginning where Windmill begins on Hawkins Hill Road (See Figures 28/29 on pages 45/46), and effectively finishing up at the Turbine Carpark, probably sharing its final metres with Windmill.

The alignment of Track 16 on the Plan is only nominal and the Plan doesn't necessarily envisage it being a point to point experience. The route shown in the Plan has the same start and finish points as Windmill and thus has the same overall height gain of about 70 metres. It would be about 1,700 metres long, which is similar to Windmill but, as it is shown in the Plan, Track 16 would descend nearly 150 metres to the bottom of Careys Gully before climbing about 220 metres back up to the Turbine Carpark.

The average slopes of these two legs would be nine degrees downhill for the descent (Grade 3) and 15.8 degrees back up (Grade 6). In the reverse direction (Turbine Carpark to Hawkins Hill Road at the Windmill entry), the slopes are the same but both legs would be Grade 5. Figure 49 shows these slopes on an approximate profile.

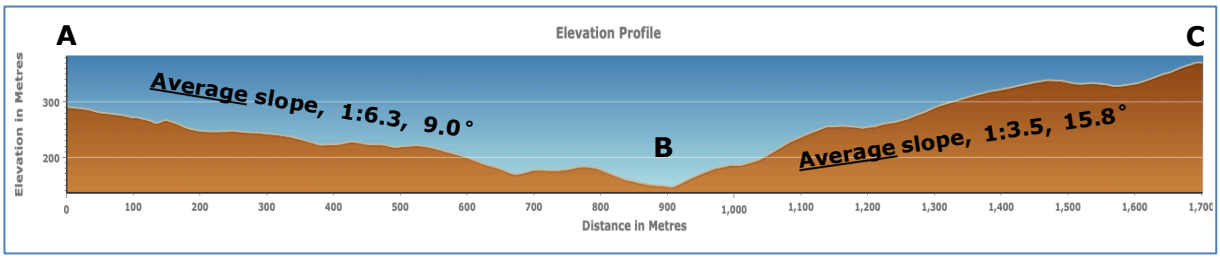


Figure 34. Approximate profile of Track 16 from Hawkins Hill Road (A, 292m asl) down to Careys Gully (B, 147m asl) and then up to the Turbine Carpark (C, 370m asl).

Cycling use

In the configuration in the Plan, Track 16 would be very difficult to ride and have minimal appeal. To make it work for cycling, the slopes would have to be reduced radically, with a range of options available depending on the Grade targeted and the direction (two-way or one way). The table below summarises these options (note that these are all average slopes and estimated distances/altitudes). These calculations show that Track 16 – nominally 1.7km in the Plan – could be as long as 4.6km as a Grade 3 trail.

Scenario	Slope	Length
DOWNHILL (150m from A to B in Figure 49)		
As per plan, A-B	-9.0	**915**
Grade 3 average (target)	**-6.0**	2121
Grade 4 average (target)	**-10.0**	1265
Walking Track max/ Grade 4 Max	**-15°**	541
UPHILL (220m from B to C in Figure 49)		
As per plan, B-C	15.8°	**790**
Grade 3 average (target)	**5.0°**	2549
Grade 4 average (target)	**6.0°**	2121
Walking Track Max	**15°**	832
Grade 4 Max	**7°**	1817

Figure 35. Calculations for trails lengths of the two legs of Track 16, with different grade scenarios.

It is possible to calculate slope if length is known and to calculate length if a slope target is chosen. Starting points are represented in bold

Note: these distances would be the same in reverse

Walking

The slopes listed above for the two legs of Track 16 (9.0 and 15.8 degrees) might be steep to ride but could be fine for an on-foot experience. Indeed, 15 degrees is the maximum gradient for the type of foot track – Walking Track – that is normally associated with nature walks and, at 1.7km, Track 16 is a good length for such an experience. A high standard, no-bikes track is not provided for elsewhere in the plan and the relative maturity of the forest here suggests one might be considered.

4.5.2. Track 16 as it appears in the Brooklyn Trail Builders plan

The Brooklyn Trail Builders plan shows two tracks – Tracks 13 and 14 in figure 51 – in essentially the same location as Track 16 in the Council's Draft Track Network Plan. However, the concept is very different: these two tracks will link up in Careys Gully somewhere, then head southwards and downhill as a Grade 3 trail finishing on Ohiro Road opposite Wharangi Track. The last section part would 'pick up' riders from a series of Grade 4/5 trails descending from the Wind Turbine Carpark Tracks 15a-f in Figure 51.

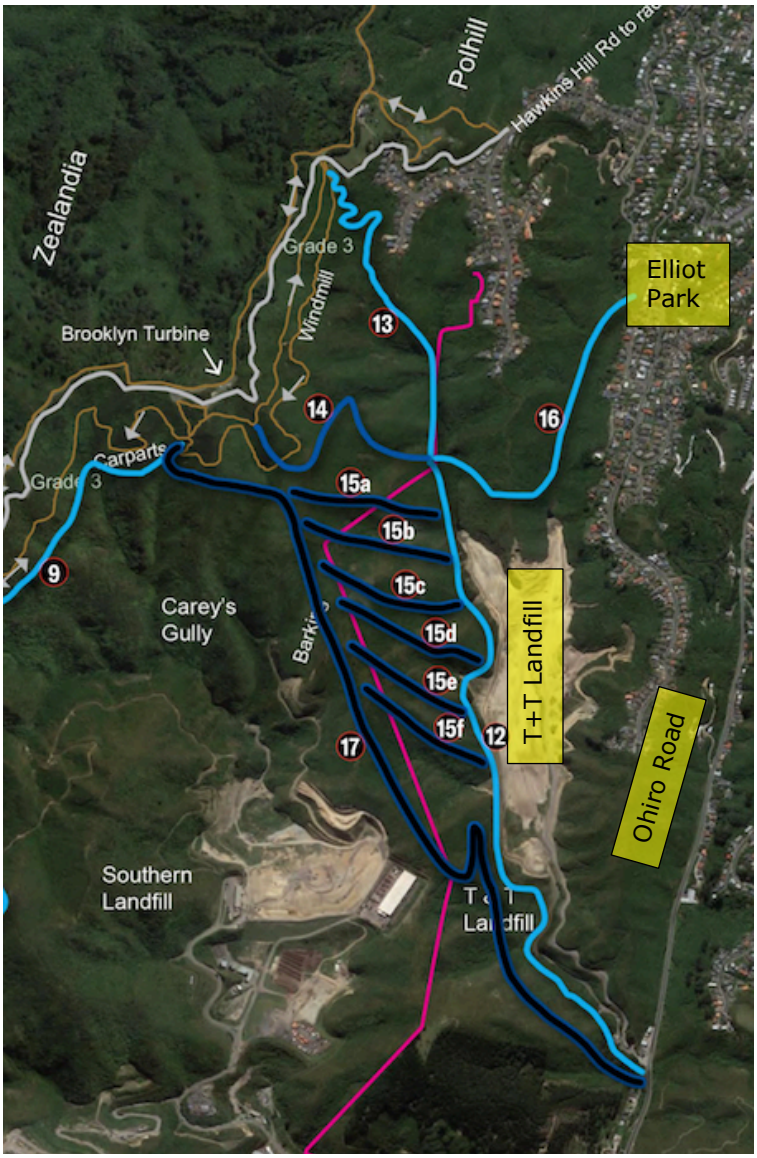


Figure 36. This map, from the Brooklyn Trail Builders plan (yellow labels added), shows an entire sub-network of trails, mostly downhill-oriented, to the south of Hawkins Hill Road that would connect that road to Ohiro Road.

The Tracks 14 and 13 shown here are similar to Track 16 in the Council Plan (the Draft Track Network Plan). Track 16 here is not in that Plan and, while it could be very important addition to the overall city network, it crosses private land and relies on a right that is not yet in place

There is certainly a lot to commend the 'Careys Gully sub-network' shown above. It will have vehicle access and be serviceable by shuttle. It would make strong connections to other sub-networks, reducing road involvement significantly (Figure 52). It is discrete and it stands alone from the trails in the area south of the Radome – important since the implied

riding style is different to what is recommended for that more nature/place-focused part of Te Kopahou Reserve.

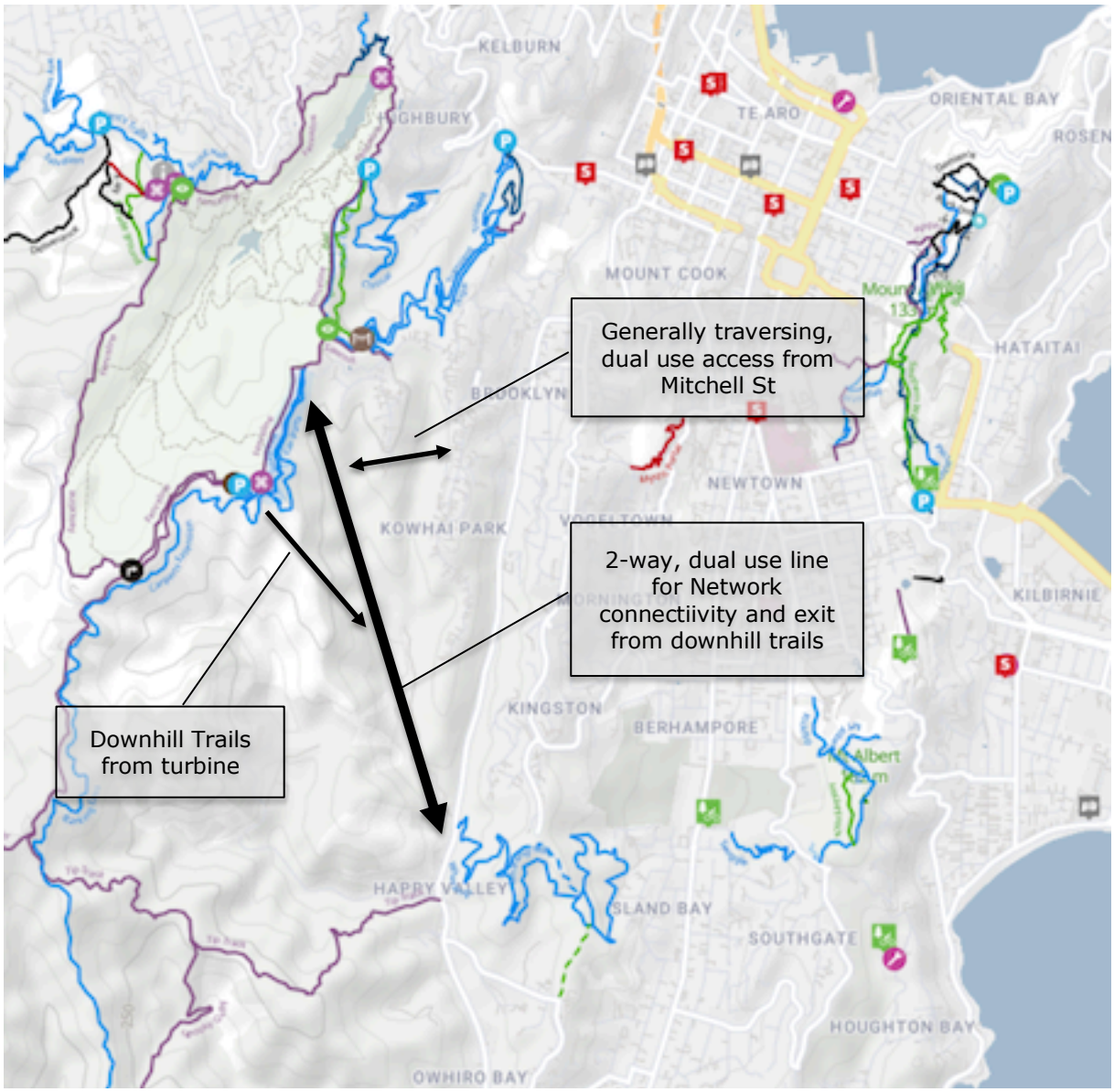


Figure 37. This map, from Trailforks, shows the current off-road cycling Destinations in a major part of metropolitan Wellington, and the <u>potential</u> significance (black arrows) of the Brooklyn Trail Builders' proposed Careys Gully trails.

However, the potential value of this sub-network hinges on there being legal access for the track connecting Track 16 (as numbered in the Draft Track Network Plan) to Ohiro Road, which is shown as Track 12 in the Brooklyn Trail Builders plan and in Figure 51 above. Currently, the proposed route of this track goes through a landfill licenced to operate until 2026, and a block of private land.

Both of these matters could be resolved by negotiation, even before the landfill closes. However, there is no guarantee of this and without Brooklyn Trail Builders' Track 12 (numbered as per their plan/Figure 51), there is little to gain from building Track 16 (Draft Track Network Plan) as shown by the analysis of it in figures 49 and 50 above.

The track marked '16' in the Brooklyn Trail Builders plan (Figure 51, not shown in the Draft Track Network Plan at all) also has merit, although it too, hinges on access permission being negotiated across (multiple pieces of) private land between Te Kopahou Reserve and Mitchell St, probably at Elliot Park. We consider that such accessways into public reserves, direct from residential streets, have very high value for day-to-day, neighbourhood-level recreational activity. However, they should be readily useable by a wide range of people and not just by a single group of users or only by particularly competent users.

Considering all of the above, we consider there is no merit in constructing Track 16 (Brooklyn Trail Builders Tracks 13/14) until and unless there is a suitable legal agreement in place that allows for the construction of Brooklyn Trail Builders Track 12 as well. This agreement should allow for (Brooklyn Trail Builders) Track 12 to be dual use, two-way, and readily climbable. A Grade 3 trail, or a minimal-obstacle Grade 4 trail, is recommended to achieve this (Figures 51 and 52 refer).

The Brooklyn Trail Builders Track 16 (the Mitchell Street link) provides a less powerful (but still significant) reason for building (Draft Track Network Plan) Track 16. Legal access between Te Kopahou Reserve and Mitchell Street would provide sufficient justification to build at least some of Track 16 but probably to a dual use, two-way standard given its proximity to a residential space.

There is another issue that the Careys Gully sub-network might create: shuttles and groups of thrill/technical riders at the Wind Turbine Carpark. This will require management; it will be even more important to properly signpost the tracks there and provide some separation between users. The configuration will need to ensure that thrill-style riding does not start until those riders have crossed, at low speed, all the walking trails and adventure-style trails.

4.5.3. Recommendations

- We recommend considering all of the Brooklyn Trail Builders plans for Careys Gully in the current process.
- We recommend not permitting Track 16 (Brooklyn Trail Builders Track 13/14) to proceed until there is clarity/certainty about downhill access all the way to Happy Valley Road (Brooklyn Trail Builders Track 12).
- Shuttle use of the Wind Turbine Carpark is commended as appropriate, with some control and with careful design of signage and shuttle operating conditions.
- It is recommended that the major track line from Hawkins Hill Road down to Happy Valley Road (Brooklyn Trail Builders Tracks 13 and 12) be dual use and two-way.
- It is recommended that at least one of the tracks from the Wind Turbine carpark down to(wards) Careys Gully (Brooklyn Trail Builders Tracks 14, 15, 17) should be two-way and Grade 4 maximum. Track 14 would probably be the best option.
- We recommend Council actively participate in any negotiations that community groups undertake to obtain access from Te Kopahou Reserve to Mitchell St and Ohiro Road. This is to ensure that the outcome allows for tracks that suit a wide range of users.

4.6. Proposed Track 17

The Draft Track Network Plan shows a Track 17 as a parallel/duplicate track for Carparts Extension and Barking Emu, with the same start and finish points, including touching Hawkins Hill Road where Carparts Extension and Barking Emu join. The Plan suggests Track 17 would be a two-way mountain bike-priority track, leaving Carparts Extension and Barking Emu to be two-way, shared tracks. However, the exact outcome is not decided and indeed, the Brooklyn Trail Builders suggest something different and that the trail "will only be built if track usage gets to the point where directional separation is required".

Separate tracks, however configured, is an idea with some merit that is in use elsewhere in the city. We consider it is not necessary in this location at this time, for several reasons:

1. Riders and walkers are already sharing Carparts Extension and Barking Emu. They are already sharing somewhat similar trails at other locations on the Signature-branded Skyline Track, including much steeper areas where bike speeds and the 'intimidation factor' are higher. While promotion and other improvements seem likely to increase visitor numbers, the type of riders and riding that most cause consternation to others are considered unlikely to be present in high numbers.

2. Building duplicate tracks should be something of a last resort. Even if a track is built carefully and is maintained, it still has an environmental impact and loads cost on to its owner. We note lots of examples of shared, branded and high service-level tracks around the country, many in thicker forest or more speed-inducing terrain.

3. Duplicating Carparts Extension and Barking Emu would create more junctions, which would be difficult to explain on signs or display on maps. There is already a confusing web of tracks around the Turbine Carpark (Figure 48, p61) and a duplicate track would make for additional impact, cost, signs and potential confusion on the Fenceline-Carparts Extension link track (suggested in 4.1 above, especially Figure 42 (p56)).

4. Separate tracks might be indicated when a zig-zag is needed to achieve cycling slope requirements, since this can create a very ponderous route that might be annoying for walkers. However, they are not indicated when two points might be linked for dual use where the start and finish points are a long way horizontally from each other but not far vertically. The latter situation exists in this case, since there is little climbing involved in Carparts Extension and Barking Emu. Figures 53 and 54 refer.

Figure 38. In this example from the lower Red Rocks Track, the zig-zag line is realistically the only option for providing a riding experience but it's not direct enough for walkers, who clearly favour a second, more direct line.

