Bush Fire Assessment Report

Lithgow Mountain Bike Park

State Mine Gully Road, State Mine Gully

Prepared for:

Central Tablelands Mountain Bike Club

August 2025

Integrated Consulting

Planning | Bushfire | Surveying

REPORT DETAILS	
Project Number	24127
Project Name	Lithgow Mountain Bike Park
Project Address	State Mine Gully Road, State Mine Gully
Client	Central Tablelands Mountain Bike Club
Prepared by	Erika Dawson
BPAD Accreditation No.	BPAD 36371 Level 3 (NSW & WA)
File Name	24127-R01_B
Revision	B
Date	20 August 2025

Document Control		
Revision	**Date**	**Purpose**
A	17/5/2025	Draft for client review
B	20/08/2025	Final

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

Integrated Consulting
Planning | Bushfire | Surveying

PO Box 9026, Bathurst West NSW 2795
0400 940 482
www.integratedconsulting.com.au

CONSULTING SURVEYORS NATIONAL PROFESSIONAL STANDARDS SCHEME

Liability limited by a scheme approved under Professional Standards Legislation

Executive Summary

Table 1: Executive Summary

Item	Response
Street Address	State Mine Gully Road, State Mine Gully
Real Property Description	Lot 11 DP1240259, Lots 1, 2 & 3 DP 1110346, Lot 1 DP 965231, Lot 2 DP 787403, Lot 2 DP 876025.
Local Government Area	Lithgow City
Proposed Development	Mountain Bike Park
Planning for Bushfire Protection (PBP) Classification of Development	Other
Referral to RFS required	Yes ☐ (Integrated Development for s.100B BFSA) **No ☒ (clause 4.14 EP&A Act Council assessment for development that conforms with PBP)**
Compliance with PBP	Acceptable Solutions Yes ☒ No ☐ Performance Solution[1] Yes ☐ No ☒

Notes:

1 Conforming with the relevant specifications and requirements of 'Planning for Bush Fire Protection' can be achieved by both Acceptable Solutions and Performance Solutions.

Table of Contents

Appendices

Figures

Plates

Tables

1 Introduction

1.1 Purpose

This Bush Fire Assessment Report (BFAR) has been prepared to support a Development Application (DA) for Lithgow Mountain Bike Park on Lot 11 DP1240259, Lots 1, 2 & 3 DP 1110346, Lot 1 DP 965231, Lot 2 DP 787403, and Lot 2 DP 876025, being 3A State Mine Gully Road.

The DA is to be lodged with Lithgow City Council. This report has been prepared in accordance with *Planning for Bush Fire Protection 2019* (PBP) to provide sufficient information for Council pursuant to section 4.14 of the *Environmental Planning & Assessment Act 1979* (EP&A Act).

1.2 The Development

1.2.1 Background

In 2022, the Gardens of Stone State Conservation Area (GoSSCA) was gazetted

> *… as part of a $49.5 million NSW Government investment to establish Lithgow as a world-class ecotourism destination, while conserving the exceptional natural and cultural heritage values of the region (World Trail Pty Ltd 2024).*

As part of the enhancement of the GoSSCA, it is proposed to establish approximately 62.71 km of mountain bike (MTB) trail network. The trail network will traverse both the (proposed & subject to approval) GoSSCA network (38.17 km) and the adjacent State Mine Gully Precinct (SMG) (24.54km). Whilst the trail network will function as a continuous network, due to the multiple land tenures, approvals and construction will be carried out as two (2) separate projects.

This Development Application (DA) covers the proposed trails within the SMG Precinct, which includes the primary trailhead area for the entire trail network. The applicant for this DA is Central Tablelands Mountain Bike Club. The proposed (& subject to approval) GoSSCA trails are to be developed by the National Parks & Wildlife Service (NPWS).

1.2.2 Proposed Development

The proposed development involves the construction and ongoing use of the SMG Mountain Bike Park which is the portion of the trail network within the SMG Precinct. Plans of the development are provided in **Appendix A**.

The proposed development includes:

- The primary trailhead at the State Mine Heritage Park. This will be the main point of access to the trails. It will have a carpark for users of the MTB park, located to the south of the existing museum, with trail access to the west of the carpark.
- Two (2) shuttle pick up points. These will be detailed during the detailed design phase of the development.
- Twenty two (22) MTB trails with a total length of 24.54 km

Full details of the construction of the trails are provided in **Appendix B** and will be further developed during the detailed design process following DA approval.

The primary trailhead is located only 2.5km from the CBD of Lithgow and therefore many users of the MTB park will be able to access the park by riding as opposed to driving and parking at the trailhead.

1.3 The Site

1.3.1 Location

The subject site is comprised of seven (7) parcels, being Lot 11 DP1240259, Lots 1, 2 & 3 DP 1110346, Lot 1 DP 965231, Lot 2 DP 787403, and Lot 2 DP 876025. The site is located on either side of State Mine Gully Road approximately 100m north of the intersection with Atkinson Street. The location of the site is shown in **Figure 1** and an aerial image in **Figure 2**.

1.3.2 Site Details

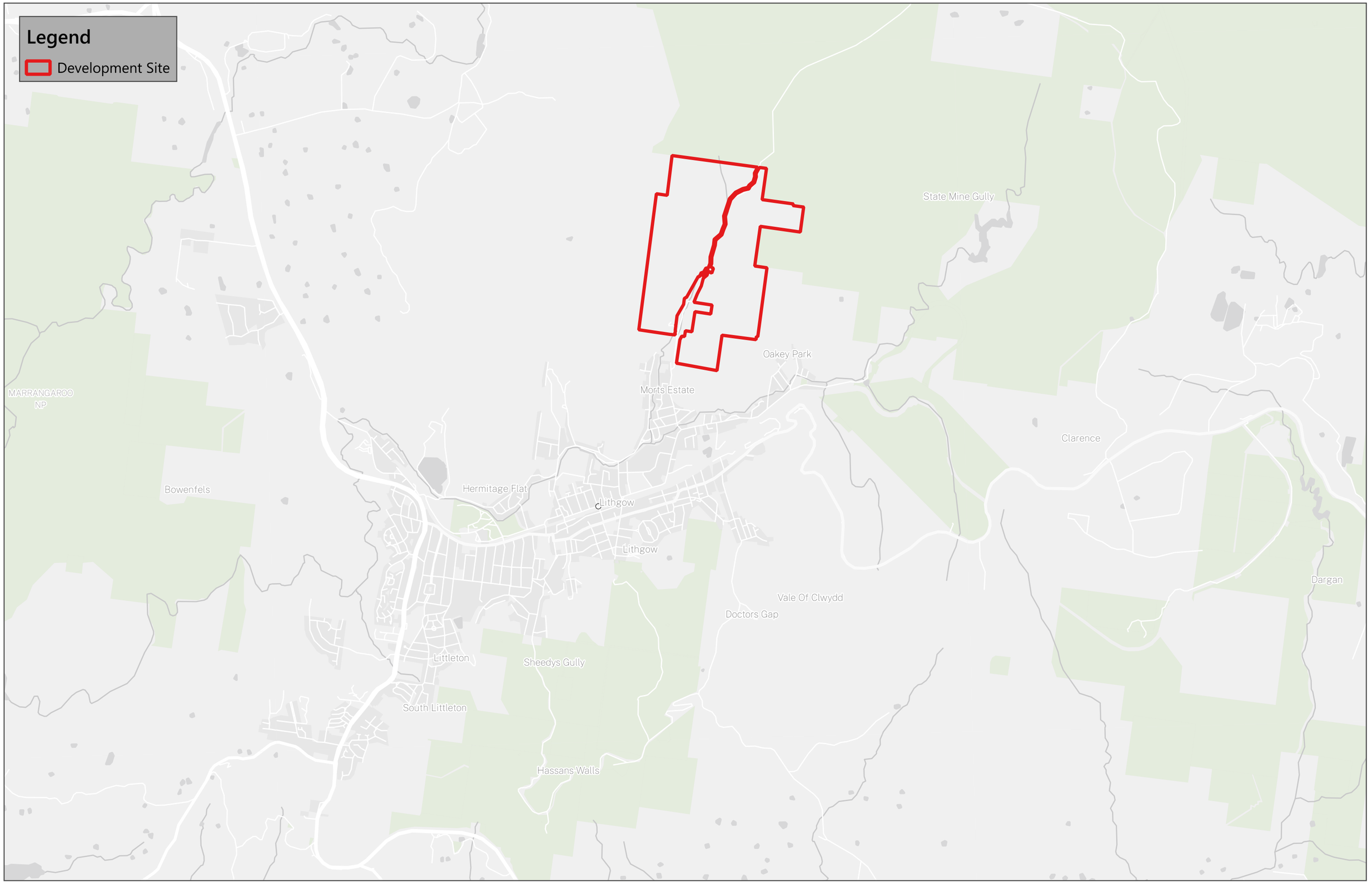
The following table outlines the size of each of the lots within the subject site.

Table 2: Site Details

Real Property Description	Street Address	Area	Landowner
Lot 11 DP1240259	3A State Mine Gully Road, State Mine Gully	12.93ha	The City of Greater Lithgow Mining Museum Incorporated
Lot 1 DP 1110346	Macaulay Street, Marrangaroo	No area on DP. Calculated from dimensions as 20.90ha	The Council of The City of Greater Lithgow
Lot 2 DP 1110346	Macaulay Street, Marrangaroo	No area on DP. Calculated from dimensions as 13.34ha	The Council of The City of Greater Lithgow
Lot 3 DP 1110346	Macaulay Street, Marrangaroo	Approximately 1.618ha	The Council of The City of Greater Lithgow
Lot 1 DP 965231	Coalbrook Street, Marrangaroo	109 acres 2 roods 7 perches on title diagram. Converts to 44.33ha.	His Most Gracious Majesty King George the Fifth
Lot 2 DP 787403	3A State Mine Gully Road, State Mine Gully	118.2ha	The City of Greater Lithgow Mining Museum Incorporated
Lot 2 DP 876025	1A Laidley Street, Morts Estate	67.95ha	Private Landowner

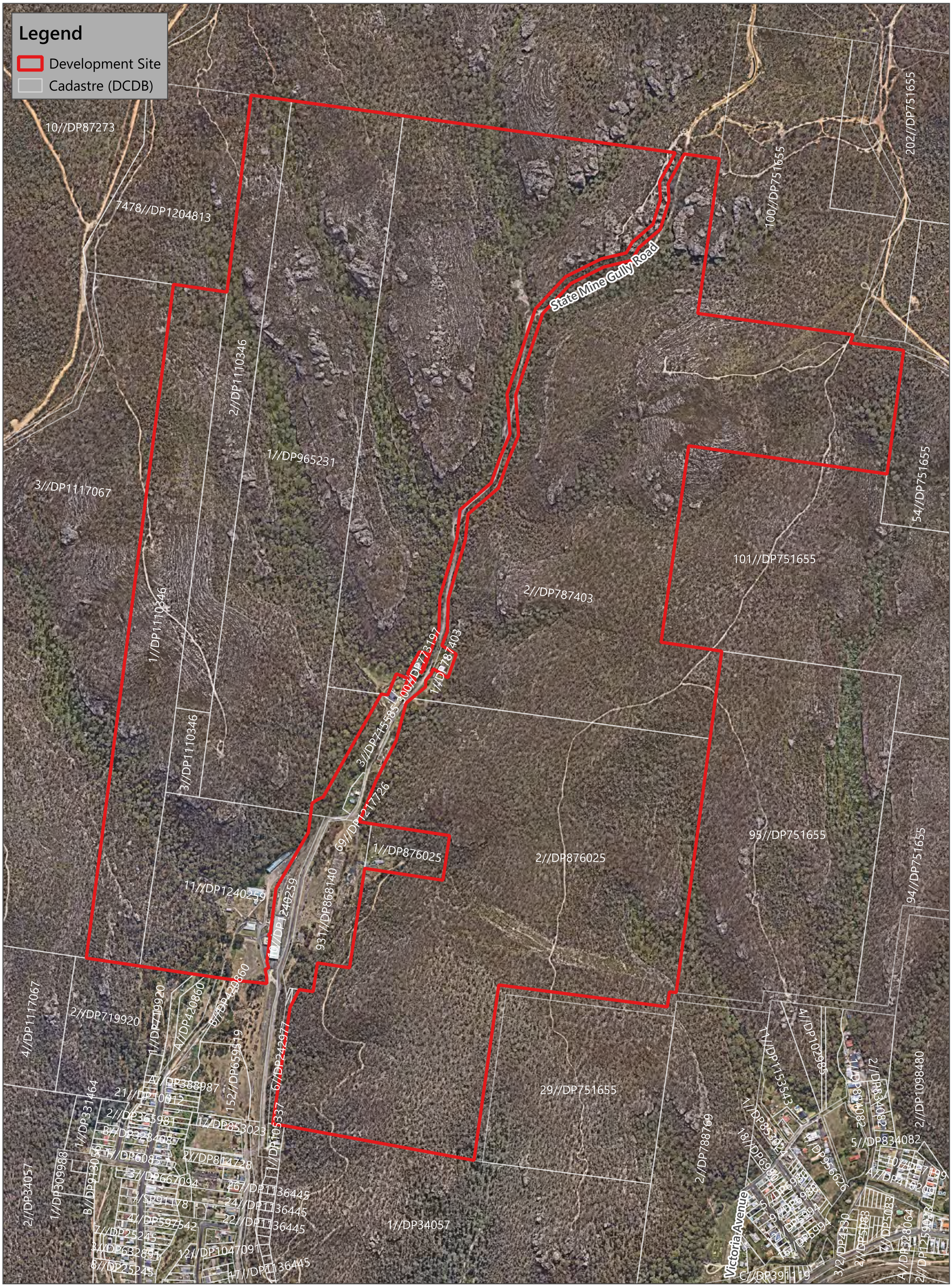
The site is largely steep, heavily timbered land. The exception to this is the eastern part of Lot 11 which is flatter and contains the Lithgow State Mine Heritage Park.

The site is located within an area zoned C3 Environmental Management under *Lithgow Local Environmental Plan 2014* as shown in **Figure 3**. The land to the north and north east of the site is zoned RU3 Forestry, to the south east and south west C3, and to the south R1 General Residential.



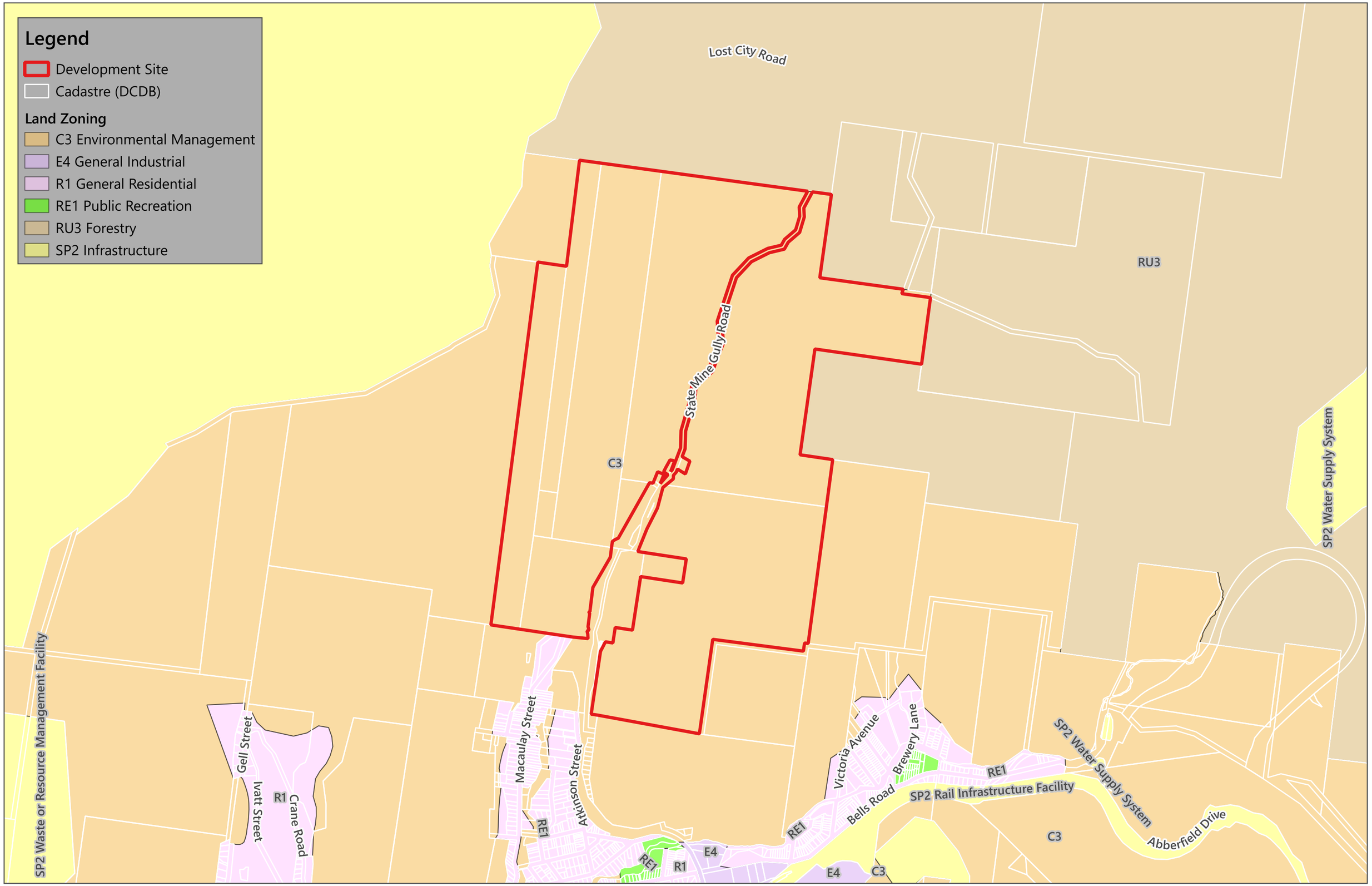
Source: NSW Spatial Services
Ref: 24127

Figure 1: Site Location



Source: NearMap; NSW Spatial Services
Ref: 24127

Figure 2: Site Aerial



Source: NSW Spatial Services; SEED
Ref: 24127

Figure 3: LEP Zoning

1.3.3 Environmental Significance

The subject site is identified as having the following features of environmental significance:

- Being wholly within the Sydney Drinking Water catchment (SEPP),
- Partially containing Terrestrial biodiversity (LEP),
- Partially containing Environmentally Sensitive Land (LEP),
- Being partially within the Lithgow Mine Subsidence District, and
- Partially containing areas of Biodiversity Values, as mapped on the Biodiversity Values Map.

Figure 4 to **Figure 6** show the areas of environmental significance on site.

1.3.4 Threatened Species

A Biodiversity Development Assessment Report (BDAR) has been undertaken by OzArk for the proposed development. The Executive Summary and relevant mapping from the BDAR is provided in **Appendix C**.

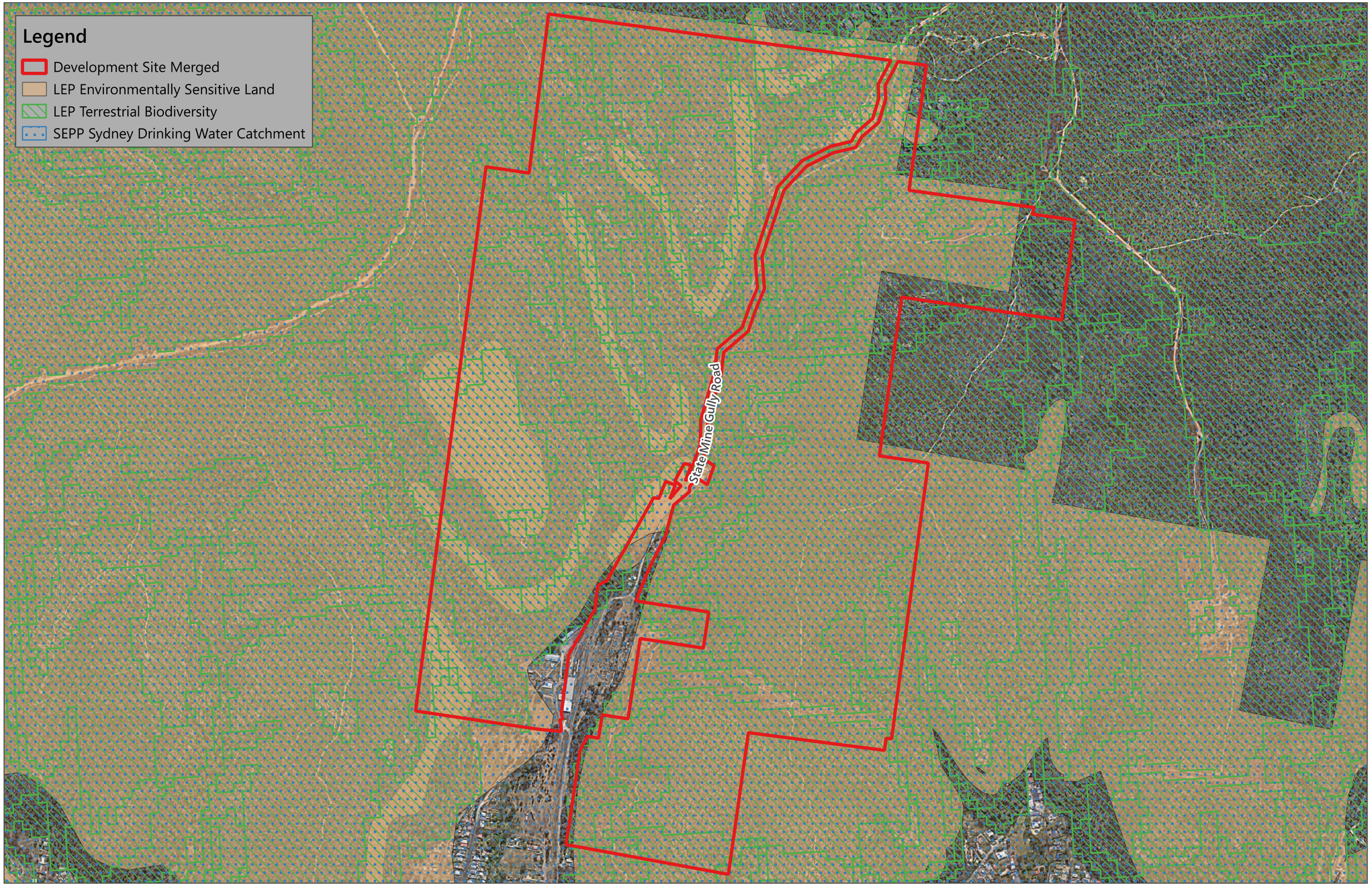
1.3.5 Indigenous Heritage

An Aboriginal Due Diligence Assessment has been undertaken by OzArk for the proposed development. The Executive Summary of the Assessment is provided in **Appendix D**.

1.4 Legislative Framework

1.4.1 Bush Fire Prone Land

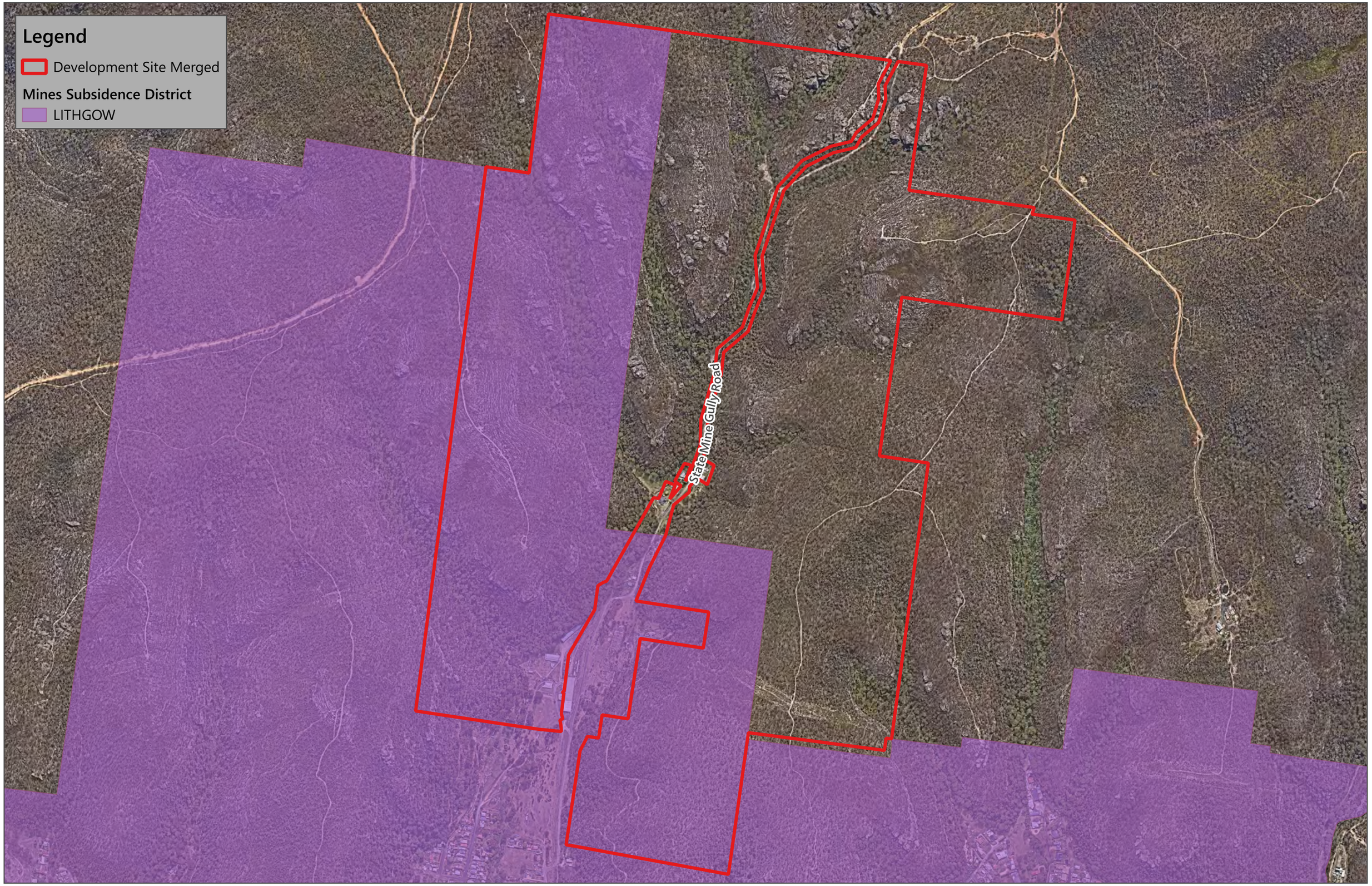
The site is designated as bush fire prone land in accordance with Section 10.3 of the EP&A Act. As shown in **Figure 7** the site is mapped as being within the Category 1 Vegetation (red) and buffer (yellow).



