



KALAMUNDA
MOUNTAIN BIKE
NETWORK
TRAIL CONCEPT PLAN

Contents

Prepared by Common Ground Trails Pty Ltd for Department of Biodiversity Conservation and Attractions

Acknowledgements

The authors of this Kalamunda MTB Trail Network Concept Plan respectfully acknowledge that this land on which we live and work is Noongar country, and that the Noongar people are the traditional custodians who have a rich social, spiritual and historical connection to this country, which is as strong today, as it was in the past.

Common Ground Trails wishes to acknowledge the significant contribution of the Project Advisory Group (PAG) as well as the valuable input from, stakeholders, organisation representatives, users and individuals.

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Department of Biodiversity, Conservation and Attractions



Introduction

Project Overview

The Kalamunda Mountain Bike (MTB) network is a well-established and popular recreation facility located approximately 45km from Perth CBD. The network's proximity to Perth CBD makes it a popular destination for weekend, mid-week, post work riders and for school groups.

The existing sanctioned network is located on Department of Biodiversity and Attractions (DBCA) managed land including Beelu National Park and Mundaring State Forest. It comprises of approximately 56km with 48km of single track and caters for a broad range of users from beginner to experienced. The sanctioned network is actively managed by Kalamunda Mountain Bike Collective (KMBC) under an adoption agreement with the land and trail manager DBCA. There are several unsanctioned trails in the area and surrounds. The Munda Biddi Trail and Kattamorda Trail also traverses the network and the Bibbulmun Track passes north of the project area.

Planning Context

The Kalamunda designated MTB recreation area covers part of Beelu National Park and Mundaring State Forest. While no current management plan exists for these parks they will be covered in the soon to be developed Parks of the Darling Range Management Plan.

The trails are located in the Middle Helena Catchment Area, a constituted public drinking water source area and an important and high yielding catchment in close proximity to Mundaring Dam. The Department of Water and Environmental Regulation (DWER) has recognised the area as a "Recreational Area" under processes described in Operational policy 13. DBCA manage the area in accordance with its designation. The project area is defined by the designated "Recreation Area" boundary.

The Perth Peel Mountain Bike Masterplan (2017) identified the existing Kalamunda MTB Network as a key part of the broader, Nationally Significant Perth Hills Precinct.

The existing network is actively managed by the Kalamunda Mountain Bike Collective under a trail adoption agreement with DBCA. The trail adoption agreement outlines the sanctioned trails, the management guidelines and responsibilities for management of the network.

Project Objectives

The objectives of this project are to reinvigorate and enhance the existing MTB trail network providing an accessible and intuitive trail network with improved flow, for a range of rider levels that showcases the unique attributes of the landscape. Providing a suitable alignment for the Kattamorda Walking Tail through the project area is also a key project objective. The concept plan should also consider the existing trailheads and make recommendations for improvements. Overall objectives are outlined below:

- Ensure new trail proposals consider environmental and cultural heritage values and provide a sympathetic fit within the natural landscape.
- Ensure trail development is consistent with best practice planning, design and construction standards.
- Enhance the MTB trail network so that it is suitable for a diverse range of rider levels.
- Improve offering of inclusive trails, specifically trails with access for off-road hand cycles and other mobility equipment
- Ensure the Kattamorda Trail retains a scenic alignment that is connected to its history.
- Consider user group conflict and minimise wherever possible

Scope and Scale

The network currently contains approximately 56km of MTB trails with 48km of singletrack. The concept plan is intended to consolidate, upgrade and expand the existing network (by 10-15%), reducing load on high use trails and better suiting a diverse range of rider levels. A range of trail classifications should be provided broadly aiming for 15% Green, 60% Blue and 25% Black.

The Kattamorda Trail traverses the project area for approximately 6km, the revised alignment of the Kattamorda Trail should aim for a similar distance to ensure the overall Kattamorda Trail and distances between rest points is retained.

Target Market

The primary target market for the Kalamunda MTB Network is leisure, enthusiast, sport and gravity cohorts. These markets are comprised of a diverse mix of trail users, including general cyclists, recreational cyclists and highly skilled technical riders. Trail styles for these target markets will vary from accessible easy trails to purpose designed trails with technical trail features.

Trail types to be incorporated into the network include predominantly cross country (XC) and All Mountain/Enduro and adaptive mountain biking where the terrain is suitable.

Engagement and Consultation

Project Advisory Group

The Project Advisory Group (PAG) comprised representatives from the Department of Biodiversity Conservation and Attractions head office and regional teams, Kalamunda Mountain Bike Collective and Westcycle. The PAG were involved in development of the concept with site visits and workshops undertaken in development of the broad concept. The broad concept and draft concept were presented to the PAG for feedback.

Key stakeholders

Key stakeholders were informed about the project and invited to provide input via email and phone conversations. Key stakeholders involved in the project included:

- Department of Water and Environmental Regulation
- Break the Boundary
- Commercial operators including Calamunnda Camel Farm and Rock n Roll MTB
- Friends of Kattamorda Heritage Trail
- Munda Biddi Trail Foundation
- Water Corporation
- Inter-Agency Collaborative Working Group (DBCA, DWER, Department of Health, DLGSC and Water Corporation).

Consistent themes from consultation included:

- Need to improve and expand on the adaptive MTB opportunities
- Need to resolve user group conflict in sections of the network
- Minimise water crossings where possible, where unavoidable design appropriate to the environment and sensitive to water quality
- Ensure trail network is accessible and intuitive in terms of user flow
- Assessment of trail network access points and trail head facilities is required, including carpark security
- Need to investigate modifications to existing trails to ensure efficiencies in maintenance are maximised
- Regular maintenance needs to become a higher priority
- Crossing points along Mundaring Weir Road need to be carefully considered for safety
- Consider needs of beginner riders particularly around trail head and network access points
- Consider desire for new and more challenging trails for advanced riders
- Investigate opportunity to add more variety into the construction and ride style throughout the network, without losing its current character



Site Assessment

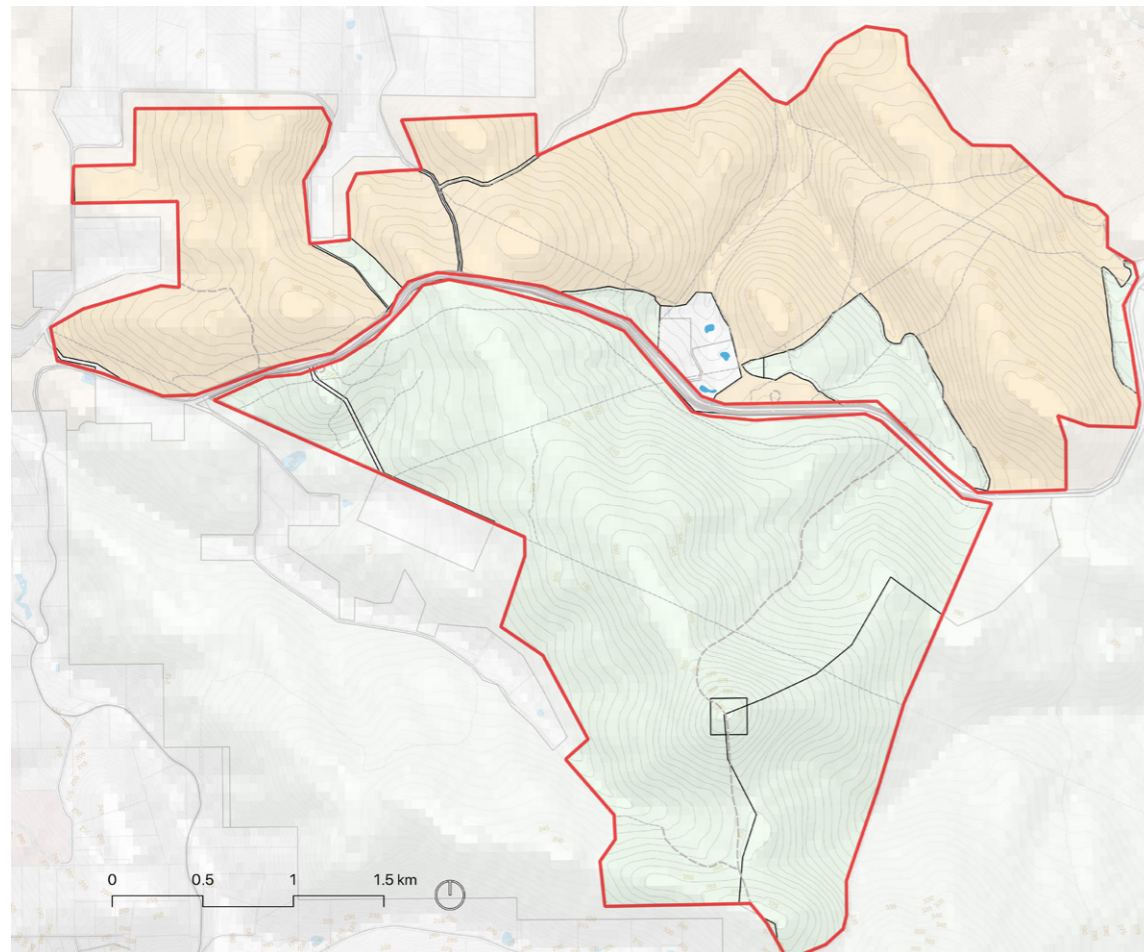
Site assessment undertaken considered the inherent qualities of the landscape such as terrain and vegetation types, existing trails and infrastructure and constraints such as dieback occurrence and threatened and priority species presence. The Kalamunda landscape includes native bushland, valleys and undulating hills covered with a diversity of vegetation interspersed with granite outcrops and stream courses, and historic and cultural landscape elements such as former rail alignments.

Tenure

The project area is within Beelu National Park and Mundaring State Forest managed by the Department of Biodiversity Conservation and Attractions. Parcels of freehold lie within and neighbour the project area, including the Calamunnda Camel Farm which for most riders is considered the primary trailhead for the network.

The Kalamunda MTB trails are located in a constituted public drinking water source area, the Middle Helena Catchment Area, an important and high yielding drinking water catchment in close proximity to Mundaring Dam. DWER has recognised the area as a

“Recreational Area” under Operational Policy 13: Recreation within public drinking water source areas on crown land. Under this policy recreation facilities may be considered as an ‘area’, rather than an individual track or trail. A recreation area recognises where facilities occur within a localised area (e.g. where many tracks and trails occur in proximity) if they are currently managed or should best be managed as one ‘area’. This is the case for the Kalamunda mountain bike area and is consistent with how DBCA manage the area.



Tenure
 National Park
 State Forest
 Freehold

MAP 1 - Kalamunda tenure

Topography & hydrology

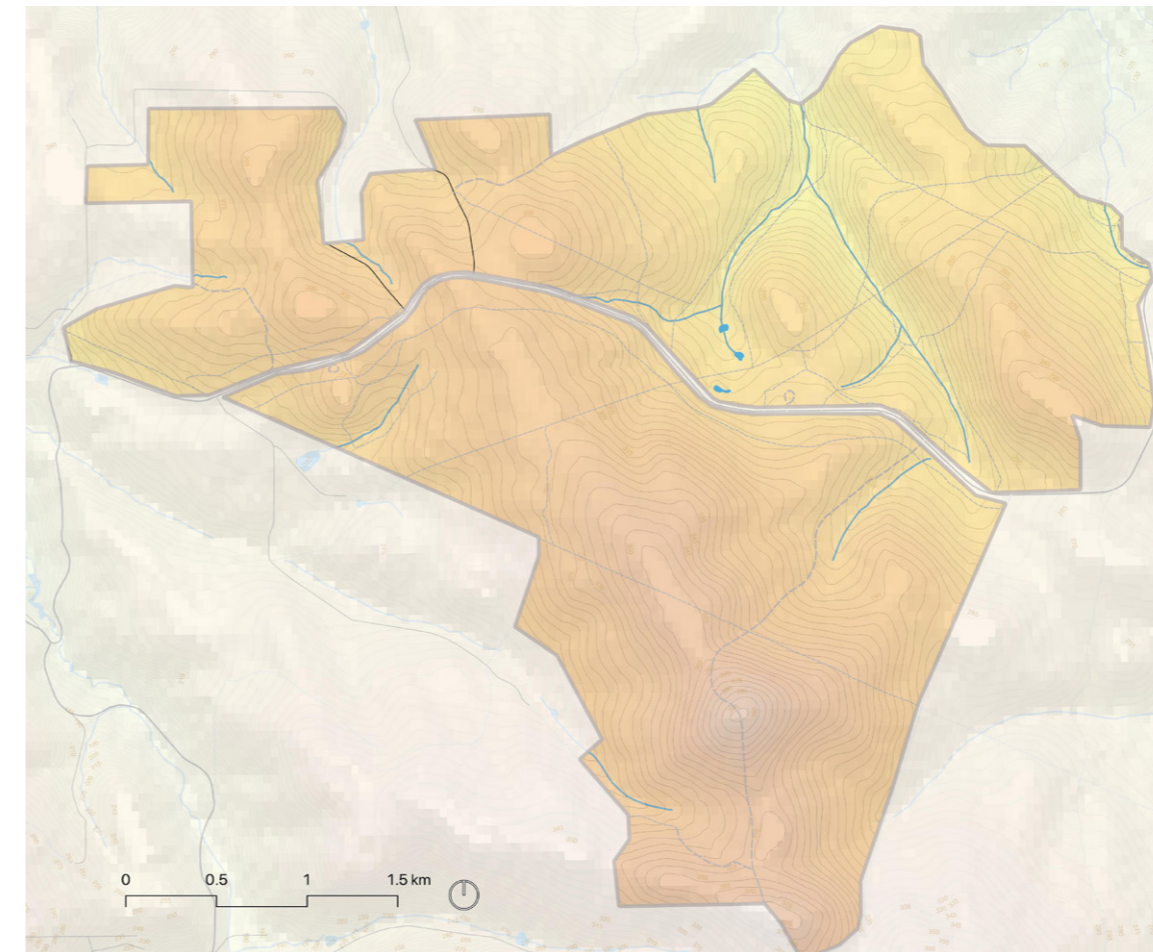
The project area is sited on the western edge of the Darling Plateau, an ancient plateau composed mainly of granite rock with intrusions and capped with laterite. As a result of weathering there are a number of distinct landscapes, namely lateritic uplands, minor valleys, major valleys and scarps.

Mt Gunjin is the highest point within the project area with 150m of change on the northern aspect where the popular gravity trails are located. North of Mundaring Weir Road minor valleys which contain tributaries of the Helena River provide for variety in the landform and changes of up to 105m vertical. A series of spurs and gullies provide for a range of slope gradients, providing good opportunity for

engaging trail with purposeful ascents mixed with exhilarating descents. The varied terrain provides for a range of slope aspects.

The soils are influenced by the granite bedrock and physical geological processes. Within the project area, the soils are highly erodible and are sharply divided into those that are developed on either dolerite or granite.

No major river systems occur within the project area, non-perennial streams which are tributaries of the Helena River flow during winter. Some low lying areas become swampy during winter.



Elevation
 5
 63
 122
 181
 240
 299
 358
 417
 476
 535

MAP 2 - Kalamunda topography

Flora

Most of the project area is covered by jarrah and marri woodland interspersed with grasstrees. Wandoo can be seen in granite areas while blackbutt and flooded gums are found along the valley floors. Spring sees a spectacular display of a wide range of wildflowers

These variances provide opportunity to create a varied trail experience and work towards fostering a greater understanding of the landscape and ecosystem values for visitors, through experience, appreciation and interpretation. A significant number of Threatened and Priority species are found within the National Park. In addition to desk top surveys, field flora surveys are required to identify and assist in avoiding impact.

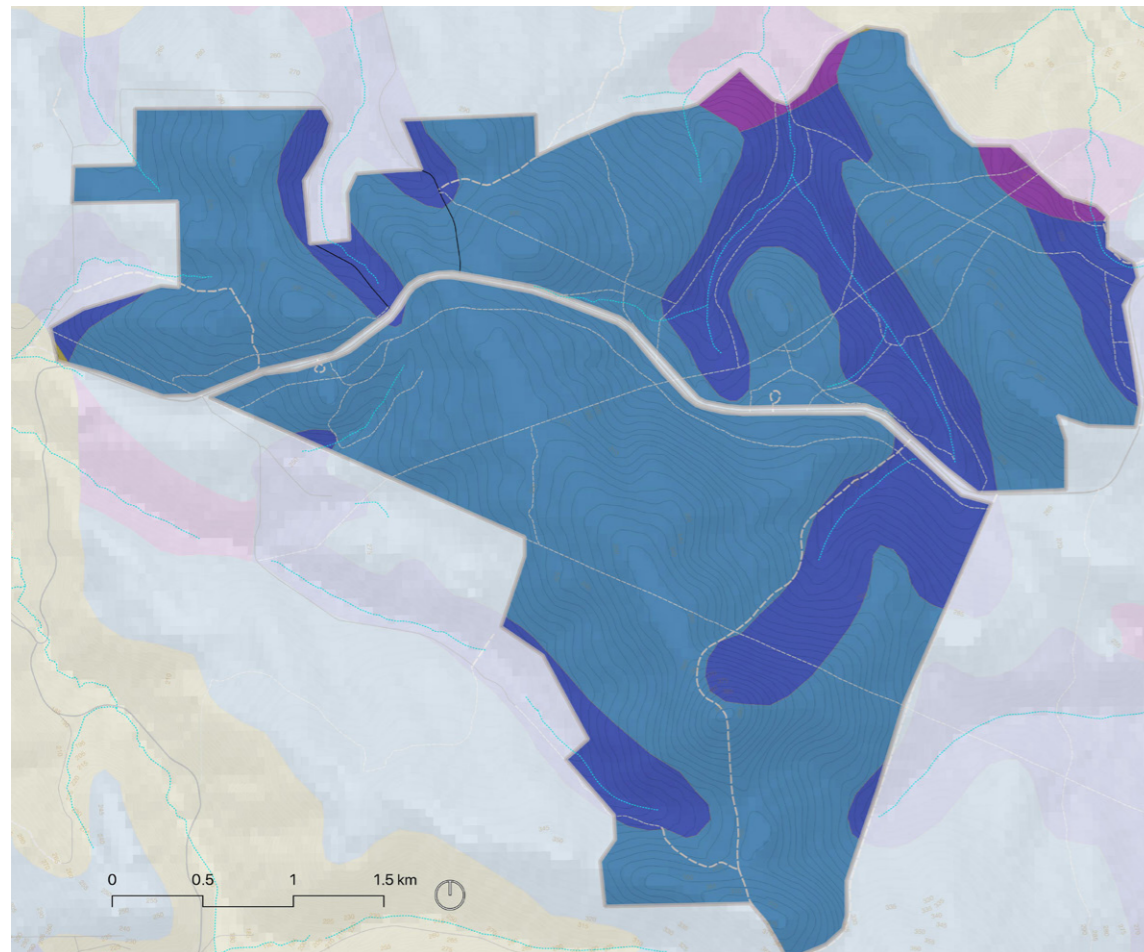
Fauna

Some habitats, such as granite outcrops, wetlands and ecologically mature forest, are types of ecological communities that are significant for the abundance and diversity of flora and fauna habitats they provide. The most visible inhabitants are the birds including the threatened Carnaby's cockatoos, Baudin's cockatoos, western warblers, splendid fairy wrens and grey shrike thrushes. Quendas, western brush wallabies and western grey kangaroos are also found in the project area and surrounds.

The planning area is valuable for fauna conservation due to its size, habitat diversity and continuity with adjoining conservation estate. Design of the trail network will be cognisant of intact areas of habitat and the need to minimise further fragmentation.

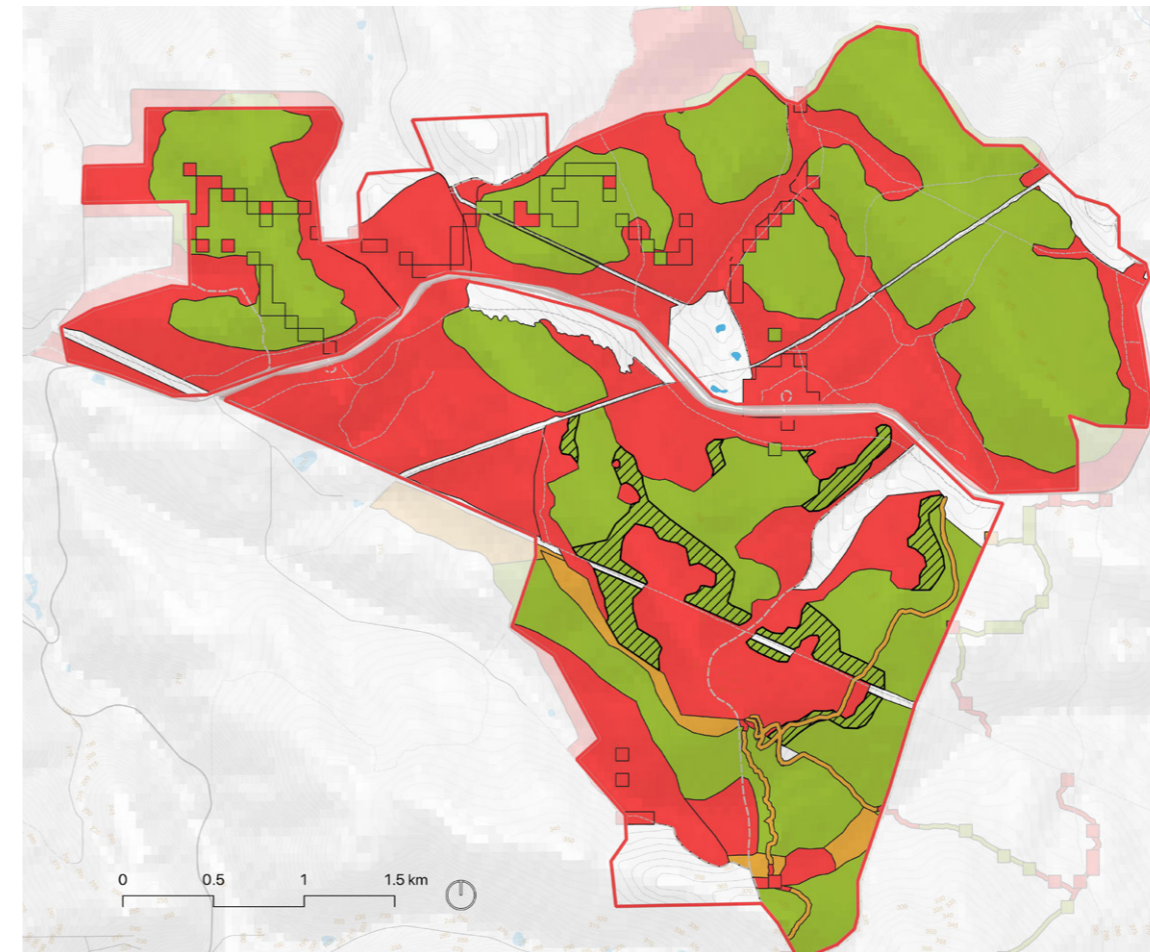
Hygiene (Phytophthora Dieback)

Phytophthora dieback disease, principally *Phytophthora cinnamomi*, is known to occur in the project area. The southern portion of the project area has been thoroughly assessed, with pockets of uninfested forest present. Areas known to be dieback free have been avoided in the development of the trail network concept. Detailed corridor assessments may be undertaken as a next step and the trail realigned where necessary in detailed design.



Vegetation complexes

- Open forest of *Eucalyptus marginata* subsp. *marginata*-*Corymbia calophylla* on lateritic uplands in subhumid and semiarid zones.
- Open forest of *Eucalyptus marginata* subsp. *marginata*-*Corymbia calophylla* on slopes with mixtures of *Eucalyptus patens* and *Eucalyptus megacarpa* on the valley floors in humid and subhumid zones.
- Open forest of *Eucalyptus marginata* subsp. *thalassica*-*Corymbia calophylla*-*Eucalyptus patens* and woodland of *Eucalyptus wandoo* with some *Eucalyptus accedens* on valley slopes to woodland of *Eucalyptus rudis*-*Melaleuca raphiophylla* on the valley floors in semiarid and arid zones.