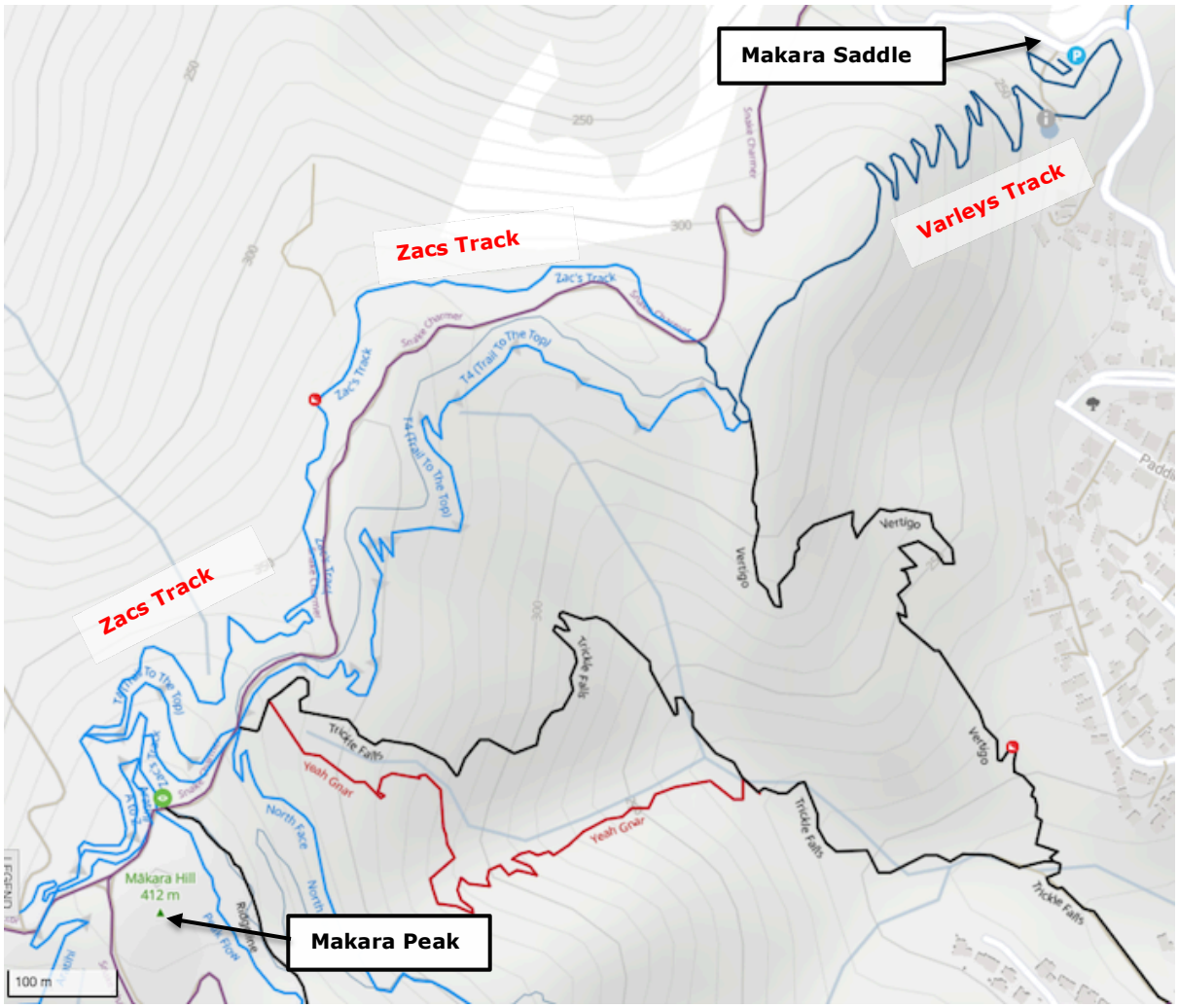


Figure 39. Two tracks between Mākara Peak and Mākara Saddle demonstrate the point made above. Both ascend similar heights in 1.3 kilometres but Varleys must zig-zag extensively to do this – a different and more direct line would likely be favoured by walkers.

Zacs Track is in flatter terrain so takes a straighter path that is more or less similar to the line a walking track might take.

<u>An alternative to duplicate tracks</u>

As an alternative to providing duplicate tracks, Barking Emu and Carparts Extension could be widened (and smoothed out in the case of Barking Emu) to provide more visibility and passing room. The widening need not be severe; in lots of places the current bench is sufficiently wide – it's just the useable part[11] that's not.

We consider Barking Emu, with its (currently) more sparse vegetation and open feel, is particularly adaptable to dual use, and that walkers (especially) would much prefer it to a fully forested new track. Carparts Extension is a bit narrower and has thicker forest already. As noted above (4.1.2), many walkers will likely use the Fenceline Track and its proposed link to Carparts Extension for their walk rather than Carparts Extension itself.

A particular problem exists because of the current identity, names, configuration, grading and signage of the tracks in this area. The overall effect does not present clearly to visitors and is likely to be causing some confusion, and possible conflict. The entry signs for

[11] This is what DOC calls, in its Cycling Track Service Standard, the 'maintained riding surface'.

Carparts Extension and Barking Emu do not saying that those tracks are NOT mountain bike-priority; the current names of those trails are likely to be off-putting for walkers, since they seem like park-style or bike-only names, especially since the Carparts actually is bike-priority. It seems that there is an opportunity to improve the way the current tracks are marketed, as a test of the current configuration, before adding duplicate tracks. The figures supplied in Section 4.2 refer as do these:

Figure 40. Current entry signage for Windmill/Carparts Extension (left) and Barking Emu (right). There is some confusion here, caused by the many arrows and additions over time. The left-hand example does invite walkers down on to Carparts Extension, but not completely convincingly.

<u>Recommendations</u>

- The construction of Track 17 is not recommended at the present time because it seems that walkers and cyclists should be able to share the current tracks (Barking Emu and Carparts Extension).
- A judicious and selective widening of Barking Emu and Carparts Extension is recommended to better accommodate two-way dual use. 600mm is suggested as the minimum rideable width, with a 900mm track bench and 1.2m for passing bays.
- We suggest reviewing all aspects of the network configuration in this area and effectively 'relaunching' the tracks with improved signage, revised riding grades and greater clarity about sharing.
- We recommend changing the names of Carparts Extension and Barking Emu to something more inviting to non-cyclists, preferably including the Signature Trail branding and/or the Skyline Track name.

5. THE EAST – ABOVE HAPPY VALLEY

This Part of the report discusses those tracks that provide (or would provide) experiences in the Reserve that would begin or end at Happy Valley Road. A narrow strip of Reserve land here joins the road to the bulk of the Reserve, and includes the Tip Track, which is the only current accessway. A recent land purchase means an opportunity to improve the currently limited parking and provide a higher amenity entrance area.

5.1. Track 14 – The Tip Track

The Tip Track is the notoriously steep and direct eastern accessway to the Reserve and the Hawkins Hill area, climbing nearly 400 vertical metres from Happy Valley Road to Hawkins Hill Road. It is a former farm track that is still used by vehicles for management purposes. Its public users are walkers, trail runners and off-road cyclists travelling both up and down. Despite its reputation for being unrelenting and steep, the Tip Track is popular and well-loved, probably because of its legendary challenge and because its location gives green space access, without driving through the CBD, to residents of the southern suburbs.

Carparking is currently limited to a small number of on-street parks near a busy intersection, but a dedicated new space is planned nearby (Point P in Figure 42). This will both facilitate and virtually require some track realignment, which should greatly improve the amenity value of the general area (discussed in Section 5.3.1 as Track 20a).

5.1.1. Analysis

The Tip Track naturally splits into sections defined by slope changes. These are shown in Figures 41 and 42 below. The Draft Track Network Plan proposes no change for the Tip Track itself but does include several proposals that would affect both its use and its users by providing alternatives. These changes align with the track sections shown below and are described briefly here:

- Track 20a offers a way to eliminate the steep bottom section (A-B-C in Figure 42) and provide a more interesting/scenic experience to visitors than the old road provides. It is discussed in Section 5.3.1 below.
- Track 20b offers a way to eliminate a second steep section near the top of the track (D-E in Figure 42) and provide a more interesting/scenic experience than current track provides above the landfills. It is discussed in Section 5.3.2 below.
- Track 23 (a new track from E-A in Figure 42) would provide an alternative downhill riding experience that would increase network diversity and eliminate some user conflict potential (see Section 5.5 of the report).
- A technical or thrill-seeker track or tracks (Tracks 21, Section 5.4), descending to the new carpark from part way up the Tip Track (Point 21 to Point P in Figure 42), would provide another downhill alternative.

		Altitude (metres)			Track grade		
Section	Distance	Start	Finish	Change	Slope ratio	Slope (deg)	Grade
A to B	320	43	101	58	1 in 5.5	10.27	6 (up)
B to C	1230	101	268	167	1 in 7.4	7.73	5 (up)
C to D	780	268	273	5	1 in 156.0	0.37	1 (up)
D to E	1040	273	413	140	1 in 7.4	7.67	5 (up)
E to F	290	413	437	24	1 in 12.1	4.73	3 (up)
Whole track, up	3660	43	437	394	1 in 9.3	6.14	4 (up)
Whole track, down	3660	437	43	-394	1 in -9.3	-6.14	2 (dn)

Figure 41. This table shows the steepness (and the nominally implied cycling track Grade) of the Tip Track's natural sections. It is very steep overall and indeed, there are multiple shorter lengths that exceed the Grade 5 maximum. The most obvious opportunity for improvement is to provide a gentler climbing track for cyclists to replace sections A-B-C and D-E in this table.

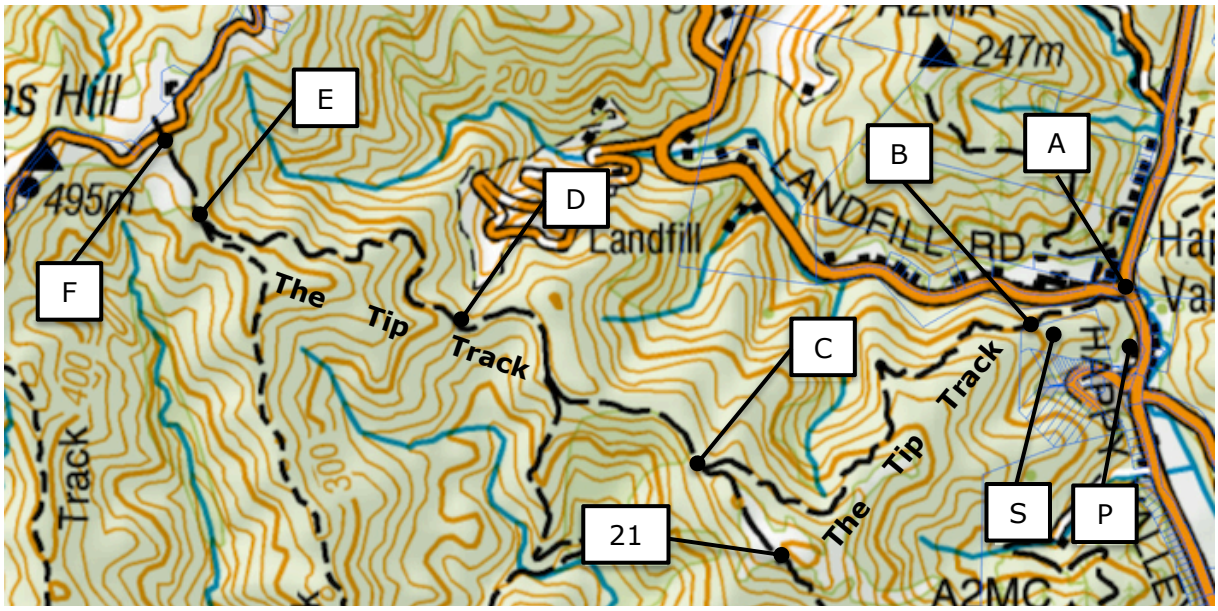


Figure 42. The Tip Track (A to F) showing its natural section breaks, as discussed above. Point P is the new carpark site and Point S is a saddle referred to elsewhere in the report.

The uppermost piece of the Tip Track and the whole Tip Track as a descent are unaffected by the four Plan proposals listed above so they are discussed here.

<u>The entire Tip Track downhill (F to A in Figure 42)</u>

Even if all of the proposed changes included in the Plan go ahead, the Tip Track in its current form will likely still serve a purpose for management reasons. It will still provide a useful experience in a downhill direction, including as an emergency exit option in case of fire or bad weather. Although condition-dependent, it is a manageable descent on foot or by bike. This is despite exceeding the Grade 5 maximum for downhill riding in places.

In the short term then, there is little need to provide an alternative option for descending; the current track likely works for walkers, runners and cyclists given it has sufficient visibility and width for conflict to be minimised.

<u>The Uppermost Section (E to F in Figure 42)</u>

The final section of the Tip Track is that short section above the Tip Track/Red Rocks Track/Barking Emu junction. At 4.73 degrees on average, this piece of track (which includes a locked gate) is nominally Grade 3 for cycling. However, in reality it has short higher grade moments and is a demanding climb by bike. On the other hand, most cyclists are considered likely to either head north (on Barking Emu) or south (on Red Rocks Track) from Point E instead of carrying on up to Hawkins Hill Road.

For cycling, this section of track is considered adequate as it is and to not require an alternative. Further justification for not building an alternative track for cyclists between E and F is provided by the fact that the vegetation in the area includes numerous taramea/Spaniard plants and even though a track might follow an old fenceline, this would likely be too steep to ride up.

For on-foot visitors, the uppermost section of the Tip Track is of an 'easy' gradient – realignment is not indicated for walkers by the slope. Besides, improvements and changes to Barking Emu and the Red Rocks Track should lead to more walkers using those tracks – Barking Emu especially – rather than feeling obliged or inclined to walk up to and along Hawkins Hill Road.

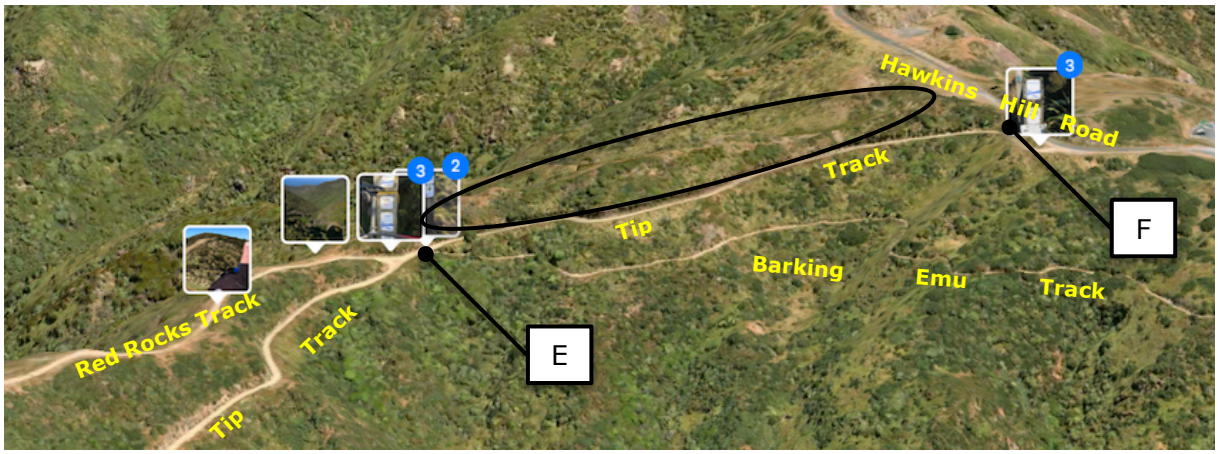


Figure 43. The uppermost area of the Tip Track showing the configuration of the tracks and Hawkins Hill Road. An old fenceline is visible inside the black oval but may not be practicable as a track.

<u>Overall</u>

Overall, the effect of the proposed alternate alignments to the Tip Track should be to increase and broaden the appeal of this part of the Reserve. They would especially make the eastern (Happy Valley) entrance to the Reserve better for ascending and for cyclists, but would also improve the area for walkers by providing more options. The provision of a dedicated parking/entry area at the bottom of the Tip Track will increase its value even more.

5.1.2. Recommendations

- The several proposals in the Draft Track Network Plan that provide alternatives to the Tip Track, or otherwise enhance the Reserve experience from the Happy Valley entrance commended in principle.
- Retaining the entire current Tip Track is recommended for management purposes and as meaningful downhill exit from the Reserve, especially fo those seeking a farily quick exit.

5.2. Track 15

Track 15 is a vehicle track that leaves the Tip Track where it levels near some old stockyards. It initially climbs steeply but then crosses a nice, flat area before rolling steeply down to the Reserve boundary at a point where there is no secure public exit to Happy Valley Road. Without this, Track 15 has little potential to provide a meaningful experience.

However, the flat and grassy terrain around the very highest part of Track 15 forms a distinct shoulder with excellent views of Cook Strait, the city and the harbour. This area will be very accessible to Track 20a should that be constructed (see 5.3.1) and there is a good opportunity here to develop a lookout and/or picnic area as envisaged in the Draft Track Network Plan.

It would seem likely that many visitors would be attracted to the idea of climbing just as high as this point, using Track 20a then returning to the entry area via the same track (on foot) or the Tip Track (on foot or by bike). While too big to be considered a nature walk, this loop experience would provide a nice, 1-3 hour walk/ride that isn't available currently.

The other way in which Track 15 may have a role to play is that it will serve to access Tracks 21a-n should they be developed (see section 5.4 below). These would all peel off Track 15 and it can be assumed riders would effectively never use Track 15 in the uphill direction, meaning no change to it would be required (see Figure 55, p69).

Recommendations

- No changes are needed or recommended to Track 15.
- The idea of a picnic/lookout area at the high point of Track 15 is commended.
- While it is out of scope for this work, it does seem that permanent/secure legal access from the end of Track 15 to Happy Valley Road and/or the South Coast would be desirable. We recommend considering negotiating such access.

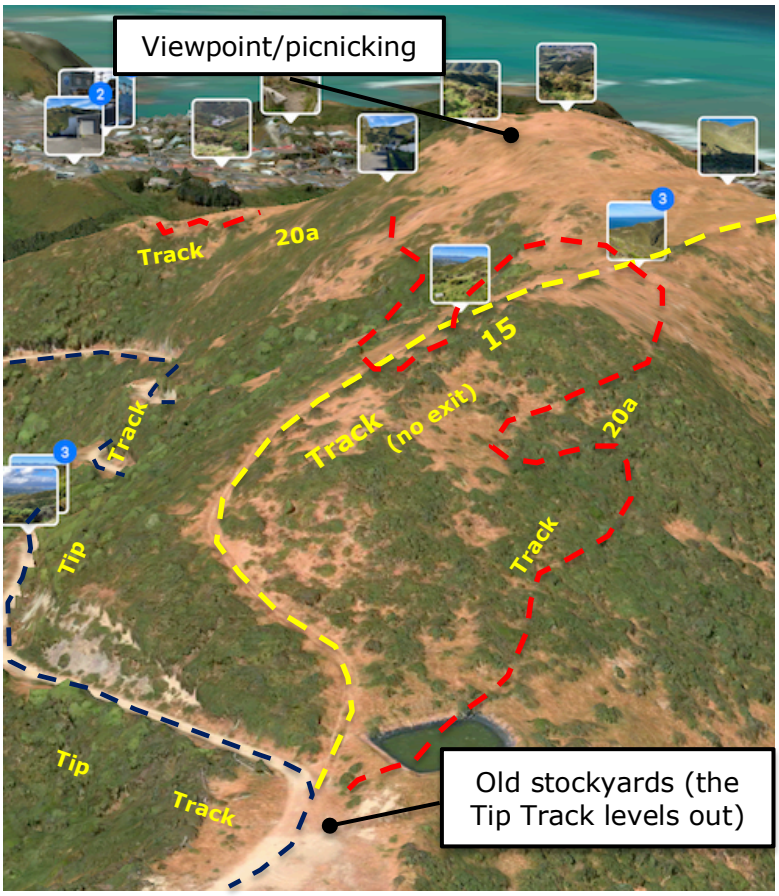


Figure 44. View over the upper reaches of Track 15 showing existing and proposed tracks.

5.3. Proposed Track 20 – eliminating the very steep parts of the Tip Track

As it is shown in the Draft Track Network Plan, Track 20 only runs from Happy Valley Road up to the old stockyards area on Tip Track, where that track flattens after its initial steep section. Track 20 is intended principally for walking and uphill riding, in lieu of Tip Track and it would also – potentially – give access to a series of thrill-style downhill mountain bike tracks (Tracks 21a-n, see Section 5.4).

