

A priority project for the City of Cockburn's Manning Park Master Plan

MANNING PARK MOUNTAIN BIKE TRAIL NETWORK CONCEPT PLAN

May 2020



MANNING PARK MTB TRAIL NETWORK CONCEPT PLAN

Prepared by Common Ground Trails Pty Ltd for City of Cockburn

SUPPORTED BY

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WestCycle

ACKNOWLEDGEMENTS

The authors of this 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 steering committee as well as the valuable input from, stakeholders, organisation representatives, users and individuals.

PHOTOGRAPHY

David Willcox – Common Ground

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EXECUTIVE SUMMARY

PROJECT OVERVIEW

Located in the City of Cockburn, Manning Park comprises terrain and character suited to development of a mountain bike trail network as has been identified in the Manning Park Master Plan and the Perth and Peel Mountain Bike Master Plan. The proposed development will create a tourism and recreation resource for visitors and residents of the City of Cockburn.

It is widely recognised that participation in activities in the outdoors is beneficial for general wellbeing. There are recognised physical, social and emotional benefits in participation in cycling. It is a fun, cheap (after initial outlay costs) and good for the environment. Once mastered, cycling is an easy activity to participate in and can be as intense a workout, or challenge, as is desired.

Recreational cycling facilities create fun and positive atmospheres within communities. Specifically designed facilities introduce a level of challenge into cycling, allowing children through to adults to develop new skills. All ages and all skill levels can generally learn and progress in the same location, gradually building up challenge and intensity.

PROJECT OBJECTIVES

The project objectives were defined by the Project Steering Group (PSG), and are intended to direct the development and implementation of the plan through all future stages. Key objectives include:

- Developing a state-of-the-art metropolitan mountain bike trail for the Cockburn region which is used as a demonstration project for Western Australia.
- Demonstrating excellent environmental, social & economic sustainability practice
- Recognising the existing importance and community value of the area
- Minimising the impact of mountain bike activity and ensure existing conservation values are protected, maintained and potentially enhanced in degraded areas through rehabilitation
- Ensuring all trail infrastructure and facilities are low maintenance

EXISTING CONDITIONS

Manning Park is popular with many local residents who walk their dog, walk and/or run for exercise, utilising both formal and informal trails. There is current use of informal trails and walk trails by people riding mountain bikes, and rampant creation of new informal trails. There is approximately 15km of existing trail in Manning Park that is unsanctioned or informal. These comprise fire management access tracks and informal user-created trails. These trails have not been formally planned or designed nor has their construction necessarily been in accordance with best practice. These trails have been taken into consideration in development of this concept plan and where deemed suitable both in terms of trail style and sustainable alignment incorporated into the proposed network.

Creation of unsanctioned trails often reflects demand in the community for these type of facilities. This concept plan for mountain bike trails in Manning Park seeks to formalise a trail network that is of a scope and scale which is big enough and technical enough to respond to the demand that local riders are seeking. As proven in locations such as Margaret River, provision of high quality formalised networks of purpose designed trails leads to reduced rates of informal trail creation.

Mountain bike trails are typically designed and signposted as single direction to eliminate risk of conflict with other oncoming mountain bikers. A code of conduct for the use of the trail system is also developed and communicated through signage to ensure a level of etiquette is maintained on the trails.

A program of revegetation is also recommended to rehabilitate dilapidated areas of the park, enhancing the park environment and improving the visitor experience.

ENGAGEMENT AND CONSULTATION

The Project Steering Group comprised representatives from the City of Cockburn, Department of Local Government, Sport and Cultural Industries, Department of Biodiversity, Conservation and Attractions, Western Australian Mountain Bike Association and Westcycle. This body was consulted in the early framework stages of the project.

Although broader engagement with the mountain bike community was not specified in the scope of works for concept development, a number of one on one meetings were held with local riders to discuss the proposal.

Engagement and consultation with surrounding residents and land owners was undertaken in development of the concept. Potential impacts have been taken into consideration in the design of the trail network layout. The proposed staging of development of the trails allows time for this critical consultation to occur as trails with little potential impact on neighbours are progressing.

PROPOSED MOUNTAIN BIKE NETWORK

The proposed mountain bike trail network at Manning Park features a range of descending focused Cross Country (XC) trails and some Park (PK) trails in the northern and southern quarries. It is based on a stacked loop design, which includes a series of loop trails radiating successively from the trail head and a series of trail nodes providing users with a range of short, medium and long loop options.

The Manning Park trail system comprises a range of individual style networks to cater for the diverse range of landscapes and riding opportunities in the project area. These opportunities include;

- Beginner Loop – Emanating from the trail head a beginner trail provides a loop for novice riders and also serves as a connection between network focus points. This trail is also proposed to be designed to cater for adaptive cycle use.
- Intermediate Technical Loop – Set off the beginner loop on the steeper slopes, caters for intermediate riders seeking a tight and technical XC trail.
- Northern Quarry Park Zone – Emanating from the primary trailhead a challenge bike park featuring pump track, jump track, jump line and earn to ride track in a range of easy, moderate and difficult sessionable trails.
- Pump Track and Jump lines – Optional pump track and jump lines which would cater for beginners through to advanced riders and allow for technique progression.

STAGING AND COSTS

The design of the Manning Park trail network allows for the staged delivery of the project. In early stages a focus should be applied to high use and strategic trails, as well as trails which can be used in event scenarios.

Stage One focuses on the southern half of the network and provides beginner and intermediate loop options. Stage Two focuses on the northern half of the network, completing the range of trail styles on offer and extending the loop options. Staging the delivery of the network in this way will enable time for further detailed consultation with residents and land owners adjacent the northern end of the park ensuring any potential impacts are mitigated. Indicative costs for each stage are outlined below.

Although the staging and opinion of costs is different to that as outlined in the Manning Park Master Plan this concept plan has looked at the overall layout, staging and costs in more detail and recommends two stages with estimated costs overall considerably lower and outlined below. Given that funding for the Manning Park Master Plan is allocated over a 10 year timeframe it is suggested that Stage 1 be completed within 5 years and Stage 2 be completed following the completion of Stage 1. If alternative or additional funding sources, such as grants, become available construction may be able to be commenced and completed earlier.

		LENGTH	DESIGN	BUILD	TOTAL
STAGE1	CROSS COUNTRY NETWORK	5,229	\$13,073	\$315,495	\$328,568
	SOUTHERN QUARRY PARK	2,320	\$7,460	\$247,950	\$255,410
	STAGE 1 TOTAL		\$20,533	\$563,445	\$583,978
STAGE2	CROSS COUNTRY NETWORK	5,605	\$8,013	\$188,900	\$196,913
	NORTHERN QUARRY PARK		\$130,913	\$1,553,900	\$1,684,813
	STAGE 2 TOTAL		\$138,925	\$1,742,800	\$1,881,725
	GRAND TOTAL		\$159,458	\$2,306,245	\$2,465,703

OVERALL TRAIL NETWORK

TYPICAL LEGEND

Trails

- Proposed Easy - Green Circle
- Proposed Moderate - Blue Square
- Proposed Difficult - Black Diamond
- Proposed Extreme - Double Black Diamond
- Proposed Walk Trail

Park Area

TRAILHEADS

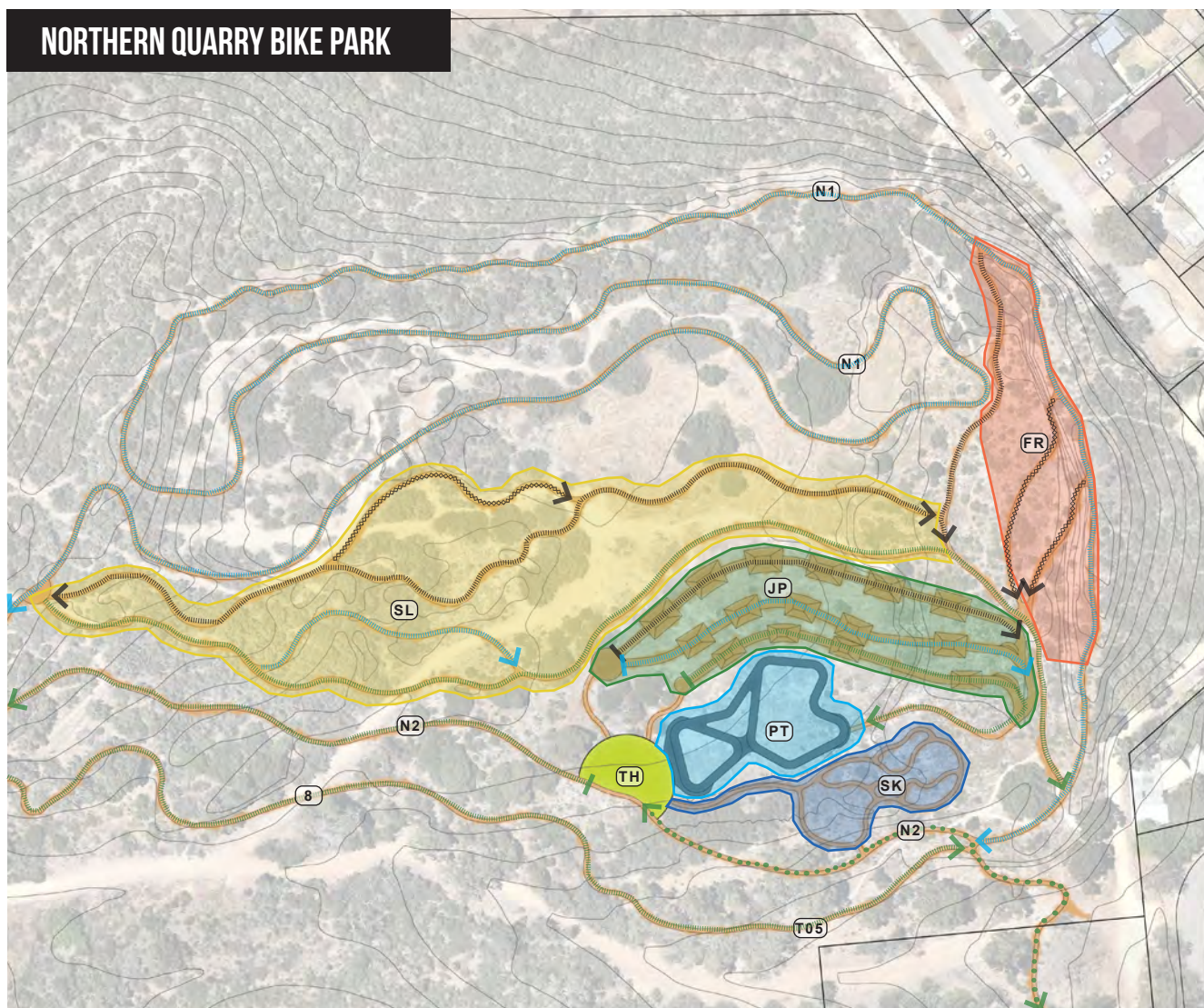
- Car Park
- Decision Point
- Primary
- Secondary
- Lookout point
- 1m Contour
- ▨ Road Reservation

CROSS COUNTRY TRAIL PRECEDENTS



MANNING PARK MOUNTAIN BIKE TRAIL NETWORK CONCEPT PLAN

NORTHERN QUARRY BIKE PARK



NORTHERN QUARRY PARK PRECEDENTS

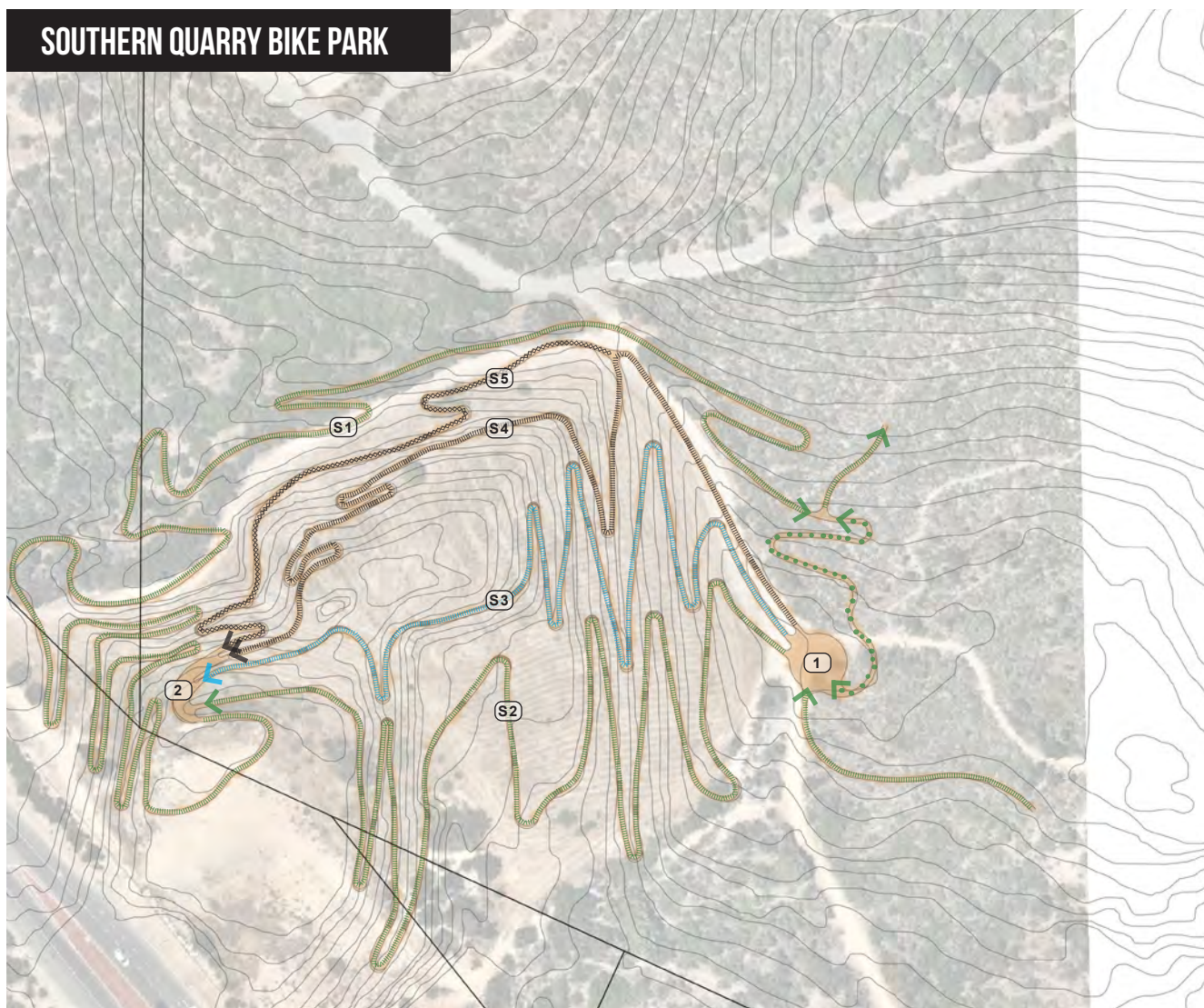


- (TH)** Trail Head including shelter, furniture, signage & learn to ride track
- (PT)** Pump Track
- (SK)** Skills Area & Bike Playground
- (JP)** Dirt Jump lines including green, blue, black and double black options
- (SL)** Slopestyle jump lines including green, blue, black and double black options
- (FR)** Freeride lines to be black or double black options depending on terrain opportunities

- (N1)** Blue Quarry XC Trail
- (T05)** Green descent trail
- (T06)** Green trail connecting to ridgeline loop
- (N2)** Green Park Up Trail

- Green classification trail/features
- Green multidirection classification trail/features
- Blue classification trail/features
- Black classification trail/features
- Double Black classification trail/features

SOUTHERN QUARRY BIKE PARK



SOUTHERN QUARRY PARK PRECEDENTS



T14 Green Ridge Loop

- ① Trail Head including signage, open space for gathering/pulloff for groups and seating
- ② Re-grouping point at base of descents before the climb back up
- S1 Green climb – 3.5% avg gradient, 850m long
- S2 Green air flow descent – 5.1% avg gradient, 590m long
- S3 Blue air flow descent – 7.8% avg gradient, 385m long
- S4 Black air flow descent – 9.5% avg gradient, 315m long
- S5 Double black air flow descent – 12.2% avg gradient, 180m long

Green classification trail/features

Green multidirection classification trail/features

Blue classification trail/features

Black classification trail/features

Double Black classification trail/features

MANNING PARK MOUNTAIN BIKE TRAIL NETWORK CONCEPT PLAN

WHAT IS MOUNTAIN BIKING

Mountain biking styles are diverse, but principally involve cycling off-road on a variety of unsealed surfaces, typically through a natural setting.

Although mountain biking can be undertaken in wide open spaces, it usually involves manoeuvring through specifically designed trails which encounter obstacles such as trees, rocks, man-made structures and other technical trail features. To allow riding in these conditions mountain bikes are robust and typically have wide tyres, suspension and an upright riding position.

Mountain biking is a great way to experience the outdoors and connect with the landscape, and people of all ages and abilities participate in the activity. Mountain biking is usually highly accessible and can deliver significant environmental, social, health, cultural and economic benefits.

Mountain biking is engaged in competitively (including as an Olympic sport) and has various styles of racing, some of which have world championships managed by the Union Cycliste Internationale (UCI).

Mountain biking is considered an adventure recreation, although not all riding opportunities fit into this description. It is a relatively new activity that is experiencing rapid growth in popularity throughout the world.

WHO ARE MOUNTAIN BIKERS

Mountain bikers are often misrepresented in the wider community as the younger adrenaline junky stereotype. However, there have been numerous studies into the demographics and profile of typical mountain bikers, which dispel this illusion.

From an economic and tourism perspective, mountain bikers are typically high yield, and willing to travel domestically and internationally to experience new trails and participate in events. Mountain bikers also make a significant volunteer contribution to trail care. Recent market research suggests that mountain bikers are:

- Mostly male (however women are a rapidly increasing market segment)
- Predominantly between the ages of 25–44
- Relatively affluent with high household incomes
- Generally well educated
- Participate frequently and over the long term
- When travelling for mountain biking, the average stay at each location 3 to 5 days, and the average spend per day is between \$60 and \$100 (accommodation, food, recreation, excluding travel cost to get to a destination) (Pinkbike, 2016).

Mountain bike trails are enjoyed by a diverse range of user types, who have varying motivators, needs and expectations.

The profiles below provides a brief overview of the various user types, the experience they seek and their market potential.

SUCCESS FACTORS FOR MOUNTAIN BIKING

Mountain biking has traditionally been undertaken as a recreation activity, however there is a rapidly growing trend toward mountain bike tourism. Mountain bike trails have the potential to capitalise on the domestic and international visitor markets. Building on the existing supply of mountain bike trails, the result of decades of volunteer and community efforts, can provide immense economic benefits to communities.

While there is enormous potential to attract mountain bike markets to visit specifically to undertake the activity, it is essential to understand the success factors for developing a mountain biking location.

Mountain biking can be a primary motivator for travel or an activity undertaken whilst a traveller is visiting an area for another primary purpose. Recreational mountain bikers are drawn to high quality trails in scenic landscapes.

Successful mountain bike developments must have the appropriate scale and level of significance.

Nationally significant locations capture the tourism market for at least a week of unique riding and can provide a large recreation resource for a major population centre. They must be developed to cater for international, interstate and intrastate tourism as a priority.

Regionally significant locations cater for tourism short breaks or weekend trips and can provide a recreation resource to larger communities. They should be developed primarily to cater for interstate and intrastate tourism use and community based trail use.

Regions aspiring to develop mountain bike tourism should ensure the following are considered and adequately planned for:

- Mountain bike specific product – trails and infrastructure, commercial services
- High quality, diverse, iconic, scenic trail experiences
- Marketing and promotion – experience packaging
- Events
- Visitation and accessibility, accommodation, attractions and activities
- Revenue generation
- Unique experiences
- A positive destination image
- Partnerships and political support

Mountain bike tourism is growing globally, and a number of states in Australia are starting to invest in dedicated mountain biking and cycle tourism products. Tasmania is one of the most recent success stories, investing approximately \$3 million in the development of a world class mountain bike network in Derby in 2013, which is forecast to see a return on investment of more than \$30 million per year.

A number of international destinations, such as Whistler in Canada, Rotorua in New Zealand and the 7 Stanes in Scotland, have been attracting mountain bike tourists for many years. Ride Cairns is currently Queensland's only mountain biking destination that can be marketed to the tourism market, when benchmarked against national and international standards.

If trails are planned, developed and promoted appropriately, it is likely that people will travel for mountain biking.

TRAIL DEVELOPMENT & MANAGEMENT

Increased use of existing facilities, as well as poor trail design and construction, can lead to accelerated deterioration of trails and higher resourcing requirements for ongoing maintenance. In many instances, volunteer trail groups are delegated some of the management and maintenance responsibilities, strengthening relationships between land managers and the mountain biking community.

The standards to which trails are maintained is influenced by available resources and the skill and experience of the parties undertaking the work. It can be challenging for land managers with limited or no mountain bike trail experience to set appropriate standards. Some land managers employ professional trail builders to undertake routine trail maintenance. However, there is no existing professional certification framework and curriculum to identify minimum qualifications of trail builders.

Funding for trail maintenance is often difficult to source, and is rarely provided through grant funding. Grants are usually limited to capital works. Other options for funding include:

- Club membership fees and fundraising activities
- Corporate sponsorship and advertising
- Event contributions
- Local government contributions
- Revenue generation from commercial models

Scarcity of resources places increased pressure on land managers and volunteers who maintain trails, and as a consequence, often maintenance requirements cannot be met. A number of respondents to user surveys state that many existing facilities were in need of improved maintenance. The impacts of poorly maintained trails can be significant for user safety and experience, as well as the environment.

Development of appropriate trails through sustainable planning, design and construction practices will minimise long term maintenance and resourcing requirements. As part of the development process, a trail management and maintenance plan should be developed to inform life cycle costing of the new facility prior to construction.

It is important to clarify and formalise roles and responsibilities of 'trail owners' and 'trail operators'. The trail owner is the entity that owns the physical structure of the trail and is usually the land owner or manager where the trail is located. The owner carries liability for the health and safety of all trail users. The trail operator is the entity that maintains the trails to the agreed standards of the owner.

CHALLENGES FOR LAND MANAGERS

Council and state managed reserves are under pressure from the growing popularity of mountain biking and population growth.

There are a range of issues and challenges for land managers in managing the growing demand for mountain biking and visitor expectations. Broad challenges identified through consultation with land managers include:

- Catering for single-use mountain bike trails, while balancing the needs of other user groups
- Balancing conservation or public health values and recreation values in parks and reserves
- Growing demand and lack of supply for new styles of mountain biking
- Growing number and variety of events, and the impacts of events on trails (e.g. mountain bike trails used by multi-sport racing and mountain bike racing)
- Management and prevention of unsanctioned trail development
- Management models are heavily reliant on community and volunteer champions and resources
- Limited availability of funding for maintenance
- Lack of standards for maintenance and construction

OVERVIEW



PROJECT OVERVIEW

The Manning Park Mountain Bike Trail Network Concept Plan is a response to the endorsed Manning Park Master Plan. Action 33 of the Master Plan recommends a mountain bike concept plan is developed to further rationalise and identify suggested trails within Manning Park.

The concept plan includes proposed locations of trail heads, trail types, indicative corridors as well as integration and links with existing or proposed facilities. Upgrades and modifications to existing and proposed infrastructure is recommended to provide visitors with trail and interpretive information and how to host mountain bike events at the park. Recommendations have been made to implement design and construction techniques to protect the sensitive environment and biodiversity in Manning Park. Consideration has been given to re-using and repurposing existing trails, where possible, to reduce the need to clear vegetation for new trails and associated infrastructure. Where new trails are proposed, the quality and style of trail is vital to ensure mountain bikers utilise these trails rather than creating more informal unsanctioned trails.

DESCRIPTION OF PROJECT AREA

Manning Park is located approximately 25km South West of Perth (refer to figure 1). The Manning Park reserve, part of the Beeliar Regional Park, encompasses Manning Lake and a limestone ridge to the west of the wetland. The reserve is home to diverse flora and fauna within the lake and its surrounding wetland areas. Within the landscaped open spaces and recreation areas there are picnic and barbeque facilities. The existing Davilak walk trail traverses the ridge with views of Cockburn Sound and the Perth CBD from multiple lookouts, and a dual use pathway circles Manning Lake. The reserve also contains the Davilak Ruins, Alan Thomas Music Shell, the Azelia Ley Homestead Museum as well as an amenities building, playground and multiple formal parking nodes. The combined area is a vibrant recreation destination, which suits the development of the proposed mountain bike facility.

Successful trail network planning, design and management is dependent on the understanding of:

- Facilities and infrastructure
- Land use, tenure and management considerations

- Landscape
- Natural values and environmental protection
- Cultural values and Aboriginal and European heritage protection
- Existing recreational use, demand and conflicts
- Consultation requirements

LOCATION & ACCESS

Manning Park is located in the City of Cockburn and is bordered by Cockburn Rd to the west, Spearwood Ave to the south, Gorham Way, Glenister Rd, Janson Rd, Claygate Rd and Southend Rd to the east and Nunn St and Whitton St to the North. Currently commercial property lies along the western boundary and residential property lies to the east and south of the site.

The current formal access to the site for vehicles is limited to the lake and parkland area however informal parking occurs throughout the park and along adjacent street verge. Current pedestrian access from the suburbs to the east is good. Access from the west is less utilised given the land use, topography and the volume of traffic on Cockburn Rd.

A gazetted road reserve runs down the western boundary. The City has noted that this road is not supported and designs are unlikely to be progressed in the current alignment. This land is currently managed as a part of Manning Park. This Manning Park Master Plan and this concept plan have been prepared based on the assumption that this road reserve will be formally included within the Park in the future. Prior to construction of any trails within the road reservation the City will seek approval from the Western Australian Planning Commission.

PLANNING CONTEXT

The proposed Manning Park mountain bike trail network forms a significant component of the development of the Perth Metropolitan Region as a mountain biking destination, recommended within the Perth and Peel Mountain Bike Master Plan (WestCycle, 2016).

A number of additional areas surrounding Manning Park also have the potential mountain bike trail development and strategic connections to these areas have been considered as part of this concept plan.

The available opportunities have the potential to establish the City of Cockburn as a regionally significant location for mountain biking with more than 30km of mountain bike trail.

The Western Australian Mountain Biking Strategy and the PPMP both identified the significant demand and opportunity for urban mountain bike trails and facilities within the Perth metropolitan region. The development of the Manning Park network will contribute toward addressing this objective through provision of highly accessible mountain bike trails in proximity to other popular recreation opportunities.

In accordance with the Western Australian Mountain Bike Management Guidelines (2019, DBCA), (WAMTBMG), a Framework was developed to define project objectives, target market and user types. Terminology and definitions are provided in the guidelines.



Figure 1: Project location



MANNING PARK MOUNTAIN BIKE TRAIL NETWORK CONCEPT PLAN

PROJECT OBJECTIVES

The following project objectives were defined by the Project Steering Group (PSG), and are intended to direct the development and implementation of the plan through all future stages.

- Developing a state-of-the-art metropolitan mountain bike trail for the Cockburn region which is used as a demonstration project for Western Australia.
- Demonstrating excellent environmental, social & economic sustainability practice
- Recognising the existing importance and community value of the area
- Promoting health and wellbeing through the provision of a new outdoor facility that connects the community to nature based activities
- Minimising the impact of mountain bike activity and ensure existing conservation values are protected, maintained and potentially enhanced in degraded areas through rehabilitation
- Ensuring all trail infrastructure and facilities are low maintenance
- Enhancing and increasing the use of existing facilities and connectivity to existing trail networks
- Developing a universally accessible mountain bike trail
- Developing a strong governance model with a sense of community ownership & participation. Considering provision of trails for other user groups and minimising the potential for conflict between various park users
- Integrating with other recreation pursuits such as BMX, bush walking
- Ensuring limited risk and user safety through appropriate design and excellent communication
- Providing accessible, user friendly, fun and enjoyable mountain bike trails and facilities
- Create a network of purpose designed mountain bike trails which respond to riding community demand and desires, effectively discouraging informal trail development.

TARGET MARKET AND USER TYPES

DEMAND AND MARKET ANALYSIS

The proposed development will create a tourism and recreation resource for visitors and residents of the City of Cockburn. The Perth and Peel Mountain Bike Master Plan identified that connections to the proposed Railway Reserve Trail, Woodman Point Camp School and the City of Fremantle would promote formal recreation and tourism utilisation of the trail network.

The objectives of the development include developing a state-of-the-art metropolitan mountain bike trail for the Cockburn region which is used as a demonstration project for Western Australia. This will be achieved by providing a range of high quality trails. The trails will need to cater for:

- The needs of people of all abilities, in alignment with the City of Cockburn's Disability Access and Inclusion Plan
- Leisure market seeking additional activities and opportunities in the area
- Predicted increase in the enthusiast market seeking new trails in the Perth region
- Existing users of Manning Park
- Increasing number of local and travelling school groups

TARGET USER GROUP DEMOGRAPHICS

Determining the target market and demand for mountain bike facilities in Manning Park involves exploring local demographics as well as the potential demand from the existing local mountain bike enthusiast market.

A primary focus is catering for the leisure market via strategic connections to existing and planned trails and paths. Leisure users include general trail users of all ages and abilities and is potentially the largest market. Typically they use trails infrequently, have limited experience on trails and require very accessible experiences. They are not members of clubs and they are more likely to use highly accessible routes close to home or key

destinations. They will make the journey to trail facilities with amenities and services such as bike hire, cafes and toilets. This group will generally seek the easiest classification trail.

Due to a distinct lack of existing urban mountain bike trails, Manning Park may also see significant demand for trails from the enthusiast market, being day trip visitors in the Perth region (WestCycle, 2016). Enthusiasts are purely recreational mountain bikers with moderate skills and variable fitness, and ride weekly. They are typically aged 29-49 and form the existing market majority. They typically don't compete in events and they possess limited outdoors experience. They prefer trails with good trail signage and seek technical but not too challenging trails. Enthusiast mountain bikers are the most likely to take short breaks to different areas. This group will generally seek easy and moderate classification trails. As they progress, they will start to ride difficult classification trails.

A secondary focus is on catering for the sport cohorts within the greater trail network and event-specific facilities. Topography and value of landscape, and historical use of the site dictate that cross country style mountain bike events are appropriate.

The primary use of the trail network will be for recreation. Trails should be linked appropriately to potential event staging areas, spectator access and facilities to allow for ongoing use of the area for mountain bike and other events. Impacts of viewing areas for spectators must be considered. Non spectator based events (such as long distance events) may be appropriate where it can be demonstrated they will not have a negative effect on the landscape.

Due to its location and proximity to high population centres, high level of accessibility, and its regional significance as an urban mountain bike park, it is likely to be popular with the typical leisure and enthusiast demographic in the Perth area.

TRAIL SYSTEM

The trail system is to incorporate the following design principles:

- Stacked loop trail network
- 100% single MTB use (no shared/multi use)
- Single direction
- Provide a range of trail classifications for the network:
 - Green (easy) 50%
 - Blue (moderate) 50%
- Consider alternate lines and optional technical features to increase difficulty of trails.
- Multiple trail opportunities allowing for different riding lengths and difficulty.
- Maximise opportunities for event use with continuous, non-compounding trail allowing for events and which considers the circulation of the existing trail network.
- Consider event specific infrastructure requirements and ensure day use infrastructure allows for it. Pop-up/container infrastructure facilities for events are a good option only requiring space onsite.

STYLE

The trails will comprise primarily cross country (XC) style trails as well as some park (PK) style trail, including skills features. The trails will cater for a wide range of ability levels, and will include easy and moderate classifications. The network design should identify options for the inclusion of trails to cater for offroad hand cycles and other mobility equipment.

SCOPE AND SCALE

Manning Park comprises approximately 110 hectares of reserve space, however due to alternate uses and proposed road realignments much of the area is inappropriate for mountain bike trail development. A preliminary 60-hectare area, excluding buffer zones, has been identified for potential to develop trails within.

There is potential to develop 5-15km of singletrack trail and park type facilities within the identified area. The Master Plan for the park located a pump track adjacent the carpark and playground which has been reviewed and relocated adjacent to other similar facilities in the north quarry.

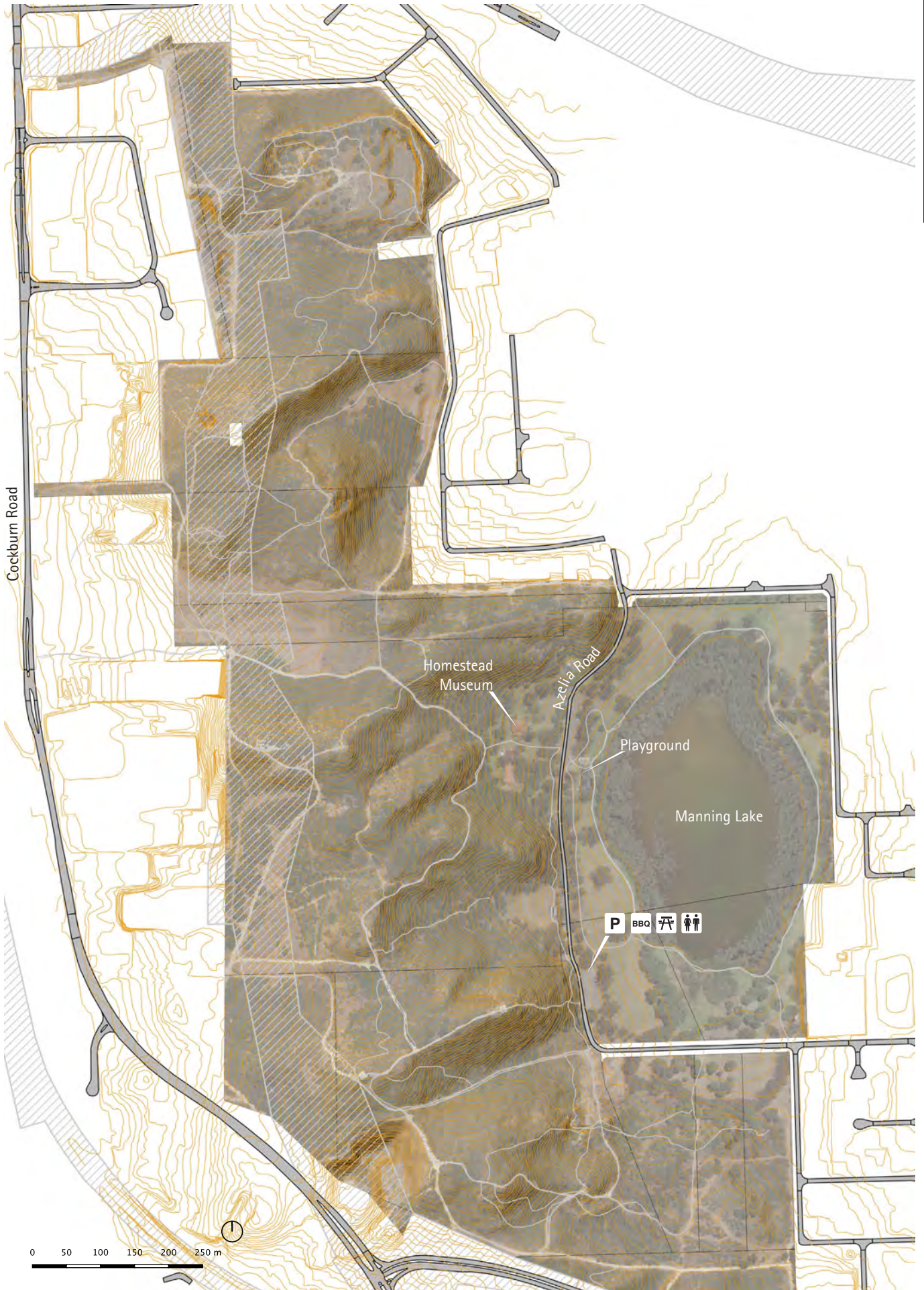


Figure 2: Project Area

MANNING PARK MOUNTAIN BIKE TRAIL NETWORK CONCEPT PLAN

BENEFITS MOUNTAIN BIKING PROVIDES TO THE COMMUNITY

Sustainable mountain biking development can deliver environmental, social and economic benefits to individuals and communities. There are numerous opportunities for the City of Cockburn to leverage these benefits for the broader community.

ECONOMIC BENEFITS

Broadly, mountain biking can provide the following economic benefits:

- Increase visitation and extend length of stay in communities.
- Spend in regional communities.
- Economic diversification in areas experiencing decline in traditional industries and population.
- Decrease costs associated with adverse health impacts.

Mountain biking tourism is a growing trend and acts as a catalyst for economic development. People travel to various destinations around the world to experience mountain biking (Research and Markets, 2017).

In recent years, Western Australia has experienced significant economic downturn, following high employment growth during the commodity boom. The reliance in parts of Western Australia on export-led mining and subsequent market downturn has had adverse impacts on unemployment rates and house prices.

Considered investment in mountain biking trails and facilities can have significant return on investment in the form of economic development, as well as decreased costs associated with physical and mental health issues.

The following case study on Blue Derby demonstrates these economic opportunities, which have the potential to provide similar benefits in across Western Australia, where there is significant opportunity to develop mountain biking.

ENVIRONMENTAL BENEFITS

Broadly, mountain biking can provide the following environmental benefits:

- Well planned and managed trails increase access to natural areas for recreation whilst protecting environmental values.
- Trails increase community ownership and connection with natural areas, creating stewards for long term conservation outcomes.
- Strategic planning of mountain biking facilities to cater for the full spectrum of opportunities can prevent the development of user built unsanctioned trails in unsuitable environments.
- Passive surveillance provided by trail users can reduce antisocial behaviour and illegal dumping of waste in natural areas.

Growing populations are increasing pressure on land and biodiversity, impacting on air quality, water quality and significant environmental values.

Creating opportunities in cities and urban areas for everyday interactions with nature provides an unparalleled opportunity to reconnect people with biodiversity. As tools for conservation, trails preserve important natural landscapes, provide needed links between fragmented habitats and offer opportunities for protecting plant and animal species (Trails and Greenways Clearinghouse).

The provision of well planned and managed mountain bike trails in natural areas, particularly in areas currently and forecast to experience high population growth and expansion, has the potential to positively contribute to conservation efforts and preservation of natural areas in Western Australia.

SOCIAL AND HEALTH BENEFITS

Broadly, mountain biking can provide the following social and health benefits:

- Opportunities to socialise with friends and family.
- Engagement in the community.
- Increased participation in healthy outdoors activity.
- Increased self-efficacy, risk evaluation and problem solving in children.

Worldwide, children are spending much less time outdoors and engaged in unstructured play compared to indoor time or screen time (P.Starling, 2011).

Physical inactivity, obesity, cardiovascular disease and diabetes all significantly contribute to chronic diseases and reduced life expectancy. Over 60% of adults, and 24% of children in Queensland are overweight or obese (Australian Bureau of Statistics, 2014–15).

The importance of regular physical activity to the health and wellbeing of adults, and in prevention of chronic diseases, is well established. *Australia's Physical Activity & Sedentary Behaviour Guidelines* (Australian Department of Health, 2012) for Adults (18–64 years) recommend accumulating at least 2.5 hours of moderate intensity physical activity each week. The Guidelines for Children aged 5–12 years recommend at least 60 minutes of moderate to vigorous intensity physical activity daily.

Community surveys conducted identify the most common reasons for participating in mountain biking are mental health benefits, improving general health and wellbeing, fitness and social interactions. An assessment of the existing mountain bike trail networks in Western Australia identified that the majority cater for approximately 1–2 hours of ride duration.

Increased participation by children and adults in mountain biking has the potential to reduce the risk of physical and mental health problems adversely affecting West Australians.

THE RISE OF BLUE DERBY

Blue Derby in Tasmania is a case study for the success of mountain bike tourism in achieving economic benefits for local communities. The Tasmanian Cycle Tourism Strategy aims to establish Tasmania as the cycle tourism capital of Australia, and is backed by a \$6 million fund.

After suffering a decline in traditional mining and forestry industries, the rural township of Derby has been revitalised by the investment in more than 80km of purpose built mountain bike trails. Offering a range of experiences through pristine bushland on the town's doorstep, the 'Blue Derby' mountain bike tourism destination is widely regarded as the mountain bike capital of Australia, its closest rivals located across the ditch in New Zealand. In 2017, the Blue Derby trails were voted by professional mountain bikers as the best in the Enduro World Series (EWS) competition. This was the first time a stage of the EWS was held in Australia.

The \$3.1 million, 80km network is reportedly attracting more than 30,000 visitors every year, who spend four to five nights in Derby then another five nights elsewhere in Tasmania. The return on investment has been estimated at \$30 million per year. A \$2.5 million Federal Government grant enabled the project, aiming to develop a new industry to help the region recover from the collapse of the forestry industry.

Further investment is planned for Stage 2, a 66km network south of St Helens, including an iconic Bay of Fires Descent Trail.

The township of Derby has largely embraced the opportunities provided by mountain biking, with the development of new food and beverage outlets, accommodation and bike stores.

Programs have been established to provide local disengaged youth the opportunity to experience mountain biking in Blue Derby. The experiences have been transformative for young people in St Helens, who have limited alternative options for recreation. The programs provide them

with an appreciation of the natural environment, personal health and wellbeing benefits, as well as career options in adventure guiding, mountain bike maintenance and tour guiding.

While there has been immense success in terms of economic longevity of the town, some local residents have expressed their concerns and fears that the new mountain biking culture has displaced the more traditional values of the town and its people. The case has highlighted the importance of community engagement and consultation in the development process, to ensure old and new industries can co-exist harmoniously.

Building on the success of Blue Derby, Stage 1 of the \$4.1 million, 100km+, Wild Mersey Mountain Bike Development in the North West of Tasmania, catering for more beginner and family experiences, commenced construction in 2018. The North West is predicted to attract over 138,000 new visitors, and create 51 full time jobs, contributing \$6.88 million to the economy.