Source: NearMap; DCS Spatial Services; SEED

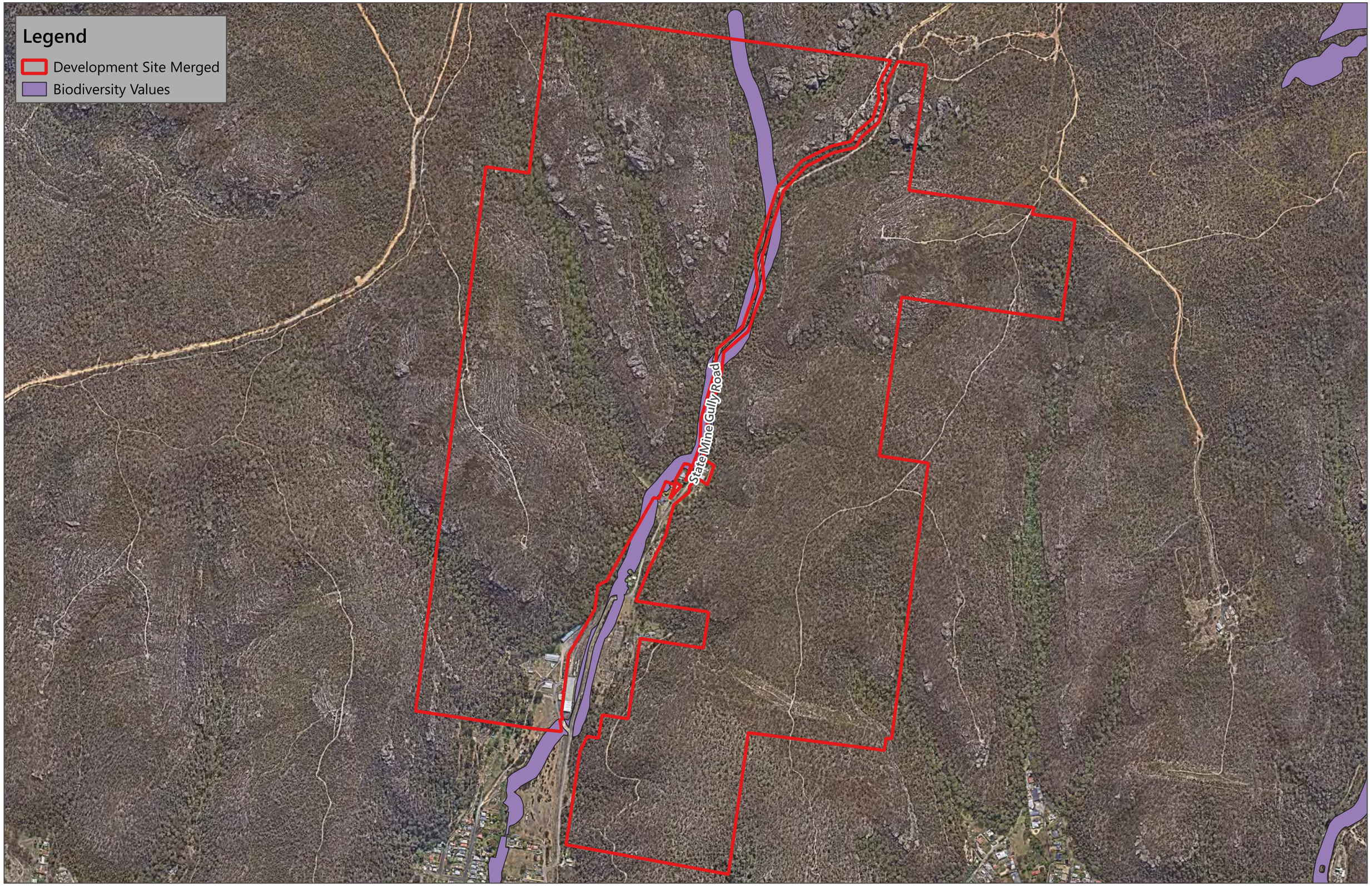
Ref: 24127

Figure 4: EPI Environmental Significance



Source: NearMap; DCS Spatial Services; SEED
Ref: 24127

Figure 5: Mine Subsidence District

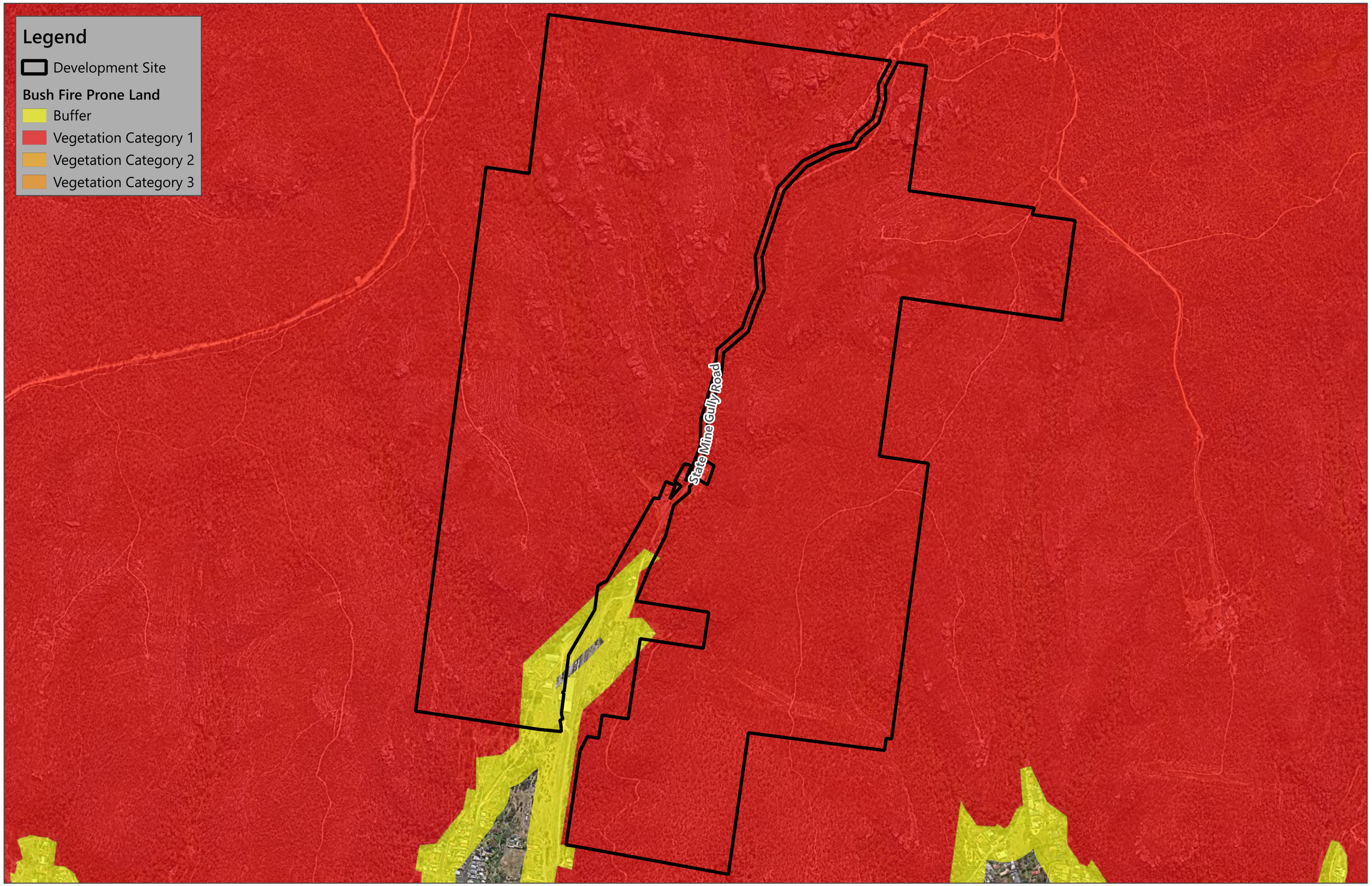


0 400 800 m

1:10,000 @ A3

Source: NearMap; DCS Spatial Services; SEED
Ref: 24127

Figure 6: Biodiversity Values Map



Source: NearMap; DCS Spatial Services; SEED
Ref: 24127

Figure 7: Bush Fire Prone Land Map

1.4.2 Development Application Considerations

Development Applications on bushfire prone land require consideration of section 4.14 of the EP&A Act:

> *(1) Development consent cannot be granted for the carrying out of development for any purpose (other than a subdivision of land that could lawfully be used for residential or rural residential purposes or development for a special fire protection purpose) on bush fire prone land (being land for the time being recorded as bush fire prone land on a relevant map certified under section 10.3 (2)) unless the consent authority:*
>
> *(a) is satisfied that the development conforms to the specifications and requirements of the version (as prescribed by the regulations) of the document entitled Planning for Bush Fire Protection prepared by the NSW Rural Fire Service in co-operation with the Department (or, if another document is prescribed by the regulations for the purposes of this paragraph, that document) that are relevant to the development (the relevant specifications and requirements), or*
>
> *(b) has been provided with a certificate by a person who is recognised by the NSW Rural Fire Service as a qualified consultant in bush fire risk assessment stating that the development conforms to the relevant specifications and requirements.*
>
> *(1A) If the consent authority is satisfied that the development does not conform to the relevant specifications and requirements, the consent authority may, despite subsection (1), grant consent to the carrying out of the development but only if it has consulted with the Commissioner of the NSW Rural Fire Service concerning measures to be taken with respect to the development to protect persons, property and the environment from danger that may arise from a bush fire.*

This BFAR has been prepared to demonstrate that the development conforms to the specifications and requirements of Planning for Bush Fire Protection.

1.4.3 Planning for Bush Fire Protection

PBP (NSW Rural Fire Service 2019) applies to all DAs on bush fire prone land. As required by Section 1.4 of PBP, this report has been prepared to address the requirements of the PBP as "Other Non-Residential development". Specifically, the following has been addressed in this report:

- The objectives of PBP, as outlined in Section 1.1 of PBP, and as addressed in Section 3.2 of this report; and
- the relevant Bush Fire Protection Measures (BFPM), which are outlined in Section 8.3 of PBP, and as addressed in **Sections 3.4** and **3.5** of this report.

2 Bush Fire Assessment

2.1 Methodology

The methodology utilised for this bush fire assessment is consistent with Appendix 1 of PBP. The following provides the required information in accordance with the methodology.

2.2 Vegetation Formations

A site inspection was carried out on 8 May 2025 of the site and land within 140m of the site (assessment area). All vegetation within the assessment area has been classified in accordance with *Ocean Shores to Desert Dunes* (Keith 2004) as required by A1.2 of PBP.

The classified vegetation within the assessment area has been mapped and is shown in **Figure 8**. Photographs of the classified vegetation from the site inspection are provided in the following plates for each of the assessment plots.

Plot 1	
Vegetation Description	Managed vegetation on site and within the Lithgow State Mine Heritage Park.
Existing Classification	Exclusion
Post Development Classification	Exclusion/APZ

Plate 1: Plot 1

Plate 2: Plot 1

Plot 1	
Vegetation Description	Managed vegetation on site and within the Lithgow State Mine Heritage Park.
Existing Classification	Exclusion
Post Development Classification	Exclusion/APZ

Plate 3: Plot 1

Plate 4: Plot 1

Plate 5: Plot 1

Plate 6: Plot 1

Plate 7: Plot 1

Plate 8: Plot 1

Plot 1	
Vegetation Description	Managed vegetation on site and within the Lithgow State Mine Heritage Park.
Existing Classification	Exclusion
Post Development Classification	Exclusion/APZ

Plate 9: Plot 1

Plate 10: Plot 1

Plate 11: Plot 1

Plate 12: Plot 1

Plate 13: Plot 1

Plate 14: Plot 1

Plot 2	
Vegetation Description	Buildings and managed vegetation around existing dwellings not on the subject site.
Existing Classification	Exclusion
Post Development Classification	Exclusion

Plate 15: Plot 2

Plate 16: Plot 2

Plate 17: Plot 2

Plate 18: Plot 2

Plate 19: Plot 2

Plate 20: Plot 2

Plot 2	
Vegetation Description	Buildings and managed vegetation around existing dwellings not on the subject site.
Existing Classification	Exclusion
Post Development Classification	Exclusion

Plate 21: Plot 2

Plate 22: Plot 2

Plate 23: Plot 2

Plate 24: Plot 2

Plot 3	
Vegetation Description	Hard paved areas of roads
Existing Classification	Exclusion
Post Development Classification	Exclusion

Plate 25: Plot 3

Plate 26: Plot 3

Plate 27: Plot 3

Plate 28: Plot 3

Plate 29: Plot 3

Plate 30: Plot 3

Plot 3	
Vegetation Description	Hard paved areas of roads
Existing Classification	Exclusion
Post Development Classification	Exclusion

Plate 31: Plot 3

Plate 32: Plot 3

Plot 4	
Vegetation Description	Unmanaged grassland with scattered trees. Generally off site. Includes the existing rail yards as there is significant grass growth within the existing infrastructure.
Existing Classification	Grassland
Post Development Classification	Grassland

Plate 33: Plot 4

Plate 34: Plot 4

Plot 4	
Vegetation Description	Unmanaged grassland with scattered trees. Generally off site. Includes the existing rail yards as there is significant grass growth within the existing infrastructure.
Existing Classification	Grassland
Post Development Classification	Grassland

Plate 35: Plot 4

Plate 36: Plot 4

Plate 37: Plot 4

Plate 38: Plot 4

Plot 4	
Vegetation Description	Unmanaged grassland with scattered trees. Generally off site. Includes the existing rail yards as there is significant grass growth within the existing infrastructure.
Existing Classification	Grassland
Post Development Classification	Grassland

Plate 39: Plot 4

Plate 40: Plot 4

Plate 41: Plot 4

Plate 42: Plot 4

Plot 5	
Vegetation Description	Predominantly comprises eucalypts with shrubby understorey. Project ecologists have classified the area as PCT 3687 Newnes Plateau Peppermint-Ash Tall Forest. There are small areas of 3696 - Western Blue Mountains Rocky Scribbly Gum Woodland and 3688 - Newnes Plateau Silvertop Ash Woodland. These are all forest formations.
Existing Classification	Forest
Post Development Classification	Forest

Plate 43: Plot 5

Plate 44: Plot 5

Plate 45: Plot 5

Plate 46: Plot 5

Plot 5	
Vegetation Description	Predominantly comprises eucalypts with shrubby understorey. Project ecologists have classified the area as PCT 3687 Newnes Plateau Peppermint-Ash Tall Forest. There are small areas of 3696 - Western Blue Mountains Rocky Scribbly Gum Woodland and 3688 - Newnes Plateau Silvertop Ash Woodland. These are all forest formations.
Existing Classification	Forest
Post Development Classification	Forest

Plate 47: Plot 5

Plate 48: Plot 5

Plate 49: Plot 5

Plate 50: Plot 5

Plot 5	
Vegetation Description	Predominantly comprises eucalypts with shrubby understorey. Project ecologists have classified the area as PCT 3687 Newnes Plateau Peppermint-Ash Tall Forest. There are small areas of 3696 - Western Blue Mountains Rocky Scribbly Gum Woodland and 3688 - Newnes Plateau Silvertop Ash Woodland. These are all forest formations.
Existing Classification	Forest
Post Development Classification	Forest

Plate 51: Plot 5

Plate 52: Plot 5

Plate 53: Plot 5

Plate 54: Plot 5

Plot 6	
Vegetation Description	Heath vegetation with some eucalyptus on fringe areas on top of the plateaus. Project ecologists have identified the vegetation as PCT 3862 - Newnes Plateau Rockplate Heath.
Existing Classification	Short Heath
Post Development Classification	Short Heath

Plate 55: Plot 6

Plate 56: Plot 6

Plate 57: Plot 6

Plate 58: Plot 6

Plot 6	
Vegetation Description	Heath vegetation with some eucalyptus on fringe areas on top of the plateaus. Project ecologists have identified the vegetation as PCT 3862 - Newnes Plateau Rockplate Heath.
Existing Classification	Short Heath
Post Development Classification	Short Heath

Plate 59: Plot 6

Plate 60: Plot 6

Legend

- Assessment Area (140m)
- Development Site
- Trails

Trail Points

- Primary Trailhead
- Shuttle Pickup Point

Veg Class Merged

- Exclusion
- Forest
- Grassland
- Short Heath

Lost City Road
State Mine Gully Road
Plot 6
Plot 3
Plot 2
Plot 5
Plot 4
Plot 1
Macaulay Street
Atkinson Street
Victoria Avenue
Brewery Lane
Bells Road

0 300 600 m

1: 9,000 @ A3

Source: NearMap; NSW Spatial Services
Ref: 24127

Figure 8: Vegetation Classification Plan

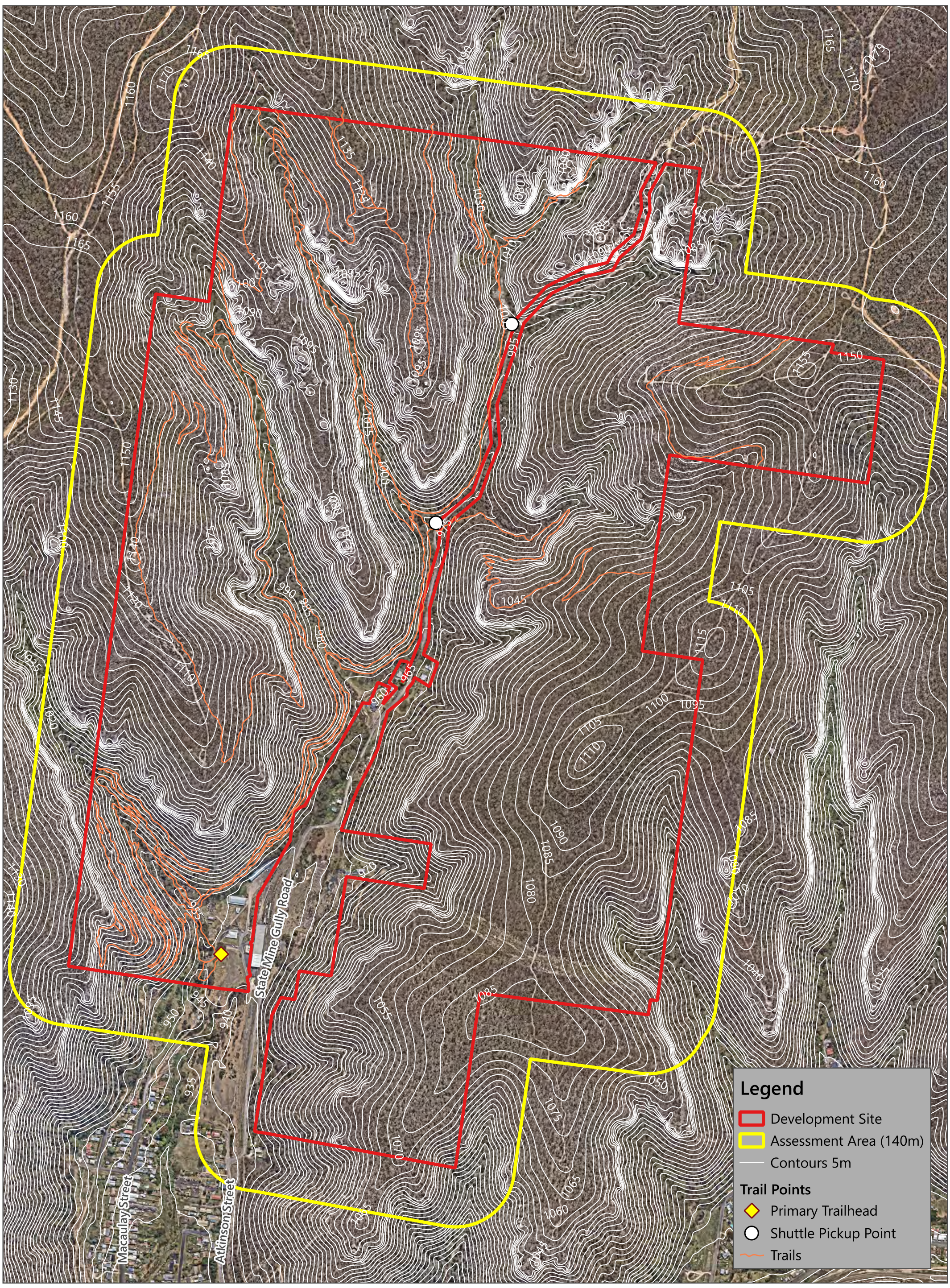
2.3 Effective Slope

The topography for the site is shown in **Figure 9** and general slope (perpendicular to contours) in **Figure 10**. To determine the effective slope, 2m contour data has been sourced from the NSW Elevation Data Service (NSW Government n.d.). The contour data was verified by ground truthing during the site inspection.

A detailed consideration of slope in relation to the Primary Trailhead and carpark is provided in **Figure 11**.

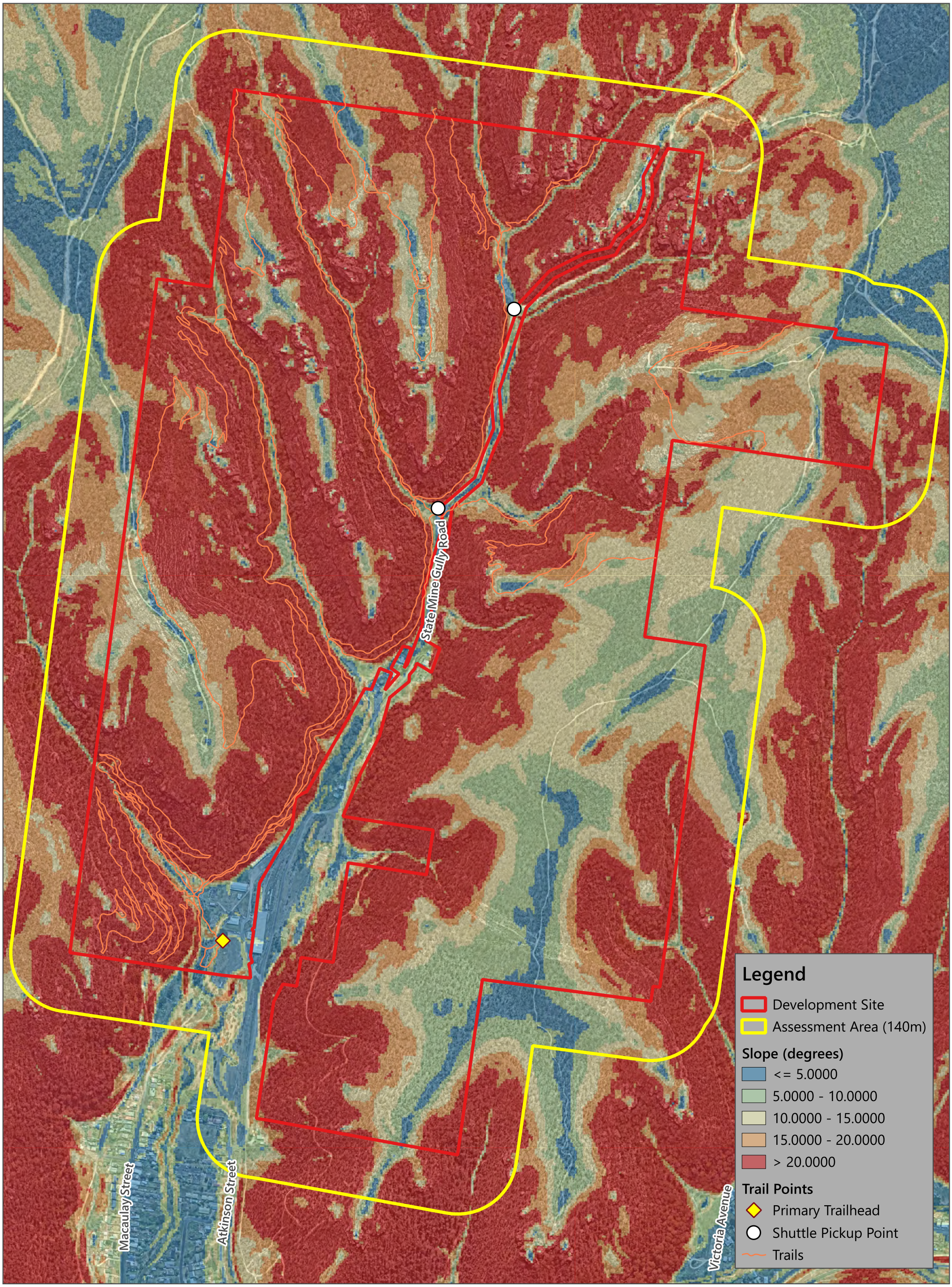
2.4 Fire Weather

The subject site is located within the Lithgow Council LGA. Pursuant to A1.6 of the PBP and the RFS' *NSW Local Government Areas FDI* (NSW Rural Fire Service 2017), the relevant Fire Danger Index (FDI) for the site is 80.