For the purposes of this report, the new track up to the stockyards will be called Track 20a. An additional Track – Track 20b – will be considered in this section that will eliminate the second (upper) steep section of Tip Track. The effect of the Plan on the Tip Track itself is discussed in Section 5.1 of the report – the way it might look is shown here:

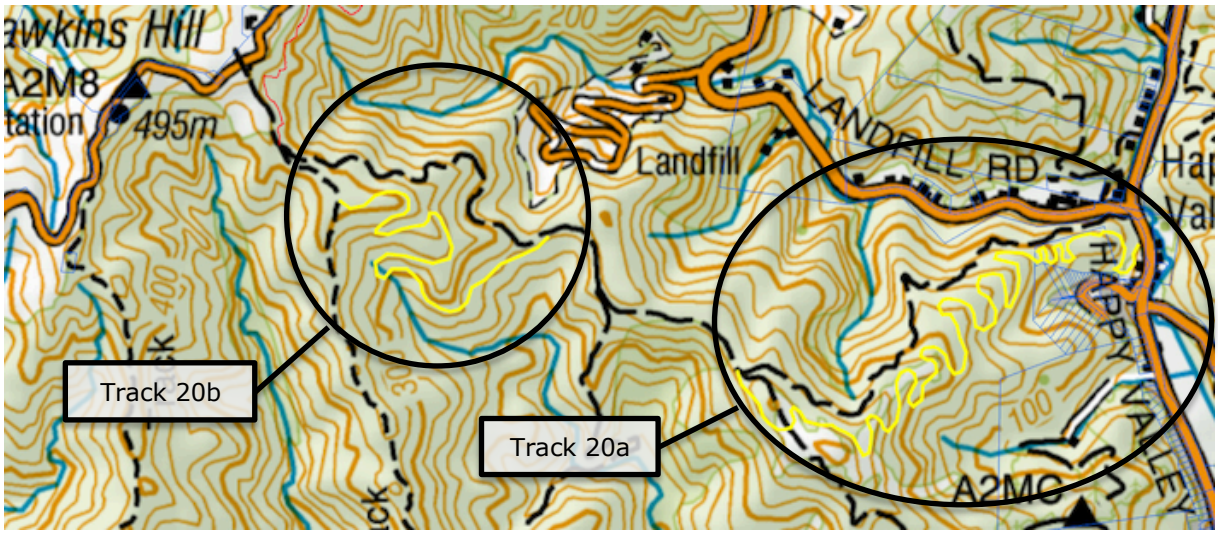


Figure 45. Track options under discussion in this Section. The relatively flat section of Tip Track between 20a and 20b is discussed with the rest of Tip Track in section 5.1.

5.3.1. Track 20a

This track would replace the bottom 1550 metres of the Tip Track, from the Happy Valley entrance up to where the track flattens near some old stockyards. It would essentially be for walking and uphill mountain biking but, in light of the tenure and terrain, parts of it near the bottom will need be two-way and/or fully dual use (see Figure 46 and 48).

Experience and audience

The experience required on Track 20a is a simple, single-track climb that is more enjoyable and less arduous than the current ascent on Tip Track. It should be consistent with the other riding experiences in the Reserve network, providing adventure-focused Grade 4 riding. For all users, but perhaps especially for walkers, Track 20a creates a loop experience with the Tip Track that would be more interesting than using the latter both ways, yet short enough to be squeezed into a small leisure window – say, a post-work evening walk.

There would be two target audiences for this track. The first is walkers, runners and adventure mountain bikers climbing up into the Reserve, perhaps to exit to Polhill, the south coast or even towards Mākara around the Zealandia fenceline. The on-foot users in this group would also use the track to descend but the plan rightly implies downhill riding would not be permitted.

A second group of riders will make use of Track 20a if the proposed sub-network of downhill thrill trails (Tracks 21a-n, see Section 5.4) goes ahead. These riders would essentially just use Track 20a as an uphill access route to the thrill trails (Tracks 21), but may also require downhill access on the lowest part of it (see Figure 48, p63). It is anticipated that an increasing proportion of them would use e-bikes.

Feasibility

The design of Track 20a would need to ensure it is rideable and has no steps. It should also seek to eliminate repeated turns where possible so it's not too ponderous for walkers, although it may be an option to have shortcuts for walkers or take advantage of a barely visible old cutting shown in Figure 51 (p65). One key advantage for this route is that it is mostly covered in gorse. There are presumed to be no significant ecological values that might be disturbed by construction but there is a pocket of more mature forest just above a row of houses on an old track alignment near the bottom (see Figures 47 and 48).

A key issue with this Track, is the narrowness of the Reserve at the bottom (Figure 46). There is limited space available for all the tracks needed between private properties and

the current Tip Track. This is shown in Figure 48 and will be exacerbated should this part of the Reserve need to accommodate the terminal/exit section of Tracks 21 as well.

The total amount of climbing required for Track 20a is 225 vertical metres. The Tip Track takes just 1550m to achieve this, at an average of 8.3 degrees, which is Grade 5 but with plenty of even steeper sections.

Track 20a will need to be much longer, 1832 metres at the nominal maximum uphill slope for Grade 4 (7 degrees). However, in our experience a lower average slope should be used instead – six degrees is suggested[12], giving a total length of 2140 metres. We consider that the intent of the maximum slopes specified in the standards is not to be an average for the entirety of lengthy trails. In our experience almost all trails that climb reasonably constantly have average slopes well below the maximum for their grade – a lesser slope makes a trail a bit better to ride and offsets any width, turn radius or smoothness issues, especially as some inevitable deterioration occurs.

Recommendations

- Track 20a is, in principle, a commendable concept that could add significantly to the attractiveness of this part of the Reserve. Its construction is recommended.
- Track 20a should essentially be two-way for walkers, but uphill-only for riders. At the bottom however, where the available Reserve land is quite narrow, separated tracks are recommended if they can be accommodated (Figure 48).
- If track 21 goes ahead in any form, its exit will include Track 20a, which will complicate design even more. We recommend doing all the design work in one phase before any construction occurs.
- We note the presence of a high-value patch of vegetation near the bottom of this track and the close proximity of the area to a row of private properties – care is required in this area. We recommend engaging the Rarangi Way residents, conducting an ecological check and considering a surveyor to provide certainty as to tenure.

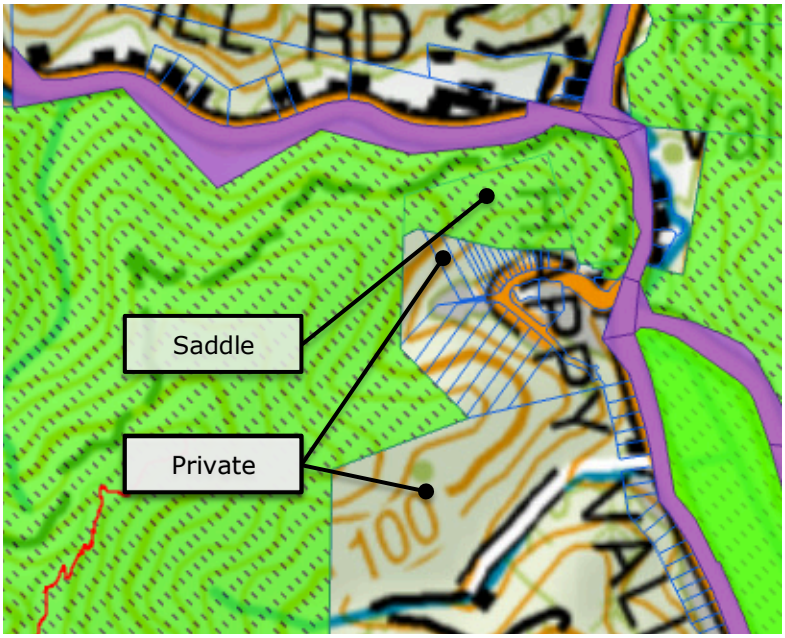


Figure 46. This map shows how the Te Kopahou Reserve is very narrow at the bottom, meaning that accommodating all the potential trails at the necessary specifications will be difficult. The private sections here are very long and extend uphill behind the homes on Rarangi Way, well into regenerating forest.

[12] The Recreation Aotearoa Guidelines give 6 degrees (+/- 1°) as the "Target Average Gradient" for Grade 4 trails. The idea of a target average is a useful concept not used in the other two standards, which both have 7-degree maxima (all three standards do allow for specified sections to be steeper, up to 11.5-12 degrees).

Figure 47. A view from lower Murchison Street of the nominal possible route of Track 20a (yellow dotted line). An old track exists (inside the white circle – not investigated) that leads up the all-important saddle where a junction would separate users (see Figure 48 below).

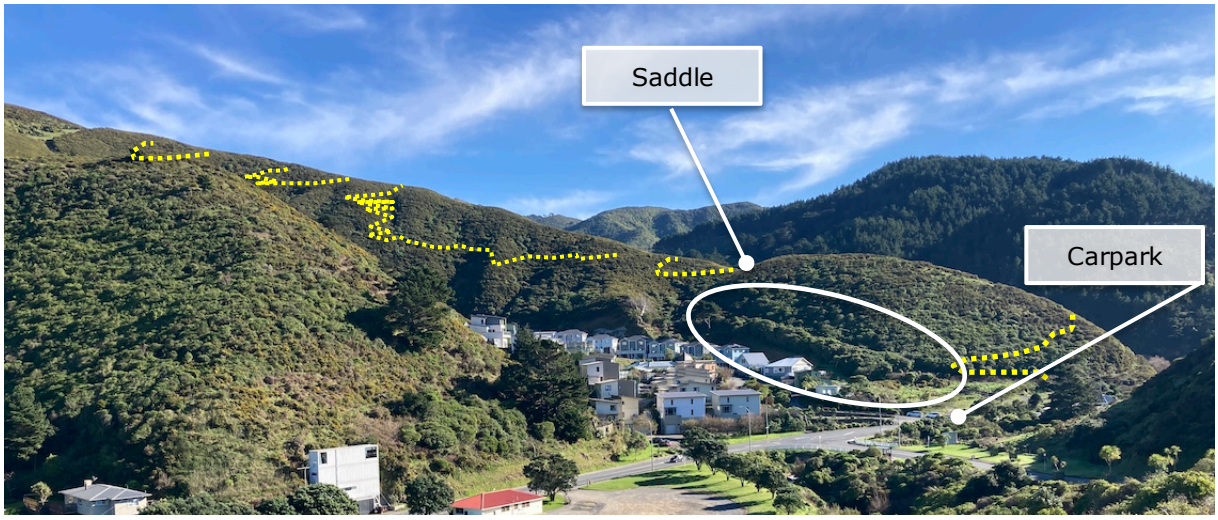


Figure 48. Possible track configuration and use parameters for the lower portion of Track 20a. 550 metres of track would be required to climb the 57 metres from carpark to saddle at 6 degrees (significantly more than the yellow dashed line). The red dashed line achieves the same height gain in just 210 metres on an old track alignment, whose condition is unknown. This is a slope of 15 degrees, which is suitable for a Tramping Track but would be marginal for a Walking Track.
Note that the use parameters would be different if high-grade downhill tracks (Tracks 21) joins Track 20a from above (top of the photo).

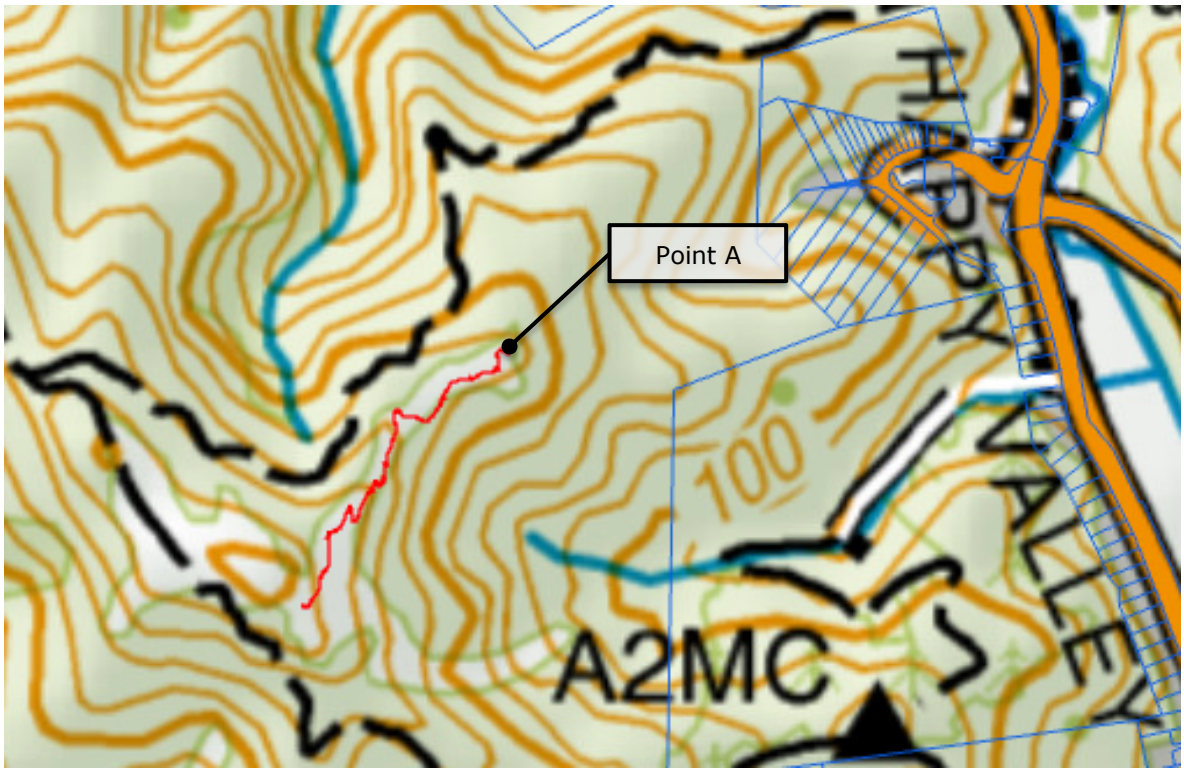


Figure 49. The red line was reasonably open and explored as part of the field work for the report. It seems to be good route although at 455 metres, it has an average slope of 8.38 degrees. At the recommended 6 degrees, this part of the trail alone needs to be 637m. The entire length of Track 20a will need to be 2150m and below Point A (here and in Figure 50), this will be harder to achieve because of gorse, and steeper terrain.

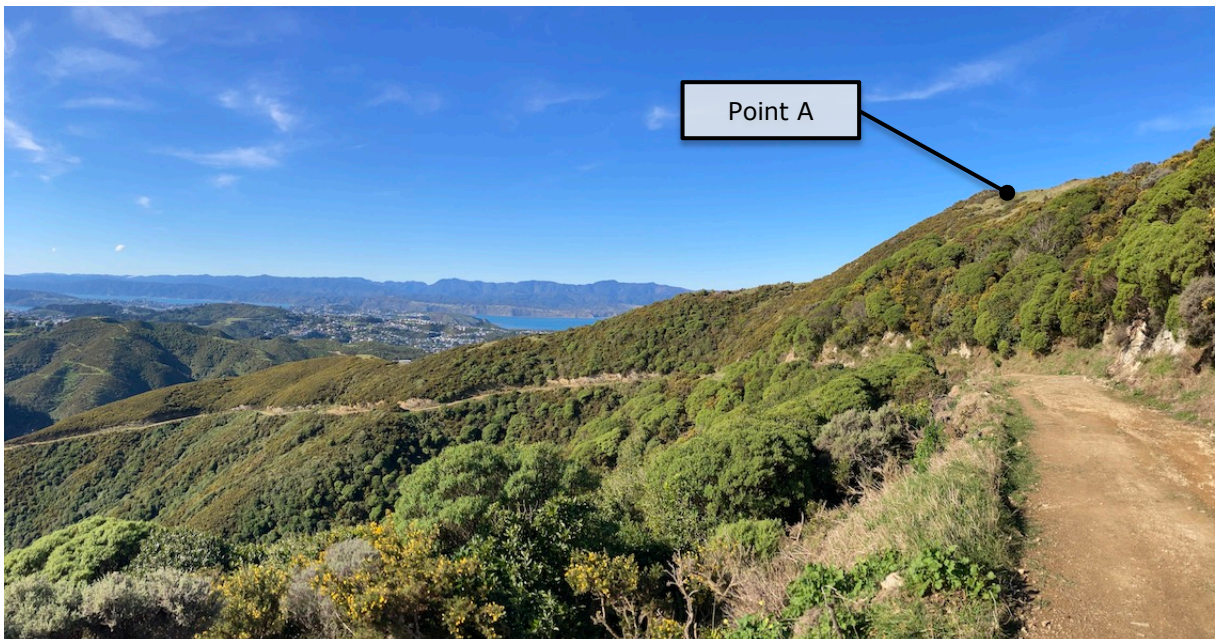
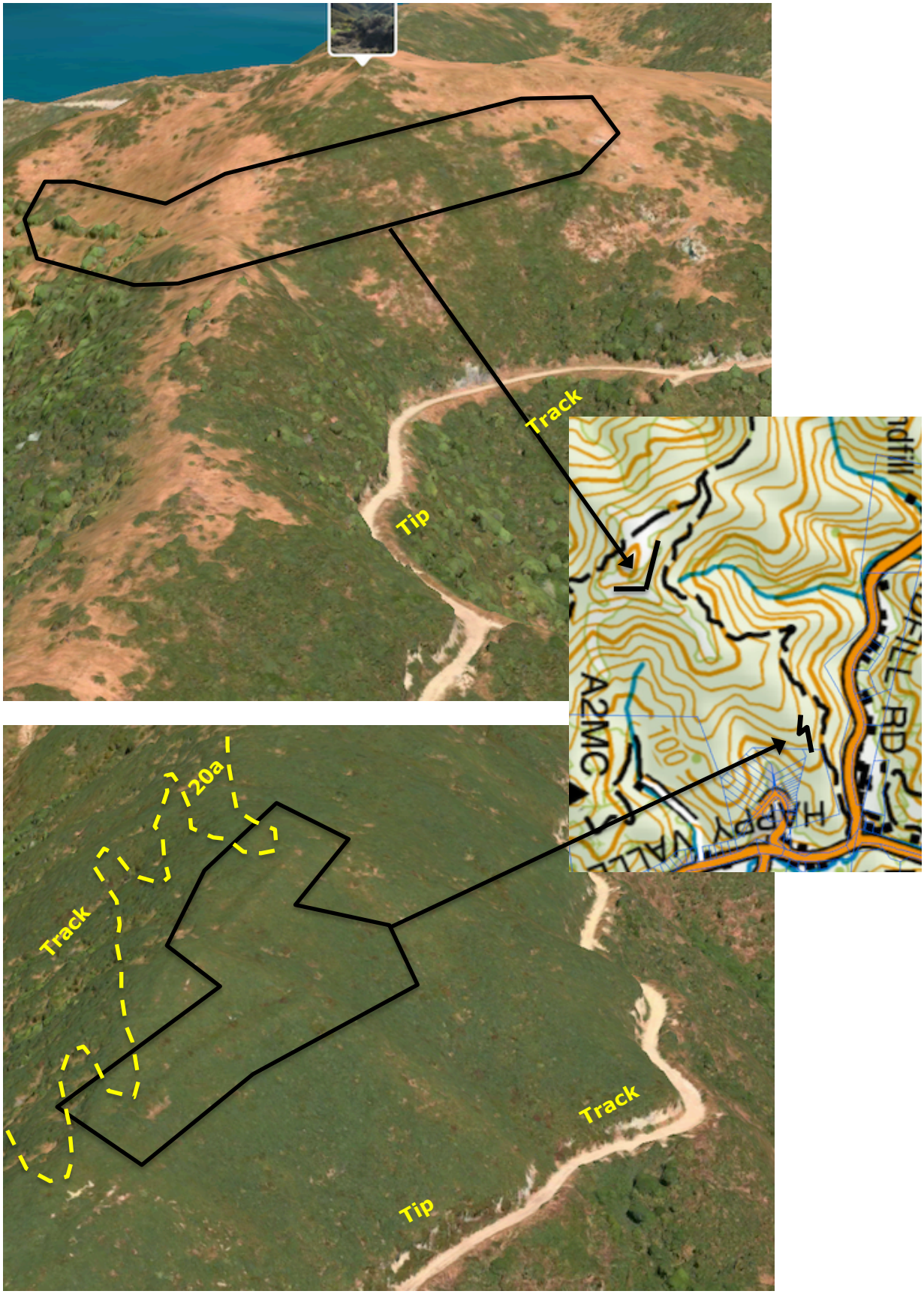


Figure 50. A view downhill from the Tip Track showing the Point A in the figure above, which was the maximum extent of our exploration along Track 20a during field work.