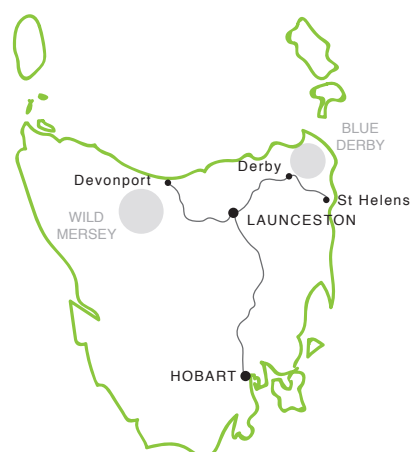


Table 1. Planning and Development Timeline

Partners	Planning	Funding
Multiple State Government Departments	2002 – Trails Tasmania Strategy	2013 – \$2.45 million funding towards mountain bike trails in North East Tasmania – Australian Government's Regional Development Australia Fund.
	2004 – Northern Tasmania Regional Recreation Trails Strategy	
	2005 – Mountain Biking in Tasmania: A summary of current trends and future opportunities	
Multiple Local Government Agencies	2005 – Cycling Tourism in Great Western Tiers	\$550k investment from other project partners.
	2007 – IMBA Hollybank Concept Plan	
	2008 – Mountain Bike Tourism – Market Profile for Tasmania	
Private sector	2009 – Tasmania Mountain Bike Plan	2017 – \$6 million for cycle tourism in Tasmania – Department of State Growth
	2009 – Tasmania Mountain Bike Marketing Strategy	
	2011 – Mountain Bike Tourism Potential in Northern Tasmania	
Mountain Bike community	2012 – North East Tasmania Trail Development Region Planning	2018 – Funding for Wild Mersey Stage 1 announced: \$300k Federal Government, \$600k State Government, \$200k Local Governments
	2012 – North Eastern Mountain Bike Development Project Discussion Paper	
	2013 – Potential for Mountain Biking in North Eastern Tasmania	
Event promoters	2013 – Hollybank Mountain Bike Facility Master Plan	2018 – Labour Government commitment to \$4 million statewide Tracks and Trails Community Grants Program over three years
	2013 – Blue Derby Concept Design	
	2013 – North Eastern MTB Development Business Case	
Local business	2015 – Opening of Blue Derby Stage 1	
	2016 – Opening of Blue Tier descending trail, Derby	
	2016 – Planning and Economic Modelling, Blue Derby Stage 2	
	2017 – Tasmanian Government Cycle Tourism Strategy	
	2018 – Wild Mersey Mountain Bike Trails Development	



UNSANCTIONED TRAILS

There is approximately 15km of existing trail in Manning Park that is unsanctioned or informal. These comprise fire management access tracks and informal user-created trails. These trails have not been formally planned or designed nor has their construction necessarily been in accordance with best practice. These trails have been taken into consideration in development of this concept plan and where deemed suitable both in terms of trail style and sustainable alignment incorporated into the proposed network.

Creation of unsanctioned trails often reflects demand in the community for these type of facilities however the haphazard and uninformed nature of informal trail creation can lead to significant impacts on environmental and heritage values, impacts that are evident in Manning Park.

This concept plan for mountain bike trails in Manning Park seeks to formalise a trail network that is of a scope and scale which is big enough and technical enough to respond to the demand that local riders are seeking. As proven in locations such as Margaret River, provision of high quality formalised networks of purpose designed trails leads to reduced rates of informal trail creation.

In Margaret River unsanctioned trail creation was rampant prior to the Compartment 10 network being built and the Creek Trails being adopted and improved by the community. Since these developments unsanctioned trail creation has almost ceased. Key to achieving this has been creation of a diverse trail network containing a range of styles and classifications to suit larger range of users.

REVEGETATION

Alongside development of the mountain bike trail network there is opportunity to implement a program of revegetation works, to rehabilitate areas of environmental damage caused by unsanctioned trail creation as well as enhancing the park environment and improving the visitor experience. A collaborative and coordinated approach between the City of Cockburn, Parks and Wildlife and volunteers is recommended.

BENEFITS OF MOUNTAIN BIKE PARK FACILITIES

It is widely recognised that participation in activities in the outdoors is beneficial for general wellbeing. There are recognised physical, social and emotional benefits in participation in cycling. It is a fun, cheap (after initial outlay costs) and good for the environment. Once mastered, cycling is an easy activity to participate in and can be as intense a workout, or challenge, as is desired.

Recreational cycling facilities create fun and positive atmospheres within communities. Specifically designed facilities introduce a level of challenge into cycling, allowing children through to adults to develop new skills. All ages and all skill levels can generally learn and progress in the same location, gradually building up challenge and intensity. Very young riders can establish competency within a variety of recreational cycling facilities and can be introduced to road safety and traffic controls signals in a safe artificial environment on Learn to Ride tracks. Challenge parks and mountain bike trails offer a range of other benefits outlined below:

- Challenge parks cater for the growing trend in cycling as a recreation activity and provide a safe and fun environment for young people to learn bike handling skills. Local mountain bike networks often connect to pump track facilities in parks and public open space where adults and children can ride in a safe environment;
- Provide a low cost recreation opportunity for under privileged community members;
- Attract visitors to the local area, particularly families looking for activities on school holidays;
- Promote physical activity improving health and wellbeing;
- Pump tracks can be built in small areas connecting with existing sporting precincts, parks, trails and even lakes, beaches and golf courses;
- If designed appropriately, pump tracks can cater for a range of users, such as scooters and skateboards but only if surfaced with concrete or asphalt;
- Pump tracks can create passive surveillance through use by community members in otherwise quiet or unused areas;
- Pump tracks can be ridden by people of all ages, from toddlers on pedalless balance-bikes, to teenagers, through to over-55s and older people; and
- Mountain bike trails with a suitable range of classification can be ridden by people of all ages and abilities.

CURRENT PARTICIPATION TRENDS

Cycling is one of the most popular sport and recreation activities in Australia. In Western Australia, nearly 500,000 people (18.5% of the population) ride a bike regularly, with 85% of these people (425,000) riding for sport or recreation rather than transport.¹

Wheeled sports have recently shown to be growing in popularity over organised sports. Research, undertaken by the Australian Bureau of Statistics, into children's participation in sport and physical recreation found that participation rates for physical recreation activities such as skateboarding, bike riding and roller blading were much higher than organised sports (refer table 1). The research also indicated increasing participation rates for both males and females (refer table 2). Note data relating to skateboarding and roller blading in the years 2009 and 2012 also incorporates scooter riding.² More recent data is yet to be released, however in the years since this study anecdotally the popularity of wheeled sports has continued to grow.

1. Western Australia, Strategic Cycling Facilities Review, West Cycle

2. ABS (2012), Children's Participation in Cultural and Leisure Activities, Australia, 2012, code 4901.0

Table 2. Comparison of organised sport vs wheeled sports 2012.

Males	No ('000)	Participation (%)
Soccer	309.7	21.7
Bike riding	998.8	69.9
Skateboarding or roller blading	857.8	60.0
Females	No ('000)	Participation (%)
Dancing	367.4	27.1
Bike riding	770.6	56.8
Skateboarding or roller blading	640.0	47.2

Table 3. Growth in wheeled sports participation rates across Australia 2009-2012.

Males	No ('000)		Participation (%)	
	2009	2012	2009	2012
Bike riding	992.5	998.8	66.1	69.9
Skateboarding or roller blading	780.4	857.8	55.9	60.0
Females	No ('000)		Participation (%)	
	2009	2012	2009	2012
Bike riding	721.1	770.6	54.4	56.8
Skateboarding or roller blading	562.2	640.0	42.4	47.2

Mountain biking in Western Australia is growing in popularity. The Western Australian Mountain Bike Strategy identified young people as being underrepresented in mountain bike participation. Increasing availability and accessibility of different styles of trail offering different levels of technical difficulty is one of the recommendations aimed at reducing barriers to participation.³

Anecdotal evidence from recently opened facilities around Perth indicates there is a demand locally for more purpose designed facilities. Kingsley Pump and Jump Trail in City of Joondalup opened in 2017 and includes a pump track, jump track, and safety track. This facility is still drawing crowds especially on weekends, with people travelling large distances to visit the facility.

CURRENT TRENDS IN FACILITY PROVISION

Dedicated facilities for sport and recreation cycling can:

- Provide an environment for recreation, training and events that is not affected by other users or activities
- Help raise the profile of cycling
- Be a home to clubs, organisations and community groups
- Host events using simplified event approvals, logistics and management processes
- Provide enhanced spectator opportunities
- Cater for bike education and skill building



Pump Track Jindowie, Yanchep



CREATING VARIETY

Distributing varied facilities across Manning Park will prevent influx to a particular area within the park and will both disperse users and provide a differing challenge and experience across the site. Depending on the level of investment, there are opportunities to design and construct facilities that meet growing demand and encourage new users to participate.

Having varying classification of facilities will also affect the number of users. Developing large scale, leading edge facilities will see an influx of recreational users to the City of Cockburn. While the recommendations within this report are directed at servicing the City of Cockburns residents first, at the same time there is an opportunity to create facilities that are exciting and create a desire for continual use from a regional perspective.

Not all areas in the park are suitable for all disciplines, but grouping facilities together creating Challenge Parks is the most rewarding for the user and generally the most successful facility. Multi-disciplinary sites allow for introductory experiences and skills progression. Alternatively, a single discipline community facility is well placed with non-cycling activities to provide an alternative experience whilst other family members are participating in other activities within the park.



FACILITY CLASSIFICATION

COMMUNITY

Community facilities are designed to service the community in the immediate vicinity or are supplementary to existing experiences offered at a site. They are small scale, minimal budget projects that create opportunity for introductory experiences and skills development for beginners.

LOCAL

A local level facility is intended to service the City of Cockburn's residents. Users may travel within the City to access the facility and multiple local facilities should be strategically distributed across the local government area. Facilities incorporate basic design, simple detail and are value for money. They generally should allow for skills development for beginners and intermediate riders. Local facilities should be constructed next to existing infrastructure and recreation spaces and are capable of holding small local events, competitions and workshops.

REGIONAL

A regional level facility will be attractive to a wider market and will attract users from outside the immediate area. Additionally, these facilities will provide a greater level of satisfaction and desire to return to the site for local residents. These facilities incorporate more technical design elements, increased detail and will be of varying greater cost depending on technical features and supporting infrastructure. Development around existing supporting infrastructure greatly reduces the cost of regional facilities. There will be opportunity to host larger events, competitions and workshops and the spaces will become thriving community spaces.

STATE

State level facilities capture a much broader market, with individuals travelling great distances to participate. These facilities will attract all user groups from beginners and new participants through to elite riders. Significant capital expenditure is required to develop a State level facility, but there are major opportunities for return on investment. Competitions will draw spectator crowds, there are opportunities for facility and equipment hire and many opportunities for private enterprise in areas such as hospitality, coaching and private sporting clubs.

State facilities require a significant investment in supporting infrastructure such as car parking, ablutions and shower facilities, food and beverage; therefore, require a significant parcel of land.

MANNING PARK

Manning Park is of the scope and scale which has the opportunity to host trails of local significance and facilities of regional classification.



MANNING PARK MOUNTAIN BIKE TRAIL NETWORK CONCEPT PLAN

FACILITY CLASSIFICATION DESIRED REQUIREMENTS

KEY REQUIREMENTS	COMMUNITY	LOCAL	REGIONAL	STATE
Ablutions				
Changing facilities & showers				
Drinking Water				
Designated Emergency Access				
Designated Spectator Viewing & Seating				
Food and beverage outlets				
Lighting				
Parking & Drop-Off				
Proximity to major community centre				
Public Transport Access				
Rubbish Bins				
Shelter/ shade				

FACILITY TYPES AND TRENDS

In order to assess the suitability and the appropriateness of mountain bike facilities within Manning Park, it is important that a sound understanding of the potential facilities is established. Within urban interface sites there are a range of facilities that can be developed including; Bike Playparks, BMX tracks, Jump Tracks, Pump Tracks, Learn to Ride Tracks and Skills Tracks and Trails.

BIKE PLAYGROUND

Bike playparks include features such as tunnels, ramps, walls, and balance planks and are designed to suit a more playful riding style, incorporating tricks and highly skilled riding and suited to young people. Typically bike playgrounds have a more urban character, with constructed elements rather than more natural features.



BMX TRACKS

BMX tracks typically consist of a single lap track usually between 300–400m, constructed from compacted dirt and asphalt, with a start ramp and features such as tabletops, gap jumps and rhythm sections. BMX racing rewards strength, speed, and bike handling. BMX tracks are typically used in a structured and organised setting rather than unstructured play.



PUMP TRACKS

A pump track is a 1-3 metre wide track that can be used for bicycle, skateboard, in-line skates and scooter riders to practice skills on a series of features, such as berms and rollers placed in quick succession. Essentially they are scaled down BMX tracks which do not require pedaling. ‘Pump’ refers to the action made by riders pushing down with their arms and legs to manoeuvre the bike or board over features to maintain momentum without pedaling or pushing-off the ground. Typically, tracks can be ridden continuously, and different combinations of features can be linked to provide a varied challenge. Bike handling skills can be transferred to other mountain bike tracks. Well designed pump tracks cater for all abilities, with all features being roll-able for beginners, and allowing for progression to pumping, and even jumping for more advanced riders. Riding a pump track is easy and children are typically comfortable using them within 10-20 minutes.

A well designed pump track provides enough challenges to stay attractive for years, because the rollers and berms can be combined and transitioned in different directions, creating opportunity for skilled riders to do jumps and maneuvers. Pump tracks can be made from natural soil, hardened surfaces, wood, fibreglass, concrete or asphalt. Historically pump tracks were constructed from natural soil blends and required significant ongoing maintenance. More recently, world’s best practice is tending toward lower maintenance surfacing techniques and materials, such as asphalt, which are inclusive for a larger user base of wheeled-sports including skateboarding, scooters, in-line skates and non-off road bikes.



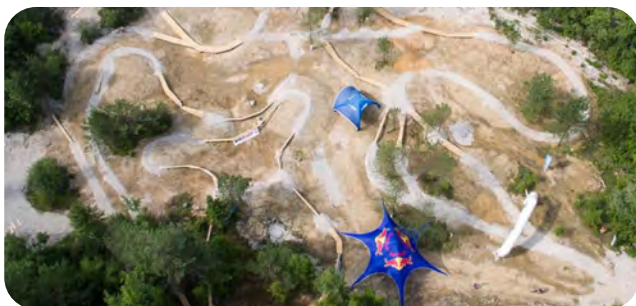
JUMP TRACKS

Jump tracks typically feature a series of jumps of various size and technicality in multiple lines. Provision of jump tracks is a vital inclusion allowing for progression for young people through to adults who seek an alternate and often more challenging experience than a pump track. Jumps are developed so that they allow for progression while always keeping safety in mind. Featuring all types of jumps, including table-tops, gaps, step-ups, step-downs and hips, with features linked so riders flow immediately from one to the next. Ideally, a rider will not have to brake between jumps. Well designed jump tracks offer a wide variety of challenges, from easy rollers to big jumps. A diversity of lines will allow riders to build their skills gradually and will create a park that is fun for all abilities. Typically, jump lines are arranged side-by-side in increasing difficulty, all starting at a common roll-in hill and traveling in the same direction. Jump tracks are primarily constructed of soil, however increasingly jump take offs and entire jump lines are being made from hardened surfaces, such as wood, concrete and asphalt. This significantly reduces ongoing maintenance and improves rideability.



SKILLS TRACKS

Skills tracks feature man-made technical trail features that test the skills of a rider and allow them to try features that they may encounter on trails in the region. Typical features may include log rollovers, log rides, balance planks, rock drops and other technical features. They can also incorporate street features such as rails and wall rides, or freeride stunts like ladder bridges, skinnys, teeters and drops. Importantly all features are built with progression allowing users to start small and build their confidence up to larger features. Successfully executed skills park areas feature a diverse range of materials and can look like well landscaped areas or 'nature play' areas with natural features such as timber, logs and rocks.



LEARN TO RIDE/ SAFETY TRACKS

Learn to ride, also known as safety tracks, make learning road rules fun for young people on bikes and scooters. A safety track features a miniature road network giving real life experiences while learning essential safety skills. Safety tracks are designed to enable reading traffic signals, crossing railways and school crossings, negotiating roundabouts and gutters, recognising traffic signs and line marking, and cycling on roads or footpaths. Safety tracks are typically constructed using materials and features as they would be encountered in the real world including asphalt and concrete combined with various line marking and road safety signage. To improve the enjoyment of these tracks, features like fuel stations and parking areas can be included for diversity.



CHALLENGE BIKE PARKS

Pump, jump, skills and learn to ride tracks are often integrated into one, larger-scale, seamless facility under the banner of challenge bike parks. Challenge bike parks are larger scaled developments featuring multiple bike related facilities and are used to improve riding skills. Their combined facilities provide an excellent entry point into bike riding while offering technical riding features for more advanced riders all within one convenient and safe location.

Challenge bike parks are typically developed with soft landscaping, hardscaping and site improvements turning the area into an aesthetically pleasing community hub and making them suitable for urban interface developments. Due to their offerings, challenge parks also often act as a trailhead or hub for the area's greater trail networks. Urban interface challenge parks provide significant community benefit with extensive use from youth, but also recreation enthusiasts and, when of significant scale, tourists. Such facilities have proven extremely successful nationally and internationally.



MANNING PARK MOUNTAIN BIKE TRAIL NETWORK CONCEPT PLAN

MOUNTAIN BIKE TRAILS

Mountain Bike Trails are purpose built trails in varying terrain. The terrain available will typically dictate the style of trail built. Typically a mountain bike trail or network of trails requires larger areas.

Trail type defines the style of trail and its typical attributes. Different trail types suit different styles of riding and typically each trail type will have a specific kind of mountain bike designed to suit. Different cohorts use different types of trails and all trail types can have varying classifications. Not all environments are suitable to host all trail types and any mountain bike trails developed within Manning Park will require thorough consideration and planning to ensure long term sustainability.

CROSS COUNTRY

Primarily singletrack, with a combination of climbing and descending trails and natural trail features of varying technicality. They appeal to the majority market and are suitable for timed competitive events. Cross country trails can include cyclo-cross tracks.



ALL MOUNTAIN

Similar to cross country, primarily singletrack with greater emphasis on technical descents and non-technical climbs. All mountain trails are suitable for timed competitive events.



DOWNHILL

Descent only trails with an emphasis on speed and technical challenge. They appeal to more experienced riders; however lower-classification trails are emerging to cater for all experience levels. Downhill trails usually require shuttle uplift to the trailhead via chairlift or vehicle shuttle. These trails are suitable for timed competitive racing.



FREERIDE

Descent focused trails with an emphasis on technical challenge and skill development. Trails feature both built and natural technical features with a focus on drops and jumps. Appeals to more experienced riders and caters for competitions judging manoeuvres and skills.



PARK

Built feature environment with emphasis on manoeuvres, skills and progression. Appeals to wide market including youth and can cater for competitions judging aerial manoeuvres. Can include jump and pump tracks and skills parks. Typically, dirt surfaced but can include hardened surfaces.



TOURING

Long distance riding on reasonably uniform surface conditions and lower grades. Touring trails are dual direction linear trails or long distance circuits with a focus on reaching a destination. Touring trails can include rail trails, access/fire roads and singletrack. While there is a limited market, touring trails can be ridden in sections making them accessible to all.



EXISTING CYCLING FACILITIES

There are a number of existing facilities around Perth as identified in the below table. The City of Cockburn hosts a range of community scale pump tracks in smaller recreation parks.

Table 4. Existing facilities in Perth Region.

FACILITY	SCALE (HA)	SURFACE	LOCAL GOVERNMENT
BMX TRACK			
Balcatta	1.3	Asphalt	Stirling
Wanneroo	1.4	Asphalt	Wanneroo
Bibra Lake	3.3	Asphalt	Cockburn
Bull Creek	1.5	Asphalt	Melville
Lesmurdie	1.2	Asphalt	Kalamunda
Medina	2	Asphalt	Kwinana
Rockingham	1.5	Asphalt	Rockingham
Byford	1.1	Asphalt	Serpentine-Jarrahdale
Mandurah	0.9	Asphalt	Mandurah
PUMP TRACK			
Kingsley	0.29	Asphalt	Joondalup
College Park	0.14	Natural	Nedlands
Calleya	0.9	Asphalt	Cockburn
Black Stump	0.12	Natural	Kalamunda
Jindowie, Yanchep	1.24	Natural	Wanneroo
Baldivis	0.18	Asphalt	Rockingham
South Lake	0.09	Asphalt	Cockburn
Muchea	0.32	Asphalt	Chittering
Lake Leschenaultia	0.15	Natural	Mundaring
Wellard	0.05	Asphalt	Kwinana
Dixon Reserve Hamilton Hill	0.06	Natural	Cockburn
Perena Rocchi Reserve Yangebup	0.18	Natural	Cockburn
Maddox Estate Piara Waters	0.11	Asphalt	Armadale
Sussex Bend Lower Chittering	0.13	Natural	Chittering
Houghton Park Carramar	0.20	Natural	Wanneroo
JUMP TRACK			
Kingsley	0.3	Natural	Joondalup
Lightning Park Reserve, Noranda	0.48	Natural	Bayswater
Wotton Reserve, Bayswater	0.24	Natural	Bayswater
SKILLS TRACK			
Goat Farm		Natural	Mundaring
Kalamunda		Natural	Kalamunda
SAFETY TRACK			
Kingsley	0.3	Asphalt	Joondalup
Reg Williams	0.3	Asphalt	Armadale

MANNING PARK MOUNTAIN BIKE TRAIL NETWORK CONCEPT PLAN

CASE STUDY - KINSLEY PUMP AND JUMP TRACK

In 2017 the City of Joondalup opened a bike orientated park within the Shepherds Bush Reserve in the suburb of Kingsley. Located along Barridale Drive, and accessible via the Perth Bicycle Network, the facility is often accessed via bike. The previously dilapidated site is now extremely popular and well used by the community. The challenge park meets the needs of a diverse range of users from young children to the adults and is extremely popular with families. It caters for beginners through to advanced riders in a well thought out and integrated layout.

The Shepherds Bush Park has dedicated parking, playground, picnic and BBQ facilities and grassed area. Most importantly the overall development features three dedicated bike facilities. These are described below.

JUMP TRACK

The Shepherds Bush Reserve facility features two jump lines, rated intermediate and advanced. Each jump line begins on a large asphalt start ramp, features four step up table top jumps and a large return berm with hipped jump entry option. The jumps range from 1.2m to 2m high and are up to 4.5m long. To minimise maintenance each of the jumps features an asphalt lip combined with a clay landing which reduces risk of injury. The jump track integrates seamlessly with the pump track allowing experienced riders to transition between and providing a consistent finish. To reduce risk the intermediate and advanced jump lines are demarcated with blue and red painted lines.

PUMP TRACK

The reserve also features a highly used asphalt pump track. The pump track is designed to cater for a range of users and has easily rollable lines combined with larger optional transfer lines. The pump track is demarcated with green line work allowing parents to advise and monitor young riders. The asphalt surface was utilised to reduce ongoing maintenance. The pump track is utilised as part of the return track to the jump tracks allowing users to effortlessly pump their way back to the top of the start mound.

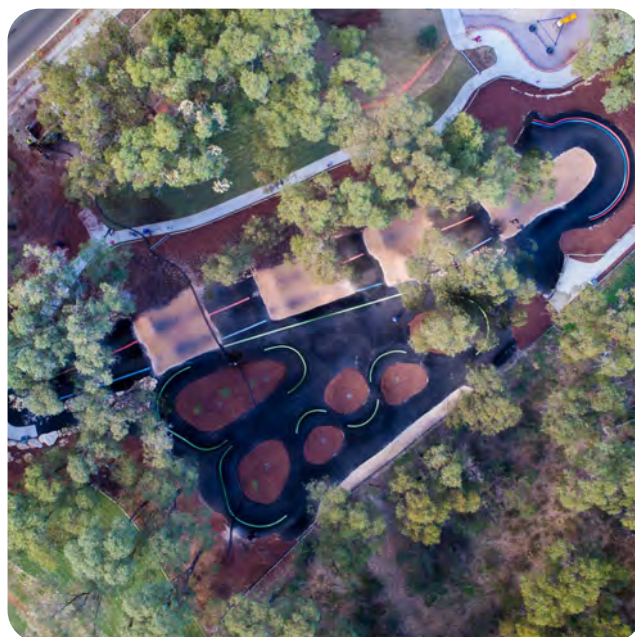
The jump track and pump track are surrounded by a low fence which manages risk of young children accidentally wandering into a high speed area. The area is accessible through two gated entries at either end of the jump lines which also feature safety signs and bins.

SAFETY TRACK

Catering for young children, the Shepherds Bush Reserve facility also features a road safety track. The simple track design features an asphalt surface with signed intersections and roundabout as well as a parking areas and fuel station.

All of the facilities in the greater Shepherds Bush facility are designed to cater for cyclists but scooter and skateboarders frequent the area.

One of the primary reasons the facility is popular with families is the diversity of experiences combined with rest areas and sheltered spaces. The extremely popular facility has something for everyone.



EXISTING TRAILS PROVISION

To assess the suitability of the trail types prescribed in the project framework, a basic regional provision study was undertaken. The study identified that there was a severe lack of all trails in the Perth metropolitan area, but a significant lack of Gravity and Park style trails across the whole region. Due to the lack of elevation in Manning Park, provision of gravity trails is restricted to descending cross country trails. Park style trails do have an excellent opportunity to be developed, but due to their level of impact are restricted to low conservation estate and areas with low potential visual impact. The primary use of the site is recreation. The proposed XC and Park trails as part of Manning Park will go a long way in filling the gap in supply of mountain bike trails south of Perth.

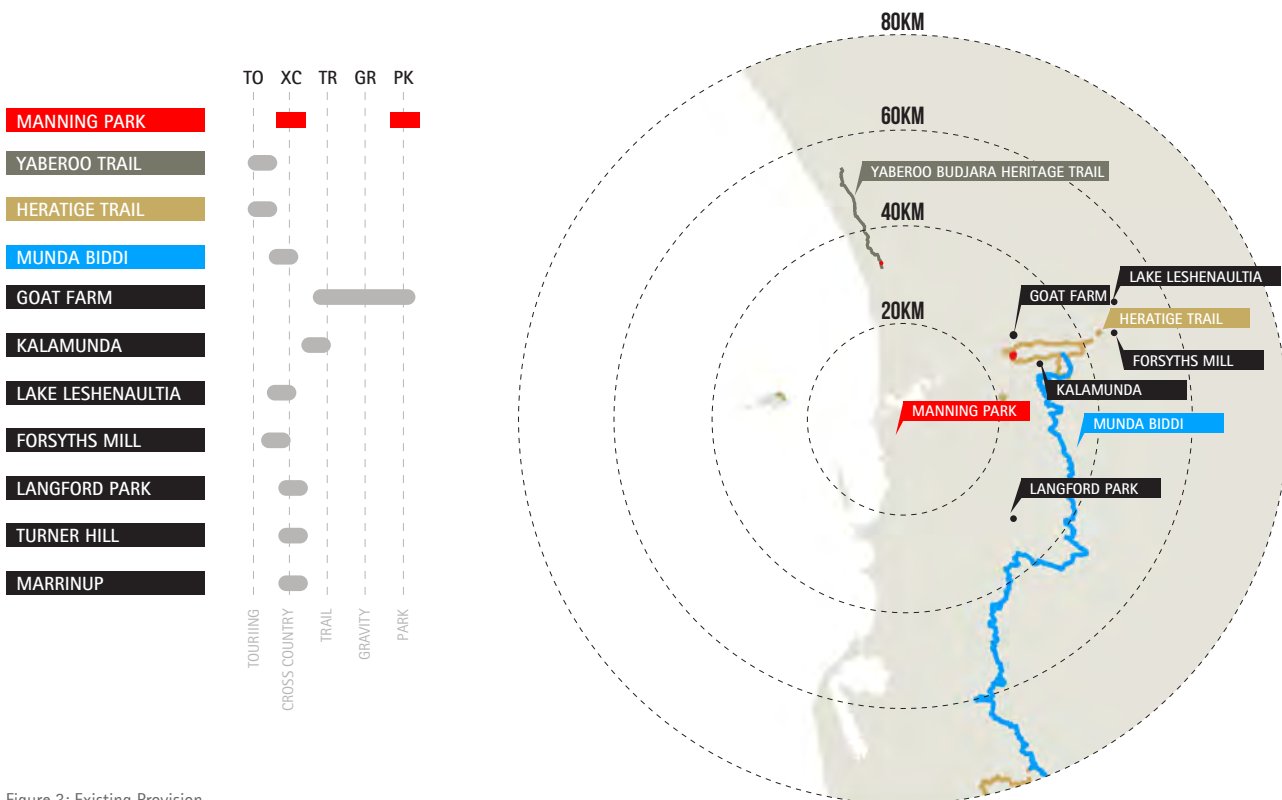
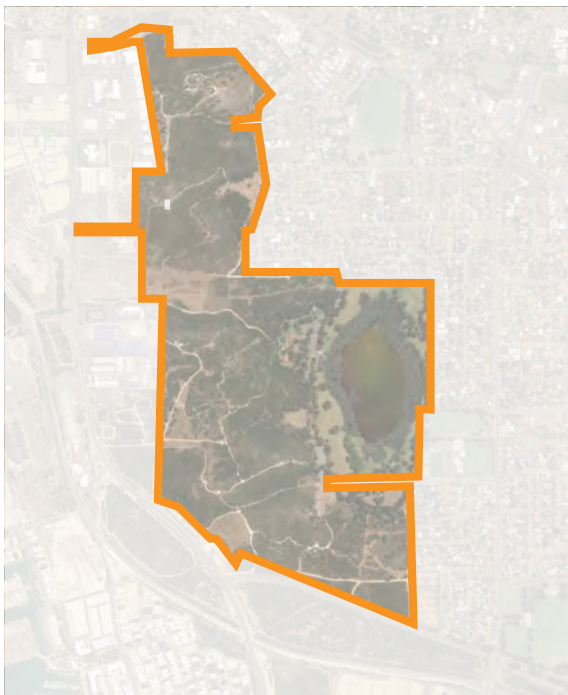


Figure 3: Existing Provision

MANNING PARK MOUNTAIN BIKE TRAIL NETWORK CONCEPT PLAN

SCALE STUDY

To establish the appropriateness of the trail density prescribed in the project framework, '5-10km of trail with Park and Skills facilities included', a basic scale comparison study was undertaken. The study showed a density of 6 hectares per kilometer of trail, which is far less than trail density of other popular areas which service much smaller communities such as the compartment 10 development in Margaret River which has 3.5ha hectares per kilometer of trail. Increasing the prescribed trail density to a similar density would still allow successful separation between trails, maintain the limited impact on vegetation and will reduce the feeling of repeating trail throughout the network. Most importantly it would ensure that unsanctioned trail building is reduced. Therefore the final recommended trail density for the cross country trails is four hectares per kilometer, or up to a 15km trail network.



COMPARTMENT 10 - MARGARET RIVER
SIZE ~ 410,000 m2 / 41HA
12km = 3.5HA per KM Density



MANNING PARK - COCKBURN
SIZE ~ 60,000 m2 / 60HA
15km = 4HA per KM Density

Figure 4: Scale Study

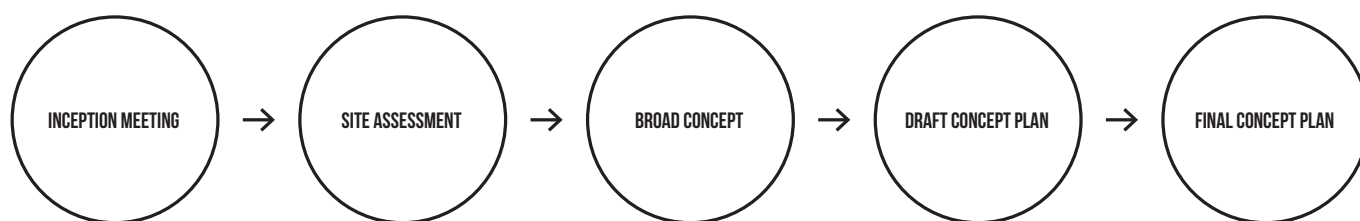


Figure 5: Project methodology

PROJECT METHODOLOGY

To fulfil the project brief and objectives identified, the following stages were undertaken:

Inception

In consultation with the steering committee, the project framework, objectives and staging were reviewed and confirmed. Details including project area, key stakeholders, user groups and community groups were confirmed.

Site Assessment

Site meetings were held with City of Cockburn representatives. An audit of the existing conditions was undertaken to gain a detailed understanding of the landscape, topography, soil types, vegetation and ground conditions. The site study identified areas where trail development is and is not appropriate.

Broad Concept Plan

A broad concept plan was presented to the City of Cockburn, outlining opportunities, constraints and broad layout for a mountain bike trail network.

The master planning process for Manning Park was initiated after this and the planning for mountain bike trails put on hold while the Master Plan was developed.

Draft Concept Plan

The Manning Park Master Plan was developed after extensive consultation with the local community including the aboriginal community. The development of mountain bike trails in the park was supported by the community. The Master Plan thus identified the need for formalised mountain bike trails and it was adopted by Council in October 2018.

Following adoption of the Master Plan the preparation of this draft concept plan commenced. This draft plan illustrates the trail system with concept plans and mapping, trail system configuration and description, individual trail summaries and potential event usage. The draft also includes recommended construction staging and cost estimates.

Handover of Final Concept Plan

The concept plan was finalised following wider stakeholder consultation.

ENGAGEMENT AND CONSULTATION

STEERING GROUP

The Project Steering Group comprised representatives from the City of Cockburn, Department of Local Government, Sport and Cultural Industries, Department of Biodiversity, Conservation and Attractions, Western Australian Mountain Bike Association and Westcycle. This body was consulted in the early framework stages of the project.

COMMUNITY CONSULTATION

Engagement and consultation was undertaken with the mountain bike community and surrounding residents and landowners in the development of the concept. A survey was developed as an online form and widely distributed throughout the mountain bike community as well as residents of the City of Cockburn. It was promoted through mountain bike membership data bases, websites and social media during the month long consultation period. Residents were notified by mail and news letters from the City. A copy of the survey results is available by request.

Additional consultation was also undertaken during development of the Manning Park Master Plan.

LIMITATIONS

While the scope of this concept plan was mountain bike trails specifically, in designing the trail network consideration has also been given to other trail users including walkers and trail runners.

Walk trails identified in the Manning Park Master Plan including the Spearwood Ridge Trail and the Lake to Hilltop Circuit have been mapped indicatively to enable consideration in relation to location of the mountain bike trail network. These walk trails should be developed in conjunction with the mountain bike trail network, to ensure reduction in potential conflict points and enabling sharing of infrastructure at trail heads.

Trail running in the area has exploded in popularity since the Manning Park Master Plan was completed. The potential for some or all of the cross country mountain bike trail network to be shared use with trail runners has been factored into the concept development, with trail style carefully considered. The ability for some trails to be shared use with trail runners should be investigated during the detailed design process. All trails should remain single direction.

MANNING PARK MOUNTAIN BIKE TRAIL NETWORK CONCEPT PLAN

SITE ASSESSMENT TOPOGRAPHY, SLOPE & ASPECT ANALYSIS

Land form at Manning Park is defined by the Spearwood Ridge, running north south along the coast, and peaking at 40-50m AHD. To the east of the ridge, the landform drops steeply towards Manning Lake. Surface geology is aligned with the Spearwood Ridge. At a broad level, the geology of the ridge area is primarily Tamala limestone overlain by Safety Bay sand. At the lower elevations, leading toward Manning Lake, the surface geology is Spearwood Sand, and immediately surrounding the lake is Sandy Silt.

The slopes across the site range from 5-25%. Aspect varies across the ridge with most slopes facing East and South.

The highest point on the site is situated close to the western most lookout near the intersection of Cockburn Road and Spearwood avenue. The site is approximately 50m above sea level. From the various lookout points, there are views of the BRP wetlands, the ocean, Woodman Point, Rockingham and Fremantle to the north. Figures 4 and 5 provide an overview of the topography, slope and aspect characteristics.

LANDSCAPE

The prominent limestone ridge and rolling topography of the Spearwood Dune System possess the ideal characteristics for the development of mountain bike trails. The exposed limestone peaks offer fantastic vantage points of the surrounding landscape and are ideal locations to connect trails. The reserve's vegetation types, including Low Heath Communities, Low Open Woodland Eucalypts and Scrub of Acacia Et Melaleuca, give opportunity for diverse riding cover and exposure thereby promoting the uniqueness of the area.

Much of the natural bushland in the park is undisturbed and provides a unique natural experience close to urban areas. There are a number of small recreation nodes and facilities provided for visitors already which will ensure the area caters for other family members who are not riding bikes.



Figure 6: Elevation change



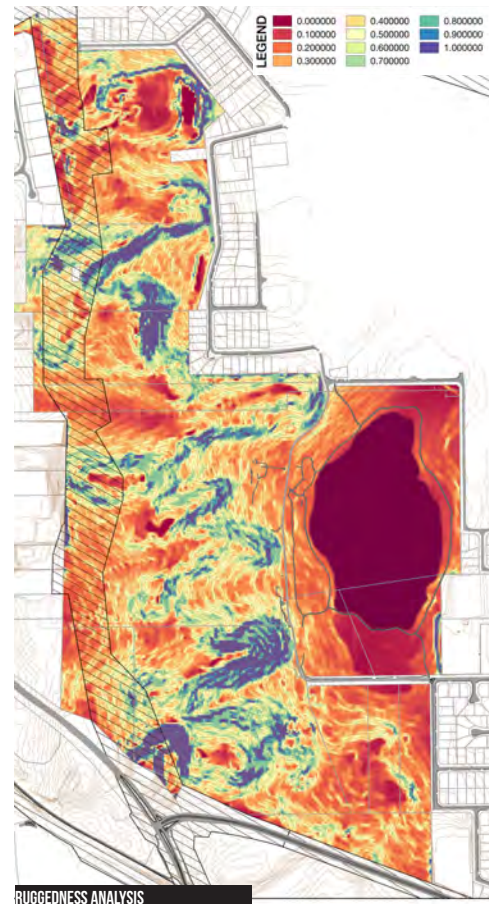
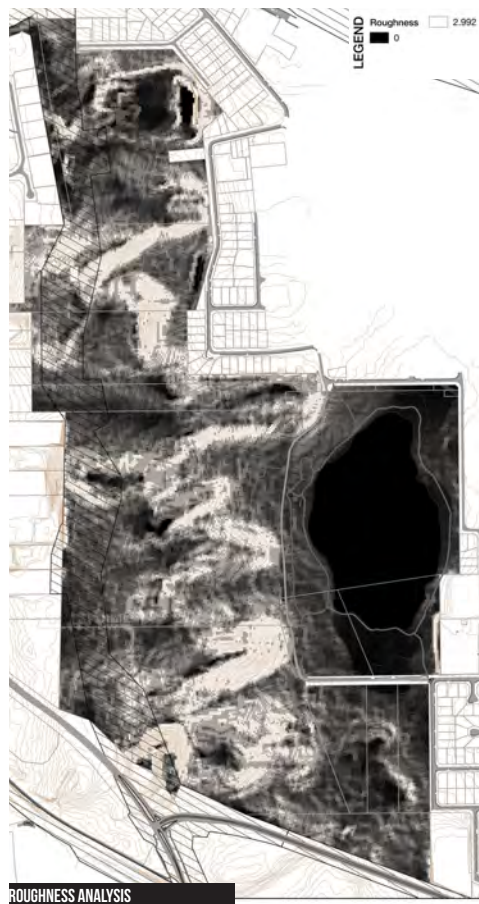
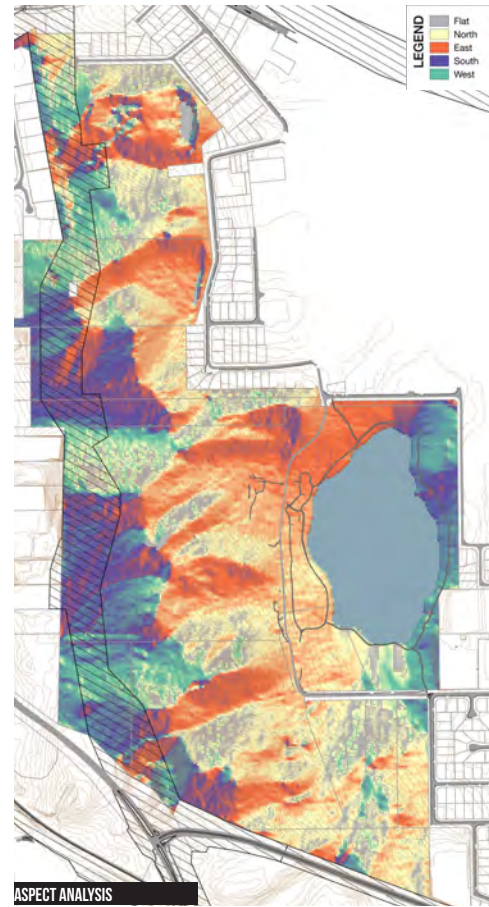


Figure 7: Project Area Analyses

MANNING PARK MOUNTAIN BIKE TRAIL NETWORK CONCEPT PLAN

CONSTRAINTS

ENVIRONMENTAL PROTECTION AND REHABILITATION

Manning Park is a Bush Forever site (247) and part of the Beeliar Regional Park. Vegetation in Manning Park is dictated and somewhat reliant on the presence of coastal limestone, shallow soils and exposure to salt laden winds. Nearby urban development poses other threats. As a result, Manning Park's coastal vegetation is recognised as having high conservation value and it is important to employ strategies to ensure for its protection.

Sensitive plant and animal species within Manning Park may be adversely impacted by the following activities, which must be managed through the careful planning, design and construction of mountain bike trails:

- Importation of soil into the park (disease, weed seed)
- Erosion and sedimentation
- Soil compaction
- Unplanned fire
- Weed invasion
- Threat of Phytophthora (dieback) and other diseases (such as Armillarial uteobubalina, honey fungus)
- Fragmentation of the park due to past uses, roads and infrastructure
- Urban interface issues and uncontrolled access by vehicles, pedestrians, bikes and horses
- Increased visitor numbers

Mountain bike trails have a similar impact on flora, fauna and ecological communities as walking trails. In order to prevent environmental impacts and protect the values of Manning Park, various design and construction strategies can be employed.

Rationalising and upgrading existing unauthorised trails can successfully control access through careful planning, design and construction methods.

Trail types that result in higher construction impacts should be limited to previously disturbed areas.

VEGETATION

Vegetation condition mapping of Manning Park was undertaken (2014), and the majority of vegetation is characterised as good to very good condition given its proximity to urban development and residential areas. Flora surveys have not been undertaken at the site, and should be completed to identify any threatened flora present within proposed alignments if required during the detailed design phase of the project.

FAUNA

Fauna surveys should be completed to identify any threatened and significant fauna species within the reserve. Habitat for threatened species should not be removed or damaged through trail construction.

PHYTOPHTHORA DIEBACK

Phytophthora Dieback is a deadly plant disease considered to be a significant threat to the Park, which contains a number of susceptible species. Limited dieback surveys and investigations have occurred to date, and it is recommended that surveys are undertaken when proposed trail alignments are confirmed. Weeds have impacted on disturbed areas, such as roadsides, firebreaks, fire access tracks, car parks and trails. In developing, upgrading and rehabilitating trails it will be important to reduce the presence and impact of weeds. Care should be taken during design and construction of trails to prevent spread of disease and weeds and associated impacts on the biodiversity value and visual amenity of the area.

ABORIGINAL AND EUROPEAN HERITAGE PROTECTION

Manning Park has high cultural significance to the historical and continuing connection between the local Whadjuk Nyungar people and the wetlands as camping, ceremonial areas, and sources of food. Additionally, non-Aboriginal people have historical connections to the area, since the first occupation of the area in 1830 as well as agriculture in the 1890s.

EXISTING RECREATIONAL USE AND DEMAND

Due to the site's natural, cultural and landscape and recreation values it is used and promoted as a destination for many recreation activities.

Mountain bike trails will be designed as single use, but will need to be designed with the safety of potential walkers and dogs in mind.