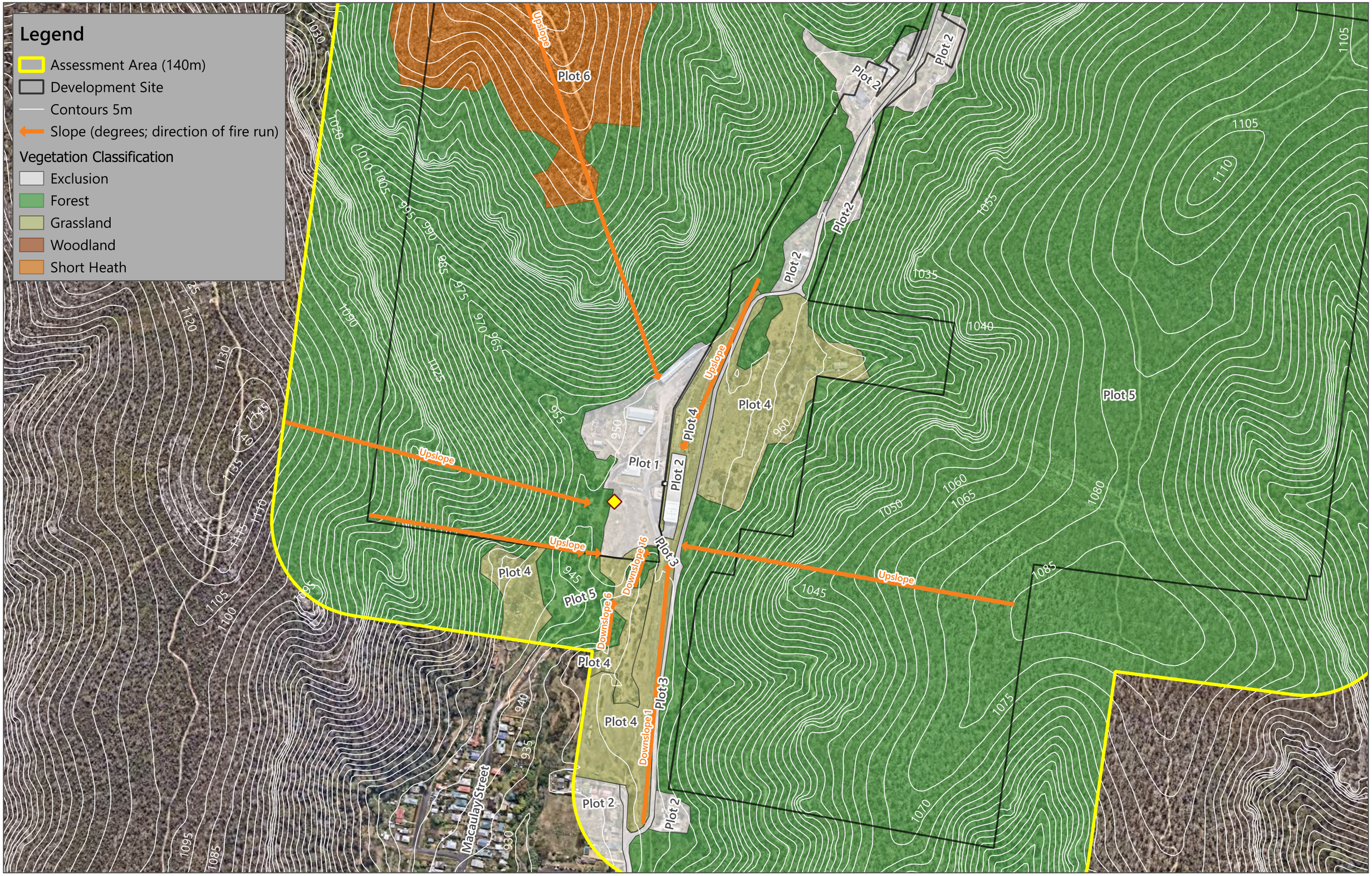
Source: NearMap; NSW Spatial Services
Ref: 24127

Figure 9: Topography



Source: NearMap; NSW Spatial Services
Ref: 24127

Figure 10: Slope



0 300 600 m

1:5,000 @ A3

Source: NearMap; DCS Spatial Services
Ref: 24127

Figure 11: Trailhead Slope

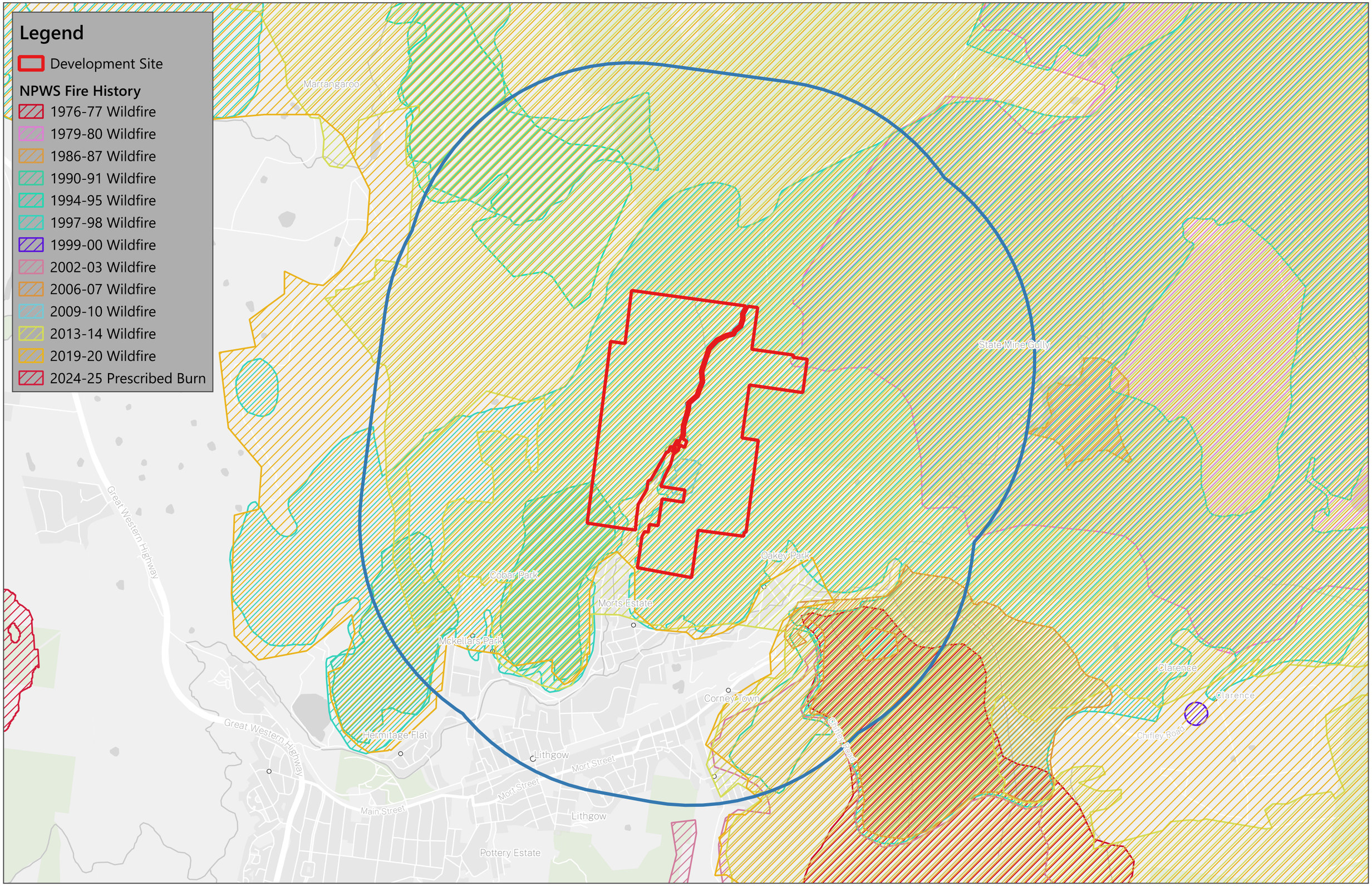
2.5 Fire History

A review of the available Historical Bushfire Boundaries shows that there has been a number of large fires within 2km of the site for the reporting period as shown in **Figure 12** and outlined in the following table.

Date	Fire Name	Size (ha)	Type	Site Impact
1976-77	Nil	1064	Wildfire	No
1979-80	Nil	74,261	Wildfire	Yes
1990-91	Nil	114	Wildfire	No
1990-91	Nil	108	Wildfire	Yes
1990-91	Nil	52	Wildfire	No
1994-95	Nil	267	Wildfire	No
1997-98	Nil	29,580	Wildfire	Yes
1997-98	Nil	239	Wildfire	No
2002-03	Vickers	1,531	Wildfire	No
2006-07	Zig Zag Fire	384	Wildfire	No
2009-10	State Mine Gully	5	Wildfire	Yes
2013-14	State Mine	54,429	Wildfire	Yes
2019-20	Gospers Mountain	479,513	Wildfire	Yes

2.6 Asset Protection Zone Determination

The size of Asset Protection Zones is not required to be calculated in accordance with either Table A1.12.1 or A1.12.3 for the purposes of this assessment.



Source: Google Satellite; DCS Spatial Services
Ref: 24127

Figure 12: Fire History

3 Bush Fire Protection Measures

3.1 Introduction

The proposed development is most akin to an outdoor event. Therefore Section 8.3.8 of PBP for Outdoor events in bush fire prone areas has been applied to the proposed development.

Section 8.1 of PBP requires that in order to comply with PBP, the following conditions must be met:

- *satisfy the aim and objectives of PBP outlined in Chapter 1;*
- *consider any issues listed for the specific purpose for the development set out in this chapter; and*
- *propose an appropriate combination of BPMs.*

It is important to ensure that a defendable space is provided for the size and scale of the development.

Proposed measures must operate in combination to minimise the impact of bush fire and ensure that access and services are adequate.

The PBP aims and objectives are considered in relation to the proposed development in **Section 3.2.** The specific issues listed for outdoor events are considered in **Section 3.3.** The appropriate combination of Bush Fire Protection Measures (BFPM) are outlined in **Sections 3.4** and **3.5** and illustrated on **Figure 13**.

3.2 PBP Aims & Objectives

The aim of PBP is:

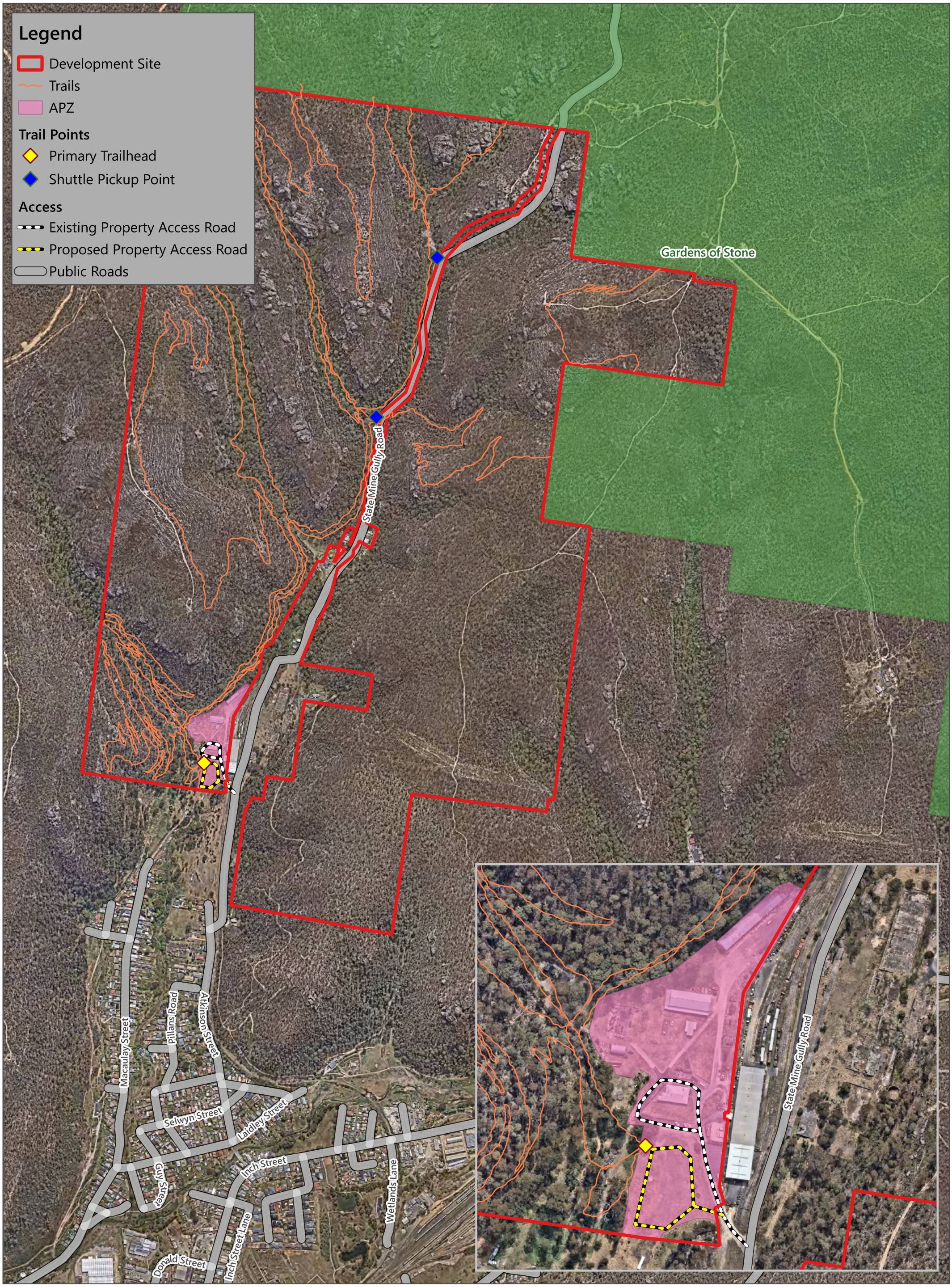
to provide for the protection of human life and minimise impacts on property from the threat of bush fire, while having due regard to development potential, site characteristics and protection of the environment.

The objectives of PBP are to:

- *afford buildings and their occupants protection from exposure to a bush fire;*
- *provide for a defendable space to be located around buildings;*
- *provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;*
- *ensure that appropriate operational access and egress for emergency service personnel and occupants is available;*
- *provide for ongoing management and maintenance of BPMs; and*
- *ensure that utility services are adequate to meet the needs of firefighters.*

The development has been designed to be consistent with aims and objectives of PBP as it:

- recognises that there are no buildings or structures to protect, and the nature of the use being for general public access and not an event as such,
- will limit the use of the site to fire weather days other than Catastrophic or Extreme, and
- provide for suitable emergency management measures including:
  - access for evacuation and emergency services ingress,
  - awareness and triggers for evacuation, and
  - consultation with the local RFS and NPWS.



Source: MetroMap; NSW Spatial Services
Ref: 24127

Figure 13: Bush Fire Protection Measures

3.3 PBP Considerations for Outdoor Events in Bush Fire Prone Areas

Section 8.3.8 of PBP provides the following considerations for outdoor events on bush fire prone land:

> *Outdoor events often cater for large numbers of people in isolated locations, can continue over a number of days and may include on site accommodation. They include music festivals, cultural festivals, sporting events, and regional shows. Events that involve overnight camping, multiple days, or attract large numbers of people in high risk or isolated bush fire prone areas during the bush fire danger period require careful consideration. Such events create a number of logistical and operational issues if evacuation is required due to a bush fire.*
>
> *Crowd control and operational access at the venue during bush fire events can prove to be challenging especially if they are held in remote locations.*

The proposed development is the use of land, that does not involve any buildings or overnight accommodation, and is located near to an urban area.

PBP further provides the following considerations for outdoor events on BFPL.

Table 3: Other considerations for outdoor events

Consideration	Development Response
• Holding events outside the gazetted bush fire danger period for the area.	The MTB park will be open to the general public to use throughout the year. There are no specific events proposed.
• Areas of accommodation should be strategically located to ensure maximum time to warn and evacuate people who may be sleeping and slow to respond. This also ensures that highly flammable and combustible materials, such as tent fabric, vehicle fuels and gas cookers are in areas that will not facilitate the spread of fire.	No accommodation proposed.
• A Bush Fire Emergency Management and Evacuation Plan must be prepared that is acceptable to relevant stakeholders, including crowd management and security. It should be consistent with the NSW RFS document: *A guide to developing a bush fire emergency management and evacuation plan*.	A Bush Fire Emergency Management and Evacuation Plan (BFEMEP) is to be prepared as part of the development as outlined in **Section 3.5.3.** Preliminary consultation has been undertaken with the Chifley Lithgow RFS Office (refer **Appendix E**) regarding emergency management. The measures outlined in the correspondence are to be incorporate into the BFEMEP.
• Access and egress routes for emergency services and patrons in the event that evacuation is required.	As outlined in **Section 3.5.2**.
• A refuge building of suitable capacity to contain all participants and staff that complies with the NSW RFS *Neighbourhood Safer Place Guidelines* (see www.rfs.nsw.gov.au).	Given the ad hoc nature of the use of the MTB park, the provision of a refuge building is not reasonably feasible or appropriate to provide. Instead limiting park access is more appropriate to manage risk.
• An open air bush fire emergency assembly area capable of accommodating all participants and staff that complies with the NSW RFS *Neighbourhood Safer Place Guidelines* (see www.rfs.nsw.gov.au).	Given the ad hoc nature of the use of the MTB park, the provision of an open air refuge is not reasonably feasible or appropriate to provide. Instead limiting park access is more appropriate to manage risk.
• A suitable method of staging evacuation, ensuring that evacuation flow is directed through different stages/areas of the site, moving from areas of higher risk to lower risk.	As outlined in **Section 3.5.3**.
• Expected evacuation timeframes.	As outlined in **Section 3.5.3**.

Table 3: Other considerations for outdoor events

Consideration	Development Response
• On severe or higher fire danger rating days the event will not proceed.	The facility will not operate on Catastrophic or Extreme Fire Danger Rating days.
• Advance warning to patrons identifying that the event is located on BFPL and giving advice on any fire restrictions.	As outlined in **Section 3.5.8**.
• Ability to cease and override P.A. and audio systems throughout the site to announce emergency warnings, alerts or safety information, which can be clearly heard from all areas of the site.	The scale and nature of the site would make this approach inappropriate. Emergency warning and evacuation measures are outlined in **Section 3.5.8**.
• A prescribed ratio of trained fire wardens to participants.	The MTB park will not have staff/operators present on site.
A suitable package of other protection measures should be proposed based on individual event characteristics which considers the following:	As outlined in **Section 3.4**.
• bulk water supplies on site that are specifically allocated to firefighting purposes;	Evacuation is the preferred course of action given the absence of assets to protect as part of the development. No requirement for provision of water supply was deemed required for the proposed development.
• unobstructed APZs of suitable width surrounding the site along the boundaries adjacent to the bush fire threat. Slashing of grassed areas needs to occur in the lead-up to the event and maintained throughout its duration;	The museum site will continue to be managed in a low threat state and be formally managed as an APZ in accordance with the Appendix 4 of PBP requirements.
• emergency management planning during the event organisation stage to be undertaken in consultation with the NSW RFS and all other relevant stakeholders; and	As outlined in **Section 3.5.3**.
• fires for cooking and heating in approved fire places only and addressed by a Fire Management Plan.	No cooking or heating appliances to be used as part of the development.

3.4 Appropriate Combination of BFPM

Considering the characteristics of the proposed development, the aims and objectives of PBP, and the specific considerations for Outdoor Events in Bush Fire Prone Areas, the following BFPM are to be applied to the development:

3.4.1 Asset Protection Zone (APZ)

The purpose of an APZ is to provide a low fuel buffer between a bushfire fire hazard (i.e. vegetation) and the development, in order to reduce the effects of bushfire on the development and to provide an area of defendable space. APZs are typically applied to buildings, being sized based on the type of use (i.e. 29kW/m^2 for standard developments and 10kW/m^2 for the more vulnerable land uses).

Whilst there are no buildings to be protected as part of the proposed development, the entire museum site that is currently low threat vegetation is to continue to be managed as such and formally as an APZ. The APZ is to be managed in accordance with the standards of Appendix 4 of PBP as an Inner Protection Area (IPA).

The reason for this is to provide a low threat area in the part of the site where vehicles are parked and where people are likely to congregate.

3.4.2 Access

PBP requires the:

> *Design of access roads shall enable safe access and egress for residents attempting to leave the area at the same time that emergency service personnel are arriving to undertake firefighting operations.*
>
> *…*
>
> *In a bush fire prone area, the purpose of the road system is to:*
>
> - *provide firefighters with access to structures, allowing more efficient use of firefighting resources;*
> - *provide evacuation routes for firefighters and the public; and*
> - *provide access to areas of bush fire hazard for firefighting and hazard mitigation purposes.*
>
> *…*
>
> *Dead-end roads should be avoided. However, where they are present, they must incorporate a sufficient turn-around area to minimise the need for vehicles to make multipoint turns (NSW Rural Fire Service 2019)p.29.*

The site has existing access to State Mine Gully Road. Due to existing land tenure, the site does not have any alternative access points available to the public road network.

State Mine Gully Road is a two lane two-way sealed rural road from its intersection with Atkinson Street to the subject site and beyond for approximately 1km. Beyond this point the road becomes unsealed.

Atkinson Street provides the public road connection from State Mine Gully Road into Lithgow. It is a two lane two way sealed rural and urban road.

The site has an existing well-formed property access road, which provides access, including turnaround areas, for heavy vehicles such as garbage trucks. The proposed development will provide for a new connection off this existing property access road to the proposed carpark. It will provide for all vehicles to enter and exit the site in a forward direction.

The primary intent of the access for the proposed development is to facilitate the egress of the site. Whilst the RFS may access the site for property protection, the proposed development itself does not have any buildings to protect.

A property access road to the standard required by Table 7.4a of PBP, with the exception of the provision of access to water supply, is to be provided.

3.4.3 Services – Water Supply, Electricity & Gas

The proposed development does not comprise any buildings and does not have any water supply, electricity or gas connections. Given the absence of buildings within the proposed development to defend and the intent to evacuate the site, a static water supply for the proposed development is not considered necessary.

3.4.4 Emergency Management Planning

The nature of the proposed development, being an outdoor recreation facility with no buildings, relies primarily on emergency management planning for appropriate protection from bushfire. In this regard, a Bush Fire Emergency Management and Evacuation Plan (BFEMEP) is to be prepared for the development in accordance with the NSW RFS's *A guide to developing a bush fire emergency management and evacuation plan*. The BFEMEP is to be developed in consultation with the Chifley Lithgow RFS Zone Office.

The BFEMEP is to include the following provisions:

- Closure of the park on the same operational/safety risk measures as the adjacent GoSSCA (i.e. no operation on Catastrophic and Extreme Fire Danger Rating days). Co-ordination and engagement with NPWS shall be required as the site boarders NPWS managed lands.
- A pre-incident plan (PIP) be formulated with the Land Managers (council/NPWS/mountain bike assoc) for enacting should a fire or risk of fire threaten the Park.
- Outline who is the responsible agency/land manager required to close the park from the Lithgow end in the event of an emergency or operationally planned closures.
- Identification of evacuation points, including the shuttle points.
- Implementation of trail markers so in the event of accident, injury or emergency riders can relay their position to emergency services.
- A sign be installed at the carpark or main trail entrance as an information point, to:
    - Identify that the site is in a bushfire prone area, and
    - include a phone number/website address for NSW RFS, Council and NPWS and include reference to the Hazards Near Me App. All emergencies call 000
- If applicable, trail access keys be made available to all agencies of the Lithgow LGA LEMC.

3.5 Bush Fire Protection Measures

3.5.1 Asset Protection Zone

The following table outlines the Performance Criteria and associated Acceptable Solutions for the APZ BFPM, and how the development responds.

Table 4: Asset Protection Zones

Performance Criteria	Acceptable Solution	Development Response			
Intent may be achieved where:		Acceptable Solution	Performance Solution	N/A	Comment
• A defendable space is provided.	The museum site and proposed carpark area is managed as an APZ during the operation of the development.	☒	☐	☐	As shown in **Figure 13**, the existing museum site and proposed carpark area is to be managed as an APZ.
APZs are managed and maintained to prevent the spread of a fire within the site.	APZs are managed in accordance with the requirements of Appendix 4 of PBP.	☒	☐	☐	The APZ is to be managed in accordance with the requirements of Appendix 4 of PBP (and contained in **Appendix F** of this report).
• The APZ is provided in perpetuity. • APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	APZs are wholly within the boundaries of the development site.	☒	☐	☐	APZ is wholly within the subject site.
	APZ are located on lands with a slope less than 18 degrees.	☒	☐	☐	The APZ will be located on land with a slope of less than 18 degrees.

3.5.2 Access

The following table outlines the Performance Criteria and associated Acceptable Solutions for the Access BFPM, and how the development responds.

Table 5: Access

Performance Criteria	Acceptable Solution	Development Response			
Intent may be achieved where:		Acceptable Solution	Performance Solution	N/A	Comment
Firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation.	Property access roads are two-wheel drive, all weather roads.	☒	☐	☐	The existing and proposed property access roads, as shown on **Figure 13**, are two wheel drive and all weather.
The capacity of access roads is adequate for firefighting vehicles.	The capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes), bridges and causeways are to clearly indicate load rating.	☒	☐	☐	The existing property access road does not have any bridges/causeways. It is suitable for carrying fire appliances. The proposed property access road is to be designed to be sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes). Any bridges/causeways are to clearly indicate load rating.
Firefighting vehicles can access the dwelling and exit the property safely.	• At least one alternative property access road is provided for individual dwellings or groups of dwellings that are located more than 200 metres from a public through road;	☐	☐	☒	Located < 200m from a public through road.
	• There are no specific access requirements in an urban area where an unobstructed path (no greater than 70m) is provided between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that	☒	☐	☐	The property access road provides: • minimum 4m carriageway width, • is not located in forest, woodland or heath situations, • a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, • a suitable turning area in accordance with Appendix 3 [of PBP], • curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress,

Table 5: Access

Performance Criteria	Acceptable Solution	Development Response			
Intent may be achieved where:		Acceptable Solution	Performance Solution	N/A	Comment
	supports the operational use of emergency firefighting vehicles. In circumstances where this cannot occur, the following requirements apply: • minimum 4m carriageway width; • in forest, woodland and heath situations, rural property roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m, at the passing bay; • a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; • property access must provide a suitable turning area in accordance with Appendix 3; • curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress; • the minimum distance between inner and outer curves is 6m; • the crossfall is not more than 10 degrees;				• the minimum distance between inner and outer curves is 6m, • the crossfall is not more than 10 degrees, and • maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads.