Figures 51a and b. We have noticed what look like former track benches or similar in the slopes above the Tip Track, where Track 20a might be located. These are worth understanding and would be easier to see using LIDAR contour maps, if available. They are very unlikely to be low-angled enough for uphill cycling but may be good for walkers.



5.3.2. Track 20b

This track would offer an alternative to 1,040 metres of the Tip Track – most of that track above its central, nearly flat section. This part of the Tip Track extends from the landfill fence up to the junction of the Tip Track with Barking Emu and the Red Rocks Track, a critical intersection in the overall network. It has an average slope of 7.6 degrees so is slightly less steep than the bottom 1,550 metres of track where Track 20a is proposed.

Like Track 20a, Track 20b would be for two-way walking and uphill mountain biking. However, part of it might best be presented as a two-way track to accommodate riders exiting Track 22, should that track be built up through the Hāpe Stream valley.

Experience and audience

The experience required on Track 20b is of a simple, single-track climb that is less arduous than the current ascent on Tip Track. It should be consistent with the other riding experiences in the Reserve network, providing adventure-focused Grade 4 riding at an average slope of 6 degrees.

The primary users of this track are expected to be adventure mountain bikers climbing up into the Reserve from Happy Valley, on their way to Polhill or the south coast, or even towards Mākara around the Zealandia fenceline. On-foot visitors would also use the track in both directions but the Plan rightly implies downhill riding would not be permitted. This would instead continue to be facilitated by the current Tip Track and, in a possible future, by Track 23 (Section 5.5).

Feasibility

Like Track 20a, the design of Track 20b would need to ensure it is rideable and has no steps. It would be less important to eliminate repeated turns, since walkers seem likely to be a smaller percentage of overall visitors here than they will be on Track 20a. The vegetation in this area is a mosaic with high-and low-value areas.

The total amount of climbing required for Track 20b is 140 vertical metres, which the current Tip Track requires just 1,040 metres to achieve. That is an average of 7.7 degrees, which is Grade 5, but which includes plenty of even steeper sections and, in places, quite a bedrock surface that is rough and slick.

Track 20b will need to be much longer – 1,140m at the nominal maximum uphill slope for Grade 4 (7 degrees). However, a more gentle average slope is recommended instead – six degrees. This will require 1332 metres of new track, which is 30% longer than the current Tip Track but shorter than a track built at the Grade 3 target average slope (5 degrees), which would be 1600 metres – 50% longer.

Recommendations

- Track 20b is a commendable concept that would add significantly to the attractiveness of this part of the Reserve. Its construction is recommended but only if Track 20a can be constructed so that both steep sections of the Tip Track are eliminated.
- Track 20b should be two-way for walkers, but uphill-only for riders. At the bottom however, a two-way section would be recommended if Track 22 proceeds.

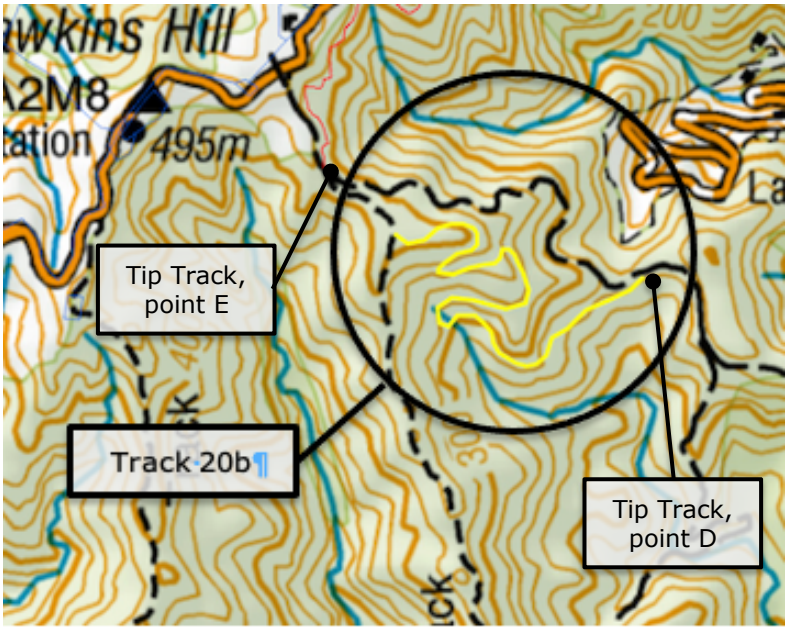


Figure 52. The location and nominal route of Track 20b (yellow line) on a map. Note that Track 20b would not strictly finished at Point E of the Tip Track but rely instead on a portion of the Red Rocks Track.

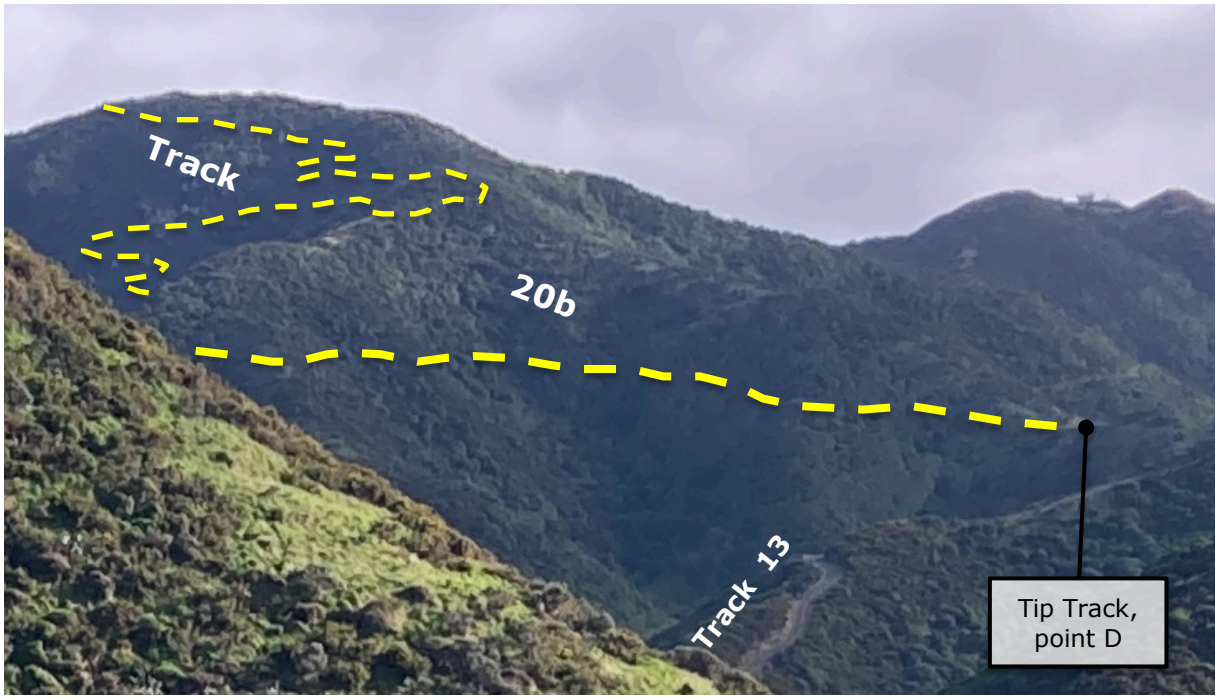


Figure 53. Track 20b as viewed from down on Track 12; this route joins the Red Rocks Track at the top, just out of sight in the top left of the photo. There are some rounded ridges and naturally favourable points for track construction in this area, but also some valuable patches of regenerating forest. Some or all of the part of the track shown with a thicker line may need to be two-way if Track 22 goes ahead (see figures 16/19 on pages 24/26).

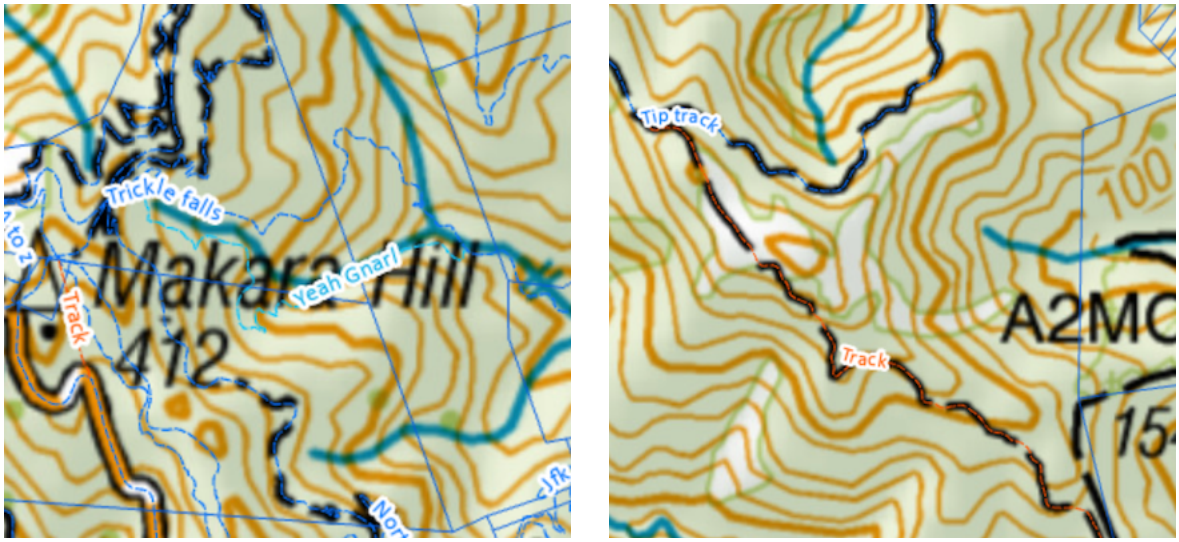
5.4. Proposed Tracks 21a-n

The proposal for this part of the Reserve is a series of downhill mountain bike tracks. The Draft Track Network Plan proposes Grade 5 for these and labels them 'technical'. However, Grade 6 may also be appropriate and thrill-seeking is also a possible purpose, or type. The Plan also says these trails would be accessed from the new carpark on Happy Valley Road but that is really where they would finish. Access will instead be up the existing Tip Track (to the Track 15 junction at the old stockyards) or up Track 20a if that goes ahead.

Analysis

A sub-network of multiple trails in a low (ecological) value part of a wider Network is a naturally understandable concept. The vegetation in this area is mostly grass and gorse so the impact will be minimal and finding and establishing suitable routes won't be too hard.

At c30 degrees, the average slope in this area is very steep, giving plenty of scope for the type of trail envisaged; in fact the slopes are similar to those at Mākara Peak where the well-known trails Yeah Gnar! (Grade 6) and Trickle Falls (Grade 5) are established (see Figure 56).



Figures 54a and b. These two maps are captured at the same scale from the Walking Access Management System. They show that the slopes in the area proposed for Tracks 21 to be built (right) are slightly steeper than those on at Mākara Peak (left) where well-known trails are established.

Tracks 21 are slated to be built two basins south of their exit so will only be able to descend directly for c500 lineal and c100m vertical metres, before possibly joining each other and traversing about twice as far again to meet Track 20a and then exit via a junction at a saddle to a carpark (Figure 57). Track 20a is commended as a lower-grade, uphill-only-for-bikes, dual use track (see Figure 48 in 5.3.1 (p63)) meaning the network layout will be somewhat complex, requiring co-operation between users. This is less than ideal since people riding trails like Tracks 21 need a lot of space and develop high speed.

Feasibility and appropriateness

These tracks are feasible and, at first glance, seem like a good idea. However, the analysis above reveals a number of issues that limit their potential. In particular, not being able to use the full vertical scope available will likely be frustrating for riders, as will sharing the exit part of the sub-network with others. Tracks 21, as envisaged in the Draft Track Network Plan are appropriate but likely to be of limited value.

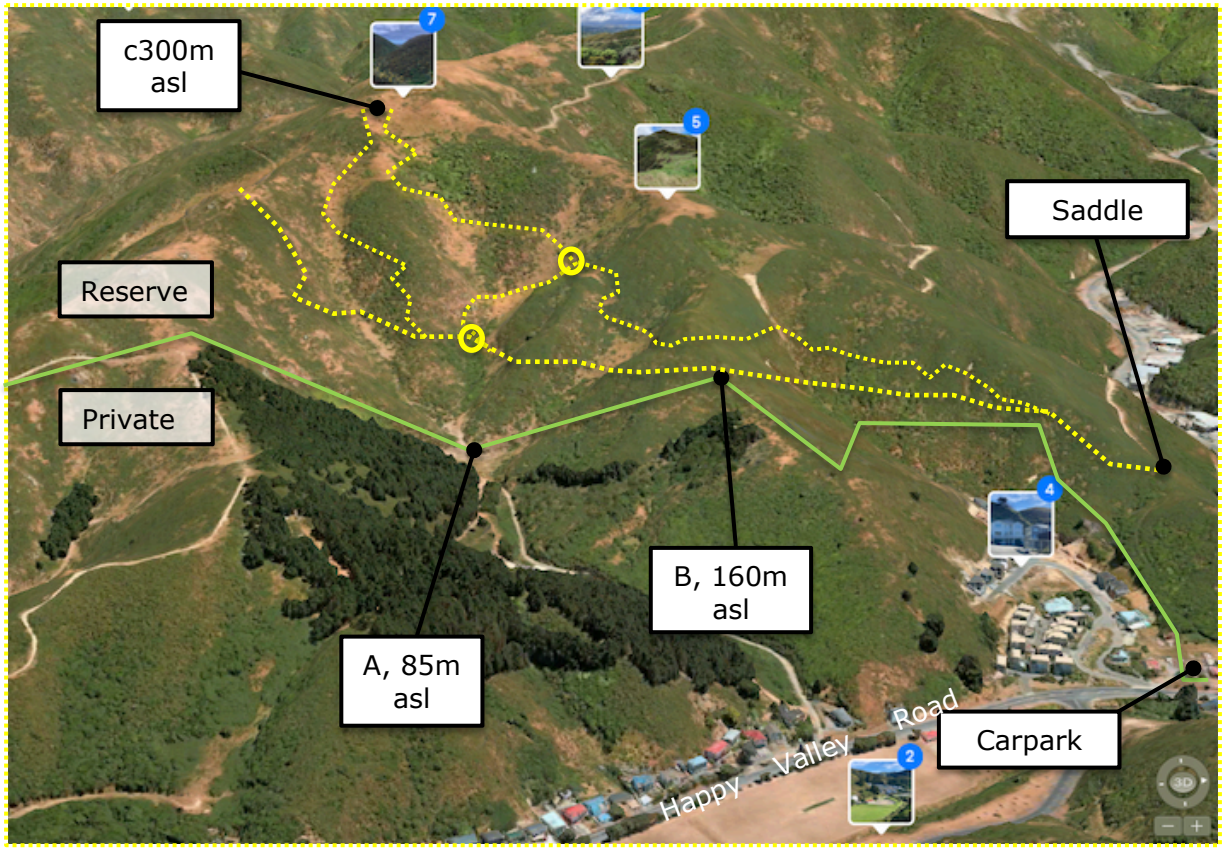


Figure 55. The area in which Tracks 21 might be built, showing a possible track layout (yellow dotted lines) with all the tracks descending sharply initially, to where the yellow circles are, then traversing northwards to a saddle, joining Track 20a and dropping to the carpark. Space is very tight around and just above the saddle area, as shown especially in Figure 17-19 (p26). The (approximate) Reserve boundary is shown as a green line.

Recommendations

- Given the climbing required to reach the top of these tracks and the difficulty in repeat-riding them, consideration should be given to building just one trail.
- If a number of tracks is desired (a sub-network), an attempt should be made to negotiate secure legal access from the Reserve boundary (near point A in Figure 55) to Happy Valley Road. This would increase the vertical fall available and the appeal of these tracks.
- A more thorough investigation of the area around the saddle (marked in Figure 557 and in Figure 48 (p63) is required to be sure there is sufficient space for all the potential tracks.
- A thrill-type ride, or enduro track would probably be better than a technical ride given that Track 23 (if/when built) could probably only be technical, and tracks 14 and 20a (part) will also be available for descending riders.
- Given the very steep slopes in play here, Grade 6 might be a better target grade than
- It is recommended that the likely trail users should participate in setting out the routes of any trail(s) developed in this part of the Reserve.

5.5. Track 23 – a downhill alternative to the Tip Track

Track 23 is a proposed new track that might be built in the medium term, once the C and D landfill is closed and remediated. This track would essentially run parallel to the current Tip Track, from the southern end of Barking Emu to Happy Valley Road or to join Track 20a just above the new carpark area on that road (Figure 48, p63). In the Draft Track Network Plan, it is proposed as a Grade 5 mountain bike track.

The plan doesn't show any links between Track 23 and the Tip Track, but a few of these are suggested to allow riders to bail out if necessary (on to the Tip Track) or to access Tracks 20b and 21a-n should these be constructed. The plan also shows the entire track on the downhill (northern) side of the Tip Track but it may be better to cross the Tip Track somewhere near the current boundary fence to avoid the old landfill area altogether. The possible configuration is shown in Figure 56.