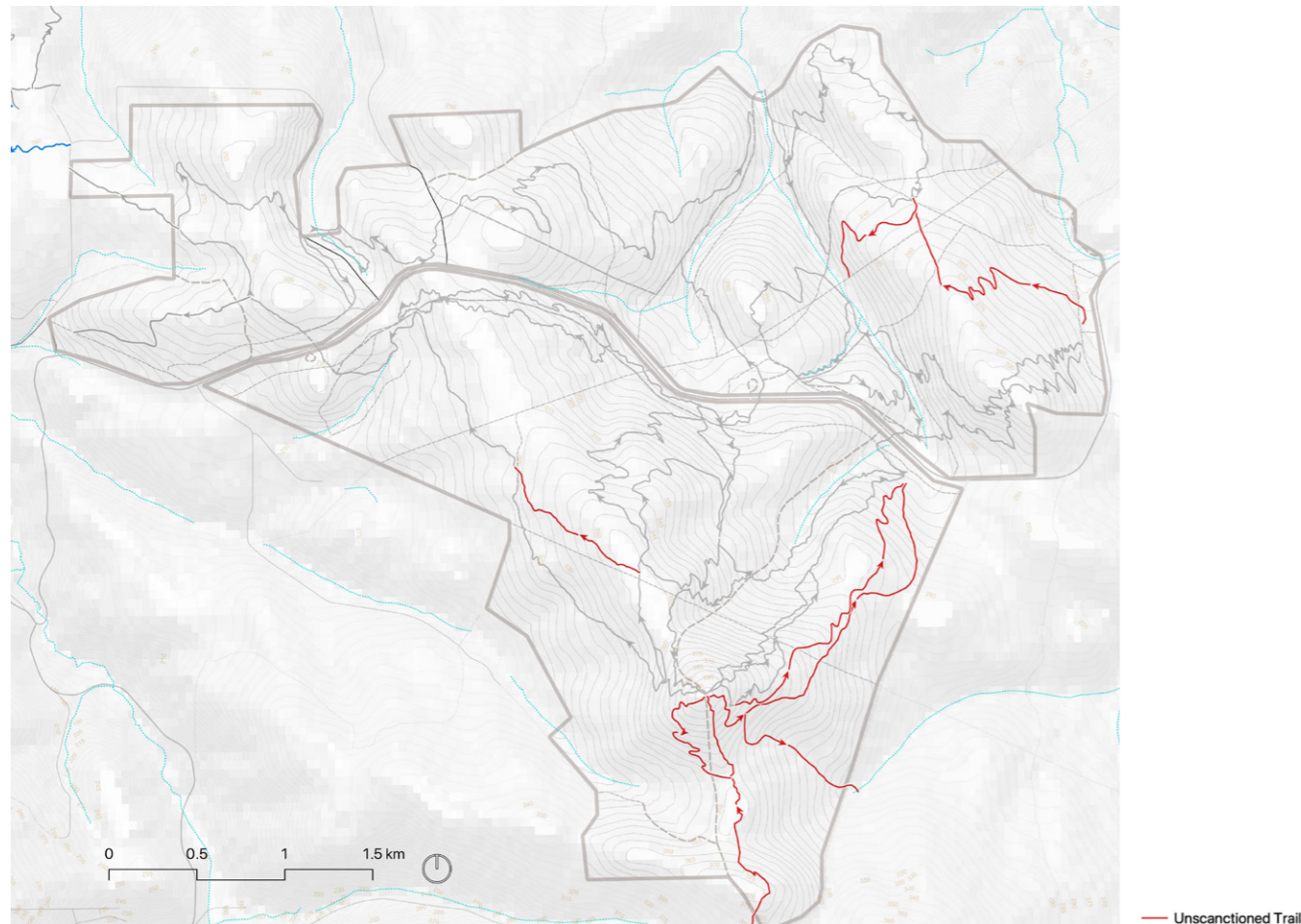
- Infested
- Inferred Uninfested
- ▨ Inferred Unprotectable
- Uninterpretable

MAP 3 - Kalamunda vegetation complexes

MAP 4 - Kalamunda dieback occurrence

Unsanctioned Trails

There are a number of unsanctioned trails within and surrounding the project area. These are primarily gravity and cross country style MTB trails however it is understood that walkers and trail runners also use these trails. Unsanctioned trails within the project area will be assessed and strategically closed and rehabilitated.



MAP 5 - Kalamunda unsanctioned trails

Cultural Values

The project area has many layers of cultural heritage including Aboriginal and European values. The area supported a significant Noongar population prior to European settlement. Part of the Helena River registered site occurs in the project area and corridor assessments may uncover more sites.

European cultural heritage is also rich within the project area with a diverse range of stories and layers from early exploration and industries such as timber and forestry.

There is opportunity in development of the Kattamorda Trail through the project area for interpretation of sites of cultural significance which can assist in maintaining a sense of place and informing visitors about the values of the area. Interpretation infrastructure such as signs should be minimised in remote bush areas. In terms of MTB riders opportunities for interpretation should be focussed at trailheads rather than along trails.

Areas of known significance have been avoided in the development of the trail network concept. For proposed new trails detailed corridor assessments including cultural heritage surveys will be undertaken as a next step and trails realigned where necessary in detailed design.



Existing interpretation sign along the Kattamorda Trail

Existing Trails and Facilities

Context

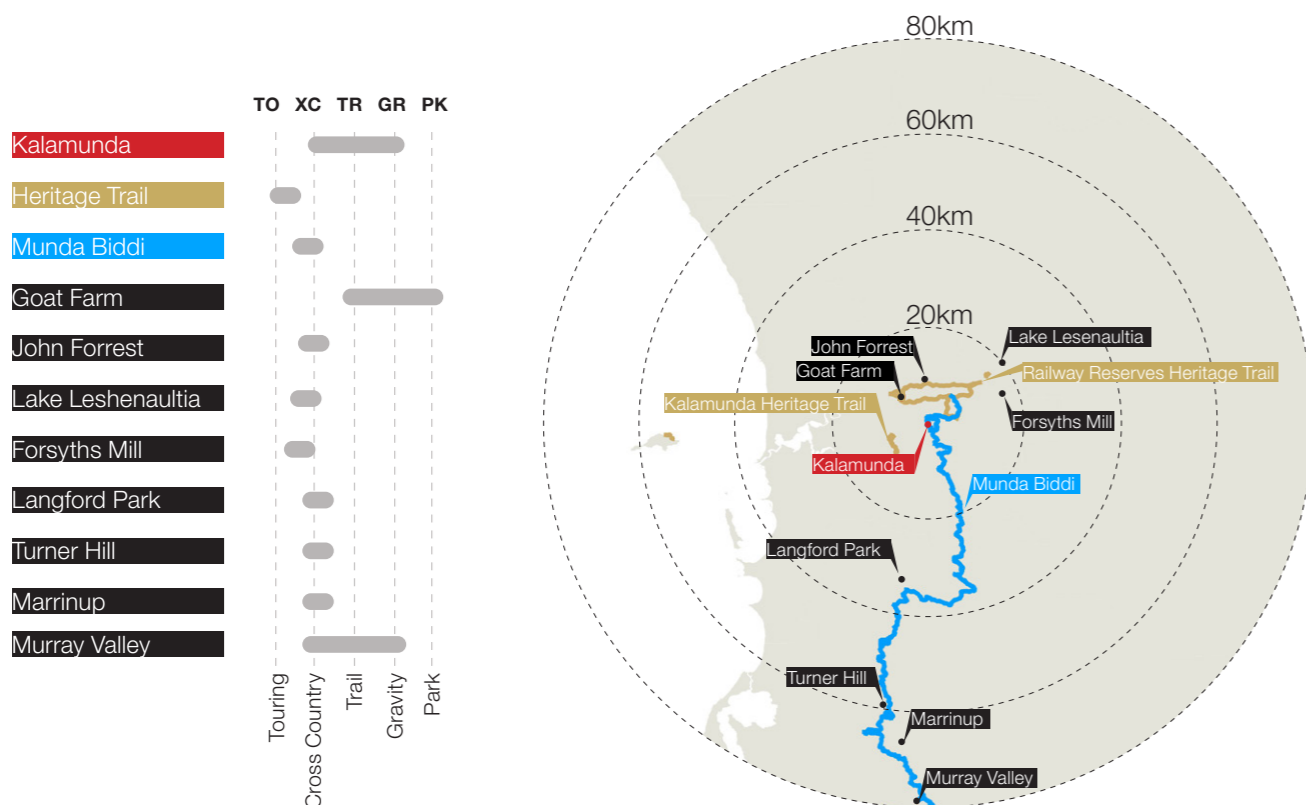
In assessing and developing the Kalamunda MTB Network it is important to consider the broader mountain bike offer. As identified in the Perth and Peel MTB Master Plan the Kalamunda MTB Network is a key part of establishing the Perth Hills as a Nationally significant riding destination. Other MTB networks and trails forming part of the offer which are existing or have planning underway include:

Table 1: MTB networks and trails in the broader region

Trail Network	Length	Trail type	Notes
Goat Farm	22km	Cross Country (XC), Down Hill (DH), Freeride (FR), Park (PK)	Recently upgraded
John Forrest	Approx 35km	Cross Country (XC)	Proposed adventure style trails, concept plan recently developed
Railway Reserves Heritage Trail	41km	Touring (TO)	
Kalamunda Heritage Rail Trail	11km	Touring (TO)	
Kalamunda to Pickering Brook Loop Trail	20km	Cross Country (XC)	
Munda Bididi Trail	1000km	Touring (TO)	

Given the Kalamunda network is located in National Park and State forest lower impact cross country (XC) and trail (TR) style trails are suited, this style of trail is also suited to the terrain on offer within the project area. A focus on XC and TR style will complement the offer at the nearby Goat Farm and the proposed adventure cross country style at John Forrest National Park.

There is potential to link the Kalamunda Network to Kalamunda townsite via MTB trails which would allow riders to access the network via bike rather than vehicle. This link would also provide tourism and economic benefits for Kalamunda.



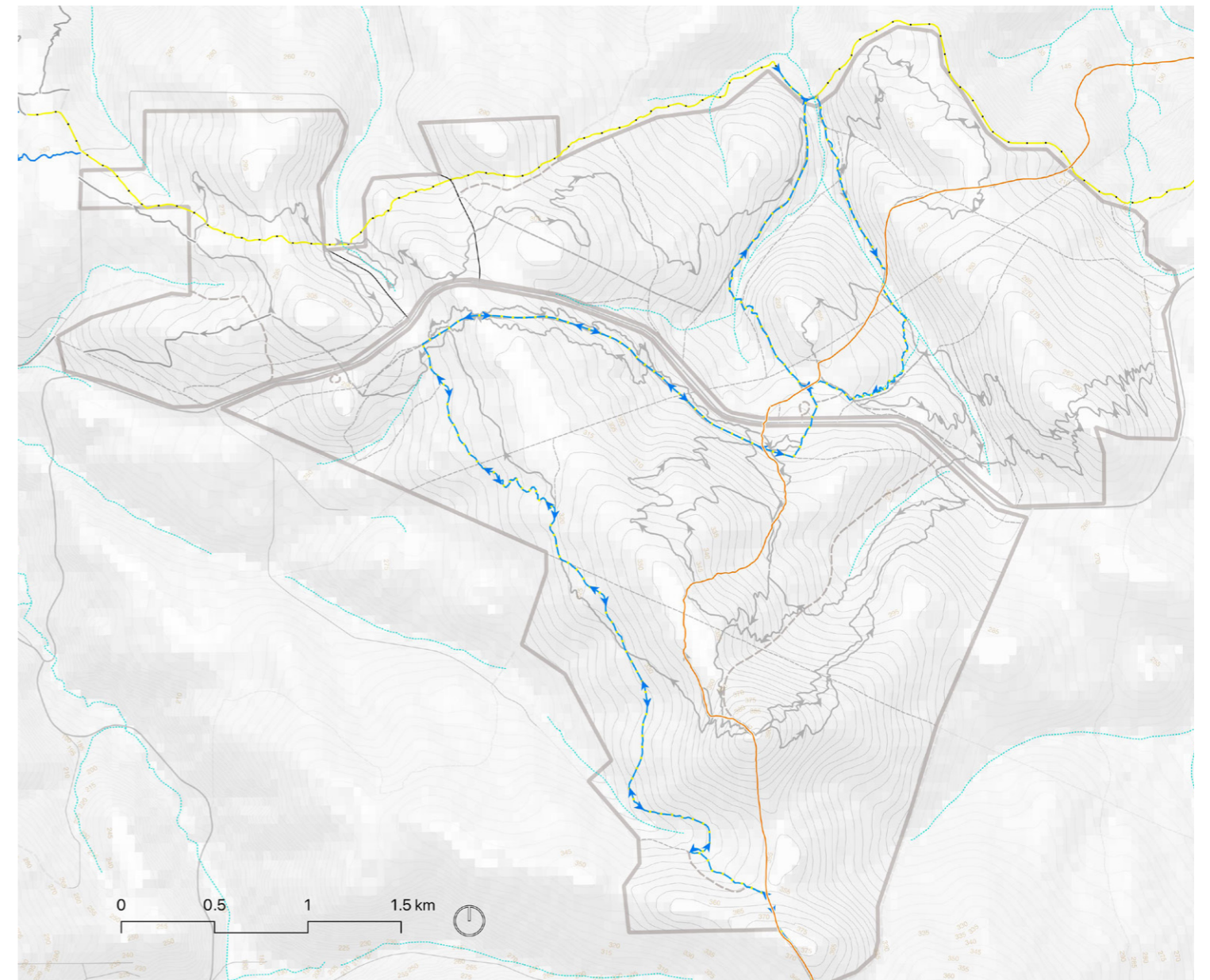
Existing Trails

Munda Bididi Trail

The Munda Bididi provides a connection from the Kalamunda network to Mundaring Weir and Picking Brook and also connects into the recently completed Kalamunda Loop Trail. The Munda Bididi traverses the project area for 12km, the trail splits into single direction north bound and south bound trails north of Mundaring Weir Road and joins again into dual direction south of Mundaring Weir Road. The Munda Bididi uses a combination of purpose designed single track and management/fire roads. Approximately 1.8km of single track Munda Bididi is used as part of the MTB network. Map 6 below locates the Munda Bididi within the project area.

Kattamorda Trail

The Kattamorda Trail forms part of the W.A. Heritage Trails network and was funded by the Australian Commonwealth/State Bicentennial Commemorative Program, in the late 1980s. The trail is a 30km Class 3 walk trail which links Mundaring and Bickley Brook Reservoir. Currently 6km of the trail traverses the project area utilising management/fire roads and some MTB trails. There is an informal rest point located in the picnic area to the West of The Dell trailhead. Map 6 below locates the Kattamorda Trail within the project area.



MAP 6 - Existing Munda Bididi Trail, Bibbulmun Track and Kattamorda Trail alignments

— Munda Bididi — Bibbulmun Track
— Kattamorda

Mountain Bike Trails

The existing Kalamunda MTB Network contains 47.8km of single track and 8km of management vehicle road links which are essential for network function. The Munda Biddi traverses the project area, utilising some of the MTB trails.

The network receives over 100,000 passes per year on the more popular trails, and has been the primary MTB destination for Perth locals for the past 20+ years. While a popular network there is a need for a reinvigoration looking particularly at reducing load on high use trails, improving the experience for all riders and making the most of the topographic features. Assessment of the current network identified the following key issues:

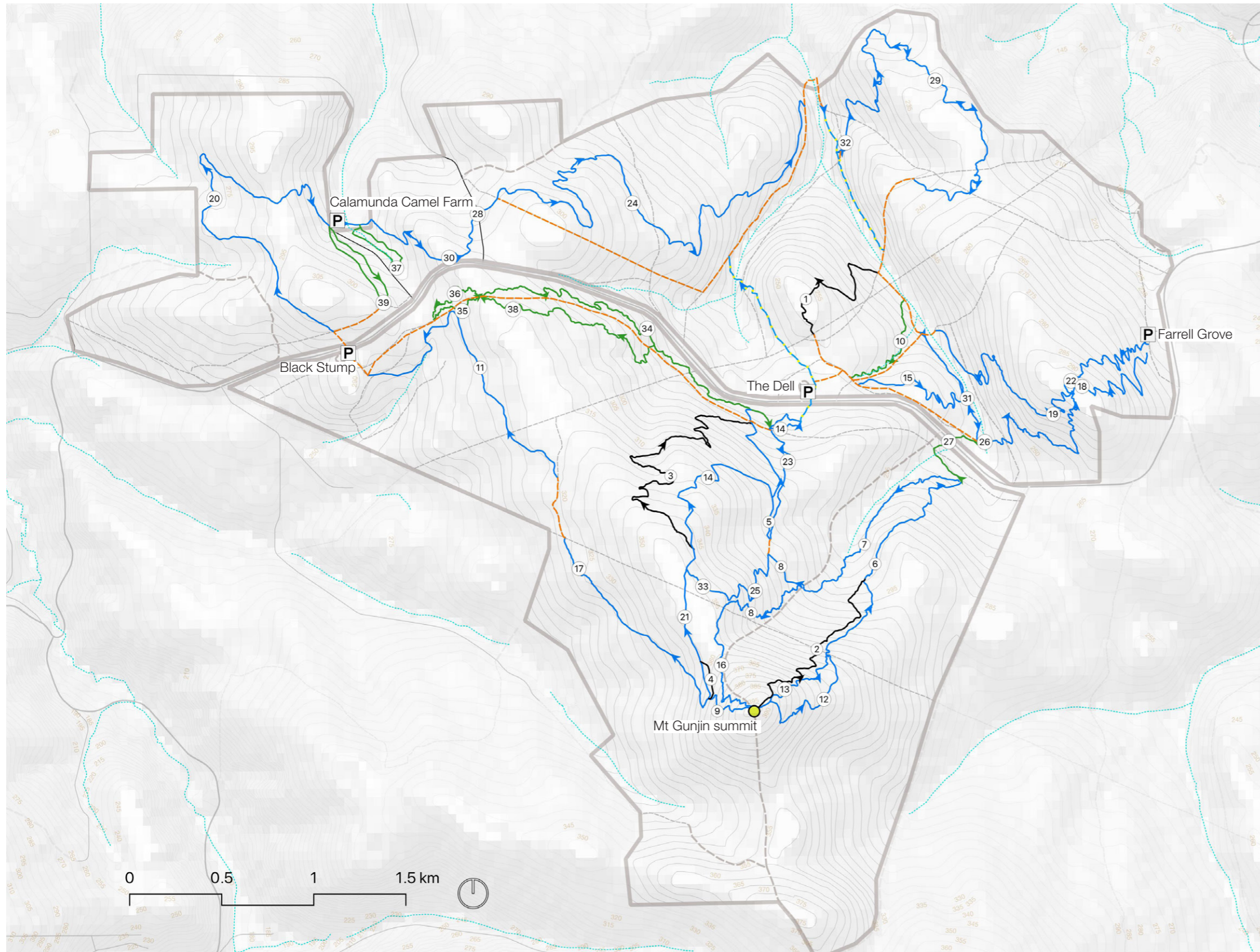
- Signage and wayfinding for riders and vehicles is lacking in some areas
- Trail network is not intuitive to navigate and is missing key connections
- The network has evolved with multiple access points making it unclear for new riders and visitors where to start and resulting in riders parking on edge of roads and in un-designated areas
- The network needs more green/beginner friendly loops that emanate and connect from key access points
- Some trails are poorly designed, with features included not matching the trail ride speed
- Mount Gunjin shuttle function needs review/upgrade in terms of infrastructure provided at the base of Mt Gunjin Road and connection of trails at the base into the broader network
- There are a number of unsanctioned trails with alignment that indicates poor connections and experience within the sanctioned network
- There is a need to consider access to and from the network at the key trailheads (Black Stump, The Dell, Farrell Grove, Calamunnda Camel Farm) and implement measures to resolve conflict between user groups at trailheads
- Crossings of Mundaring Weir road need addressing for safety with a need to slow riders on approach
- A majority of trail terminations occur at road intersections where there are multiple direction options for the rider causing confusion

Walking Trails

The Bibbulmun Track traverses north of the project area and through the Calamunnda Camel Farm trailhead (refer to Map 6). The Kattamorda Trail alignment traverses the project area for approximately 6km, the full Kattamorda Trail extends 30km from Kalamunda linking Mundaring Weir to Bickley Reservoir.

Table 2: Existing MTB trails

ID	Name	Class	Direction	length	Issue/opportunity
1	Lancaster	Difficult		1,004	Realignment of entry/exit to improve rider experience
2	Loco en el Coco	Difficult		1,343	Trail requires some adjustments to make fit for purpose
3	Luvin Shovels	Difficult		2,400	Trail requires some adjustments to make fit for purpose
4	3 Monkeys	Difficult		242	Trail in planning - potential to extend to start at Mt Gunnjin summit
5	Mercury lane	Moderate		239	Good link trail
6	Alchemy	Moderate		1,516	Bottom half doesn't currently make the most of the terrain
7	Brand New Second Hand	Moderate		1,299	Potential to make green with a mellower grade/sections of rest added
8	Drago	Moderate		822	Good technical climb providing a challenging climb option
	Drago	Moderate	Dual	255	Section of Drago linking Brand New Second Hand to Rocky Balboa - critical network link
9	Goldilocks	Moderate		375	Challenging technical trail providing a good filter
10	Highway to Dell	Easy		732	Realignment of entry/exit to improve rider experience
11	Horny Devil	Easy		1,905	Minor works/maintenance required to improve quality of trail, confusing finish on road intersection at Black Stump
12	Judderbars	Moderate		903	Minor works/maintenance required to improve quality of trail
13	Lazarus	Moderate		583	Minor works/maintenance required to improve quality of trail
14	Mercury St	Moderate		1,948	Potential to add black optional features
14	Mercury St	Moderate		179	Small section linking Lost n Found to Munda Biddi
15	Metasoma	Moderate		1,115	Minor works/maintenance required to improve quality of trail, realignment of entry will help to improve rider experience
16	Mother-in-law	Moderate		900	Good technical climb providing a challenging climb option
17	Muffin Tops	Moderate		1,378	Minor works/maintenance required to improve quality of trail
18	Feral Groove	Moderate		1,202	Minor works/maintenance required to improve quality of trail
19	Scorpion	Moderate		1,862	Potential for some black optional features to be included
20	Slippery When Dry	Moderate		2,557	Minor works/maintenance required to improve quality of trail
21	Three Bears	Moderate		745	Minor works/maintenance required to improve quality of trail
22	Up Up And Away	Moderate		1,239	Minor works/maintenance required to improve quality of trail
23	Lost n Found	Moderate		954	Good technical climb providing a challenging climb option
24	Camakazi	Moderate		3,788	Minor works/maintenance required to improve quality of trail
25	Rocky Balboa	Moderate		689	Good technical climb providing a challenging climb option
26	Lube Me Up	Moderate		1,486	Minor works/maintenance required to improve quality of trail
27	Gunjin Scorpion link	Easy	Dual	505	Important link trail
28	Dugite	Moderate	Dual	456	Dual direction is confusing for riders, trail could be improved by making it single direction
29	FJ	Moderate	Dual	2,817	Trail could be improved by making it single direction and extending to finish on single trail rather than road
30	Joeys Line	Moderate	Dual	805	Dual direction is confusing for riders, trail could be improved by making it single direction
31	Creek Trail	Moderate	Dual	690	Important link trail, minor works/maintenance required to improve quality of trail
32	X Files	Moderate	Dual	210	Trail could be improved by making single direction and realignment of entry to improve rider experience
33	Apollo	Moderate	Single	306	Good link trail, minor works/maintenance required to improve quality of trail
34	Flaccid Ashback	Easy		2,426	Good flowy alignment, minor works/maintenance required to improve quality of trail
35	Tangaroo Kick	Easy		402	Realignment of entry/exit to improve rider experience
36	Gottysnobble	Easy		480	Needs some improvements to flow
37	Shake, Rattle n Roll	Easy		750	Good beginner loop
38	Gridlocked	Easy		1,413	Realignment of entry/exit to improve rider experience, minor works/maintenance required to improve quality of trail
39	Camel Train	Easy		1,086	Good beginner loop
	Munda Biddi	N/A		1,798	Munda Biddi single trail that forms apart of the MTB network
TOTAL				47,804	
	Road links			8,824	



MAP 7 - Kalamunda existing MTB trail network

Existing facilities

The Calamunda Camel Farm for most riders is considered the primary trailhead for the network. This freehold property contains a kiosk and is the base for Break the Boundary, Rock n Roll Mountain Biking and KMBC. Other access points include Black Stump, The Dell, Mt Gunjin Shuttle Road and Farrell Grove. Facilities at each site are summarised in the table below.

Trailhead	Current facilities	Considerations
Calamunda Camel Farm	Carpark (up to 200 spaces using adjacent fields), toilets, kiosk, bike hire and repair, tours, clinics, shuttle services	All services are privately owned, concept plan should ensure the network functions without relying on access from the Camel Farm.
Black Stump	Carpark (29 spaces), natural surface pump track	Investigate need for toilet facilities
The Dell	Carpark (29 spaces), toilet	Carpark often at capacity The Friends of Kattamorda have established a rest area/trailhead to the west of the carpark
Gunjin Shuttle Road	Shuttle Road, turn around/drop off at summit	Base of Gunjin Road is used informally as a trailhead, causing significant environmental impacts
Farrell Grove	Carpark (12 spaces), toilets	

Opportunities and Constraints

Assessment of the current network and facilities alongside an analysis of the landscape features enabled a clearer picture of the opportunities and constraints presented in developing the concept plan.

Key constraints identified include:

- Ensuring impacts to the flora, fauna and cultural values are minimised
- New trail proposals avoid areas known to be dieback free and considered protectable
- Minimising watercourse crossings to protect water quality

Key opportunities identified include:

- Improvement to existing trails to make the network flow and suit a diverse range of rider abilities without compromising the existing character of the network
- Potential for an additional descent off Mount Gunjin
- Ensuring Kalamunda provides a complementary offer to the nearby Goat Farm
- Establishing a formal trailhead at the base of Gunjin Road
- Provide additional facilities (parking / toilets) to enhance visitor experience and reduce impact on water quality
- Connecting network to Kalamunda townsite
- Maximise the features in the terrain to provide engaging trail experiences.