Manning Park is popular with many local residents who walk their dog, walk and/or run for exercise, utilising both formal and informal trails. Recently a new staircase was constructed to accommodate those in the south-western corridor of Perth looking for an exercise activity similar to Jacob's ladder near Kings Park, Perth City.

Formal walking trails linking the lookout points are popular routes for dog walking.

Although it is not permitted in the park, it is evident that motor biking occurs in the park. With increased usage from mountain bikers and walkers, and promotion of the park as a mountain bike park, this may make the park less appealing to motor bike riders in future.

Horse riding is not permitted in the regional park however horse riders have been given permission to utilise the road reserve on the western side.

There is current use of informal trails and walk trails by people riding mountain bikes. Strava data shows significant use by cyclists of all trails in the reserve (refer figure 8).

There is a large popular playground located close to the carpark, toilet facilities and lake, that caters for children.

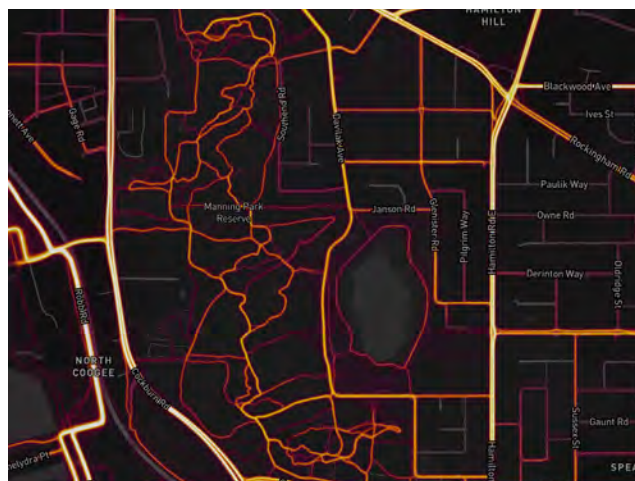


Figure 8: Strava heatmap, cycling.

USER CONFLICT MANAGEMENT

Mountain bike trail systems are designed to minimise the potential for conflict between different users and to allow them to exist harmoniously within an area. Specific car parking design and trailhead planning is undertaken to minimise conflict between different recreational users of an area. Typically mountain bike trails are designed for exclusive use to eliminate conflict with pedestrians. In high use areas additional measures are taken such as appropriate signage and ensuring long sight lines within the trail to reduce potential conflict if pedestrians are encountered on the trail. Similar measures will be implemented to ensure that trails are still available to horse riders in the western road reserve and conflict is minimised.

Mountain bike trails are typically designed and signposted as single direction to eliminate risk of conflict with other oncoming mountain bikers. A code of conduct for the use of the trail system is also developed and communicated through signage to ensure a level of etiquette is maintained on the trails.

There is potential for a majority of the cross country network to be shared use with trail runners, with implementation of a thorough management strategy including maintaining single direction of travel and shared use signage/trail user code of conduct.

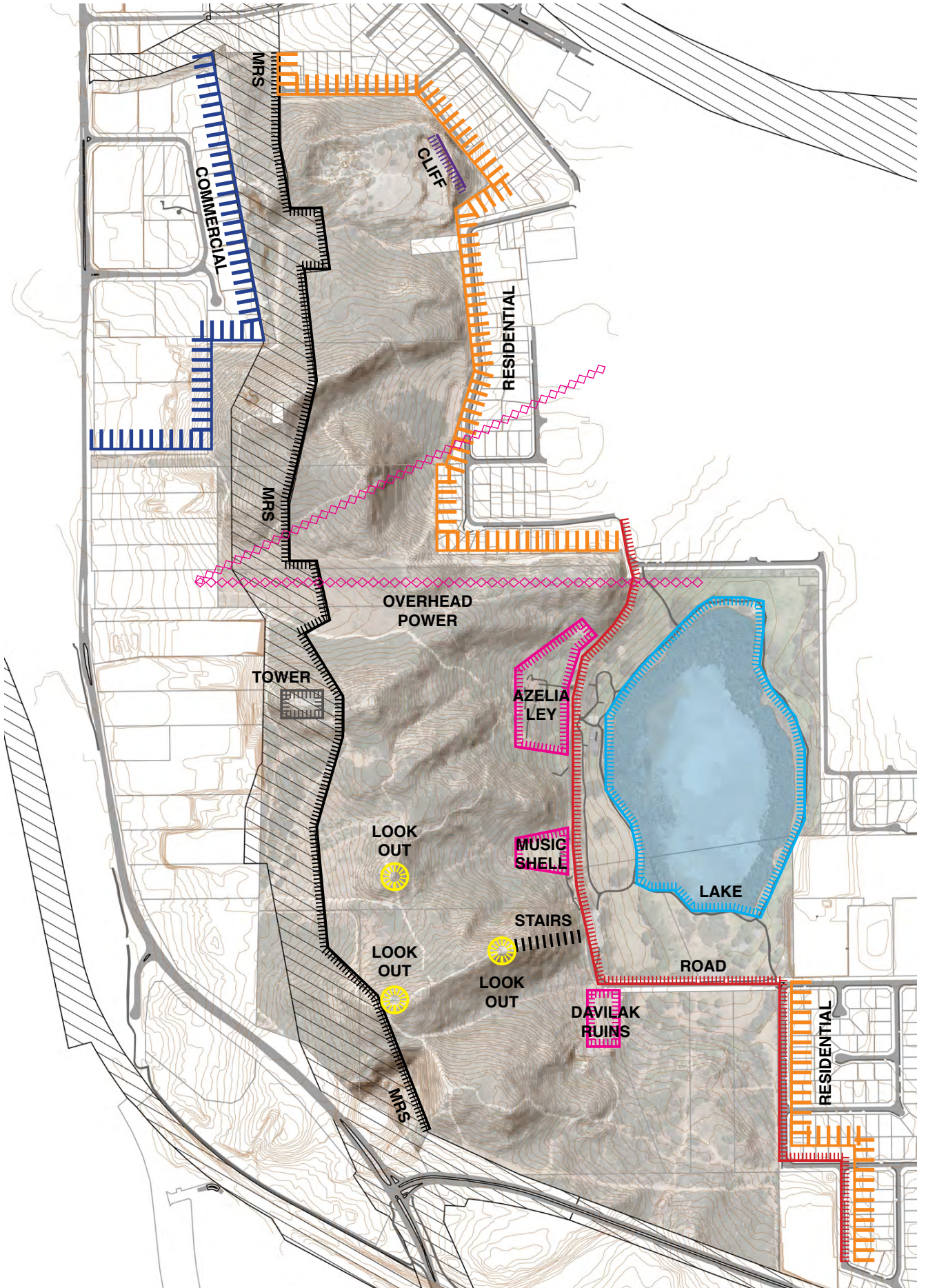


Figure 9: Existing site constraints

MANNING PARK MOUNTAIN BIKE TRAIL NETWORK CONCEPT PLAN

OPPORTUNITIES

SITE SUITABILITY

Manning Park upland is considered to be suitable for a range of mountain biking experiences. It is large and diverse enough to accommodate an excellent urban mountain bike park, including a trail network, challenge park and bike park trails. Some of the features are highlighted below. Notably there is more rise and fall at Manning Park than the extremely popular mountain bike trails in Margaret River.

The characteristics of the site are considered to be suitable for an urban mountain bike park due to:

- the site is sufficiently large and diverse to include over 10km of single use, one way, single track, as well as a dedicated challenge park and bike park
- the elevation of the hill provides several view points
- the elevation of the hill provides opportunities for skills progression with gentle slopes for beginners, as well as steeper sections for intermediate or advanced riders seeking a greater challenge
- the existing cycleways surrounding Manning Park could be integrated to allow easy access for residents in surrounding areas
- there is sufficient space to allow for at least two main circuits without the trails crossing each other
- the site already hosts a number of major events for the City, and has potential to accommodate mountain biking events
- existing services and facilities are of a high standard, and include car parking, toilets, drinking water, picnic areas, BBQs, playgrounds, and wheelchair accessible car parking, amenities and lighting
- the park's connectivity and proximity to Fremantle make it a potentially attractive tourist destination
- proximity to the coast and beaches means:
 - there is more for families to do in the area
 - it is likely to be cooler than the inland mountain biking trails in the summer months
 - there is opportunity to combine beach activities with a mountain bike ride, which is a unique outdoor experience in Perth, with most mountain biking facilities only provided in the hills away from the coast.

The limestone ridge is traversed by a multitude of existing vehicular access tracks and formal and informal trails. Recently there has been an explosion of unsanctioned trail construction. Through successful design the facility can be capable of having minimal impact on the existing environment and surrounding landowners. Best practice trail design has the potential to enhance the environment and provide passive surveillance and act as a deterrent to undesirable motorised trail users.

The disused quarries at the northern and southern ends of the site provide the best topography and elevation change. The Manning Park Master Plan identified the quarries as sites for development of concentrated Mountain bike trails.

Figure 8 outlines existing site features that present the best opportunities for mountain bike trails.

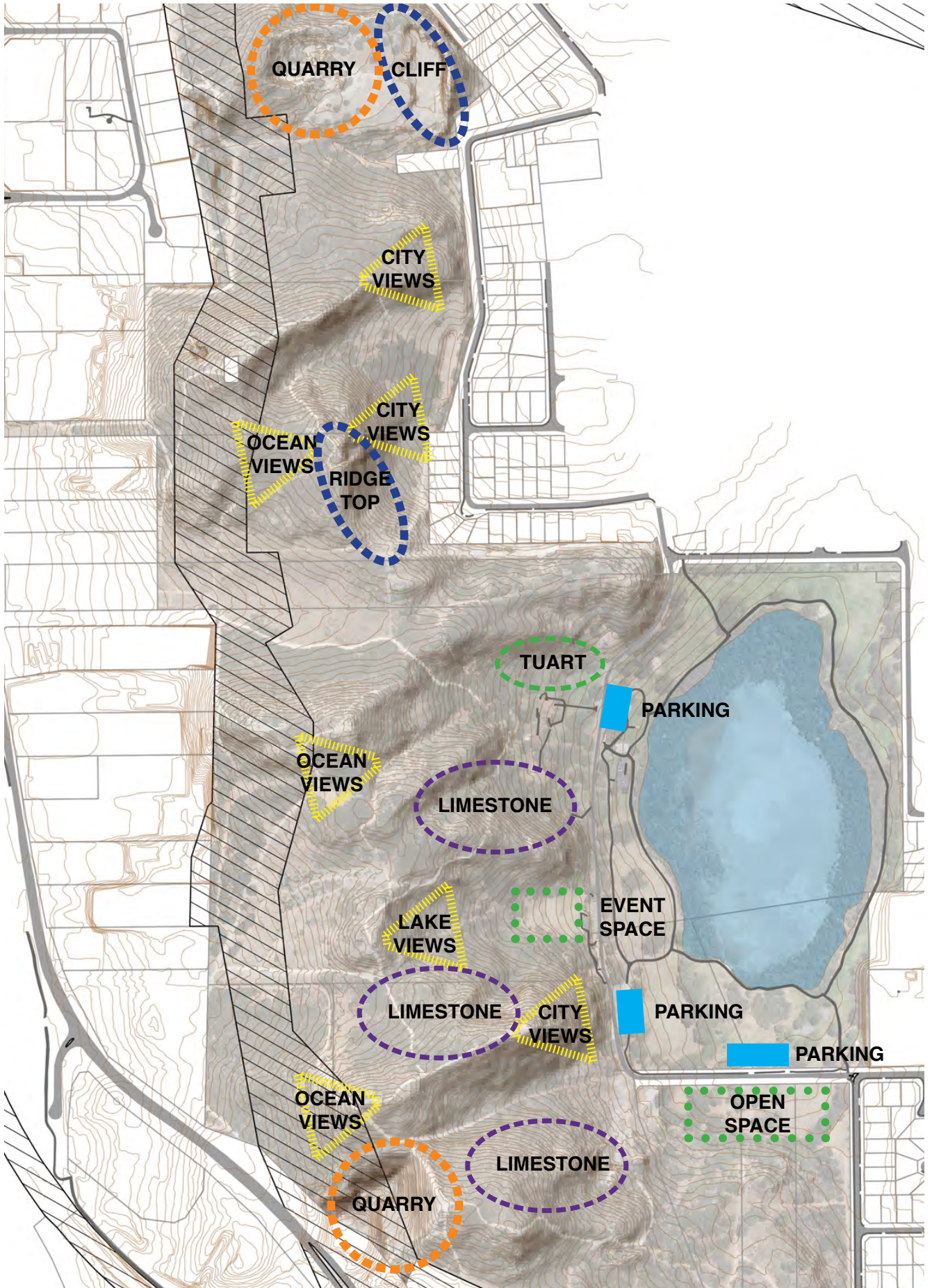


Figure 10: Opportunities

TRAIL SYSTEM



TRAIL SYSTEM OVERVIEW

The proposed Manning Park network features a range of descending focused Cross Country (XC) trails and some Park (PK) trails in the northern and southern quarries. It is based on a stacked loop design, which includes a series of loop trails radiating successively from the trail head and a series of trail nodes providing users with a range of short, medium and long loop options. The Manning Park network prescribes to the following best practice principles;

- The network avoids areas of environmental significance, problematic landforms, and is generally sympathetic to the landscape and viewsheds
- Where possible the network connects users with the natural environment and it's features within the project boundary
- Appropriate trail styles have been located in appropriate landscapes with high impact trails in the open woodland areas and low impact trails in the remnant bush
- Trail alignments are purposeful and provide direct movement through the landscape
- A range of trail difficulties have been provided allowing for progression in the network
- The network caters for a wide variety of riding styles and abilities and fills the gap of trail styles which are not available in the region
- The stacked loop trail system places the easiest trails closest to the trail head and more difficult trails are progressively reached
- All trails are designed to be bike optimised and single direction, allowing purposeful descents and climbs
- The overall system is accessible, intuitive and easy to navigate with simple loops and trails following an overall clockwise direction
- The majority of the trail system is able to be ridden in a continuous lap without backtracking, repeating or crossing over other trails, allowing for cross country marathon racing and longer uninterrupted rides
- Provides a range of trail options suitable for hand cycle and other mobility equipment use, including the entire green loop

The Key features and design principals of the trail network are:

- 14.7 km Stacked loop trail network including PK and XC trails
- Range of classifications for the trail network

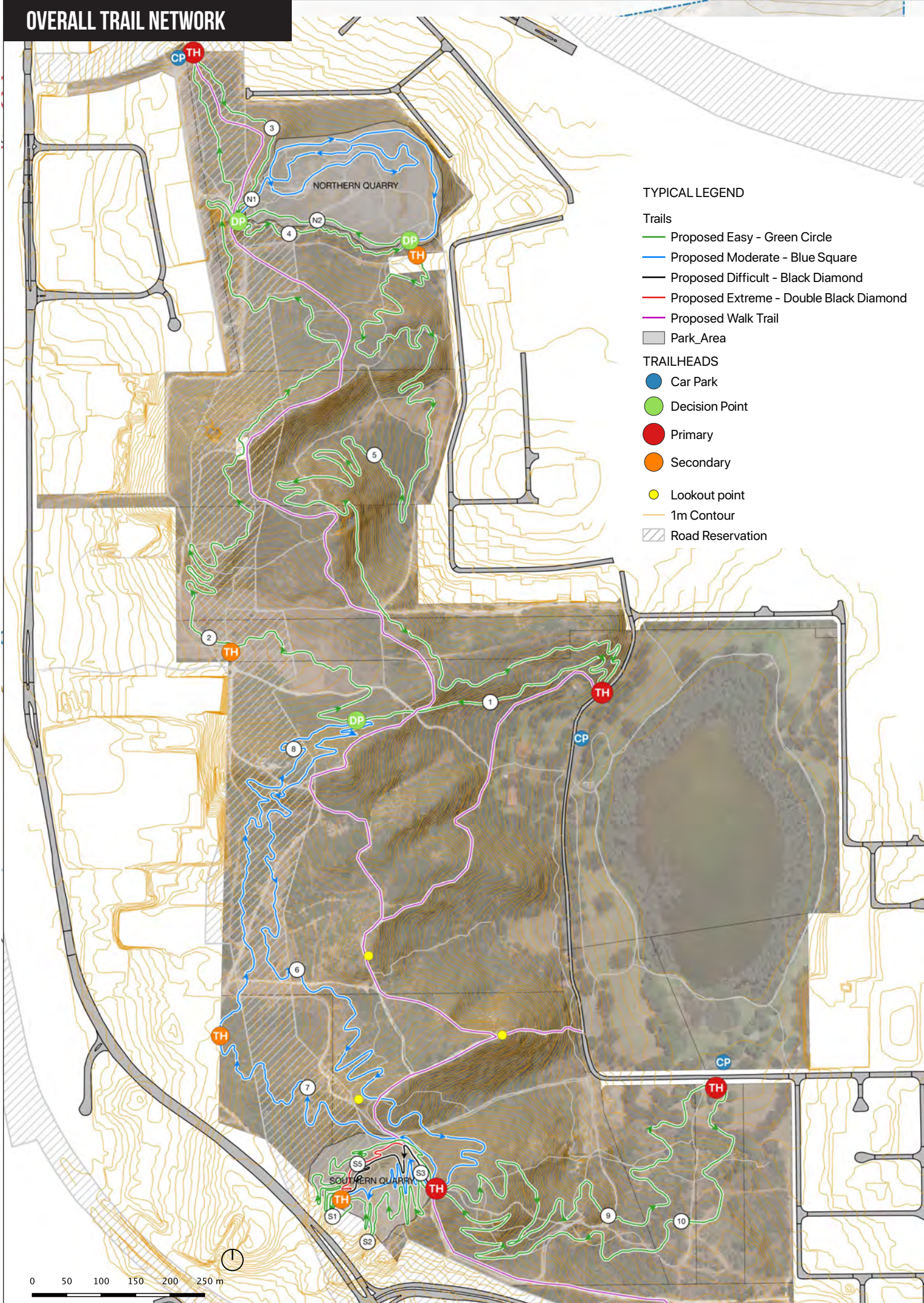
STYLES

The Manning Park trail system comprises a range of individual style networks to cater for the diverse range of landscapes and riding opportunities in the project area. These opportunities include;

- Beginner Loops – Emanating from the primary trail heads beginner trails provide loop options for novice riders and also serves as a connections between network focus points. These trails are also proposed to be designed to cater for adaptive cycle use.
- Intermediate Technical Loop – Set off the beginner loop on the steeper slopes, caters for intermediate riders seeking a tight and technical XC trail.
- Northern Quarry Park Zone – Emanating from the primary trailhead a challenge bike park featuring pump track, jump track, jump line and earn to ride track in a range of easy, moderate and difficult sessionable trails.
- Pump Track and Jump lines – Optional pump track and jump lines which would cater for beginners through to advanced riders and allow for technique progression.

Walk trails identified in the Manning Park Master Plan including the Spearwood Ridge Trail and the Lake to Hilltop Circuit have been mapped indicatively to enable consideration in relation to location of the mountain bike trail network. These trails are outside the scope of this report, however are critical in the overall success of the mountain bike trail network as they will reduce trail user conflict. These walk trails should be developed in conjunction with the mountain bike trail network. While indicative only, consideration has gone into the actual alignment of the walking trail network including the Spearwood Ridge Trail.

OVERALL TRAIL NETWORK



MANNING PARK MOUNTAIN BIKE TRAIL NETWORK CONCEPT PLAN

NETWORK COMPOSITION

The following table provides a breakdown of the network to illustrate quantities of different styles and classifications of trail.

Details of the infrastructure is provided in the following sections.

Table 6. Network summary

ID	PROVISIONAL NAME	CLASSIFICATION	STAGE	TRAIL STYLE	TRAIL TYPE	LENGTH (M)
CROSS COUNTRY NETWORK						
T01	Trail 01	Easy - Green Circle	2	Cross Country	Open	470
T02	Trail 02	Easy - Green Circle	2	Cross Country	Flowing Trail	1775
T03	Trail 03	Easy - Green Circle	2	Cross Country	Open	585
T04	Trail 04	Easy - Green Circle	2	Cross Country	Flow Trail	375
T05	Trail 05	Easy - Green Circle	2	Cross Country	Flow Trail	2400
T06	Trail 06	Moderate - Blue Square	2	Cross Country	Technical	1655
T07	Trail 07	Moderate - Blue Square	2	Cross Country	Technical	636
T08	Trail 08	Moderate - Blue Square	1	Cross Country	Technical	760
T09	Trail 09	Easy - Green Circle	1	Cross Country	Technical	1135
T10	Trail 10	Easy - Green Circle	1	Cross Country	Flowing	1044
Total Cross Country Trail Length						10,834
NORTHERN QUARRY BIKE PARK						
JP	Jump Park	Easy - Green Circle > Extreme - Double Black Diamond	2	Park	Jump Track	NA
PT	Pump Track	Easy - Green Circle > Moderate - Blue Square	2	Park	Pump Track	1,000 sqm
FL	Freeride Lines	Easy - Green Circle > Extreme - Double Black Diamond	2	Park	Freeride Technical	200
SL	Slopestyle Lines	Easy - Green Circle > Extreme - Double Black Diamond	2	Park	Slopestyle	NA
SK	Skills Park	Easy - Green Circle > Difficult - Black Diamond	2	Park	Skills	NA
N1	XCO Loop	Moderate - Blue Square	2	Cross Country	Varied Flow Et Technical	1250
N2	Up Trail	Easy - Green Circle	2	Cross Country	Open	315
Total Northern Quarry Trail Length						1,565
SOUTHERN QUARRY BIKE PARK						
S1	Green Climb	Easy - Green Circle	1	Park	Open	850
S2	Green Air Flow Descent	Easy - Green Circle	1	Park	Air Flow	590
S3	Blue Air Flow Descent	Moderate - Blue Square	1	Park	Air Flow	385
S4	Black Air Flow Descent	Difficult - Black Diamond	1	Park	Air Flow	315
S5	Double Black Air Flow Descent	Extreme - Double Black Diamond	1	Park	Air Flow	180
Total Southern Quarry Trail Length						2,320
GRAND TOTAL						14,719

TRAIL STYLE OVERVIEW

The network provides descending focused cross country trails that link two park areas which are unique from one another in the features and style of riding they offer. The northern quarry site contains one park area which is the primary trail head and contains a pump track, jump lines, freeride trail and a skills area. The southern park area is accessible off the XC network and is located in the southern quarry site. This contains air flow trails.

CROSS COUNTRY NETWORK

Manning Park has a recent history of descending focused cross country trail use by local mountain bike enthusiasts. Longer term users of Manning Park recall alignments of various informal and unsanctioned trails throughout the park. The formal vision maximises historic and existing alignments to create an improved network of cross country trails.

The cross country trail network emanates from the existing carparks with a series of green circle stacked loops connecting the proposed northern quarry park and various peaks through the park. The network of green trails provide a variety of introductory flow and technical trails.

In addition to the green trails, there is a blue loop which stacks on the green trails. These trails offer intermediate and advanced users more challenging flow and technical trails. All of these loops are designed to be ridden in succession and are able to be raced.

The majority of the cross country trails are located on the west and east faces of the ridge allowing the proposed central walk trail through the park to be developed unimpeded.

Many of the cross country loops have converging points where the loop can be shortened or shorter loops can be joined together to traverse the hillside creating short medium and longer loops.

The cross country network has been designed to allow multiple entry points from the south, west, north and east which will promote recreational users to cycle to the trails.

NORTHERN QUARRY PARK

The dilapidated and unused northern quarry park provides a unique and exciting experience for a challenge bike park style development. It will be a central point for meeting and gathering for mountain bike users of Manning Park. There is sufficient space for day to day parking by users and overflow for parking and event setup. Within a compact space there is opportunity for diverse riding opportunities including the pump track, jump lines and free ride lines. A learn to ride facility is also proposed as part of the trail head. With the park centred around a gathering space to include shelter and furniture it will be a hot spot for a diverse range of users from families, advanced users and events.

SOUTHERN QUARRY PARK

The southern quarry park contains air flow trails, trails with larger jumps and banked turns suitable for beginners through to advanced riders. The the gradient of the site allow for a good diversity of features to be included across the park for all level of users.

This park will have a different method of use given it is accessible from the XC trail network. Access from Cockburn Rd may be an option but will be challenging given the vehicle movement on the road. It would allow event vehicles into the site and the open grass nature of the site would make it terrific for viewing.

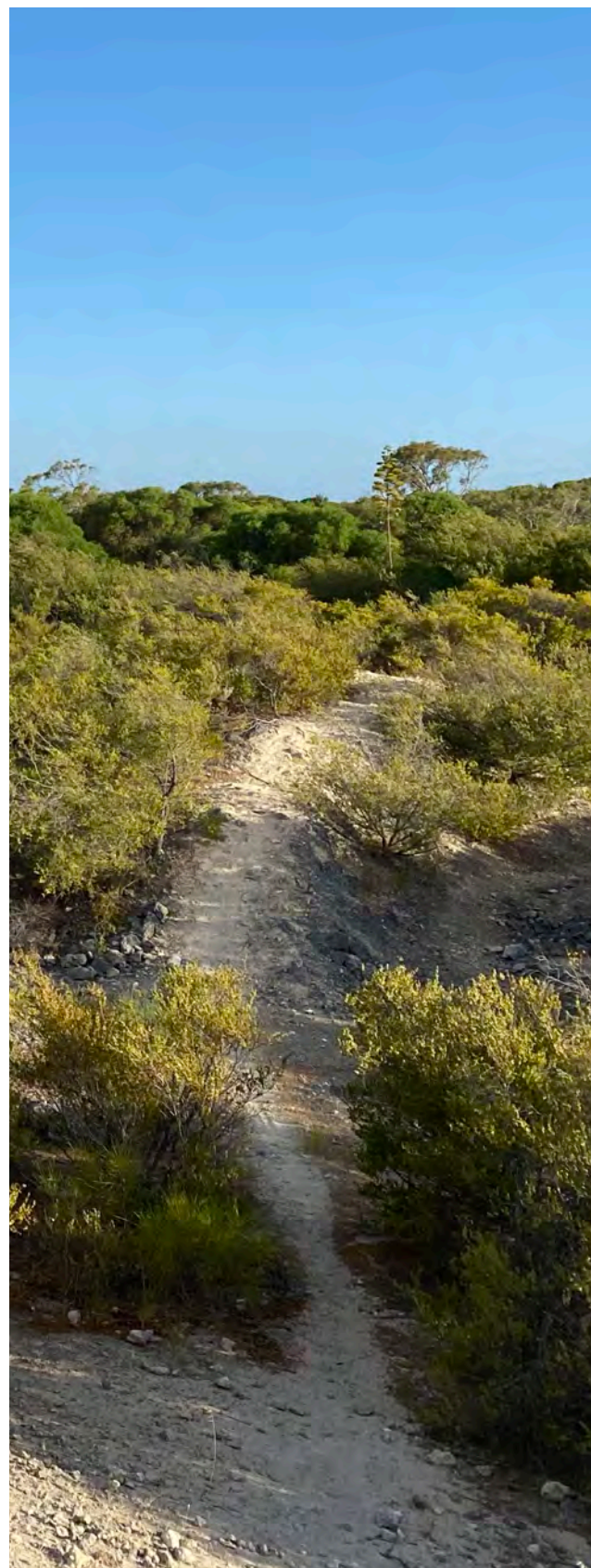
EVENT USE

The trail network provides opportunities for multiple event formats to be hosted for freestyle competitions and cross country mountain bike racing.

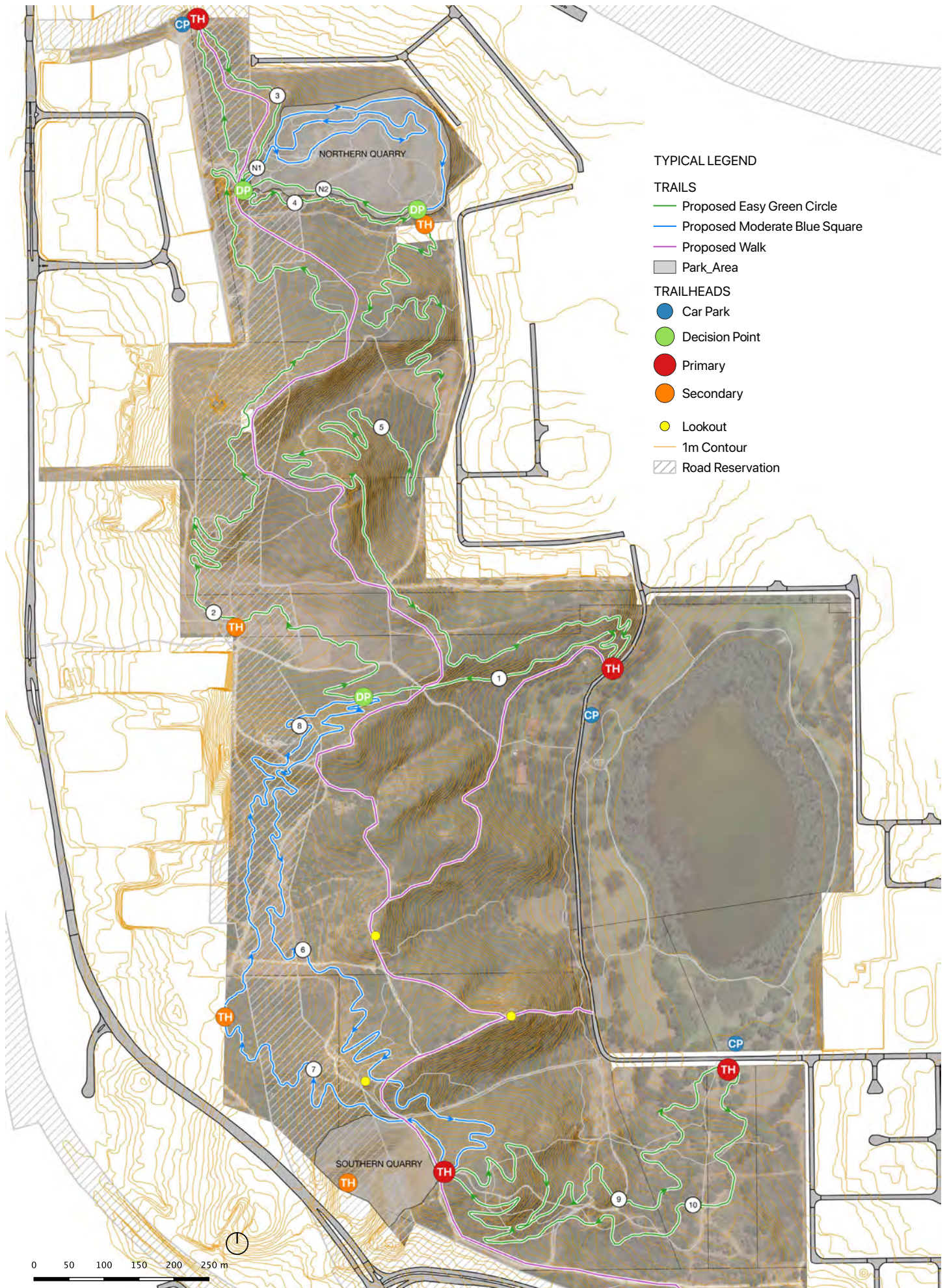
Cross country racing is catered for through the flexible trail network with numerous potential event layouts. A variety of loops at varying distances can emanate from the Car Park Trail Head where there is provision for a racing start and finish straight. The detailed design stage should address the need for passing opportunities and alternative lines from a racing perspective. Cross Country Marathon (XCM) Mountain Bike racing is

provided for with the complete trail network, excluding a few freeride and air flow trails able to be ridden in a continuous non interrupted loop without crossing.

The trail networks have been designed to potentially allow freestyle competitions/demonstrations to operate at the same time as an XC event and remain independent of each other.



CROSS COUNTRY TRAIL NETWORK





GREEN XC TRAIL



BLUE XC TRAIL



- (TH)** Trail Head including shelter, furniture, signage & learn to ride track
- (PT)** Pump Track
- (SK)** Skills Area & Bike Playground
- (JP)** Dirt Jump lines including green, blue, black and double black options
- (SL)** Slopestyle jump lines including green, blue, black and double black options
- (FR)** Freeride lines to be black or double black options depending on terrain opportunities
- (N1)** Blue Quarry XC Trail

- (T05)** Green descent trail
- (T06)** Green trail connecting to ridgeline loop
- (N2)** Green Park Up Trail

-  Green classification trail/features
-  Green multidirection classification trail/features
-  Blue classification trail/features
-  Black classification trail/features
-  Double Black classification trail/features



CHALLENGE PARK



PUMP TRACK



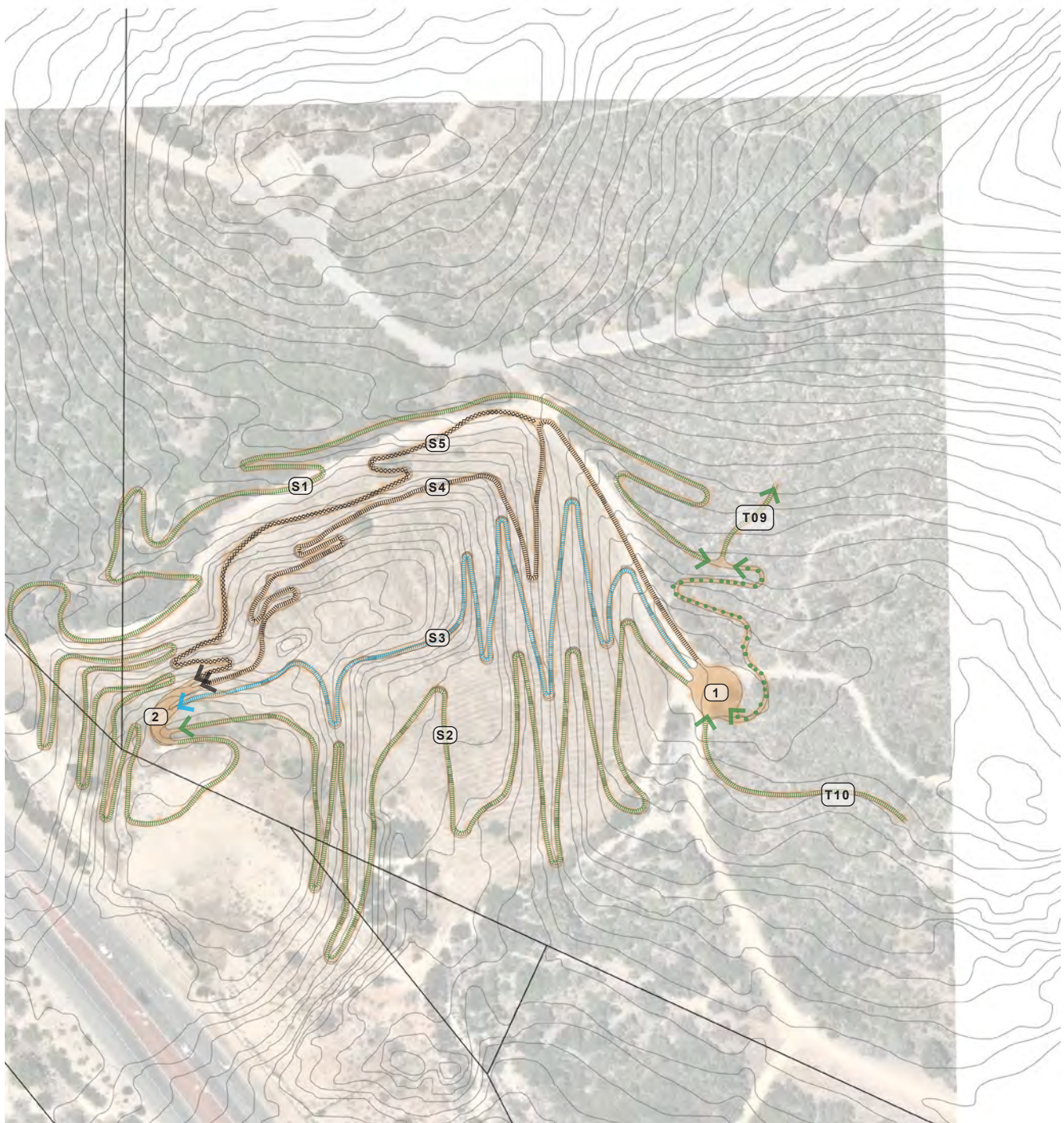
JUMP LINES



FREERIDE



SKILLS



(T14) Green Ridge Loop

- (1) Trail Head including signage, open space for gathering/pulloff for groups and seating
- (2) Re-grouping point at base of descents before the climb back up
- (S1) Green climb - 3% avg gradient, 850m long
- (S2) Green air flow descent - 5% avg gradient, 590m long
- (S3) Blue air flow descent - 7% avg gradient, 385m long
- (S4) Black air flow descent - 9% avg gradient, 315m long
- (S5) Double black air flow descent - 10% avg gradient, 180m long

- Green classification trail/features
- Green multidirection classification trail/features
- Blue classification trail/features
- Black classification trail/features
- Double Black classification trail/features



AIR FLOW PARK PRECEDENTS



BLUE & GREEN AIR FLOW FEATURES



BLACK AIR FLOW FEATURES

MANNING PARK MOUNTAIN BIKE TRAIL NETWORK CONCEPT PLAN

INFRASTRUCTURE

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

The main access points and infrastructure were evaluated to determine appropriate locations for formal trail heads and additional trail related infrastructure that would achieve the project objectives. Consideration was given to how the recreation and event user markets would be likely to access the site, consolidating the number of primary trail heads and integrating with existing infrastructure.

TRAIL HEAD

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.

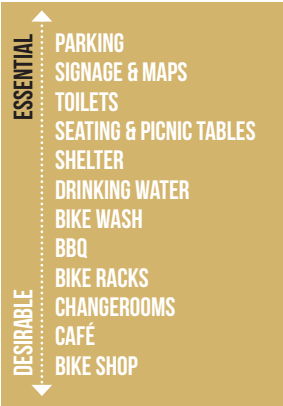


Figure 12: Trailhead requirements

Trail heads require a range of infrastructure to meet these functions. Inclusions range from essential through to desirable and are dependent on budget and location.

PRIMARY TRAIL HEADS

Primary trail heads are proposed at the northern and southern quarry bike parks and adjacent to the proposed lakeside playground. There is significant potential for additional parking space at the northern quarry bike park area, which would cater for increased visitation to the area. A car park in this location would be designed and located so as to not impact on neighbouring properties. At this trail head green trail access links to the XC loop and freeride trails, the kids loop starts and finishes, the pump track and jump lines are immediatly adjacent. This enables passive surveillance from the shelters and easy access to picnic amenities.

The primary trail head locations satisfies the following best practice principles for trail head location and design;

- Located at the bottom of the trail network
- Easy to find location
- Sufficient space to cater for recreational use with overflow event parking close by
- Aesthetically pleasing space in natural environment

SECONDARY TRAIL HEADS

Secondary trail heads are located at major entry or meeting points in the network. Secondary trail head signs should be installed with trail orientation maps at these locations. Secondary trail heads are located at the entry points to the south, west north and east. A number of nodes/ decision points occur at trail crossing points.

Table 7: Trail Heads, Amenities & Facilities

TRAIL HEAD	EXISTING AMENITIES AND FACILITIES	SUGGESTED AMENITIES AND FACILITIES
Primary – Northern Quarry Park	Nil	Major Signage, seating, picnic tables, shelter, water, BBQ, bike racks, equipment wash station, bike hire, parking, toilet
Primary – Other	Nil	Signage, seating, picnic tables, shelter,
Secondary	Nil	Signage

STAGING

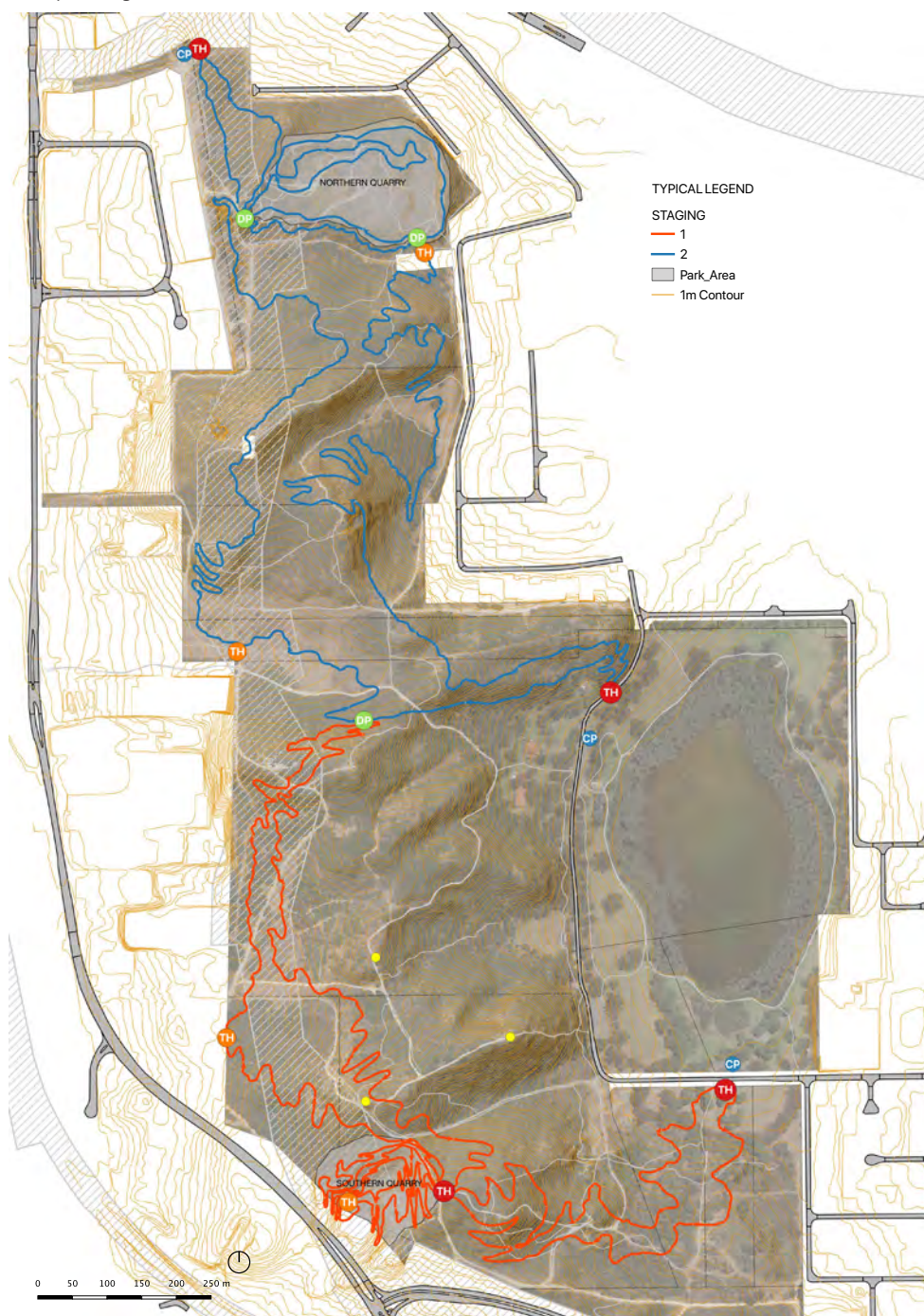
The design of the Manning Park trail network allows for the staged delivery of the project. In early stages a focus should be applied to high use and strategic trails, as well as trails which can be used in event scenarios. Table 6 (page 36) and the map below outline recommended stage for each trail.