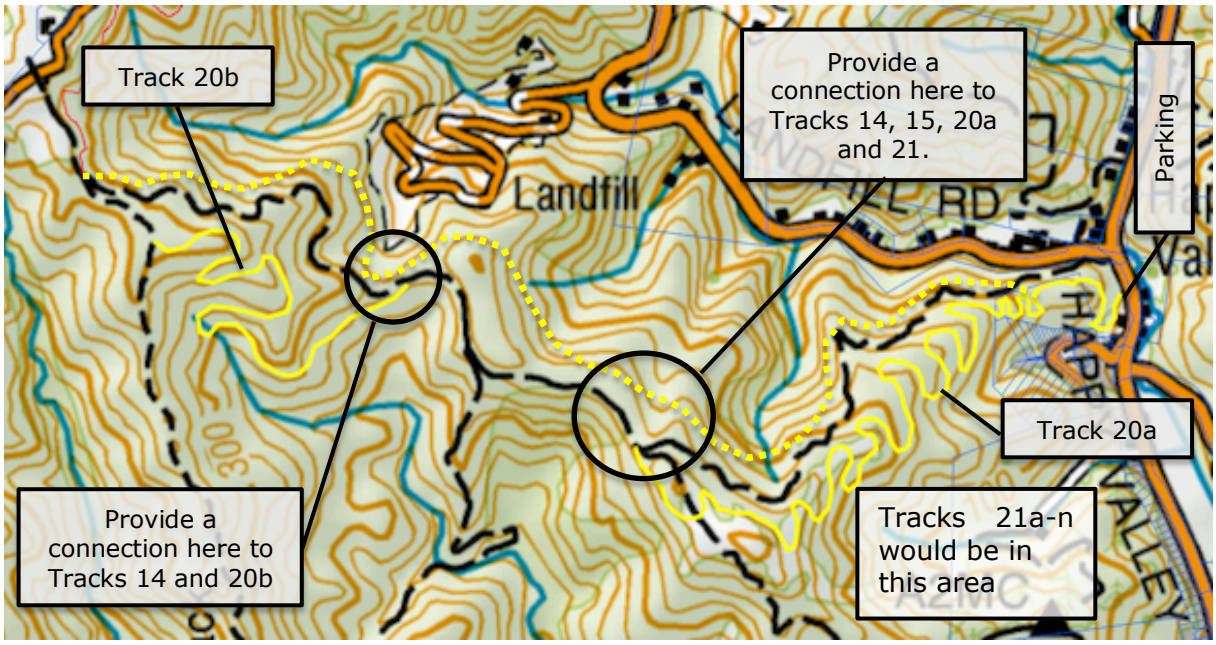


Figure 56. The yellow dotted line is the nominal position of Track 23, as shown on the Draft Track Network Plan. In certain strategic places, connections might be provided to other trails to give choices for users.

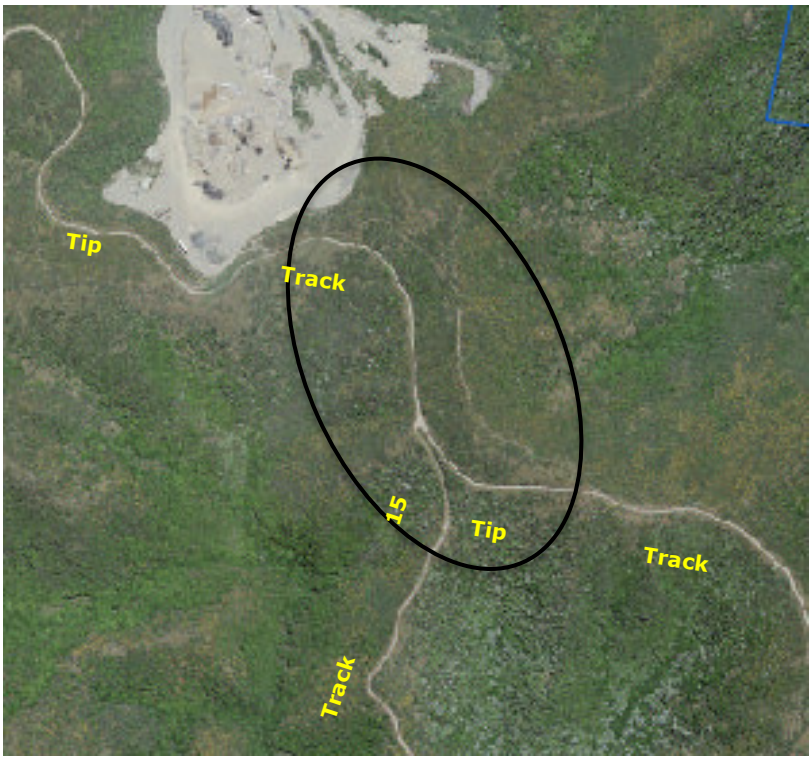


Figure 57. Track 23 might take advantage of an old fenceline/track for part of its route (within the black circle). Old features like this can enjoy a new life as part of an off-road cycling track but are usually too steep for lower grade tracks.

Analysis

This track would take some cyclists off the Tip Track, thus eliminating some conflict potential there. Its likely appeal will depend on the Grade ultimately chosen for it and, more critically, on the style of track. The Grade shown in the draft plan is Grade 5 but Grade 4 would have merit too; a Grade 3 trail would require a lot more construction effort and maintenance, and would essentially be out of keeping with the rest of the Reserve network. The two principal style options are a technical track or a thrill-type track.

It is suggested that the track is somewhat too long for thrill riding: it falls about 400 vertical metres in about 4 kilometres, an average fall ratio of 1:10 (5.5 degrees, Grade 2). This is too gentle for sustained thrill riding, which is more easily provided where there are steeper average downhill slopes. A good example of such a place is nearby, where Tracks 21(a-n) are proposed on the faces above Happy Valley Road – there the downhill slopes up to 30 degrees provide better scope for Grade 5 (or even 6) thrill trails.

As a technical ride instead, Track 23 would likely have a broader appeal and its 'Grade 5ness' would come from its narrow width, a steep sidefall and a difficult, natural surface, rather than its vertical fall.

Feasibility and appropriateness

Track 23, essentially as proposed in the plan, is both feasible and appropriate, especially if it is well integrated with several other trails. However, it is a low priority for construction, even if the landfill's closure was imminent. This is because it appeals to a relatively narrow visitor group and other, more broadly appealing trails are available or proposed nearby – tracks 20a and 20b.

Recommendations

- Track 23 is commended as a useful future addition to the network.
- If it was built, it is recommended to be more connected with the rest of the network than shown the Plan.
- A Grade 5, technical-style trail is recommended rather than a lower grade or a thrill-style one.

APPENDIX 1 – TABLE OF RECOMMENDATIONS

Table of recommendations

Page	Track number and name
Part 2, South of the Radome – non-vehicle tracks	
10	Track 11 – WW2 Observation Bunkers Track.
13	Track 12 – the Hāpe Track
23	Track 19 – a second track to the observation bunkers
27	Track 22 – a track up the Hāpe valley
27	Track 24 – a second option for a track up the Hāpe valley
29	Track 25 – a track up the Waipapa valley
Part 3, South of the Radome – former farm/vehicle tracks	
36	Track 5 or Track 18 – down the central spine
37	Track 6 – Te Kopahou Track
37	Track 7 – the Radome Track
38	Track 8 – unnamed 4WD track
38	Track 9 – unnamed 4WD track
38	Track 10 – the Te Kopahou Track
39	Track 13 – unnamed 4WD track
Part 4, North of the Radome	
45	Track 1 – the Fenceline track
47	Track 2 – Carparts and Windmill
48	Track 3 – Carparts Extension
49	Track 4 – Barking Emu
53	Track 16 – a proposed track in Careys Gully
56	Track 17 – duplicating Carparts Extension and Barking Emu
Part 5, The East – above Happy Valley	
59	Track 14 – the Tip Track
60	Track 15 – unnamed 4WD track
62	Tracks 20a – eliminating the lower steep section of the Tip Track
66	Tracks 20b – eliminating the upper steep section of the Tip Track
69	Tracks 21a-n – Downhill track on the Happy Valley faces
71	Track 23 – an alternative descent to the Tip Track

APPENDIX 2 – TABLE OF FIGURES

Table of figures

APPENDIX 3 – RESOLVING THE STEEP SECTIONS ON THE RED ROCKS TRACK (TRACK 5)

Introduction

In the body of the report (see Section 3.1.8, page 36), Track 5 (The Red Rocks Track) is commended as the best track option for all users to connect the Radome/Tip Track area and the south coast. While it is arguably fit-for-purpose as it stands, we recommend that it be improved in nine places, with the provision of 8 realignments and by widening the section of single track at the bottom. These nine changes are shown, in profile and table form, in Figures 58 and 59 below and discussed in this appendix.

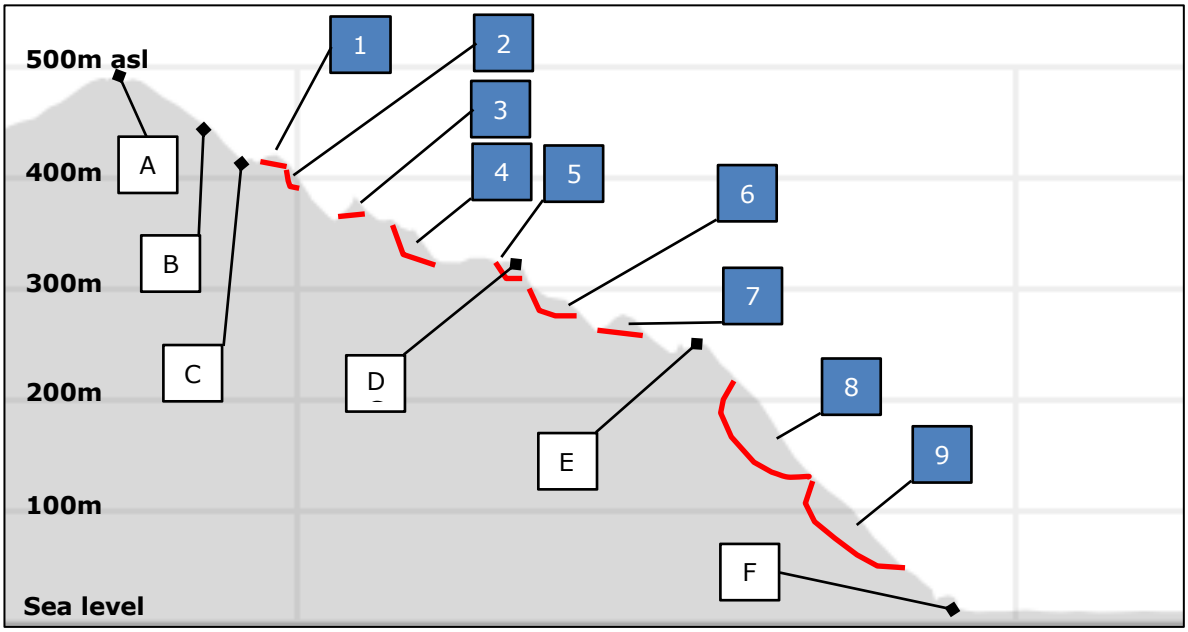


Figure 58. Profile view of the Red Rocks Track, showing the approximate location of the steep sections 1-9 where work is recommended (and discussed below). The points marked A-F are:

A Hawkins Hill, 485m above sea level
B Hawkins Hill Road/top of the Tip Track, 450m.
C Top (southern end) of Barking Emu/start of Red Rocks Track, 415m (the 0m mark on the Red Rocks Track).
D Junction of Tracks 5 and 12, 323m (1.49km along the Red Rocks Track).
E Junction of Tracks 5 and 8, 227m (3.15km along the Red Rocks Track).
F End of the Red Rocks Track at 13m asl, where it joins the Coast Track (4.88km along the Red Rocks Track).

Figure 59. Summary current information for nine sections of the Red Rocks Track recommended for bypassing or upgrading. This information describes the track in the downhill (south-bound) direction.

Steep section	Altitude change (m)	Length (m)	Av slope (deg)	Grade (down-hill)	Configuration
1	+5	185	Not relevant	Not relevant	Up a steep hill then back down to about the same altitude
2	-9	20	-24.23	6	A very short, very steep slope
3	-11	195	Not relevant	Not relevant	Up a steep hill then on a bit and then down a bit steeply
4	-21	30	-9.18	3	A steep descent with loose surface and awkward slopes

Steep section	Altitude change (m)	Length (m)	Av slope (deg)	Grade (down-hill)	Configuration
5	-26	220	-6.74	2	Over a knoll then steeply down
6	-22	620	Not relevant	Not relevant	Along for quite a distance with steep. Rough sections. Very close to the cliff edge in part.
7	+2	185	Not relevant	Not relevant	Up an extremely steep pitch over a knoll then down.
8	-72	370	-11.01	4	Sidles and descends steeply down to Steep 9
9	-69	650	-6.06	2	The single track section down to where it levels a bit and begins traversing to the exit.
	TOTAL	2575			

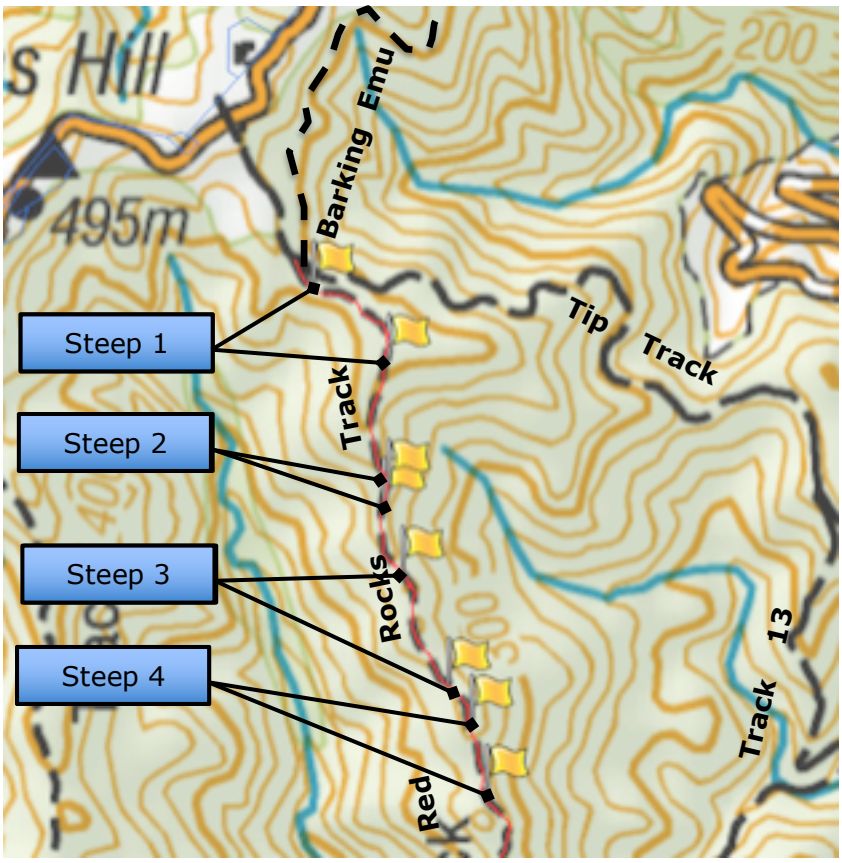


Figure 60. Topomap showing the Red Rocks Track and the location of Steep Sections 1-4, marked by the yellow flags (GPS'd on the ground during field work).

Steep Section 1

	Altitude (m)				
Scenario	**Start**	**Finish**	**Change**	**Length**	**Average Slope and Grade**
Current track (downhill/ south-bound)	411	416	+5	185	Not relevant, Steep 1 climbs then falls. The bypass is to eliminate the high point and a steep climb rather than to replace a simple steep section.
Current track (uphill/ north-bound)	416	411	-5		

Steep Section #1 begins very shortly after the Red Rocks Track starts, where it makes a very steep climb to gain the ridgeline that it then mostly follows to the sea. The point of the realignment here is simply to avoid this steep climb and return to the ridge quickly, at about the place Track 20b would begin.

The best terrain for this realignment is on the right side of the current track. The side slopes there are gentle and the vegetation is sporadic, although it probably includes some rare-in-the-North-Island taramea (Spaniard) plants (and maybe an old fence). The route is shown in Figure 61, and, if it is indeed 169 metres (as per Figure 62), it will be shorter than the current track. It will have a minimal average slope – 1.69 degrees, well within Grade 1 specifications — in either direction.

Figure 61. Photo showing the area of Steep 1 and the route option (A to B) for eliminating the nasty pinch climb there.

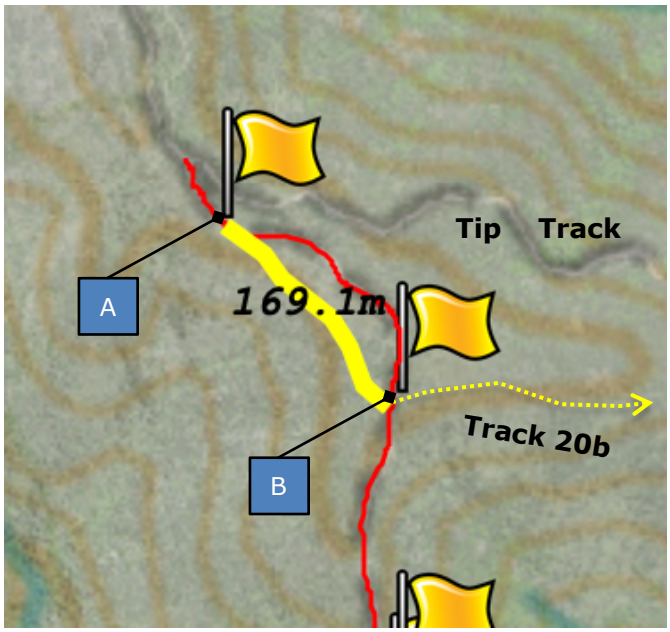


Figure 62. Realignment route (A to B again) for Steep 1. Note that it should be possible to finish on the current track at Point B at the top of Track 20b, which means this realignment might be 2-way.

Steep Section 2

	Altitude (m)				
Scenario	**Start**	**Finish**	**Change**	**Length**	**Average Slope and Grade**
Current track (downhill/ south-bound)	375	366	-9	20	-24.2 degrees, well above the Grade 5 maximum of 20° (there is no maximum slope for Grade 6).
Current track (uphill/ north-bound)	366	375	+9		+24.2 degrees, above even the Grade 6 maximum for a short pinch.

Steep 2 is really just a very short but very steep, ramp section of the existing track. It's probably the steepest downhill part of the current track but, despite being steeper than the Grade 5 maximum, not enough to warrant grading the whole trail 6. Steep 2 is so steep that a Grade 4 bypass, at c51 metres, would more than double its length as shown in Figure 63.

Figure 63. Length of track required to bypass Steep Section 2 at various slope scenarios.

Scenario	Average Slope	Length (m)	Change in length	Notes
Downhill Scenarios				^ The 'target' slopes are from the Recreation Aotearoa Guidelines. These are the only standard suggesting target average downhill grades. • The recommended slope is the <u>average</u> slope we have recommended for uphill trails throughout this report (e.g., tracks 20a and b) * The other maxima are from the NZ Cycle Trail and DOC standards, with are consistent with each other.
Grade 3 'target' ^	-6°	86	+66	
Grade 3 max *	-11°	46	+26	
Grade 4 'target' ^	-10°	51	+31	
Grade 4 max *	-15°	34	+14	
Uphill Scenarios				
Grade 4 max *	7°	73	+43	
Recommended •	6°	86	+66	

Further field work is required to find the best option for the shortest possible bypass of Steep 2. The terrain on the west side of the ridge again seems to be the better option for the bypass but we recommend considering a much longer option as per Figures 64-66. Figure 66 also shows that steep sections 1 and 2 could be bypassed in a single realignment and that there appears to be an old fenceline that might be helpful.