Horny Devil trail entry



Black Stump pump track



Mt Gunjin summit trailhead



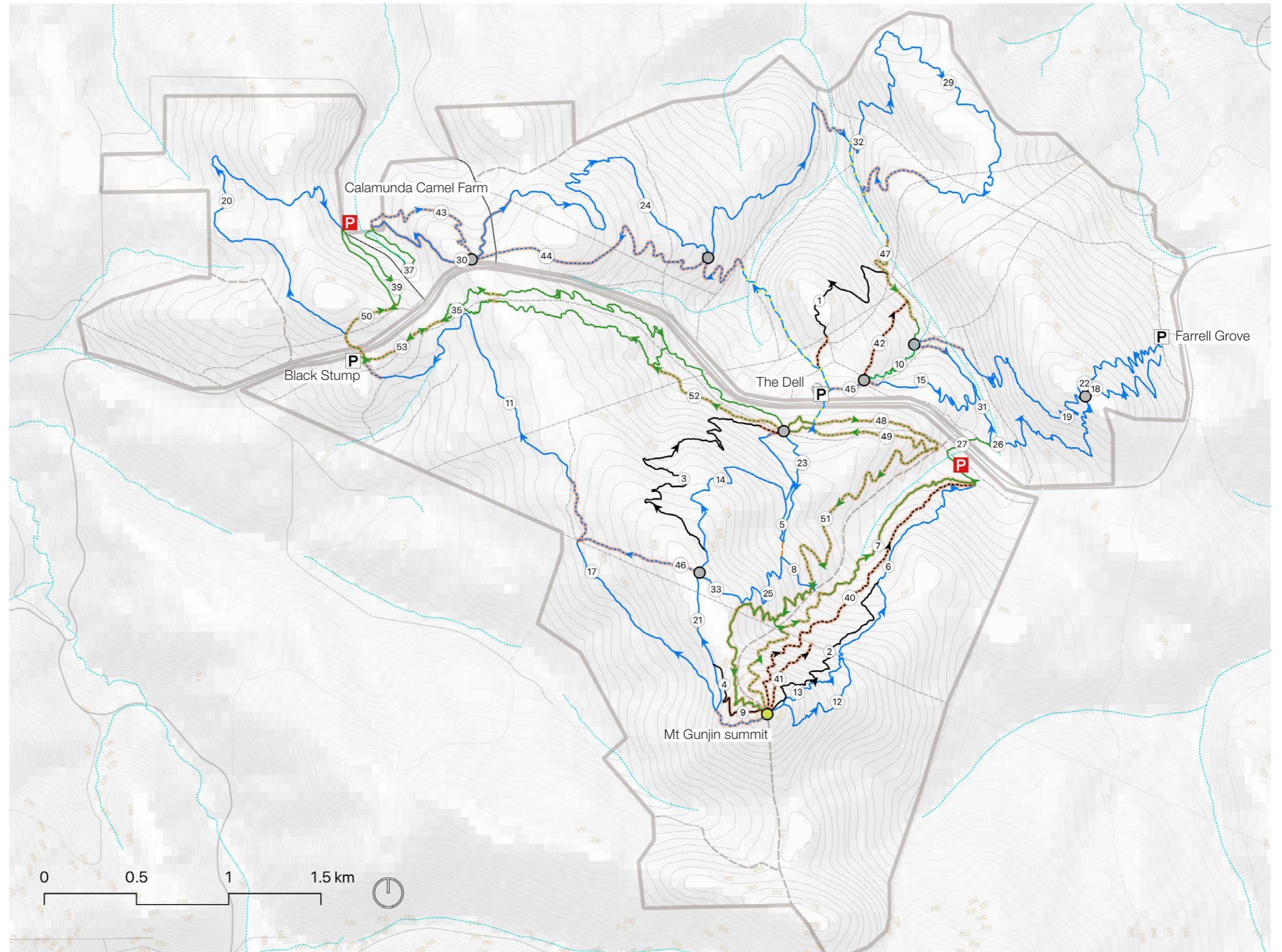
High point on FJ

Kalamunda MTB Network Concept

The Kalamunda MTB Network Concept Plan proposes a series of changes to existing trails with existing single trail to be retained at 45km and 18km of new trail bringing the total MTB Trail network length to 63km. The concept also proposes to formalise a trailhead at the base of Gunjin Road as a key access point for the network. Trail changes and additions are proposed to be in keeping with the overall network Cross Country/All Mountain style and retain the character of the Kalamunda network. Proposals will make the network more intuitive to navigate and provide more opportunities for beginner riders, advanced riders and adaptive cyclists and also providing opportunity for progression. Map 8 and Table 3 outline the proposed trail network.

The Kalamunda MTB trail network adheres to the following best practice principles;

- The network avoids areas of environmental significance, problematic landforms, and is generally sympathetic to the landscape and viewsheds
- Trails are aligned and designed to minimise impacts on water quality
- Where possible the trail network connects users with the natural environment and it's features
- Trail alignments are engaging and purposeful in their alignment and feature inclusion
- The trail system places the easiest trails closest to the trail heads and more difficult trails are progressively reached
- All trails are designed to be optimised for their intended user
- The overall system is accessible, intuitive and easy to navigate with pinch points and link trails strategically placed
- Road crossings have been kept to a minimum to allow for an improved experience while still catering for emergency access.
- Provides a range of trail options suitable for hand cycle and other mobility equipment use



MAP 8 - Kalamunda proposed MTB trail network

Kalamunda MTB trails

- Existing Black
- Existing Blue
- Existing Green
- Road Link
- Modified existing Black
- Modified existing Blue
- Modified existing Green
- - - New Black
- - - New Blue
- - - New Green

Proposed Trailheads

- P** Primary
- P** Secondary
- Secondary without parking
- Node

Table 3: Proposed MTB Trails

ID	Name	Current Class	New Class	Current Direction	New direction	Current length	Retained length	New Trail Length	Total Trail length	Adaptive suitable	Proposed works
1	Lancaster	Difficult	Difficult	Single	Single	1,004	943	190	1,133		New start from Munda Biddi single trail and end at new catch trail (Trail 47)
2	Loco en el Coco	Difficult	Difficult	Single	Single	1,343	1,343		1,343		Refine trail alignment to match rider speed to TTFs
3	Luvín Shovels	Difficult	Difficult	Single	Single	2,400	2,335	100	2,435		Divert end to link into Mercury St and proposed Dell node, refine trail alignment to match rider speed to TTFs
4	3 Monkeys	Difficult	Difficult	Single	Single	242	235		235		No significant change proposed
5	Mercury St link	Moderate	Moderate	Single	Single	239	239		239		No significant change proposed
6	Alchemy	Moderate	Moderate	Single	Single	1,516	1,516		1,516		Realign bottom half to make the most of the terrain, refine TTFs
7	Brand New Second Hand	Moderate	Easy	Single	Single	1,299	1,250	1,101	2,351		Upgrade Brand New Second Hand to Easy descent starting from Mt Gunjin summit
8	Drago	Moderate	Easy	Single	Single	822	794	606	1,400		Repurpose Drago to Easy Climb with Moderate optional lines which shortcut switchbacks and contain challenging TTFs
8	Drago	Moderate	Moderate	Dual	Dual	255	255		255		Section of Drago to remain Moderate, links Rocky Balboa to proposed Easy Climb
9	Goldilocks	Moderate	Difficult	Single	Single	375	369		369		Upgrade to Difficult and link into Three Monkeys
10	Highway to Dell	Moderate	Easy	Single	Single	732	624		624		Shorten to link into new catch trail (Trail 47)
11	Horny Devil	Moderate	Moderate	Single	Single	1,905	1,905	516	2,421		Add 377m at start to link from Muffin Tops and 139m at end to link into Black Stump off road. Also potential at future date to repurpose last 741m of end to Green with Blue optional lines to complete the Easy stacked loops between Black Stump and Gunjin Base
12	Judderbars	Moderate	Moderate	Single	Single	903	903		903		Realign entry to start at Mt Gunjin summit
13	Lazarus	Moderate	Moderate	Single	Single	583	582		582		No significant change proposed - minor works/maintenance to improve flow
14	Mercury St	Moderate	Moderate	Single	Single	2,127	1,784	74	1,858		Divert end to link into proposed trail node and repurpose last 137m to Easy linking into new trail from Gunjin Base. Consider addition of Difficult classified optional features
15	Metasoma	Moderate	Moderate	Single	Single	1,115	1,115	80	1,195		Create new start from the proposed trail node
16	Mother-in-law	Moderate	Easy	Single	Single	900	900	400	1,300		Repurpose to Easy Climb with Moderate optional lines which shortcut switchbacks and contain challenging TTFs
17	Muffin Tops	Moderate	Moderate	Single	Single	1,378	1,378		1,378		Consider addition of Difficult classified optional features
18	Feral Groove	Moderate	Moderate	Single	Single	1,202	1,202		1,202		No significant change proposed
19	Scorpion	Moderate	Moderate	Single	Single	1,862	1,719	289	2,008		Realign bottom section to link into proposed trail node, add some optional Difficult TTFs where appropriate
20	Slippery When Dry	Moderate	Moderate	Single	Single	2,557	2,557		2,557		No significant change proposed
21	Three Bears	Moderate	Moderate	Single	Single	745	745	395	1,140		Extend to start from Gunjin summit
22	Up Up And Away	Moderate	Moderate	Single	Single	1,239	1,239		1,239		No significant change proposed
23	Lost n Found	Moderate	Moderate	Single	Single	954	720		720		Repurpose bottom 234m to Easy
24	Camakazi	Moderate	Moderate	Single	Single	3,788	3,788	250	4,038		Extend end across creek with new bridge to link into Munda Biddi single trail
25	Rocky Balboa	Moderate	Moderate	Single	Single	689	689		689		No significant change proposed
26	Lube Me Up	Moderate	Moderate	Single	Single	1,486	1,486		1,486		No significant change proposed
27	Gunjin Scorpion link	Moderate	Moderate	Dual	Dual	505	505		505		Improve to ensure connections to proposed trailhead at Gunjin Base are logical
28	Dugite	Moderate	Moderate	Dual	Single	456	456		456		Retain as Moderate make single direction descent
29	FJ	Moderate	Moderate	Dual	Single	2,817	2,817	785	3,602		Make single direction and extend to link into Munda Biddi single Trail
30	Joeys Line	Moderate	Moderate	Dual	Single	805	805		805	Yes	Retain as Moderate make single direction descent
31	Creek Trail	Moderate	Moderate	Dual	Dual	690	690	182	872		Realign western end to link into proposed trail node
32	X Files	Moderate	Moderate	Dual	Single	210	210	39	249		Make single direction and create new start point off Munda Biddi single trail
33	Apollo	Moderate	Moderate	Single	Single	306	306		306		No significant change proposed
34	Flaccid Ashback	Easy	Easy	Single	Single	2,426	2,403		2,403	Yes	Close first section to link into Gottysnobble rather than road
35	Tangaroo Kick	Easy	Easy	Single	Single	402	201	55	256	Yes	Reverse direction and divert each end into Horny Devil and Gridlocked
36	Gottysnobble	Easy	Easy	Single	Single	480	448		448	Yes	Reverse direction and link to Flaccid Ashback
37	Shake, Rattle n Roll	Easy	Easy	Single	Single	750	750		750	Yes	No significant change proposed
38	Gridlocked	Easy	Easy	Single	Single	1,413	1,391		1,391	Yes	Close last little bit to link to proposed link into Tangaroo Kick
39	Camel Train	Easy	Easy	Single	Single	1,086	1,086		1,086	Yes	No significant change proposed
	Munda Biddi	N/A	N/A	Single	Single	1,798	1,798		1,798		Minor change to utilise Trail 47 to get to Highway to Dell. Section of proposed dual use with Kattamorda alignment on south side of Mt Gunjin

Table 3: Proposed MTB Trails continued

ID	Name	Current Class	New Class	Current Direction	New direction	Current length	Retained length	New Trail Length	Total Trail length	Adaptive suitable	Proposed works
40	Trail 40		Difficult		Single			2,034	2,034		New Difficult descent
41	Trail 41		Difficult		Single			569	569		Coaching trail with push up track in same corridor
42	Trail 42		Difficult		Single			512	512		New Difficult descent sessionable with Highway to Dell
43	Trail 43		Moderate		Single			971	971	Yes	New trail link from Camel farm to Dugite to enable Joeys line and Dugite to be single direction
44	Trail 44		Moderate		Single			2,301	2,301	Yes	New trail to get riders back to the Camel Farm from the Dell
45	Trail 45		Moderate		Dual			209	209		New dual direction link from Dell to Highway to Dell and Metasoma
46	Trail 46		Moderate		Single			691	691		New Apollo to Horny Devil Link
47	Trail 47		Moderate		Single			600	600		New Moderate catch trail to get riders off road
48	Trail 48		Easy		Single		179	754	933	Yes	New Dell to Gunjin Base, utilising last 179m of Mercury St
49	Trail 49		Easy		Single		234	793	1,027	Yes	New Gunjin Base to Dell, utilising last 234m of Lost n Found
50	Trail 50		Easy		Dual			455	455	Yes	New Black Stump to Camel Train dual direction trail
51	Trail 51		Easy		Single			1,602	1,602		New Easy Climb linking Gunjin Base to Drago
52	Trail 52		Easy		Single			833	833		New link from proposed Trail node to Gridlocked
53	Trail 53		Easy		Dual			566	566	Yes	New dual direction link from Black Stump to Gottysnobble and Tangaroo Kick
						47,804	47,073	17,331	64,970		
Kattamorda Trail (walk)		Grade 3	Grade 3	Dual	Dual	6,105	6,217	713	6,930	Proposed to use 901m of former Munda Biddi Touring route and 2,500m shared with Munda Biddi	

Trail Network overview

Beginner Riders

For beginner riders the revised network will offer an additional 8.9km of green trail which will link the proposed Gunjin Base trailhead, Black Stump and the Camel Farm, via a series of loops which will enable riders to tailor the length of ride to their desire. It is also proposed to build a new green climbing trail from the base of Mt Gunjin on the west side of Gunjin Road up to Drago. Drago and Mother in Law are proposed to be repurposed to green climbs to enable green riders to access the top of Mt Gunjin. This repurposing will involve lowering the average gradient and ensuring technical trail features are in line with green classification. The addition of a green gravity style trail will enable beginner riders to progress and advance their skills.

Intermediate Riders

For intermediate riders the revised network will offer an additional 7.4km of blue trail which will fill the identified missing links in the network and take riders off of management roads significantly improving the riding experience. Key improvements include:

- Linking X-files and FJ away from roads,
- A new climb from the Munda Biddi to Dugite to enable riders to get back to the Camel Farm without crossing Mundaring Weir Road,
- A new climb from the Camel Farm to Dugite enabling Joey's Line and Dugite to become single direction and also opening up a shorter blue loop from the Camel Farm
- A new connection from Apollo to Horny Devil (off road and unsanctioned trail) enabling riders to bail on climbing to the top of Mount Gunjin if returning to The Dell or Camel Farm
- A new short descent from the top of Mount Gunjin linking directly into Muffin Tops and Three Bears

Advanced Riders

For advanced riders in addition to the overall network function and flow improvements outlined for intermediate riders the revised network offers 4.2km of additional black trail including:

- A full descent top to bottom of Mount Gunjin,
- A new coaching trail from the top of Mount Gunjin to the powerline with a push-up track adjacent to allow riders to session individual features and coaching clinics space to demonstrate technique.
- A repurposing of Goldilocks to black classification to link into 3 Monkeys,
- An additional descent parallel Highway to Dell

It is also proposed to add black optional features on blue classified trails including Mercury St, Muffin Tops and Scorpion.

Adaptive riders

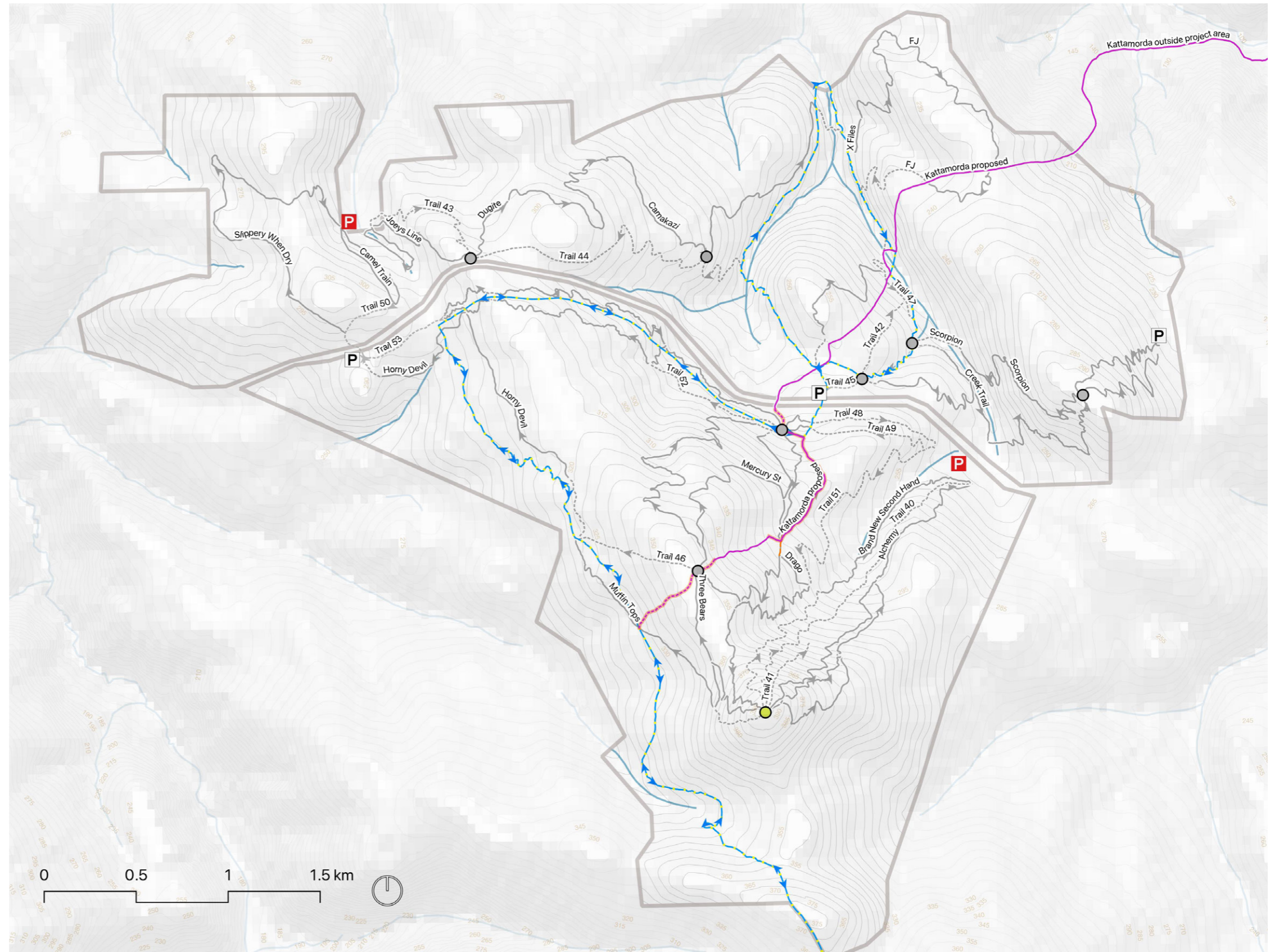
It is proposed that the easy trails linking the Camel Farm to Gunjin Base be designed and constructed to be fully accessible for adaptive bikes, this loop will allow for a range of distance options for beginner adaptive cyclists and also has potential to be shuttled with riders starting at Black Stump and getting picked up from Gunjin Base. A longer loop utilising the Munda Biddi and Trail 44 will enable more advanced adaptive riders to return to Camel Farm/ Black Stump. The short moderate loop out of the Camel Farm using Trail 43 and Joey's Line will also be made adaptive suitable. It is also proposed that the whole network be audited, and each trail signposted indicating its adaptive rating. DBCA in consultation with Break the Boundary could also investigate maintaining a selection of fire/management roads close to the Camel Farm/Black Stump so that these could be used for beginner adaptive riders new to the sport.

Munda Biddi Trail

The Munda Biddi Trail remains largely unchanged, the route will use Trail 47 to get to Highway to Dell and it is proposed that 2.5km on the south side of Mt Gunjin is shared use with the Kattamorda Trail . A few short sections of single track form a critical component of the mountain bike network. It may be that once proposed new trails are constructed that the DBCA choose to realign the Munda Biddi route off of management roads utilising these new trails This is TBD at the discretion of DBCA in consultation with the Munda Biddi Trail Foundation (MBTF).

Kattamorda Trail

The proposed Kattamorda Trail alignment will remain unchanged north of Mundaring Weir Road aside from a small diversion to the proposed bridge, to retain connection to the historic railway alignment. From the Kattamorda trailhead west of the Dell the trail will then be realigned to make use of the former Munda Biddi Touring Route which is an existing trail that no longer has a designated use. The proposed alignment then rejoins the existing Kattamorda before descending the southern face of the spur on a new dedicated Kattamorda Trail that will take hikers and trail runners off of MTB trails. The proposed alignment then joins the Munda Biddi Trail to head south of the project area and rejoin the existing Kattamorda Trail. The proposed improvements will ensure adequate separation of hikers/trail runners and mountain bikers, with crossing points located strategically at trail nodes where riders will be slowing down or stopped. The proposed new Kattamorda alignment will be 7km within the project area.



MAP 9 - Kalamunda proposed Munda Biddi Trail and Kattamorda Trail

Infrastructure

A range of infrastructure is required to ensure the proposed trails are accessible, safe and enjoyable.

Most important is the trail head which fulfils a number of important functions:

- Is visible and a safe place to leave a vehicle.
- Provides needs of trail users – water, toilets, bins, information and car parking
- Bike Maintenance facilities
- Encourages social interaction as the primary meeting place and finishing point for users.
- Promotes positive use of the site through additional infrastructure such as seating, shelters, landscaping
- Is easily accessible and promoted to suit visitors of all mobility
- Provides all of the necessary trail information to plan a ride through good signage and also considers inclusion of interpretation signage.

The network has been designed around a series of trailheads each with a different level of service and providing access to different sections of the network. It is proposed that the Calamunda Camel Farm and Gunjin Base trailheads be presented as the primary trailheads with Black Stump, The Dell and Farrell Grove as secondary trailheads. Establishing Gunjin Base as a primary access point will ensure that the network is accessible and functional for all riders in the case that the Calamunda Camel Farm no longer supports rider access. From each of the primary trailheads there are beginner friendly loops and trails linking intermediate and advanced riders to the broader network. It is recommended that a detailed investigation into car parking capacity requirements be undertaken to determine number of carpark spaces required to meet demand and number of spaces that can be accommodated at each of the existing and proposed trailheads. An estimate of the number of spaces that could be accommodated in the space available has been provided in Table 4.

Trail nodes have been identified where there are critical intersections or where there is a convergence of several trails requiring a decision from trail users. Seven Trail Nodes have been identified in the network and should have a small network map provided alongside directional signage.

Table 4: Proposed infrastructure at trailheads

Trailhead	Type	Existing infrastructure	Proposed infrastructure
Calamunda Camel Farm	Primary	Carpark (up to 200 spaces using adjacent fields), toilets, café, bike hire and repair, tours, clinics, shuttle services, network map	At discretion of property owner
Gunjin Base	Primary		Carpark (100-150 spaces), toilets, shuttle services, network map. (café, bike hire and repair, tours, clinics in future)
Black Stump	Secondary	Carpark (29 spaces), natural surface pump track, network map	Toilet, increased carpark capacity (approx. additional 10 spaces) upgraded pump track
The Dell	Secondary	Carpark (29 spaces), toilet, network map	
Farrell Grove	Secondary	Carpark (12 spaces), toilets, network map	Increase carpark capacity (approx. additional 12 spaces)
Gunjin Summit	Secondary	Shuttle Road, turn around/ drop off at summit, network map	
Trail nodes (seven separate)	Node		Network map



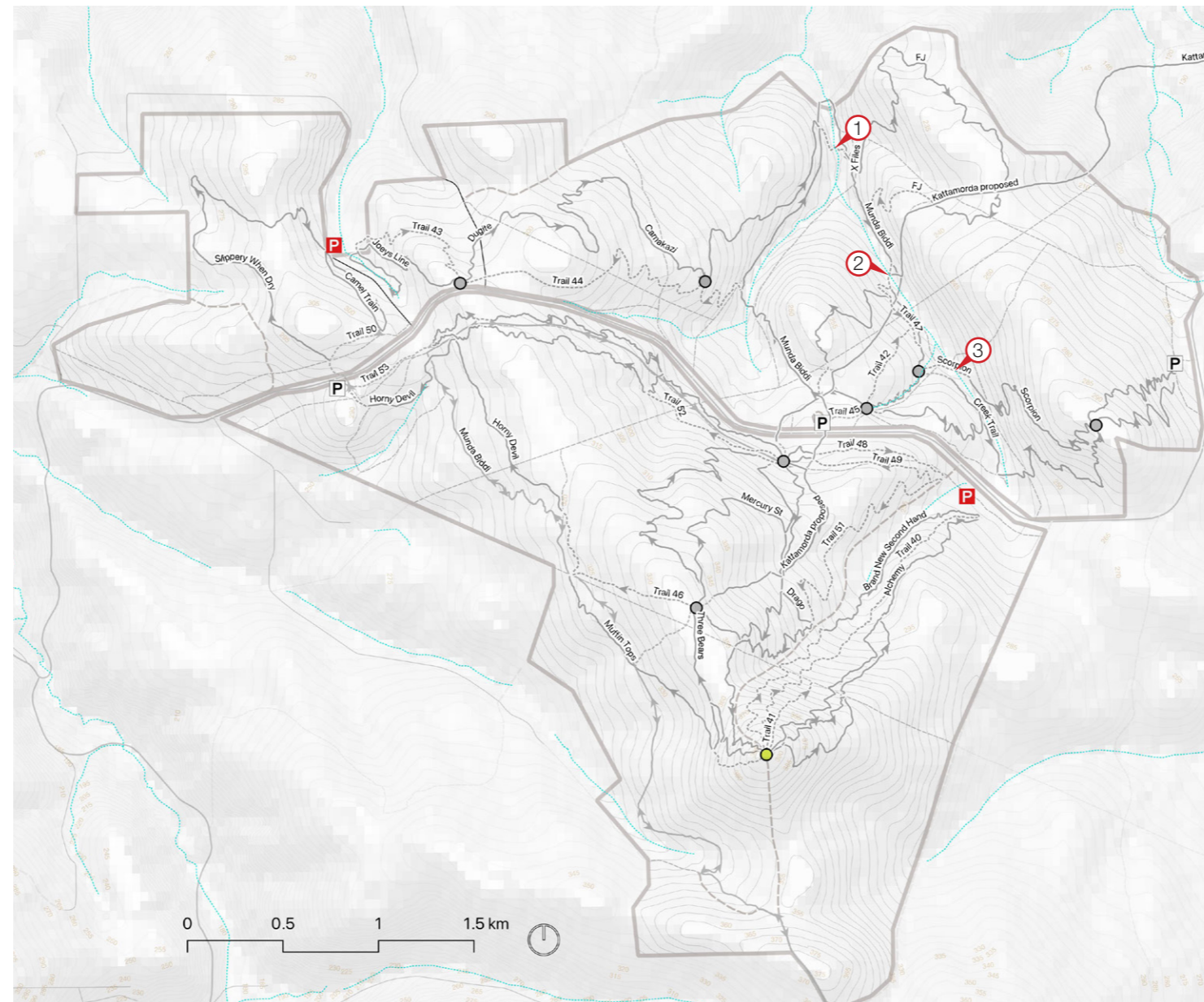
Existing Trailhead sign at Black Stump

Bridges

Crossing of watercourses have been minimised, three proposed formal crossings of the main gully north of Mundaring Weir Road are proposed. These crossings will ensure riders and walkers/runners are able to cross the gully in winter without having to pass through water as they do currently. DBCA kit bridge is the recommended design. The proposed bridge in the middle will be used by Kattamorda walkers/runners as well as riders. Refer to Map 10 for bridge locations.