Table 5: Access

Performance Criteria	Acceptable Solution	Development Response			
Intent may be achieved where:		Acceptable Solution	Performance Solution	N/A	Comment
	• maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads; and • a development comprising more than three dwellings has formalised access by dedication of a road and not by right of way. Note: Some short constrictions in the access may be accepted where they are not less than 3.5m wide, extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also apply to community style development property access roads in addition to the above.				

3.5.3 Emergency Management

The following table outlines the Performance Criteria and associated Acceptable Solutions for the Emergency Management BFPM, and how the development responds.

Table 6: Emergency Management

Performance Criteria	Acceptable Solution	Development Response			
Intent may be achieved where:		Acceptable Solution	Performance Solution	N/A	Comment
A bush fire emergency and evacuation management plan is prepared.	A Bush Fire Emergency Management and Evacuation Plan is prepared by the operator consistent with the NSW RFS publication: *A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan*.	☒	☐	☐	A Bush Fire Emergency Management and Evacuation Plan (BFEMEP) is to be prepared for the development in accordance with the NSW RFS's A guide to developing a bush fire emergency management and evacuation plan. The BFEMEP is to be developed in consultation with Chifley Lithgow RFS Zone Office. The BFEMEP is to include the following provisions: • Closure of the park on the same operational/safety risk measures as the adjacent GoSSCA (i.e. no operation on Catastrophic and Extreme Fire Danger Rating days). • A pre-incident plan (PIP) be formulated with the Land Managers (council/NPWS/mountain bike assoc) for enacting should a fire or risk of fire threaten the Park. • Outline who is the responsible agency/land manager required to close the park from the Lithgow end in the event of an emergency or operationally planned closures. • Identification of evacuation points, including the shuttle points. • Implementation of trail markers so in the event of accident, injury or emergency riders can relay their position to emergency services.

Table 6: Emergency Management

Performance Criteria	Acceptable Solution	Development Response			
Intent may be achieved where:		Acceptable Solution	Performance Solution	N/A	Comment

					• A sign be installed at the carpark or main trail entrance as an information point, to:
					  • Identify that the site is in a bushfire prone area, and
					  • include a phone number/website address for NSW RFS, Council and NPWS and include reference to the Hazards Near Me App. All emergencies call ooo
					• Trail access keys be made available to all agencies of the Lithgow LGA LEMC.

4 Recommendations

4.1 Summary of Bush Fire Protection Measures

This BFAR has assumed that the proposed development will be carried out in accordance with a number of Bush Fire Protection Measures (BFPM). The following table provides a summary of the BFMP that must be incorporated into the development to ensure it best protects the development from the effects of bushfire in accordance with the requirements of PBP and other best practice guidelines. The BFPM are also shown on **Figure 13**.

Table 7: Summary of Recommendations

Provision	Measures
Asset Protection Zone	• Prior to the Use the development, an Asset Protection Zone is to be provided over the museum site and carpark area as shown on **Figure 13** and as outlined in **Appendix F**, and is to be maintained in perpetuity in accordance with these requirements.

Access	• Prior to the Use of the development, the new property access road is to be constructed in the general location as shown on **Figure 13** to comply with the following requirements and both the existing and proposed property access roads are to be maintained in accordance with the following requirements in perpetuity:
	  • Ensure the road is suitable for two-wheel drive vehicles and for all weather access;
	  • The capacity of road surfaces is to be sufficient to carry a fully loaded fire fighting vehicle (up to 32 tonnes);
	  • Bridges and causeways are to clearly indicate load rating;
	  • Minimum 4m wide road carriageway width;
	  • Vegetation above the road is clear to a height of 4m above it;
	  • curves have a minimum inner radius of 6m
	  • the minimum distance between inner and outer curves is to be 6m;
	  • Gradient of the access road is not to exceed 15 degrees (sealed road)/10 degrees (unsealed road); and
	  • Crossfall of the access road is not to exceed 10 degrees.

Emergency Evacuation Plan	Prior to the Use of the development, A Bush Fire Emergency Management and Evacuation Plan (BFEMEP) is to be prepared by the operator,
	• consistent with the NSW RFS publication: *A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan*, and
	• developed in consultation with the Chifley Lithgow RFS Zone Office.
	• The BFEMEP is to include the following provisions:
	  • Closure of the park on the same operational/safety risk measures as the adjacent GoSSCA, in consultation with NPWS (i.e. no operation on Catastrophic and Extreme Fire Danger Rating days).
	  • A pre-incident plan (PIP) be formulated with the Land Managers (council/NPWS/mountain bike assoc) for enacting should a fire or risk of fire threaten the Park.
	  • Outline who is the responsible agency/land manager required to close the park from the Lithgow end in the event of an emergency or operationally planned closures.
	  • Identification of evacuation points, including the shuttle points.
	  • Implementation of trail markers so in the event of accident, injury or emergency riders can relay their position to emergency services.
	  • A sign be installed at the carpark or main trail entrance as an information point, to:

Table 7: Summary of Recommendations

Provision	Measures
	• Identify that the site is in a bushfire prone area, and • include a phone number/website address for NSW RFS, Council and NPWS and include reference to the Hazards Near Me App. All emergencies call 000 • Trail access keys be made available to all agencies of the Lithgow LGA LEMC.

5 Conclusion

On completion, the proposed development will ensure that the development is located in an area that has an acceptable bushfire hazard level. With the implementation of the recommendations, as outlined in **Section 4** and as shown on **Figure 13**, the proposed development is considered to be appropriately protected from bushfire and complies with the requirements of PBP. The proposed development is not expected to increase the bushfire risk.

6 References

Keith. 2004. *Ocean Shores to Desert Dunes: The Native Vegetation of New South Wales and the ACT.* Hurstville: NSW Department of Environment and Conservation.

NSW Government. n.d. *NSW Elevation Data Service.* Accessed February 10, 2023. https://portal.spatial.nsw.gov.au/portal/apps/webappviewer/index.html?id=437c0697e6524d8ebf10ad0d915bc219.

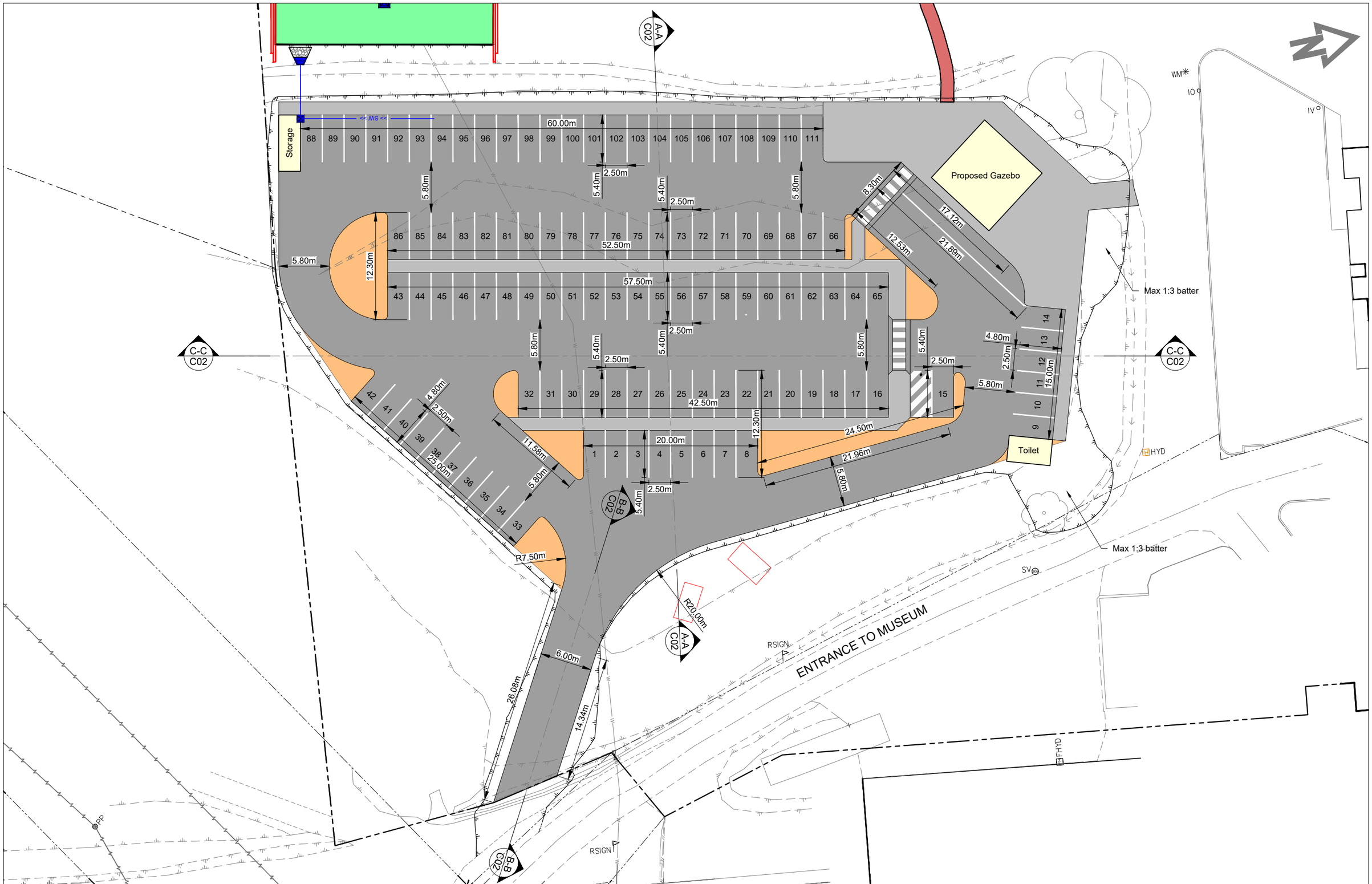
NSW Rural Fire Service. 2017. *NSW Local Government Areas FDI.* Lidcombe: NSW RFS.

NSW Rural Fire Service. 2019. *Planning for Bush Fire Protection: A Guide for Councils, planners, fire authorities and developers.* Lidcombe: NSW RFS.

World Trail Pty Ltd. 2024. *State Mine Gully Mountain Bike Trail Network Ground Truthing Report.* Cairns: World Trail Pty Ltd.

Appendix A

Development Plans



Amend	Date	Description	By
P2	25/06/25	Water Cycle Management and E&SC Plan - For Approval	HO
P1	07/05/25	Original Issue	GBL

DO NOT SCALE OFF DRAWINGS
Contact Calare Civil if clarification required

FOR DA APPROVAL
(Not for construction)

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	HO
Designed:	GBL / HO
Checked:	GBL
Scale (A1):	1:150
Original Date:	May 2025

Plot File: 20250105-civil-P2.PDF
Plot Date: 6/08/2025 15:08:42
File Name: ...\20250105-civil-P2.dwg

Lithgow Mountain Bike Park
3A State Mine Gully Road
Lot 11 DP1240259

PRELIMINARY OVERALL SITE PLAN

Central Tablelands Mountain Bike Club

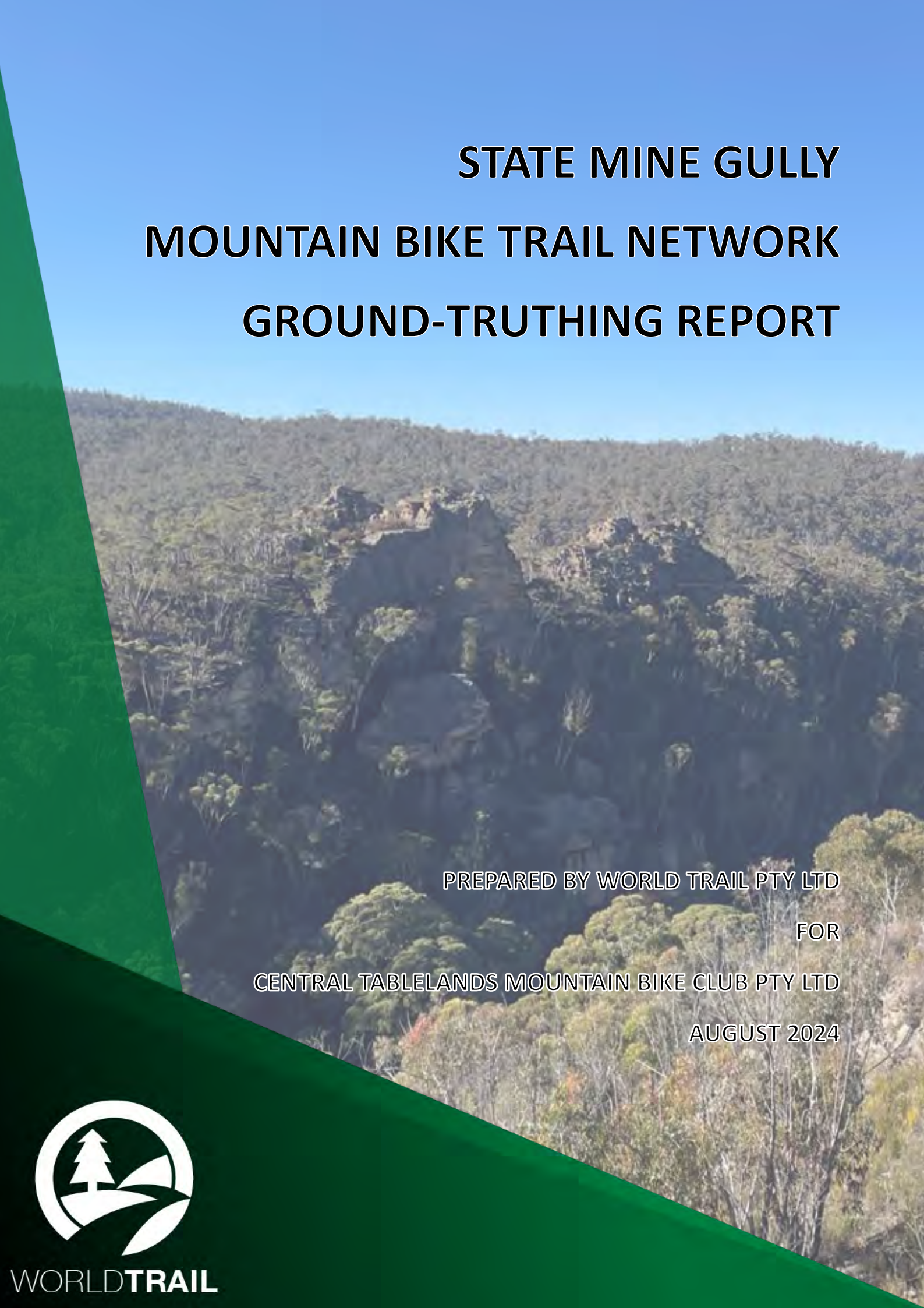
CALARE CIVIL
CONSULTING ENGINEERS AND BUILDING DESIGNERS
170 RANKIN STREET BATHURST NSW 2795
58 MAIN STREET LITHGOW NSW 2790
Tel: (02) 6332 3343 Email: admin@calare-civil.com.au Web: www.calare-civil.com.au

Job No. 20250105
DWG. No. C01
Issue P2
No. in set 8

Appendix B

Ground Truthing Report

STATE MINE GULLY MOUNTAIN BIKE TRAIL NETWORK GROUND-TRUTHING REPORT



PREPARED BY WORLD TRAIL PTY LTD

FOR

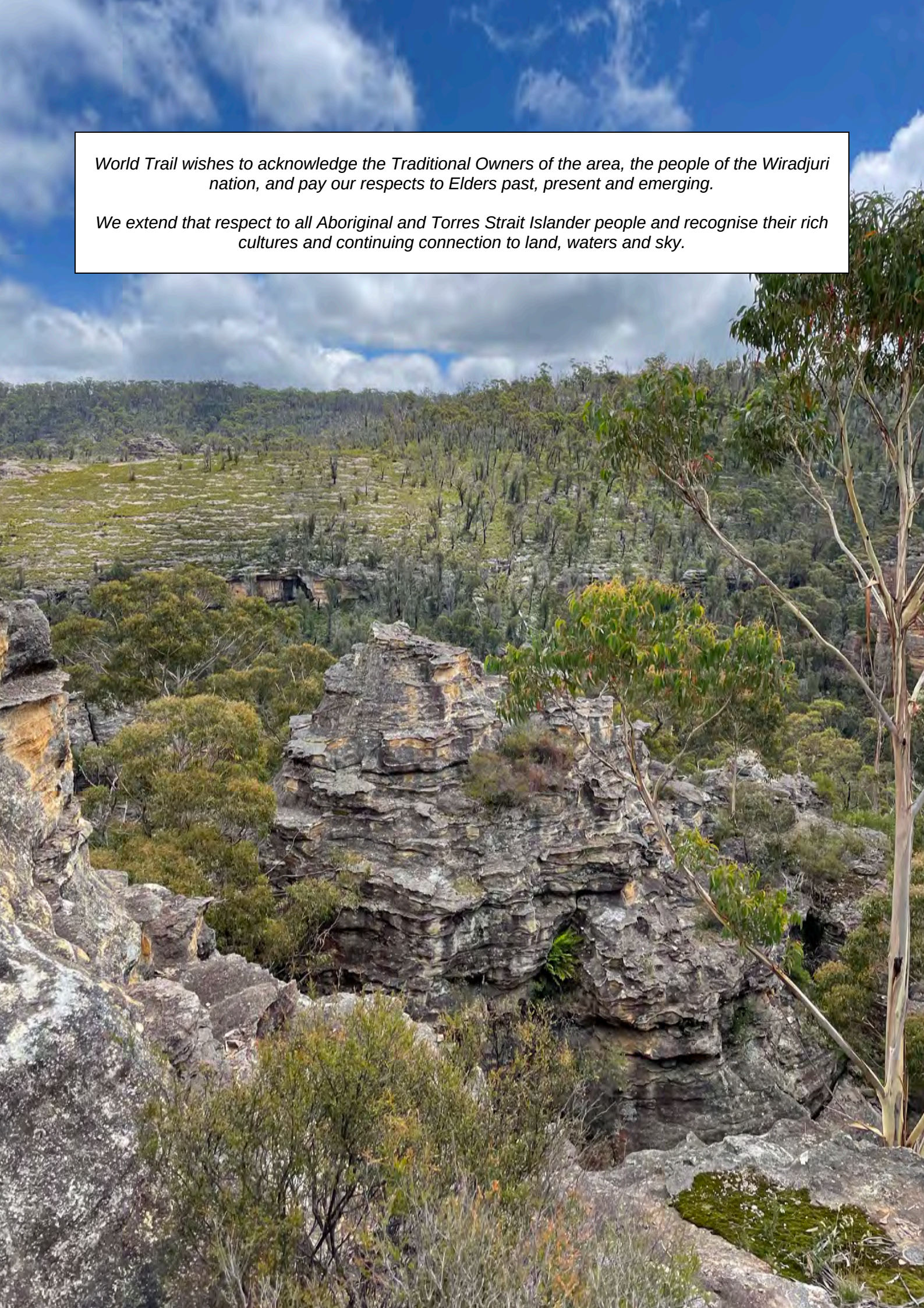
CENTRAL TABLELANDS MOUNTAIN BIKE CLUB PTY LTD

AUGUST 2024

WORLDTRAIL

World Trail wishes to acknowledge the Traditional Owners of the area, the people of the Wiradjuri nation, and pay our respects to Elders past, present and emerging.

We extend that respect to all Aboriginal and Torres Strait Islander people and recognise their rich cultures and continuing connection to land, waters and sky.



Disclaimer

This document, *State Mine Gully Mountain Bike Trail Network Ground-truthing Report,* has been prepared by World Trail Pty Ltd for Central Tablelands Mountain Bike Club Pty Ltd. This document is the work of World Trail and does not necessarily reflect the final views or opinions of all stakeholders. It has been prepared in accordance with the relevant federal, state and local legislation and current industry best practice. World Trail accepts no liability for any damages or loss incurred as a result of reliance placed upon the report content or for any purpose other than that for which it was intended.

Version Control

Version	Date	Author	Notes
Draft	*13/8/2024*	*G. McHugh*	
Rev1	*04/10/2024*	*G. McHugh*	

CONTENTS

1 INTRODUCTION

World Trail (WT) visited Lithgow and the State Mine Gully precinct from June 24-28 2024 to investigate, finalise and map the trail alignments for a network of mountain bike (MTB) trails that is proposed to be constructed in the State Mine Gully area. This report presents the findings from this work and provides information about the location, type, length and specifications for the proposed trail network. This report and the associated spatial files represent the final design stage for the trail network, prior to construction.

The trail network represented in this report is a refinement of the proposed trail network presented in the *Gardens of Stone Mountain Bike Trails Concept Report* (January 2023). The trails presented herein largely follow the alignments proposed in the earlier concept plan but have been modified in response to opportunities and constraints encountered in the field, such as the available parcels of land, terrain, topography, vegetation and soils. A significant body of work was undertaken prior to fieldwork to firstly confirm the available land parcels, and then to modify the concept accordingly to ensure trails were located only on available land parcels.

World Trail was engaged to undertake this project by the Central Tablelands Mountain Bike Club Pty Ltd (CTMBC). CTMBC is supported in this project by the following stakeholders:

- Lithgow City Council (LCC)
- The City of Greater Lithgow Mining Museum Inc (CGLMM)
- National Parks and Wildlife Service (NPWS)

2 PROJECT BACKGROUND

State Mine Gully is located on the western slopes of the Blue Mountains, on the northern outskirts of Lithgow– see Figure 1 below. It is about two hour's drive from Sydney.

Figure 1. State Mine Gully Location

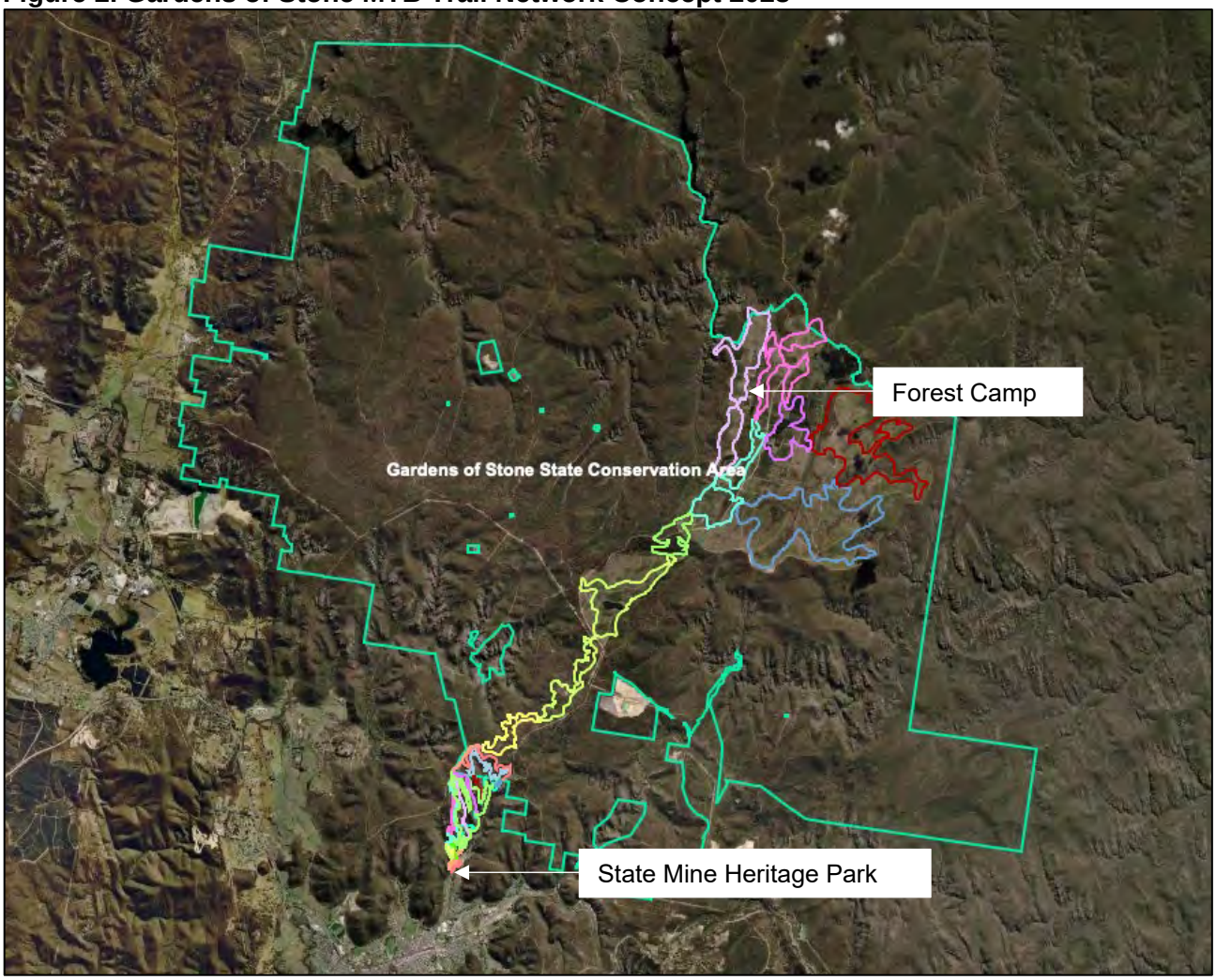
The 220-hectare State Mine Gully precinct is centred around the Lithgow State Mine Heritage Park and comprises numerous parcels of public and freehold lands of various ownership and status. Historically used for mining, the area today has little formal use but possesses many outstanding attributes that make it suitable for development as a mountain biking destination.