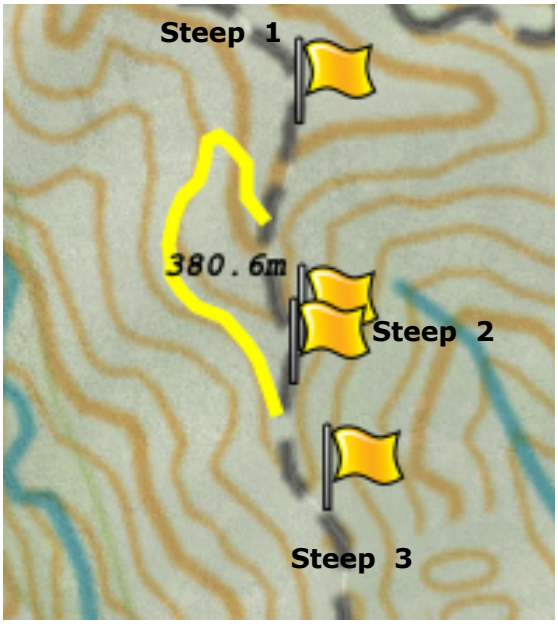


Figure 64. A possible configuration for the bypass of Steep Section 2. At 381 metres, this is much longer than the nominal minimum required to eliminate a 20-metre long ramp. The slope of the bypass is 5.1 degrees, Grade 2 down and 4 up.

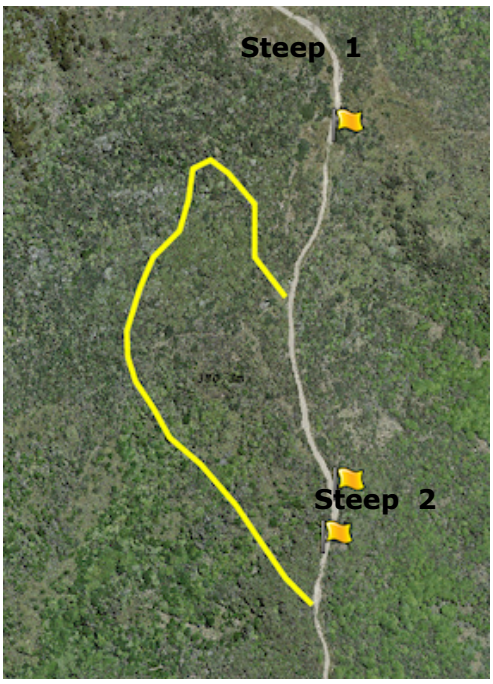


Figure 65. The same area shown with a photo basemap.

Figure 66. Oblique view of the area around steep sections 1 and 2 showing the two bypasses and giving a sense of how they might be joined, perhaps using what appears to be an old fenceline (within the black oval).

Steep Section 3

	Altitude				
Scenario	**Start**	**Finish**	**Change**	**Length**	**Average Slope and Grade**
Current track (downhill/ south-bound)	357	346	-11	195	Not relevant, Steep 3 climbs then falls. The bypass is to eliminate the high point and a steepish section below that rather than to replace a simple steep section.
Current track (uphill/ north-bound)	346	357	+11		

Like Steep Section 1, Steep 3 doesn't involve a lot of height loss; instead the aim of the bypass is to eliminate a steepish climb over a knoll. The best option for the reroute seems to be on the left side of the current track and just below it. At 209 metres long, the route shown in Figures 67 and 68 is a just a bit longer than the section it will bypass, which is to be expected. The average slope will be just over 3 degrees: Grade 1 down and 2 up.

Figure 67. Proposed bypass route for Steep Section 3.

Figure 68. Bypass route for Steep Section 3 with length calculation.

Steep 4

	Altitude				
Scenario	**Start**	**Finish**	**Change**	**Length**	**Average Slope and Grade**
Current track (downhill/ south-bound)	345	324	-21	130	-9.2 degrees, Grade 3.
Current track (uphill/ north-bound)	324	345	+21		+9.2 degrees, Grade 5 up

Steep Section 4 is currently a Grade 3 ride in the downhill direction, but steepens at the bottom where it is also awkwardly cambered and has a loose, difficult surface. A bypass on the western (Waipapa Stream) side is suggested. This is shown in Figures 70-72, but at just 159 metres, the average slope is only reduced from 9.2 degrees to 7.5, which would still be Grade 5 as a climb. Figure 69 shows that a further 41 metres of track (200 in total) would be required to achieve the recommended grade of six degrees should it be decided to designate the track for two-way use.

Figure 69. Length of track required to bypass Steep Section 4 at various slope scenarios.

Scenario	Average Slope	Length	Change in length	Notes
Downhill Scenarios				^ The 'target' slopes are from the Recreation Aotearoa Guidelines. These are the only standard suggesting target average downhill grades. • The recommended slope is the <u>average</u> slope we have recommended for uphill trails throughout this report (e.g., tracks 20a and b) * The other maxima are from the NZ Cycle Trail and DOC standards, with are consistent with each other.
Grade 3 'target' ^	-6°	199.8	+70m	
Grade 3 max *	-11°	108	-22m	
Grade 4 'target' ^	-10°	119.1	-11m	
Grade 4 max *	-15°	78.4	-52m	
Uphill Scenarios				
Grade 4 max *	7°	171	+41m	
Recommended •	6°	199.8	+70m	

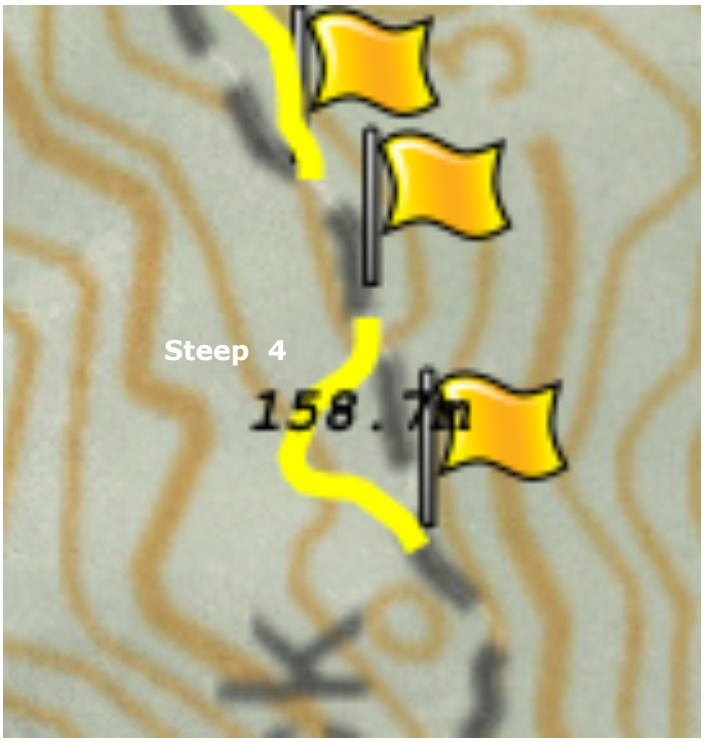


Figure 70. Approximate location of the bypass option for Steep Section 4.

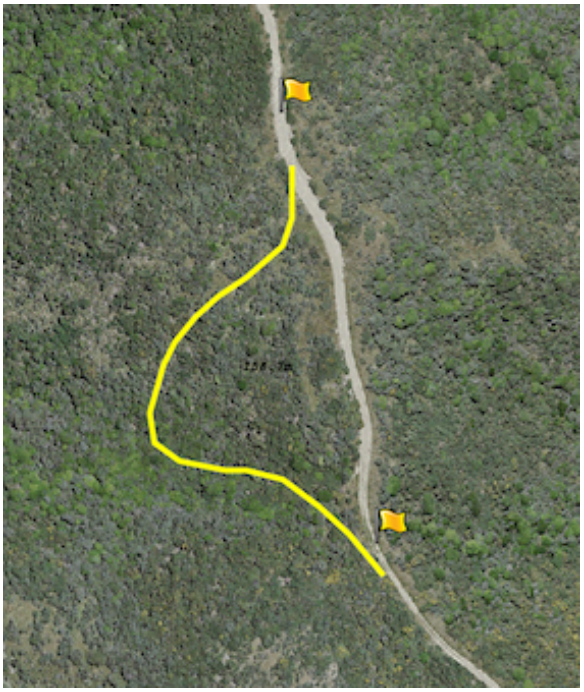


Figure 71. Bypass route option for Steep Section 4 in vertical photo view. While this 159-metre bypass would have a much more consistent slope than the current track, at 7.5 degrees it will not be as mellow as the earlier bypasses and Grade 5 for riding up, if the track is if ever marketed for two-way cycling use.

Figure 72. An oblique photo showing the nominal location of the Steep 4 bypass.

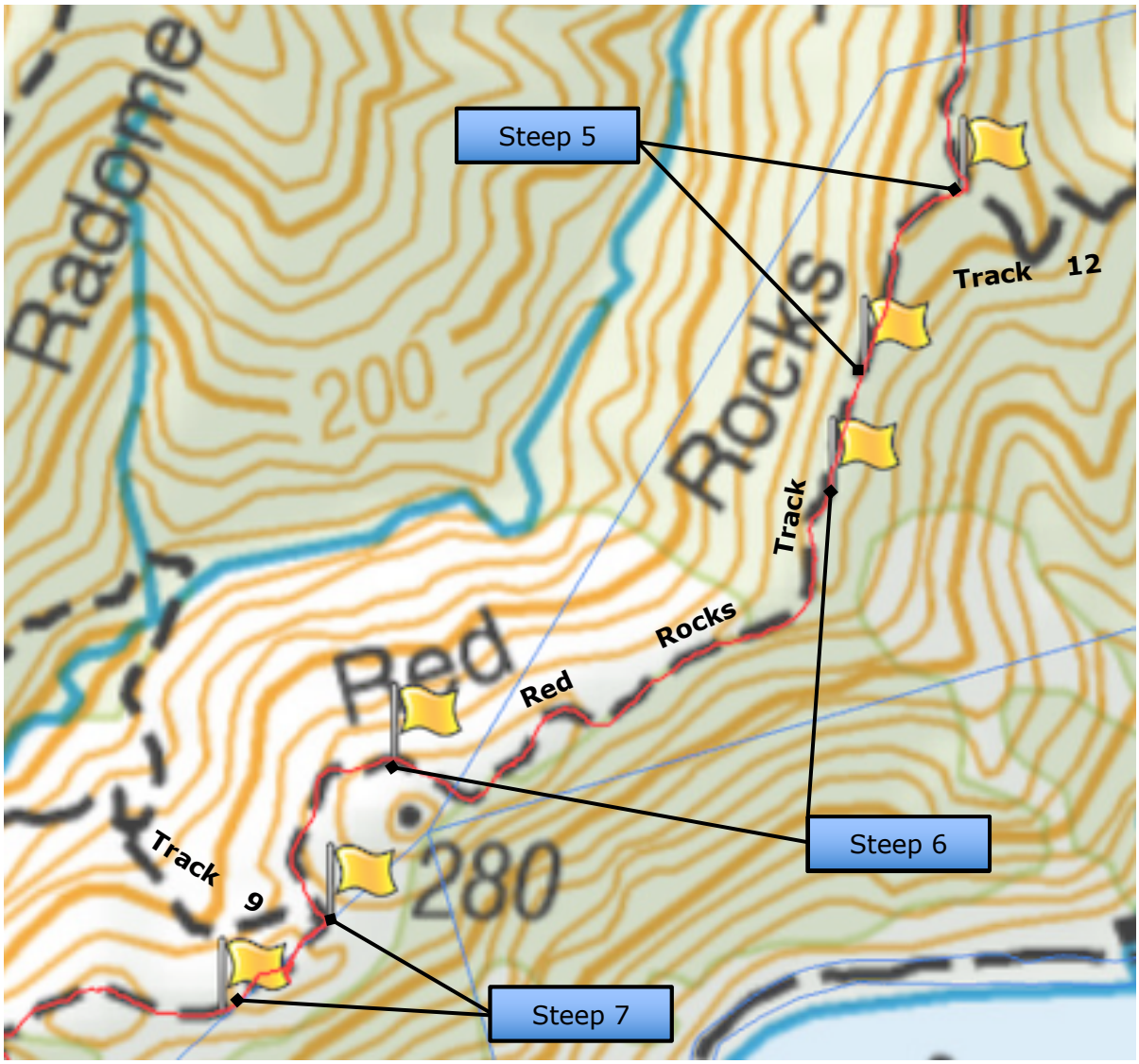


Figure 73. Topomap showing the Red Rocks Track and location of Steep Sections 5-7, marked by the yellow flags (these were GPS'd on the ground during field work).

Steep 5

	Altitude				
Scenario	**Start**	**Finish**	**Change**	**Length**	**Average Slope and Grade**
Current track (downhill/ south-bound)	319	293	-26	220	-6.7 degrees, Grade 2. However, Steep 5 climbs initially over a knoll then descends and is certainly steeper.
Current track (uphill/ north-bound)	293	319	+26		+6.7 degrees, Grade 4. However, the majority of this steep section would be much steeper to climb than 6.7° and probably Grade 6.

Steep Section 5 is found just below the junction of Tracks 5 and 12, about 1.5km down the Red Rocks Track. The actually over-steep part of Steep 5 doesn't start at the junction, but beyond a short climb (see Figure 76 and 77) that is not excessively steep itself. However, the suggested bypass begins at the junction in order to eliminate this climb and give more space in which to lose the required height. This in-turn means the bypass — at about 282 metres — is about 60 metres longer than the section of track it replaces, with an average slope of 5.4 degrees, Grade 2 down and 4 up.

Figure 74. Length of track required to bypass Steep Section 5 at various slope scenarios.

Scenario	Average Slope	Length	Change in length	Notes
Downhill Scenarios			Steep Section 5 goes over a hill before descending making the bypass legnth indicative only.	^ The 'target' slopes are from the Recreation Aotearoa Guidelines. These are the only standard suggesting target average downhill grades. • The recommended slope is the <u>average</u> slope we have recommended for uphill trails throughout this report (e.g., tracks 20a and b) * The other maxima are from the NZ Cycle Trail and DOC standards, with are consistent with each other.
Grade 3 'target' ^	-6°	247		
Grade 3 max *	-11°	134		
Grade 4 'target' ^	-10°	148		
Grade 4 max *	-15°	97		
Uphill Scenarios				
Grade 4 max *	7°	212		
Recommended •	6°	247		

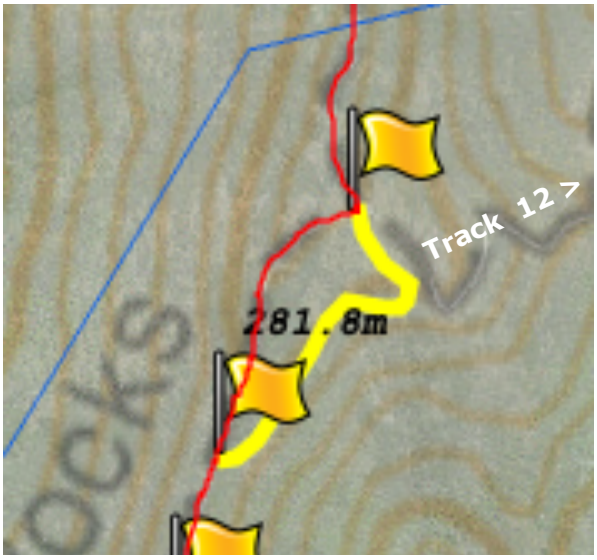


Figure 75. The Steep Section 5 bypass (yellow line) overlain on the Topographic map.

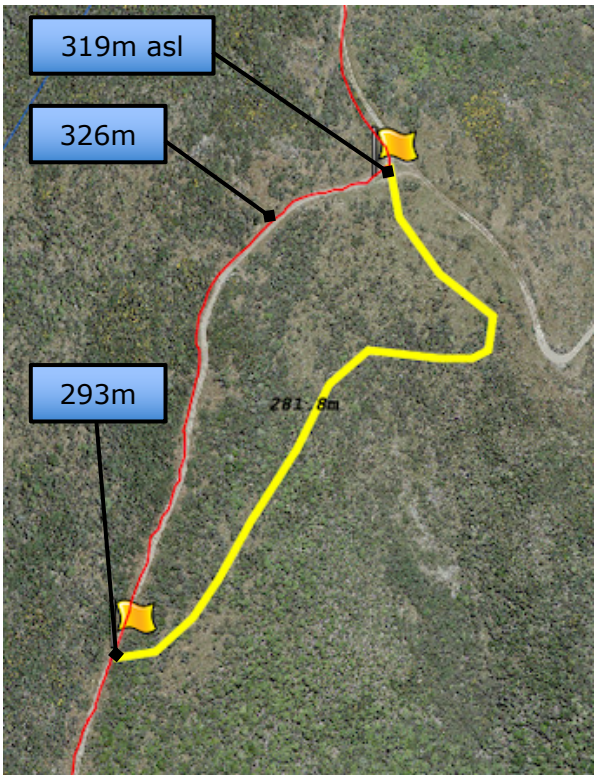


Figure 76. Steep Section 5 overlain on a satellite photo – note the spot heights showing that Steep 5 climbs a little before falling.

Figure 77, Oblique view of Steep 5 and its proposed bypass.

Figure 78, Additional view showing (parts of) the proposed bypass for Steep Section 5. The inset shows that the skyline ridge has a slope of about 28 degrees. This is certainly not the steepest in the Reserve or too steep to build on, but the right hand side recommended.

Steep 6

	Altitude				
Scenario	**Start**	**Finish**	**Change**	**Length**	**Average Slope and Grade**
Current track (downhill/ south-bound)	286	264	-22	620	-2.0 degrees, Grade 1.
Current track (uphill/ north-bound)	264	286	+22		+2.0 degrees, Grade 2.

The steep section identified here is longer than all of the others except Steep Section 9, which is already a single-track bypass to a former vehicle track. Steep 6 is as much difficult as it is steep, especially its uphill end, just below Steep 5, where it is rutted and the surface is loose. Indeed, much of what is identified for bypassing here is not steep so a shorter bypass may be preferred. It's worth noting however, that one of the reasons for suggesting this bypass is that part of the current track, while very wide, sits on a precipitous cliff top. This seems somewhat fragile and likely to be scary for some visitors, both cyclists and non-.

The suggested bypass route shown in figures 80-82 below includes four hairpin bends before beginning a long sidle under the ridge, then rejoining the current track. The full bypass will be about 710 metres long, with an average slope of 1.8 degrees (Grade 1 in either direction). However, an alternative would be to only install enough new track to eliminate the actual steep section. This shorter (360-metre) option would have a slope of 4.5 degrees: Grade 2 downhill and Grade 3 uphill.

Figure 79. Length of track required to bypass Steep Section 6 at various slope scenarios.