DBCA Kit Bridge
Kalamunda Mountain Bike Network | Trail Concept Plan



MAP 10 - Proposed bridge locations

Events

Noting its location within PDWSA the number and scale of events needs to be carefully considered and assessed under Department of Water and Environmental Regulation's Operational policy 13: Recreation within PDWSA on crown land. There are currently 2 events held using the network:

1. Perth MTB Club - XC event held annually, participant numbers have averaged around 200 over the past 10+ years
2. Kalamunda 50 - XC event held annually, participant numbers are capped at 500 with registrations selling out quickly once released.

It is the presence of humans (and the pathogens they carry) that is the greatest risk to water quality and public health in PDWSA. Increasing the number of people in these areas does increase risks however there are some strategies to reduce potential impacts on water quality and on the trails themselves include:

- Limiting the number of events per year
- Being strategic with the type/style of events run
- Spreading the event route across the trail network with varied distances so that riders are dispersed rather than concentrated in one area of the network, selecting the most robust trails for where race routes converge
- Ensure each event uses different trails to spread the risk load such as erosion
- Ensuring trails are used in their intended direction
- Building trail repair/maintenance is factored into event agreements where event organisers are obliged to repair trails post event
- Provision of adequate toilet facilities for officials, spectators and participants
- Education of event participants regarding the PDWSA, risks posed from activities and how to reduce these risks

With this in mind, the Kalamunda network presents opportunities for cross country style events including Olympic format Cross Country (XCO) and Cross Country Marathon (XCM). These events will enable spreading riders across the network (preferably to within normal levels of use of the site) and will allow for course changes in subsequent events.

The proposed upgrades to the Kalamunda network including formalising a trailhead at the base of Mt Gunjin will help to reduce the impacts from events as they will provide a formalised space for event marshalling area and trails that are up to standard. These management techniques can be included in event proposals submitted for assessment under Operational policy 13.

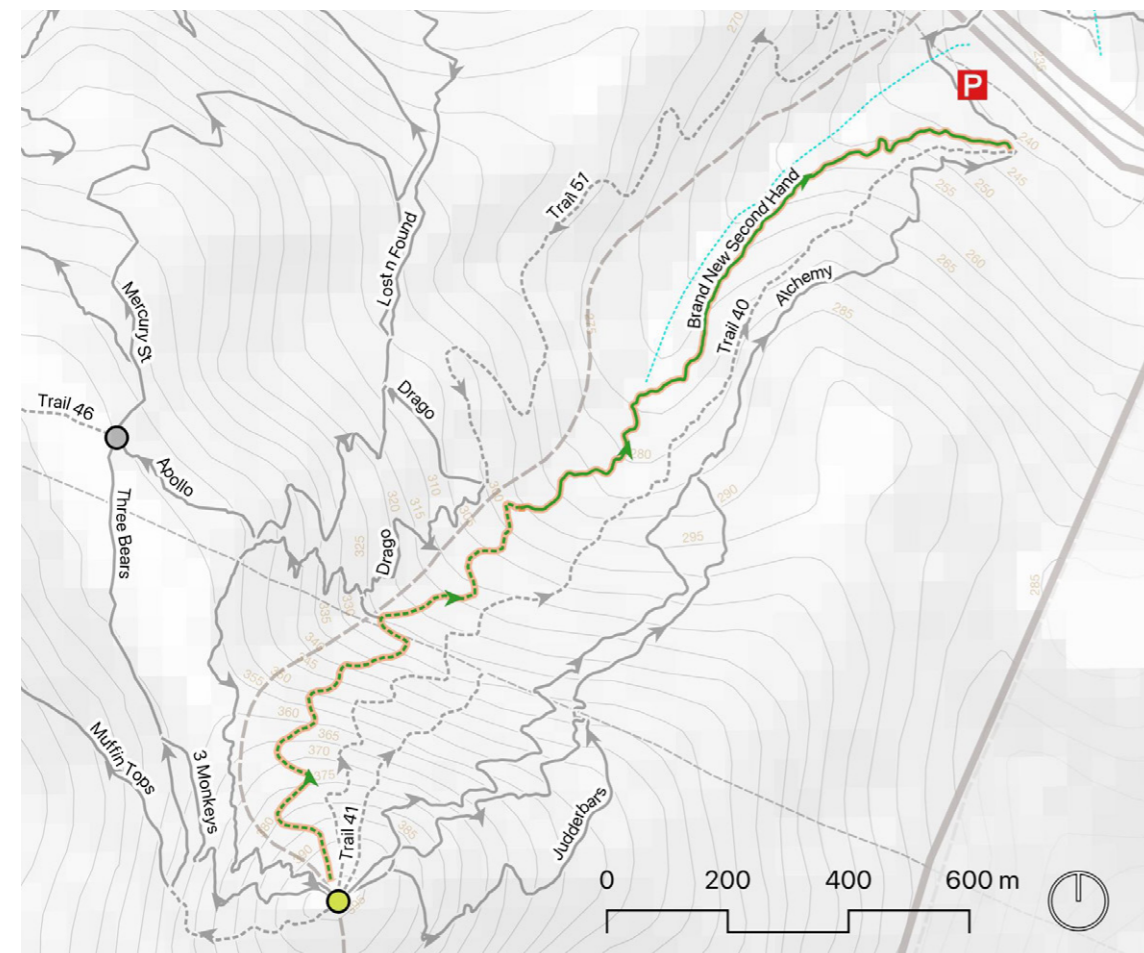
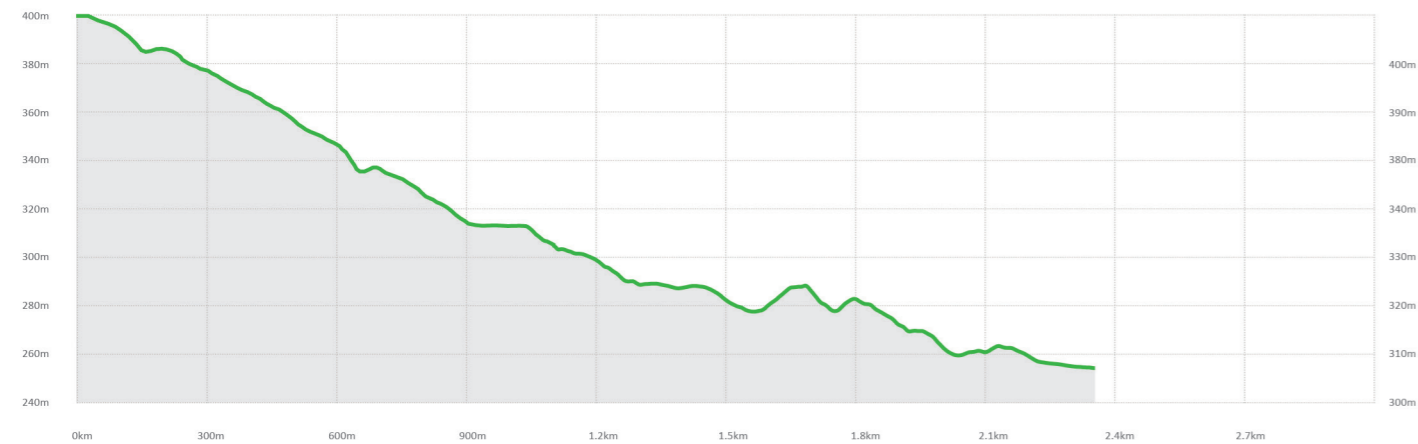
Trail Summaries

Trail summaries have been provided below for proposed new trails and existing trails that have significant changes proposed.

Brand New Second Hand

Brand New Second Hand is proposed to be repurposed into a green descending trail starting from Mt Gunjin Summit. This Green descent will enable green level riders opportunity to progress and advance their skills. A green descent from the summit of Mt Gunjin will also allow green riders to shuttle with other more advanced riders in their group. From the summit 1,101m of new trail is proposed to link into Brand New Second Hand. The existing Brand New Second Hand will be refined to fit within the parameters of a green descending trail. The Trail is intended to introduce riders to the Mt Gunjin gravity experience, therefore the intent of the trail should align with other existing blue and black descents in terms of style and technical trail feature inclusion but scaled to green classification.

Trail ID	7
Provisional Name	Brand New Second Hand
Classification	Easy - Green
Direction	Single, descent
Length	2,351m
Tread width	900mm
Corridor Width	50m
Average Trail Gradient	7%
Maximum Trail Gradient	15% up to 20m
Options	Nil
Qualifier/filter	Nil



MAP 11 - Brand New Second Hand
Kalamunda Mountain Bike Network | Trail Concept Plan

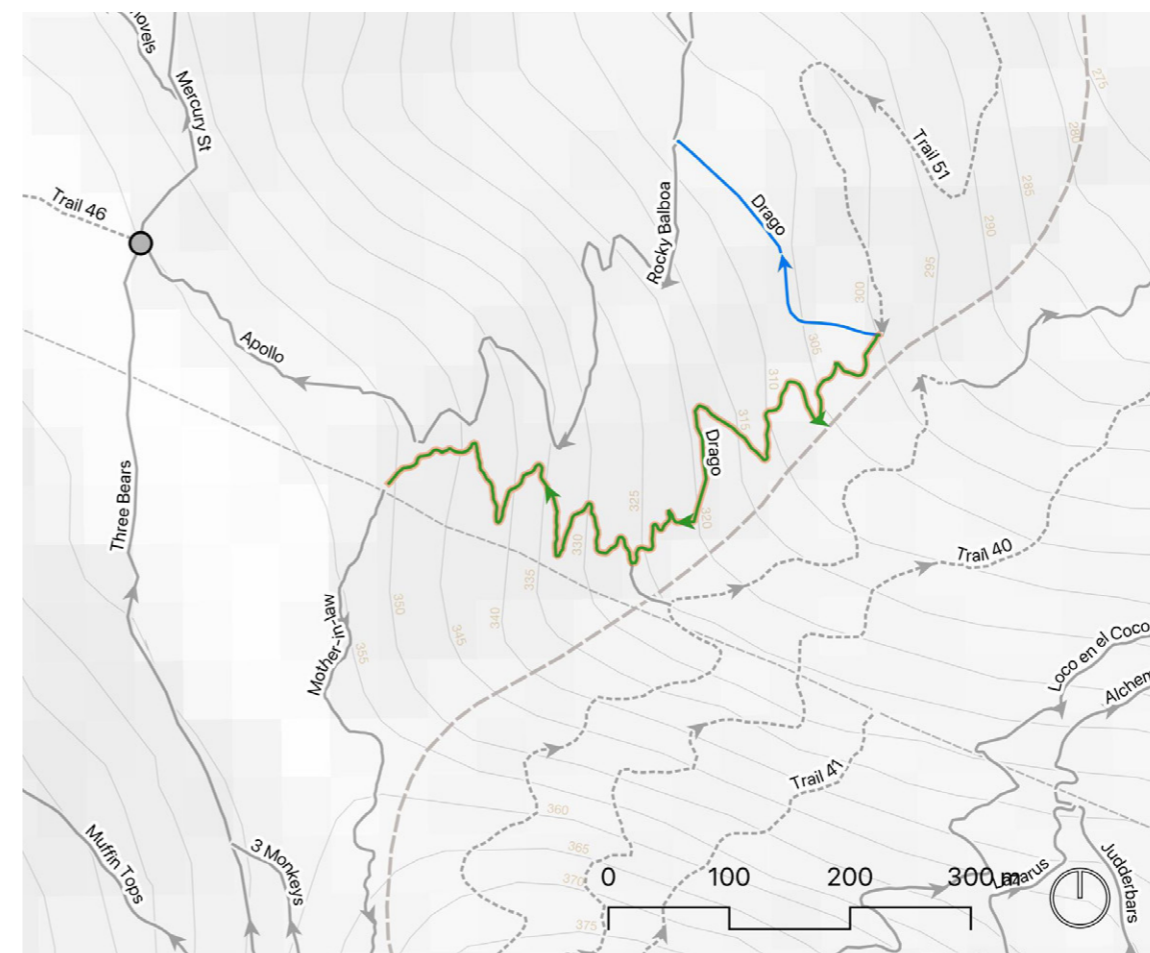
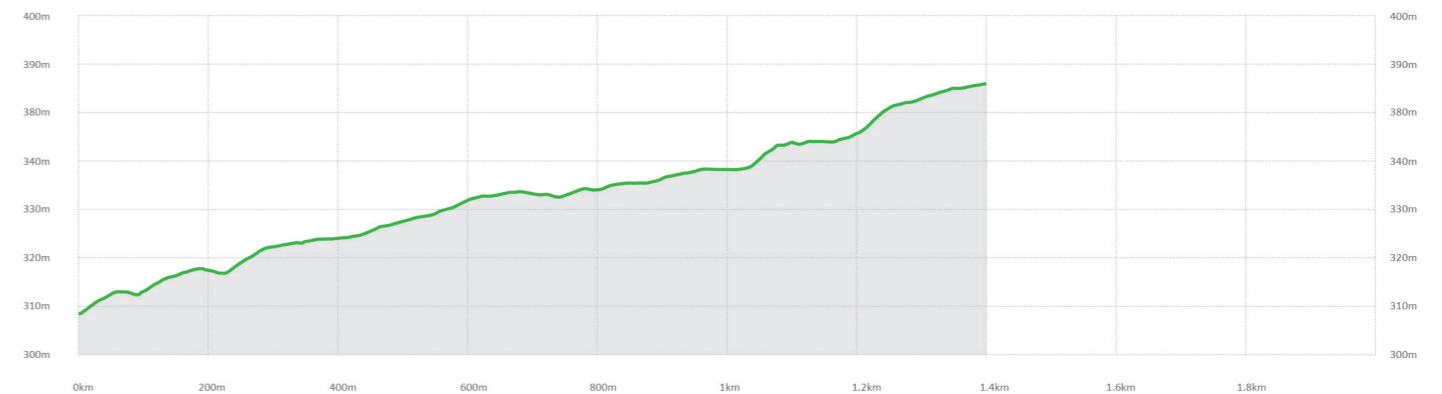
Anticipated TTFs

- Berm
- Insloped descending turn
- Outsloped descending turn
- Descending switchback
- Rising catch turn
- Roll in
- Rock armouring
- Insloped turn
- Rollers
- Chicane
- Outsloped turn
- Table top jump
- Choke
- Grade Reversal
- Rollable step down

Drago

Drago is proposed to be repurposed into a green climb which when combined with proposed Trail 50 and Mother in Law will get riders from the proposed Gunjin Base Trailhead to the summit of Mt Gunjin. This green climb will enable green riders to access the proposed new green descent and also provide an easier climb option for more advanced riders. Repurposing Drago to a green trail will involve lowering the average gradient and ensuring technical trail features are in line with green classification. The trail length will increase by 606m to allow for a mellower average gradient. It is proposed that optional blue lines be incorporated into the design, these optional lines should be purposeful in their alignment making the climb shorter for advanced riders and retaining some technical challenge.

Trail ID	8
Provisional Name	Drago
Classification	Easy - Green
Direction	Single, climb
Length	1,400m
Tread width	900mm
Corridor Width	50m
Average Trail Gradient	5%
Maximum Trail Gradient	15% up to 20m
Options	Blue optional lines and technical features
Qualifier/filter	Nil



MAP 12 - Drago

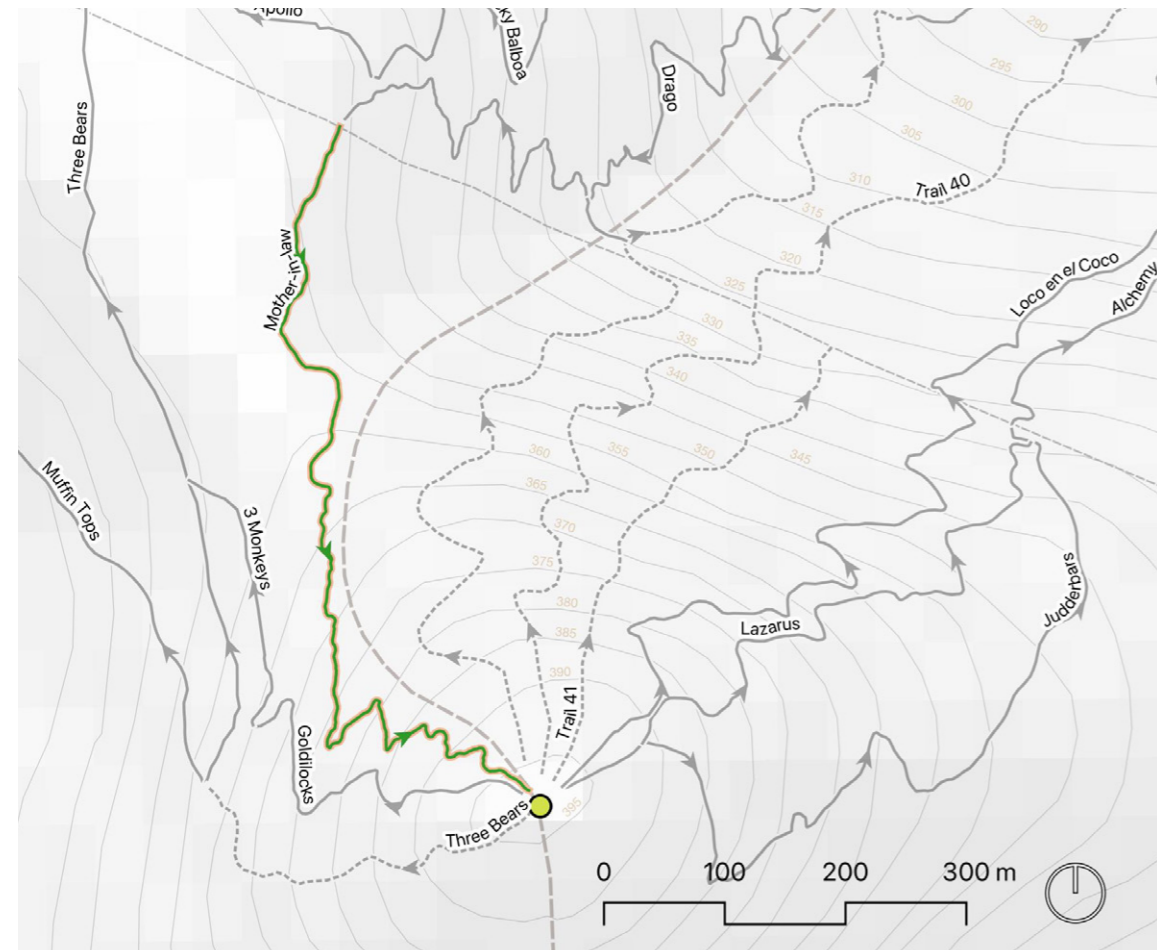
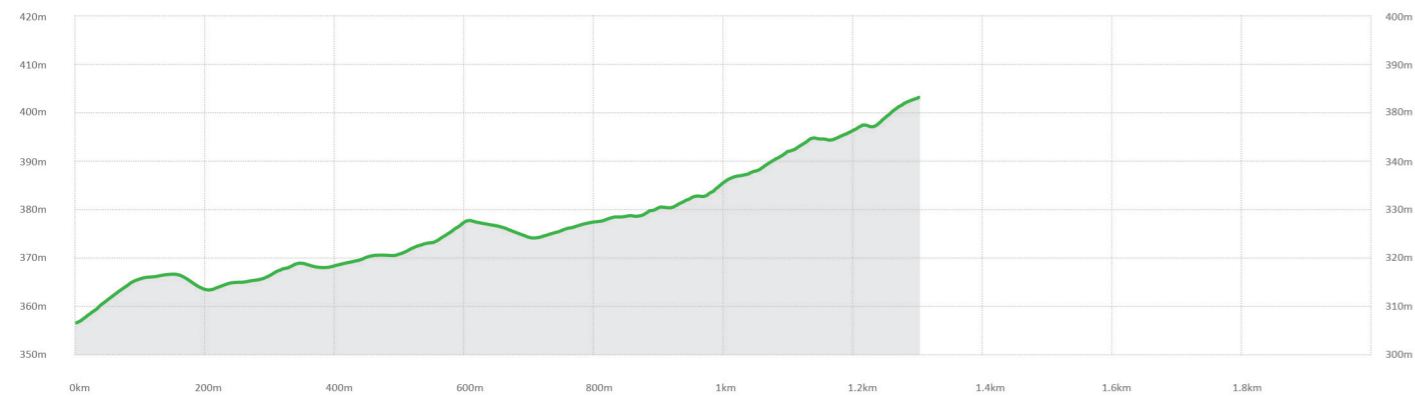
Anticipated TTFs

- Insloped turn
- Rising catch turn
- Climbing turn
- Climbing switchback
- Step up
- Rock armouring
- Outsloped turn
- Rollers Chicane
- Grade Reversal
- Choke
- Rock garden
- Rock rollover
- Technical inside line

Mother in Law

Mother in Law is proposed to be repurposed into a green climb which when combined with proposed Trail 50 and Drago will get riders from the proposed Gunjin Base Trailhead to the summit of Mt Gunjin. This green climb will enable green riders to access the proposed new green descent and also provide an easier climb option for more advanced riders. Repurposing Mother in Law to a green trail will involve lowering the average gradient and ensuring technical trail features are in line with green classification. The trail length will increase by 400m to allow for a mellower average gradient. It is proposed that optional blue lines be incorporated into the design, these optional lines should be purposeful in their alignment making the climb shorter for advanced riders and retaining some technical challenge.

Trail ID	16
Provisional Name	Mother in Law
Classification	Easy - Green
Direction	Single, climb
Length	1,300m
Tread width	900mm
Corridor Width	50m
Average Trail Gradient	5%
Maximum Trail Gradient	15% up to 20m
Options	Blue optional lines and technical features
Qualifier/filter	Nil



Anticipated TTFs

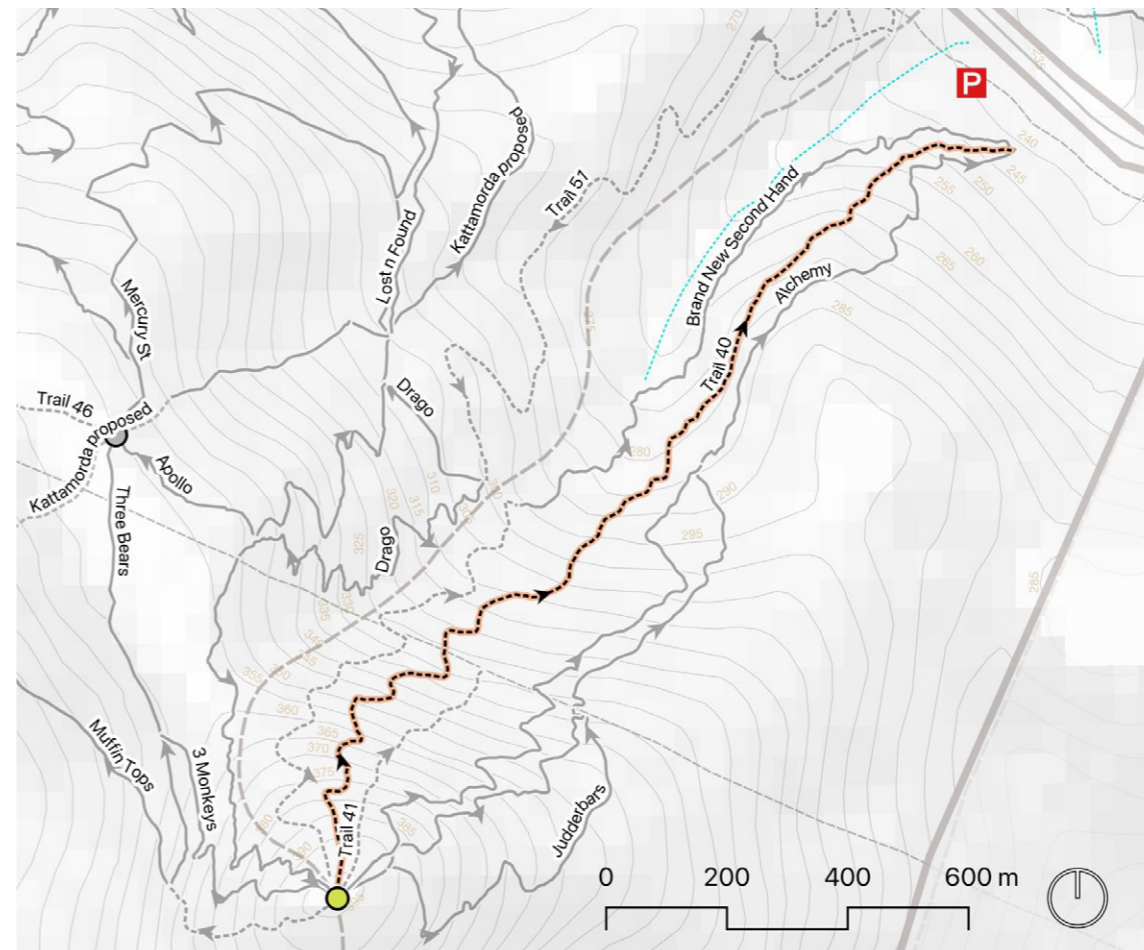
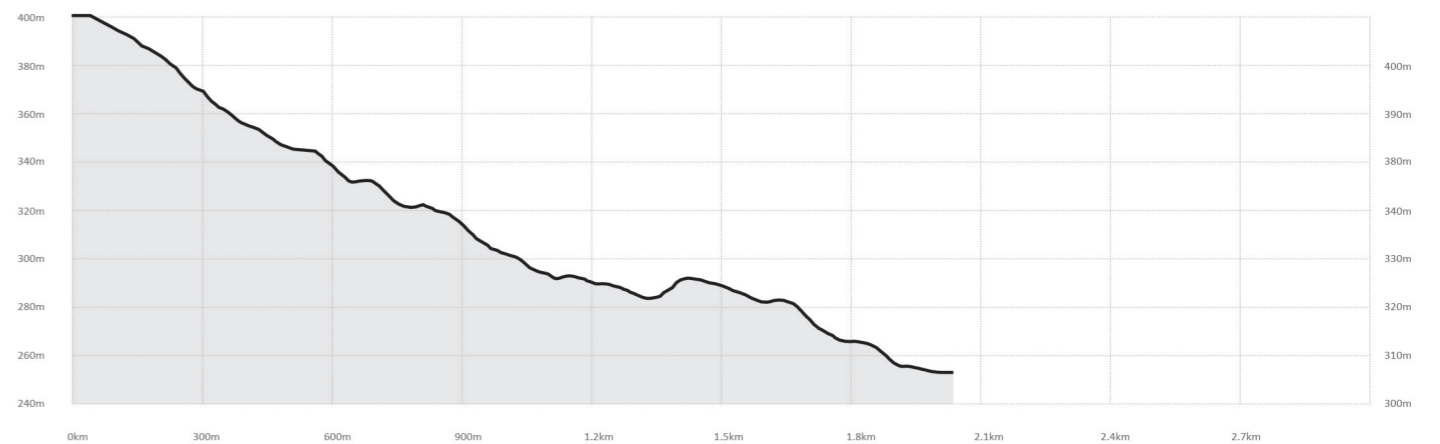
- Insloped turn
- Outsloped turn
- Climbing turn
- Climbing switchback
- Rising catch turn
- Technical in-side line
- Step up
- Rollers
- Grade Reversal
- Rock armouring
- Chicane
- Choke
- Rock garden
- Rock rollove

MAP 13 - Brand New Second Hand

Trail 40

Trail 40 is a proposed Black Descent from the summit of Mt Gunjin to the proposed Gunjin Base Trailhead. This trail will provide advanced level riders with a full top to bottom descent of Mt Gunjin. The trail runs parallel with the existing descents and will make use of the rocky terrain on the northern face of Mt Gunjin. The trail is proposed to have a technical trail style incorporating jumps and rocky trail features.