Stage One focuses on the southern half of the network and provides beginner and intermediate loop options. Stage Two focuses on the northern half of the network, completing the range of trail styles on offer and extending the loop options. Staging the delivery of the network in this way will enable time for further detailed consultation with residents and land owners adjacent to the northern end of the park ensuring any potential impacts are mitigated. While the Park areas in the Northern and Southern Quarries can be constructed independently of the broader trail network, it is recommended that the Southern Quarry be developed in Stage 1 and the Northern Quarry in Stage 2.

Although the staging and opinion of costs is different to that as outlined in the Manning Park Master Plan this concept plan has looked at the overall layout, staging and costs in more detail and recommends two stages with estimated costs considerably lower as outlined. Given that funding for the Manning Park Master Plan is allocated over a 10 year timeframe it is suggested that Stage 1 be completed within 5 years and Stage 2 be completed following the completion of Stage 1. If alternative or additional funding sources, such as grants become, available construction may be able to be commenced and completed earlier.

INDIVIDUAL TRAIL SUMMARIES

The following pages detail the individual trail summaries for each trail or proposed facility in the overall trail system.



TRAIL 01

Trail ID **T01**



TRAIL TYPE
XC CROSS COUNTRY
OPEN FLOWING

TRAIL LENGTH
470M SINGLE DIRECTION

AVERAGE GRADIENT
8% 22M VERTICAL
37M VARIATION

TRAIL WIDTH
1M SMOOTH
CONSTRUCTED

TRAIL 01 OVERVIEW

Trail 01 is a 470m easy, single direction trail offering a cross country experience focused on open flowing trail over predictable smooth terrain. It forms a key connection from the primary trailhead at the proposed lakeside playground and is therefore of high strategic value to the overall networks functionality. Located in generally moderate side slopes, the trail climbs then traverses along the contours of the hill before climbing to reach a decision point. It features continuous rolling grade reversals and a smooth surface with typical finished width of 1m. The proposed alignment does not traverse sections of existing unsanctioned trail.

ANTICIPATED TECHNICAL TRAIL FEATURES

TURNS

Climbing Turn
Technical Climbing Turn
Insloped Climbing Turn
Rolling Crown
Switchback

VERTICAL CHANGE

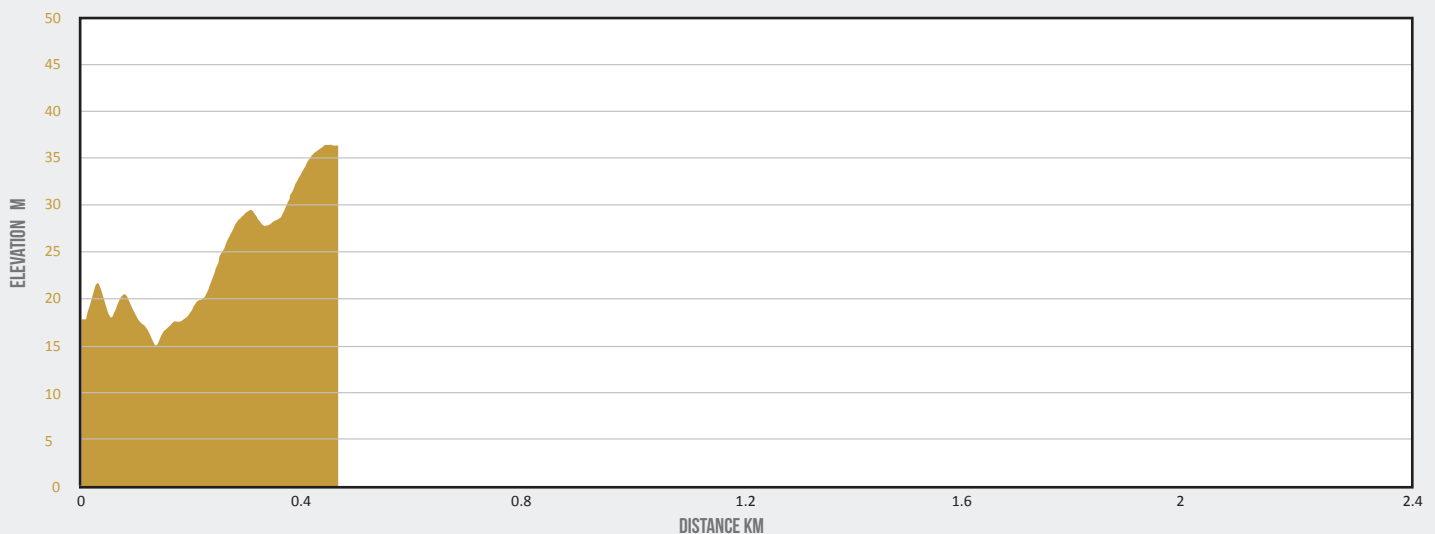
Rollers
Obstacle Step Up
Chicane
Choke

OBSTACLES

TRAIL 01 DETAILS

Trail ID	01
Provisional Name	Trail 01
Classification	Beginner - Green Circle
Strategic Value	High
Trail Type	Cross Country
Trail Style	Open Flowing
Tread Width	1m
Use	Bike & Hand Cycle Optimised
Direction	Single Direction
Ascent / Descent	Undulating
Options	Nil
Corridor Width	50m
Trail Length	470m
Vertical Range	22m
Elevation Variation	37m
Prevailing Cross Slopes	Moderate - Steep
Average Trail Gradient	8%
Maximum Trail Gradient	15% up to 20m
Minimum Line of Sight	Minimum 10m
Qualifier / Filter	None

TRAIL T01 - ELEVATION PROFILE



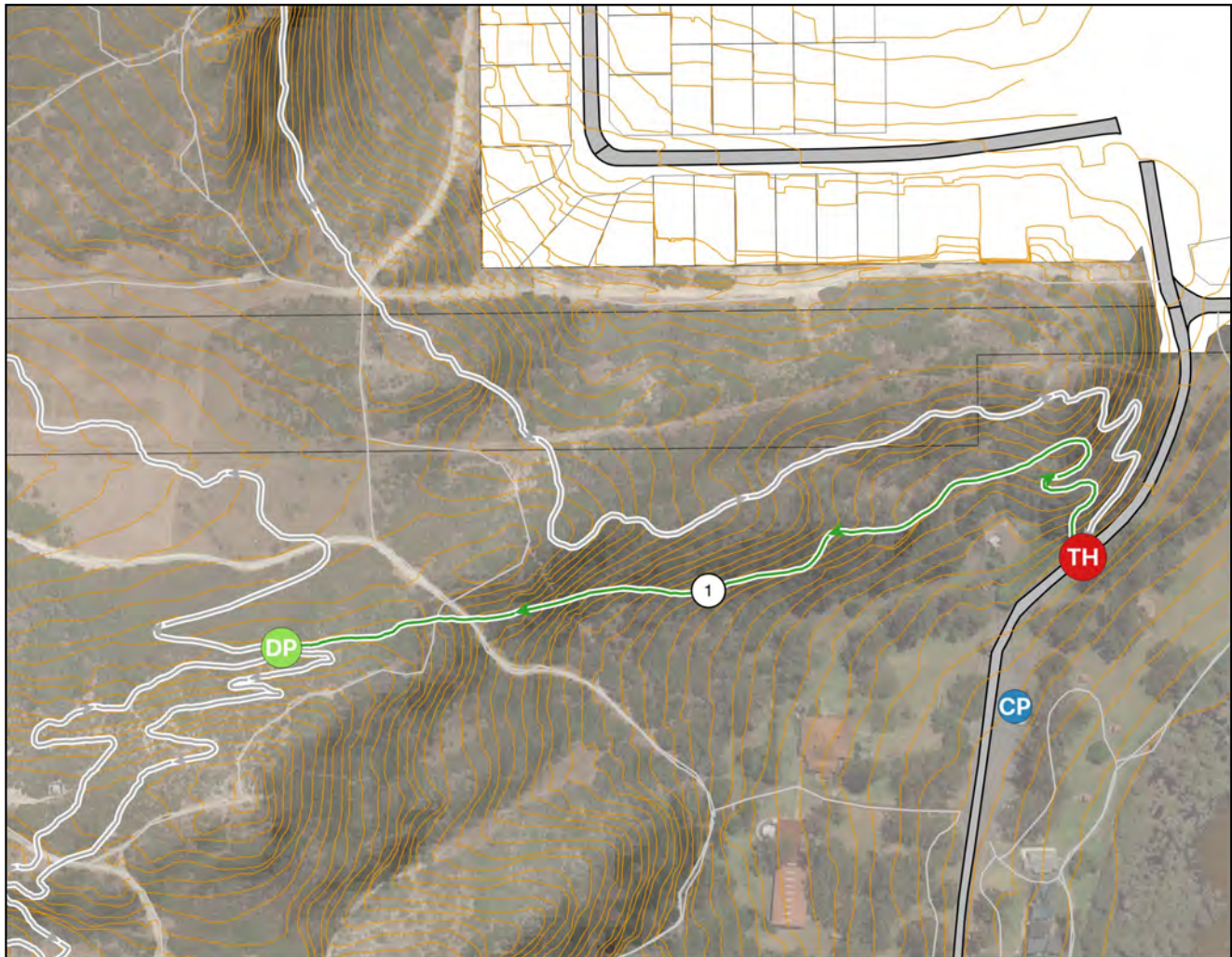
TRAIL 01 CHARACTERISTICS

SETTING	WILDERNESS	NATURAL LANDSCAPE	PLANTATION	RURAL	URBAN FRINGE	URBAN
VEGETATION QUALITY	EXCELLENT	VERY GOOD	GOOD	DEGRADED		
TRAIL TYPE	TOURING	CROSS COUNTRY	DOWN COUNTRY	ALL MOUNTAIN	GRAVITY	PARK
TRAIL STYLE	TECHNICAL	NATURAL	OPEN	FLOWING	FLOW TRAIL	FREERIDE
ORIENTATION	ASCENT ONLY	UNDULATING ASCENT	CONTOURING	UNDULATING DESCENT	DESCENT ONLY	
FLOW / SINUOSITY	IRREGULAR	STRAIGHT	WINDING	FLOWING		
SCALE	VERY NARROW	NARROW	OPEN	WIDE	VERY WIDE	
ROUGHNESS	VERY ROUGH	ROUGH	SMOOTH	GROOMED		
TECHNICAL TRAIL FEATURES	NATURAL	ENHANCED	CONSTRUCTED	IMPORTED MMTF		
FEATURE FREQUENCY	NONE	VERY LONG	LONG	MODERATE	SHORT	
FEATURE MAGNITUDE	NONE	SMALL	MEDIUM	LARGE	VERY LARGE	
EXPOSURE	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH	

TRAIL 01 BENCHMARK & PRECEDENT IMAGERY



TRAIL 01 ALIGNMENT



TRAIL 02

Trail ID **T02**



TRAIL TYPE
XC CROSS COUNTRY
FLOWING TRAIL

TRAIL LENGTH
1776M SINGLE DIRECTION

AVERAGE GRADIENT
5% 27M VERTICAL
93M VARIATION

TRAIL WIDTH
1M SMOOTH
ENHANCED

TRAIL 02 OVERVIEW

Trail 02 is a 1.7km easy single direction bike optimized trail offering a cross country experience focused on flowing trail over predictable smooth terrain. It forms part of the core network of trails and is of high strategic value to the overall networks functionality. Located in moderate side slopes, the trail descends from the decision point before climbing. The climb will have a range of optional blue lines. It features continuous rolling grade reversals and technical trail features with smooth surface and a typical finished width of 1m. The proposed alignment traverses sections of existing unsanctioned trail.

ANTICIPATED TECHNICAL TRAIL FEATURES

TURNS

Berm
Insloped Descending Turn
Climbing Turn
Technical Climbing Turn
Insloped Climbing Turn
Rolling Crown Switchback

VERTICAL CHANGE

Rollers
Kicker Jump
Tabletop
Rollable Double
Grade Reversal
Chicane
Choke

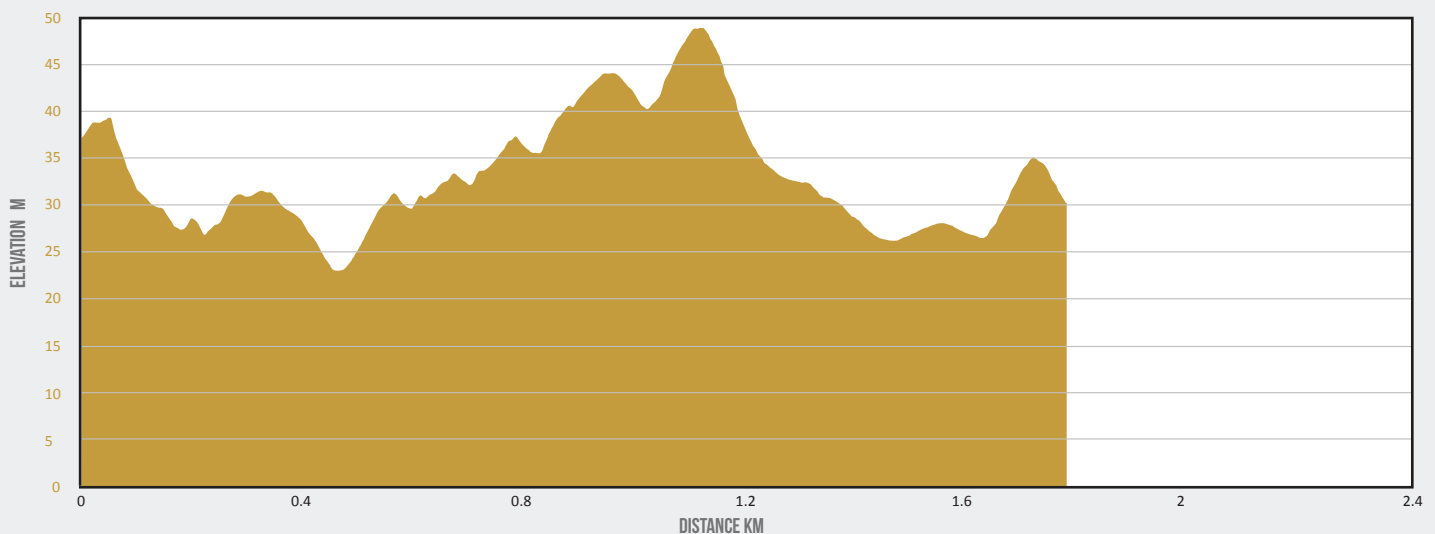
OBSTACLES

Rock Garden
Exposed Bedrock
Rock Rollover

TRAIL 02 DETAILS

Trail ID	02
Provisional Name	Trail 02
Classification	Beginner - Green Circle
Strategic Value	High
Trail Type	Cross Country
Trail Style	Flowing Trail
Tread Width	1m
Use	Bike & Hand Cycle Optimised
Direction	Single Direction
Ascent / Descent	Undulating
Options	Optional Blue lines & Features
Corridor Width	50m
Trail Length	1776m
Vertical Range	27m
Elevation Variation	93m
Prevailing Cross Slopes	Moderate
Average Trail Gradient	5%
Maximum Trail Gradient	15% up to 20m
Minimum Line of Sight	Minimum 10m
Qualifier / Filter	None

TRAIL T02 - ELEVATION PROFILE



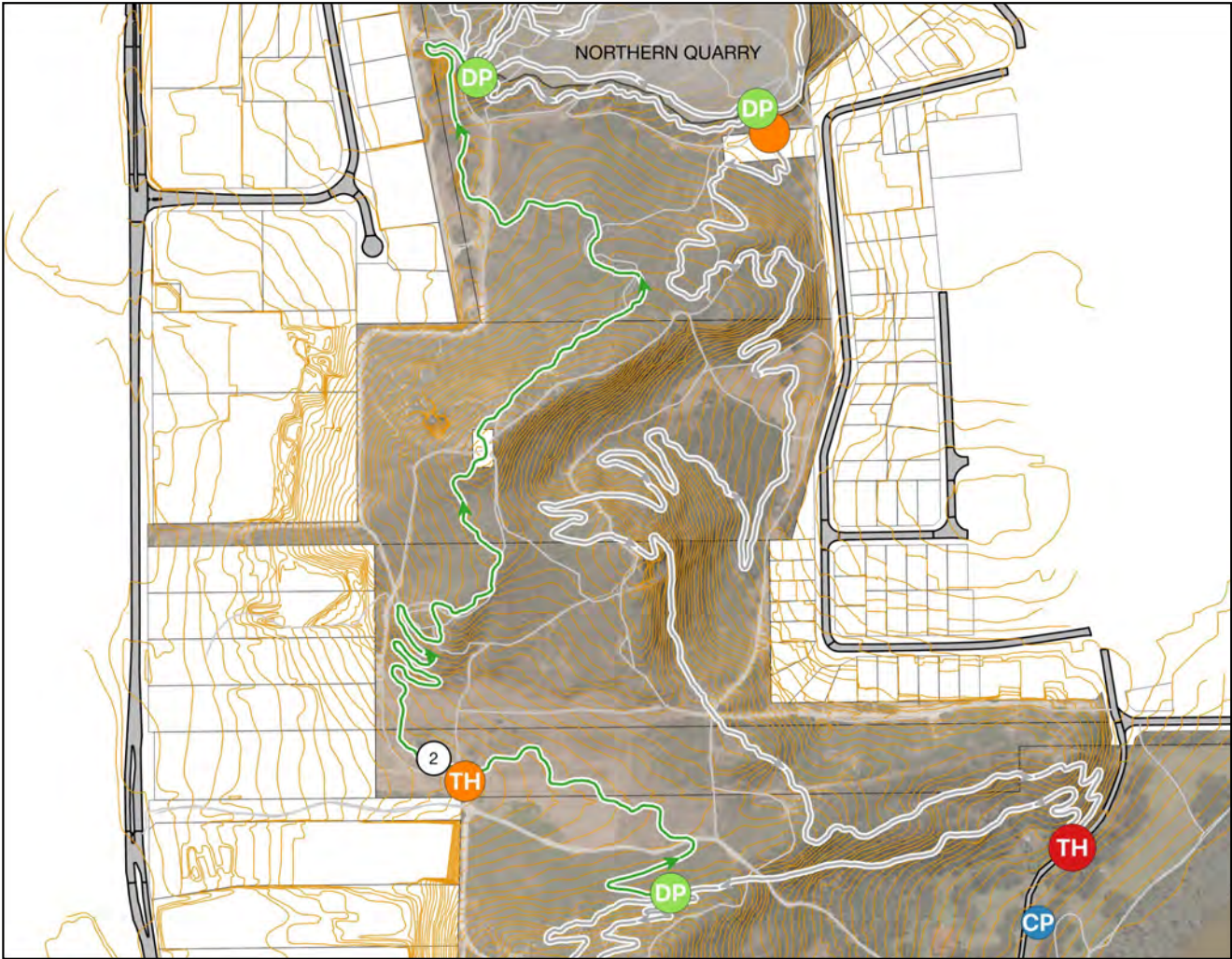
TRAIL 02 CHARACTERISTICS

SETTING	WILDERNESS	NATURAL LANDSCAPE	PLANTATION	RURAL	URBAN FRINGE	URBAN
VEGETATION QUALITY	EXCELLENT	VERY GOOD	GOOD	DEGRADED		
TRAIL TYPE	TOURING	CROSS COUNTRY	DOWN COUNTRY	ALL MOUNTAIN	GRAVITY	PARK
TRAIL STYLE	TECHNICAL	NATURAL	OPEN	FLOWING	FLOW TRAIL	FREERIDE
ORIENTATION	ASCENT ONLY	UNDULATING ASCENT	CONTOURING	UNDULATING DESCENT	DESCENT ONLY	
FLOW / SINUOSITY	IRREGULAR	STRAIGHT	WINDING	FLOWING		
SCALE	VERY NARROW	NARROW	OPEN	WIDE	VERY WIDE	
ROUGHNESS	VERY ROUGH	ROUGH	SMOOTH	GROOMED		
TECHNICAL TRAIL FEATURES	NATURAL	ENHANCED	CONSTRUCTED	IMPORTED MMTF		
FEATURE FREQUENCY	NONE	VERY LONG	LONG	MODERATE	SHORT	
FEATURE MAGNITUDE	NONE	SMALL	MEDIUM	LARGE	VERY LARGE	
EXPOSURE	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH	

TRAIL 02 BENCHMARK & PRECEDENT IMAGERY



TRAIL 02 ALIGNMENT



TRAIL 03

Trail ID **T03**



TRAIL TYPE
XC CROSS COUNTRY
OPEN

TRAIL LENGTH
585M SINGLE DIRECTION

AVERAGE GRADIENT
4% 17M VERTICAL
25M VARIATION

TRAIL WIDTH
1.2M SMOOTH
CONSTRUCTED

TRAIL 04 OVERVIEW

Trail 4 is a 585m easy single direction looped trail offering a cross country experience focused on an open and flowing trail over predictable smooth terrain. It is of high strategic value to the overall networks functionality if the proposed northern trail head with car park proceeds. Located in moderate side slopes, the moderate gradient trail descends before climbing back up to the decision point. It features minimal technical trail features and an open feel with a smooth surface with typical finished width of 1.2m. The proposed alignment does not traverse sections of existing unsanctioned trail.

ANTICIPATED TECHNICAL TRAIL FEATURES

URNS

Berm
Insloped Descending Turn
Technical Inside Line
Climbing Turn
Technical Climbing Turn
Insloped Climbing Turn
Rolling Crown

VERTICAL CHANGE

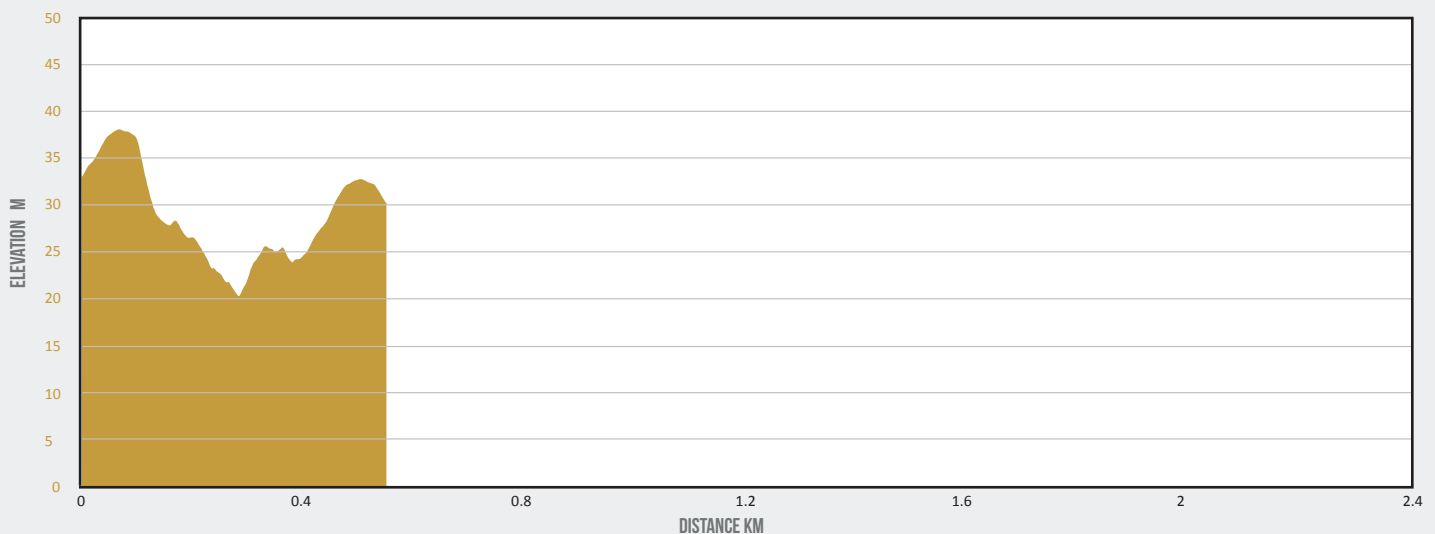
Rollers
Grade Reversal
Chicane
Choke

OBSTACLES

TRAIL 04 DETAILS

Trail ID	04
Provisional Name	Trail 04
Classification	Beginner - Green Circle
Strategic Value	High
Trail Type	Cross Country
Trail Style	Open
Tread Width	1.2m
Use	Bike & Hand Cycle Optimised
Direction	Single Direction
Ascent / Descent	Undulating
Options	Nil
Corridor Width	50m
Trail Length	585m
Vertical Range	17m
Elevation Variation	25m
Prevailing Cross Slopes	Moderate
Average Trail Gradient	4%
Maximum Trail Gradient	15% up to 20m
Minimum Line of Sight	Minimum 10m
Qualifier / Filter	None

TRAIL T03 - ELEVATION PROFILE



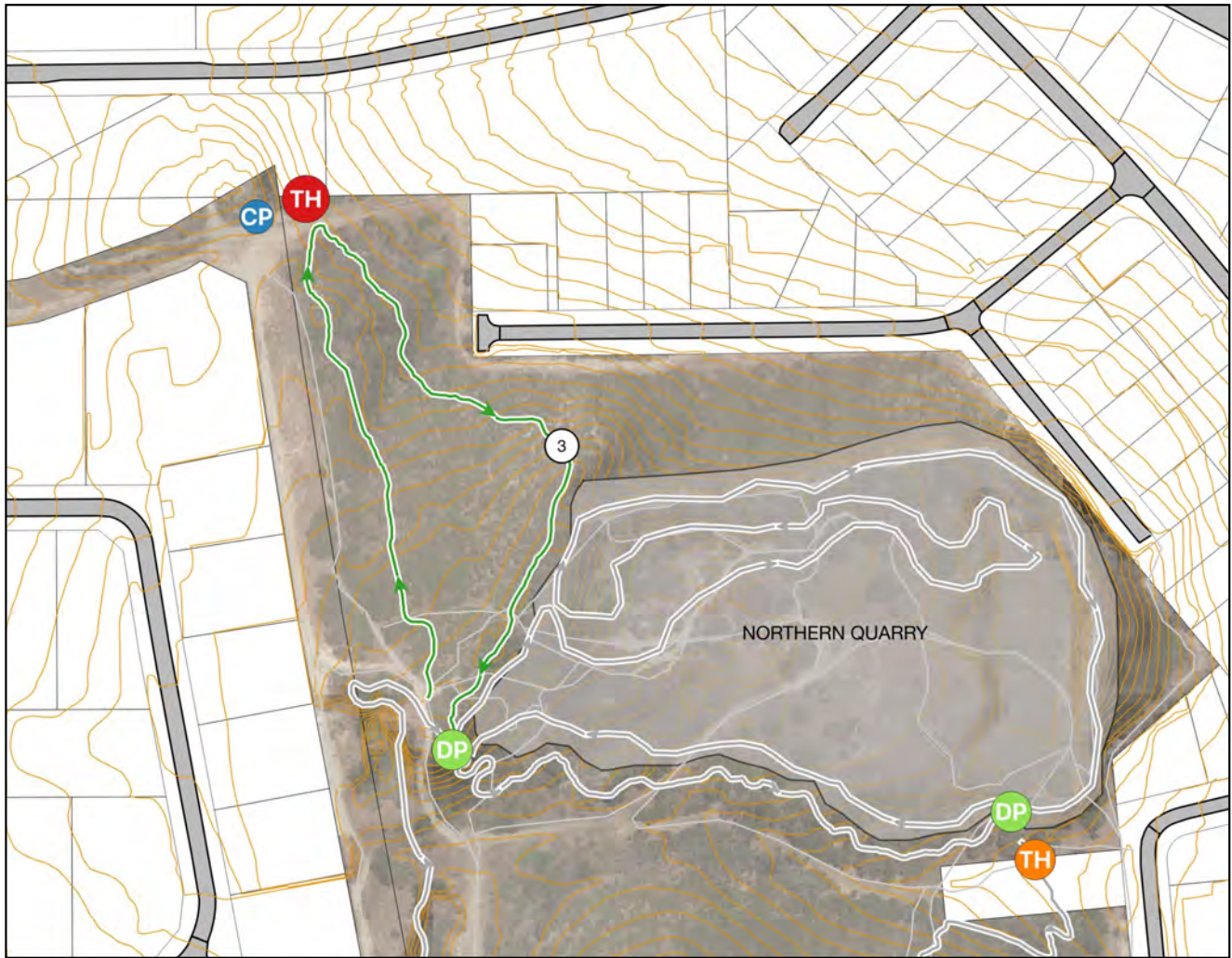
TRAIL 04 CHARACTERISTICS

SETTING	WILDERNESS	NATURAL LANDSCAPE	PLANTATION	RURAL	URBAN FRINGE	URBAN
VEGETATION QUALITY	EXCELLENT	VERY GOOD	GOOD	DEGRADED		
TRAIL TYPE	TOURING	CROSS COUNTRY	DOWN COUNTRY	ALL MOUNTAIN	GRAVITY	PARK
TRAIL STYLE	TECHNICAL	NATURAL	OPEN	FLOWING	FLOW TRAIL	FREERIDE
ORIENTATION	ASCENT ONLY	UNDULATING ASCENT	CONTOURING	UNDULATING DESCENT	DESCENT ONLY	
FLOW / SINUOSITY	IRREGULAR	STRAIGHT	WINDING	FLOWING		
SCALE	VERY NARROW	NARROW	OPEN	WIDE	VERY WIDE	
ROUGHNESS	VERY ROUGH	ROUGH	SMOOTH	GROOMED		
TECHNICAL TRAIL FEATURES	NATURAL	ENHANCED	CONSTRUCTED	IMPORTED MMTF		
FEATURE FREQUENCY	NONE	VERY LONG	LONG	MODERATE	SHORT	
FEATURE MAGNITUDE	NONE	SMALL	MEDIUM	LARGE	VERY LARGE	
EXPOSURE	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH	

TRAIL 03 BENCHMARK & PRECEDENT IMAGERY



TRAIL 03 ALIGNMENT



TRAIL 04

Trail ID **T04**



TRAIL TYPE
XC CROSS COUNTRY
FLOW TRAIL

TRAIL LENGTH
375M SINGLE DIRECTION

AVERAGE GRADIENT
4% 8M VERTICAL
16M VARIATION

TRAIL WIDTH
1.2M GROOMED
CONSTRUCTED

TRAIL05 OVERVIEW

Trail 05 is a 375m easy single direction undulating trail offering a cross country flow trail experience. It forms part of the core outer network linking the decision points close to the northern quarry park area and is of medium strategic value to the overall networks functionality. Located in moderate side slopes, the moderate gradient trail traverses along the contours of the hill. It features continuous rolling grade reversals with flowy technical trail features and an open feel with a smooth surface with typical finished width of 1.2m. The proposed alignment does not traverse sections of existing unsanctioned trail.

ANTICIPATED TECHNICAL TRAIL FEATURES

URNS

Berm
Insloped Descending Turn

VERTICAL CHANGE

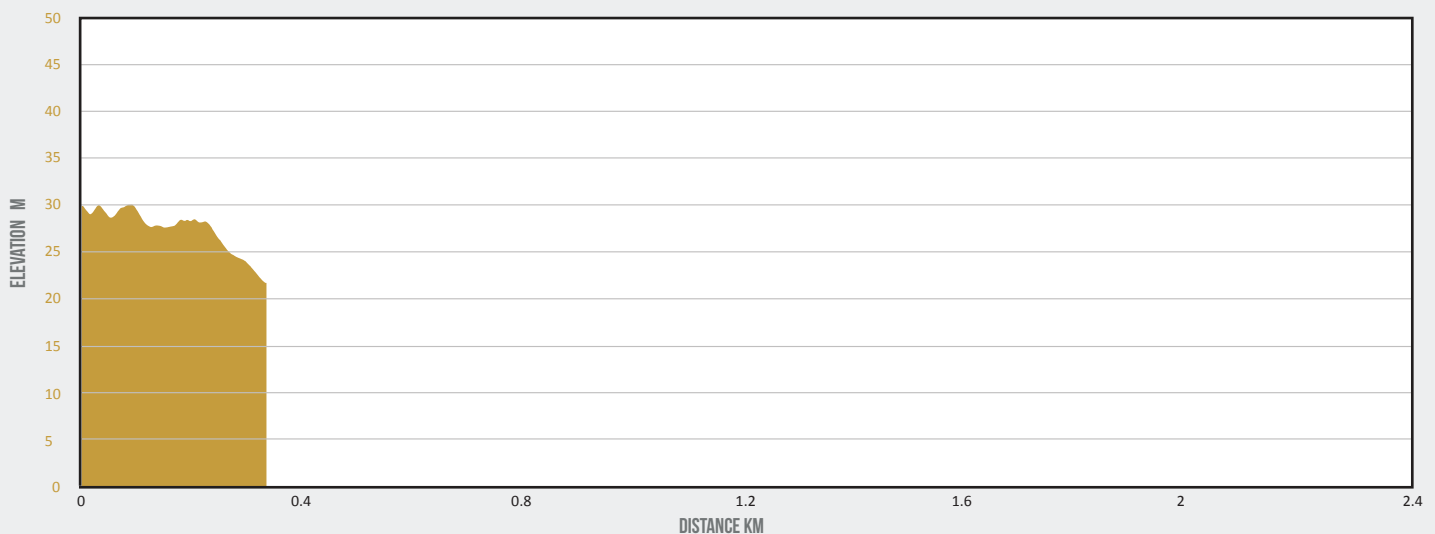
Rollers
Kicker Jump
Tabletop
Rollable Double
Grade Reversal
Chicane
Choke

OBSTACLES

TRAIL 05 DETAILS

Trail ID	05
Provisional Name	Trail 05
Classification	Beginner - Green Circle
Strategic Value	Medium
Trail Type	Cross Country
Trail Style	Flow Trail
Tread Width	1.2m
Use	Bike & Hand Cycle Optimised
Direction	Single Direction
Ascent / Descent	Undulating
Options	Nil
Corridor Width	50m
Trail Length	375m
Vertical Range	8m
Elevation Variation	16m
Prevailing Cross Slopes	Moderate
Average Trail Gradient	4%
Maximum Trail Gradient	15% up to 20m
Minimum Line of Sight	Minimum 10m
Qualifier / Filter	None

TRAILT04 - ELEVATION PROFILE



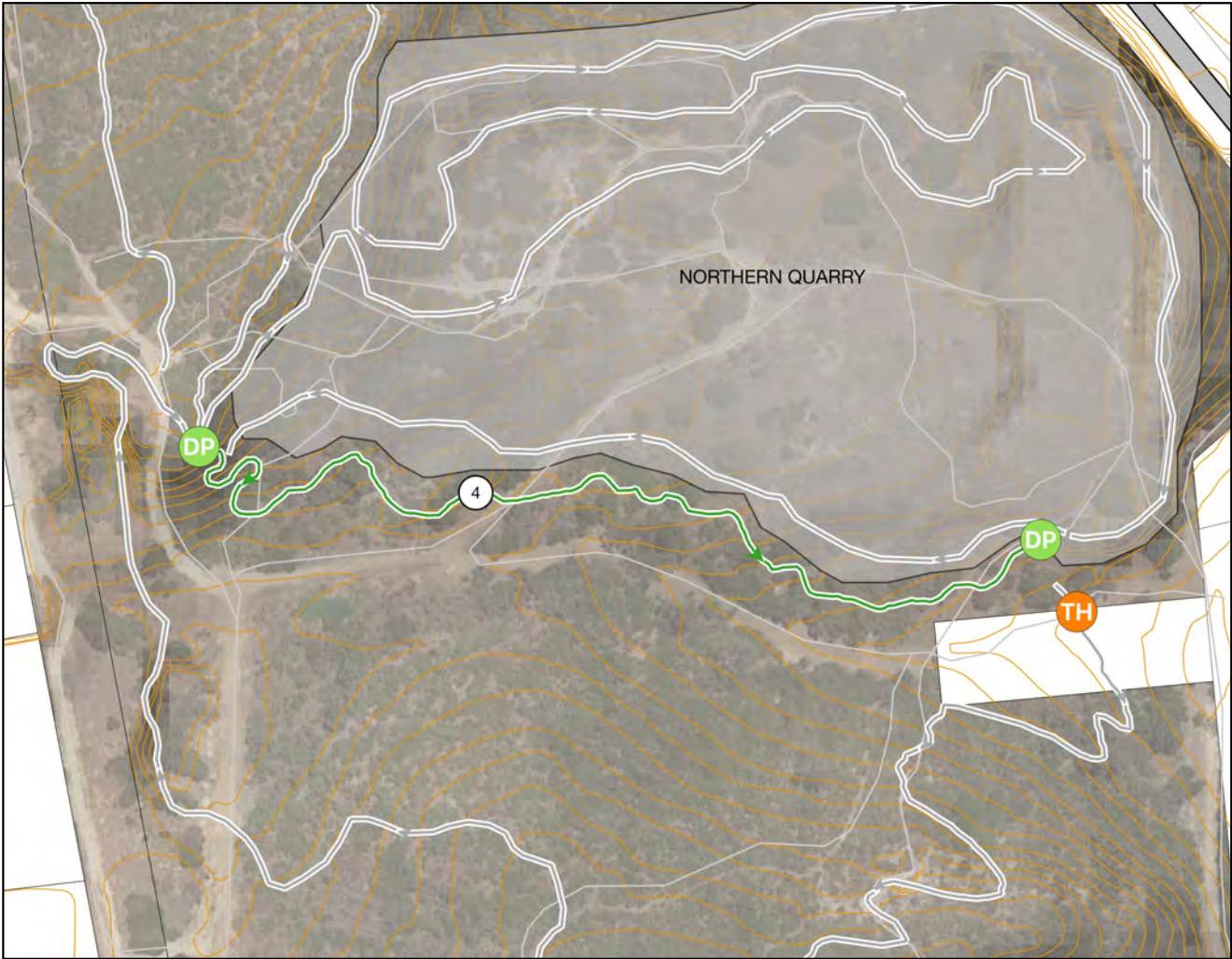
TRAIL 05 CHARACTERISTICS

SETTING	WILDERNESS	NATURAL LANDSCAPE	PLANTATION	RURAL	URBAN FRINGE	URBAN
VEGETATION QUALITY	EXCELLENT	VERY GOOD	GOOD	DEGRADED		
TRAIL TYPE	TOURING	CROSS COUNTRY	DOWN COUNTRY	ALL MOUNTAIN	GRAVITY	PARK
TRAIL STYLE	TECHNICAL	NATURAL	OPEN	FLOWING	FLOW TRAIL	FREERIDE
ORIENTATION	ASCENT ONLY	UNDULATING ASCENT	CONTOURING	UNDULATING DESCENT	DESCENT ONLY	
FLOW / SINUOSITY	IRREGULAR	STRAIGHT	WINDING	FLOWING		
SCALE	VERY NARROW	NARROW	OPEN	WIDE	VERY WIDE	
ROUGHNESS	VERY ROUGH	ROUGH	SMOOTH	GROOMED		
TECHNICAL TRAIL FEATURES	NATURAL	ENHANCED	CONSTRUCTED	IMPORTED MMTF		
FEATURE FREQUENCY	NONE	VERY LONG	LONG	MODERATE	SHORT	
FEATURE MAGNITUDE	NONE	SMALL	MEDIUM	LARGE	VERY LARGE	
EXPOSURE	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH	

TRAIL 04 BENCHMARK & PRECEDENT IMAGERY



TRAIL 04 ALIGNMENT



TRAIL 05

Trail ID **T05**



TRAIL TYPE
XC CROSS COUNTRY
FLOW TRAIL

TRAIL LENGTH
2400M SINGLE DIRECTION

AVERAGE GRADIENT
6% 27M VERTICAL
149M VARIATION

TRAIL WIDTH
1.2M GROOMED
CONSTRUCTED

TRAIL 05 OVERVIEW

Trail 05 is a 2.4km easy single direction undulating trail offering a cross country flow trail experience. It forms part of the core outer network linking the decision points close to the northern quarry park area and is of medium strategic value to the overall networks functionality. Located in moderate side slopes, the moderate gradient trail traverses along the contours of the hill. It features continuous rolling grade reversals with flowy technical trail features and an open feel with a groomed surface with typical finished width of 1.2m. The proposed alignment does not traverse sections of existing unsanctioned trail.