With the precinct situated just south of the Gardens of Stone State Conservation Area (GOSSCA) on the northern outskirts of Lithgow, this development will connect Lithgow's existing accommodation and hospitality services with new walking and mountain biking trails and other infrastructure proposed to be constructed within the GOSSCA, as part of a large eco-adventure project.

Announced in 2022, The Gardens of Stone State Conservation Area was formally gazetted in May 2022 as part of a $49.5 million NSW Government investment to establish Lithgow as a world-class ecotourism destination, while conserving the exceptional natural and cultural heritage values of the region. The project initially included a range of recreational opportunities, including new walking tracks, mountain biking trails, new camping areas and facilities, 4WD and motorcycle touring circuits and ziplines and climbing routes.

Since the project was initially announced, the concept for the MTB trail network has moved through a number of design stages and iterations. The first stage was the development of a conceptual design for the trail network. This project was undertaken by WT in 2022 and is documented in *Gardens of Stone Mountain Bike Trails Concept Report* (January 2023). This report proposed a large trail network comprised of 23 mountain biking trails, totalling 124km in length, spanning from Forest Camp (an old forestry operations site, now proposed to be a visitor campsite) at the northern end, to State Mine Heritage Park at the southern end. Figure 2 below shows the conceptual design.

Figure 2. Gardens of Stone MTB Trail Network Concept 2023



The 124km trail network proposed could be broken down by land tenure as follows:

- 99km within the GOSSCA
- 25km within State Mine Gully

While the completed trail network will be continuous across these land tenures and will function effectively as one trail network, it spans across the GOSSCA and the State Mine Gully precinct. The Primary Trailhead, or main visitor node, is proposed to be located at the State Mine Heritage Park, adjacent to the museum.

Given the two different land tenures, the development of the Gardens of Stone MTB Trail Network effectively diverged into two separate projects after the completion of the *Gardens of Stone Mountain Bike Trails Concept Report* (January 2023). The trails within the GOSSCA would be developed by NPWS using funding from the Government's $49.5 million ecotourism destination proposal and moved quickly towards the next stage in the design process – the ground-truthing stage. This work was undertaken by WT in late 2022 and early 2023, with the *Gardens of Stone SCA Mountain Bike Trail Network Ground-truthing Report* completed in March 2023. The final trail network designed in this stage included twenty-six trails, totalling 89.6km in length.

The State Mine Gully MTB Trail Network, being outside GOSSCA, would need to be developed using funding from a different source. The local mountain biking club, CTMBC, with support from CGLMM, LCC and NPWS, applied to the NSW Government's $150 million Round Two Regional

Tourism Activation Fund. It was successful, being awarded $3.5 million for the construction of the State Mine Gully MTB Trail Network, positioning Lithgow as a drawcard destination for mountain biking enthusiasts.

The concept plan for the State Mine Gully MTB Trail Network includes a mix of cross-country style loops, gravity point-to-point mountain biking trails, and shared-use trails suitable for hiking. Additionally, the project will feature the construction of a trailhead at the State Mine Heritage Park and provide vehicle shuttle services to support the mountain bike trail network.

3 SITE OBSERVATIONS

The Stage Mine Gully precinct in New South Wales holds significant industrial heritage centred around the Lithgow State Mine Heritage Park and Railway.

Lithgow State Mine was a major coal mine established in the Western Coalfield in 1919 and was operational until 1992. At its peak, it employed up to 490 workers and produced 1,650 tons of coal per eight-hour shift using faithful pit horses (the photo on the preceding page is a sculpture paying tribute to the pit horses) and advanced technologies like an endless rope system for coal extraction. The mine faced a major setback in 1964 when severe flooding led to its temporary closure, resulting in widespread job losses and community upheaval. By 1990, the property was sold, and ownership transferred to the Lithgow City Council, which converted the site into the State Mine Heritage Park. Today, the park not only preserves artifacts and historical items from its mining days in a museum but also serves as a venue for various events, including weddings, celebrations, and commercial photoshoots.

The coal seams around Lithgow were essential for the Great Western Railway's development, establishing Lithgow as a major railhead in 1869. The construction of the line to Bathurst included a 'Zig-Zag' system to navigate the descent to the Lithgow Valley, but this approach soon became inadequate due to limitations on train length and growing demand. In 1994, the State Mine Railway was created to restore the State Mine branch line and develop a tourist route linking heritage sites like the Lithgow State Mine and Zig Zag Railway. However, arson in 2001 severely damaged the project, causing a suspension of operations. In 2006, the Lithgow State Mine Railway Limited was formed to focus on rail activities, while the Greater Lithgow Mining Museum continued to preserve mining history. Despite slow progress, volunteers remain vital in maintaining the railway through ongoing efforts and working bees.

Surrounding the State Mine Heritage Park is the State Mine Valley, notable for its diverse geological formations such as rocky plateaus and sandstone pagodas. This valley also supports a rich variety of native flora and fauna, ranging from eucalyptus forests to riparian zones. Its natural beauty and biodiversity make it an important area for conservation and recreational activities, offering scenic views and opportunities for visitors to explore both the industrial history and natural splendour of the region.

The figures on the following page illustrate some of the outstanding natural scenery and values found within the State Mine Gully. The horse sculpture shown in Figure 3 is a memorial to the ‘pit ponies’ that were used to haul coal in the mine.

Figure 3. Horse sculpture

Figure 4. View over State Mine Heritage Park

Figure 5. Sandstone pagodas

Figure 6. Flagging tape

4 GROUND-TRUTHED TRAIL NETWORK

4.1 GUIDING PRINCIPLES

The following Guiding Principles have been developed through many years of designing and building MTB trails and embody a range of underlying drivers such as risk management, safety, visitor experience, navigation, event compatibility, ride flexibility and sustainability. They are not listed in any priority order.

1. **Trails to offer a good mix of trail difficulty ratings** – a suitable breakdown of trail difficulties might be 30% Easy, 50% Intermediate and 20% Very Difficult. WT uses the Trail Difficulty Rating System (TDRS) published by AusCycling 2023 in the Australian Mountain Bike Trail Guidelines. The complete TDRS is provided in Appendix 6.1.

2. **Trail network to offer a wide spectrum of riding styles where compatible with the topography, terrain, soil and users** – in order to maximise the attractiveness of the trail network to the widest group of riders as possible, the network should ideally include opportunities for a variety of types of MTB riding, however, only where the 'raw ingredients' exist to do so. Over many years WT has developed a suite of trail styles to communicate the features found on the different types of trails. These styles are listed and explained in Appendix 6.2.

3. **Trails to be single direction** – Single direction trails provide the safest and most enjoyable visitor experience. By directing people to use the trails in a recommended direction, head-to-head interactions with other MTB riders are minimised. Riders only interact with other riders where one rider catches and overtakes another. Single direction trails are not only safer, but they provide a better visitor experience through a more intuitive traffic flow and decreased disruptive interactions with other riders. Dual direction trails can be useful in some situations, but should generally only be used on flatter terrain with slower speeds and good sight-lines.

4. **Trail network to follow a logical pattern and rotation direction with minimal cross-overs** – by ensuring all trails within a trail network follow the same direction (i.e. clockwise or anti-clockwise), it helps to create a trail network that is intuitive and easy to navigate and that minimises conflicts at intersections.

5. **Trail network should be event ready** – that is, the trail network works well for day-to-day recreational riding, but is also ready to host any competitive MTB events. This means having good event staging areas available, but also means having the right types of trails, minimal conflict/cross-over zones, access for emergency vehicles, spectator access and a flexible trail network offering maximum course configuration options.

6. **Trail network to maximise use of existing trails and minimise new trails** – where existing informal MTB trails are found to offer a safe and enjoyable experience and meet modern MTB trail sustainability guidelines, they should be incorporated into the trail network instead of constructing new trails.

7. **New trails to be designed to minimise environmental impacts** – where new trails are to be constructed, they should be designed to avoid areas of high environmental values. Previously disturbed areas, unused management vehicle tracks, heavily modified or degraded areas, areas with introduced vegetation (e.g. pines) etc. should be prioritised for trail development, where the rider experience is not negatively impacted.

8. **Trails to maximise use of singletrack as much as possible** – Singletrack is the preferred experience sought by all MTB riders, from beginner to advanced and must be the primary focus of the proposed trail network. Where existing trails or management vehicle tracks are found to be in good condition and provide an appropriate experience for MTB riding, they may be incorporated into the proposed MTB trail network.

9. **Trails should not re-appropriate popular walking tracks for MTB** – this project is not seeking to take away trail opportunities from one user group while rewarding another. Where an existing trail is deemed to be heavily used by walkers, it should not be incorporated into the proposed MTB trail network, except in exceptional circumstances, and only if appropriate – i.e. flat or uphill for MTBs, good forward sight lines etc.

10. **Trails to maximise opportunities for views and lookouts** – not all riders are obsessed with speed – many want to stop and take in the sights and smells, especially in beautiful locations like the Blue Mountains. Achieving this principle leads to increased rider satisfaction and also has a direct correlation with increased visitation – visitation to MTB destinations is heavily influenced by imagery. In the modern age of social media (especially the new wave of fitness tracking social media apps like Strava) spectacular trails stand out and a single persuasive image can be enough to influence a rider to visit a new area.

11. **Trails to incorporate adequate signage to ensure safe and enjoyable usage by all visitors –** An effective trail network will ensure information provision, signage and education for users on difficulty levels/grades, distances/times, expected users, etc. to ensure that actual experiences meet expectations.

4.2 TRAIL NETWORK OVERVIEW

The key features of the proposed State Mine State Gully MTB Trail Network are:

- Twenty-two mountain bike trails, totaling 37.6 km in length;
- Eleven 'Adventure' trails – most closely analogous to cross-country trails, generally including a mix of climbs, descents and flats and are mostly loop trails, comprising about 18.6km of trails;
- Nine 'Flow' trails – dedicated point-to-point descending trails with gentle to moderate gradients, bermed corners, rollers and jumps, comprising about 17.2km of trails;
- One 'Shared-use' trail – this Easy trail is intended to be shared by walkers and MTB riders, and forms the main climbing trail from the bottom to the top. Note that it is intended to be dual directional for walkers, but single direction for MTB riders (uphill direction).
- One 'Gravity' trail – dedicated point-to-point descending trail, but generally rawer and more natural in form than a flow trail;
- The Trail Difficulty Ratings breakdown of the trail network is:
    - 9 trails rated Easy (41% by number of trails; 37% by length of trails);
    - 3 trails rated Easy / Intermediate (14% by number of trails; 14% by length of trails);
    - 7 trails rated Intermediate (32% by number of trails; 30% by length of trails).
    - 2 trail rated Intermediate/ Difficult (9% by number of trails; 11% by length of trails).
    - 1 trail rated Difficult (4% by number of trails; 8% by length of trails).

Note that throughout this report, the trails are referred to as Trail 02, Trail 50 etc. These names are for use in this report only, and should not be used for the final completed trails. WT recommends that all trails have a unique name, rather than simple trail numbers. Names help to create an identity and culture for each trail, and can assist in marketing and promotion of trails.

Table 1 on the next page provides a summary of the entire trail network, providing a brief description, the trail difficulty rating, the style and the length for each trail.

Table 1. State Mine Gully MTB Trail Network Summary

Trail Name	Description	Trail Difficulty Rating	Trail Style	GOSSCA Length (m)	State Mine Gully Length (m)	Total Length (m)
01	Flat, easy, traversing trail, providing access to Trails 50, 51, 52 and 53. Single direction, northeast to southwest.	 Easy	Adventure	668		668
02	Long, flowing descent from Lost City South Trailhead, all the way down to State Mine Gully Trailhead. Acts as the 'home trail' which majority of other descents merge onto.	 Easy with Intermediate Sections	Flow	2333	2467	4800
03	Provides an alternative option to the start of Trail 2, with more challenging features and terrain, amidst stunning rock formations.	 Intermediate	Flow	2346		2346
50	Long, cross-country style, traversing descent. Features rocky terrain and slabs, with some challenging technical sections.	 Easy	Adventure/flow	540	2360	2901
51	Existing downhill trail - Left Hand Gully. Mostly in good condition, but some trails could benefit from better drainage and some minor reshaping.	 Intermediate	Gravity	400	1396	1796
52	Intertwined with Left Hand Gully (Trail 51) like a DNA helix, this trail will be a fast, flowing descent.	 Intermediate With Difficult Sections	Flow	467	1249	1716
53	Trail 53 provides an alternative entry into Trail 51 and 52, starting high up on the exposed ridgeline before making its way down into the valley.	 Intermediate	Flow	453	697	1150
54	Trail 54 is located high up on a rocky ridgeline, providing some exciting optional rock chute A-lines and long views towards Lithgow. Mellow gradients mean slower speed and higher technical challenges.	 Intermediate	Adventure	1025	1536	2561
55	Rockier and more technical alternative to Trail 56.	 Intermediate	Flow	914	626	1539
56	Fast, flowing trail located deep in a valley surrounded by towering rocky pagodas. Roller-coaster like shape.	 Easy	Flow	1181	285	1466
57	Signature climbing trail from the State Mine Gully Trailhead, all the way to the Lost City South Trailhead.	 Easy	Adventure	2764	4003	6767

	Gentle gradients, but consistently uphill.					
58	Gentle climbing trail located in the base of a deep, moist gully. Provides access to Trails 50 and 59.	 Intermediate	Adventure		854	854
59	Challenging trail for experienced riders. Includes narrow hand-built sections of trail, steep rocky chutes and steep drop-offs beside the trail. Mix of climbing and descending.	 Difficult	Adventure		3031	3031
60	Being the first trail from the State Mine Gully Trailhead, Trail 60 forms the entry and exit for all the trails connecting back to the Primary Trailhead.	 Easy	Adventure		307	307
61	Easy, meandering cross-country style loop trail in the shady valley near the State Mine Gully Trailhead.	 Easy	Adventure		714	714
62	Cross-country style loop trail, starting on Trail 61 and finishing on Trail 60.	 Easy	Adventure		546	546
63	Longer, more challenging cross-country loop trail, climbing up above the valley floor, before descending back down to Trail 62. Offers some A-line options.	 Intermediate With Difficult Sections	Adventure		2314	2314
64	Super easy warm-up trail for kids and beginners.	 Easy	Adventure		142	142
65	Loop trail, providing access to the main climb (Trail 57) and exit from most of the descending trails.	 Easy	Adventure		516	516
66	Cross-country style loop trail - mix of climbing and descending.	 Intermediate	Flow		1083	1083
67	Short, but scenic trail offering a cool experience through a deep ferny gorge.	 Easy with Intermediate Sections	Adventure		168	168
68	Short, fun descent, cutting off some of the climbing from Trail 66.	 Easy with Intermediate Sections	Flow		248	248
Total				**13091**	**24542**	**37633**

4.3 MAPS

The maps on the following pages illustrate the proposed State Mine Gully MTB Trail Network.

Map 1 shows the trails represented by different colours corresponding to their proposed trail difficulty rating and includes waypoints such trailheads, shuttle pick-up points and lookouts. Recommended direction of travel is represented by small white arrows on the trails.

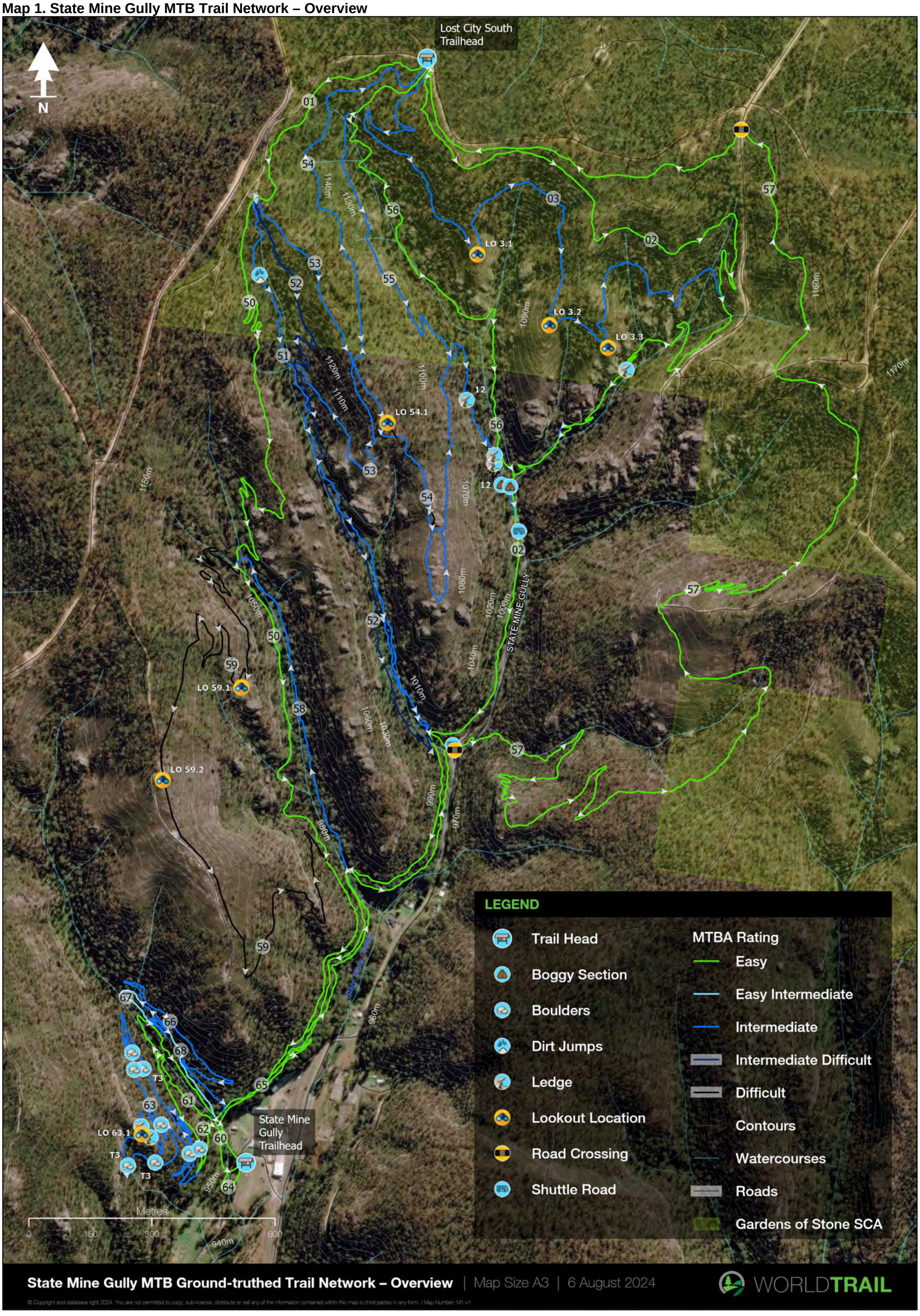
Map 2 shows the trails represented by different colours and line styles corresponding to trail type and showing waypoints relating to construction treatments such as rock armours, bridges and trail surfacing. Recommended direction of travel is represented by small white arrows on the trails.

All waypoints have been given a unique label, which is shown in the maps. These labels are comprised of letters and numbers – the letters indicate the type of waypoint and the numbers indicate the trail on which it is located, and the numbered position of that waypoint along the trail. Letter codes used are:

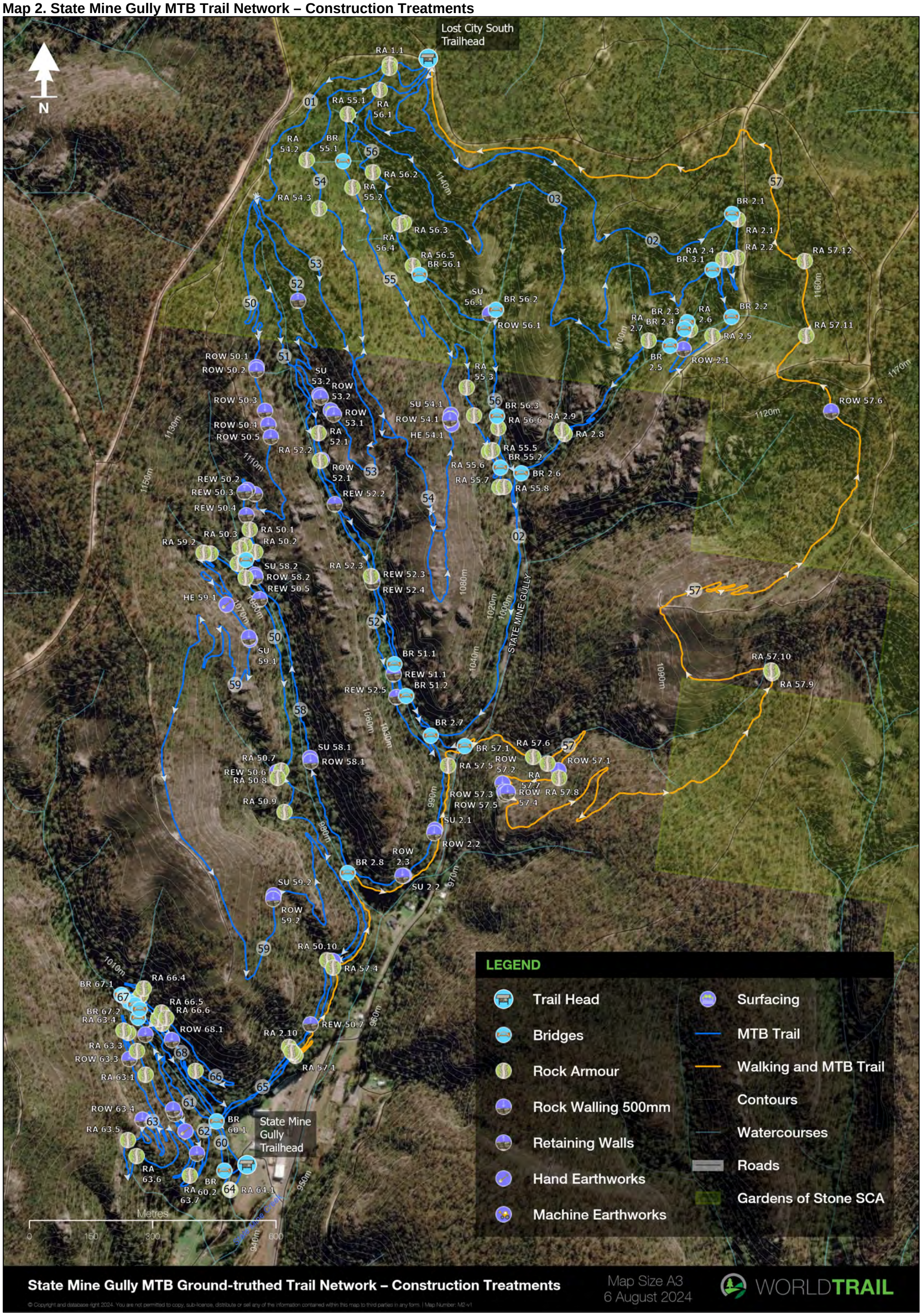
- BR – Bridge
- HE – Hand earthworks
- LO – Lookout
- RA – Rock Armour
- REW – Retaining wall (greater than 500mm)
- ROW – Rock walling (up to 500mm)
- SU – Surfacing

As an example, waypoint LO3.1 is a lookout, located on Trail 3 and is the first lookout located on that trail. LO3.2 is a lookout, located on Trail 3 and is the second lookout located on that trail.

Map 1. State Mine Gully MTB Trail Network – Overview



Map 2. State Mine Gully MTB Trail Network – Construction Treatments

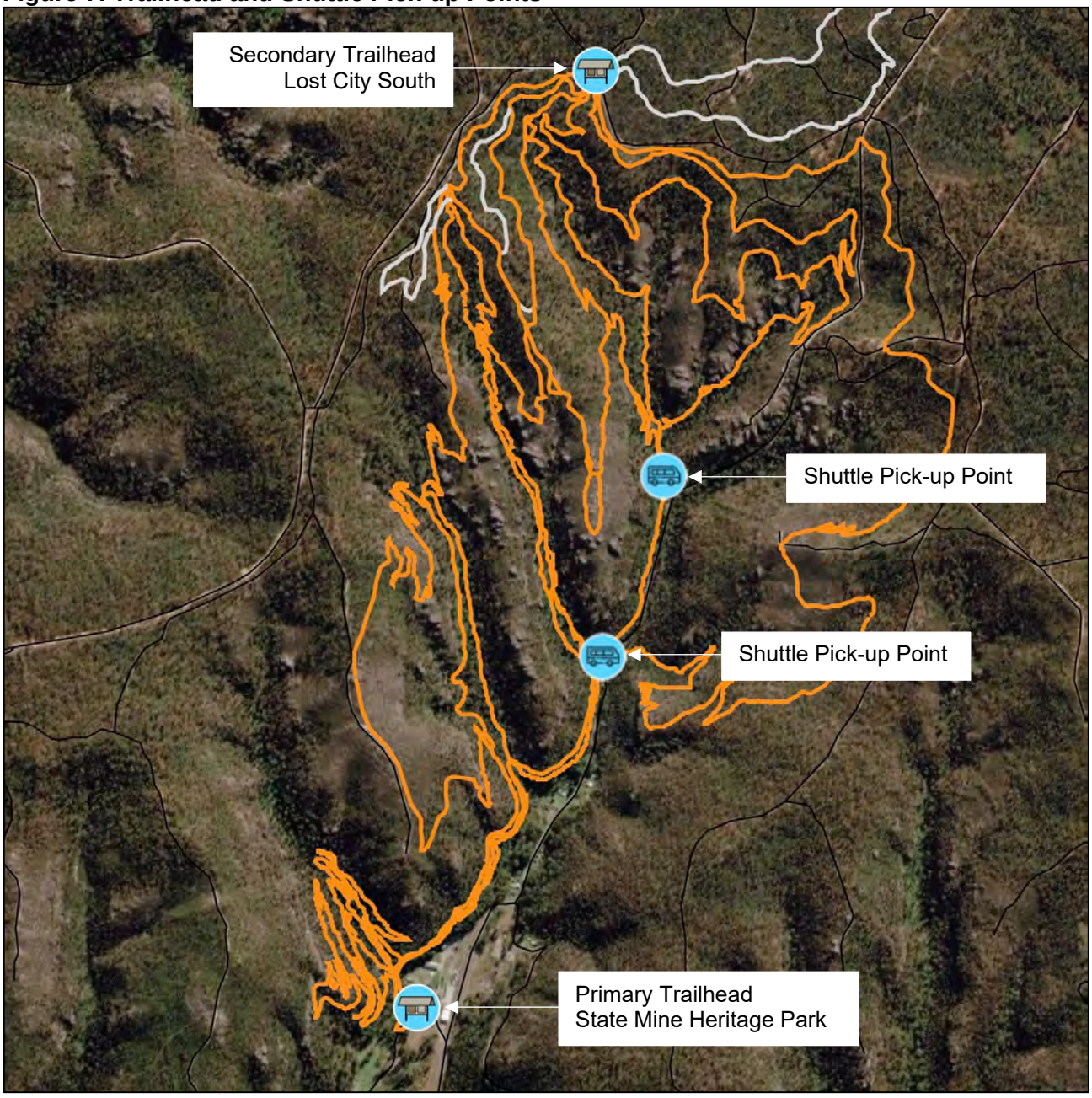


4.4 TRAILHEADS

Two separate trailheads are proposed within this project to service the MTB trail network – the Primary Trailhead at State Mine Heritage Park and a Secondary Trailhead at Lost City South. Two additional Shuttle Pick-up Points are recommended at key locations along State Mine Gully Rd, allowing riders more flexibility in how they choose to utilise the trail network. These are shown in Figure 7 below.