Trail ID	40
Provisional Name	Trail 40
Classification	Difficult - Black
Direction	Single, descent
Length	2,034m
Tread width	300mm
Corridor Width	50m
Average Trail Gradient	15%
Maximum Trail Gradient	50% up to 10m
Options	Blue optional lines around advanced features
Qualifier/filter	Technical trail filter



Anticipated TTFs

- Insloped descending turn
- Outsloped descending turn
- Rising catch turn
- Technical inside line
- Kicker Jump
- Step up Jump
- Feature Jump
- Tabletop Jump
- Obstacle Drop Off
- Grade Reversal
- Technical roll in
- Rock armouring
- Chicane
- Choke
- Rock garden
- Rock rollover

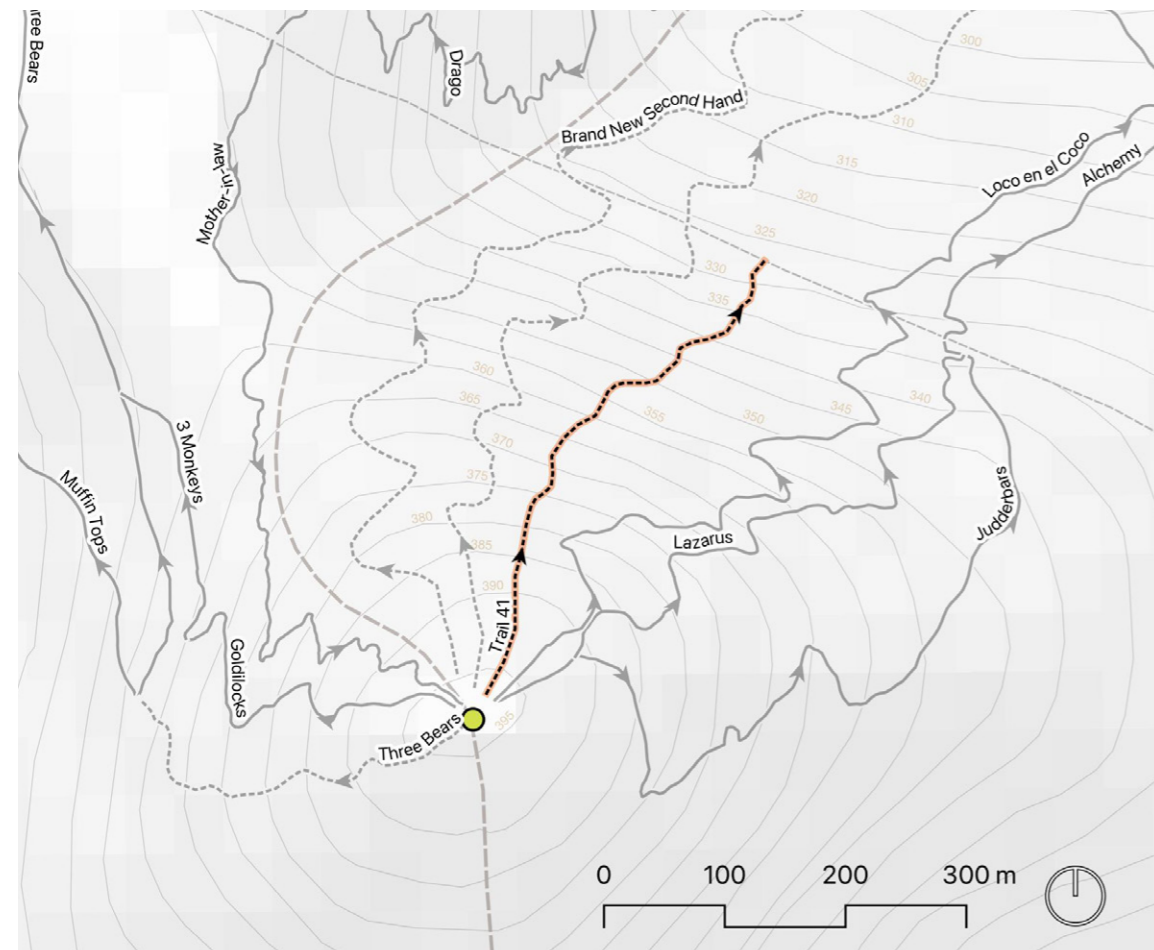
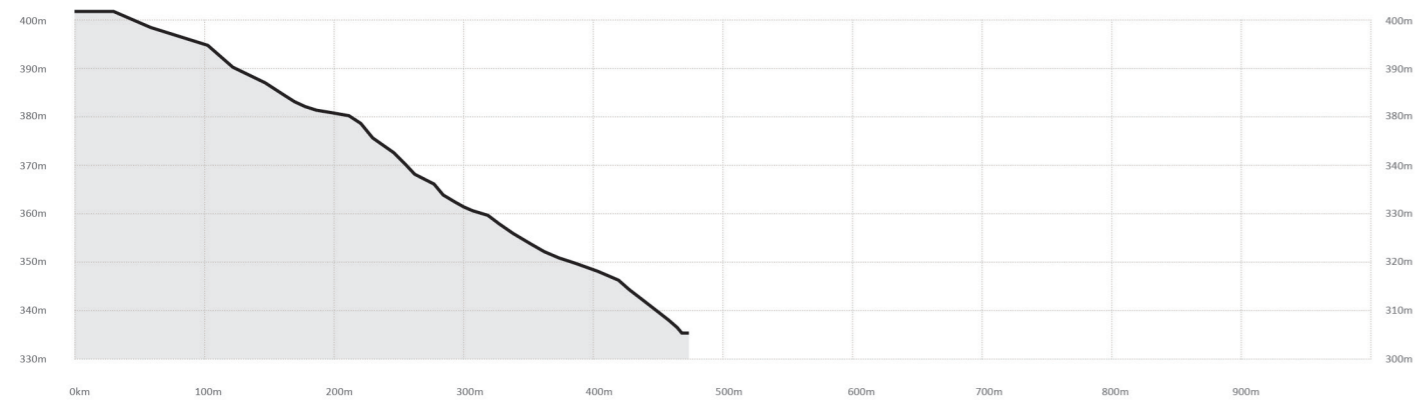
MAP 14 - Trail 40

Trail 41



Trail 41 is a proposed Black descent from the summit of Mt Gunjin to the powerline. The intent of this trail is to provide opportunity for riders to session features and progress skills. The trail will be classified black but contain smaller features to enable riders to practice on smaller scale features before hitting black classified features. A push up track is proposed to built parallel to enable riders to session individual features or the entire trail, this space will also enable riders to gather around features during coaching sessions. Riders can choose to push their bike back up to the top or access Mother in Law via the powerline track to ride back to the summit.

Trail ID	41
Provisional Name	Trail 41
Classification	Difficult - Black
Direction	Single, descent with parallel push up track
Length	569m
Tread width	1500mm (300mm trail and 1200mm for push up track)
Corridor Width	50m
Average Trail Gradient	15%
Maximum Trail Gradient	50% up to 10m
Options	Blue optional lines around advanced features
Qualifier/filter	Technical trail filter



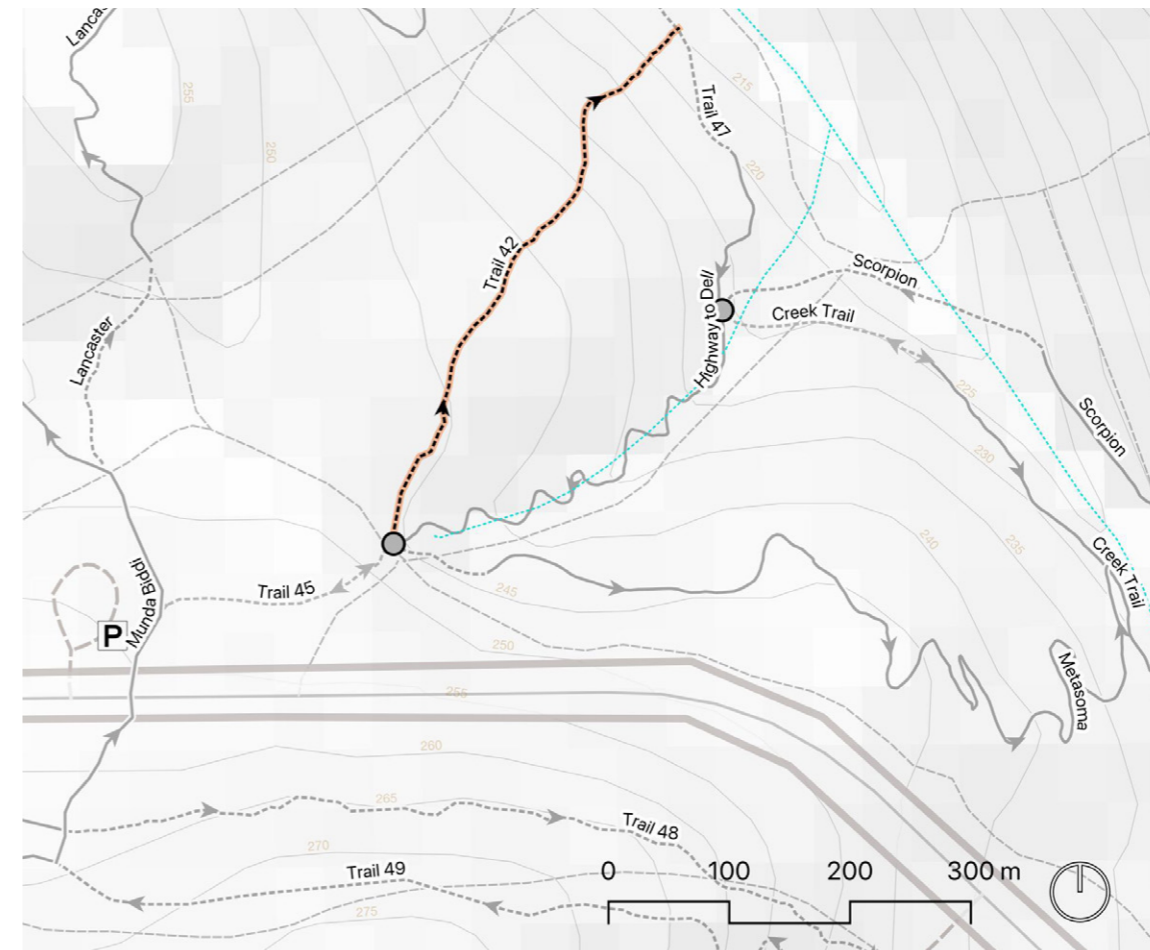
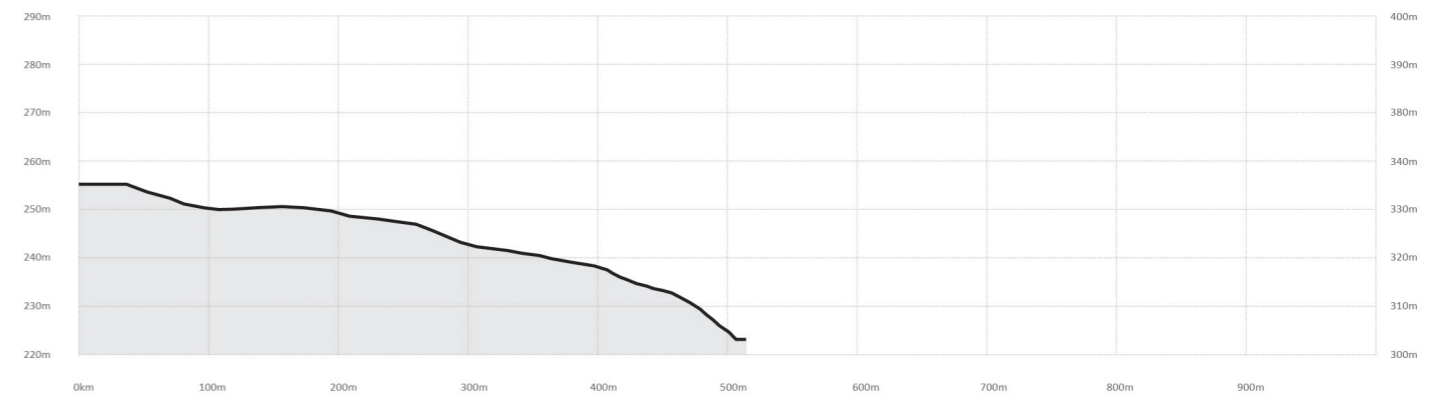
MAP 15 - Trail 41

Trail 42



Trail 42 is a proposed Black Descent from the proposed trail node at the top of Highway to Dell to Trail 47. This proposed trail traverses open forest with less rock feature and is intended to be a minimalist style flow trail with long sweeping turns and jumps which send riders 'long and low'. The trail will finish on the proposed catch trail (Trail 47) where riders can climb Highway to Dell and session the trail again.

Trail ID	42
Provisional Name	Trail 42
Classification	Difficult - Black
Direction	Single, descent
Length	512m
Tread width	300mm
Corridor Width	50m
Average Trail Gradient	15%
Maximum Trail Gradient	50% up to 10m
Options	Nil
Qualifier/filter	Technical trail filter



MAP 16 - Trail 42

Anticipated TTFs

- Insloped descending turn
- Outsloped descending turn
- Rising catch turn
- Technical inside line
- Kicker Jump
- Step up Jump
- Feature Jump
- Tabletop Jump
- Obstacle Drop Off
- Grade Reversal
- Technical roll in
- Rock armouring
- Chicane
- Choke
- Rock garden
- Rock rollover

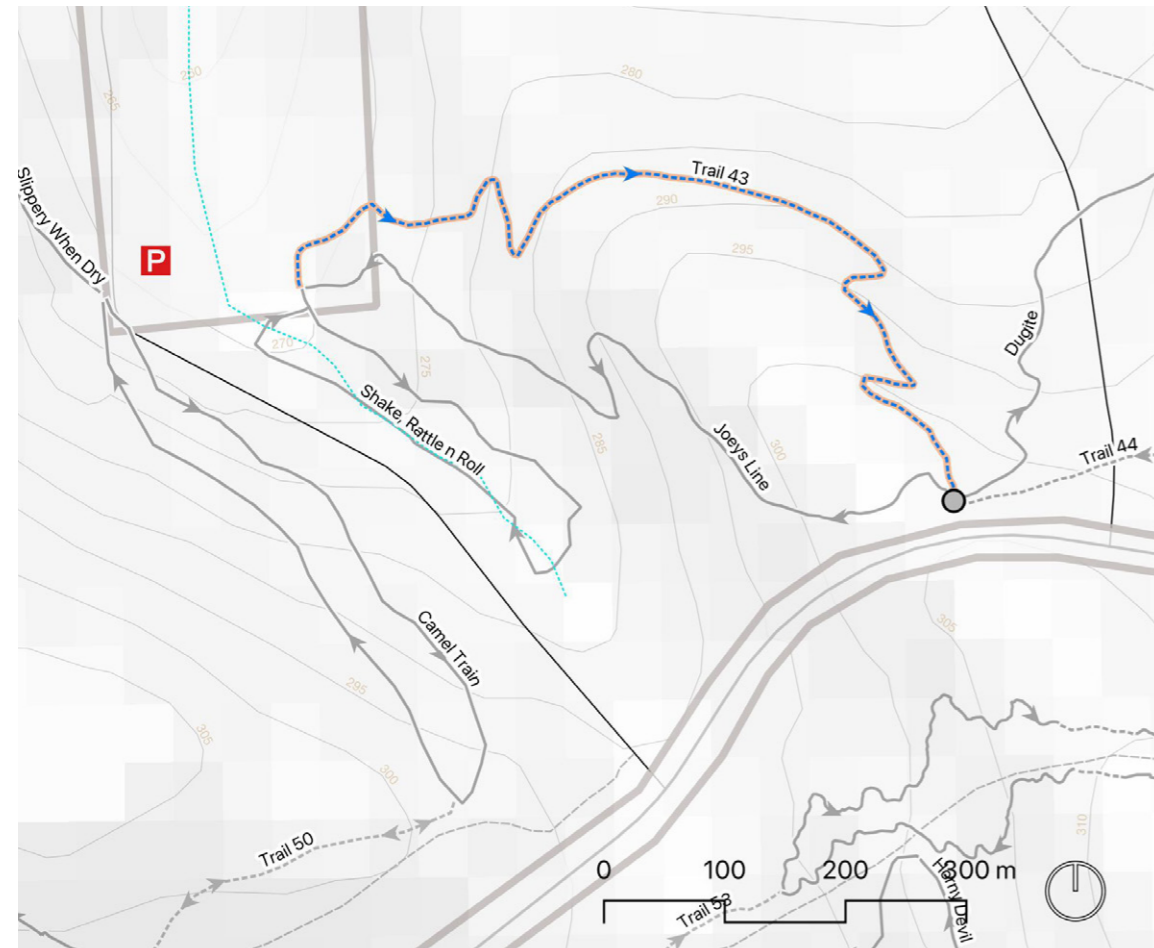
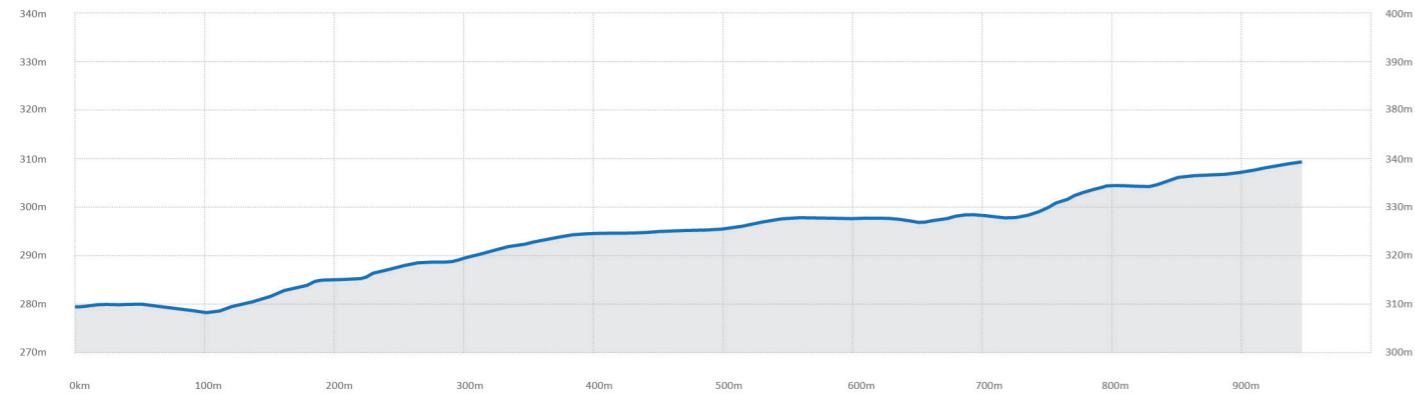
Anticipated TTFs

- Insloped descending turn
- Outsloped descending turn
- Rising catch turn
- Kicker Jump
- Feature Jump
- Tabletop Jump
- Hipped Jump
- Grade Reversal
- Chicane
- Choke

Trail 43

Trail 43 is a 971m blue climb starting from the Camel Farm trailhead and linking into the trail node at the start of Dugite. This trail will enable Joey's line to become single direction, and also create a short blue loop option for riders out of the Camel Farm trailhead. It is proposed that this loop be designed and constructed to be suitable for adaptive cycles. The trail is proposed to be an open and flowing climb to provide a point of difference to the more technical blue climbs elsewhere in the network.

Trail ID	43
Provisional Name	Trail 43
Classification	Moderate - Blue
Direction	Single, climb
Length	971m
Tread width	600mm
Corridor Width	50m
Average Trail Gradient	7%
Maximum Trail Gradient	20% up to 50m
Options	Nil
Qualifier/filter	Technical trail filter

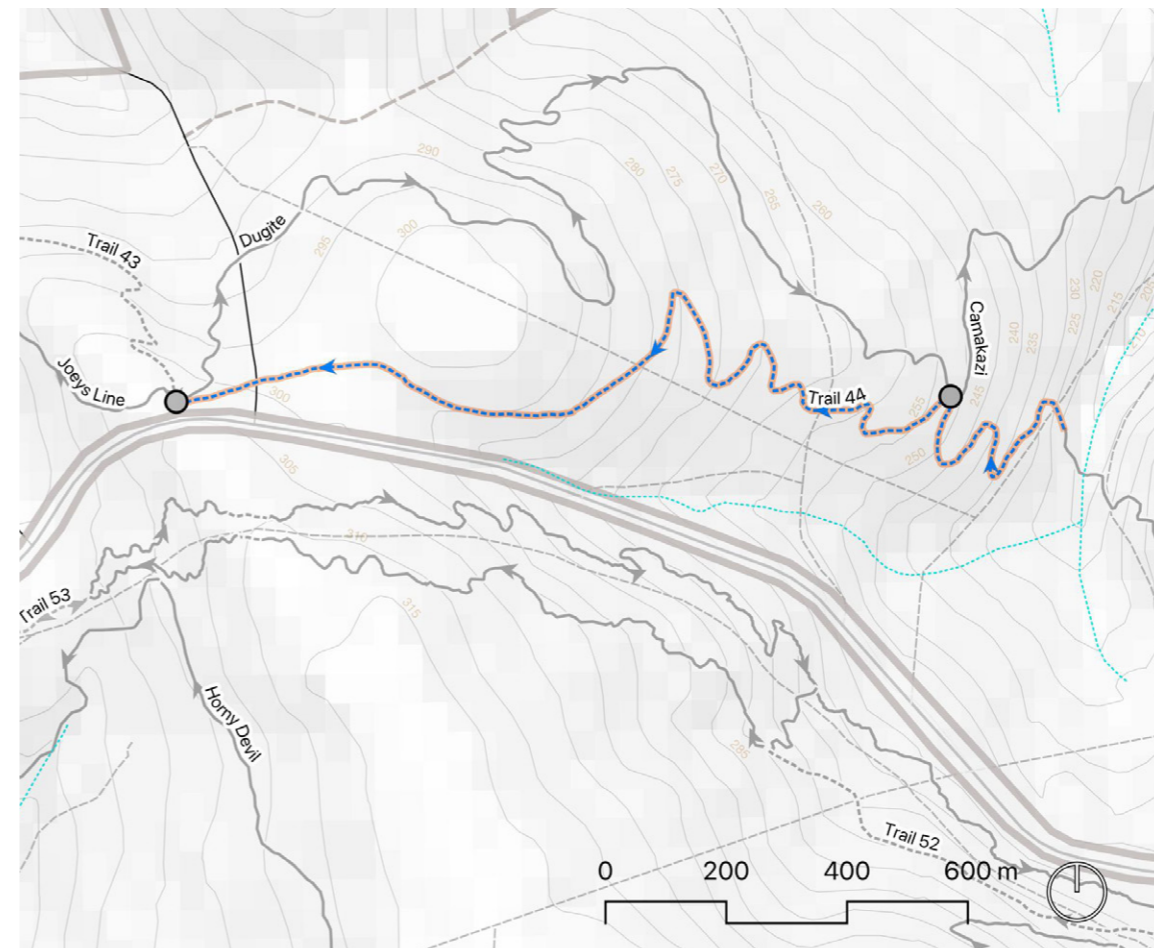
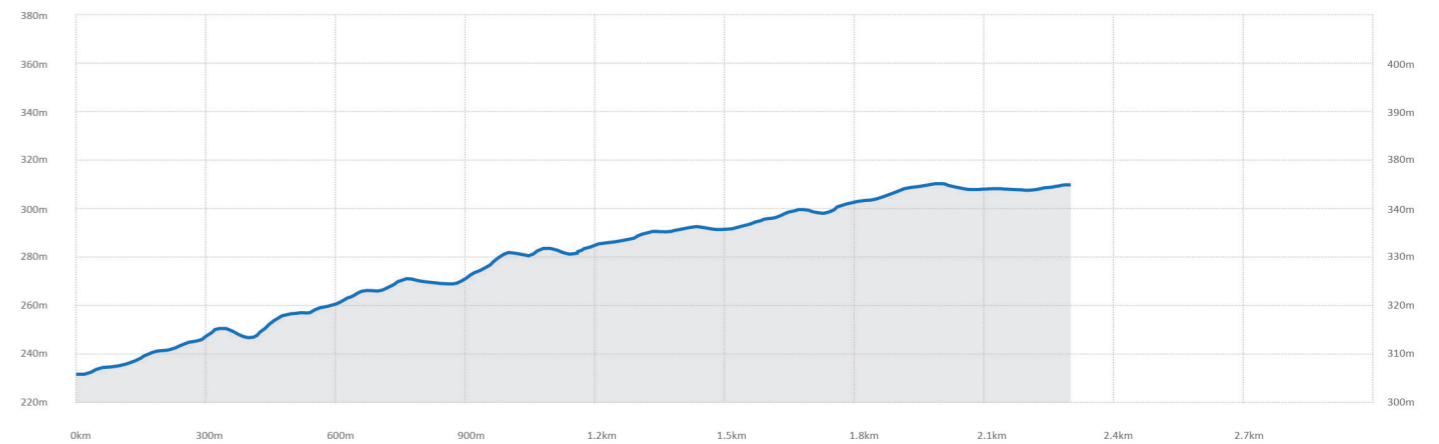


MAP 17 - Trail 43

Trail 44

Trail 44 is a 2,301m blue climb starting from the Munda Biddi and linking to the trail node at the start of Dugite. This trail will enable riders to return to the Camel Farm trailhead without needing to cross Mundaring Weir Road. A strategically placed pinch point with Camakazi will allow for long and short loop options for riders. The trail is proposed to be an open and flowing climb to provide a point of difference to the more technical blue climbs elsewhere in the network.