ANTICIPATED TECHNICAL TRAIL FEATURES

URNS

Berm
Insloped Descending Turn

VERTICAL CHANGE

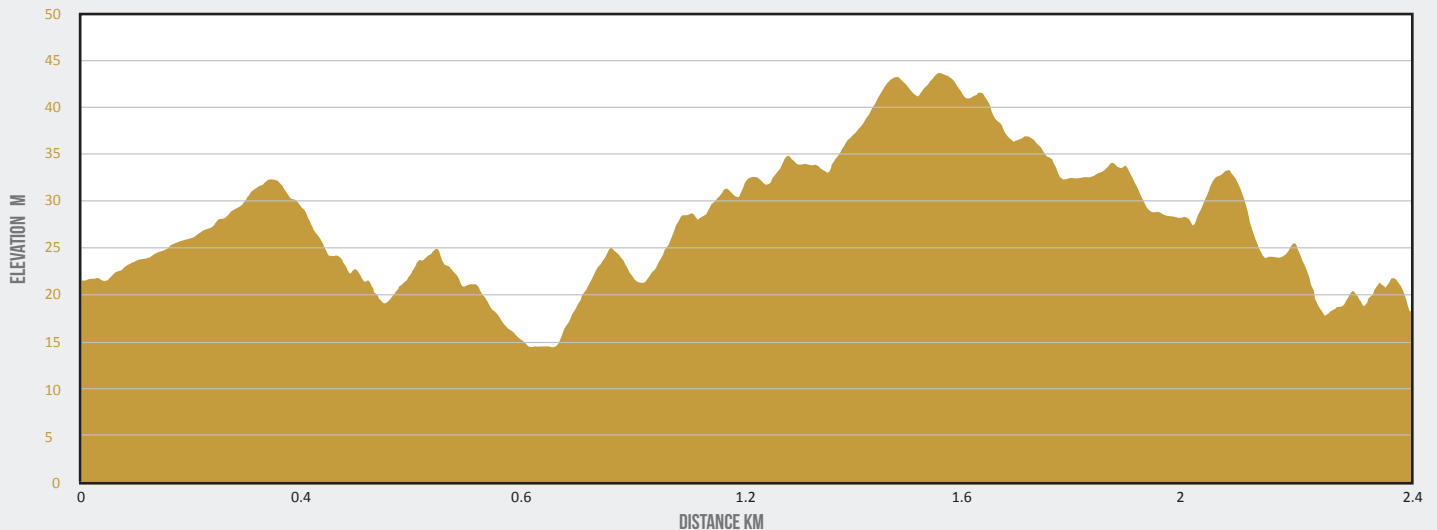
Rollers
Kicker Jump
Tabletop
Rollable Double
Grade Reversal
Chicane
Choke

OBSTACLES

TRAIL 05 DETAILS

Trail ID	05
Provisional Name	Trail 05
Classification	Beginner - Green Circle
Strategic Value	Medium
Trail Type	Cross Country
Trail Style	Flow Trail
Tread Width	1.2m
Use	Bike & Hand Cycle Optimised
Direction	Single Direction
Ascent / Descent	Undulating
Options	Nil
Corridor Width	50m
Trail Length	2400m
Vertical Range	27m
Elevation Variation	149m
Prevailing Cross Slopes	Moderate
Average Trail Gradient	4%
Maximum Trail Gradient	15% up to 20m
Minimum Line of Sight	Minimum 10m
Qualifier / Filter	None

TRAIL T05 - ELEVATION PROFILE



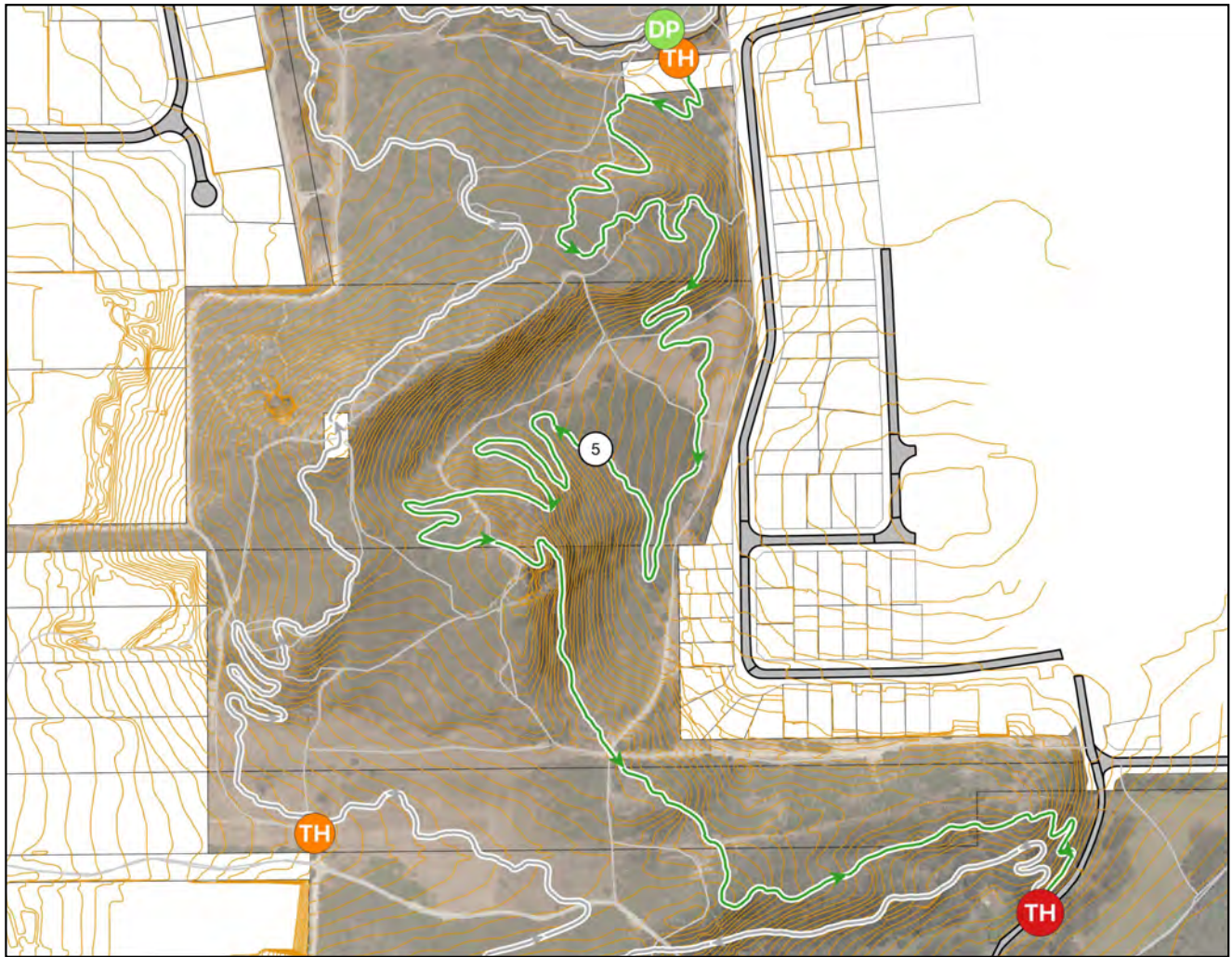
TRAIL 05 CHARACTERISTICS

SETTING	WILDERNESS	NATURAL LANDSCAPE	PLANTATION	RURAL	URBAN FRINGE	URBAN
VEGETATION QUALITY	EXCELLENT	VERY GOOD	GOOD	DEGRADED		
TRAIL TYPE	TOURING	CROSS COUNTRY	DOWN COUNTRY	ALL MOUNTAIN	GRAVITY	PARK
TRAIL STYLE	TECHNICAL	NATURAL	OPEN	FLOWING	FLOW TRAIL	FREERIDE
ORIENTATION	ASCENT ONLY	UNDULATING ASCENT	CONTOURING	UNDULATING DESCENT	DESCENT ONLY	
FLOW / SINUOSITY	IRREGULAR	STRAIGHT	WINDING	FLOWING		
SCALE	VERY NARROW	NARROW	OPEN	WIDE	VERY WIDE	
ROUGHNESS	VERY ROUGH	ROUGH	SMOOTH	GROOMED		
TECHNICAL TRAIL FEATURES	NATURAL	ENHANCED	CONSTRUCTED	IMPORTED MMTF		
FEATURE FREQUENCY	NONE	VERY LONG	LONG	MODERATE	SHORT	
FEATURE MAGNITUDE	NONE	SMALL	MEDIUM	LARGE	VERY LARGE	
EXPOSURE	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH	

TRAIL 05 BENCHMARK & PRECEDENT IMAGERY



TRAIL 05 ALIGNMENT



TRAIL 06

Trail ID **T06**

CLASSIFICATION



MODERATE
BLUE SQUARE

TRAIL TYPE

XC

CROSS COUNTRY
TECHNICAL

TRAIL LENGTH

1655M

SINGLE DIRECTION

AVERAGE GRADIENT

5%

25M VERTICAL
88M VARIATION

TRAIL WIDTH

0.6M

ROUGH
NATURAL

TRAIL 06 OVERVIEW

Trail 06 is a 1.6km moderate single direction climbing trail offering cross country experience focused on technical trail style over rough terrain. It forms part of the primary network of trails and is of moderate strategic value to the overall networks functionality. Located in generally moderate side slopes, the moderate gradient trail climbs from the secondary trailhead to the central decision point. It features climbing switchback corners with technical trail features and a narrow rough surface with typical finished width of 0.6m. The proposed alignment does not traverse sections of existing unsanctioned trail.

ANTICIPATED TECHNICAL TRAIL FEATURES

TURNS

Climbing Turn
Technical Climbing Turn
Insloped Climbing Turn
Rolling Crown
Switchback

VERTICAL CHANGE

Rollers
Grade Reversal
Drop Off
Obstacle Step Up
Chicane
Choke

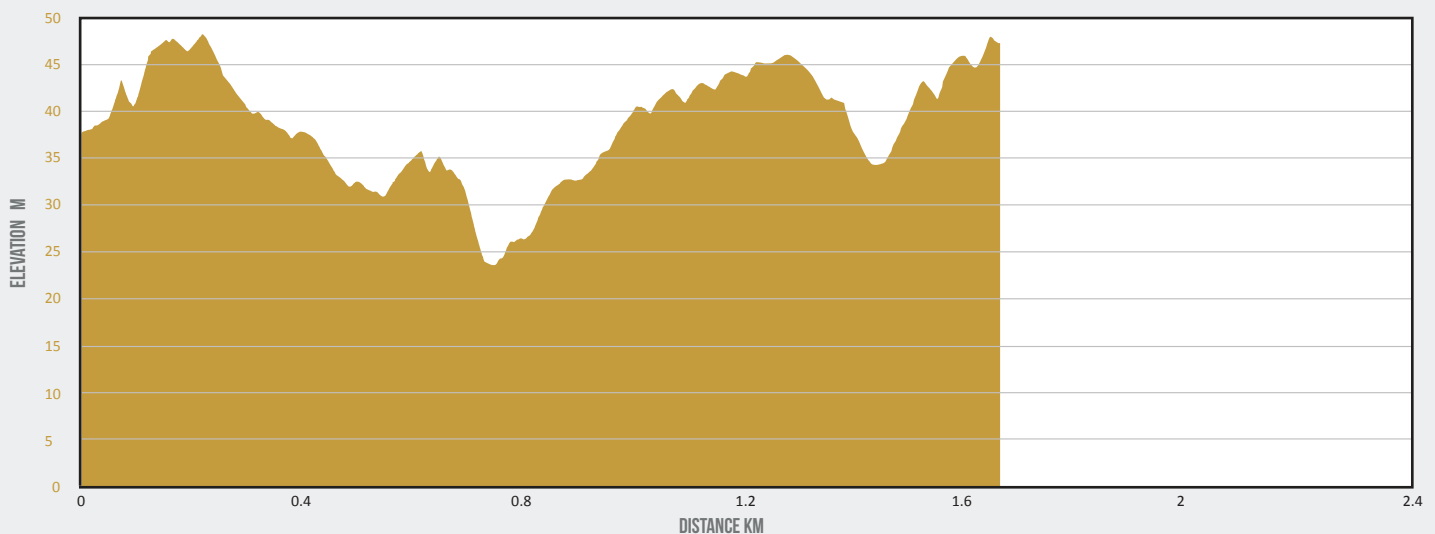
OBSTACLES

Rock Garden
Exposed Bedrock
Stabilised Root Section

TRAIL 06 DETAILS

Trail ID	06
Provisional Name	Trail 06
Classification	Moderate – Blue Square
Strategic Value	Moderate
Trail Type	Cross Country
Trail Style	Technical
Tread Width	0.6m
Use	Bike Optimised
Direction	Single Direction
Ascent / Descent	Undulating
Options	Optional Features and Lines
Corridor Width	50m
Trail Length	1655m
Vertical Range	25m
Elevation Variation	88m
Prevailing Cross Slopes	Moderate
Average Trail Gradient	5%
Maximum Trail Gradient	10% up to 50m
Minimum Line of Sight	Minimum 7.5m
Qualifier / Filter	None

TRAIL T06 - ELEVATION PROFILE



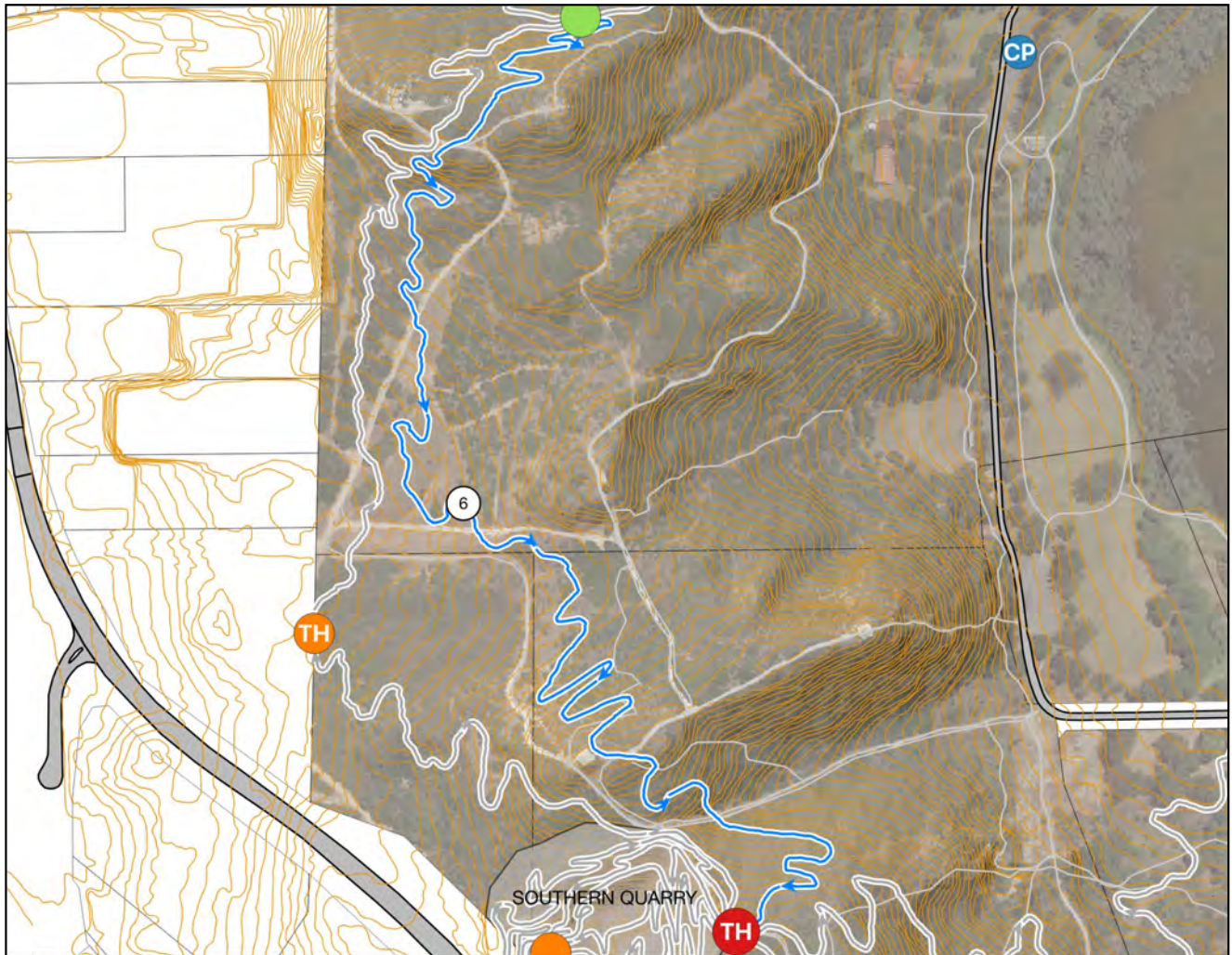
TRAIL 06 CHARACTERISTICS

SETTING	WILDERNESS	NATURAL LANDSCAPE	PLANTATION	RURAL	URBAN FRINGE	URBAN
VEGETATION QUALITY	EXCELLENT	VERY GOOD	GOOD	DEGRADED		
TRAIL TYPE	TOURING	CROSS COUNTRY	DOWN COUNTRY	ALL MOUNTAIN	GRAVITY	PARK
TRAIL STYLE	TECHNICAL	NATURAL	OPEN	FLOWING	FLOW TRAIL	FREERIDE
ORIENTATION	ASCENT ONLY	UNDULATING ASCENT	CONTOURING	UNDULATING DESCENT	DESCENT ONLY	
FLOW / SINUOSITY	IRREGULAR	STRAIGHT	WINDING	FLOWING		
SCALE	VERY NARROW	NARROW	OPEN	WIDE	VERY WIDE	
ROUGHNESS	VERY ROUGH	ROUGH	SMOOTH	GROOMED		
TECHNICAL TRAIL FEATURES	NATURAL	ENHANCED	CONSTRUCTED	IMPORTED MMTF		
FEATURE FREQUENCY	NONE	VERY LONG	LONG	MODERATE	SHORT	
FEATURE MAGNITUDE	NONE	SMALL	MEDIUM	LARGE	VERY LARGE	
EXPOSURE	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH	

TRAIL 06 BENCHMARK & PRECEDENT IMAGERY



TRAIL 06 ALIGNMENT



TRAIL 07

Trail ID **T07**

CLASSIFICATION



MODERATE
BLUE SQUARE

TRAIL TYPE

XC

CROSS COUNTRY
TECHNICAL

TRAIL LENGTH

635M SINGLE DIRECTION

AVERAGE GRADIENT

6% 25M VERTICAL
37M VARIATION

TRAIL WIDTH

0.6M ROUGH
NATURAL

TRAIL 07 OVERVIEW

Trail 07 is a 635m moderate single direction descending trail offering cross country experience focused on technical trail style over rough terrain. It forms part of the primary network of trails and is of moderate strategic value to the overall networks functionality. Located in generally moderate side slopes, the moderate gradient trail descends from the Southern Quarry trailhead to the primary trailhead at the Western edge of the network. It features descending switchback corners with technical trail features and a narrow rough surface with typical finished width of 0.6m. The proposed alignment does not traverse sections of existing unsanctioned trail.

ANTICIPATED TECHNICAL TRAIL FEATURES

TURNS

Descending Turn
Technical Descending Turn
Insloped Descending Turn
Rolling Crown
Switchback

VERTICAL CHANGE

Rollers
Grade Reversal
Drop Off
Obstacle Step Up
Chicane
Choke

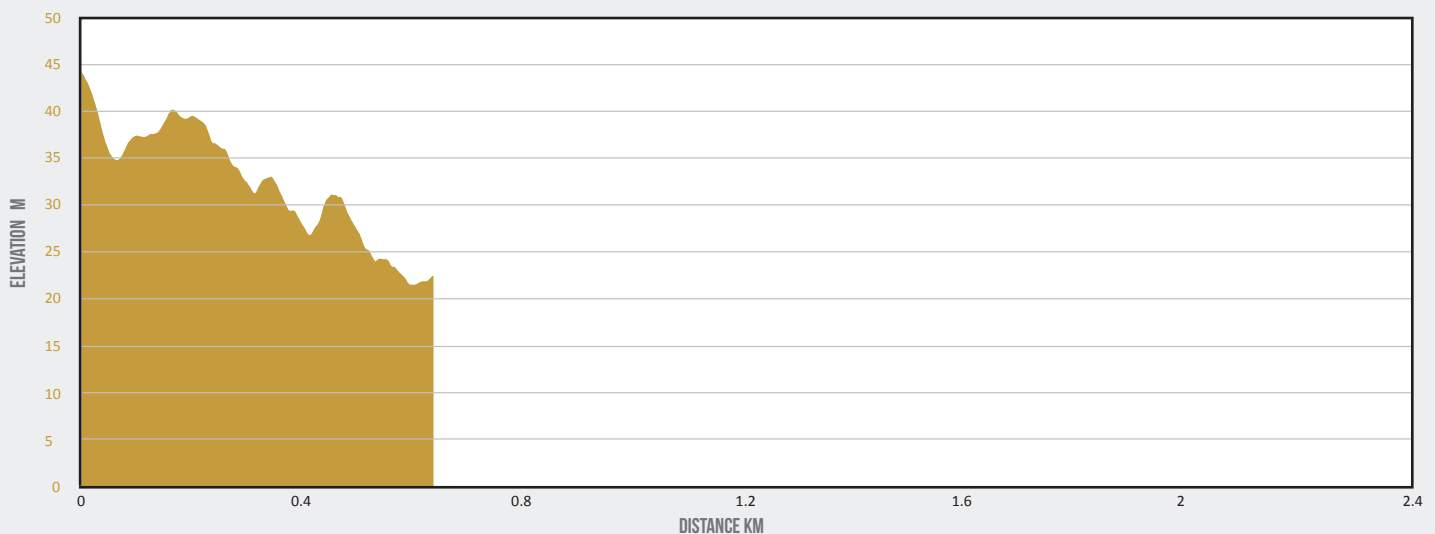
OBSTACLES

Rock Garden
Exposed Bedrock
Stabilised Root Section

TRAIL 07 DETAILS

Trail ID	07
Provisional Name	Trail 07
Classification	Moderate – Blue Square
Strategic Value	Moderate
Trail Type	Cross Country
Trail Style	Technical
Tread Width	0.6m
Use	Bike Optimised
Direction	Single Direction
Ascent / Descent	Descending
Options	Optional Features and Lines
Corridor Width	50m
Trail Length	635m
Vertical Range	25m
Elevation Variation	37m
Prevailing Cross Slopes	Moderate
Average Trail Gradient	6%
Maximum Trail Gradient	10% up to 50m
Minimum Line of Sight	Minimum 7.5m
Qualifier / Filter	None

TRAIL T07 - ELEVATION PROFILE



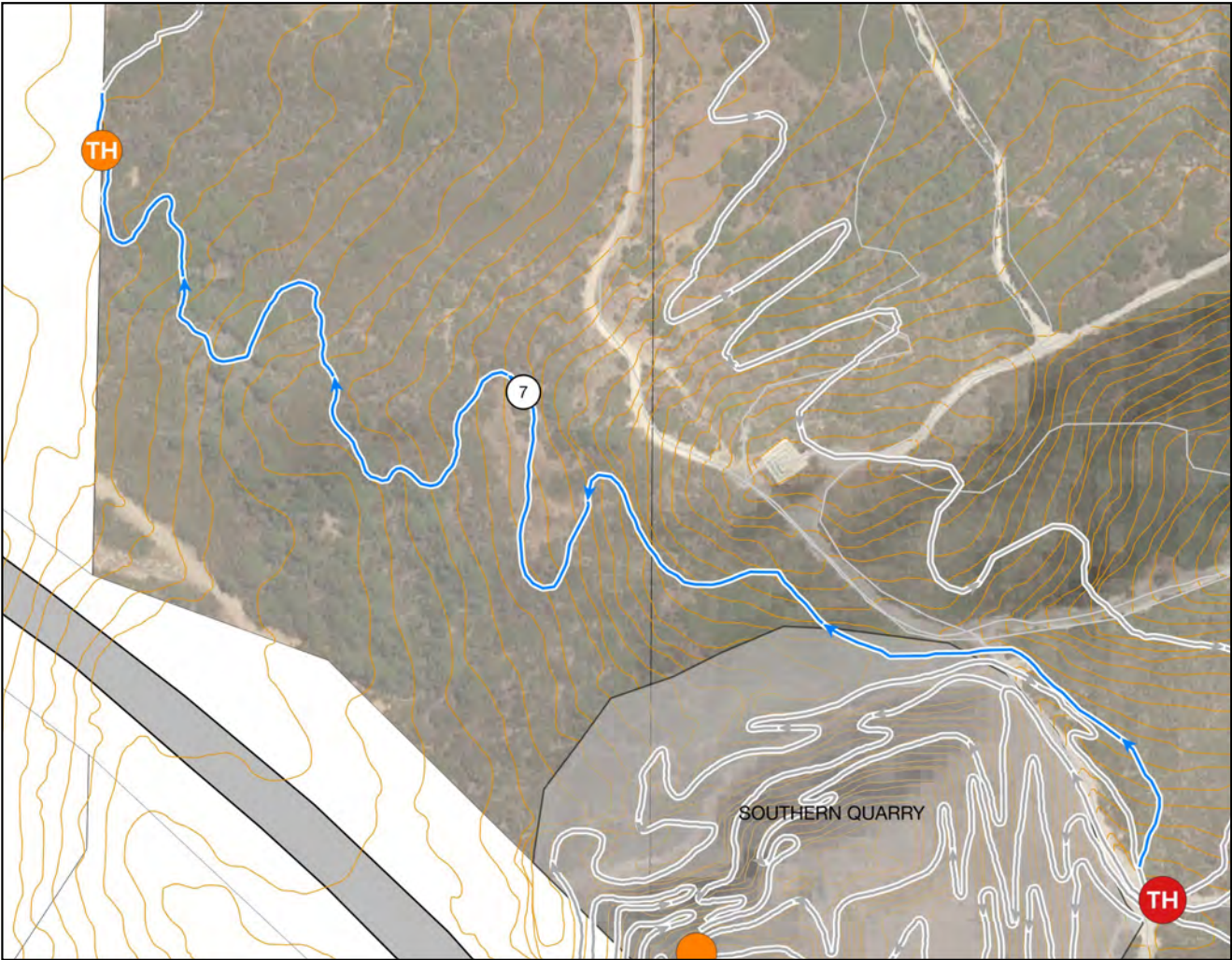
TRAIL 07 CHARACTERISTICS

SETTING	WILDERNESS	NATURAL LANDSCAPE	PLANTATION	RURAL	URBAN FRINGE	URBAN
VEGETATION QUALITY	EXCELLENT	VERY GOOD	GOOD	DEGRADED		
TRAIL TYPE	TOURING	CROSS COUNTRY	DOWN COUNTRY	ALL MOUNTAIN	GRAVITY	PARK
TRAIL STYLE	TECHNICAL	NATURAL	OPEN	FLOWING	FLOW TRAIL	FREERIDE
ORIENTATION	ASCENT ONLY	UNDULATING ASCENT	CONTOURING	UNDULATING DESCENT	DESCENT ONLY	
FLOW / SINUOSITY	IRREGULAR	STRAIGHT	WINDING	FLOWING		
SCALE	VERY NARROW	NARROW	OPEN	WIDE	VERY WIDE	
ROUGHNESS	VERY ROUGH	ROUGH	SMOOTH	GROOMED		
TECHNICAL TRAIL FEATURES	NATURAL	ENHANCED	CONSTRUCTED	IMPORTED MMTF		
FEATURE FREQUENCY	NONE	VERY LONG	LONG	MODERATE	SHORT	
FEATURE MAGNITUDE	NONE	SMALL	MEDIUM	LARGE	VERY LARGE	
EXPOSURE	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH	

TRAIL 07 BENCHMARK & PRECEDENT IMAGERY



TRAIL 07 ALIGNMENT



TRAIL 08

Trail ID **T08**

CLASSIFICATION



MODERATE
BLUE SQUARE

TRAIL TYPE

XC

CROSS COUNTRY
TECHNICAL

TRAIL LENGTH

760M

SINGLE DIRECTION

AVERAGE GRADIENT

6%

22M VERTICAL
42M VARIATION

TRAIL WIDTH

0.6M

ROUGH
NATURAL

TRAIL 08 OVERVIEW

Trail 08 is a 760m moderate single direction climbing trail offering cross country experience focused on technical trail style over rough terrain. It forms part of the primary network of trails and is of moderate strategic value to the overall networks functionality. Located in generally moderate side slopes, the moderate gradient trail climbs from the secondary trailhead to the central decision point. It features climbing switchback corners with technical trail features and a narrow rough surface with typical finished width of 0.6m. The proposed alignment does not traverse sections of existing unsanctioned trail.

ANTICIPATED TECHNICAL TRAIL FEATURES

TURNS

Climbing Turn
Technical Climbing Turn
Insloped Climbing Turn
Rolling Crown
Switchback

VERTICAL CHANGE

Rollers
Grade Reversal
Drop Off
Obstacle Step Up
Chicane
Choke

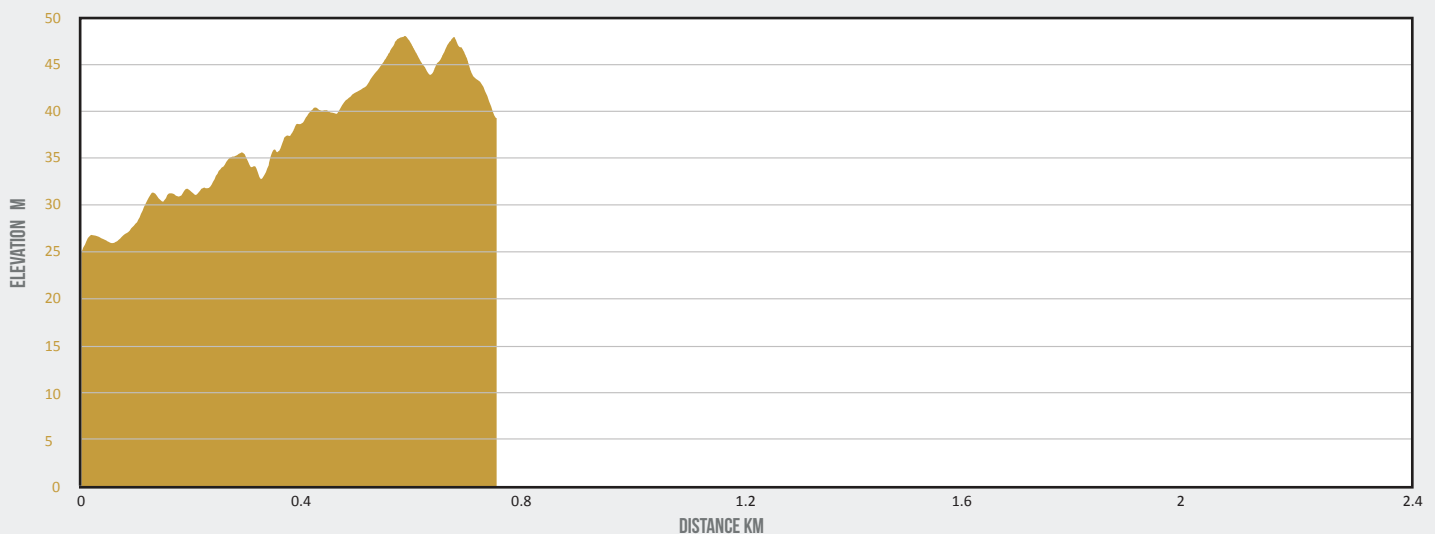
OBSTACLES

Rock Garden
Exposed Bedrock
Stabilised Root Section

TRAIL 08 DETAILS

Trail ID	08
Provisional Name	Trail 08
Classification	Moderate – Blue Square
Strategic Value	Moderate
Trail Type	Cross Country
Trail Style	Technical
Tread Width	0.6m
Use	Bike Optimised
Direction	Single Direction
Ascent / Descent	Ascending
Options	Optional Features and Lines
Corridor Width	50m
Trail Length	760m
Vertical Range	22m
Elevation Variation	42m
Prevailing Cross Slopes	Moderate
Average Trail Gradient	6%
Maximum Trail Gradient	10% up to 50m
Minimum Line of Sight	Minimum 7.5m
Qualifier / Filter	None

TRAIL T08 - ELEVATION PROFILE



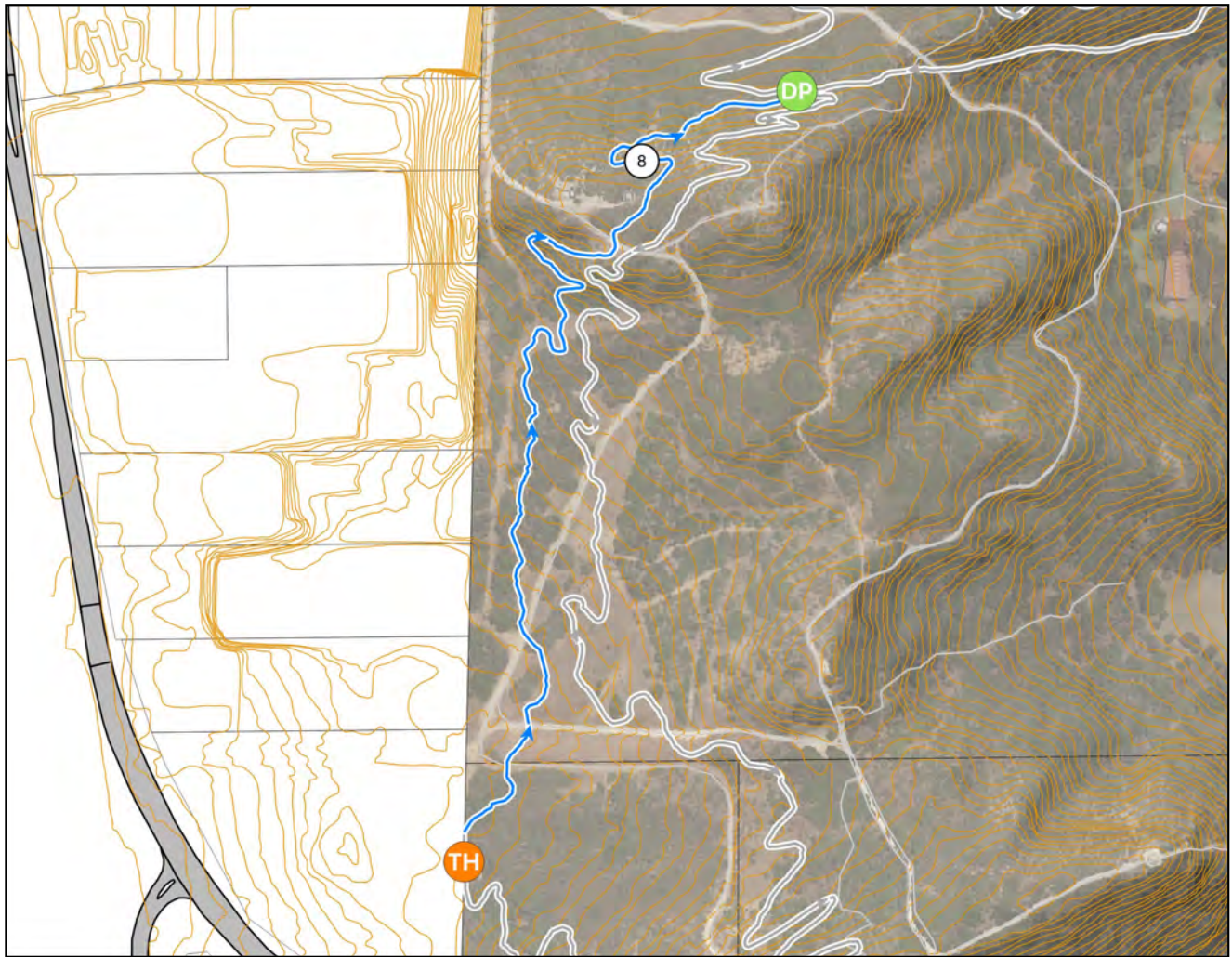
TRAIL 08 CHARACTERISTICS

SETTING	WILDERNESS	NATURAL LANDSCAPE	PLANTATION	RURAL	URBAN FRINGE	URBAN
VEGETATION QUALITY	EXCELLENT	VERY GOOD	GOOD	DEGRADED		
TRAIL TYPE	TOURING	CROSS COUNTRY	DOWN COUNTRY	ALL MOUNTAIN	GRAVITY	PARK
TRAIL STYLE	TECHNICAL	NATURAL	OPEN	FLOWING	FLOW TRAIL	FREERIDE
ORIENTATION	ASCENT ONLY	UNDULATING ASCENT	CONTOURING	UNDULATING DESCENT	DESCENT ONLY	
FLOW / SINUOSITY	IRREGULAR	STRAIGHT	WINDING	FLOWING		
SCALE	VERY NARROW	NARROW	OPEN	WIDE	VERY WIDE	
ROUGHNESS	VERY ROUGH	ROUGH	SMOOTH	GROOMED		
TECHNICAL TRAIL FEATURES	NATURAL	ENHANCED	CONSTRUCTED	IMPORTED MMTF		
FEATURE FREQUENCY	NONE	VERY LONG	LONG	MODERATE	SHORT	
FEATURE MAGNITUDE	NONE	SMALL	MEDIUM	LARGE	VERY LARGE	
EXPOSURE	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH	

TRAIL 08 BENCHMARK & PRECEDENT IMAGERY



TRAIL 08 ALIGNMENT



TRAIL 09

Trail ID **T09**



TRAIL TYPE
XC CROSS COUNTRY
FLOW TRAIL

TRAIL LENGTH
1135M SINGLE DIRECTION

AVERAGE GRADIENT
7% 36M VERTICAL
81M VARIATION

TRAIL WIDTH
1.2M GROOMED
CONSTRUCTED

TRAIL 09 OVERVIEW

Trail 09 is a 1225m easy single direction descending trail offering cross country experience focused on flow trail over smooth terrain. It forms part of the optional network of trails and is of low strategic value to the overall networks functionality. Located in generally moderate side slopes, the easy gradient trail descends from the Southern Quarry Trailhead to the eastern carpark. It features descending switchback corners with flowy trail features and a wide smooth surface with typical finished width of 1.2m. The proposed alignment traverses sections of existing unsanctioned trail.

ANTICIPATED TECHNICAL TRAIL FEATURES

URNS

Berm
Insloped Descending Turn
Technical Inside Line

VERTICAL CHANGE

Rollers
Kicker Jump
Tabletop
Rollable Double
Step Down Jump
Grade Reversal
Chicane
Choke

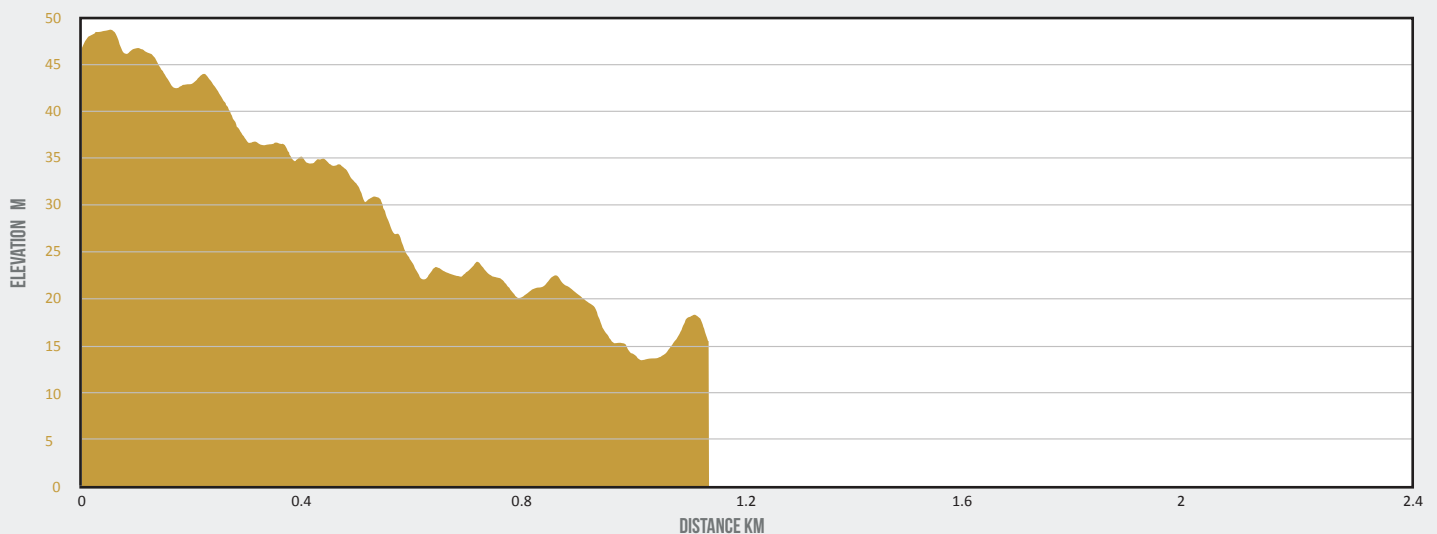
OBSTACLES

Rock Garden
Exposed Bedrock

TRAIL 09 DETAILS

Trail ID	09
Provisional Name	Trail 09
Classification	Beginner - Green Circle
Strategic Value	Low
Trail Type	Cross Country
Trail Style	Flow Trail
Tread Width	1.2m
Use	Bike Optimised
Direction	Single Direction
Ascent / Descent	Undulating
Options	Optional Blue Features
Corridor Width	50m
Trail Length	1225m
Vertical Range	36m
Elevation Variation	81m
Prevailing Cross Slopes	Moderate
Average Trail Gradient	4%
Maximum Trail Gradient	15% up to 20m
Minimum Line of Sight	Minimum 10m
Qualifier / Filter	None

TRAIL T09 - ELEVATION PROFILE



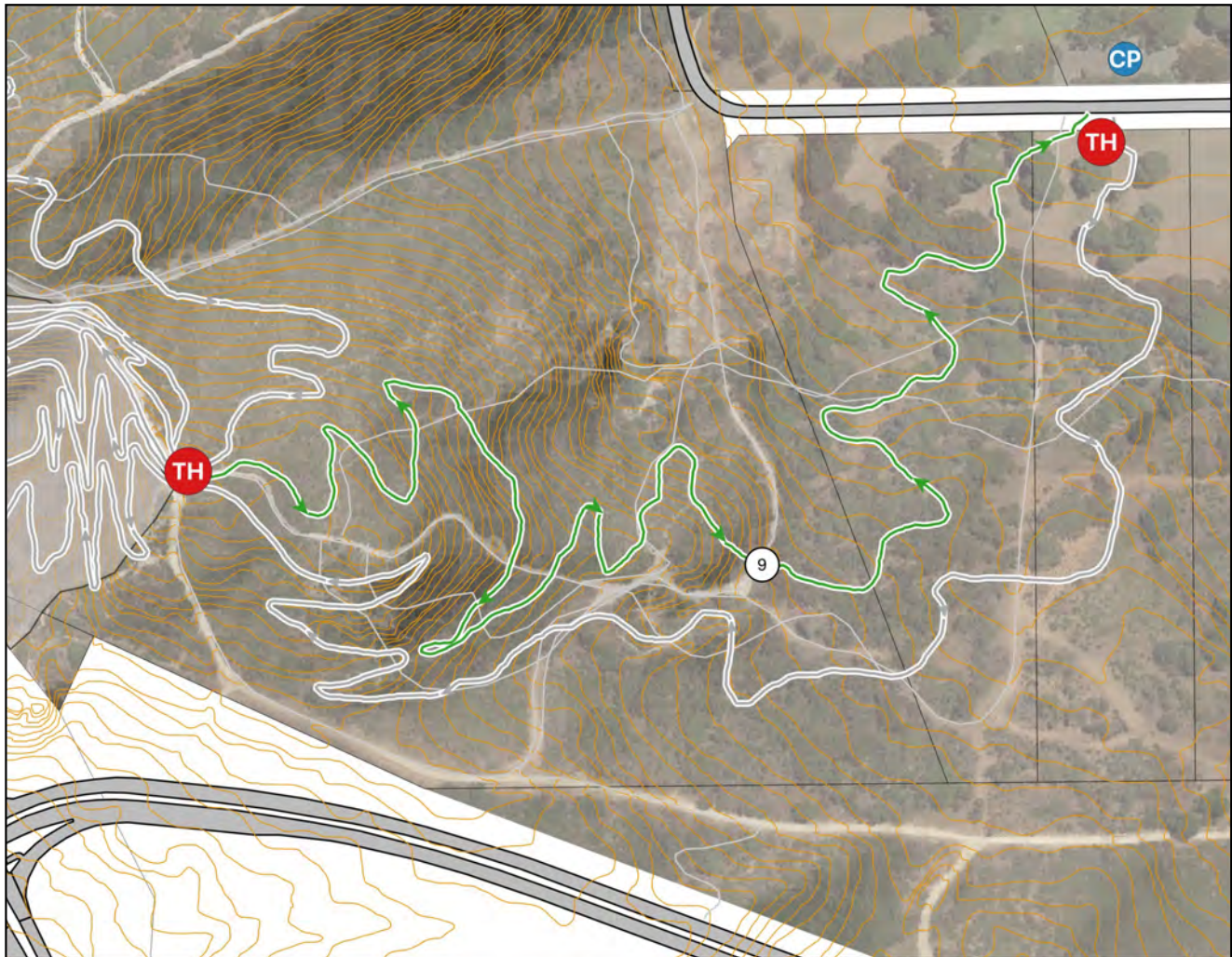
TRAIL 09 CHARACTERISTICS

SETTING	WILDERNESS	NATURAL LANDSCAPE	PLANTATION	RURAL	URBAN FRINGE	URBAN
VEGETATION QUALITY	EXCELLENT	VERY GOOD	GOOD	DEGRADED		
TRAIL TYPE	TOURING	CROSS COUNTRY	DOWN COUNTRY	ALL MOUNTAIN	GRAVITY	PARK
TRAIL STYLE	TECHNICAL	NATURAL	OPEN	FLOWING	FLOW TRAIL	FREERIDE
ORIENTATION	ASCENT ONLY	UNDULATING ASCENT	CONTOURING	UNDULATING DESCENT	DESCENT ONLY	
FLOW / SINUOSITY	IRREGULAR	STRAIGHT	WINDING	FLOWING		
SCALE	VERY NARROW	NARROW	OPEN	WIDE	VERY WIDE	
ROUGHNESS	VERY ROUGH	ROUGH	SMOOTH	GROOMED		
TECHNICAL TRAIL FEATURES	NATURAL	ENHANCED	CONSTRUCTED	IMPORTED MMTF		
FEATURE FREQUENCY	NONE	VERY LONG	LONG	MODERATE	SHORT	
FEATURE MAGNITUDE	NONE	SMALL	MEDIUM	LARGE	VERY LARGE	
EXPOSURE	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH	

TRAIL 09 BENCHMARK & PRECEDENT IMAGERY



TRAIL 09 ALIGNMENT



TRAIL 10

Trail ID **T10**



TRAIL TYPE
XC CROSS COUNTRY
OPEN

TRAIL LENGTH
1044M SINGLE DIRECTION

AVERAGE GRADIENT
6% 37M VERTICAL
65M VARIATION

TRAIL WIDTH
1.2M SMOOTH
CONSTRUCTED

TRAIL 10 OVERVIEW

Trail 10 is a 1044m easy single direction climbing trail offering cross country experience focused on open trail over smooth terrain. It forms part of the optional network of trails and is of low strategic value to the overall networks functionality. Located in generally moderate side slopes, the easy gradient trail climbs from the eastern carpark to the Southern Quarry trailhead. It features climbing switchback corners with minimal trail features and a wide smooth surface with typical finished width of 1.2m. The proposed alignment traverses sections of existing unsanctioned trail.