Scenario	Average Slope	Length	Change in length	Notes
Downhill Scenarios				^ The 'target' slopes are from the Recreation Aotearoa Guidelines. These are the only standard suggesting target average downhill grades. • The recommended slope is the <u>average</u> slope we have recommended for uphill trails throughout this report (e.g., tracks 20a and b) * The other maxima are from the NZ Cycle Trail and DOC standards, with are consistent with each other.
Grade 3 'target' ^	-6°	209	N/A	
Grade 3 max *	-11°	113	N/A	
Grade 4 'target' ^	-10°	125	N/A	
Grade 4 max *	-15°	97	N/A	
Uphill Scenarios				
Grade 4 max *	7°	179	N/A	
Recommended •	6°	209	N/A	

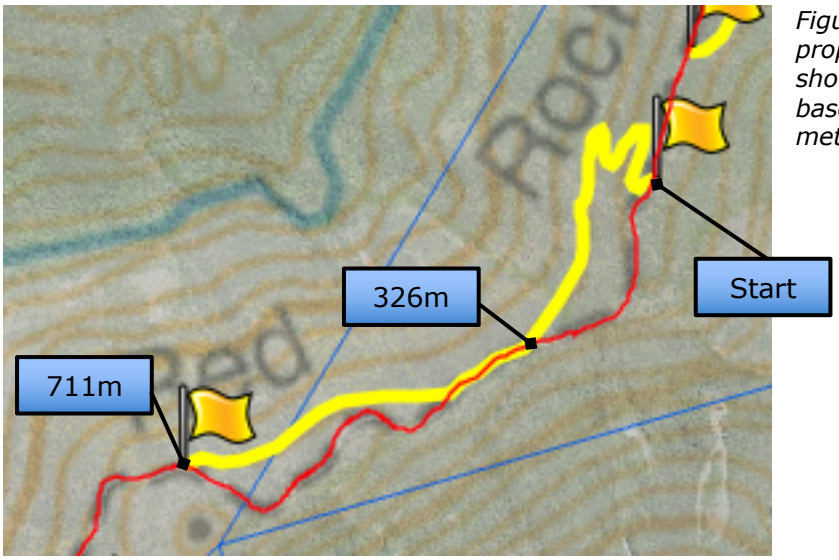


Figure 80, The 711-metre bypass proposed for Steep Section 6 shown on a topographical map base (yellow line). A shorter, 360-metre option is available.

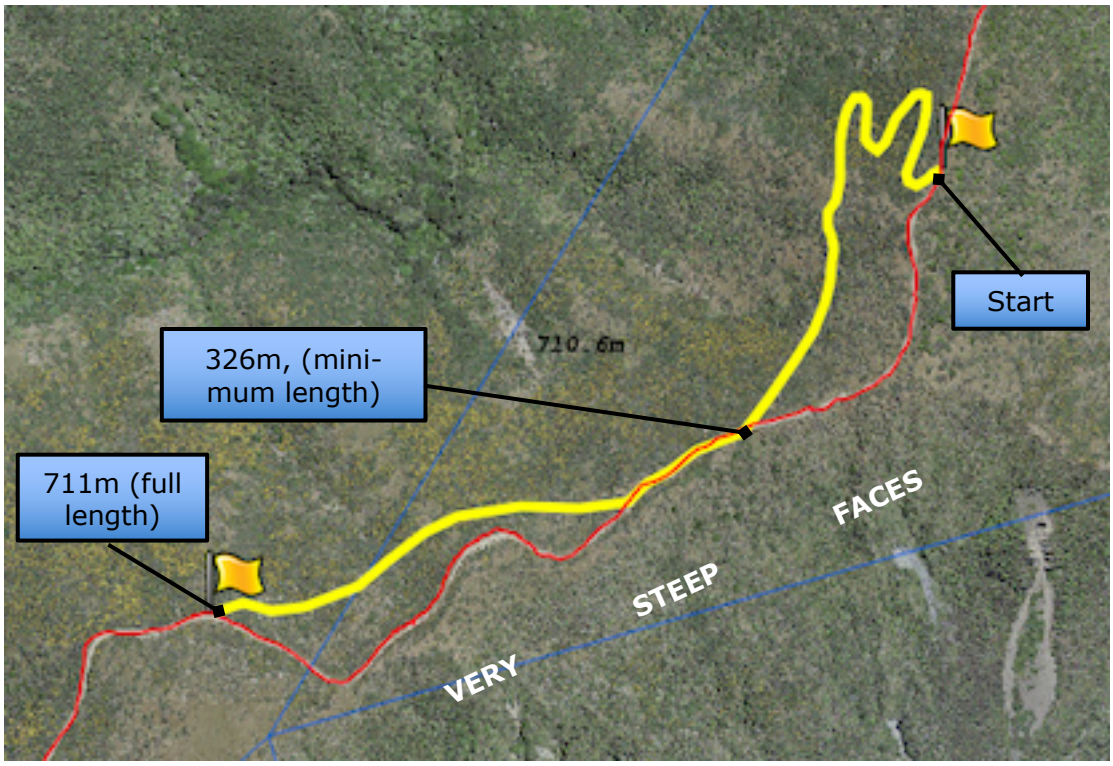
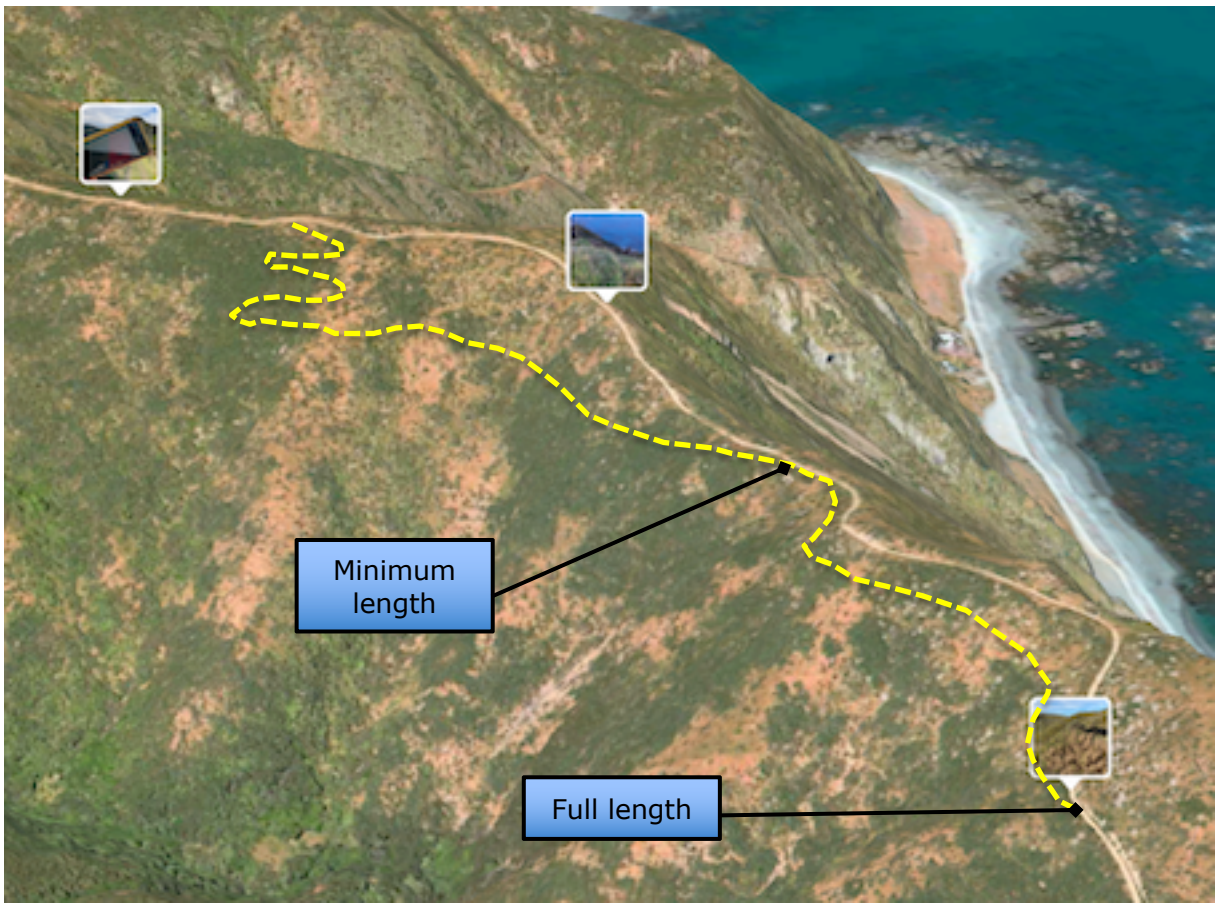


Figure 81, Steep Section 6 bypass in vertical photo mode.

Figure 82, The Steep Section 6 bypass in oblique photo mode. The turns shown are very much nominal. More than four will probably be required and they will be tighter than shown here.



Steep 7

	Altitude				
Scenario	**Start**	**Finish**	**Change**	**Length**	**Average Slope and Grade**
Current track (downhill/ south-bound)	236	238	+2	185	There is nearly no slope overall but a very, very steep pinch climb, that is all but unrideable.
Current track (uphill/ north-bound)	238	236	-2		

Steep Section 7 is another up-and-over one, located at the junction of Tracks 5 and 9, (the site for a mooted hut). There are some very odd landforms here due to tectonic activity or past quarrying, and the current trail rides over a knoll with the steepest slopes on the entire Red Rocks Track. The suggested bypass simply skirts around the knoll on the seaward side. Its estimated length, at 184m, is virtually the same as the track it replaces but, since its start and finish altitude are almost the same, there are effectively no slope considerations[1]. There are some old fences and stockyards in the way that will require removal unless they have historic value and need to be retained.

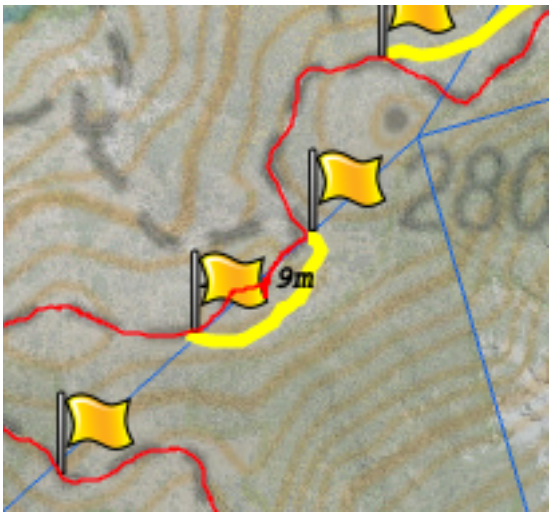


Figure 83. Steep Section 7 bypass (yellow line).

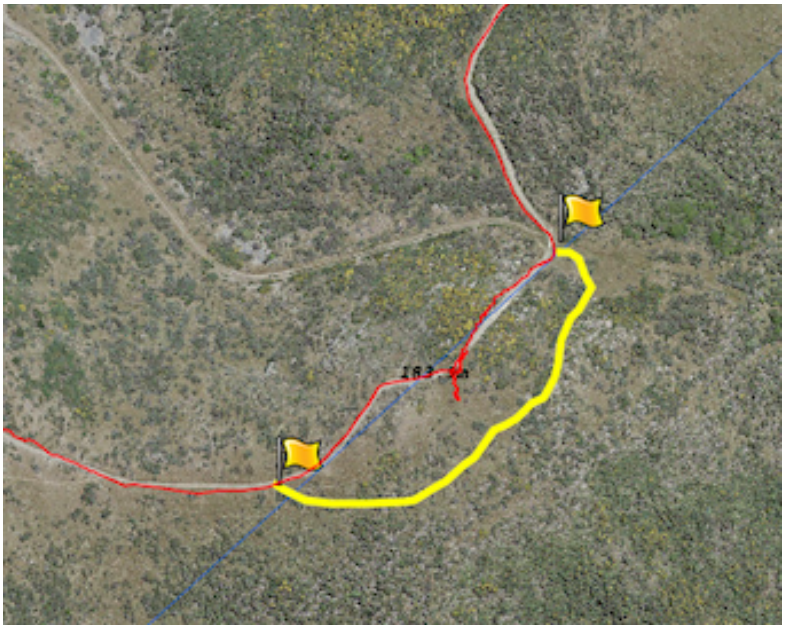


Figure 84. Steep Section 7 bypass in a vertical aerial photo.

[1] The table showing length at different target slopes is not necessary given there is virtually no altitude change.

Figure 85. Oblique (and somewhat blurry) view of the geologically interesting area where Steep 7 sits, showing the proposed bypass. The inset shows a vehicle driving (coastwards) up the extremely steep section slated for bypass, at about the point marked 'A'.

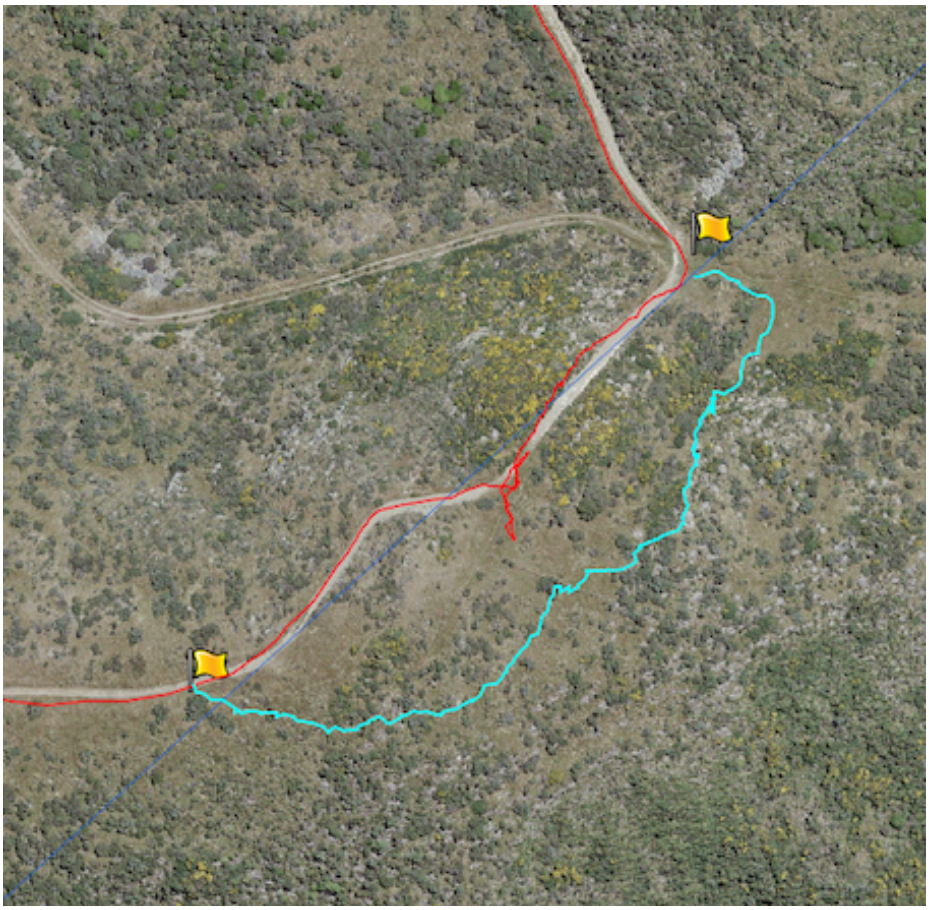


Figure 86. Steep Section 7 is one that we were able to fully explore the bypass for during field work. The exploration undertaken is shown here as a teal-coloured line. It was recorded using Strava, which gave a length of 190 metres.

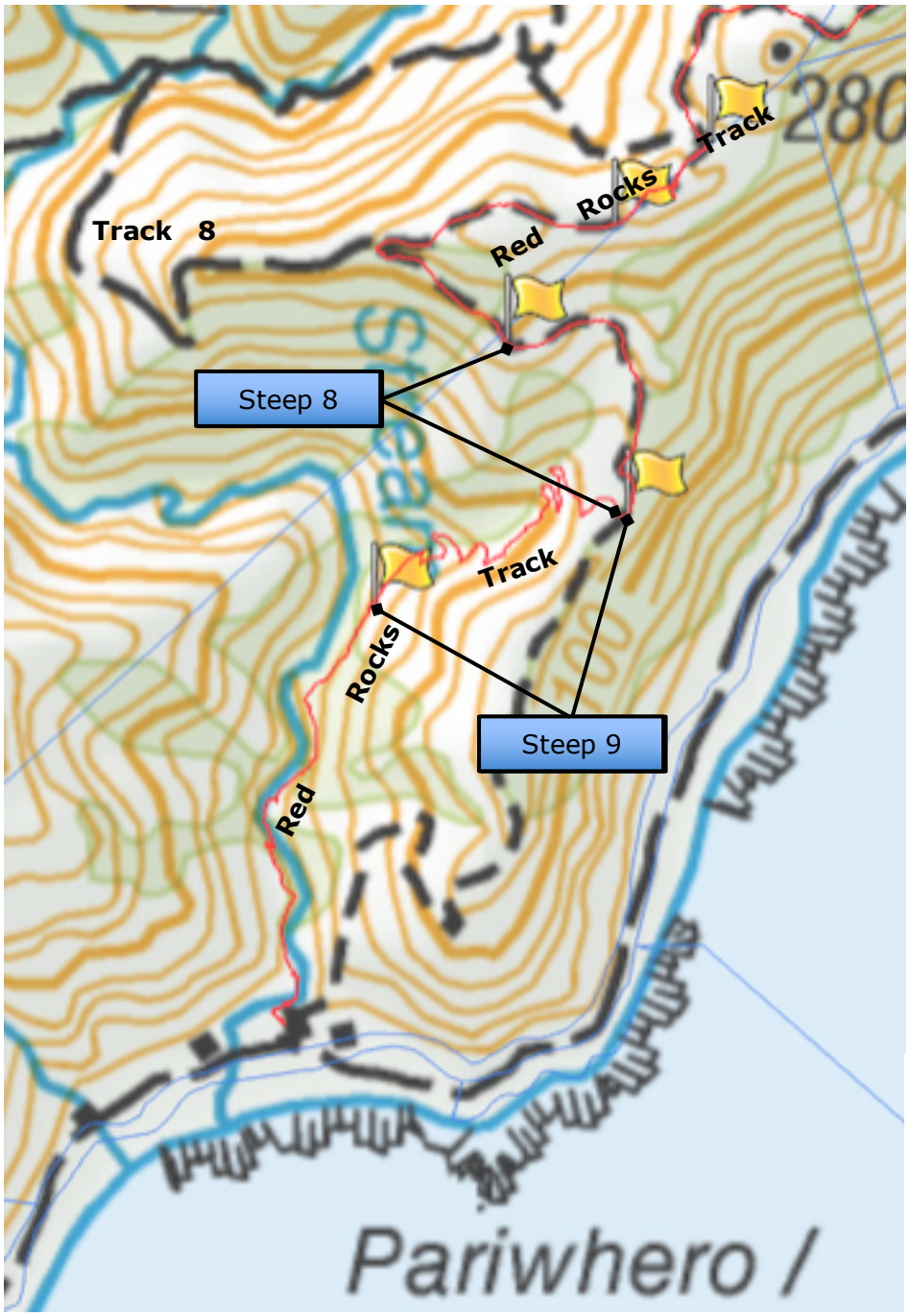


Figure 87. Topomap showing the Red Rocks Track and the location of Steep Sections 1-4, marked by the yellow flags (GPS'd on the ground during field work).

Steep Section 8

	Altitude				
Scenario	**Start**	**Finish**	**Change**	**Length**	**Average Slope and Grade**
Current track (downhill/ south-bound)	198	126	-72	370	-11.01°, Grade 4. This is right on the cusp (the maximum for Grade 3 is 11.0). There are plenty of steeper sections.
Current track (uphill/ north-bound)	126	198	+72		+11.01°, Grade 6.

Steep Section 8 is, like the previous seven steep sections, a former vehicle track. However, unlike the other sections, it's now closed to vehicles even for management purposes. As such, its effective width has narrowed, making it more difficult and seemingly focusing rainfall so that it has many treacherous gullies and a difficult surface.