Trail ID	44
Provisional Name	Trail 44
Classification	Moderate - Blue
Direction	Single, climb
Length	2,301m
Tread width	600mm
Corridor Width	50m
Average Trail Gradient	8%
Maximum Trail Gradient	20% up to 50m
Options	Nil
Qualifier/filter	Technical trail filter



MAP 18 - Trail 44

Anticipated TTFs

- Insloped turn
- Outsloped turn
- Climbing turn
- Climbing switchback
- Rising catch turn
- Step up
- Rollers
- Grade Reversal
- Obstacle drop off
- Rock armouring
- Chicane
- Choke
- Rock garden
- Rock rollover

Anticipated TTFs

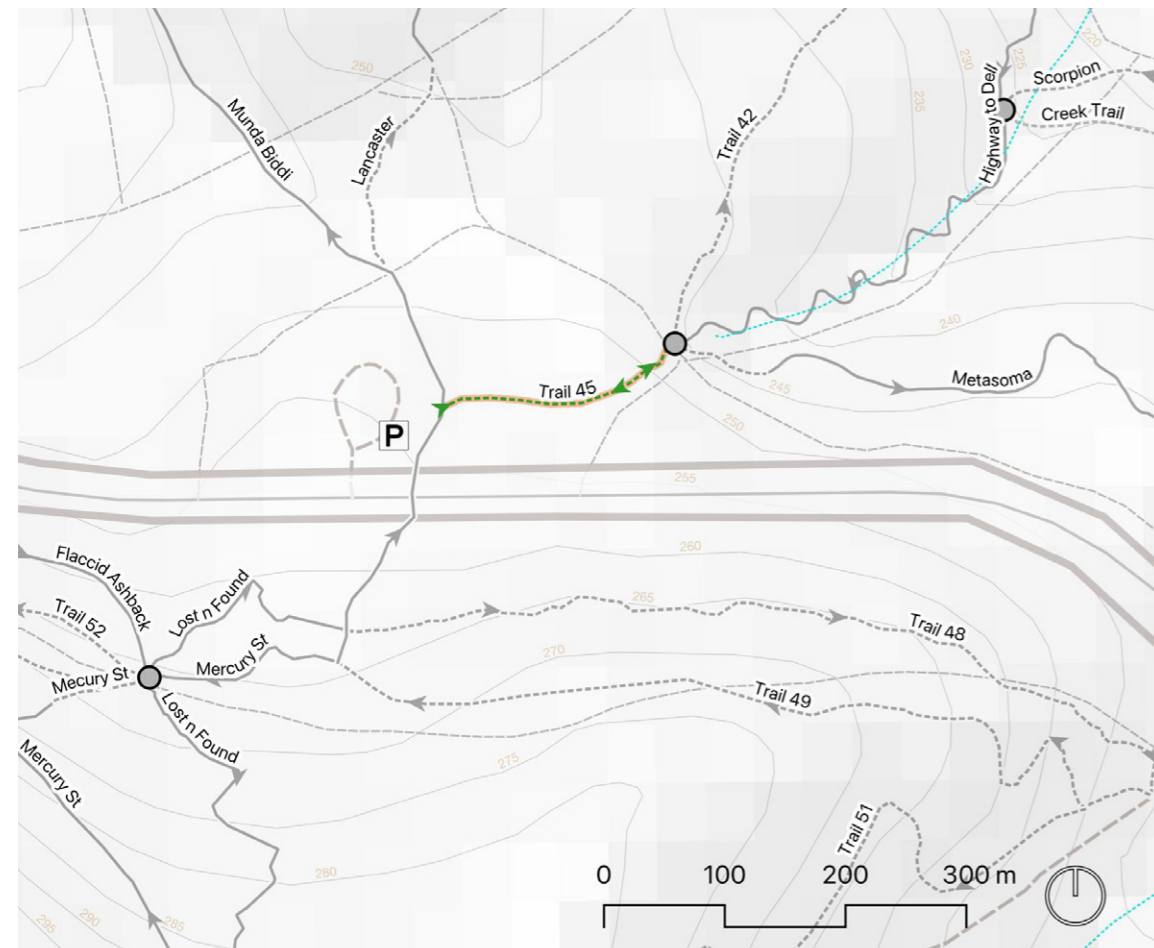
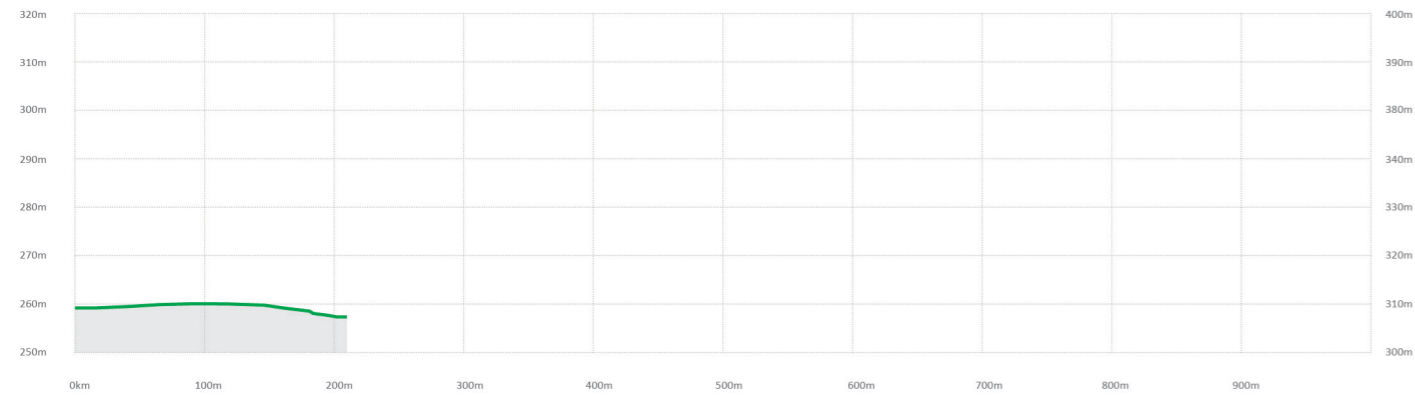
- Insloped turn
- Outsloped turn
- Climbing turn
- Climbing switchback
- Rising catch turn
- Step up
- Rollers
- Grade Reversal
- Obstacle drop off
- Rock armouring
- Chicane
- Choke
- Rock garden
- Rock rollover

Trail 45



Trail 45 is a 201m dual direction trail linking The Dell Trailhead to the trail node that services Highway to Dell, Metosoma and Trail 42. The trail is proposed to be an open trail with no technical features.

Trail ID	45
Provisional Name	Trail 45
Classification	Easy - Green
Direction	Dual, traverse
Length	201m
Tread width	900mm
Corridor Width	50m
Average Trail Gradient	8%
Maximum Trail Gradient	20% up to 50m
Options	Nil
Qualifier/filter	Nil



MAP 19 - Trail 45

Anticipated TTFs

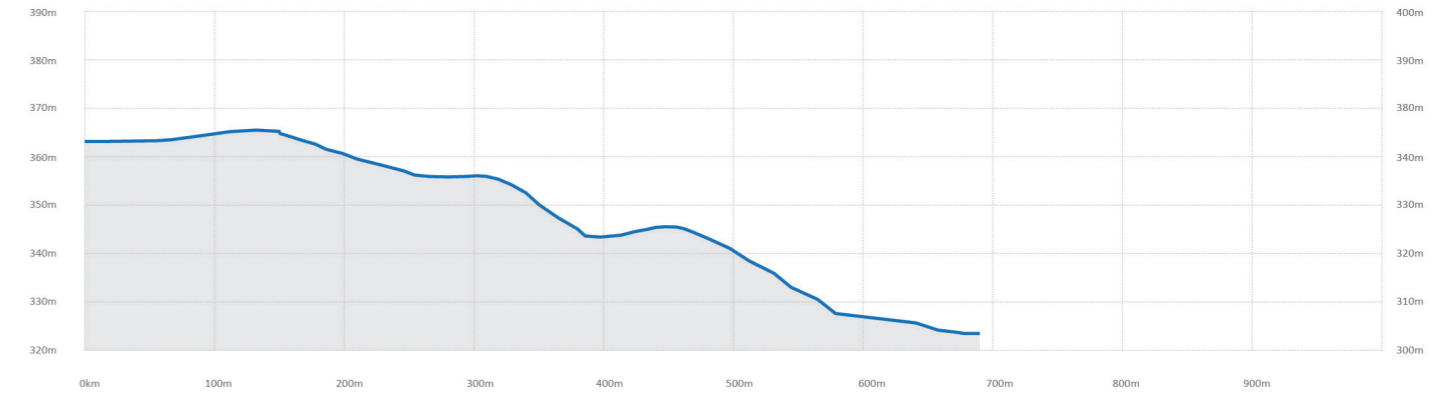
- Insloped turn
- Outsloped turn
- Grade reversal

Trail 46



Trail 46 is a proposed Blue descent linking Apollo to Horny Devil. The 691m trail provides an option for riders to only climb part way up Mt Gunjin before descending back to Black Stump. The trail is intended to be an open flowing trail with berms and jumps generally uninterrupted by natural obstacles.

Trail ID	46
Provisional Name	Trail 46
Classification	Moderate - Blue
Direction	Single, descent
Length	691m
Tread width	600mm
Corridor Width	50m
Average Trail Gradient	10%
Maximum Trail Gradient	50% up to 10m
Options	Nil
Qualifier/filter	Nil



MAP 20 - Trail 46

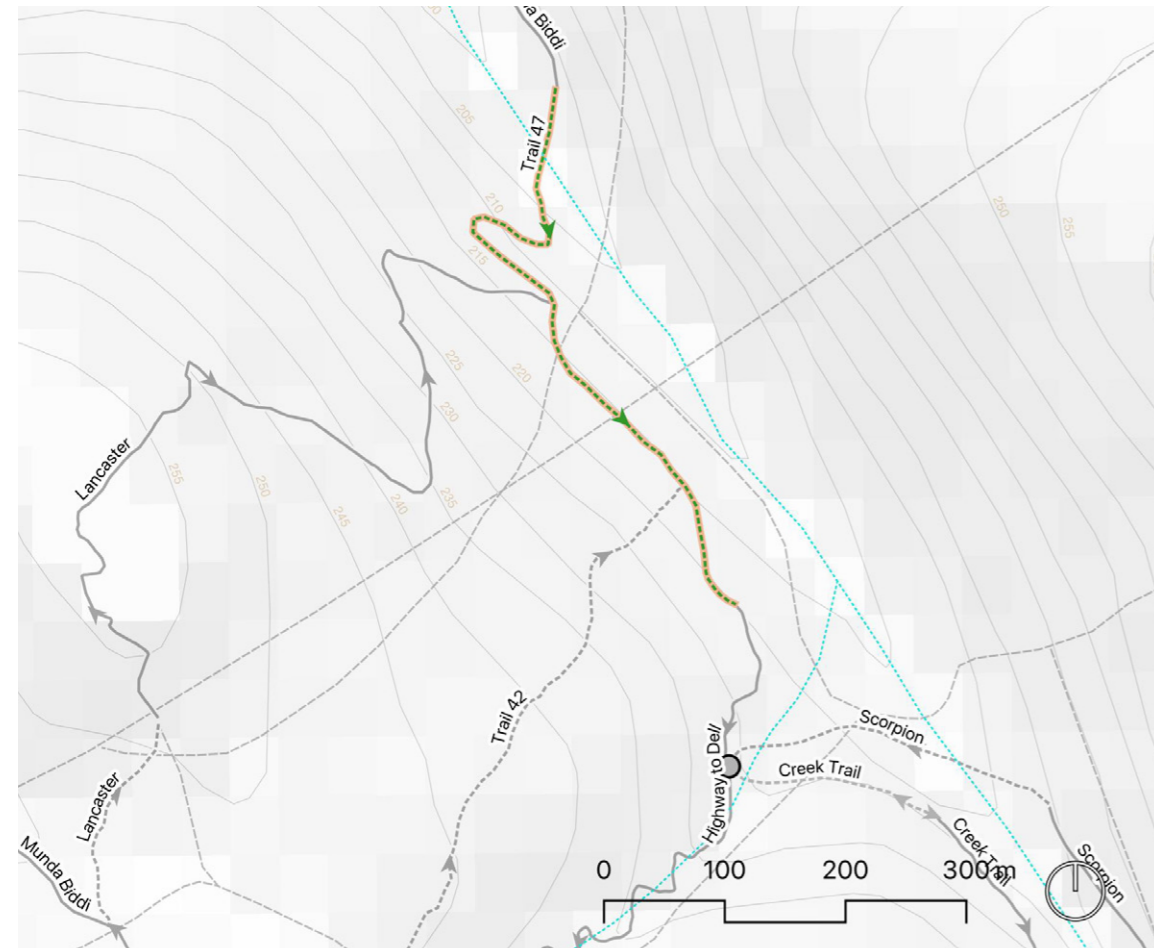
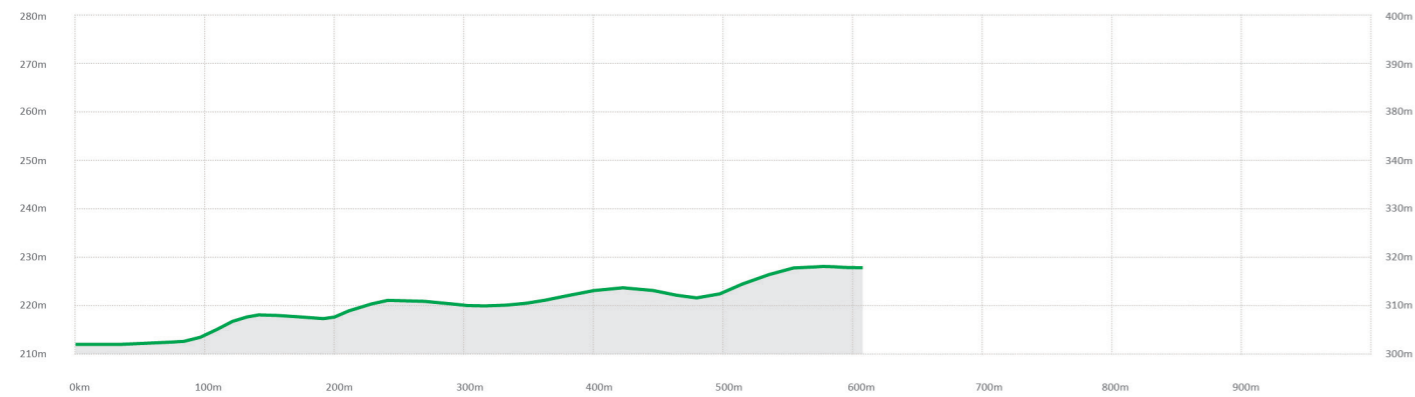
Anticipated TTFs

- Insloped descending turn
- Outsloped descending turn
- Rising catch turn
- Berm
- Kicker Jump
- Feature Jump
- Tabletop Jump
- Grade Reversal
- Chicane
- Choke

Trail 47

Trail 47 is a proposed catch trail for Lancaster and Trail 41 which links the single track section of the Munda Biddi to Highway to Dell and Creek Trail. This trail will get riders off of roads and will require a bridge over the creek. The trail is proposed to be an open flowing trail with minimal technical feature.

Trail ID	47
Provisional Name	Trail 47
Classification	Easy - Green
Direction	Single, traverse
Length	691m
Tread width	600mm
Corridor Width	50m
Average Trail Gradient	10%
Maximum Trail Gradient	50% up to 10m
Options	Nil
Qualifier/filter	Nil

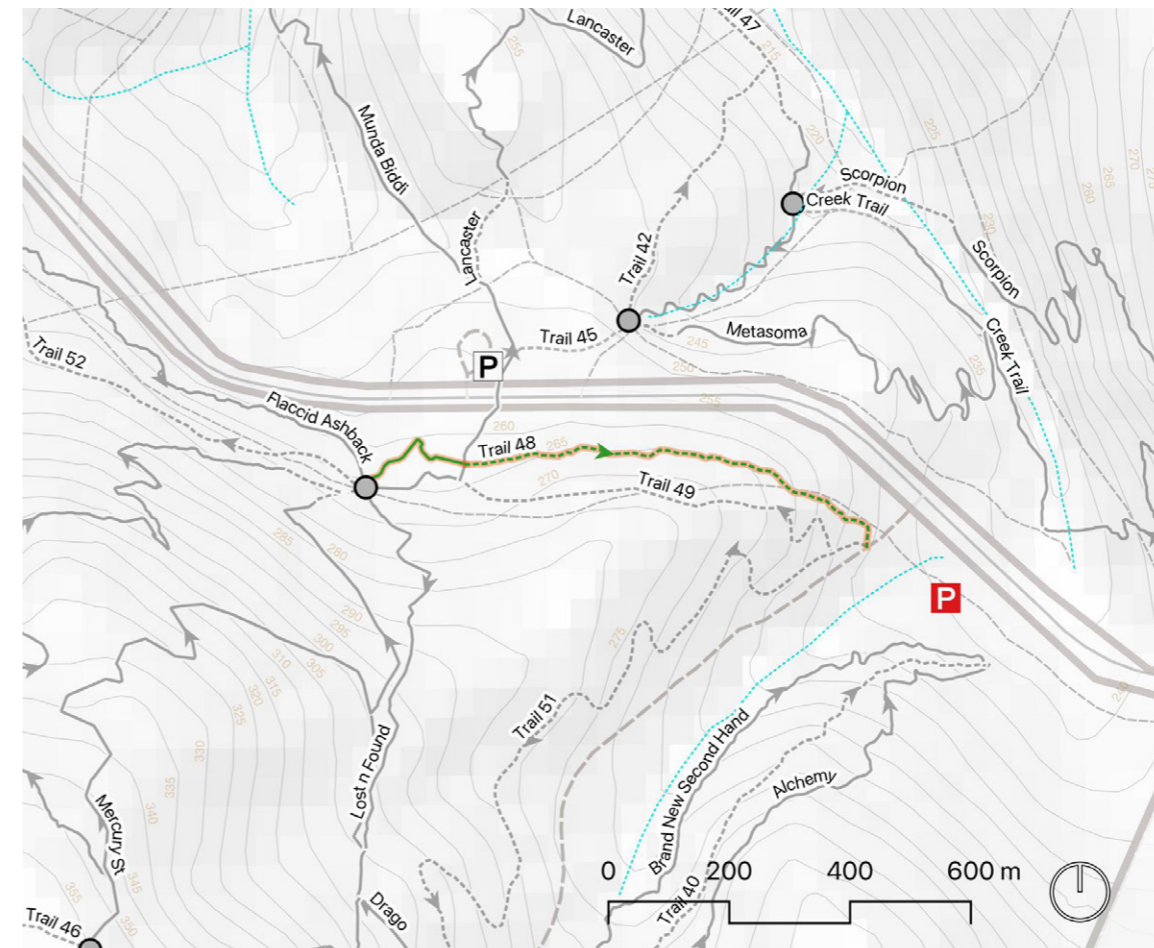
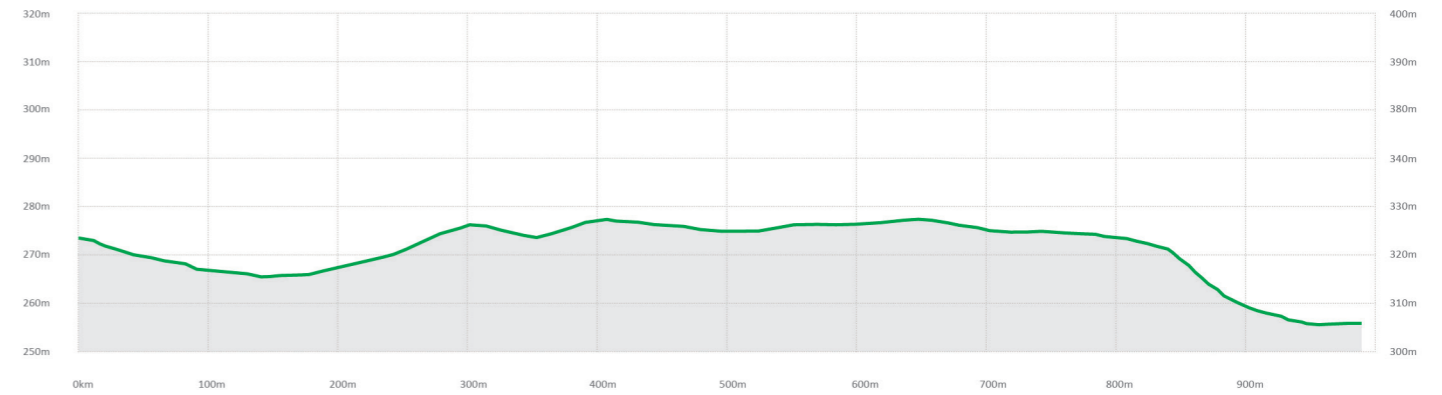


MAP 21 - Trail 47

Trail 48

Trail 48 is a proposed Green link from the Dell to the proposed Gunjin Base Trailhead. The trail is 933m long and utilises the bottom 179m of Mercury St. This trail forms apart of the proposed stacked green loops between Black Stump and Gunjin Base, providing a critical link for riders between three of the main network access points.