Further design work is needed to determine the requirements, infrastructure and layout for the proposed trailheads, giving due consideration to the requirements of any other activities – for example, overnight hiking, rock climbing, four-wheel driving etc.

Figure 7. Trailhead and Shuttle Pick-up Points



4.4.1 Primary Trailhead – State Mine Heritage Park

Description	The Primary Trailhead at State Mine Heritage Park is an existing park located on the site of the old Lithgow State Coal Mine. It has an existing museum on site. A large open area just south of the museum will be converted into a car park for MTB riders, with the trails accessible on the western side of the car park. This trailhead is close to Lithgow, and as such, will be the first contact point for visitors coming to ride the trails or heading into the GOSSCA. It will also operate as the lower shuttle pick-up point.
Location	State Mine Heritage Park, State Mine Gully Rd, Lithgow
Driving Distance from Lithgow	2.5km from the town centre
Car Parking	Yes
User Group	MTB riders and hikers
Potential Facilities	Maps, signage, toilets, drinking water, picnic tables, rubbish bins etc.
Trails Accessible	1, 2, 3 and 4
Other Activities	Walking/hiking trails will provide access to Lost City South trailhead and beyond into the GOSSCA.
Map	

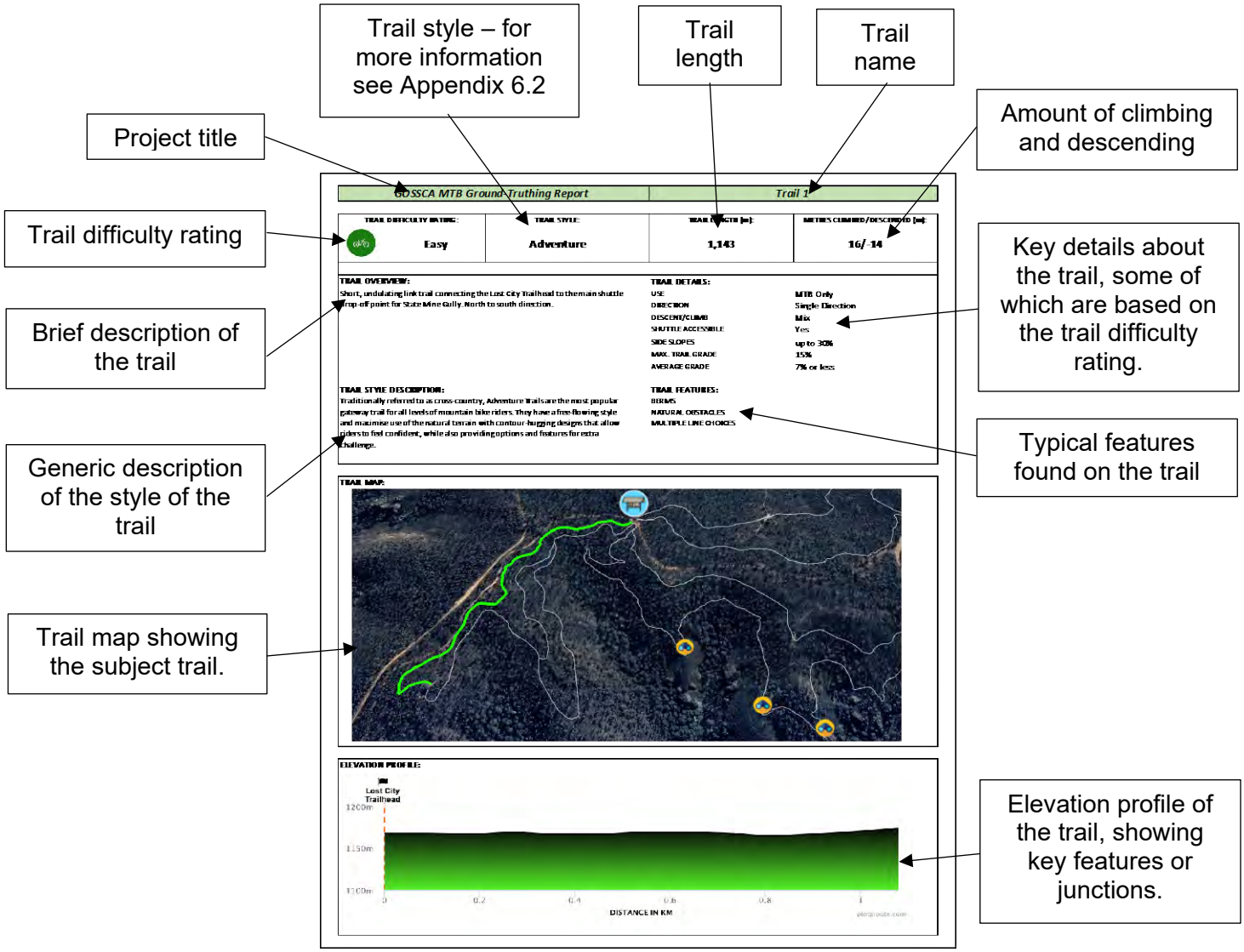
4.4.2 Secondary Trailhead – Lost City South Trailhead

Description	The Lost City South Trailhead is essentially the shuttle drop-off point for the State Mine Gully MTB Trail Network, with all the descending trails starting from this point, and heading southwards into State Mine Gully. Two key shared-use trails also connect to this point: 1. One heads northeast from here, into the GOSSCA, eventually connecting to Forest Camp and the other MTB trails located there. 2. One heads north towards a trailhead that will be the key access point for the hiking trail in Lost City. It is located in a flat area with plenty of available space for car parking and other facilities. As the secondary trailhead, it doesn't require extensive car parking – MTB visitors should be encouraged to park at the Primary Trailhead at State Mine Heritage Park – and only moderate facilities such as signage and maybe a small shelter.
Location	1km west of State Mine Gully Rd near the southern boundary of GOSSCA.
Driving Distance from Lithgow	6.8km
Car Parking	Limited – encourage visitors to use the Primary Trailhead
User Group	MTB riders and hikers
Potential Facilities	Maps, signage, shelter
Trails Accessible	1, 2, 3 and 4
Other Activities	Hiking and shared-use trail connections to the northeast and north
Map	

4.5 TRAIL DESCRIPTIONS

The following pages provide details and attributes for each of the proposed trails.

The graphic below provides a brief explanation of the information contained within each Trail Description.



State Mine Gully MTB Trail Network	1

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Easy	Adventure	668	8.9/-7.88

TRAIL OVERVIEW:

Ground-truthed 2022. Flat, easy, traversing trail, providing access to Trails 50, 51, 52 and 53. Single direction, northeast to southwest.

TRAIL DETAILS:

USE	MTB Only
DIRECTION	Single Direction
DESCENT/CLIMB	Mix
SHUTTLE ACCESSIBLE	Yes
SIDE SLOPES	up to 30%
MAX. TRAIL GRADE	15%
AVERAGE GRADE	7% or less

TRAIL STYLE DESCRIPTION:

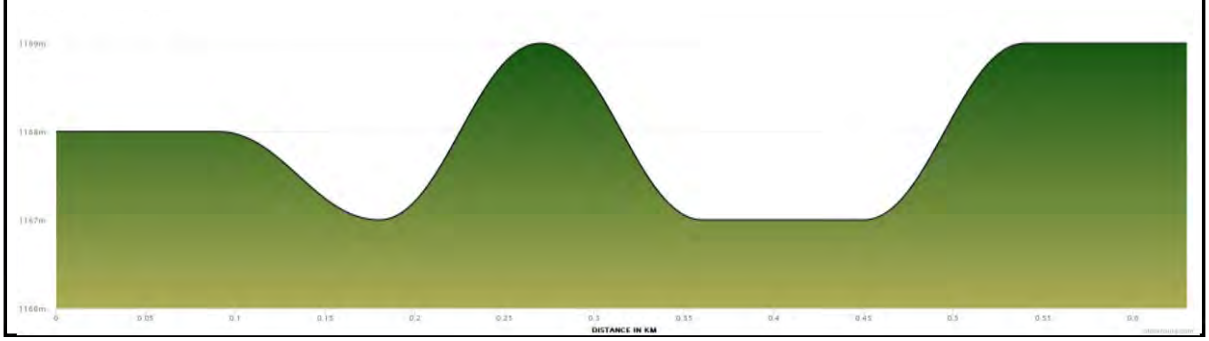
Traditionally referred to as cross-country, Adventure Trails are the most popular gateway trail for all levels of mountain bike riders. They have a free-flowing style and maximise use of the natural terrain with contour-hugging designs that allow riders to feel confident, while also providing options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

TRAIL FEATURES:

BERMS
NATURAL OBSTACLES
MULTIPLE LINE CHOICES

TRAIL MAP:

ELEVATION PROFILE:



State Mine Gully MTB Trail Network	2

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Easy with Intermediate Sections	Flow	2,467	120/-314

TRAIL OVERVIEW:

Long, flowing descent from Lost City South Trailhead, all the way down to State Mine Gully Trailhead. Acts as the 'home trail' which majority of other descents merge onto.

TRAIL DETAILS:

USE	MTB Only
DIRECTION	Single Direction
DESCENT/CLIMB	Descent
SHUTTLE ACCESSIBLE	Yes
SIDE SLOPES	up to 30%
MAX. TRAIL GRADE	20%
AVERAGE GRADE	7% or less

TRAIL STYLE DESCRIPTION:

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

TRAIL FEATURES:

BERMS
ROLLERS
OPTIONAL/ROLLABLE JUMPS
MULTIPLE LINE CHOICES

TRAIL MAP:

ELEVATION PROFILE:

State Mine Gully MTB Trail Network	*3*

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Intermediate	**Flow**	**2,345**	**138/-191**

TRAIL OVERVIEW:

Ground-truthed 2022. Provides an alternative option to the start of Trail 2, with more challenging features and terrain, amidst stunning rock formations.

TRAIL DETAILS:

USE	MTB Only
DIRECTION	Single Direction
DESCENT/CLIMB	Mix
SHUTTLE ACCESSIBLE	Yes
SIDE SLOPES	up to 50%
MAX. TRAIL GRADE	20%
AVERAGE GRADE	10% or less

TRAIL STYLE DESCRIPTION:

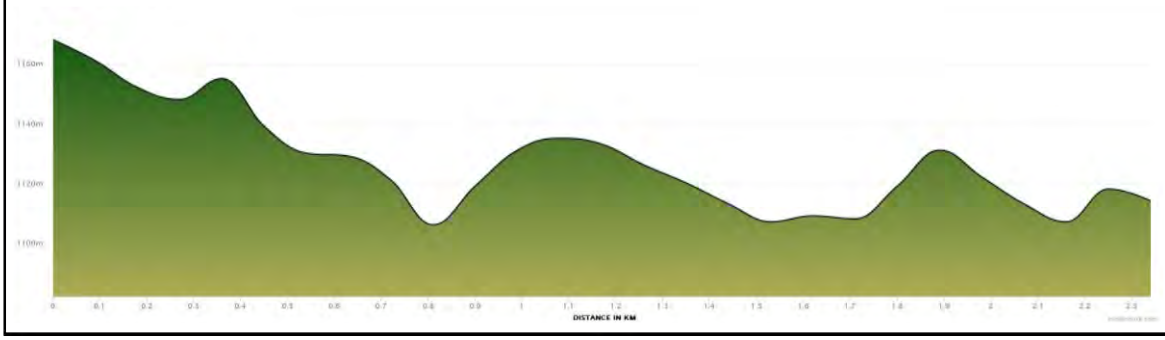
A descending trail style, Flow Trails offer a constant undulation of groomed rollers, berms, and achievable obstacles. The tyre-hugging trajectory sends riders on a sculptured luge ride through the bush. They create a sensation of speed and rhythm, require minimal decision-making and maximise the ability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

TRAIL FEATURES:

BERMS
ROLLERS
OPTIONAL/ROLLABLE JUMPS
MULTIPLE LINE CHOICES

TRAIL MAP:

ELEVATION PROFILE:



State Mine Gully MTB Trail Network	50

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Easy	Adventure	2,360	53.3/-239

TRAIL OVERVIEW:

Long, cross-country style, traversing descent. Features rocky terrain and slabs, with some challenging technical sections.

TRAIL DETAILS:

USE	MTB Only
DIRECTION	Single Direction
DESCENT/CLIMB	Descent
SHUTTLE ACCESSIBLE	Yes
SIDE SLOPES	up to 30%
MAX. TRAIL GRADE	15%
AVERAGE GRADE	7% or less

TRAIL STYLE DESCRIPTION:

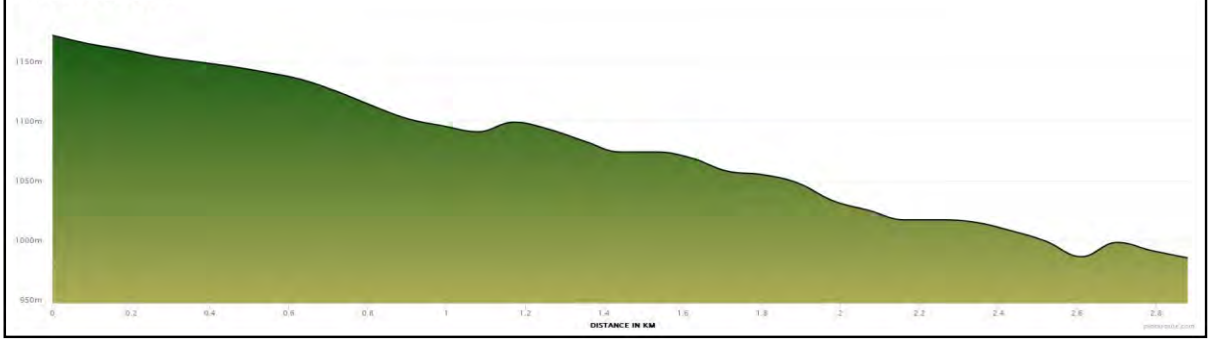
Traditionally referred to as cross-country, Adventure Trails are the most popular gateway trail for all levels of mountain bike riders. They have a free-flowing style and maximise use of the natural terrain with contour-hugging designs that allow riders to feel confident, while also providing options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

TRAIL FEATURES:

BERMS
NATURAL OBSTACLES
MULTIPLE LINE CHOICES

TRAIL MAP:

ELEVATION PROFILE:



State Mine Gully MTB Trail Network	51

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Intermediate	Gravity	1,396	1.63/-165

TRAIL OVERVIEW:

Existing downhill trail - Left Hand Gully. Mostly in good condition, but some trails could benefit from better drainage and some minor reshaping.

TRAIL DETAILS:

USE	MTB Only
DIRECTION	Single Direction
DESCENT/CLIMB	Descent
SHUTTLE ACCESSIBLE	Yes
SIDE SLOPES	up to 50%
MAX. TRAIL GRADE	20%
AVERAGE GRADE	10% or less

TRAIL STYLE DESCRIPTION:

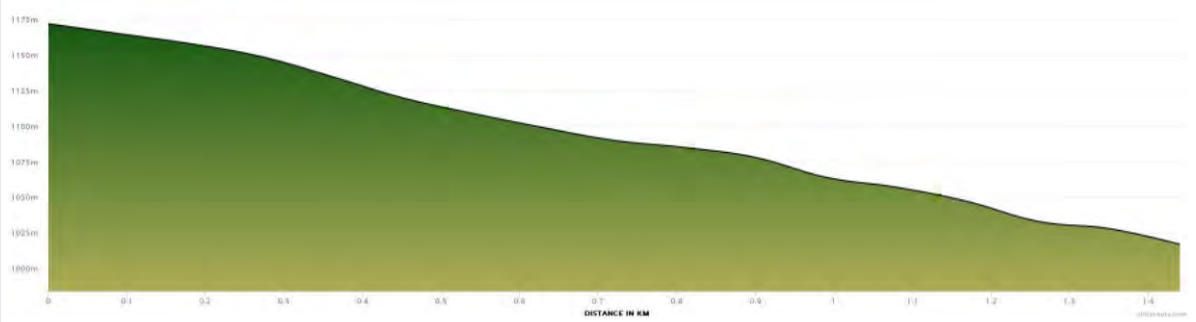
Offering a mix of Flow, Air Flow and Downhill, Gravity Trails embrace the raw beauty of the terrain in an exciting and challenging descent. They will often provide multiple line choices and a variety of features, and may include occasional short uphill sections.

TRAIL FEATURES:

BERMS
MULTIPLE LINE CHOICES
JUMPS AND DROPS
ROCK SLABS AND ROCK GARDENS

TRAIL MAP:

ELEVATION PROFILE:



State Mine Gully MTB Trail Network	52

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Intermediate with Difficult Sections	Flow	1,249	14.8/-183

TRAIL OVERVIEW:

Intertwined with Left Hand Gully (Trail 51) like a DNA helix, this trail will be a fast, flowing descent.

TRAIL DETAILS:

USE	MTB Only
DIRECTION	Single Direction
DESCENT/CLIMB	Descent
SHUTTLE ACCESSIBLE	Yes
SIDE SLOPES	#N/A
MAX. TRAIL GRADE	#N/A
AVERAGE GRADE	#N/A

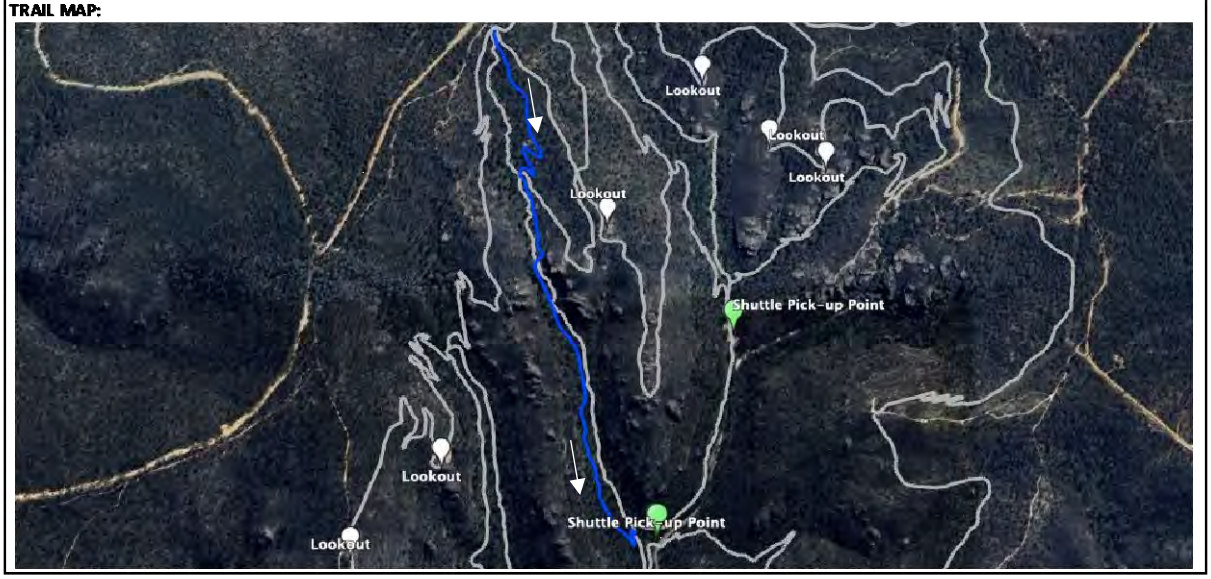
TRAIL STYLE DESCRIPTION:

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

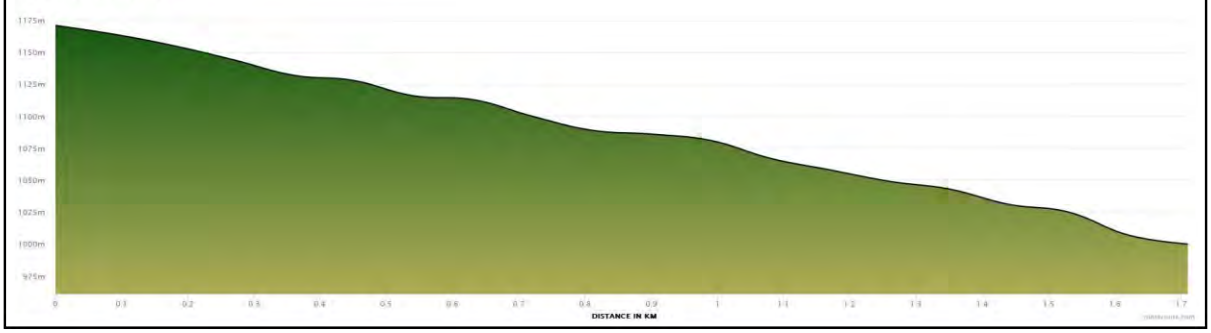
TRAIL FEATURES:

BERMS
ROLLERS
OPTIONAL/ROLLABLE JUMPS
MULTIPLE LINE CHOICES

TRAIL MAP:



ELEVATION PROFILE:



State Mine Gully MTB Trail Network	53

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Intermediate	Flow	697	30.7/-83.5

TRAIL OVERVIEW:

Trail 53 provides an alternative entry into Trail 51 and 52, starting high up on the exposed ridgeline before making its way down into the valley.

TRAIL DETAILS:

USE	MTB Only
DIRECTION	Single Direction
DESCENT/CLIMB	Mix
SHUTTLE ACCESSIBLE	Yes
SIDE SLOPES	up to 50%
MAX. TRAIL GRADE	20%
AVERAGE GRADE	10% or less

TRAIL STYLE DESCRIPTION:

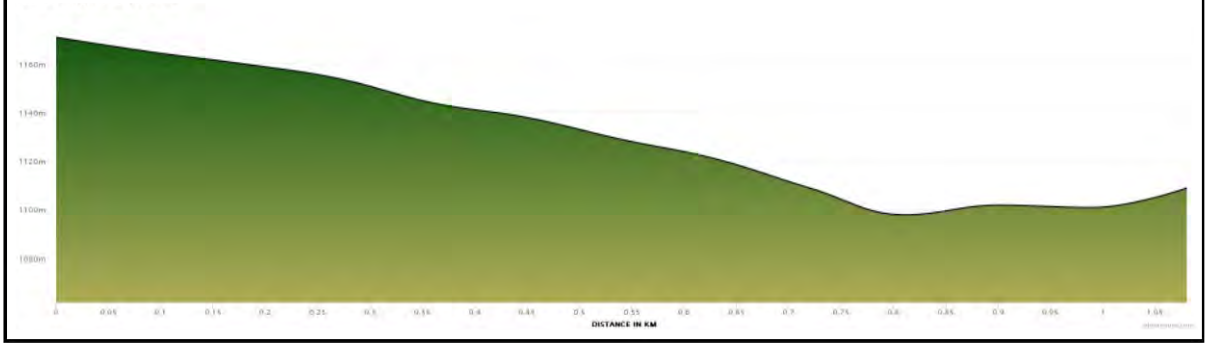
A descending trail style, Flow Trails offer a constant undulation of groomed rollers, berms, and achievable obstacles. The tyre-hugging trajectory sends riders on a sculptured luge ride through the bush. They create a sensation of speed and rhythm, require minimal decision-making and maximise the ability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

TRAIL FEATURES:

BERMS
ROLLERS
OPTIONAL/ROLLABLE JUMPS
MULTIPLE LINE CHOICES

TRAIL MAP:

ELEVATION PROFILE:



State Mine Gully MTB Trail Network	54

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Intermediate	Adventure	1,536	41.8/-132

TRAIL OVERVIEW:

Trail 54 is located high up on a rocky ridgeline, providing some exciting optional rock chute A-lines and long views towards Lithgow. Mellow gradients mean slower speed and higher technical challenges.