It is also simply quite steep; at just over 11 degrees, it's on the Grade 3/Grade 4 cusp as a descent but steeper than the nominal Grade 5 maximum as a climb. While 11 degrees and Grade 4 (down) doesn't sound intimidating, this is the average slope – a lot of it is distinctly steeper and the steepness is exacerbated by the surface. Also notable is that the height loss, at 72 vertical metres, is virtually the same as Steep Section 9. That section is 320 metres longer and at just 6.1 degrees, its average slope is a Grade 4 climb and a Grade 2 descent (it's two grades easier in terms of slope).

The bypass proposed for Steep 8 is a simple replacement with of the old, 370-metre vehicle track with 710 metres of new single track. This will require lots of turns to fit in to the space available but seems to be quite doable with minimum impact. While we have sought to avoid turns elsewhere, that hardly seems possible here and the vehicle track would certainly remain for walkers as it does elsewhere (some one-off work to repair and control erosion is recommended).

Should this bypass go ahead, the slope will be almost the same as the current slope of Steep Section 9 but it will be wider with more open turns. We were able to walk some of a possible route for this bypass during our field work. That route, and other details of the bypass for Steep Section 8, are shown below in Figures 89-92, and the discussion of Steep Section 9 is also relevant.

Figure 88. Length of track required to bypass the 370-metre Steep Section 8, at various slope scenarios. At the recommend slope — 6 degrees — the bypass would be about 315 metres longer than Steep Section 8 (85%) and the same slope as Steep Section 9.

Scenario	Average Slope	Length	Additional Length	Notes
Downhill Scenarios				^ The 'target' slopes are from the Recreation Aotearoa Guidelines. These are the only standard suggesting target average downhill grades. • The recommended slope is the average slope we have recommended for uphill trails throughout this report (e.g., tracks 20a and b) * The other maxima are from the NZ Cycle Trail and DOC standards, with are consistent with each other.
Grade 3 'target' ^	-6°	685	315	
Grade 3 max *	-11°	370	0	
Grade 4 'target' ^	-10°	408	38	
Grade 4 max *	-15°	268	-102	
Uphill Scenarios				
Grade 4 max *	7°	586	216	
Recommended •	6°	685	315	

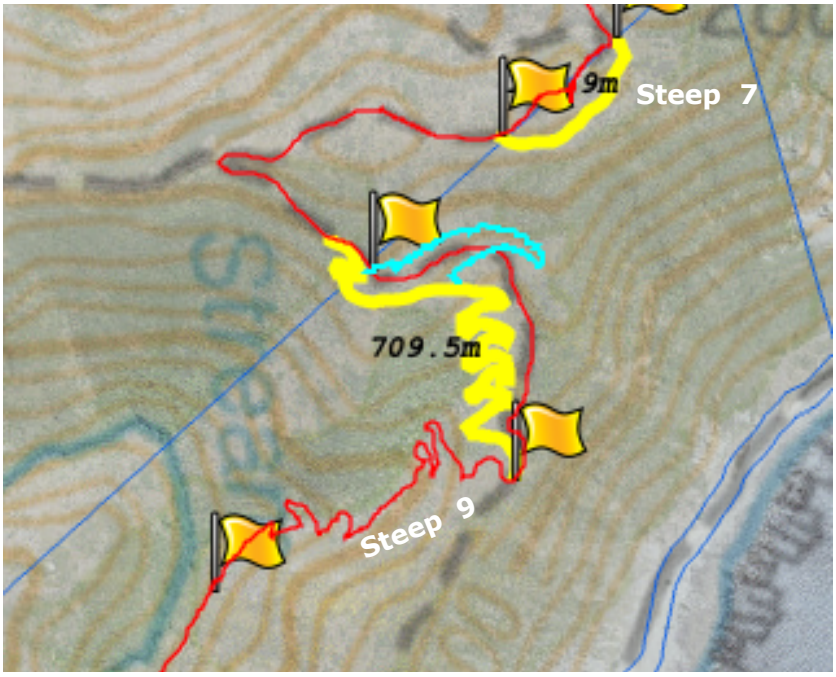


Figure 89. The 710-metre bypass for Steep Section 8 is shown here on a Topographic map. While the yellow line is fatter than the red one, it is essentially similar to Steep Section 9.

The red line is the Red Rocks Track and the teal-coloured one is a route we walked during our field work which would be a good back up option for the upper part of the bypass.

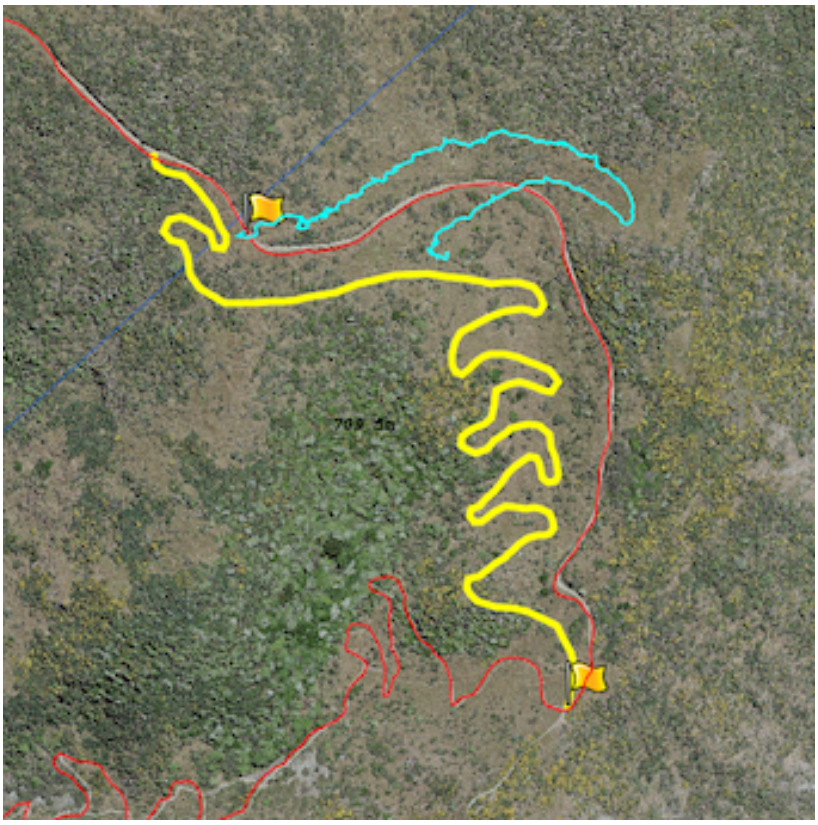


Figure 90. The same information as that in Figure 89 above, but on a vertical photo base map.

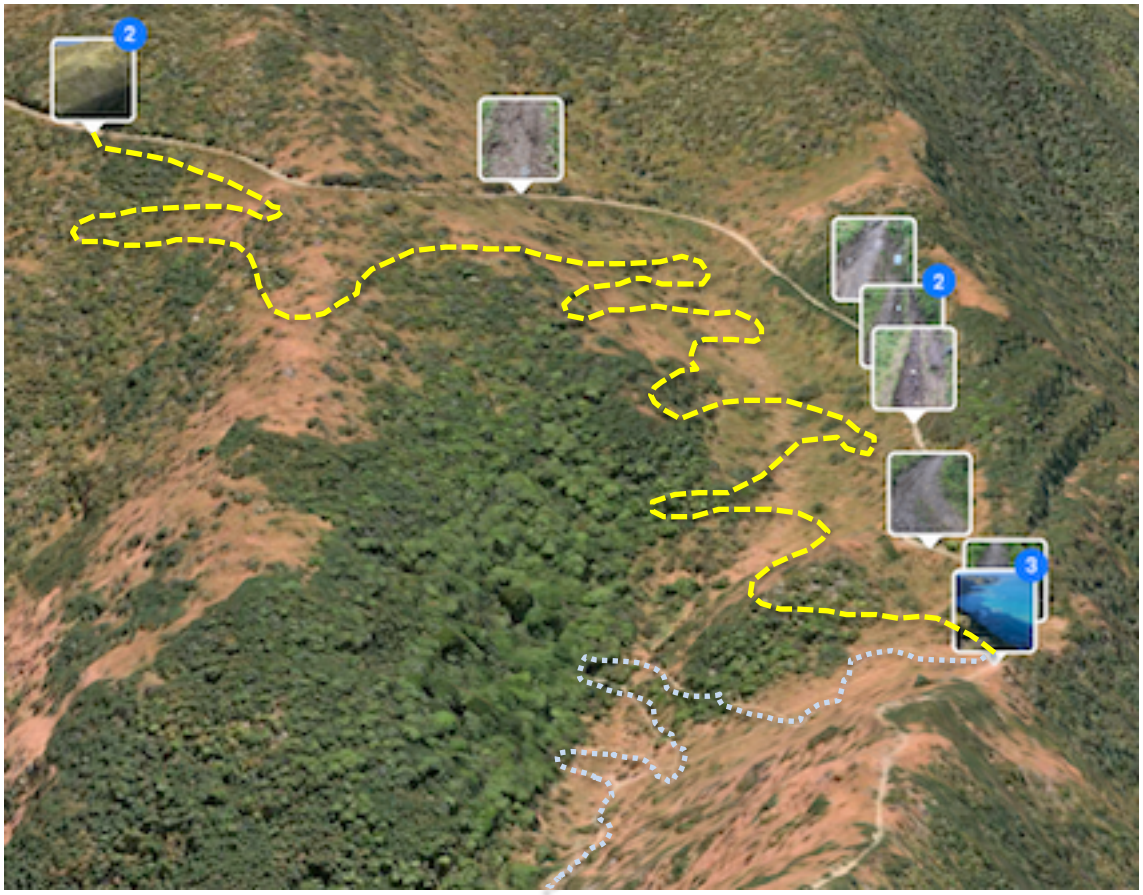


Figure 91. Oblique aerial view of the proposed Steep Section 8 bypass. Steep Section 9 – an existing piece of single track – is the light blue dotted line.

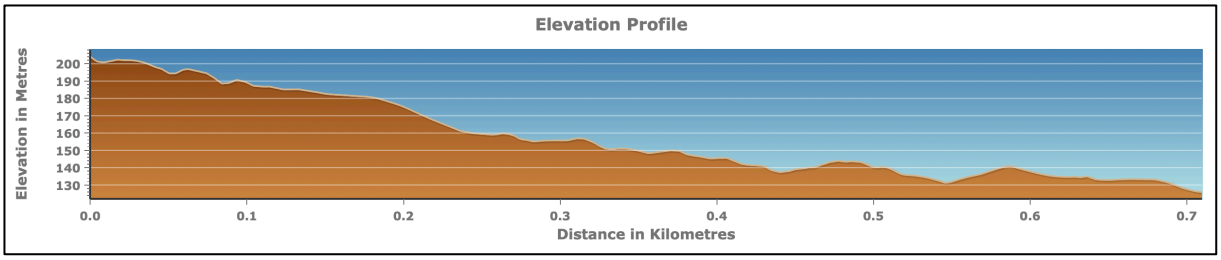


Figure 92. An elevation profile for the Steep Section 8 bypass. Final layout work should be able to smooth this out somewhat. Complete perfection – a completely smooth line – is not required but the track's design and build should eliminate over-height obstacles, since the outcome is intended to be an adventure ride rather than a technical- or thrill-style one.

Steep Section 9

	Altitude				
Scenario	**Start**	**Finish**	**Change**	**Length**	**Average Slope and Grade**
Current track (downhill/ south-bound)	126	57	-69	650	-6.1 degrees, Grade 2.
Current track (uphill/ north-bound)	57	126	+69		6.1 degrees, Grade 4 (but Grade 3 in the Recreation Aotearoa design guidelines).

Steep Section 9 is not actually steep. In fact at 6.1 degrees, it's not much more than half the slope of Steep Section 8. Slope-wise, it's a grade 4 ride up, where Steep 8 is a Grade 4 down! Instead, the issue with Section 9 is its width and the radius of its turns. It also has a very loose-surfaced section and an at-times severe sense of exposure at its outer edge. Overall, Steep Section 9 is a distinctly Grade 5 ride and there's enough of it to make the entire Red Rocks Track a Grade 5, especially when the several over-steep sections of the vehicle track above (that the bypasses 1-8 are designed to eliminate) are considered too.

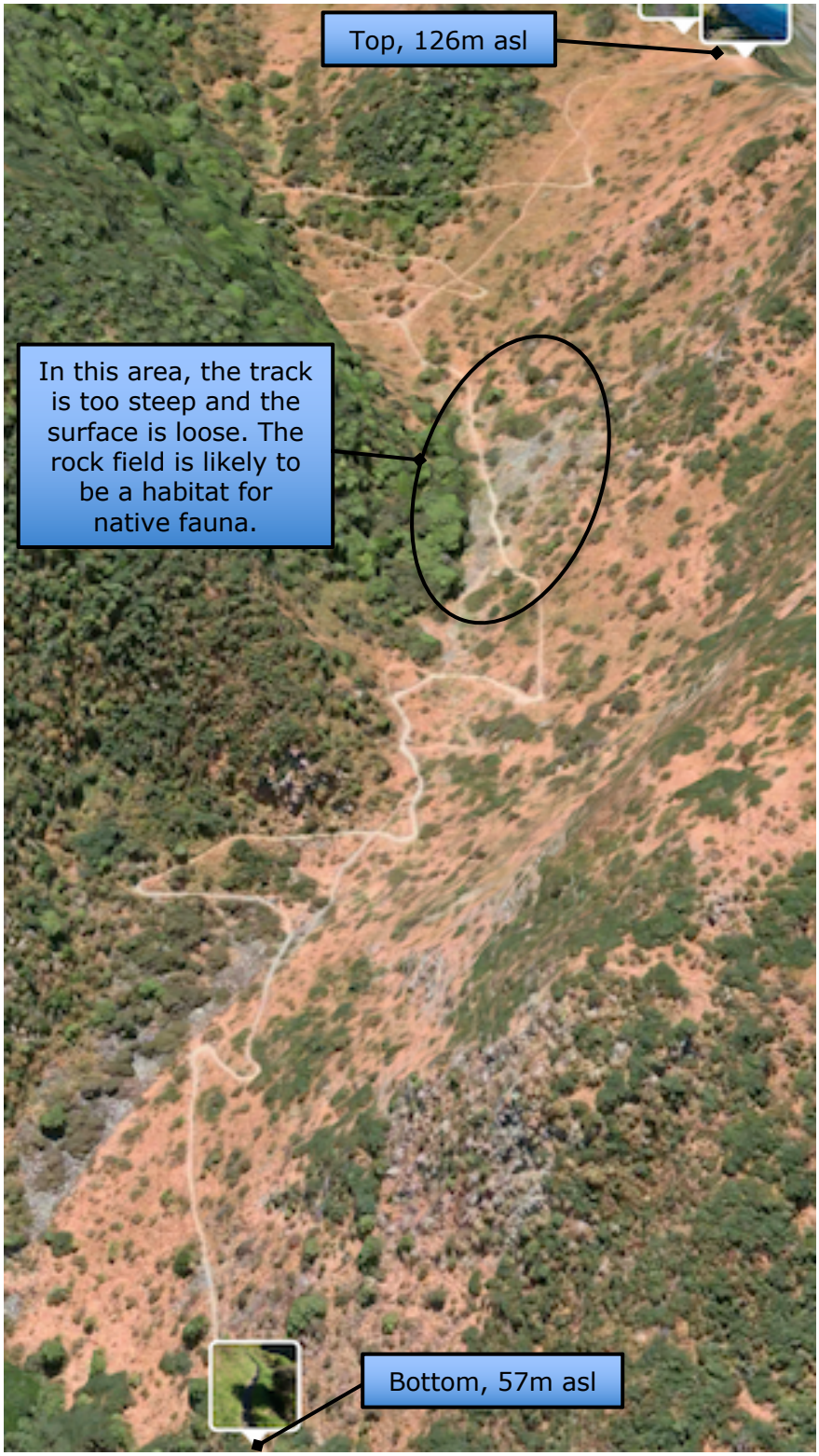
As recommended in the body of the report, Grade 4 is the appropriate grade for the Red Rocks Track even though the calculated average slopes of the bypasses are much less than the Grade maximum (15 degrees). It should be noted that most tracks are significantly less steep than the maximum for their Grade, especially downhill. If Grade 3 were adopted as the target specification for the Red Rocks Track (or indeed Track 18, which would finish in common with it), we consider that target would not be achievable on the current alignment.

In light of all of the above, a bypass is not needed for Steep Section 9. The walking line seems to be adequate and for biking, the current alignment is a good one; it just needs to be improved for the large number of riders the track sees currently and the increase in use it will see as it is marketed more as a regionally significant experience. Work is recommended to:

- increase the width of the rideable surface. In places, the formation is already sufficiently wide – it's the maintained (and actually rideable) surface that is too narrow (the DOC standard provides good guidance on this).
- ease the tightest of the hairpin bends so they all meet the Grade 4 radius specification.
- improve the surface traction in one spot (which is also over steep).

All of this work needs to be done on the entire length of the single track – Steep Section 9 – and right down to the coast. It will require some earthworks but these should not be huge and may be able to be completed by hand. The impact is likely to be low, since there is little significant vegetation, but consideration will be required to manage the impact on open rocky areas likely to harbour lizards (see Figure 93).

Figure 93. An oblique aerial photo showing Steep Section 9. This is an excellent piece of track to ride currently, but it's distinctly Grade 5 and does not meet the specification for its marketed Grade: 3. Realigning is mostly not required to meet the specifications of the recommend Grade: 4.



Environmental Impact

It seems that the nine improvements described in this appendix can be completed with little significant impact. This is because berms are not specified (i.e., should not be provided) and the existing track is used where it provides a good experience. On the other hand, track building involves removing vegetation and earthworks, so the appropriate permissions should be sought, and care taken.

Summary

The combined length of the Red Rocks Track suggested for some form of improvement is 2,575 metres – just over half the current track. Given that Steep Section 9 (650 metres) is slated for improving rather than bypassing, the total length of track to be bypassed is 1,925 metres, although all of this would be retained as alternative line for those who preferred it.

The effect of the recommended works would be the creation of about 2750 metres of new, bypass track. This would add about 620 metres to the overall track length, for bikers, as shown in Figure 94 below. In addition to the new build work, the existing single track below the bottom of Steep Section 8 is suggested for widening and upgrading – that is the 650 metres of Steep Section 9 and the final 700m of track out to the coast.

Figure 94. Table showing the amount of track required to bypass or improve nine steep sections of the Red Rocks Track:

Section name	Current length	Length to improve/ bypass #	Change
Steep Section 1	185	169 (bypass)	-16
Steep Section 2	20	380 (bypass)	170 *
Steep Section 3	195	209 (bypass)	14
Steep Section 4	130	159 (bypass)	29
Steep Section 5	220	215 (bypass)	-5
Steep Section 6	620	711 (bypass) ^	91
Steep Section 7	185	184 (bypass)	-1
Steep Section 8	370	710 (bypass)	340
Steep Section 9	650	650 (improve)	0
Single track below Steep 9	700	700 (improve)	0
Total	2575	4087	622
Length of the Entire Track	4,880m		5,502m

Notes:
** The Steep 2 bypass can possibly be reduced.*
^ There is an option with this bypass to keep using some of the existing track, in which case this figure would be just 360.
 # All of these figures are estimates and require confirmation. They are also subject – some more than others – to deciding what track Grade is desired and what slope will be specified and, in particular, whether uphill or downhill riding will drive the critical slope decisions.