Trail ID	48
Provisional Name	Trail 48
Classification	Easy - Green
Direction	Single, traverse
Length	933m
Tread width	900mm
Corridor Width	50m
Average Trail Gradient	7%
Maximum Trail Gradient	15% up to 20m
Options	Nil
Qualifier/filter	Nil



MAP 22 - Trail 48

Anticipated TTFs

- Insloped descending turn
- Outsloped descending turn
- Rising catch turn
- Climbing switchback
- Step down
- Grade Reversal
- Roller
- Chicane

Anticipated TTFs

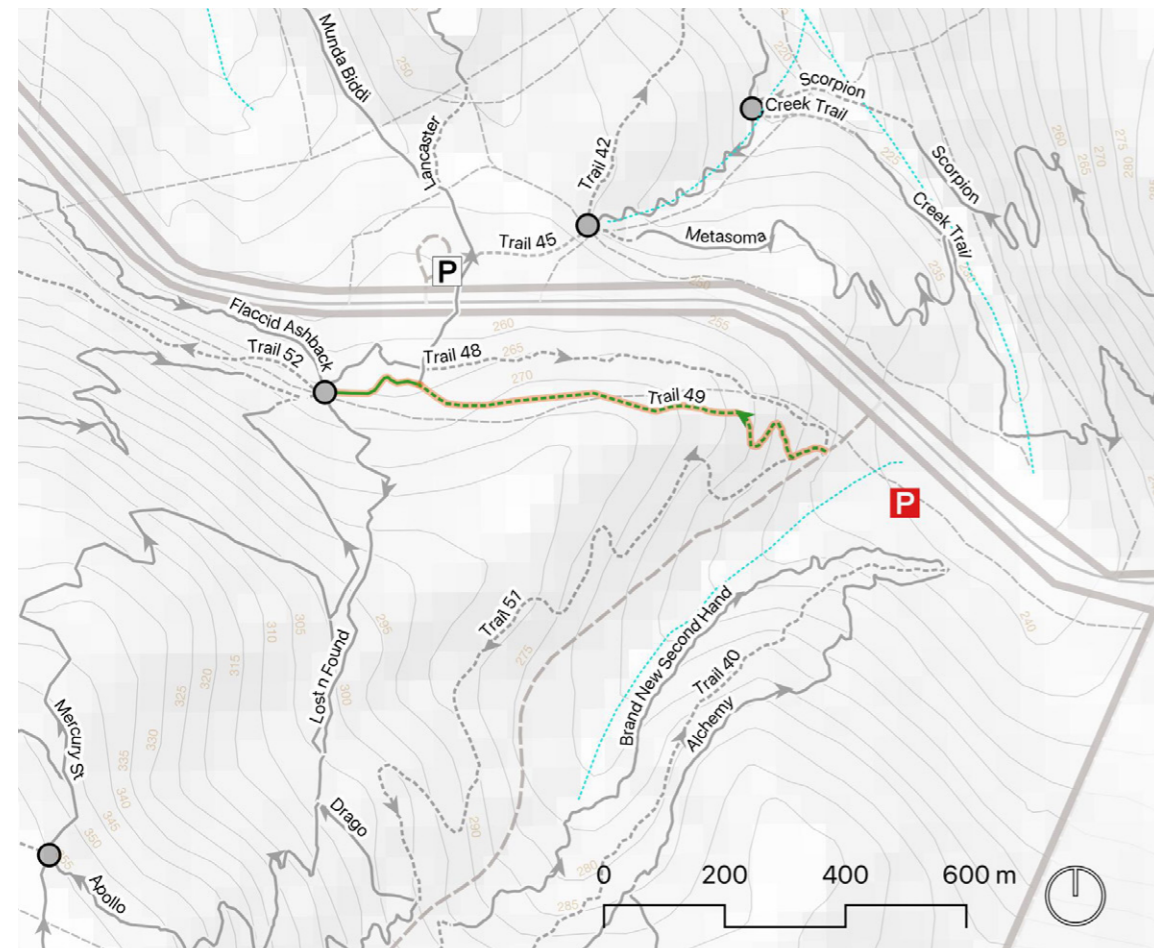
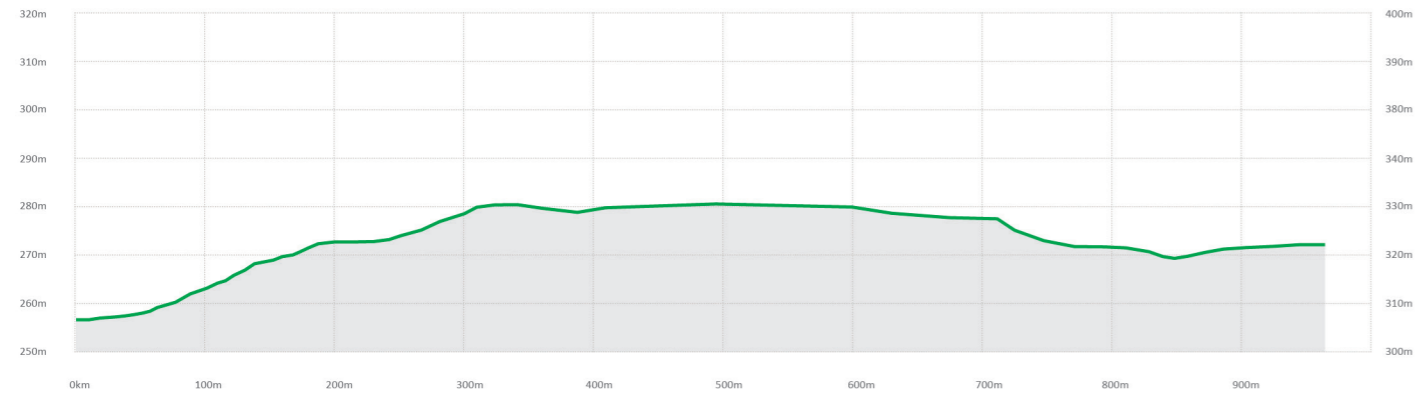
- Outsloped turn
- Rising catch turn
- Step up
- Rollers
- Grade Reversal
- Rock armouring
- Chicane
- Choke

Trail 49



Trail 49 is a proposed Green link from the proposed Gunjin Base Trailhead to the Dell. The trail is 1,027m long and utilises the bottom 234m of Lost n Found. This trail forms apart of the proposed stacked green loops between Black Stump and Gunjin Base, providing a critical link for riders between three of the main network access points.

Trail ID	49
Provisional Name	Trail 49
Classification	Easy - Green
Direction	Single, traverse
Length	1,027m
Tread width	900mm
Corridor Width	50m
Average Trail Gradient	7%
Maximum Trail Gradient	15% up to 20m
Options	Nil
Qualifier/filter	Nil



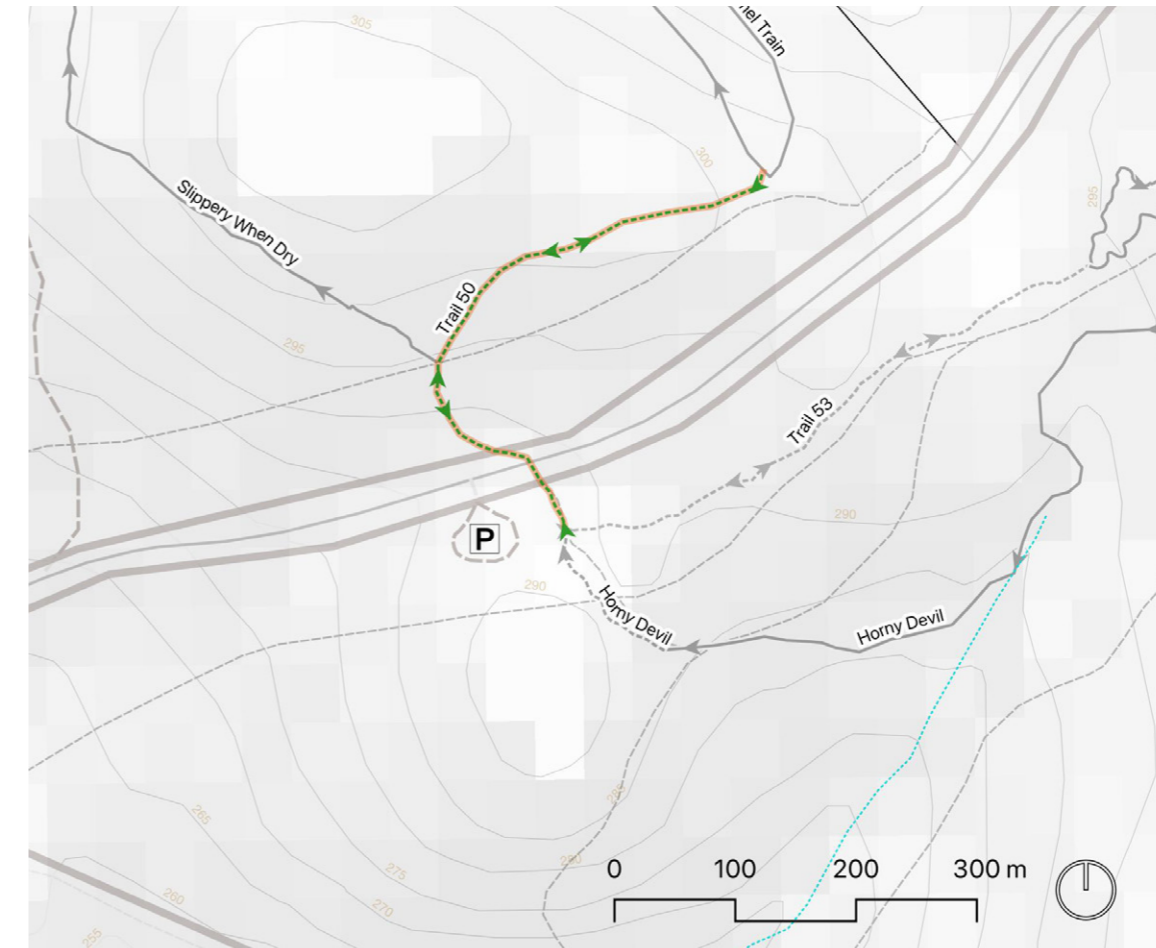
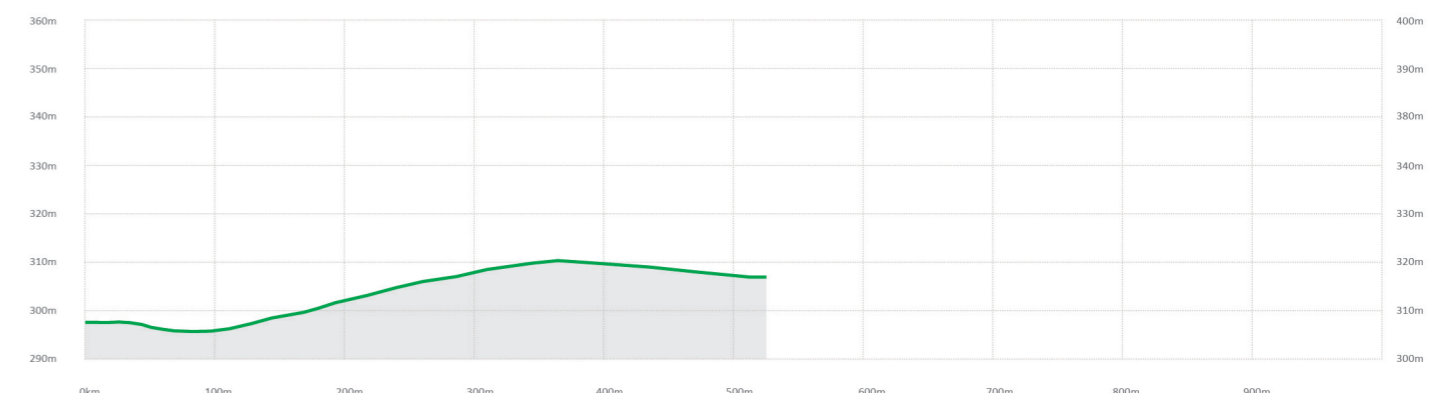
MAP 24 - Trail 49

Trail 50



Trail 50 is a 455m dual direction trail linking Black Stump to Camel Train off road. The trail is proposed to be an open trail with no technical features.

Trail ID	50
Provisional Name	Trail 50
Classification	Easy - Green
Direction	Dual, traverse
Length	455m
Tread width	1200mm
Corridor Width	50m
Average Trail Gradient	7%
Maximum Trail Gradient	20% up to 50m
Options	Nil
Qualifier/filter	Nil



MAP 23 - Trail 50

Anticipated TTFs

- Insloped turn
- Outsloped turn
- Rising catch turn
- Step up
- Rollers
- Grade Reversal
- Rock armouring
- Chicane
- Choke

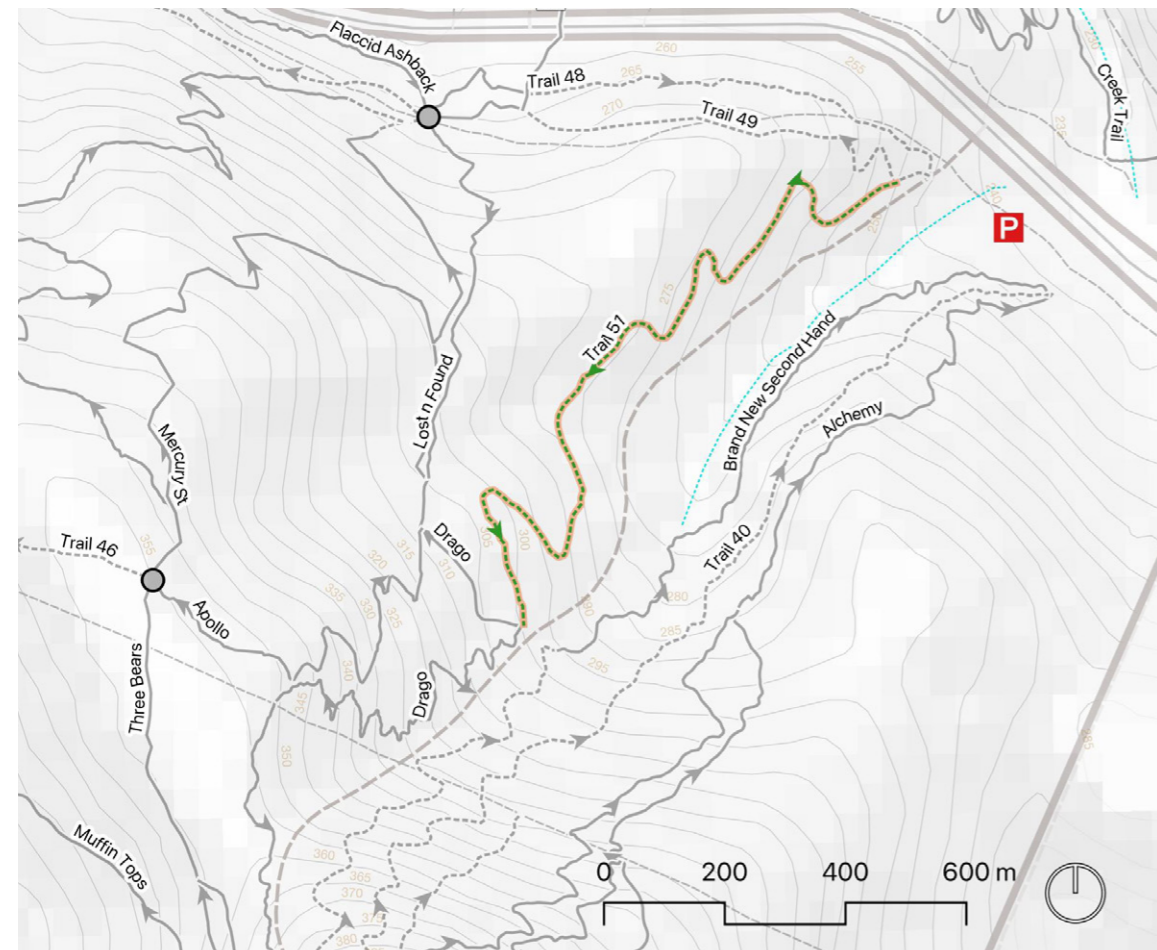
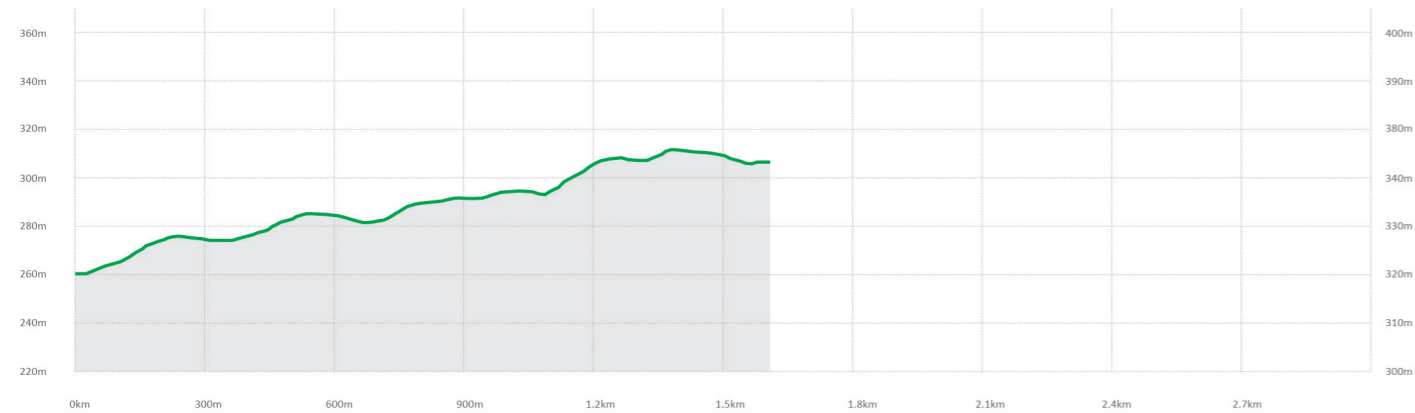
Anticipated TTFs

- Insloped turn
- Outsloped turn
- Grade Reversal

Trail 51

Trail 51 is a proposed new green climb that combined with Drago and Mother in Law will get riders from the proposed Gunjin Base Trailhead to the summit of Mt Gunjin. This green climb will enable green riders to access the proposed new green descent and also provide an easier climb option for more advanced riders. The new section of the climb linking into Drago is 1,602m long and is proposed to be an open style trail with technical trail features incorporated. This section of the climb is not proposed to contain any option blue lines with these options provided in the Drago and Mother in Law sections of the climb.

Trail ID	51
Provisional Name	Trail 51
Classification	Easy - Green
Direction	Single, climb
Length	1,602
Tread width	900mm
Corridor Width	50m
Average Trail Gradient	5%
Maximum Trail Gradient	15% up to 20m
Options	Nil
Qualifier/filter	Nil

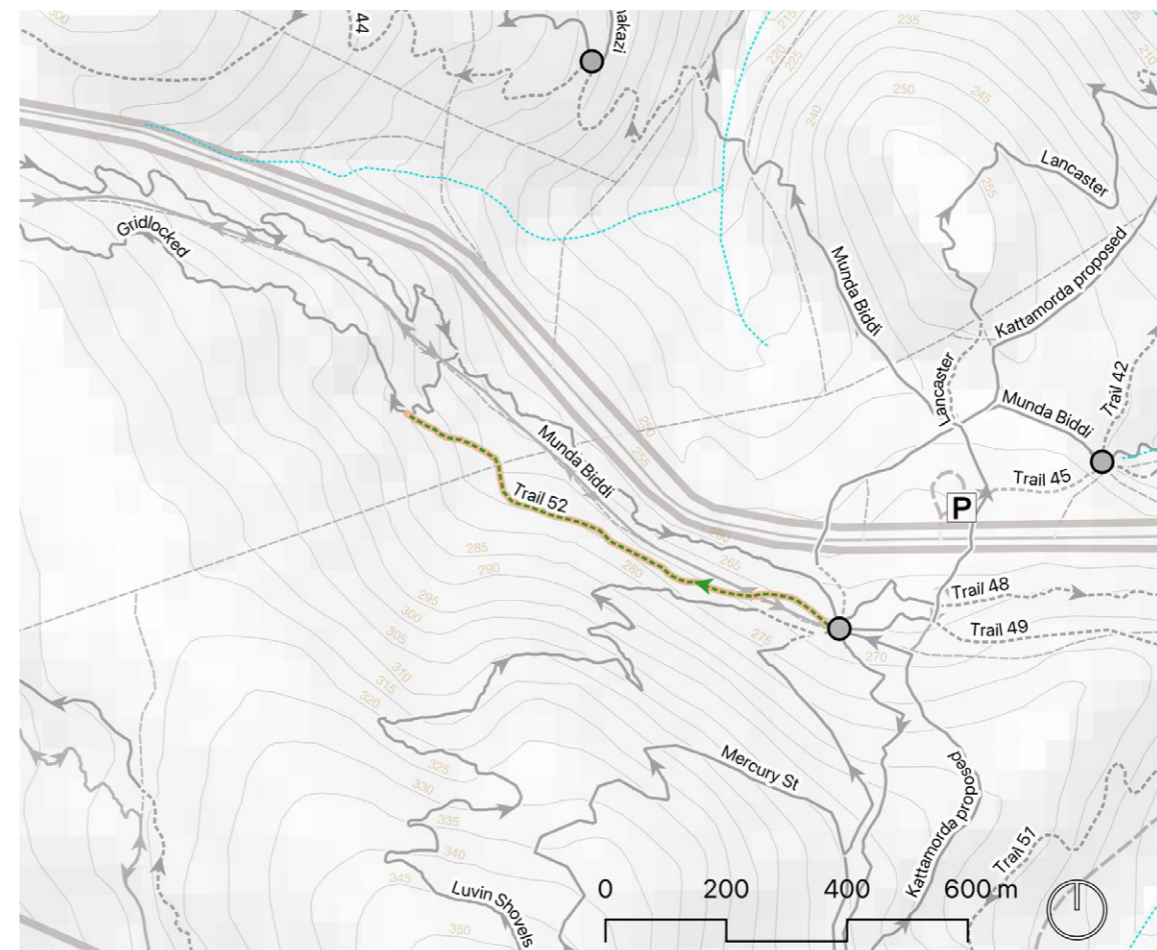
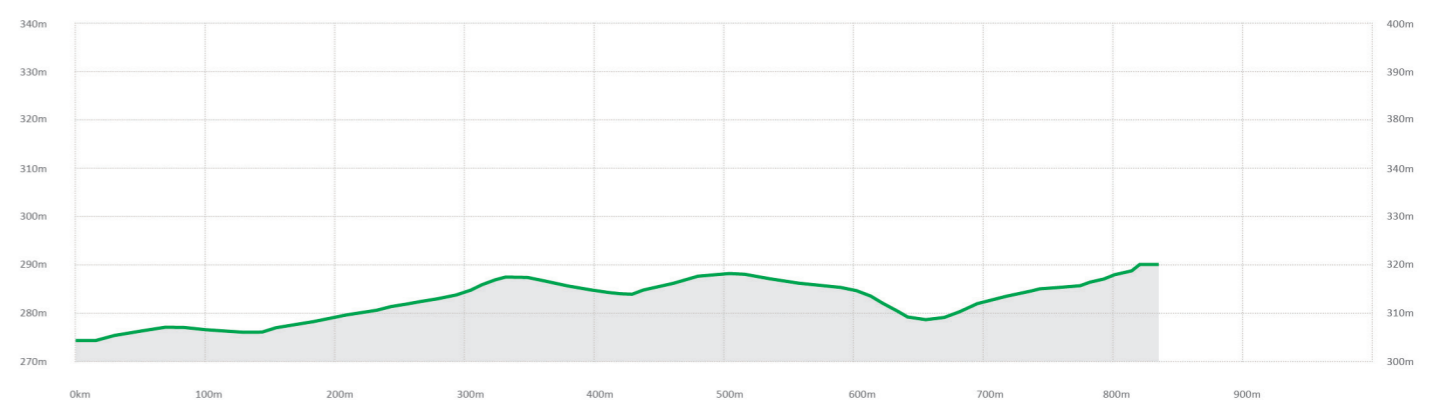


MAP 25 - Trail 51

Trail 52

Trail 52 is a proposed Green link from the proposed trail node at the Dell into Gridlocked. This trail forms apart of the proposed stacked green loops between Black Stump and Gunjin Base, providing a critical link for riders between three of the main network access points.

Trail ID	52
Provisional Name	Trail 52
Classification	Easy - Green
Direction	Single, traverse
Length	833m
Tread width	900mm
Corridor Width	50m
Average Trail Gradient	7%
Maximum Trail Gradient	15% up to 20m
Options	Nil
Qualifier/filter	Nil



MAP 26 - Trail 52

Anticipated TTFs

- Insloped turn
- Outsloped turn
- Climbing turn
- Climbing switchback
- Rising catch turn
- Step up
- Rollers
- Grade Reversal
- Rock armouring
- Chicane
- Choke
- Rock garden
- Rock rollover

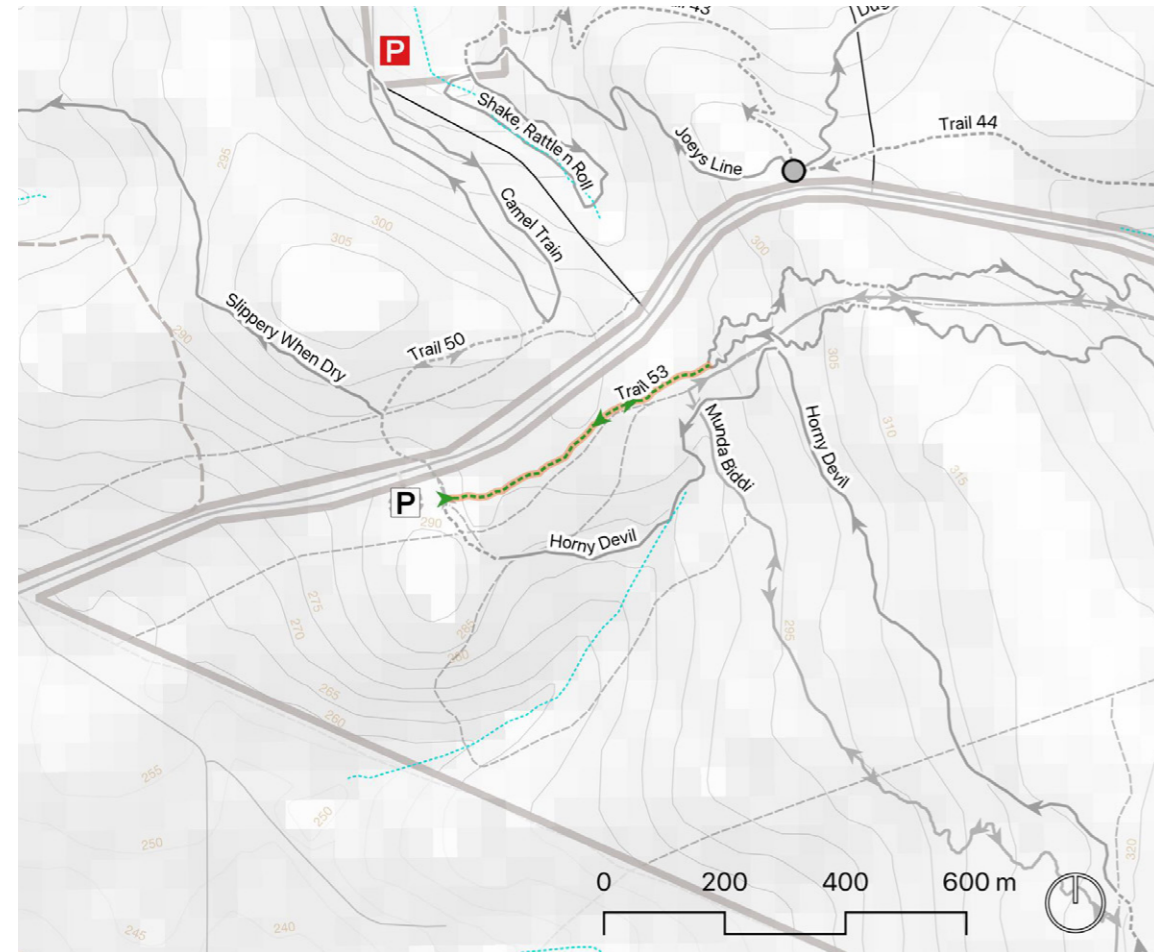
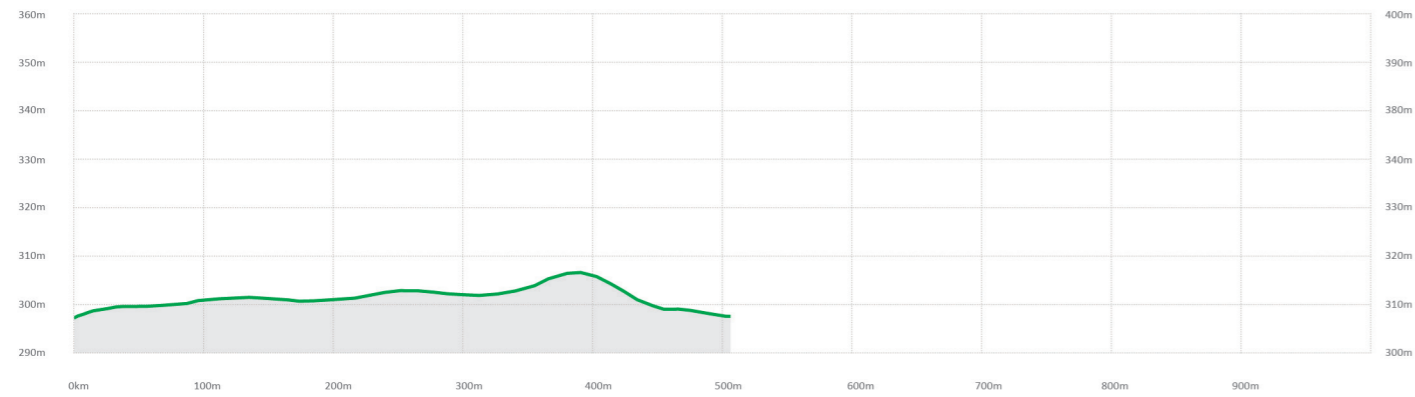
Anticipated TTFs

- Insloped turn
- Outsloped turn
- Rising catch turn
- Step up
- Rollers
- Grade Reversal
- Rock armouring
- Chicane
- Choke

Trail 53

Trail 53 is a proposed dual direction Green link from Black Stump to Gridlocked and Tangaroo Kick. This trail forms apart of the proposed stacked green loops between Black Stump and Gunjin Base, providing a critical link for riders between three of the main network access points.