TRAIL DETAILS:

USE	MTB Only
DIRECTION	Single Direction
DESCENT/CLIMB	Mix
SHUTTLE ACCESSIBLE	Yes
SIDE SLOPES	up to 50%
MAX. TRAIL GRADE	20%
AVERAGE GRADE	10% or less

TRAIL STYLE DESCRIPTION:

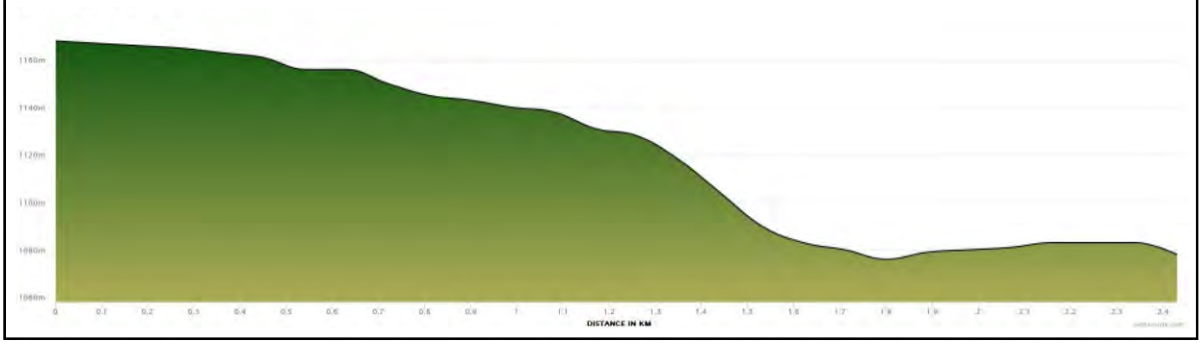
Traditionally referred to as cross-country, Adventure Trails are the most popular gateway trail for all levels of mountain bike riders. They have a free-flowing style and maximise use of the natural terrain with contour-hugging designs that allow riders to feel confident, while also providing options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

TRAIL FEATURES:

BERMS
NATURAL OBSTACLES
MULTIPLE LINE CHOICES

TRAIL MAP:

ELEVATION PROFILE:



State Mine Gully MTB Trail Network	55

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Intermediate	Flow	626	18.9/-148

TRAIL OVERVIEW:

Ground-truthed 2024. Rockier and more technical alternative to Trail 56.

TRAIL DETAILS:

USE	0
DIRECTION	0
DESCENT/CLIMB	0
SHUTTLE ACCESSIBLE	0
SIDESLOPES	up to 50%
MAX. TRAIL GRADE	20%
AVERAGE GRADE	10% or less

TRAIL STYLE DESCRIPTION:

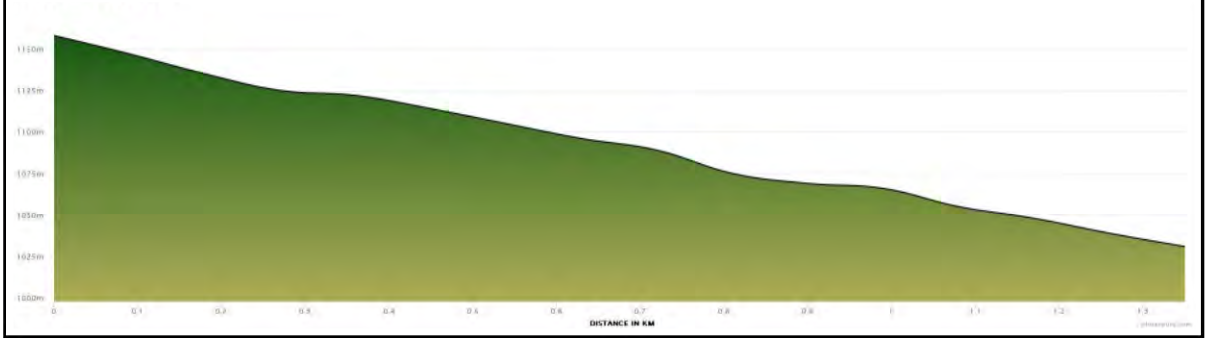
A descending trail style, Flow Trails offer a constant undulation of groomed rollers, berms, and achievable obstacles. The tyre-hugging trajectory sends riders on a sculptured luge ride through the bush. They create a sensation of speed and rhythm, require minimal decision-making and maximise the ability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

TRAIL FEATURES:

BERMS
ROLLERS
OPTIONAL/ROLLABLE JUMPS
MULTIPLE LINE CHOICES

TRAIL MAP:

ELEVATION PROFILE:



State Mine Gully MTB Trail Network	56

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Easy	Flow	285	6.75/-138

TRAIL OVERVIEW:

Fast, flowing trail located deep in a valley surrounded by towering rocky pagodas. Roller-coaster like shape.

TRAIL DETAILS:

USE	MTB Only
DIRECTION	Single Direction
DESCENT/CLIMB	Descent
SHUTTLE ACCESSIBLE	Yes
SIDE SLOPES	up to 30%
MAX. TRAIL GRADE	15%
AVERAGE GRADE	7% or less

TRAIL STYLE DESCRIPTION:

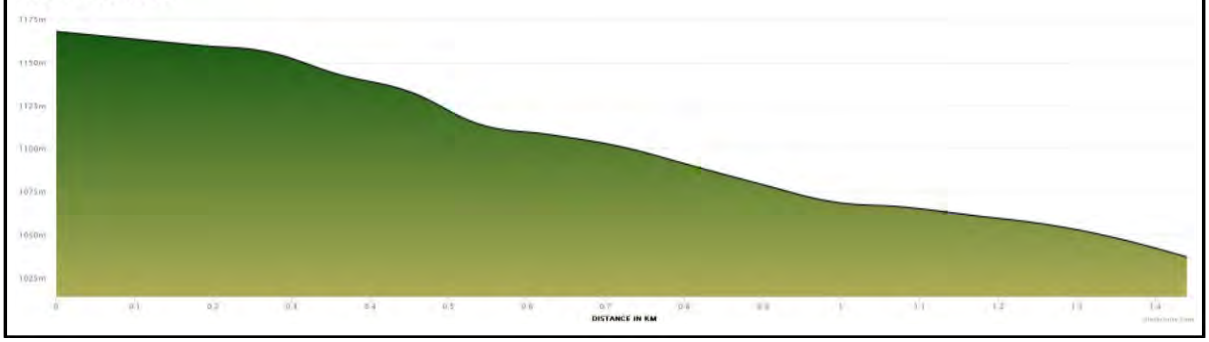
A descending trail style, Flow Trails offer a constant undulation of groomed rollers, berms, and achievable obstacles. The tyre-hugging trajectory sends riders on a sculptured luge ride through the bush. They create a sensation of speed and rhythm, require minimal decision-making and maximise the ability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

TRAIL FEATURES:

BERMS
ROLLERS
OPTIONAL/ROLLABLE JUMPS
MULTIPLE LINE CHOICES

TRAIL MAP:

ELEVATION PROFILE:



State Mine Gully MTB Trail Network	57

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Easy	Adventure	4,003	383/-190

TRAIL OVERVIEW:

Signature climbing trail from the State Mine Gully Trailhead, all the way to the Lost City South Trailhead. Gentle gradients, but consistently uphill.

TRAIL DETAILS:

USE	Shared Use
DIRECTION	Single Direction
DESCENT/CLIMB	Climb
SHUTTLE ACCESSIBLE	Yes
SIDE SLOPES	up to 30%
MAX. TRAIL GRADE	15%
AVERAGE GRADE	7% or less

TRAIL STYLE DESCRIPTION:

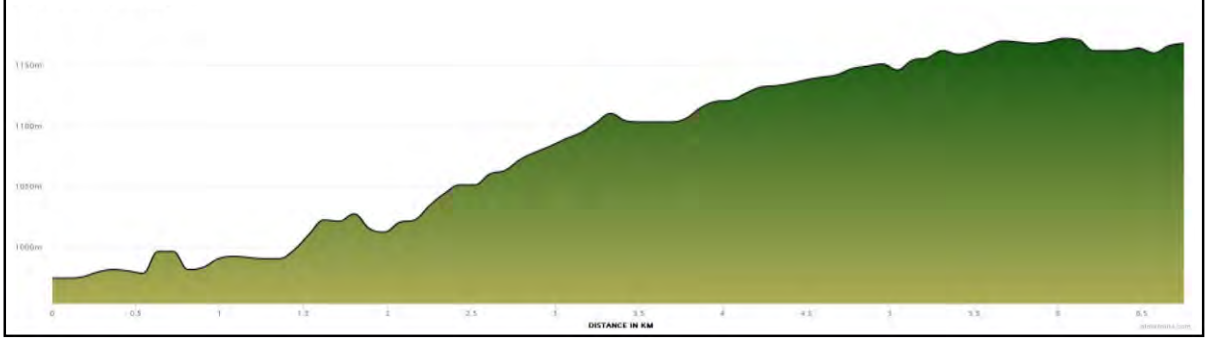
Traditionally referred to as cross-country, Adventure Trails are the most popular gateway trail for all levels of mountain bike riders. They have a free-flowing style and maximise use of the natural terrain with contour-hugging designs that allow riders to feel confident, while also providing options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

TRAIL FEATURES:

BERMS
NATURAL OBSTACLES
MULTIPLE LINE CHOICES

TRAIL MAP:

ELEVATION PROFILE:



State Mine Gully MTB Trail Network	58

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Intermediate	Adventure	854	81/-6.87

TRAIL OVERVIEW:

Gentle climbing trail located in the base of a deep, moist gully. Provides access to Trails 50 and 59.

TRAIL DETAILS:

USE	MTB Only
DIRECTION	Single Direction
DESCENT/CLIMB	Climb
SHUTTLE ACCESSIBLE	Yes
SIDE SLOPES	up to 50%
MAX. TRAIL GRADE	20%
AVERAGE GRADE	10% or less

TRAIL STYLE DESCRIPTION:

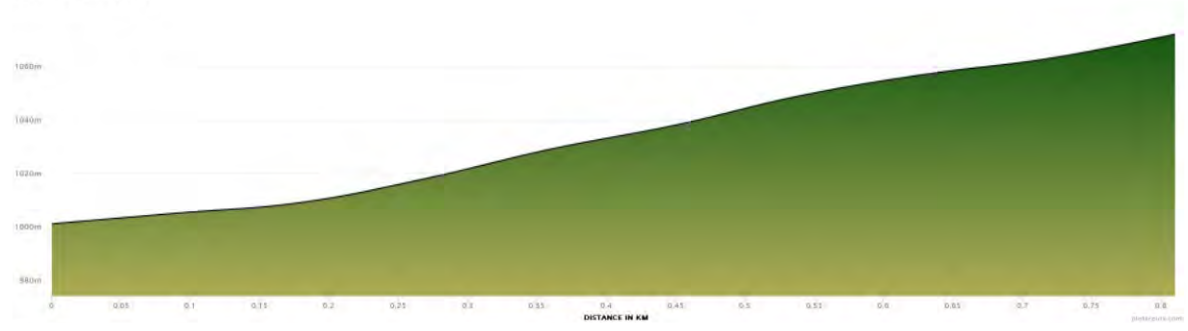
Traditionally referred to as cross-country, Adventure Trails are the most popular gateway trail for all levels of mountain bike riders. They have a free-flowing style and maximise use of the natural terrain with contour-hugging designs that allow riders to feel confident, while also providing options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

TRAIL FEATURES:

BERMS
NATURAL OBSTACLES
MULTIPLE LINE CHOICES

TRAIL MAP:

ELEVATION PROFILE:



State Mine Gully MTB Trail Network	59

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Difficult	Adventure	3,031	160/-224

TRAIL OVERVIEW:

Challenging trail for experienced riders. Includes narrow hand-built sections of trail, steep rocky chutes and steep drop-offs beside the trail. Mix of climbing and descending.

TRAIL DETAILS:

USE	MTB Only
DIRECTION	Single Direction
DESCENT/CLIMB	Mix
SHUTTLE ACCESSIBLE	Yes
SIDE SLOPES	> 50%
MAX. TRAIL GRADE	30%
AVERAGE GRADE	20%

TRAIL STYLE DESCRIPTION:

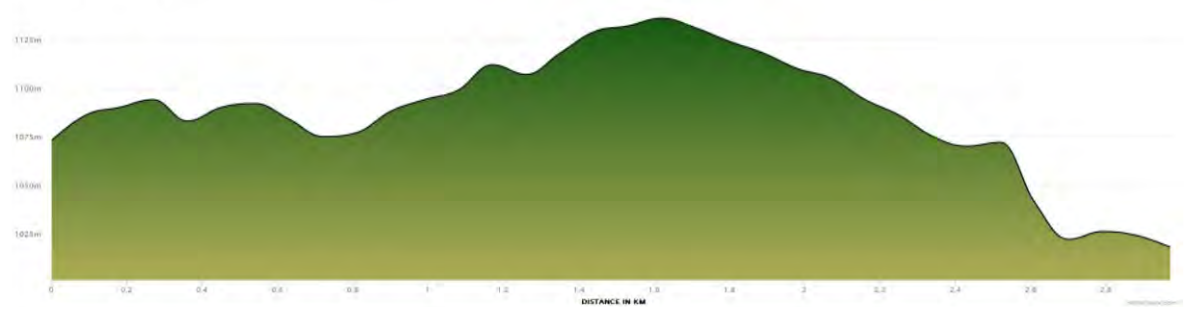
Traditionally referred to as cross-country, Adventure Trails are the most popular gateway trail for all levels of mountain bike riders. They have a free-flowing style and maximise use of the natural terrain with contour-hugging designs that allow riders to feel confident, while also providing options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

TRAIL FEATURES:

BERMS
NATURAL OBSTACLES
MULTIPLE LINE CHOICES

TRAIL MAP:

ELEVATION PROFILE:



State Mine Gully MTB Trail Network	60

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Easy	Adventure	307	17.9/-18

TRAIL OVERVIEW:

Being the first trail from the State Mine Gully Trailhead, Trail 60 forms the entry and exit for all the trails connecting back to the Primary Trailhead.

TRAIL DETAILS:

USE	MTB Only
DIRECTION	Single Direction
DESCENT/CLIMB	Mix
SHUTTLE ACCESSIBLE	Yes
SIDE SLOPES	up to 30%
MAX. TRAIL GRADE	15%
AVERAGE GRADE	7% or less

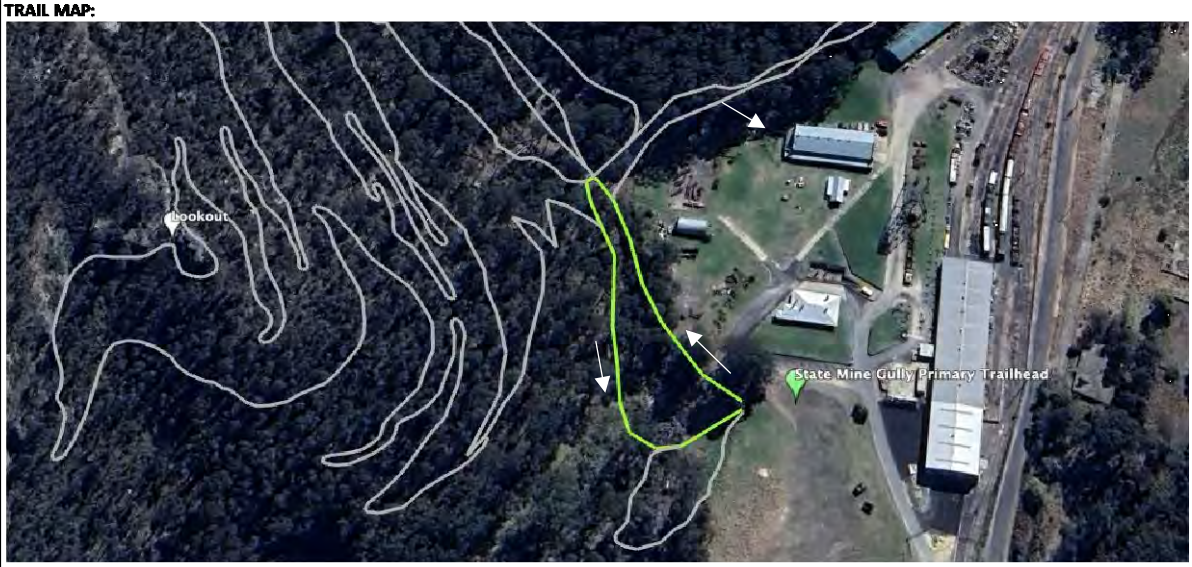
TRAIL STYLE DESCRIPTION:

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

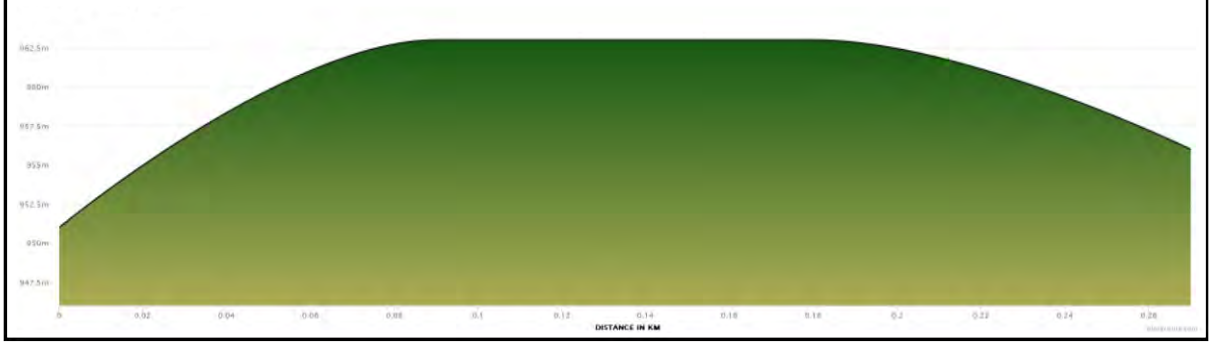
TRAIL FEATURES:

BERMS
NATURAL OBSTACLES
MULTIPLE LINE CHOICES

TRAIL MAP:



ELEVATION PROFILE:



State Mine Gully MTB Trail Network	61

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Easy	Adventure	714	55/-55.2

TRAIL OVERVIEW:

Easy, meandering cross-country style loop trail in the shady valley near the State Mine Gully Trailhead.

TRAIL DETAILS:

USE	MTB Only
DIRECTION	Single Direction
DESCENT/CLIMB	Climb
SHUTTLE ACCESSIBLE	Yes
SIDE SLOPES	up to 30%
MAX. TRAIL GRADE	15%
AVERAGE GRADE	7% or less

TRAIL STYLE DESCRIPTION:

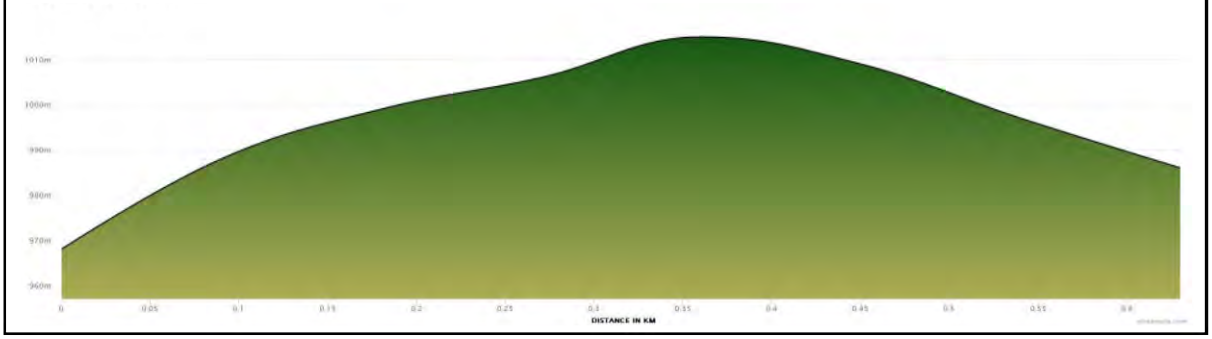
Traditionally referred to as cross-country, Adventure Trails are the most popular gateway trail for all levels of mountain bike riders. They have a free-flowing style and maximise use of the natural terrain with contour-hugging designs that allow riders to feel confident, while also providing options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

TRAIL FEATURES:

BERMS
NATURAL OBSTACLES
MULTIPLE LINE CHOICES

TRAIL MAP:

ELEVATION PROFILE:



State Mine Gully MTB Trail Network	62

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Easy	Adventure	546	23.6/-63.2

TRAIL OVERVIEW:

Cross-country style loop trail, starting on Trail 61 and finishing on Trail 60.

TRAIL DETAILS:

USE	MTB Only
DIRECTION	Single Direction
DESCENT/CLIMB	Mix
SHUTTLE ACCESSIBLE	Yes
SIDE SLOPES	up to 30%
MAX. TRAIL GRADE	15%
AVERAGE GRADE	7% or less

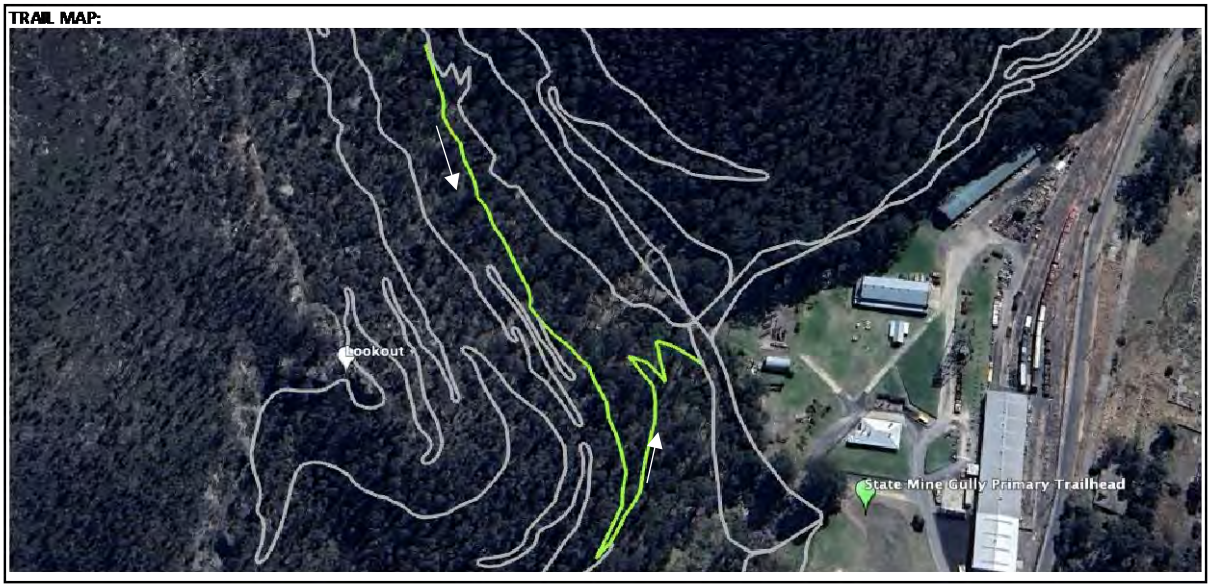
TRAIL STYLE DESCRIPTION:

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

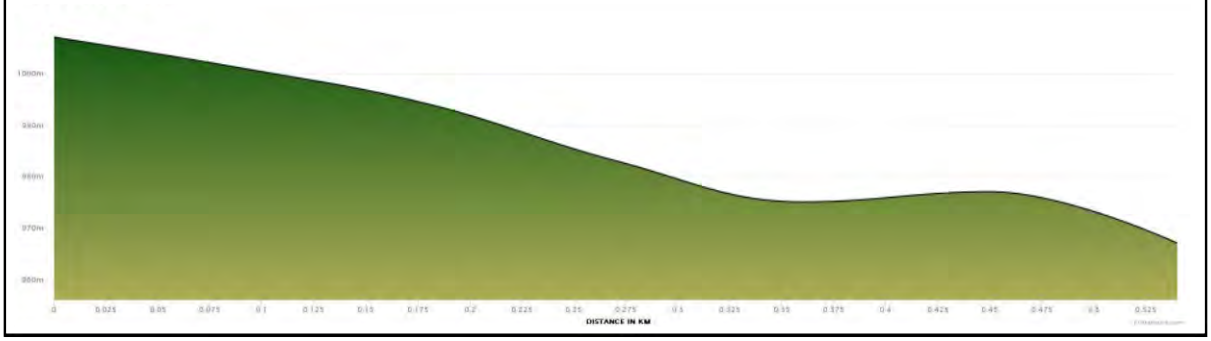
TRAIL FEATURES:

BERMS
NATURAL OBSTACLES
MULTIPLE LINE CHOICES

TRAIL MAP:



ELEVATION PROFILE:



State Mine Gully MTB Trail Network	63

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Intermediate with Difficult Sections	Adventure	2,314	174/-193

TRAIL OVERVIEW:

Longer, more challenging cross-country loop trail, climbing up above the valley floor, before descending back down to Trail 62. Offers some A-line options.

TRAIL DETAILS:

USE	MTB Only
DIRECTION	Single Direction
DESCENT/CLIMB	Mix
SHUTTLE ACCESSIBLE	Yes
SIDESLOPES	#N/A
MAX. TRAIL GRADE	#N/A
AVERAGE GRADE	#N/A

TRAIL STYLE DESCRIPTION:

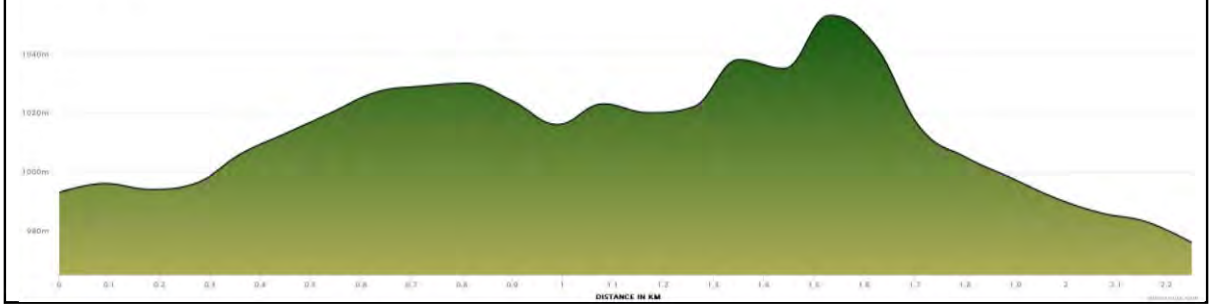
Traditionally referred to as cross-country, Adventure Trails are the most popular gateway trail for all levels of mountain bike riders. They have a free-flowing style and maximise use of the natural terrain with contour-hugging designs that allow riders to feel confident, while also providing options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

TRAIL FEATURES:

BERMS
NATURAL OBSTACLES
MULTIPLE LINE CHOICES

TRAIL MAP:

ELEVATION PROFILE:



State Mine Gully MTB Trail Network	64

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Easy	Adventure	142	9.9/-7.4

TRAIL OVERVIEW:

Super easy warm-up trail for kids and beginners.