ANTICIPATED TECHNICAL TRAIL FEATURES

URNS

Climbing Turn
Technical Climbing Turn
Insloped Climbing Turn
Rolling Crown Switchback

VERTICAL CHANGE

Rollers
Grade Reversal
Obstacle Step Up
Chicane
Choke

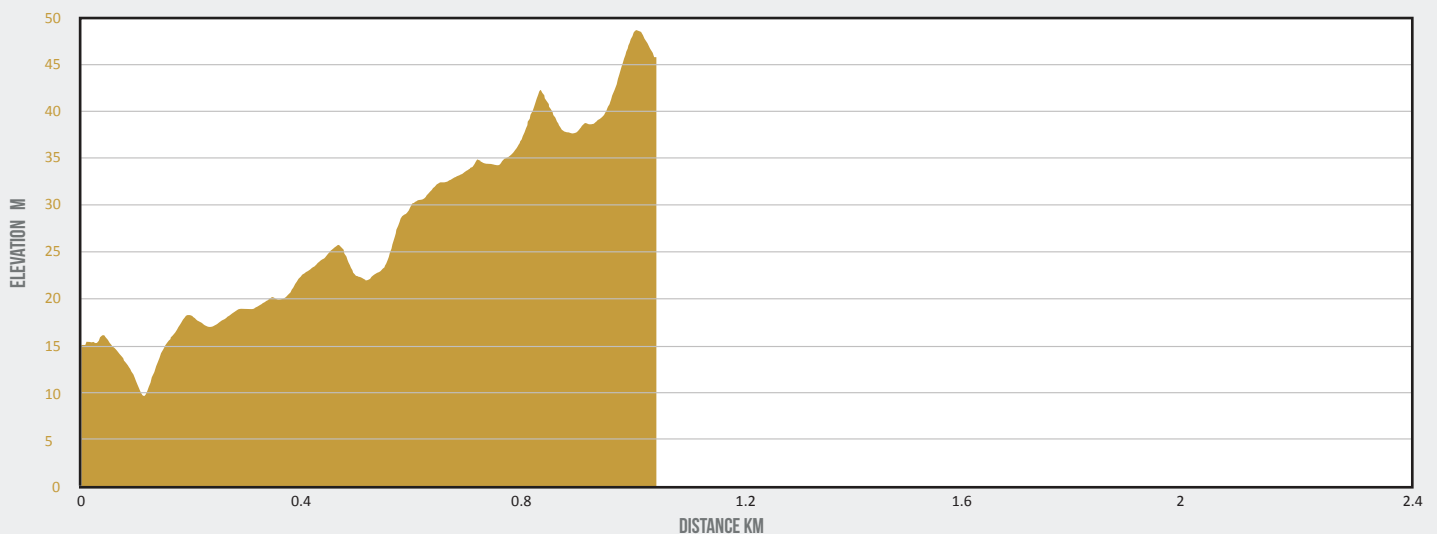
OBSTACLES

Rock Garden
Exposed Bedrock
Rock Rollover
Stabilised Root Section

TRAIL 10 DETAILS

Trail ID	10
Provisional Name	Trail 10
Classification	Beginner - Green Circle
Strategic Value	Low
Trail Type	Cross Country
Trail Style	Open
Tread Width	1.2m
Use	Bike & Hand Cycle Optimised
Direction	Single Direction
Ascent / Descent	Undulating
Options	Optional Blue Lines
Corridor Width	50m
Trail Length	1044m
Vertical Range	37m
Elevation Variation	65m
Prevailing Cross Slopes	Moderate
Average Trail Gradient	3%
Maximum Trail Gradient	15% up to 20m
Minimum Line of Sight	Minimum 10m
Qualifier / Filter	None

TRAIL 10 - ELEVATION PROFILE



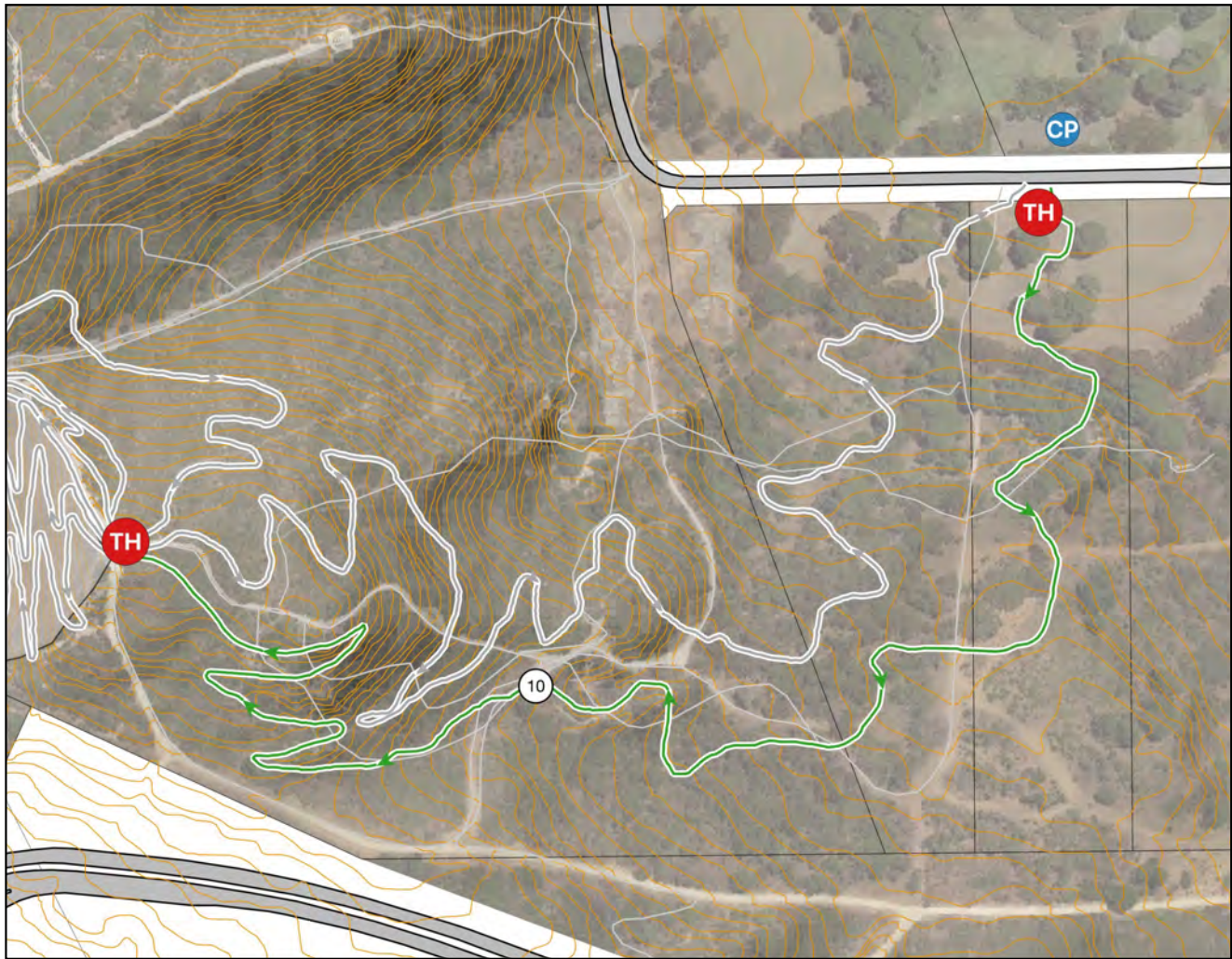
TRAIL 10 CHARACTERISTICS

SETTING	WILDERNESS	NATURAL LANDSCAPE	PLANTATION	RURAL	URBAN FRINGE	URBAN
VEGETATION QUALITY	EXCELLENT	VERY GOOD	GOOD	DEGRADED		
TRAIL TYPE	TOURING	CROSS COUNTRY	DOWN COUNTRY	ALL MOUNTAIN	GRAVITY	PARK
TRAIL STYLE	TECHNICAL	NATURAL	OPEN	FLOWING	FLOW TRAIL	FREERIDE
ORIENTATION	ASCENT ONLY	UNDULATING ASCENT	CONTOURING	UNDULATING DESCENT	DESCENT ONLY	
FLOW / SINUOSITY	IRREGULAR	STRAIGHT	WINDING	FLOWING		
SCALE	VERY NARROW	NARROW	OPEN	WIDE	VERY WIDE	
ROUGHNESS	VERY ROUGH	ROUGH	SMOOTH	GROOMED		
TECHNICAL TRAIL FEATURES	NATURAL	ENHANCED	CONSTRUCTED	IMPORTED MMTF		
FEATURE FREQUENCY	NONE	VERY LONG	LONG	MODERATE	SHORT	
FEATURE MAGNITUDE	NONE	SMALL	MEDIUM	LARGE	VERY LARGE	
EXPOSURE	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH	

TRAIL 10 BENCHMARK & PRECEDENT IMAGERY



TRAIL 10 ALIGNMENT



TRAIL N1

Trail ID **N1**

CLASSIFICATION



TRAIL TYPE

XC CROSS COUNTRY
TECHNICAL

TRAIL LENGTH

1250M DUAL DIRECTION

AVERAGE GRADIENT

4% 12M VERTICAL
56M VARIATION

TRAIL WIDTH

0.6M ROUGH
ENHANCED

TRAIL N1 OVERVIEW

Trail N1 is a 1250m moderate single direction undulating trail offering a cross country experience focused on flowing trail over rough terrain. It forms part of the optional network of trails and is of low strategic value to the overall networks functionality. Located in generally moderate side slopes, the moderate gradient trail traverses across the northern quarry wall. It features technical trail features and a narrow rough surface with typical finished width of 0.6m. The proposed alignment traverses sections of existing unsanctioned trail.

ANTICIPATED TECHNICAL TRAIL FEATURES

URNS

Berm
Insloped Descending Turn
Technical Inside Line
Timber Berm
Climbing Turn
Technical Climbing Turn
Insloped Climbing Turn
Rolling Crown Switchback

VERTICAL CHANGE

Kicker Jump
Tabletop
Rollable Double
Step Up Jump
Step Down Jump
Grade Reversal
Drop Off
Obstacle Step Up
Chicane
Choke

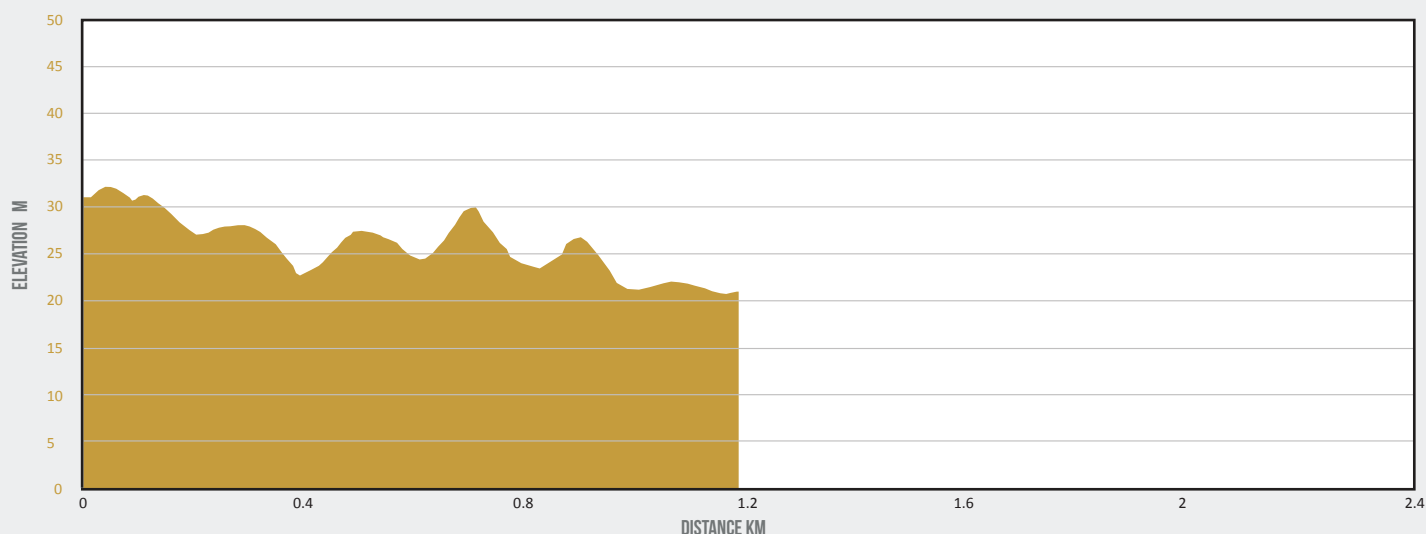
OBSTACLES

Rock Garden
Exposed Bedrock
Dual Rock Section
Rock Rollover
Stabilised Root Section

TRAIL N1 DETAILS

Trail ID	N1
Provisional Name	Trail N1
Classification	Moderate - Blue Square
Strategic Value	Low
Trail Type	Cross Country
Trail Style	Open
Tread Width	0.6m
Use	Bike Optimised
Direction	Single Direction
Ascent / Descent	Undulating
Options	Optional Black Features and Lines
Corridor Width	50m
Trail Length	1250m
Vertical Range	12m
Elevation Variation	56m
Prevailing Cross Slopes	Moderate
Average Trail Gradient	4%
Maximum Trail Gradient	10% up to 50m
Minimum Line of Sight	Minimum 7.5m
Qualifier / Filter	Blue Filter

TRAIL N1 - ELEVATION PROFILE



TRAIL N1 CHARACTERISTICS

SETTING

WILDERNESS NATURAL LANDSCAPE PLANTATION RURAL **URBAN FRINGE** URBAN

VEGETATION QUALITY

EXCELLENT VERY GOOD GOOD **DEGRADED**

TRAIL TYPE

TOURING **CROSS COUNTRY** DOWN COUNTRY ALL MOUNTAIN GRAVITY PARK

TRAIL STYLE

TECHNICAL NATURAL OPEN FLOWING FLOW TRAIL FREERIDE

ORIENTATION

ASCENT ONLY UNDULATING ASCENT **CONTOURING** UNDULATING DESCENT DESCENT ONLY

FLOW / SINUOSITY

IRREGULAR STRAIGHT **WINDING** FLOWING

SCALE

VERY NARROW **NARROW** OPEN WIDE VERY WIDE

ROUGHNESS

VERY ROUGH **ROUGH** SMOOTH GROOMED

TECHNICAL TRAIL FEATURES

NATURAL **ENHANCED** CONSTRUCTED IMPORTED MMTF

FEATURE FREQUENCY

NONE VERY LONG **LONG** MODERATE SHORT

FEATURE MAGNITUDE

NONE SMALL **MEDIUM** LARGE VERY LARGE

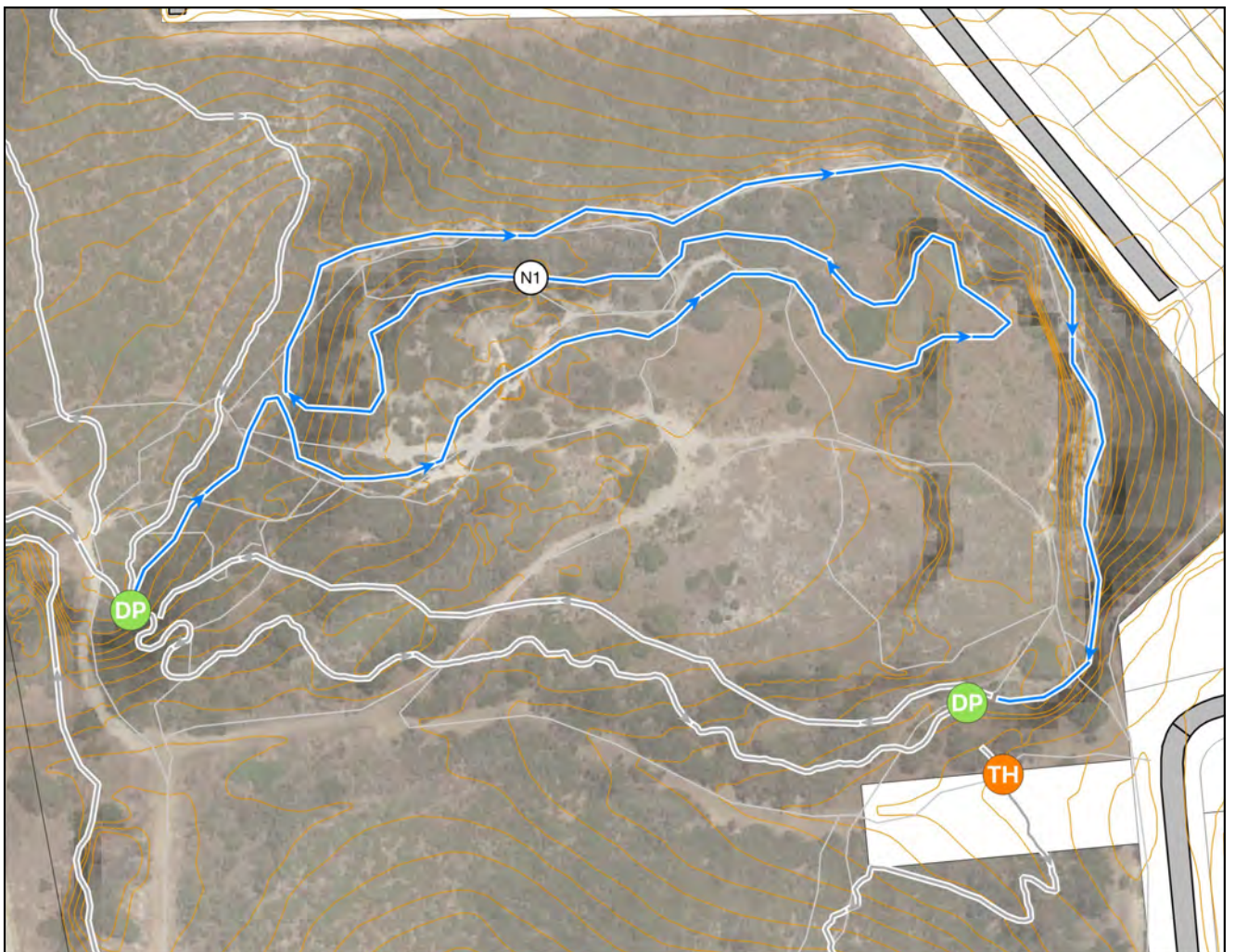
EXPOSURE

VERY LOW LOW MEDIUM HIGH **VERY HIGH**

TRAIL N1 BENCHMARK & PRECEDENT IMAGERY



TRAIL N1 ALIGNMENT



TRAIL N2

Trail ID **N2**

CLASSIFICATION



TRAIL TYPE

XC CROSS COUNTRY
OPEN

TRAIL LENGTH

315M SINGLE DIRECTION

AVERAGE GRADIENT

5% 12M VERTICAL
17M VARIATION

TRAIL WIDTH

0.9M SMOOTH
CONSTRUCTED

TRAIL N2 OVERVIEW

Trail N2 is a 315m easy single direction climbing trail offering cross country experience focused on open trail over smooth terrain. It forms part of the optional network of trails and is of high strategic value to the overall networks functionality. Located in generally moderate side slopes, the easy gradient trail climbs from the base of the Northern Quarry to the trailhead and functions as the return trail for the jump lines. It has a wide smooth surface with typical finished width of 0.9m. The proposed alignment does not traverse sections of existing unsanctioned trail.

ANTICIPATED TECHNICAL TRAIL FEATURES

TURNS

Climbing Turn
Technical Climbing Turn
Insloped Climbing Turn
Rolling Crown
Switchback

VERTICAL CHANGE

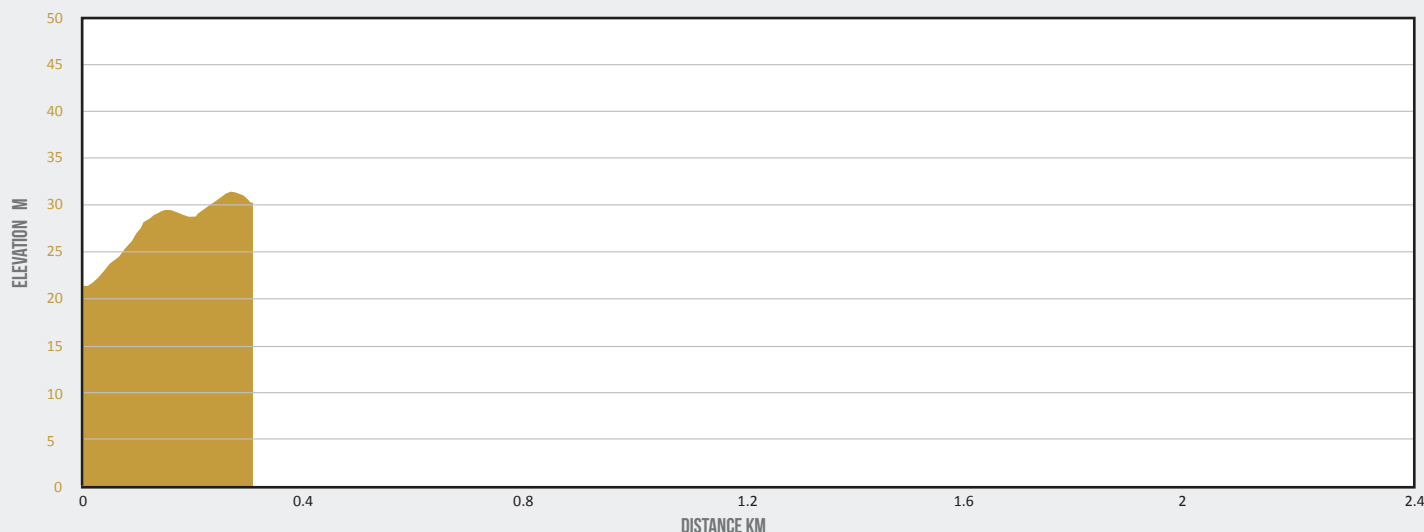
Rollers
Grade Reversal
Chicane
Choke

OBSTACLES

TRAIL N2 DETAILS

Trail ID	N2
Provisional Name	Town Connection
Classification	Beginner - Green Circle
Strategic Value	High
Trail Type	Cross Country
Trail Style	Open
Tread Width	0.9m
Use	Bike & Hand Cycle Optimised
Direction	Single Direction
Ascent / Descent	Ascent
Options	Nil
Corridor Width	50m
Trail Length	315m
Vertical Range	12m
Elevation Variation	17m
Prevailing Cross Slopes	Moderate
Average Trail Gradient	5%
Maximum Trail Gradient	15% up to 20m
Minimum Line of Sight	Minimum 10m
Qualifier / Filter	None

TRAIL N2 - ELEVATION PROFILE



TRAIL N2 CHARACTERISTICS

SETTING

WILDERNESS NATURAL LANDSCAPE **PLANTATION** RURAL URBAN FRINGE URBAN

VEGETATION QUALITY

EXCELLENT VERY GOOD GOOD **DEGRADED**

TRAIL TYPE

TOURING **CROSS COUNTRY** DOWN COUNTRY ALL MOUNTAIN GRAVITY PARK

TRAIL STYLE

TECHNICAL NATURAL **OPEN** FLOWING FLOW TRAIL FREERIDE

ORIENTATION

ASCENT ONLY UNDULATING ASCENT CONTOURING UNDULATING DESCENT DESCENT ONLY

FLOW / SINUOSITY

IRREGULAR **STRAIGHT** WINDING FLOWING

SCALE

VERY NARROW NARROW **OPEN** WIDE VERY WIDE

ROUGHNESS

VERY ROUGH ROUGH **SMOOTH** GROOMED

TECHNICAL TRAIL FEATURES

NATURAL ENHANCED **CONSTRUCTED** IMPORTED MMTF

FEATURE FREQUENCY

NONE **VERY LONG** LONG MODERATE SHORT

FEATURE MAGNITUDE

NONE **SMALL** MEDIUM LARGE VERY LARGE

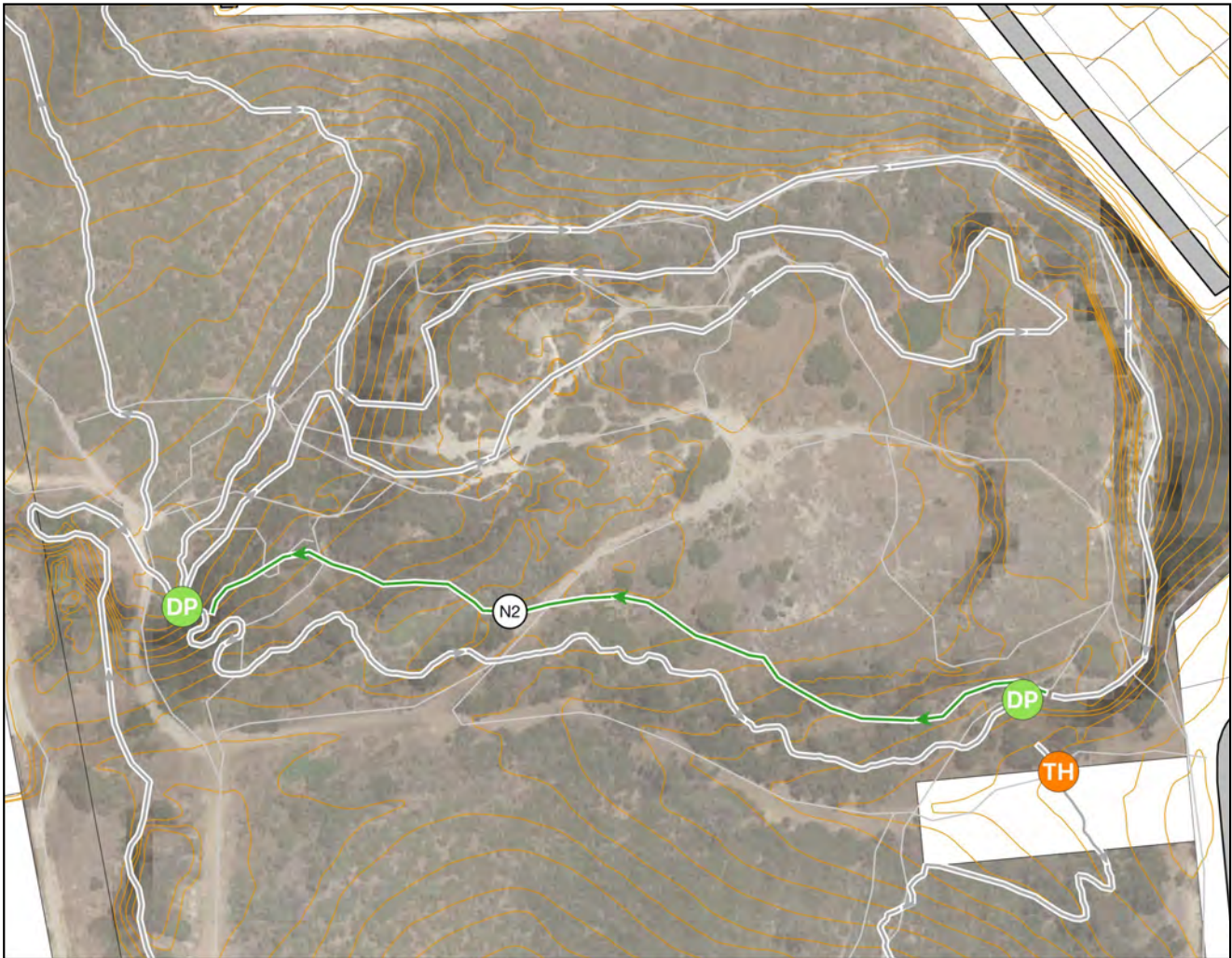
EXPOSURE

VERY LOW LOW MEDIUM HIGH VERY HIGH

TRAIL N1 BENCHMARK & PRECEDENT IMAGERY



TRAIL N1 ALIGNMENT



TRAIL S1

Trail ID **S1**



TRAIL TYPE
PK PARK
OPEN

TRAIL LENGTH
850M SINGLE DIRECTION

AVERAGE GRADIENT
3% 28M VERTICAL
28M VARIATION

TRAIL WIDTH
1M GROOMED
CONSTRUCTED

TRAIL S1 OVERVIEW

Trail S1, is a Easy Green Circle graded climbing trail with open trail style. It is a single direction, single use - bike optimised trail. Part of the Southern Quarry precinct it is a 850m long climbing trail which takes riders back to the Southern Quarry trailhead. The terrain is generally uniform featuring moderate side slopes and gravelly loam soils. The trail user objective for this trail is play, challenge and risk. This results in a trail that has flowing sinuosity with wide finish. It features constructed technical trail features with short feature frequency of large magnitude.

ANTICIPATED TECHNICAL TRAIL FEATURES

TURNS

Climbing Turn
Technical Climbing Turn
Insloped Climbing Turn
Rolling Crown Switchback

VERTICAL CHANGE

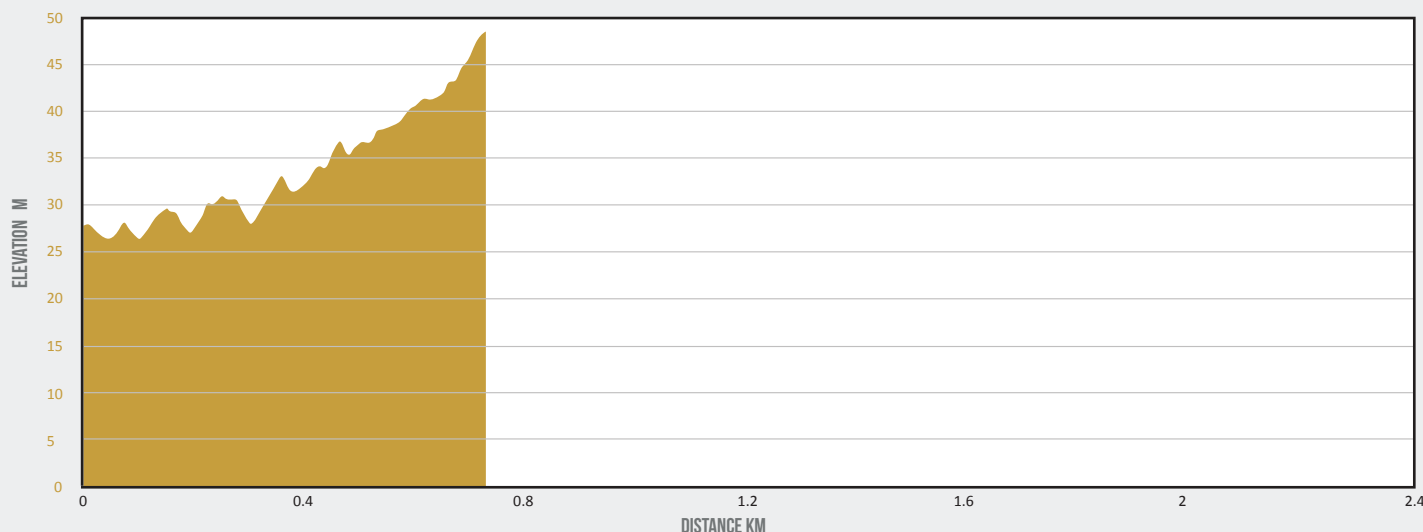
Obstacle Step Up
Chicane
Choke

OBSTACLES

TRAIL S1 DETAILS

Trail ID	S1
Provisional Name	Trail S1
Classification	Beginner - Green Circle
Strategic Value	Low
Trail Type	Cross Country
Trail Style	Open
Tread Width	0.9m
Use	Bike & Hand Cycle Optimised
Direction	Single Direction
Ascent / Descent	Ascent
Options	Nil
Corridor Width	50m
Trail Length	850m
Vertical Range	28m
Elevation Variation	28m
Prevailing Cross Slopes	Moderate
Average Trail Gradient	3%
Maximum Trail Gradient	15% up to 20m
Minimum Line of Sight	Minimum 10m
Qualifier / Filter	None

TRAIL S1 - ELEVATION PROFILE



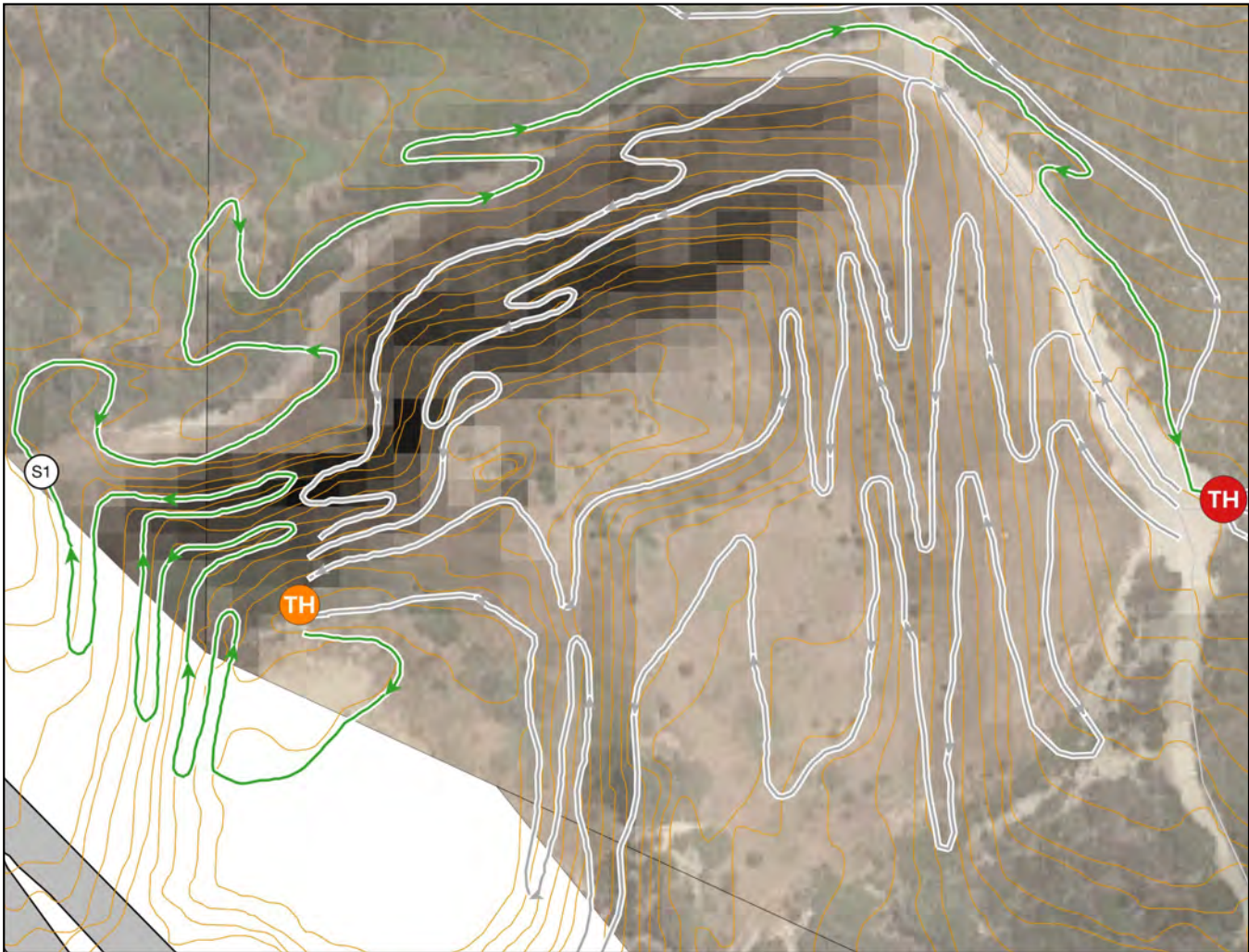
TRAIL S1 CHARACTERISTICS

SETTING	WILDERNESS	NATURAL LANDSCAPE	PLANTATION	RURAL	URBAN FRINGE	URBAN
VEGETATION QUALITY	EXCELLENT	VERY GOOD	GOOD	DEGRADED		
TRAIL TYPE	TOURING	CROSS COUNTRY	DOWN COUNTRY	ALL MOUNTAIN	GRAVITY	PARK
TRAIL STYLE	TECHNICAL	NATURAL	OPEN	FLOWING	FLOW TRAIL	FREERIDE
ORIENTATION	ASCENT ONLY	UNDULATING ASCENT	CONTOURING	UNDULATING DESCENT	DESCENT ONLY	
FLOW / SINUOSITY	IRREGULAR	STRAIGHT	WINDING	FLOWING		
SCALE	VERY NARROW	NARROW	OPEN	WIDE	VERY WIDE	
ROUGHNESS	VERY ROUGH	ROUGH	SMOOTH	GROOMED		
TECHNICAL TRAIL FEATURES	NATURAL	ENHANCED	CONSTRUCTED	IMPORTED MMTF		
FEATURE FREQUENCY	NONE	VERY LONG	LONG	MODERATE	SHORT	
FEATURE MAGNITUDE	NONE	SMALL	MEDIUM	LARGE	VERY LARGE	
EXPOSURE	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH	

TRAIL S1 BENCHMARK & PRECEDENT IMAGERY



TRAIL S1 ALIGNMENT



TRAIL S2

Trail ID **S2**

CLASSIFICATION



TRAIL TYPE

PK PARK
AIR FLOW

TRAIL LENGTH

590M SINGLE DIRECTION

AVERAGE GRADIENT

5% 28M VERTICAL
28M VARIATION

TRAIL WIDTH

2.5M GROOMED
CONSTRUCTED

TRAIL S2 OVERVIEW

Trail S2, is a Easy Green Circle graded park, descending trail with air flow trail style. It is a single direction, single use - bike optimised trail. Part of the Southern Quarry precinct it is a 590m long descending trail which has a vertical change of 28m with an average gradient of 5%. The terrain is generally uniform featuring moderate side slopes and gravelly loam soils. The trail user objective for this trail is play, challenge and risk. This results in a trail that has flowing sinuosity with wide finish. It features constructed technical trail features with short feature frequency of large magnitude.