Trail ID	53
Provisional Name	Trail 53
Classification	Easy - Green
Direction	Dual, traverse
Length	566m
Tread width	1000mm
Corridor Width	50m
Average Trail Gradient	7%
Maximum Trail Gradient	15% up to 20m
Options	Nil
Qualifier/filter	Nil



Anticipated TTFs

- Insloped turn
- Outsloped turn
- Grade Reversal

MAP 27 - Trail 52

Opinion of cost

Trails

Opinion of probable cost for sections of new trail and upgraded trail are outlined in Table 4. Lump sum estimates have also been provided for:

- Closure and rehabilitation of trail no longer apart of the network
- Closure and rehabilitation of unsanctioned trails known to occur within the project area
- Works to existing MTB trails to align them to the WA MTB Management Guidelines standards. Note where specific upgrades have been noted these are costed separately.

An approximate figure for annual maintenance of the MTB network has also been provided, this figure will ensure adequate resources to maintain the MTB network according to WA MTB Management Guidelines standard.

Table 5: Opinion of probable cost for trails

ID	Name	Class	Total Trail length	Retained length	New Trail Length	Design Cost (\$4/m)	Extent of specific upgrades (%)	Upgrade existing Cost	Construction Cost (\$45-\$50/m)	No. Bridge		Total construction	TOTAL deisgn & construction	Notes
1	Lancaster	Black	1,133	943	190	\$760.00			\$8,550.00			\$8,550.00	\$9,310.00	New start from Munda Bidli single trail and end at new catch trail (Trail 46)
2	Loco en el Coco	Black	1,343	1,343		\$-	20%	\$12,087.00				\$12,087.00	\$12,087.00	Refine TTFs to match rider speed on trail
3	Luvin Shovels	Black	2,435	2,335	100	\$400.00	20%	\$21,015.00	\$4,500.00			\$25,515.00	\$25,915.00	Divert end to link into Mercury St and proposed Dell node, refine technical trail features to match rider speed on trail
4	3 Monkeys	Black	235	235		\$-						\$-	\$-	
5	Mercury St link	Blue	239	239		\$-						\$-	\$-	
6	Alchemy	Blue	1,516	1,516		\$-	30%	\$18,192.00				\$18,192.00	\$18,192.00	Realign bottom half to make the most of the terrain, refine TTFs
7	Brand New Second Hand	Green	2,351	1,250	1,101	\$4,404.00	60%	\$37,500.00	\$55,050.00			\$92,550.00	\$96,954.00	Upgrade Brand New Second Hand to green descent starting from Mt Gunjin summit
8	Drago	Green	1,400	794	606	\$5,600.00	60%	\$23,820.00	\$30,300.00			\$54,120.00	\$59,720.00	Repurpose Drago to Green Climb with Blue optional lines which shortcut switchbacks and contain challenging TTFs
8	Drago	Blue	255	255		\$-						\$-	\$-	Link section Brand New Second Hand to Rocky Balboa
9	Goldilocks	Black	369	369		\$-	60%	\$9,963.00				\$9,963.00	\$9,963.00	Upgrade to Black and link into Three Monkeys
10	Highway to Dell	Blue	624	624		\$-						\$-	\$-	Shorten to link into new catch trail (Trail 46)
11	Horny Devil	Blue	2,421	1,905	516	\$1,508.00			\$15,080.00			\$15,080.00	\$16,588.00	Add 377m at start to link from Muffin Tops and 139m at end to link into Black Stump off road. Also potential at future date to repurpose last 741m of end to Green with Blue optional lines
12	Judderbars	Blue	903	903		\$-						\$-	\$-	
13	Lazarus	Blue	582	582		\$-						\$-	\$-	
14	Mercury St	Blue	1,858	1,784	74	\$296.00			\$2,960.00			\$2,960.00	\$3,256.00	Divert end to link into proposed trail node and repurpose last 179m to green linking into new trail from Gunjin Base (Trail 47)
15	Metasoma	Blue	1,195	1,115	80	\$320.00			\$3,200.00			\$3,200.00	\$3,520.00	Create new start from the proposed trail node
16	Mother-in-law	Green	1,300	900	400	\$5,200.00	60%	\$24,300.00	\$20,000.00			\$44,300.00	\$49,500.00	Repurpose to Green Climb with Blue optional lines which shortcut switchbacks and contain challenging TTFs
17	Muffin Tops	Blue	1,378	1,378		\$-						\$-	\$-	
18	Feral Groove	Blue	1,202	1,202		\$-						\$-	\$-	
19	Scorpion	Blue	2,008	1,719	289	\$1,156.00	30%	\$20,628.00	\$11,560.00	1	\$20,000.00	\$52,188.00	\$53,344.00	Realign bottom section to link into proposed trail node, add some optional Black TTFs near the beginning
20	Slippery When Dry	Blue	2,557	2,557		\$-						\$-	\$-	
21	Three Bears	Blue	1,140	745	395	\$1,580.00			\$15,800.00			\$15,800.00	\$17,380.00	Extend to start from Gunjin summit
22	Up Up And Away	Blue	1,239	1,239		\$-						\$-	\$-	
23	Lost n Found	Blue	720	720		\$-						\$-	\$-	Repurpose bottom 234m to Green as part of Trail 48
24	Camakazi	Blue	4,038	3,788	250	\$1,000.00			\$10,000.00	1	\$20,000.00	\$30,000.00	\$31,000.00	Extend end across creek with new bridge to link into Munda Bidli single trail
25	Rocky Balboa	Blue	995	995		\$-						\$-	\$-	
26	Lube Me Up	Blue	1,486	1,486		\$-						\$-	\$-	

Table 4: Opinion of probable cost for trails continued

ID	Name	Class	Total Trail length	Retained length	New Trail Length	Design Cost (\$4/m)	Extent of specific upgrades (%)	Upgrade existing Cost	Construction Cost (\$45-\$50/m)	No. Bridge	Total construction	TOTAL deisgn & construction	Notes	
27	Gunjin Scorpion link	Blue	505	505		\$-					\$-	\$-	Revisit once proposed trailhead constructed to ensure connections are logical	
28	Dugite	Blue	456	456		\$-					\$-	\$-	Retain as blue make single direction descent	
29	FJ	Blue	3,602	2,817	785	\$3,140.00			\$31,400.00		\$31,400.00	\$34,540.00	Make single direction and extend to link into Munda Biddi single Trail	
30	Joeys Line	Blue	805	805							\$-	\$-	Retain as blue make single direction descent	
31	Creek Trail	Blue	872	690	182	\$728.00			\$7,280.00		\$7,280.00	\$8,008.00	Realign western end to link into proposed trail node	
32	X Files	Blue	249	210	39	\$156.00			\$1,560.00		\$1,560.00	\$1,716.00	Make single direction and create new start point off Mundda Biddi single trail	
33	Apollo	Blue	306	306		\$-								
34	Flaccid Ashback	Green	2,403	2,403		\$-					\$-	\$-	Close first section to link into Gottysnobble rather than road	
35	Tangaroo Kick	Green	256	201	55	\$220.00			\$2,750.00		\$2,750.00	\$2,970.00	Reverse direction and divert each end into Horny Devil and Gridlocked	
36	Gottysnobble	Green	1,014	448	448	\$-					\$-	\$-	Reverse direction and link to Flaccid Ashback	
37	Shake, Rattle n Roll	Green	750	750		\$-					\$-	\$-		
38	Gridlocked	Green	1,391	1,391		\$-					\$-	\$-	Close last little bit to link to proposed link into Tangroo Kick	
39	Camel Train	Green	1,086	1,086		\$-					\$-	\$-		
40	Trail 40	Black	2,034		2,034	\$8,136.00			\$91,530.00		\$91,530.00	\$99,666.00	New Black descent	
41	Trail 41	Black	569		569	\$2,276.00			\$25,605.00		\$25,605.00	\$27,881.00	Coaching trail with push up track in same corridor	
42	Trail 42	Black	512		512	\$2,048.00			\$23,040.00		\$23,040.00	\$25,088.00	New Black descent sessionable with Highway to Dell	
43	Trail 43	Blue	971		971	\$3,884.00			\$38,840.00		\$38,840.00	\$42,724.00	New trail link from Camel farm to Dugite to enable Joeys line and Dugite to be single direction	
44	Trail 44	Blue	2,301		2,301	\$9,204.00			\$92,040.00		\$92,040.00	\$101,244.00	New trail to get riders back to the Camel Farm from the Dell	
45	Trail 45	Blue	209		209	\$836.00			\$8,360.00		\$8,360.00	\$9,196.00	New dual direction link from Dell to Lancaster and Metasoma	
46	Trail 46	Blue	691		691	\$2,764.00			\$27,640.00		\$27,640.00	\$30,404.00	New Apollo to Horny Devil Link	
47	Trail 47	Blue	600		600	\$2,400.00			\$24,000.00	1	\$20,000.00	\$44,000.00	\$46,400.00	New Blue catch trail to get riders off road
48	Trail 48	Green	933	179	754	\$3,016.00			\$37,700.00		\$37,700.00	\$40,716.00	New Dell to Gunjin Base, utilising last 179m of Mercury St	
49	Trail 49	Green	1,027	234	793	\$3,172.00			\$39,650.00		\$39,650.00	\$42,822.00	New Gunjin Base to Dell, utilising last 234m of Lost n Found	
50	Trail 50	Green	455		455	\$1,820.00			\$22,750.00		\$22,750.00	\$24,570.00	New Black Stump to Camel Train dual direction trail	
51	Trail 51	Green	1,602		1,602	\$6,408.00			\$80,100.00		\$80,100.00	\$86,508.00	New Green Climb linking Gunjin Base to Drago	
52	Trail 52	Green	833		833	\$3,332.00			\$41,650.00		\$41,650.00	\$44,982.00	New link from proposed Trail node to Gridlocked	
53	Trail 53	Green	566		566	\$2,264.00			\$28,300.00		\$28,300.00	\$30,564.00	New dual direction link from Black Stump to Gottysnobble and Tangaroo Kick	
	Munda Biddi	Blue	1,798	1,798		\$-					\$-	\$-	Munda Biddi single trail that forms apart of the MTB network	
	Kattamorda	Walk	6,930	6,217	713	\$2,852.00			\$35,650.00		\$35,650.00	\$38,502.00	Proposed to use 901m of former Munda Biddi Touring route and 2,500m shared with Munda Biddi	
Subtotal			71,776	51,313	18,665	\$84,400.00			\$189,735.00			\$843,795.00		
	Close and rehabilitate trail		731			\$-		\$7,310.00			\$7,310.00	\$7,310.00	Existing sanctioned trail to be closed	
	Close and rehabilitate unsanctioned trail within project area		12,443			\$-		\$124,430.00			\$124,430.00	\$124,430.00		
	Works to existing MTB trails to align to WA MTB guideline standard		47,073			\$-		\$329,511.00			\$329,511.00	\$329,511.00		
Construction Preliminaries (~12%)											\$208,419.68			
Subtotal											\$1,736,830.68	\$1,818,046.68		
Contingency (~5%)												\$90,030.11		
GRAND TOTAL												\$1,908,000.00		
Maintenance per annum (MTB Trails)											\$324,850.00			

Note: This estimate is based on trail alignment at concept plan level detail and currently available industry rates and prices. Trail design and construction is a specialised trade and costs are prone to fluctuation.

Infrastructure

Broad opinion of probable cost for proposed infrastructure is outlined in Table 6 below. Note these estimates are very broad and will need to be refined once investigations into carparking capacity and available space at each site is undertaken.

Table 6: Opinion of probable cost for infrastructure

Trailhead	Infrastructure	QTY	Rate	Unit	Total
Gunjin Base	150 space unsealed carpark	150	\$3,500.00	Park space	\$525,000.00
	Trailhead signage	1	\$10,000.00	Item	\$10,000.00
	Toilets (nominally 4 cubicle)	1	\$100,000.00	Item	\$100,000.00
Black Stump	Additional 10 car spaces	10	\$3,500.00	Park space	\$35,000.00
	Toilets(nominally 2 cubicle)	1	\$50,000	Item	\$50,000.00
	Upgraded pump track	1	\$100,000	Item	\$100,000.00
Farrell Grove	Additional 12 car spaces	12	\$3,500.00	Park space	\$42,000.00
Gunjin Road	Upgrade road	2	\$5,000.00	km	\$10,500.00
Trail nodes	Network map signage	7	\$5,000.00	Item	\$35,000.00
Directional signage	Allowed for nominally 1 every 2km for new trail	9	\$150.00	Item	\$1,350.00
Subtotal					\$908,850.00
Contingency (20%)					\$182,000.00
GRAND TOTAL					\$1,090,850.00



Volunteers ready for action (image source: KMBC)

Staging

The design of Kalamunda trail network allows for the staged delivery of the project. In the initial stage it is recommended to focus on works to upgrade existing trails to bring them in line with the WA MTB Management Guidelines, and key connections which will make the network more intuitive to ride. Subsequent stages will then focus on additional key links and proposed brand new trails. Table 7 and Map 28 outline details regarding recommended staging breakdown.

There is also potential for KMBC to be involved in implementing the concept plan. KMBC should be consulted in the detailed design phases and where appropriate may be able to undertake construction works alongside professional trail construction crews.

Note Table 7 doesn't include infrastructure costs. It is recommended that if the project is staged that infrastructure be included in stages as follows:

Stage 1

- Gunjin Road Upgrade

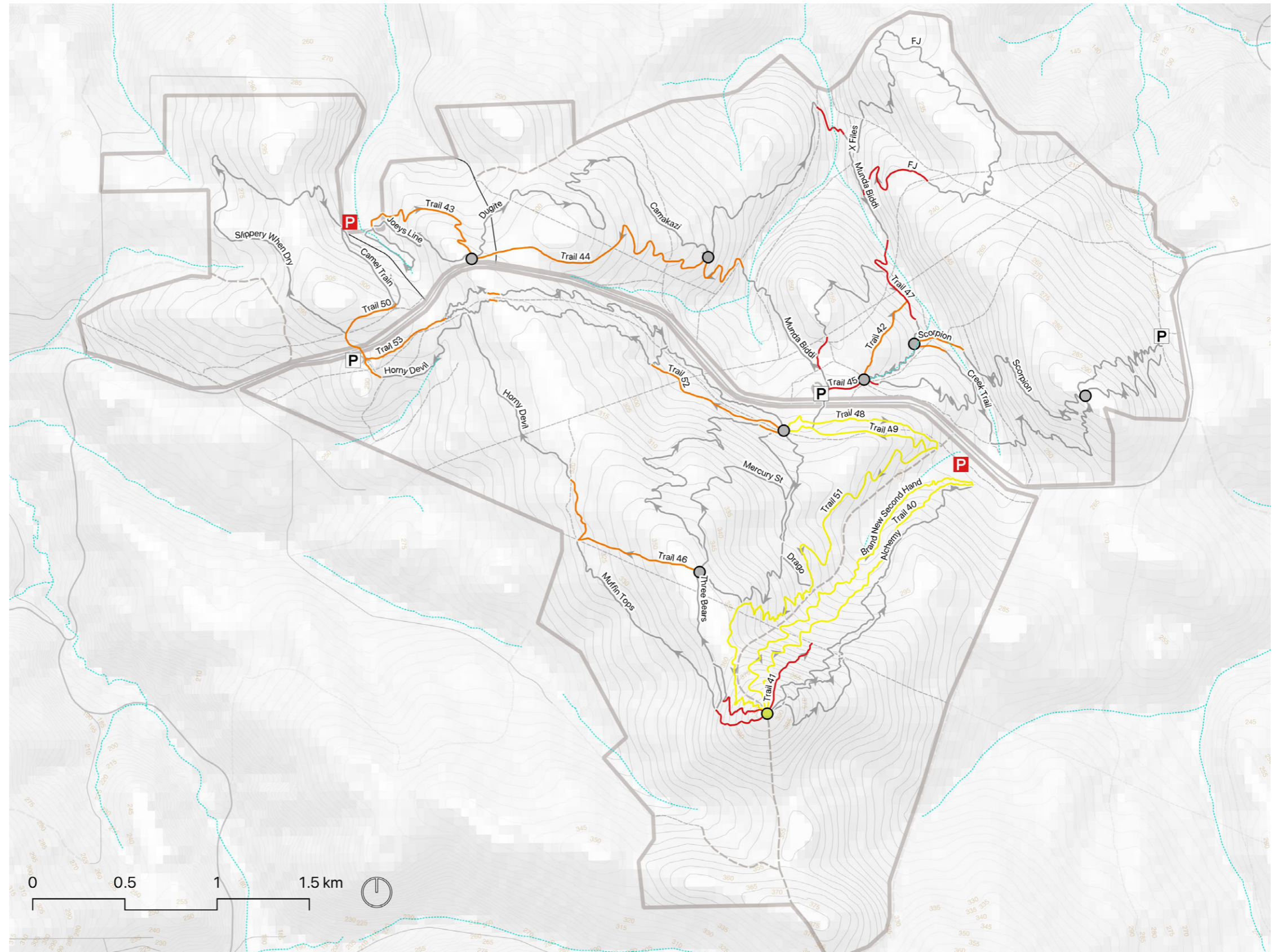
Stage 2

- Black Stump
- Farrell Grove

Stage 3

- Gunjin Base

Trail nodes and directional signage should be factored in as required across all stages.



MAP 28 - Kalamunda proposed trail indicative staging (note only sections of new trail are highlighted, refer to Table 7 for further detail).

Table 7: Opinion of Cost for trails breakdown by stage

ID	Name	Class	Total Trail length	Retained length	New Trail Length	Design Cost (\$4/m)	Extent of specific upgrades (%)	Upgrade existing Cost	Construction Cost (\$45-\$50/m)	No. Bridge		Total construction	TOTAL deisgn & construction
STAGE 1													
1	Lancaster	Difficult	1,133	943	190	\$760.00			\$8,550.00			\$8,550.00	\$9,310.00
2	Loco en el Coco	Difficult	1,343	1,343			20%	\$12,087.00				\$12,087.00	\$12,087.00
9	Goldilocks	Moderate	369	369			60%	\$9,963.00				\$9,963.00	\$9,963.00
15	Metasoma	Moderate	1,195	1,115	80	\$320.00			\$3,200.00			\$3,200.00	\$3,520.00
21	Three Bears	Moderate	1,140	745	395	\$1,580.00			\$15,800.00			\$15,800.00	\$17,380.00
24	Camakazi	Moderate	4,038	3,788	250	\$1,000.00			\$10,000.00	1	\$20,000.00	\$30,000.00	\$31,000.00
29	FJ	Moderate	3,602	2,817	785	\$3,140.00			\$31,400.00			\$31,400.00	\$34,540.00
32	X Files	Moderate	249	210	39	\$156.00			\$1,560.00			\$1,560.00	\$1,716.00
41	Trail 41	Moderate	569		569	\$2,276.00			\$25,605.00			\$25,605.00	\$27,881.00
45	Trail 45	Moderate	209		209	\$836.00			\$8,360.00			\$8,360.00	\$9,196.00
47	Trail 47	Easy	600		600	\$2,400.00			\$24,000.00	1	\$20,000.00	\$44,000.00	\$46,400.00
	Kattamorda	Walk	6,930	6,217	713	\$2,852.00			\$35,650.00			\$35,650.00	\$38,502.00
	Works to existing MTB trails to align to WA MTB guideline standard		47,073					\$329,511.00				\$329,511.00	\$329,511.00
	Construction Preliminaries (~12%)											\$75,775.36	
			SUBTOTAL			\$15,320.00						\$631,461.36	\$646,781.36
STAGE 2													
3	Luvin Shovels	Difficult	2,435	2,335	100	\$400.00	20%	\$21,015.00	\$4,500.00			\$25,515.00	\$25,915.00
11	Horny Devil	Moderate	2,421	1,905	516	\$2,064.00			\$20,640.00			\$20,640.00	\$22,704.00
14	Mercury St	Moderate	1,858	1,784	74	\$296.00			\$2,960.00			\$2,960.00	\$3,256.00
19	Scorpion	Moderate	2,008	1,719	289	\$1,156.00	30%	\$20,628.00	\$11,560.00	1	\$20,000.00	\$52,188.00	\$53,344.00
31	Creek Trail	Moderate	872	690	182	\$728.00			\$7,280.00			\$7,280.00	\$8,008.00
35	Tangaroo Kick	Green	380	380									
36	Gottysnobble	Green	448	448									
42	Trail 42	Difficult	512		512	\$2,048.00			\$23,040.00			\$23,040.00	\$25,088.00
43	Trail 43	Moderate	971		971	\$3,884.00			\$38,840.00			\$38,840.00	\$42,724.00
44	Trail 44	Moderate	2,301		2,301	\$9,204.00			\$92,040.00			\$92,040.00	\$101,244.00
46	Trail 46	Moderate	691		691	\$2,764.00			\$27,640.00			\$27,640.00	\$30,404.00
50	Trail 50	Easy	455		455	\$1,820.00			\$22,750.00			\$22,750.00	\$24,570.00
52	Trail 52	Easy	833		833	\$3,332.00			\$41,650.00			\$41,650.00	\$44,982.00
53	Trail 53	Easy	566		566	\$2,264.00			\$28,300.00			\$28,300.00	\$30,564.00
	Construction Preliminaries (~12%)											\$52,205.86	
			SUBTOTAL			\$29,960.00						\$435,048.86	\$465,008.86
STAGE 3													
6	Alchemy	Blue	1,516	1,516			30%	\$18,192.00				\$18,192.00	\$18,192.00
7	Brand New Second Hand	Green	2,351	1,250	1,101	\$4,404.00	60%	\$37,500.00	\$55,050.00			\$92,550.00	\$96,954.00
8	Drago	Green	1,400	794	606	\$5,600.00	60%	\$23,820.00	\$30,300.00			\$54,120.00	\$59,720.00
16	Mother-in-law	Green	1,300	900	400	\$5,200.00	60%	\$24,300.00	\$20,000.00			\$44,300.00	\$49,500.00
40	Trail 40	Black	2,034		2,034	\$8,136.00			\$91,530.00			\$91,530.00	\$99,666.00
48	Trail 48	Green	933	179	754	\$3,016.00			\$37,700.00			\$37,700.00	\$40,716.00
49	Trail 49	Green	1,027	234	793	\$3,172.00			\$39,650.00			\$39,650.00	\$42,822.00
51	Trail 51	Green	1,602		1,602	\$6,408.00			\$80,100.00			\$80,100.00	\$86,508.00
	Construction Preliminaries (~12%)											\$62,473.91	
			SUBTOTAL			\$35,936.00						\$520,615.91	\$556,551.91
Works to be completed progressively													
	Close and rehabilitate trail		731					\$7,310.00				\$7,310.00	\$7,310.00
	Close and rehabilitate unsanctioned trail within project area		12,443					\$124,430.00				\$124,430.00	\$124,430.00
	Construction Preliminaries (~12%)											\$17,964.55	
			SUBTOTAL										\$149,704.55
											SUBTOTAL	\$1,736,830.68	\$1,818,046.68
											Contingency (~5%)		\$89,953.31
											GRAND TOTAL		\$1,908,000.00



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