ANTICIPATED TECHNICAL TRAIL FEATURES

URNS

Berm
Insloped Descending Turn

VERTICAL CHANGE

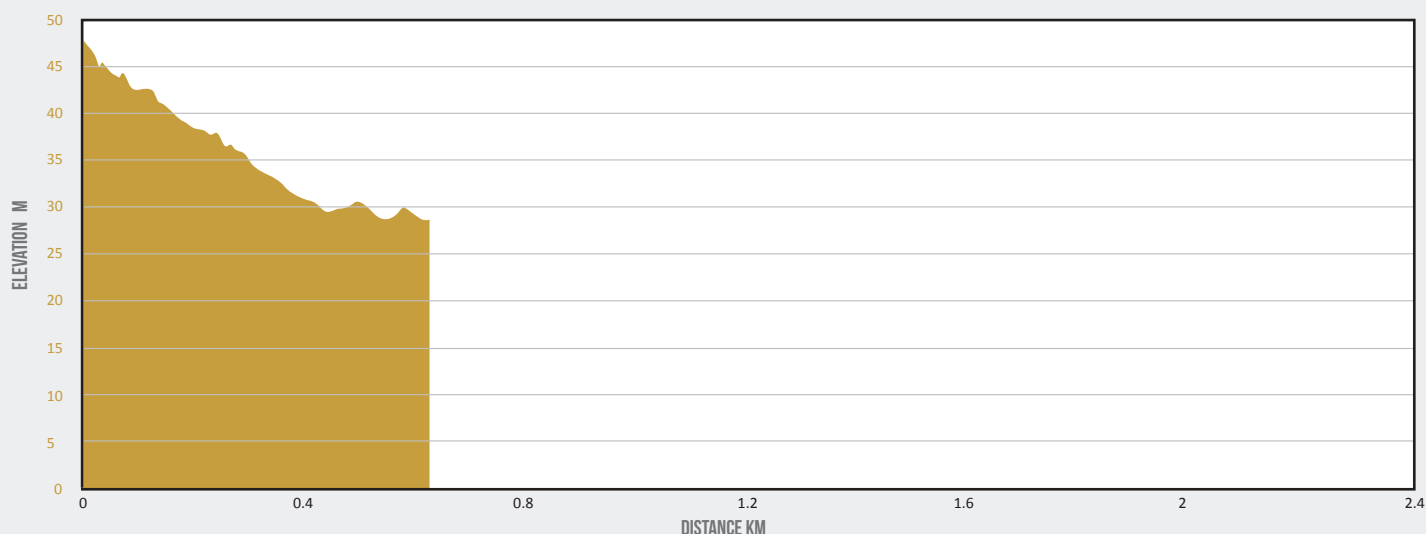
Roll In
Rollers
Kicker Jump
Tabletop
Rollable Double
Step Up Jump
Grade Reversal

OBSTACLES

TRAIL S2 DETAILS

Trail ID	S2
Provisional Name	Trail S2
Classification	Beginner - Green Circle
Strategic Value	Low
Trail Type	Park
Trail Style	Air Flow
Tread Width	2.5m
Use	Bike & Hand Cycle Optimised
Direction	Single Direction
Ascent / Descent	Descent
Options	Nil
Corridor Width	50m
Trail Length	590m
Vertical Range	17m
Elevation Variation	42m
Prevailing Cross Slopes	Moderate
Average Trail Gradient	7%
Maximum Trail Gradient	15% up to 20m
Minimum Line of Sight	Minimum 10m
Qualifier / Filter	None

TRAIL S2 - ELEVATION PROFILE



TRAILS2 CHARACTERISTICS

SETTING

WILDERNESS NATURAL LANDSCAPE PLANTATION RURAL URBAN FRINGE **URBAN**

VEGETATION QUALITY

EXCELLENT VERY GOOD GOOD **DEGRADED**

TRAIL TYPE

TOURING CROSS COUNTRY DOWN COUNTRY ALL MOUNTAIN GRAVITY **PARK**

TRAIL STYLE

TECHNICAL NATURAL OPEN FLOWING FLOW TRAIL **FREERIDE**

ORIENTATION

ASCENT ONLY UNDULATING ASCENT CONTOURING UNDULATING DESCENT **DESCENT ONLY**

FLOW / SINUOSITY

IRREGULAR STRAIGHT WINDING **FLOWING**

SCALE

VERY NARROW NARROW OPEN WIDE **VERY WIDE**

ROUGHNESS

VERY ROUGH ROUGH SMOOTH **GROOMED**

TECHNICAL TRAIL FEATURES

NATURAL ENHANCED **CONSTRUCTED** IMPORTED MMTF

FEATURE FREQUENCY

NONE VERY LONG LONG MODERATE **SHORT**

FEATURE MAGNITUDE

NONE SMALL **MEDIUM** LARGE VERY LARGE

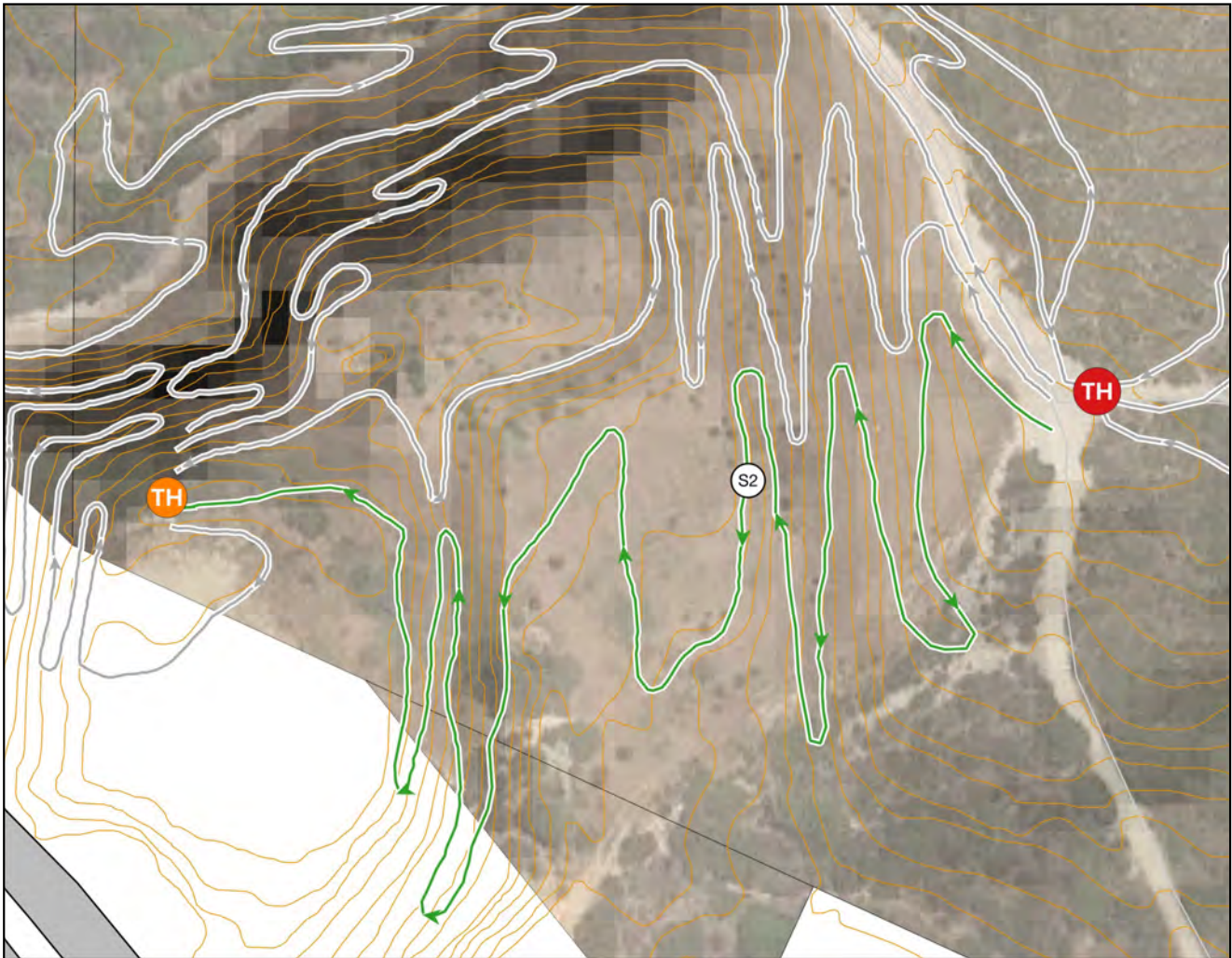
EXPOSURE

VERY LOW **LOW** MEDIUM HIGH VERY HIGH

TRAIL S2 BENCHMARK & PRECEDENT IMAGERY



TRAIL S2 ALIGNMENT



TRAIL S3

Trail ID **S3**

CLASSIFICATION



MODERATE
BLUE SQUARE

TRAIL TYPE

PK PARK
AIR FLOW

TRAIL LENGTH

385M SINGLE DIRECTION

AVERAGE GRADIENT

7% 28M VERTICAL
28M VARIATION

TRAIL WIDTH

2.5M GROOMED
CONSTRUCTED

TRAIL S3 OVERVIEW

Trail S3, is a moderate - blue square graded park, descending trail with air flow trail style. It is a single direction, single use - bike optimised trail. Part of the Southern Quarry precinct it is a 385m long descending trail which has a vertical change of 28m with an average gradient of 7%. The terrain is generally uniform featuring moderate side slopes and gravelly loam soils. The trail user objective for this trail is play, challenge and risk. This results in a trail that has flowing sinuosity with wide finish. It features constructed technical trail features with short feature frequency of large magnitude.

ANTICIPATED TECHNICAL TRAIL FEATURES

TURNS

Berm
Insloped Descending Turn

VERTICAL CHANGE

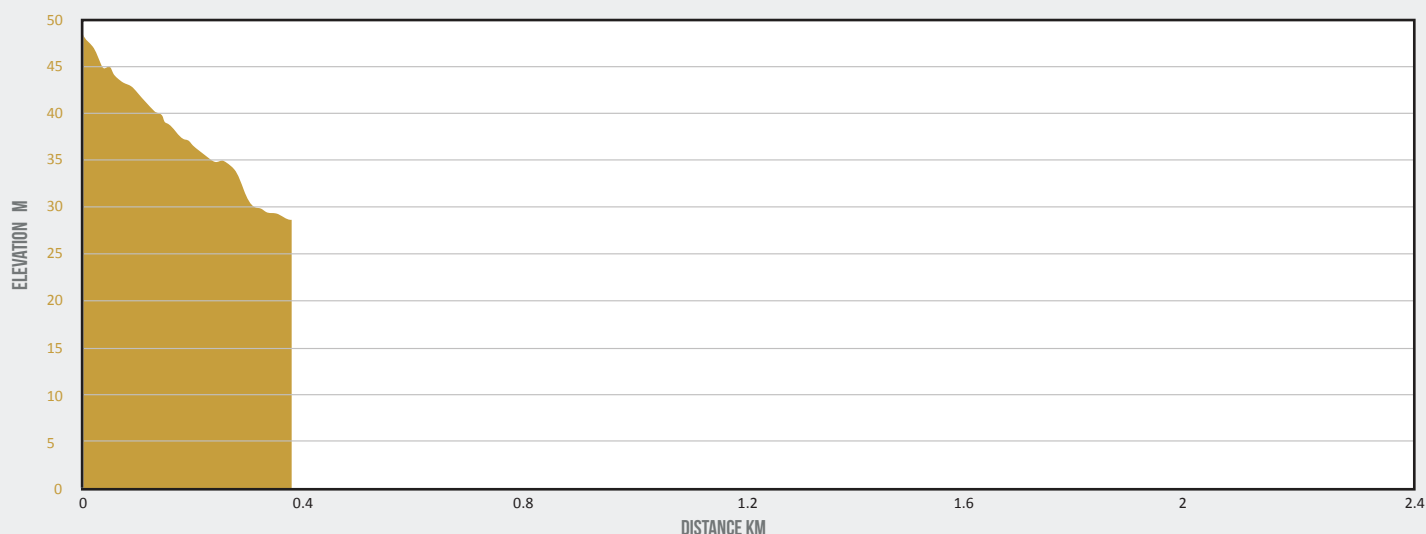
Roll In
Rollers
Tabletop
Rollable Double
Step Up Jump
Step Down Jump
Hip Jump
Grade Reversal
Rollable Step Down

OBSTACLES

TRAIL S3 DETAILS

Trail ID	S3
Provisional Name	Trail S3
Classification	Moderate - Blue square
Strategic Value	Low
Trail Type	Park
Trail Style	Air Flow
Tread Width	2.5m
Use	Bike Optimised
Direction	Single Direction
Ascent / Descent	Descent
Options	Nil
Corridor Width	50m
Trail Length	385m
Vertical Range	25m
Elevation Variation	25m
Prevailing Cross Slopes	Moderate
Average Trail Gradient	7%
Maximum Trail Gradient	10% up to 50m
Minimum Line of Sight	Minimum 10m
Qualifier / Filter	Blue Filter

TRAIL S3 - ELEVATION PROFILE



TRAIL S3 CHARACTERISTICS

SETTING

WILDERNESS NATURAL LANDSCAPE PLANTATION RURAL URBAN FRINGE **URBAN**

VEGETATION QUALITY

EXCELLENT VERY GOOD GOOD **DEGRADED**

TRAIL TYPE

TOURING CROSS COUNTRY DOWN COUNTRY ALL MOUNTAIN GRAVITY **PARK**

TRAIL STYLE

TECHNICAL NATURAL OPEN FLOWING FLOW TRAIL **FREERIDE**

ORIENTATION

ASCENT ONLY UNDULATING ASCENT CONTOURING UNDULATING DESCENT **DESCENT ONLY**

FLOW / SINUOSITY

IRREGULAR STRAIGHT WINDING **FLOWING**

SCALE

VERY NARROW NARROW OPEN WIDE **VERY WIDE**

ROUGHNESS

VERY ROUGH ROUGH SMOOTH **GROOMED**

TECHNICAL TRAIL FEATURES

NATURAL ENHANCED **CONSTRUCTED** IMPORTED MMTF

FEATURE FREQUENCY

NONE VERY LONG LONG MODERATE **SHORT**

FEATURE MAGNITUDE

NONE SMALL MEDIUM **LARGE** VERY LARGE

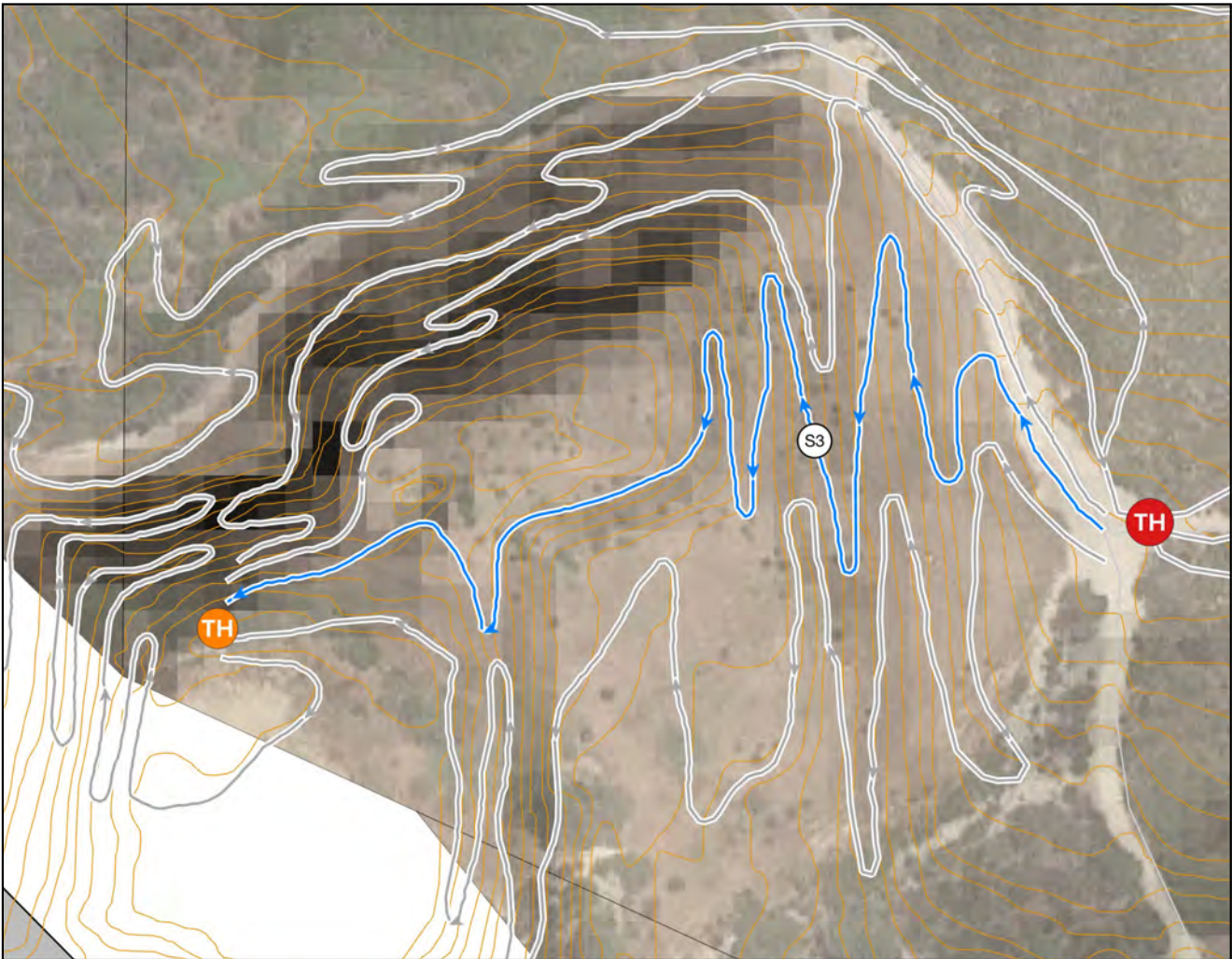
EXPOSURE

VERY LOW LOW **MEDIUM** HIGH VERY HIGH

TRAIL S3 BENCHMARK & PRECEDENT IMAGERY



TRAIL S3 ALIGNMENT



TRAIL S4

Trail ID **S4**

CLASSIFICATION



DIFFICULT
BLACK DIAMOND

TRAIL TYPE

PK PARK
AIR FLOW

TRAIL LENGTH

315M SINGLE DIRECTION

AVERAGE GRADIENT

9% 28M VERTICAL
28M VARIATION

TRAIL WIDTH

2.5M GROOMED
CONSTRUCTED

TRAIL S4 OVERVIEW

Trail S4, is a difficult - black diamond graded park, descending trail with air flow trail style. It is a single direction, single use - bike optimised trail. Part of the Southern Quarry precinct it is a 315m long descending trail which has a vertical change of 28m with an average gradient of 9%. The terrain is generally uniform featuring steep side slopes and gravelly loam soils. The trail user objective for this trail is play, challenge and risk. This results in a trail that has flowing sinuosity with wide finish. It features constructed trail features with short feature frequency of large magnitude.

ANTICIPATED TECHNICAL TRAIL FEATURES

URNS

Berm
Insloped Descending Turn

VERTICAL CHANGE

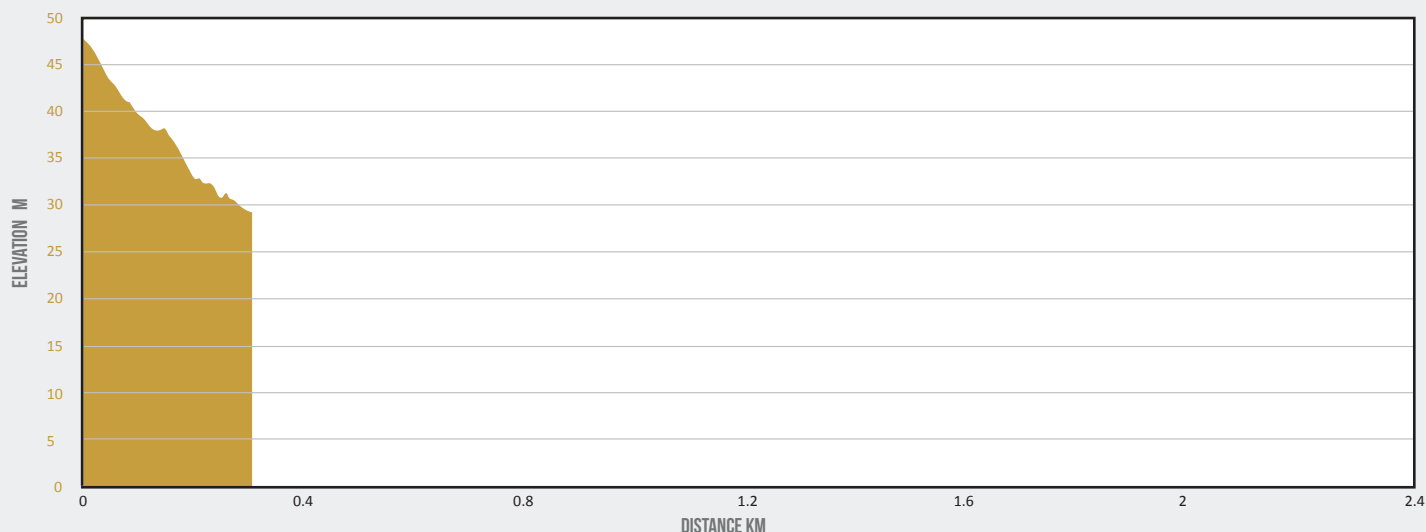
Roll In
Rollers
Tabletop
Rollable Double
Step Up Jump
Step Down Jump
Hip Jump
Grade Reversal
Rollable Step Down

OBSTACLES

TRAIL S4 DETAILS

Trail ID	S4
Provisional Name	Trail S4
Classification	Difficult - Black Diamond
Strategic Value	Low
Trail Type	Park
Trail Style	Air Flow
Tread Width	2.5m
Use	Bike Optimised
Direction	Single Direction
Ascent / Descent	Descent
Options	Nil
Corridor Width	50m
Trail Length	315m
Vertical Range	28m
Elevation Variation	28m
Prevailing Cross Slopes	Steep
Average Trail Gradient	9%
Maximum Trail Gradient	15% up to 10m
Minimum Line of Sight	Average 15m
Qualifier / Filter	Black Diamond Filter

TRAIL S4 - ELEVATION PROFILE



TRAIL S5 CHARACTERISTICS

SETTING

WILDERNESS NATURAL LANDSCAPE PLANTATION RURAL URBAN FRINGE **URBAN**

VEGETATION QUALITY

EXCELLENT VERY GOOD GOOD **DEGRADED**

TRAIL TYPE

TOURING CROSS COUNTRY DOWN COUNTRY ALL MOUNTAIN GRAVITY **PARK**

TRAIL STYLE

TECHNICAL NATURAL OPEN FLOWING FLOW TRAIL **FREERIDE**

ORIENTATION

ASCENT ONLY UNDULATING ASCENT CONTOURING UNDULATING DESCENT **DESCENT ONLY**

FLOW / SINUOSITY

IRREGULAR STRAIGHT WINDING **FLOWING**

SCALE

VERY NARROW NARROW OPEN WIDE **VERY WIDE**

ROUGHNESS

VERY ROUGH ROUGH SMOOTH **GROOMED**

TECHNICAL TRAIL FEATURES

NATURAL ENHANCED **CONSTRUCTED** IMPORTED MMTF

FEATURE FREQUENCY

NONE VERY LONG LONG MODERATE **SHORT**

FEATURE MAGNITUDE

NONE SMALL MEDIUM LARGE **VERY LARGE**

EXPOSURE

VERY LOW LOW MEDIUM **HIGH** VERY HIGH

TRAIL S4 BENCHMARK & PRECEDENT IMAGERY



TRAIL S4 ALIGNMENT



TRAIL S5

Trail ID **S5**



EXTREME
DOUBLE BLACK
DIAMOND

TRAIL TYPE
PK PARK
AIR FLOW

TRAIL LENGTH
180M SINGLE DIRECTION

AVERAGE GRADIENT
10% 18M VERTICAL
18M VARIATION

TRAIL WIDTH
2.5M GROOMED
CONSTRUCTED

TRAIL S5 OVERVIEW

Trail S5, is a extreme -double black diamond graded park, descending trail with air flow trail style. It is a single direction, single use - bike optimised trail. Part of the Southern Quarry precinct it is a 180m long descending trail which has a vertical change of 18m with an average gradient of 10%. The terrain is generally uniform featuring steep side slopes and gravelly loam soils. The trail user objective for this trail is play, challenge and risk. This results in a trail that has flowing sinuosity with wide finish. It features constructed technical trail features with short feature frequency of large magnitude.

ANTICIPATED TECHNICAL TRAIL FEATURES

URNS

Berm
Insloped Descending Turn

VERTICAL CHANGE

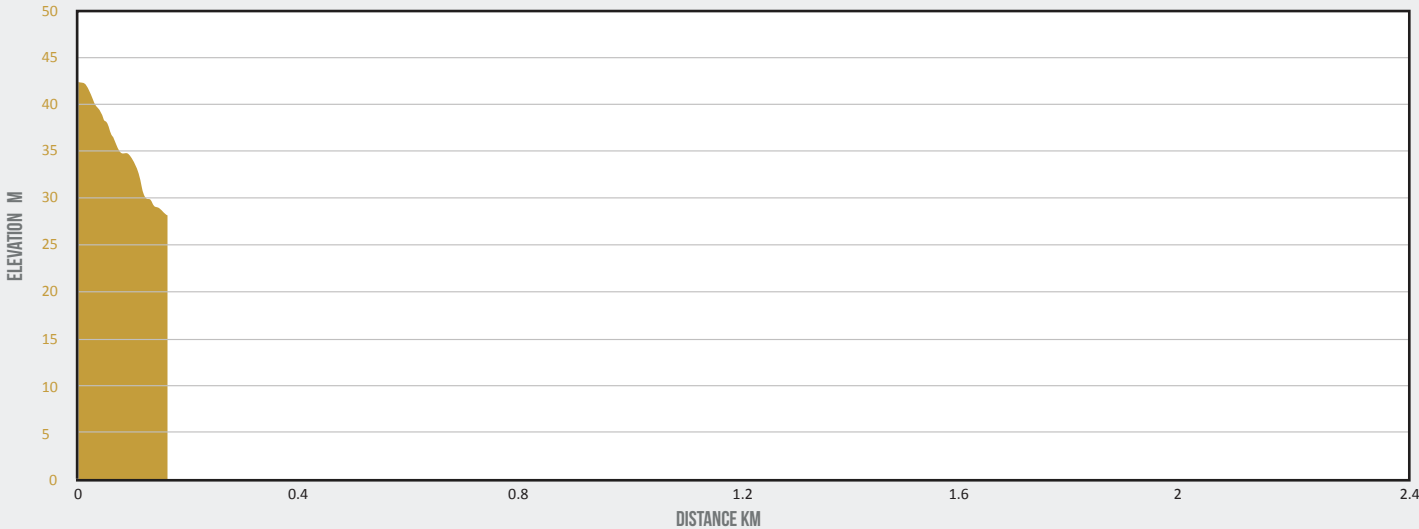
Roll In
Rollers
Tabletop
Rollable Double
Step Up Jump
Step Down Jump
Hip Jump
Grade Reversal
Rollable Step Down

OBSTACLES

TRAIL S5 DETAILS

Trail ID	S5
Provisional Name	Trail S5
Classification	Extreme - Double Black Diamond
Strategic Value	Low
Trail Type	Park
Trail Style	Air Flow
Tread Width	2.5m
Use	Bike Optimised
Direction	Single Direction
Ascent / Descent	Descent
Options	Nil
Corridor Width	50m
Trail Length	180m
Vertical Range	18m
Elevation Variation	18m
Prevailing Cross Slopes	Steep
Average Trail Gradient	15%
Maximum Trail Gradient	20% up to 20m
Minimum Line of Sight	Average 10m
Qualifier / Filter	Double Black Diamond Filter

TRAIL S5 - ELEVATION PROFILE



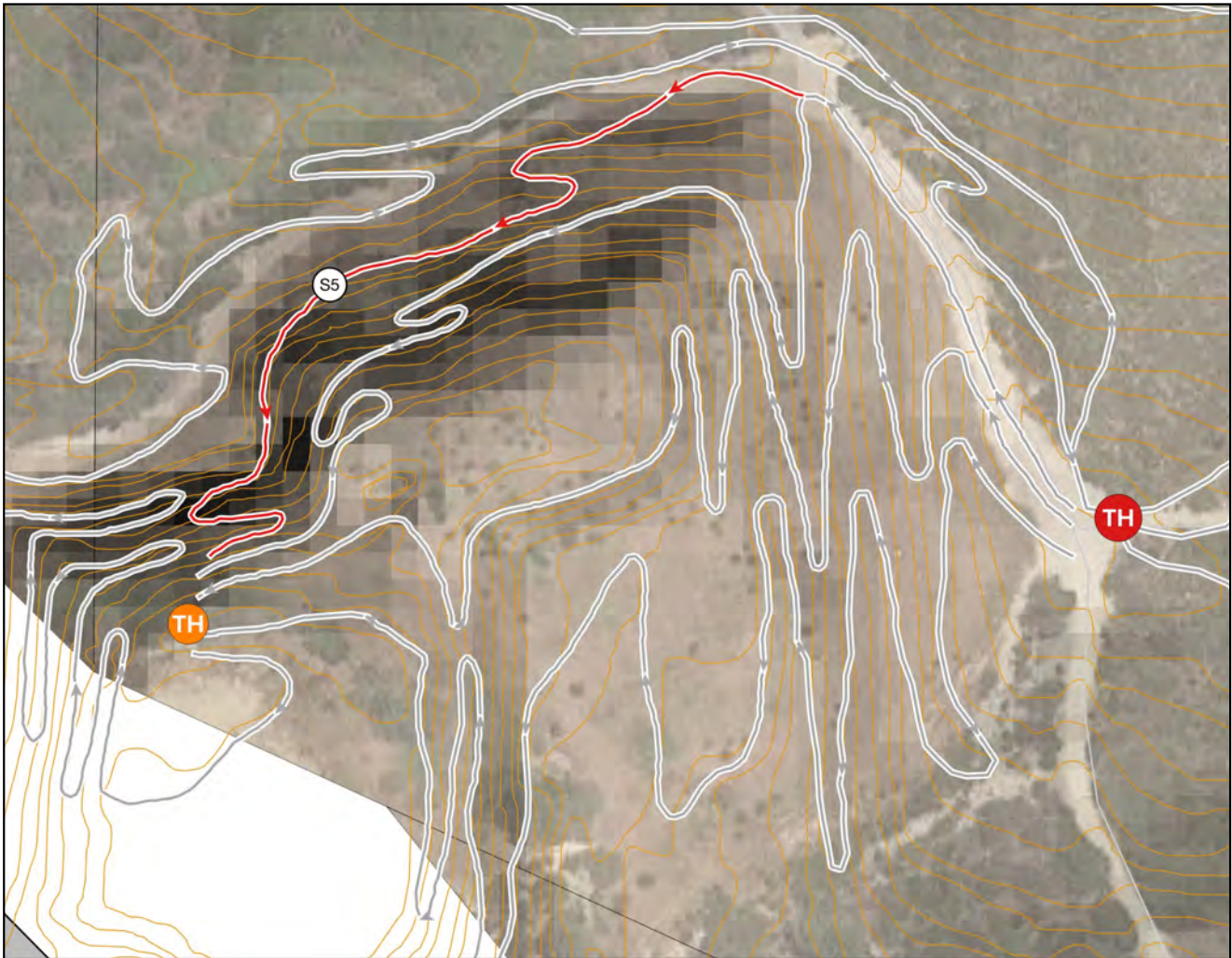
TRAIL S5 CHARACTERISTICS

SETTING	WILDERNESS	NATURAL LANDSCAPE	PLANTATION	RURAL	URBAN FRINGE	URBAN
VEGETATION QUALITY	EXCELLENT	VERY GOOD	GOOD	DEGRADED		
TRAIL TYPE	TOURING	CROSS COUNTRY	DOWN COUNTRY	ALL MOUNTAIN	GRAVITY	PARK
TRAIL STYLE	TECHNICAL	NATURAL	OPEN	FLOWING	FLOW TRAIL	FREERIDE
ORIENTATION	ASCENT ONLY	UNDULATING ASCENT	CONTOURING	UNDULATING DESCENT	DESCENT ONLY	
FLOW / SINUOSITY	IRREGULAR	STRAIGHT	WINDING	FLOWING		
SCALE	VERY NARROW	NARROW	OPEN	WIDE	VERY WIDE	
ROUGHNESS	VERY ROUGH	ROUGH	SMOOTH	GROOMED		
TECHNICAL TRAIL FEATURES	NATURAL	ENHANCED	CONSTRUCTED	IMPORTED MMTF		
FEATURE FREQUENCY	NONE	VERY LONG	LONG	MODERATE	SHORT	
FEATURE MAGNITUDE	NONE	SMALL	MEDIUM	LARGE	VERY LARGE	
EXPOSURE	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH	

TRAIL S5 BENCHMARK & PRECEDENT IMAGERY



TRAIL S5 ALIGNMENT



MANNING PARK MOUNTAIN BIKE TRAIL NETWORK CONCEPT PLAN

BROAD COST ESTIMATE

Broad cost estimates for design and construction are provided in the below table. The following assumptions have been made in developing the cost estimates:

- Supporting facilities and infrastructure such as car parks, road closures, bridges, toilets and trailhead structures have not been costed.
- Detailed Design cost allows for the requirements as outlined in the Western Australian Mountain Bike Management Guidelines
- Allowance of average industry rates based on trail complexity and status plus 10% contingency for increased trail lengths during detailed design.

A construction complexity rating has been determined for each trail, taking into account the above factors. The complexity rating is applied to the base

cost per linear metre rate, to provide an opinion of probable costs for trail construction at the concept planning stage.

Factors that may increase the complexity of construction include trail orientation, style, cross slope gradients, level of vegetation, ground conditions, construction technique, technical trail features and the level of naturalisation and finish to be applied. An assumption has been made that all trails will require imported material due to the sandy nature of the area. This has reflected construction costs which are significantly higher than standard industry costs.

The following table outlines the cost for design and construction of the trail network;

ID	PROVISIONAL NAME	CLASSIFICATION	STAGE	TRAIL STYLE	TRAIL TYPE	LENGTH (M)	DESIGN (\$)	BUILD (\$)	TOTAL
CROSS COUNTRY NETWORK									
T01	Trail 01	Easy - Green Circle	2	Cross Country	Open	470	\$1,175	\$25,850	\$27,025
T02	Trail 02	Easy - Green Circle	2	Cross Country	Flowing Trail	1775	\$4,438	\$106,500	\$110,938
T03	Trail 03	Easy - Green Circle	2	Cross Country	Open	585	\$1,463	\$32,175	\$33,638
T04	Trail 04	Easy - Green Circle	2	Cross Country	Flow Trail	375	\$938	\$24,375	\$25,313
T05	Trail 05	Easy - Green Circle	2	Cross Country	Flow Trail	2400	\$938	\$24,375	\$25,313
T06	Trail 06	Moderate - Blue Square	1	Cross Country	Technical	1655	\$4,138	\$107,575	\$111,713
T07	Trail 07	Moderate - Blue Square	1	Cross Country	Technical	636	\$1,588	\$34,925	\$36,513
T08	Trail 08	Moderate - Blue Square	1	Cross Country	Technical	760	\$1,900	\$41,800	\$43,700
T09	Trail 09	Easy - Green Circle	1	Cross Country	Technical	1135	\$2,838	\$73,775	\$76,613
T10	Trail 10	Easy - Green Circle	1	Cross Country	Flowing	1044	\$2,610	\$57,420	\$60,030
Total						10,834	\$21,085	\$504,395	\$525,480
NORTHERN QUARRY BIKE PARK									
JP	Jump Park	Varies	2	Park	Jump Track	NA	\$25,000	\$350,000	\$375,000
PT	Pump Track	Varies	2	Park	Pump Track	1,000 sqm	\$30,000	\$500,000	\$530,000
FL	Freeride Lines	Varies	2	Park	Freeride	200	\$2,000	\$10,000	\$12,000
SL	Slopestyle Lines	Varies	2	Park	Slopestyle	NA	\$30,000	\$250,000	\$280,000
SK	Skills Park	Varies	2	Park	Skills	NA	\$40,000	\$350,000	\$390,000
N1	XCO Loop	Moderate - Blue Square	2	Cross Country	Varied	1250	\$3,125	\$75,000	\$78,125
N2	Up Trail	Easy - Green Circle	2	Cross Country	Open	315	\$788	\$18,900	\$19,688
Total						1,565	\$130,913	\$1,553,900	\$1,684,813
SOUTHERN QUARRY BIKE PARK									
S1	Green Climb	Easy - Green Circle	1	Park	Open	850	\$1,700	\$46,750	\$48,450
S2	Green Air Flow Descent	Easy - Green Circle	1	Park	Air Flow	590	\$1,770	\$70,800	\$72,570
S3	Blue Air Flow Descent	Moderate - Blue Square	1	Park	Air Flow	385	\$1,155	\$53,900	\$55,055
S4	Black Air Flow Descent	Difficult - Black Diamond	1	Park	Air Flow	315	\$1,575	\$44,100	\$45,675
S5	Double Black Air Flow	Extreme - Double Black Diamond	1	Park	Air Flow	180	\$1,260	\$32,400	\$33,660
Total						2,320	\$7,460	\$247,950	\$255,410
GRAND TOTAL						14,719	\$159,458	\$2,306,245	\$2,465,703

MANNING PARK

MOUNTAIN BIKE TRAIL NETWORK

CONCEPT PLAN

ID	PROVISIONAL NAME	CLASSIFICATION	STAGE	TRAIL STYLE	LENGTH (M)	DESIGN	BUILD	TOTAL
STAGE 1								
CROSS COUNTRY NETWORK								
T06	Trail 06	Moderate - Blue Square	1	Cross Country	1655	\$4,138	\$107,575	\$111,713
T07	Trail 07	Moderate - Blue Square	1	Cross Country	636	\$1,588	\$34,925	\$36,513
T08	Trail 08	Moderate - Blue Square	1	Cross Country	760	\$1,900	\$41,800	\$43,700
T09	Trail 09	Easy - Green Circle	1	Cross Country	1135	\$2,838	\$73,775	\$76,613
T10	Trail 10	Easy - Green Circle	1	Cross Country	1044	\$2,610	\$57,420	\$60,030
Total Cross Country Trail Length					10,125	\$25,313	\$570,875	\$596,188
SOUTHERN QUARRY BIKE PARK								
S1	Green Climb	Easy - Green Circle	1	Park	850	\$1,700	\$46,750	\$48,450
S2	Green Air Flow Descent	Easy - Green Circle	1	Park	590	\$1,770	\$70,800	\$72,570
S3	Blue Air Flow Descent	Moderate - Blue Square	1	Park	385	\$1,155	\$53,900	\$55,055
S4	Black Air Flow Descent	Difficult - Black Diamond	1	Park	315	\$1,575	\$44,100	\$45,675
S5	Double Black Air Flow Descent	Extreme - Double Black Diamond	1	Park	180	\$1,260	\$32,400	\$33,660
Total Southern Quarry Trail Length					2,320	\$7,460	\$247,950	\$255,410
STAGE 1 TOTAL						\$20,533	\$563,445	\$583,978

ID	PROVISIONAL NAME	CLASSIFICATION	STAGE	TRAIL STYLE	LENGTH (M)	DESIGN	BUILD	TOTAL
STAGE 2								
CROSS COUNTRY NETWORK								
T01	Trail 01	Easy - Green Circle	2	Cross Country	470	\$1,175	\$25,850	\$27,025
T02	Trail 02	Easy - Green Circle	2	Cross Country	1775	\$4,438	\$106,500	\$110,938
T03	Trail 03	Easy - Green Circle	2	Cross Country	585	\$1,463	\$32,175	\$33,638
T04	Trail 04	Easy - Green Circle	2	Cross Country	375	\$938	\$24,375	\$25,313
T05	Trail 05	Easy - Green Circle	2	Cross Country	2400	\$938	\$24,375	\$25,313
Total Cross Country Trail Length					5,760	\$14,400	\$340,075	\$354,475
NORTHERN QUARRY BIKE PARK								
JP	Jump Park	Easy - Green Circle > Extreme - Double Black Diamond	2	Park	NA	\$25,000	\$350,000	\$375,000
PT	Pump Track	Easy - Green Circle > Moderate - Blue Square	2	Park	NA	\$30,000	\$500,000	\$530,000
FL	Freeride Lines	Easy - Green Circle > Extreme - Double Black Diamond	2	Park	NA	\$2,000	\$10,000	\$12,000
SL	Slopestyle Lines	Easy - Green Circle > Extreme - Double Black Diamond	2	Park	NA	\$30,000	\$250,000	\$280,000
SK	Skills Park	Easy - Green Circle > Difficult - Black Diamond	2	Park	NA	\$40,000	\$350,000	\$390,000
XC	XCO Loop	Moderate - Blue Square	2	Cross Country	1250	\$3,125	\$75,000	\$78,125
UT	Up Trail	Easy - Green Circle	2	Cross Country	315	\$788	\$18,900	\$19,688
Total Northern Quarry Trail Length					1,565	\$130,913	\$1,553,900	\$1,684,813
STAGE 2 TOTAL						\$138,925	\$1,742,800	\$1,881,725

APPENDICES

APPENDIX A

Outlined in the following pages are five additional moderate blue square classified trails which are proposed for future consideration should there be demand for more mountain bike trails. These trails offer additional technical trail as well as flow style trails which would add to the variety of trail style on offer.



TRAIL F1

Trail ID **F1**

CLASSIFICATION



MODERATE
BLUE SQUARE

TRAIL TYPE

XC

CROSS COUNTRY
FLOW TRAIL

TRAIL LENGTH

725M SINGLE DIRECTION

AVERAGE GRADIENT

4% 30M VERTICAL
80M VARIATION

TRAIL WIDTH

1M GROOMED
CONSTRUCTED

TRAIL F1 OVERVIEW

Trail F1 is a 725m moderate single direction descending trail offering cross country experience focused on open trail over smooth terrain. It forms part of the optional future network of trails and is of low strategic value to the overall networks functionality. Located in generally moderate side slopes, the moderate gradient trail descends from the top of the ridge to the bottom. It features contouring trail with descending switchback corners, flowy trail features and a wide smooth surface with typical finished width of 1m. The proposed alignment does not traverse sections of existing unsanctioned trail.

ANTICIPATED TECHNICAL TRAIL FEATURES

TURNS

Berm
Insloped Descending
Turn

VERTICAL CHANGE

Rollers
Tabletop
Rollable Double
Step Up Jump
Step Down Jump
Grade Reversal
Rollable Step Down
Obstacle Step Up
Chicane
Choke

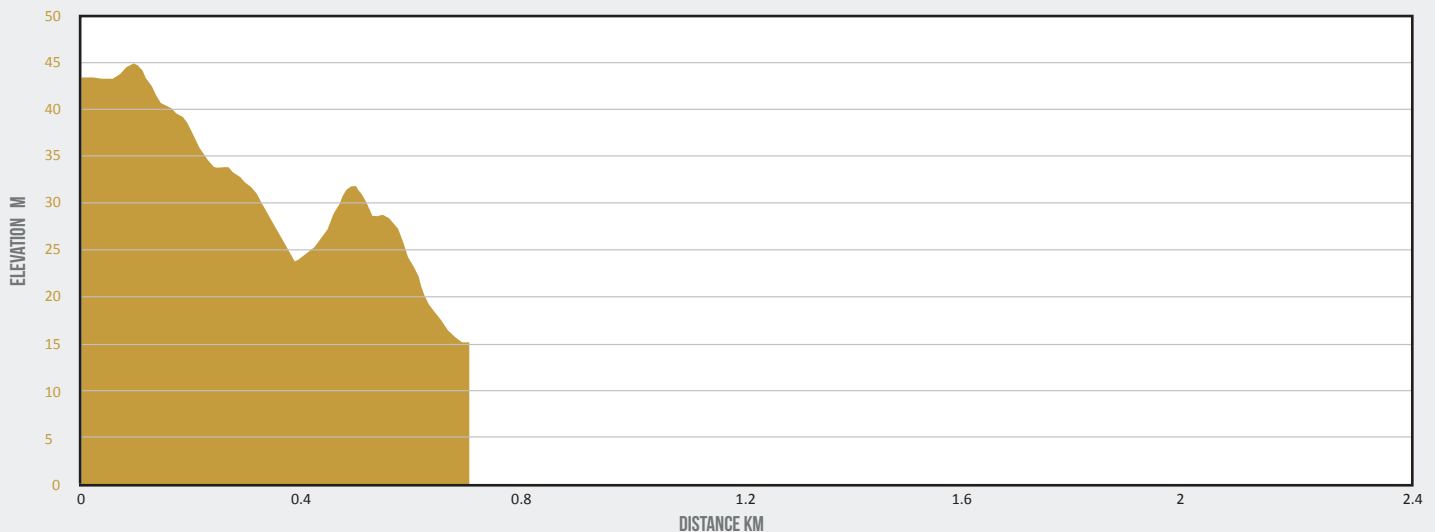
OBSTACLES

Rock Garden
Exposed Bedrock

TRAIL F1 DETAILS

Trail ID	F1
Provisional Name	Trail F1
Classification	Moderate - Blue Square
Strategic Value	Low
Trail Type	Cross Country
Trail Style	Flow Trail
Tread Width	1.0
Use	Bike Optimised
Direction	Single Direction
Ascent / Descent	Descent Only
Options	Nil
Corridor Width	50m
Trail Length	725m
Vertical Range	30m
Elevation Variation	80m
Prevailing Cross Slopes	Moderate
Average Trail Gradient	4%
Maximum Trail Gradient	10% up to 50m
Minimum Line of Sight	Minimum 7.5m
Qualifier / Filter	Blue Filter

TRAIL F1 - ELEVATION PROFILE



TRAIL F1 CHARACTERISTICS

SETTING

WILDERNESS NATURAL LANDSCAPE PLANTATION RURAL **URBAN FRINGE** URBAN

VEGETATION QUALITY

EXCELLENT VERY GOOD GOOD **DEGRADED**

TRAIL TYPE

TOURING **CROSS COUNTRY** DOWN COUNTRY ALL MOUNTAIN GRAVITY PARK

TRAIL STYLE

TECHNICAL NATURAL OPEN FLOWING **FLOW TRAIL** FREERIDE

ORIENTATION

ASCENT ONLY UNDULATING ASCENT CONTOURING UNDULATING DESCENT **DESCENT ONLY**

FLOW / SINUOSITY

IRREGULAR STRAIGHT WINDING **FLOWING**

SCALE

VERY NARROW NARROW **OPEN** WIDE VERY WIDE

ROUGHNESS

VERY ROUGH ROUGH **SMOOTH** GROOMED

TECHNICAL TRAIL FEATURES

NATURAL ENHANCED **CONSTRUCTED** IMPORTED MMTF

FEATURE FREQUENCY

NONE VERY LONG LONG **MODERATE** SHORT

FEATURE MAGNITUDE

NONE SMALL **MEDIUM** LARGE VERY LARGE

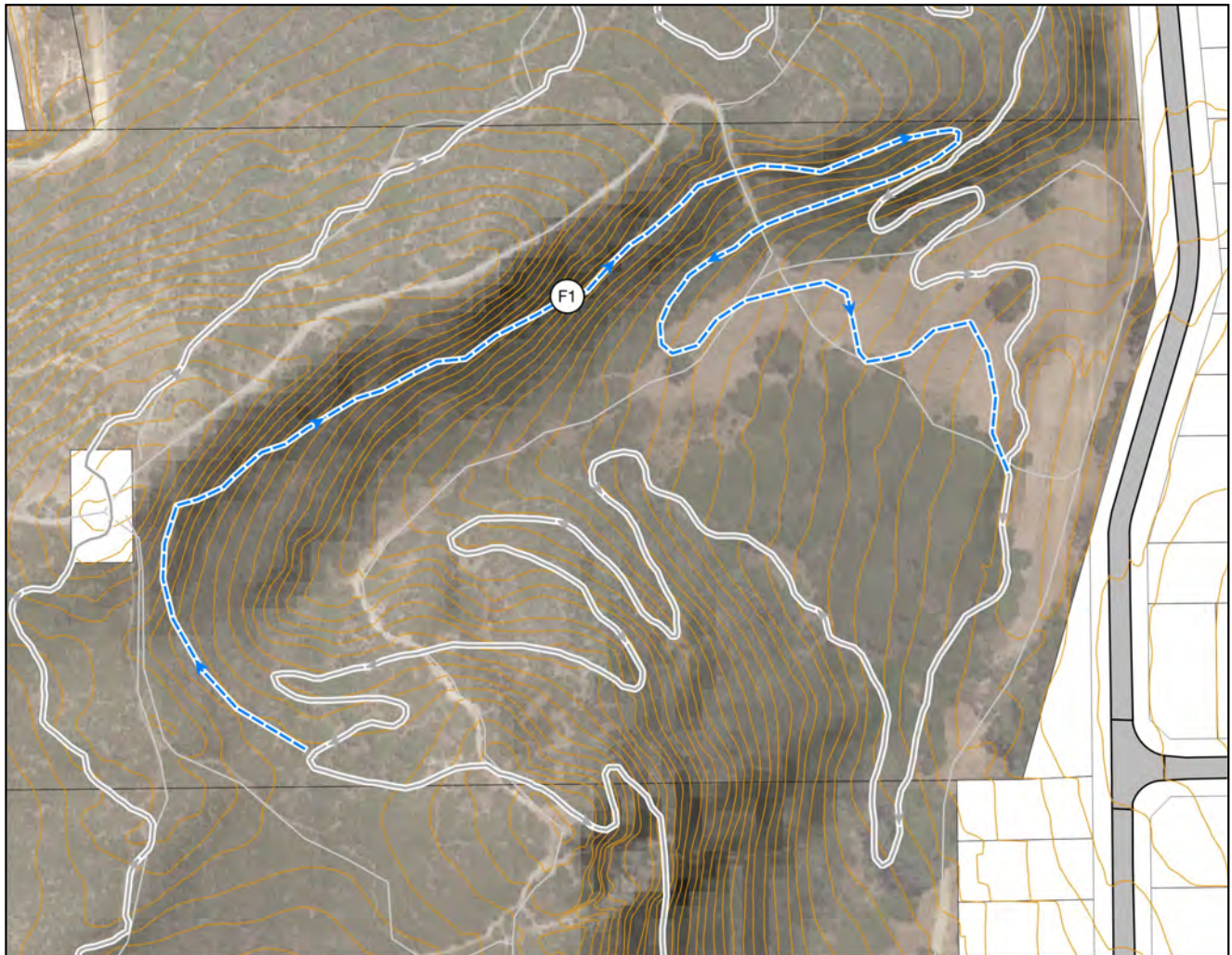
EXPOSURE

VERY LOW LOW **MEDIUM** HIGH VERY HIGH

TRAIL F1 BENCHMARK & PRECEDENT IMAGERY



TRAIL F1 ALIGNMENT



TRAIL F2

Trail ID **F2**

CLASSIFICATION



MODERATE
BLUE SQUARE

TRAIL TYPE

XC

CROSS COUNTRY
OPEN

TRAIL LENGTH

390M SINGLE DIRECTION

AVERAGE GRADIENT

5% 17M VERTICAL
39M VARIATION

TRAIL WIDTH

0.6M NATURAL
ENHANCED

TRAIL F2 OVERVIEW

Trail F2 is a 390m moderate single direction climbing trail offering a cross country experience focused on technical, natural trail. It forms part of the optional future network of trails and is of low strategic value to the overall networks functionality. Located in steep side slopes, the moderate gradient trail climbs from the decision point up to another decision point. It features natural technical trail features and a narrow rough surface with typical finished width of 0.6m. The proposed alignment traverses does not traverse sections of existing unsanctioned trail.

ANTICIPATED TECHNICAL TRAIL FEATURES

TURNS

Climbing Turn
Technical Climbing Turn
Insloped Climbing Turn
Rolling Crown Switchback

VERTICAL CHANGE

Rollers
Grade Reversal
Obstacle Step Up
Chicane
Choke

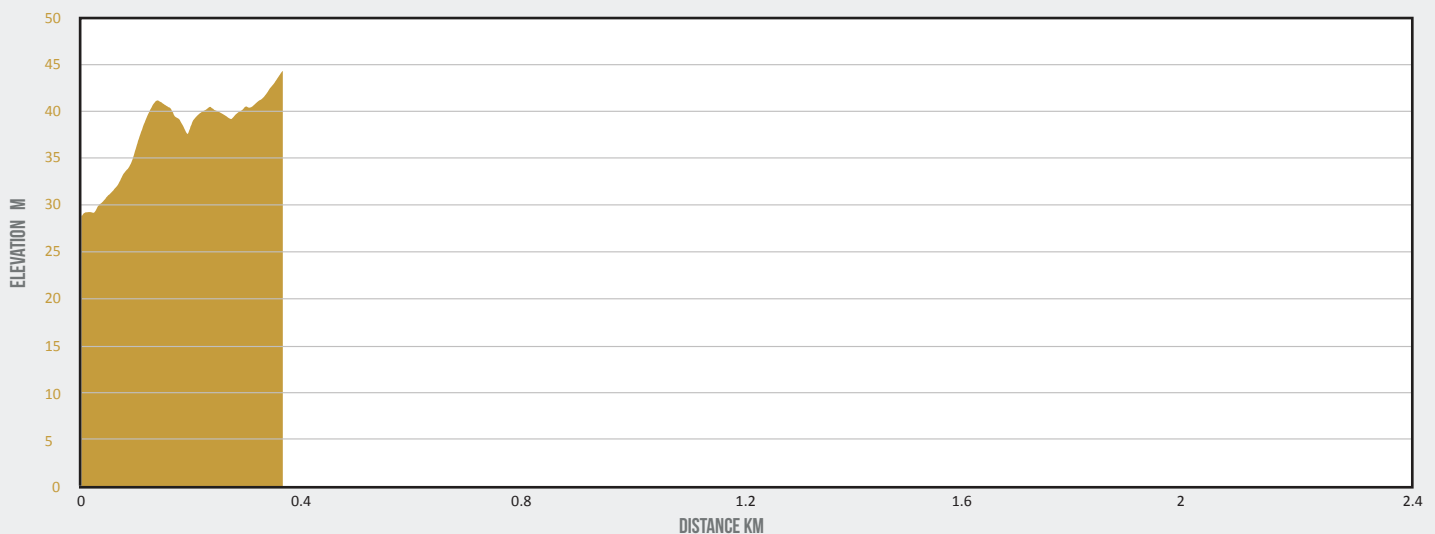
OBSTACLES

Rock Garden
Exposed Bedrock

TRAIL F2 DETAILS

Trail ID	F2
Provisional Name	Trail F2
Classification	Moderate - Blue Square
Strategic Value	Low
Trail Type	Cross Country
Trail Style	Open
Tread Width	0.6m
Use	Bike Optimised
Direction	Single Direction
Ascent / Descent	Undulating ascent
Options	Optional Black Features
Corridor Width	50m
Trail Length	390m
Vertical Range	17m
Elevation Variation	39m
Prevailing Cross Slopes	Moderate
Average Trail Gradient	5%
Maximum Trail Gradient	10% up to 50m
Minimum Line of Sight	Minimum 7.5m
Qualifier / Filter	Blue Filter

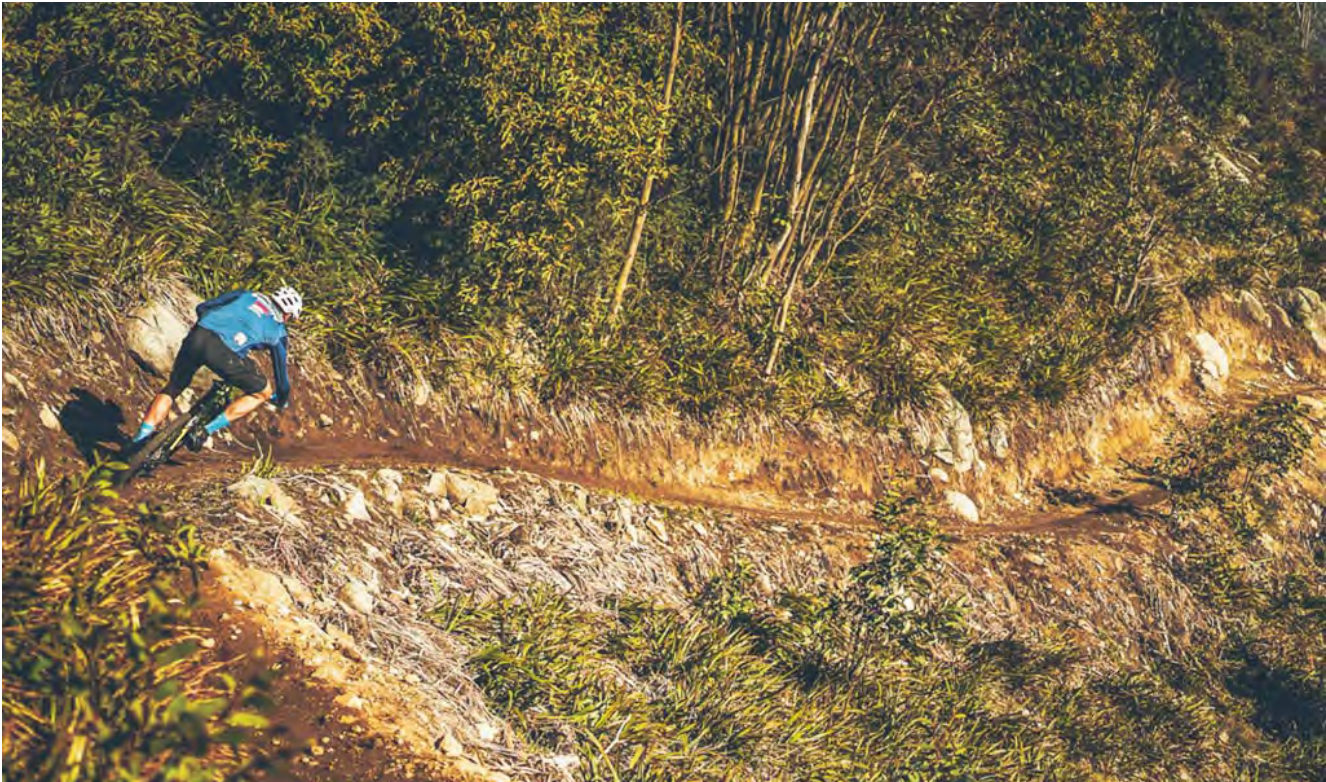
TRAIL F2 - ELEVATION PROFILE



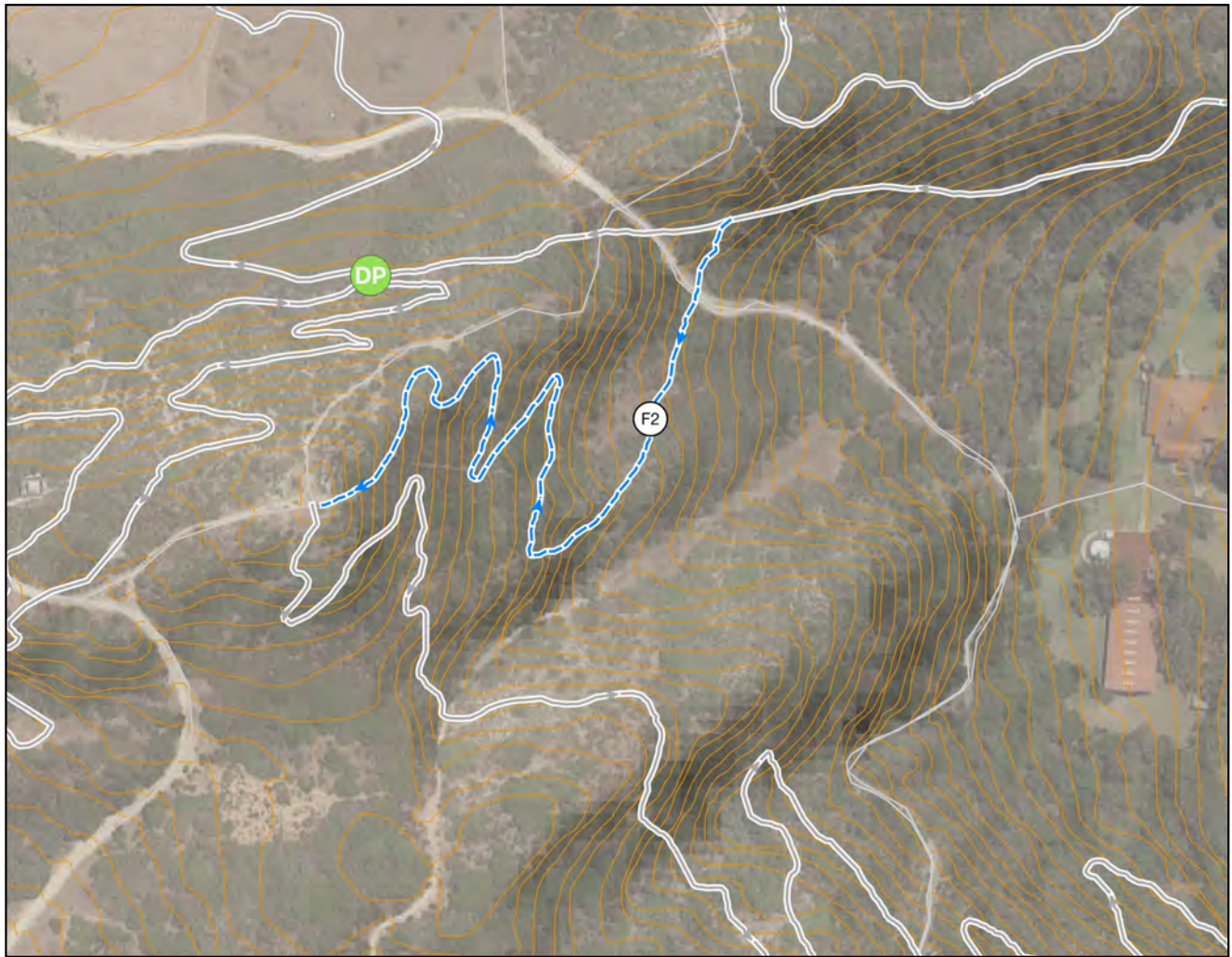
TRAIL F2 CHARACTERISTICS

SETTING	WILDERNESS	NATURAL LANDSCAPE	PLANTATION	RURAL	URBAN FRINGE	URBAN
VEGETATION QUALITY	EXCELLENT	VERY GOOD	GOOD	DEGRADED		
TRAIL TYPE	TOURING	CROSS COUNTRY	DOWN COUNTRY	ALL MOUNTAIN	GRAVITY	PARK
TRAIL STYLE	TECHNICAL	NATURAL	OPEN	FLOWING	FLOW TRAIL	FREERIDE
ORIENTATION	ASCENT ONLY	UNDULATING ASCENT	CONTOURING	UNDULATING DESCENT	DESCENT ONLY	
FLOW / SINUOSITY	IRREGULAR	STRAIGHT	WINDING	FLOWING		
SCALE	VERY NARROW	NARROW	OPEN	WIDE	VERY WIDE	
ROUGHNESS	VERY ROUGH	ROUGH	SMOOTH	GROOMED		
TECHNICAL TRAIL FEATURES	NATURAL	ENHANCED	CONSTRUCTED	IMPORTED MMTF		
FEATURE FREQUENCY	NONE	VERY LONG	LONG	MODERATE	SHORT	
FEATURE MAGNITUDE	NONE	SMALL	MEDIUM	LARGE	VERY LARGE	
EXPOSURE	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH	

TRAIL F2 BENCHMARK & PRECEDENT IMAGERY



TRAIL F2 ALIGNMENT



TRAIL F3

Trail ID **F3**

CLASSIFICATION



MODERATE
BLUE SQUARE

TRAIL TYPE

XC

CROSS COUNTRY
FLOWING

TRAIL LENGTH

1000M

SINGLE DIRECTION

AVERAGE GRADIENT

3% 30M VERTICAL
76M VARIATION

TRAIL WIDTH

0.8M ROUGH
ENHANCED

TRAIL 10 OVERVIEW

Trail F3 is a 1km moderate single direction descending trail offering cross country experience focused on natural, rough, flowing trail. It forms part of the optional future network of trails and is of low strategic value to the overall networks functionality. Located in generally steep side slopes, the moderate gradient trail descends from the decision point connecting to the secondary trailhead on Aziela Drive. It features natural technical trail features and a narrow rough surface with typical finished width of 0.8m. The proposed alignment does not traverse sections of existing unsanctioned trail.

ANTICIPATED TECHNICAL TRAIL FEATURES

TURNS

Berm
Insloped Descending Turn
Technical Inside Line

VERTICAL CHANGE

Rollers
Kicker Jump
Step Down Jump
Grade Reversal
Rollable Step Down
Drop Off
Chicane
Choke

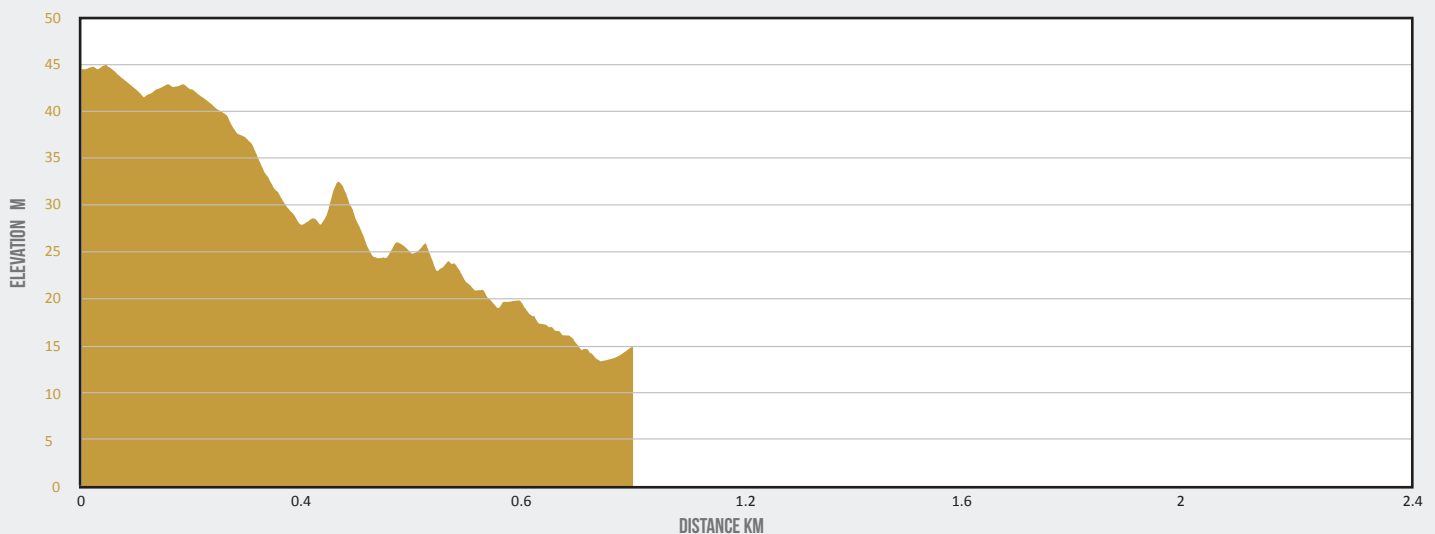
OBSTACLES

Rock Garden
Exposed Bedrock

TRAIL F3 DETAILS

Trail ID	F3
Provisional Name	Trail F3
Classification	Moderate – Blue Square
Strategic Value	Low
Trail Type	Cross Country
Trail Style	Flowing
Tread Width	0.8m
Use	Bike Optimised
Direction	Single Direction
Ascent / Descent	Undulating descent
Options	Optional Black Lines & Features
Corridor Width	50m
Trail Length	1000m
Vertical Range	30m
Elevation Variation	76m
Prevailing Cross Slopes	Moderate
Average Trail Gradient	3%
Maximum Trail Gradient	10% up to 50m
Minimum Line of Sight	Minimum 7.5m
Qualifier / Filter	Blue Filter

TRAIL F3 - ELEVATION PROFILE



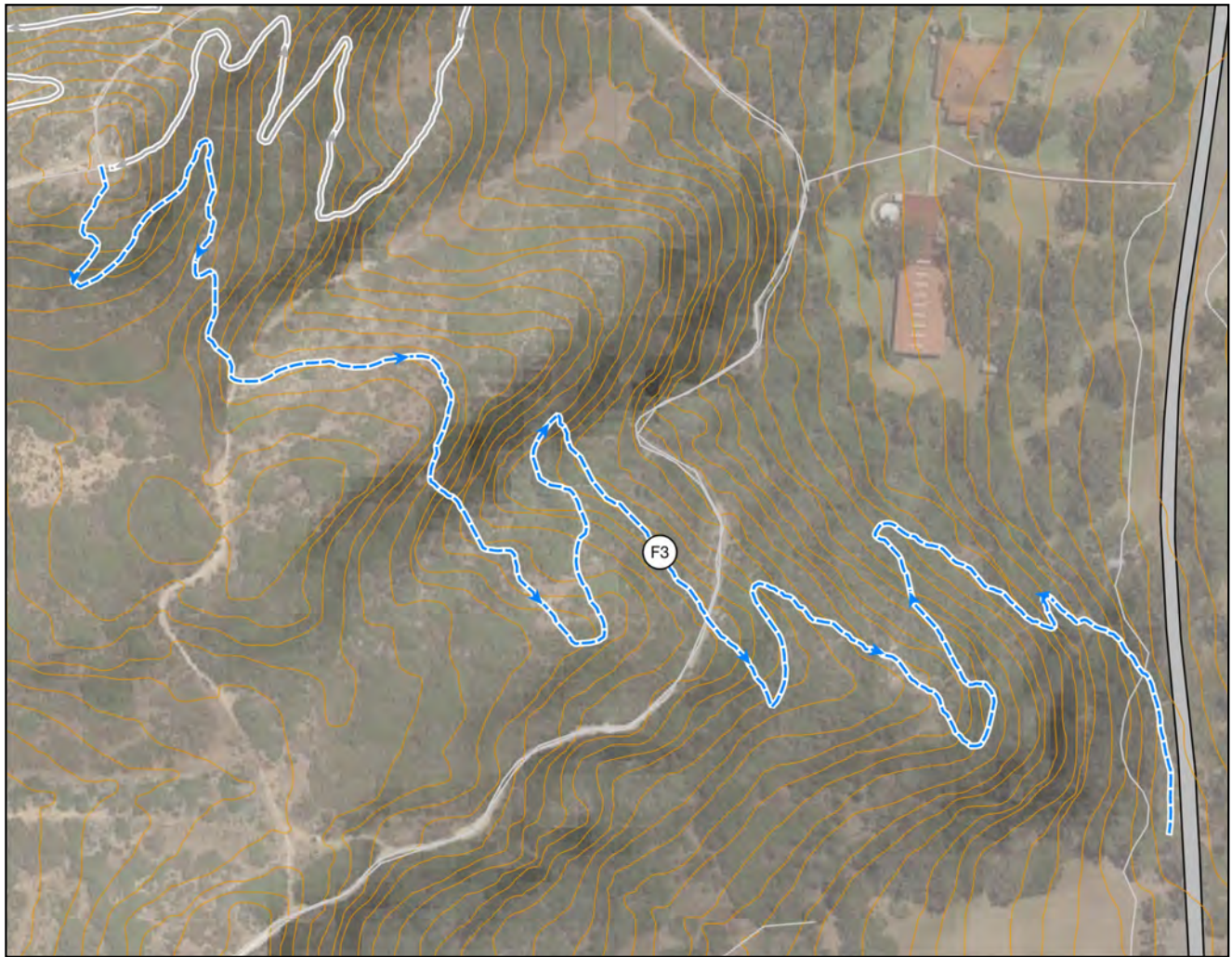
TRAIL F3 CHARACTERISTICS

SETTING	WILDERNESS	NATURAL LANDSCAPE	PLANTATION	RURAL	URBAN FRINGE	URBAN
VEGETATION QUALITY	EXCELLENT	VERY GOOD	GOOD	DEGRADED		
TRAIL TYPE	TOURING	CROSS COUNTRY	DOWN COUNTRY	ALL MOUNTAIN	GRAVITY	PARK
TRAIL STYLE	TECHNICAL	NATURAL	OPEN	FLOWING	FLOW TRAIL	FREERIDE
ORIENTATION	ASCENT ONLY	UNDULATING ASCENT	CONTOURING	UNDULATING DESCENT	DESCENT ONLY	
FLOW / SINUOSITY	IRREGULAR	STRAIGHT	WINDING	FLOWING		
SCALE	VERY NARROW	NARROW	OPEN	WIDE	VERY WIDE	
ROUGHNESS	VERY ROUGH	ROUGH	SMOOTH	GROOMED		
TECHNICAL TRAIL FEATURES	NATURAL	ENHANCED	CONSTRUCTED	IMPORTED MMTF		
FEATURE FREQUENCY	NONE	VERY LONG	LONG	MODERATE	SHORT	
FEATURE MAGNITUDE	NONE	SMALL	MEDIUM	LARGE	VERY LARGE	
EXPOSURE	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH	

TRAIL F3 BENCHMARK & PRECEDENT IMAGERY



TRAIL F3 ALIGNMENT



TRAIL F4

Trail ID **F4**

CLASSIFICATION



MODERATE
BLUE SQUARE

TRAIL TYPE

XC

CROSS COUNTRY
TECHNICAL

TRAIL LENGTH

1230M

SINGLE DIRECTION

AVERAGE GRADIENT

3%

31M VERTICAL
90M VARIATION

TRAIL WIDTH

0.8M

ROUGH
ENHANCED

TRAIL F4 OVERVIEW

Trail F4 is a 1.23km moderate single direction climbing trail offering a cross country experience focused on technical natural trail over rough terrain. It forms part of the optional future network of trails and is of low strategic value to the overall networks functionality. Located in steep side slopes, the moderate gradient trail climbs from the secondary trailhead on Aziela Drive past the top of the stairs to a decision point at the southern end of the network. It features technical trail features with a narrow smooth surface with typical finished width of 0.8m. The proposed alignment does not traverse sections of existing unsanctioned trail.

ANTICIPATED TECHNICAL TRAIL FEATURES

TURNS

Climbing Turn
Technical Climbing Turn
Insloped Climbing Turn

VERTICAL CHANGE

Grade Reversal
Obstacle Step Up
Chicane
Choke

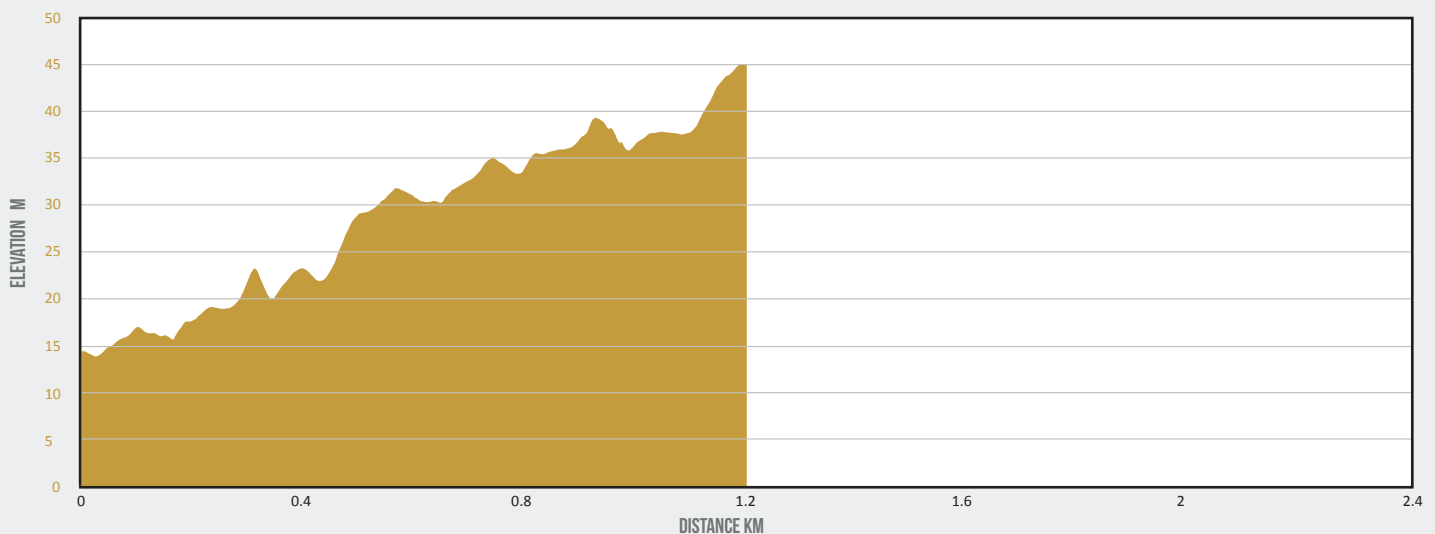
OBSTACLES

Rock Garden
Exposed Bedrock

TRAIL F4 DETAILS

Trail ID	F4
Provisional Name	Trail F4
Classification	Moderate – Blue Square
Strategic Value	Low
Trail Type	Cross Country
Trail Style	Technical
Tread Width	0.8m
Use	Bike Optimised
Direction	Dual Direction
Ascent / Descent	Undulating Ascent
Options	Nil
Corridor Width	50m
Trail Length	1230m
Vertical Range	31m
Elevation Variation	90m
Prevailing Cross Slopes	Moderate
Average Trail Gradient	3%
Maximum Trail Gradient	10% up to 50m
Minimum Line of Sight	Minimum 7.5m
Qualifier / Filter	Blue Filter

TRAIL F4 - ELEVATION PROFILE



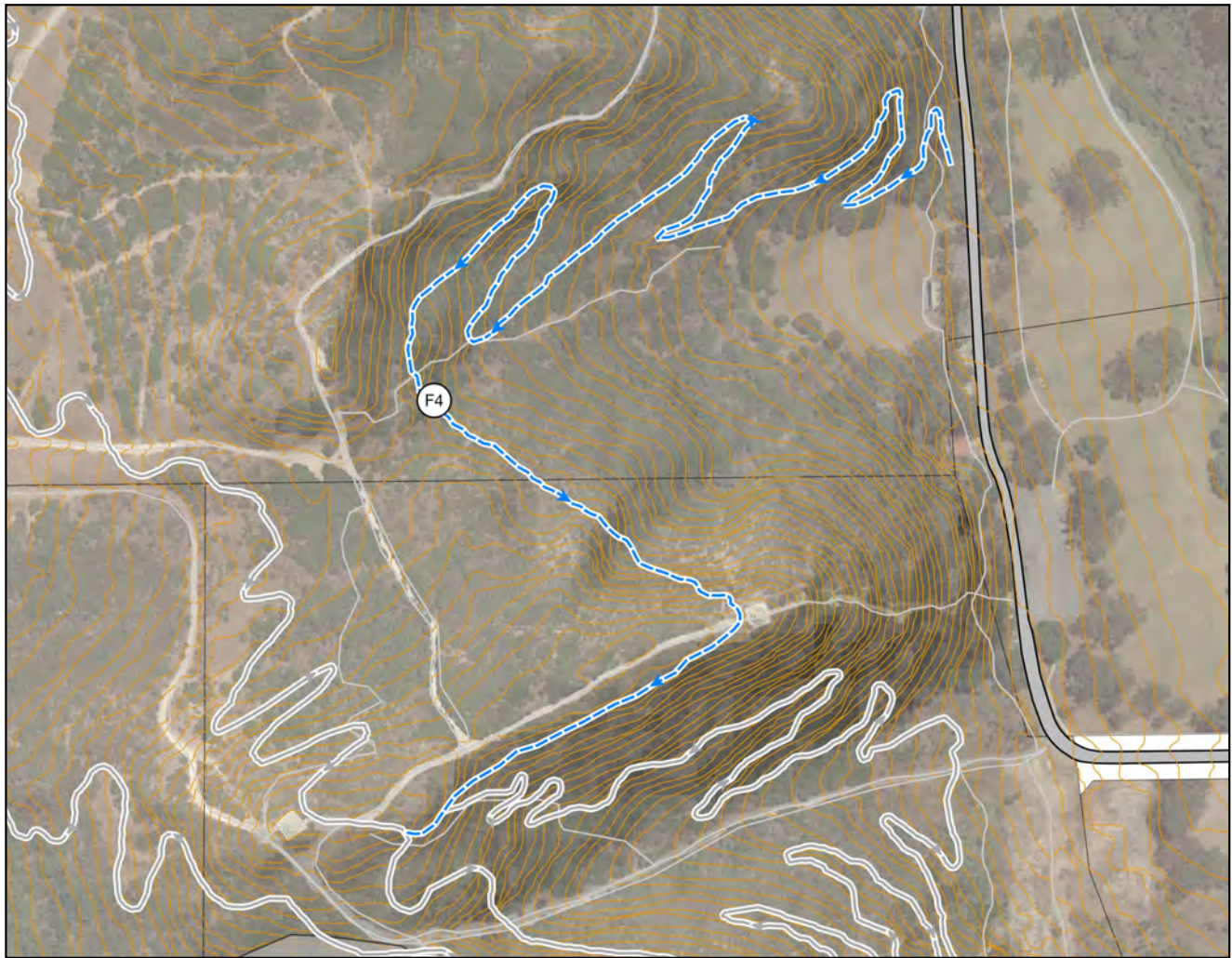
TRAIL F4 CHARACTERISTICS

SETTING	WILDERNESS	NATURAL LANDSCAPE	PLANTATION	RURAL	URBAN FRINGE	URBAN
VEGETATION QUALITY	EXCELLENT	VERY GOOD	GOOD	DEGRADED		
TRAIL TYPE	TOURING	CROSS COUNTRY	DOWN COUNTRY	ALL MOUNTAIN	GRAVITY	PARK
TRAIL STYLE	TECHNICAL	NATURAL	OPEN	FLOWING	FLOW TRAIL	FREERIDE
ORIENTATION	ASCENT ONLY	UNDULATING ASCENT	CONTOURING	UNDULATING DESCENT	DESCENT ONLY	
FLOW / SINUOSITY	IRREGULAR	STRAIGHT	WINDING	FLOWING		
SCALE	VERY NARROW	NARROW	OPEN	WIDE	VERY WIDE	
ROUGHNESS	VERY ROUGH	ROUGH	SMOOTH	GROOMED		
TECHNICAL TRAIL FEATURES	NATURAL	ENHANCED	CONSTRUCTED	IMPORTED MMTF		
FEATURE FREQUENCY	NONE	VERY LONG	LONG	MODERATE	SHORT	
FEATURE MAGNITUDE	NONE	SMALL	MEDIUM	LARGE	VERY LARGE	
EXPOSURE	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH	

TRAIL F4 BENCHMARK & PRECEDENT IMAGERY



TRAIL F4 ALIGNMENT



TRAIL F5

Trail ID **F5**

CLASSIFICATION



MODERATE
BLUE SQUARE

TRAIL TYPE

XC

CROSS COUNTRY
FLOWING

TRAIL LENGTH

1295M

SINGLE DIRECTION

AVERAGE GRADIENT

3%

22M VERTICAL
113M VARIATION

TRAIL WIDTH

1M

SMOOTH
CONSTRUCTED

TRAIL F5 OVERVIEW

Trail F5 is a 1.3km moderate single direction ascending and climbing trail offering a cross country experience focused on flowing trail over natural terrain. It forms part of the optional future network of trails and is of low strategic value to the overall networks functionality. Located in generally moderate side slopes, the easy gradient trail descends from Trail 12 and then climbs to meet Trail 12 again. It features continuous rolling grade reversals and a smooth surface with typical finished width of 1m. The proposed alignment traverses sections of existing unsanctioned trail.

ANTICIPATED TECHNICAL TRAIL FEATURES

TURNS

Berm
Insloped Descending Turn
Technical Inside Line
Climbing Turn
Technical Climbing Turn
Insloped Climbing Turn

VERTICAL CHANGE

Rollers
Kicker Jump
Tabletop
Rollable Double
Grade Reversal
Rollable Step Down
Drop Off
Obstacle Step Up
Chicane
Choke

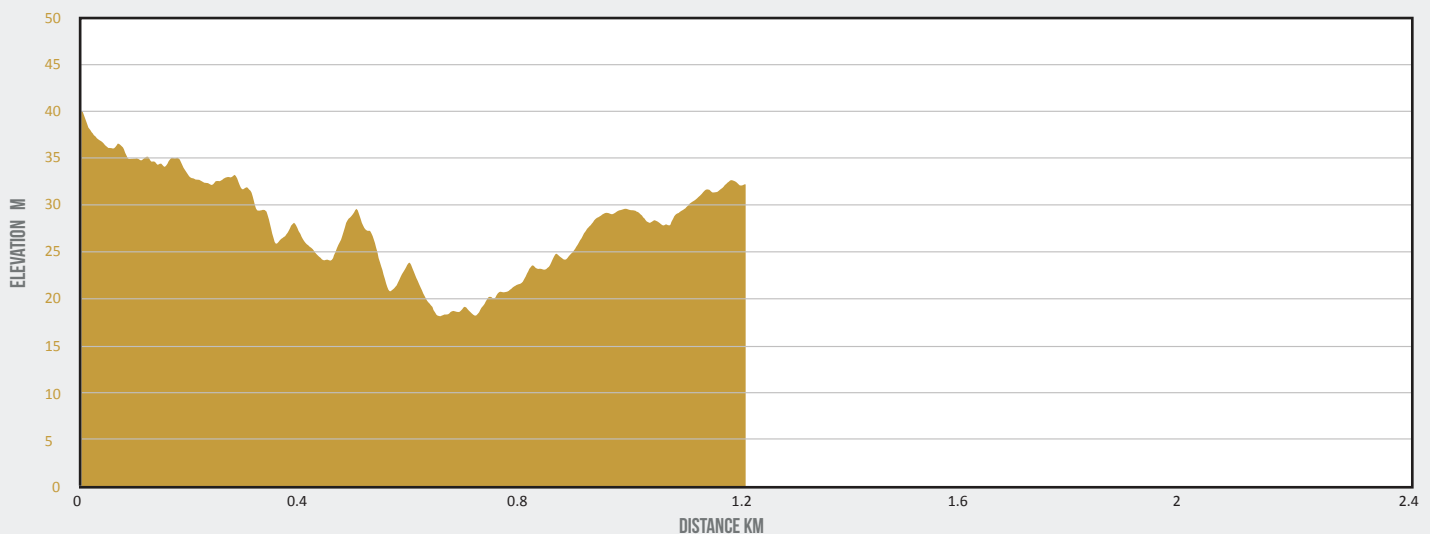
OBSTACLES

Rock Garden
Exposed Bedrock
Rock Rollover
Stabilised Root Section

TRAIL F5 DETAILS

Trail ID	F5
Provisional Name	Trail F5
Classification	Moderate – Blue Square
Strategic Value	Low
Trail Type	Cross Country
Trail Style	Flowing
Tread Width	1m
Use	Bike & Hand Cycle Optimised
Direction	Single Direction
Ascent / Descent	Undulating
Options	None
Corridor Width	50m
Trail Length	1295m
Vertical Range	22m
Elevation Variation	113m
Prevailing Cross Slopes	Moderate
Average Trail Gradient	3%
Maximum Trail Gradient	15% up to 20m
Minimum Line of Sight	Minimum 10m
Qualifier / Filter	Blue Filter

TRAIL F5 - ELEVATION PROFILE



TRAIL F5 CHARACTERISTICS

SETTING

WILDERNESS NATURAL LANDSCAPE PLANTATION RURAL **URBAN FRINGE** URBAN

VEGETATION QUALITY

EXCELLENT VERY GOOD GOOD **DEGRADED**

TRAIL TYPE

TOURING **CROSS COUNTRY** DOWN COUNTRY ALL MOUNTAIN GRAVITY PARK

TRAIL STYLE

TECHNICAL NATURAL OPEN **FLOWING** FLOW TRAIL FREERIDE

ORIENTATION

ASCENT ONLY **UNDULATING ASCENT** CONTOURING **UNDULATING DESCENT** DESCENT ONLY

FLOW / SINUOSITY

IRREGULAR STRAIGHT **WINDING** FLOWING

SCALE

VERY NARROW NARROW **OPEN** WIDE VERY WIDE

ROUGHNESS

VERY ROUGH ROUGH **SMOOTH** GROOMED

TECHNICAL TRAIL FEATURES

NATURAL ENHANCED **CONSTRUCTED** IMPORTED MMTF

FEATURE FREQUENCY

NONE VERY LONG **LONG** MODERATE SHORT

FEATURE MAGNITUDE

NONE **SMALL** MEDIUM LARGE VERY LARGE

EXPOSURE

VERY LOW LOW MEDIUM HIGH VERY HIGH

TRAIL F5 BENCHMARK & PRECEDENT IMAGERY



TRAIL F5 ALIGNMENT