TRAIL DETAILS:

USE	MTB Only
DIRECTION	Single Direction
DESCENT/CLIMB	Climb
SHUTTLE ACCESSIBLE	Yes
SIDE SLOPES	up to 30%
MAX. TRAIL GRADE	15%
AVERAGE GRADE	7% or less

TRAIL STYLE DESCRIPTION:

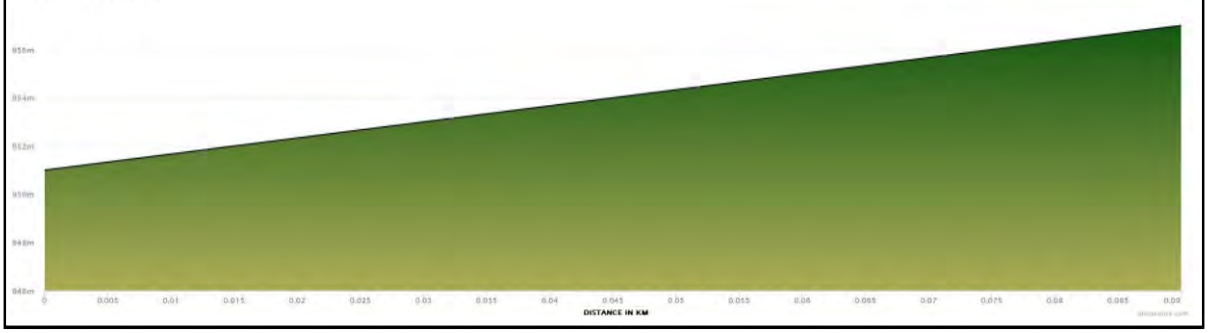
Traditionally referred to as cross-country, Adventure Trails are the most popular gateway trail for all levels of mountain bike riders. They have a free-flowing style and maximise use of the natural terrain with contour-hugging designs that allow riders to feel confident, while also providing options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

TRAIL FEATURES:

BERMS
NATURAL OBSTACLES
MULTIPLE LINE CHOICES

TRAIL MAP:

ELEVATION PROFILE:



State Mine Gully MTB Trail Network	65

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Easy	Adventure	516	56.8/-53.9

TRAIL OVERVIEW:

Loop trail, providing access to the main climb (Trail 57) and exit from most of the descending trails.

TRAIL DETAILS:

USE	MTB Only
DIRECTION	Single Direction
DESCENT/CLIMB	Mix
SHUTTLE ACCESSIBLE	Yes
SIDE SLOPES	up to 30%
MAX. TRAIL GRADE	15%
AVERAGE GRADE	7% or less

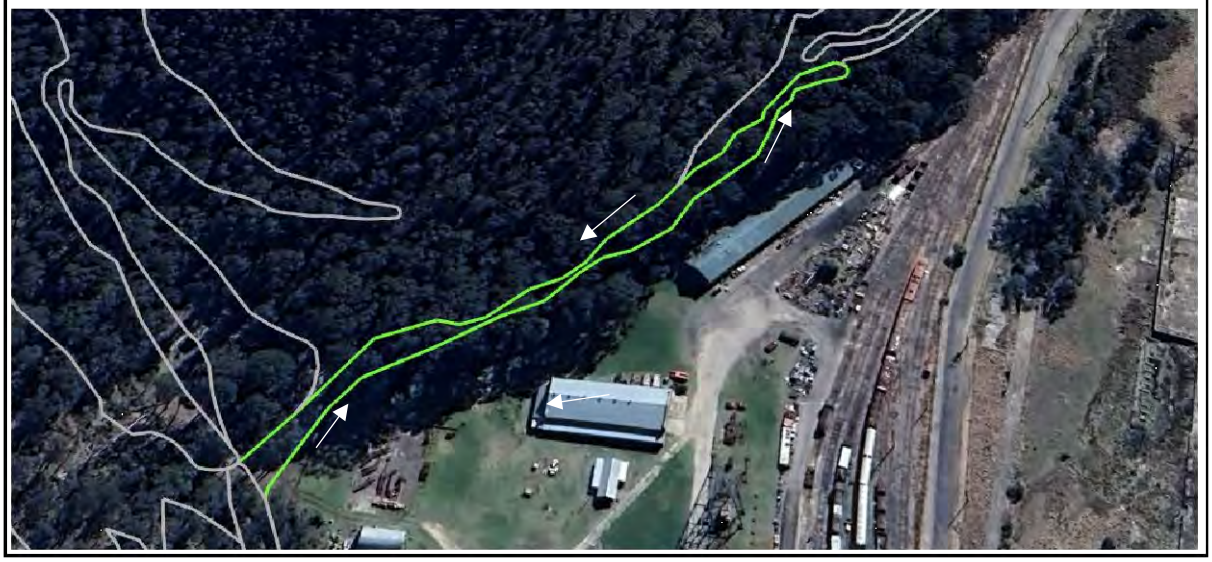
TRAIL STYLE DESCRIPTION:

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

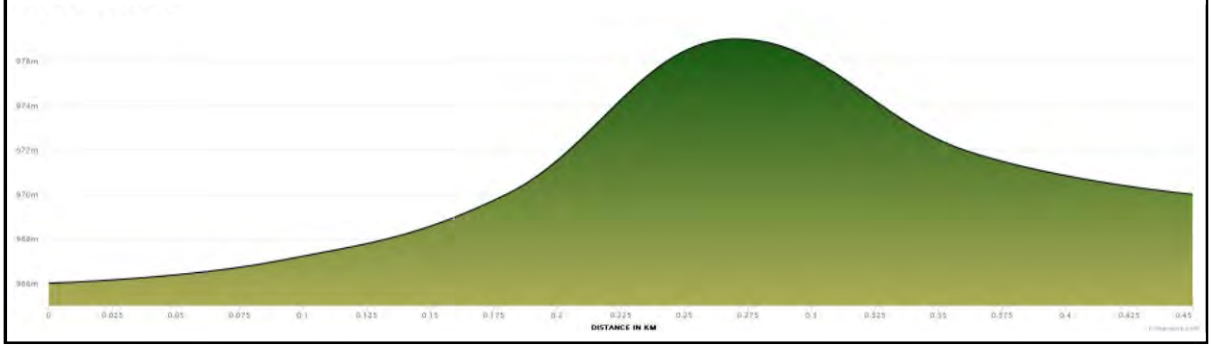
TRAIL FEATURES:

BERMS
NATURAL OBSTACLES
MULTIPLE LINE CHOICES

TRAIL MAP:



ELEVATION PROFILE:



State Mine Gully MTB Trail Network	66

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Intermediate	Flow	1,083	54.5/-95.9

TRAIL OVERVIEW:

Cross-country style loop trail - mix of climbing and descending.

TRAIL DETAILS:

USE	MTB Only
DIRECTION	Single Direction
DESCENT/CLIMB	Mix
SHUTTLE ACCESSIBLE	Yes
SIDE SLOPES	up to 50%
MAX. TRAIL GRADE	20%
AVERAGE GRADE	10% or less

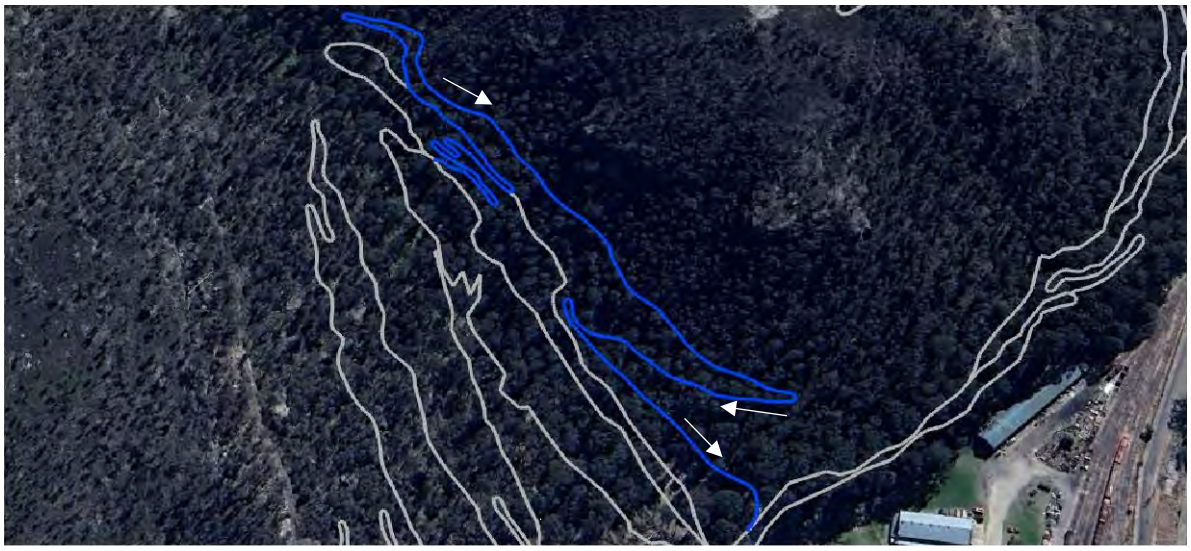
TRAIL STYLE DESCRIPTION:

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

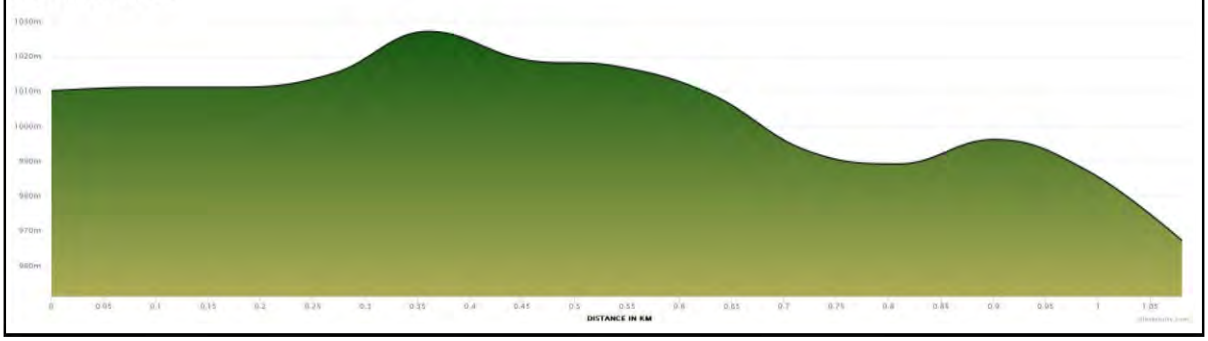
TRAIL FEATURES:

BERMS
ROLLERS
OPTIONAL/ROLLABLE JUMPS
MULTIPLE LINE CHOICES

TRAIL MAP:



ELEVATION PROFILE:



State Mine Gully MTB Trail Network	67

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Easy with Intermediate Sections	Adventure	168	7.93/-14.3

TRAIL OVERVIEW:

Short, but scenic trail offering a cool experience through a deep ferny gorge.

TRAIL DETAILS:

USE	MTB Only
DIRECTION	Single Direction
DESCENT/CLIMB	Climb
SHUTTLE ACCESSIBLE	Yes
SIDE SLOPES	up to 30%
MAX. TRAIL GRADE	20%
AVERAGE GRADE	7% or less

TRAIL STYLE DESCRIPTION:

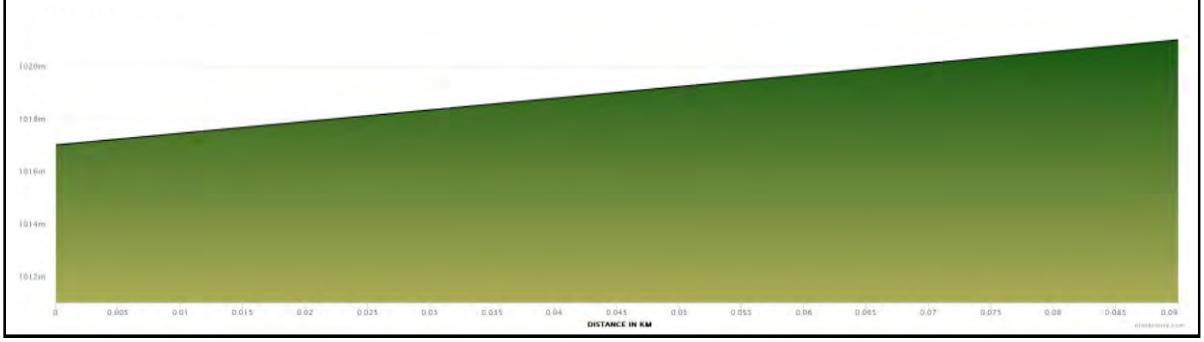
Traditionally referred to as cross-country, Adventure Trails are the most popular gateway trail for all levels of mountain bike riders. They have a free-flowing style and maximise use of the natural terrain with contour-hugging designs that allow riders to feel confident, while also providing options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

TRAIL FEATURES:

BERMS
NATURAL OBSTACLES
MULTIPLE LINE CHOICES

TRAIL MAP:

ELEVATION PROFILE:



State Mine Gully MTB Trail Network	68

TRAIL DIFFICULTY RATING:	TRAIL STYLE:	TRAIL LENGTH (m):	METRES CLIMBED/DESCENDED (m):
Easy with Intermediate Sections	Flow	248	1.96/-42.5

TRAIL OVERVIEW:

Short, fun descent, cutting off some of the climbing from Trail 66.

TRAIL DETAILS:

USE	MTB Only
DIRECTION	Single Direction
DESCENT/CLIMB	Descent
SHUTTLE ACCESSIBLE	Yes
SIDE SLOPES	up to 30%
MAX. TRAIL GRADE	20%
AVERAGE GRADE	7% or less

TRAIL STYLE DESCRIPTION:

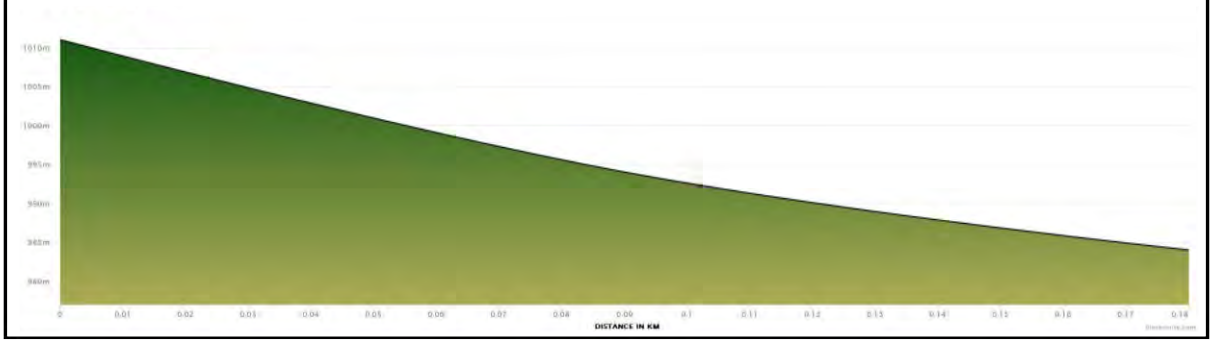
A descending trail style, Flow Trails offer a constant undulation of groomed rollers, berms, and achievable obstacles. The tyre-hugging trajectory sends riders on a sculptured luge ride through the bush. They create a sensation of speed and rhythm, require minimal decision-making and maximise the ability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

TRAIL FEATURES:

BERMS
ROLLERS
OPTIONAL/ROLLABLE JUMPS
MULTIPLE LINE CHOICES

TRAIL MAP:

ELEVATION PROFILE:



4.6 TRAIL PRIORITISATION

For planning and construction purposes, it is useful to rank the trails based on their overall importance or priority.

In order to determine the priority of a trail, three criteria were assessed – connectivity, market demand and style abundance.

Network connectivity is related to the overall functionality of the trail network. Trails with high network connectivity are those that provide access to other trails. For example, Trails 65 and 57 (green) in Figure 8 below have higher network connectivity compared to Trails 63 and 64 (red). Removing these trails would have a significant impact on the trail network functionality.

Figure 8. Trail Network Connectivity

Market demand relates to popularity in the broader mountain biking market – i.e. what sort of trails do people want to ride? Although gravity trails cater to a niche group, their technical nature means that only a relatively small portion of the market find them appealing. In recent years, flow trails have been growing in demand.

While market demand is a key consideration, it's equally important that the trail network offers a variety of trail styles to ensure the network appeals to all types of riders. In the currently proposed network, 50% are adventure, 41% are flow, 4.5% are gravity and 4.5% are shared-use. Style abundance assesses how many of a particular style of trail are in the current trail network, and therefore what impact it would have on removing a particular trail.

It is noted that the trail network on top of the plateau in the GOSSCA provides more adventure and cross-country style trails. The steeper terrain of the SMG escarpment is more suited to descending flow and gravity point-to-point trails.

Considering all of these elements, the trails have been ranked according to their priority, as shown in Table 2 on the next page.

Table 2. Priority rankings of trails

Priority	Trail	Trail Length (m)	Total Length (m)
High	01	668	18,138
	02	4799	
	50	2901	
	56	1466	
	57	6767	
	60	307	
	61	714	
	65	516	
Medium	03	2346	10,079
	53	1150	
	54	2561	
	55	1539	
	58	854	
	62	546	
	66	1083	
Low	52	1716	7,619
	59	3031	
	63	2314	
	64	142	
	67	168	
	68	248	

Note – Trail 51 is not included in this priority ranking, as it is an existing trail.

This information can be used to guide decision-making if the network needs to be reduced. We recommend that no highly ranked connective trails should be removed, regardless of their style abundance or market value. Furthermore, it is possible to change trail difficulty ratings or styles of some of the trails prior to construction, although some re-design work may be required if making significant changes.

4.7 TRAIL BREAKDOWN BY LOT PARCELS

Table 3 below shows the trails that occur on each of the various land parcels within the overall study area, and the cumulative length of trail proposed on each of the parcels.

Table 3. Trail Allocation by Lot Parcel

Tenure	Parcel No.	Trails	Length (m)
GOSSCA	n/a	01, 02, 03, 50, 51, 52, 53, 54, 55, 56, 57,	13091
State Mine Gully	DP787403	02, 50, 51, 52, 54, 55, 56, 57, 58	8748
	DP965231	02, 50, 51, 52, 53, 54, 57, 58, 59	5034
	DP876025	02, 50, 57	893
	DP1240259	02, 57, 60, 61, 62, 63, 64, 65, 66, 68	4163
	DP1110346	50, 51, 58, 59, 61, 62, 63, 66, 67, 68	5490
	Road Corridor	02, 57	154
	State Forest	53,54	60
Total			37631

Note – DP1110346 consists of two distinct land parcels, and the results shown combine data from both.

This information can be used as a guide to calculate and manage the amount of vegetation cleared per land parcel. Table 5 provides information about the construction impact widths of trails, allowing the total trail footprint to be calculated.

5 CONSTRUCTION

5.1 CONSTRUCTION NOTES

With the completion of this Ground-truthing Report, CTMTBC will possess all trail information and data required to seek final approvals and to move forward into the construction phase.

This section of the report provides some important notes relating to construction.

5.1.1 Ground-truthed Trail Alignments

During ground-truthing, the approximate centreline of each trail was flagged in the field with orange flagging tape and mapped with GPS. Natural features were identified in the field and incorporated into the alignment for the trails, including rock slabs, boulders and rock outcrops, rock gardens, fallen trees and so on.

When attempting to located and follow the trail alignments in the field, it is recommended that the following three sources of information are used:

1. Flagging tape – this indicates the true and accurate trail alignment and should be used first and foremost. Orange flagging tape was used for this project;
2. Spatial data – this should be used where flagging tape is missing;
3. Maps.

Care needs to be taken when following ground-truthing alignments, to ensure that the flagging tape is correctly interpreted. Typically, in dense vegetation, flagging tape is placed more frequently, ensuring that each tape is visible to/from the next/last. In sparser vegetation, tape is placed less frequently. The flagging tape indicates the approximate centreline of the trail, but scope should remain for trail builders to adjust the trail 5-10m to either side of the centreline. Switchback corners are generally flagged with three pieces of flagging tape placed together (see Figure 9 below).

Figure 9. Triple flagging tape indicating switchback corner

5.1.2 GIS Data

In addition to identifying, flagging and mapping the final alignment of trails, information was also captured during ground-truthing about the required construction treatments, such as bridges, boardwalks, rock armouring, hand construction etc. This information has been captured with photos, labels, notes and measurements. Table 4 below lists the different GIS shapefiles that make up the complete data set for this project. This dataset has been provided to CTMTBC along with this report. All trails and waypoints in the GIS dataset have been labelled as per the maps and descriptions provided in this report.

Table 4. GIS Data Collected

Item	Data Type	Description
1. Bridges	Point data	This layer includes details about all specified bridges and boardwalks. It nominates span lengths, footing types and indicative height.
2. Earthworks	Point data	This layer includes details about any sections requiring hand construction.
3. Field Notes	Point data	This layer contains simple notes that may be useful for trail builders and land managers such as “Merge onto vehicle track”, “Trail junction” and “Old flagging tape in this area”. These notes relate to navigation and do not include any prescribed construction treatments.
4. General Points of Interest	Point data	This layer includes features like switchbacks, waterfalls lookouts, trailheads and shuttle drop-off points.
5. Rock Armour	Point data	This layer includes details about all specified rock armouring, differentiating between natural rock armour using onsite rock, and imported, manufactured Adjustable Rock Matting (ARM).
6. Rock Walls 0 - 500mm	Point data	This layer includes details of any small rock retaining walls, from 0-500mm in height.
7. Rock Retaining Walls 500mm – 1000mm	Point data	This layer includes details of any taller rock retaining walls, from 500mm-1000mm in height.
8. Surfacing	Point data	This layer includes details about any specified surfacing treatments.
9. Trail Alignments	Line data	This layer includes the ground-truthed trail alignments, numbered as per this report, captured with details relating to trail style, trail type, trail difficulty rating etc.

5.1.3 Approvals and Permits

When seeking approvals for construction, it is recommended that approval be sought for placement of the trail within a 10-20m corridor on both sides of the flagged and mapped centreline. This allows the trail builders some flexibility to modify and adapt the trail in response to opportunities or constraints that weren't apparent during ground-truthing. It also allows for more creative expression by the trail builders who may interpret landscape features in slightly different ways.

The overall width of the trails to be constructed is usually an important consideration in seeking approvals and permits, as it correlates directly with the amount of vegetation to be removed. The actual construction impact width is wider than just the trail – it also includes the upper and lower batters. Overall construction impact width is influenced by a number of variables – side slope gradient, construction method (i.e. machine or hand) and the style of trail being constructed.

Table 5 below summarises typical construction impact widths for five different slope classes and both hand and machine construction.

Table 5. Average Trail Construction Footprint[1]

Slope Class	Build Type	Average Total Disturbance Width (m)
<=25%	Hand	1.2
	Machine	2.4
>25% to <=50%	Hand	1.6
	Machine	2.5
>50% to <=75%	Hand	1.8
	Machine	2.6
>75% to <=100%	Hand	2.0
	Machine	2.7
>100%	Hand	2.1
	Machine	3.3

Using these measurements above, it is possible to model the exact disturbance footprint of the proposed trail network to determine the exact area of native vegetation impact. This requires further GIS analysis to build a digital terrain model (DTM) and then to apply the impact widths of the trails to the relevant slope classes. This has not been undertaken for this project.

In the absence of such modelling, it is suggested that the widths provided in the table above be used as the basis for any vegetation impact calculations. It is likely that the vast majority of the trails will be located in areas with side slopes of 25-50%, with a very low percentage of trails located in the 0-25% and 50-75% class. Furthermore, it is anticipated that the entire trail network will be constructed by machine, except for the handful of locations noted for hand construction (less than 500m). It is suggested therefore, that applying the 2.5m total disturbance impact width of the 25-50% slope class across the entire trail network is a suitable and conservative estimate of total vegetation impacts.

[1] *Measuring Mountain Bike Trail Soil And Vegetation Disturbance*, World Trail, July 2021

5.1.4 Variability of Data

It should be noted that the construction treatments identified should be considered indicative and subject to review by the project manager and contractor during construction. Minor alignment changes within the approved corridor can result in changes to the length of the trail and any proposed construction treatments, possibly reducing or eliminating some of the proposed treatments. For example, by raising or lowering a trail by a few metres on a steep side slope, the construction of a small rock retaining wall may become necessary.

Therefore, while every attempt has been made to identify and quantify the likely construction treatments required, it is a normal occurrence in MTB trail construction for new or additional trail construction treatments to be identified as construction proceeds. Contractual mechanisms need to be put in place during construction to allow for these variations. Contingency allowances have been included in the cost estimate to allow for these variations and unknowns.

Another consideration is that the trail lengths provided in this report are two-dimensional calculations only, not taking into consideration changes in vertical elevation. When applied in the real three-dimensional world, where the trail will rise and fall, the actual lengths of the trails will be up to 10% longer than estimated here (without also considering any changes that may be made to the actual alignments by the trail builders).

5.1.5 Construction Challenges

The topography, soils, geology and vegetation present in State Mine Gully present some particular challenges for MTB trail construction:

- Rocky landscape of ridges and valleys – the landscape in the State Mine Gully can be described as a series of parallel flat-topped ridges and valleys, running in a northwest to southeast direction, generally sloping downwards towards the southeast. Many of the ridgetops end in steep cliff edges. The ridgetops are very rocky with only sparse soil cover and large areas of rock slabs. The valleys generally have deeper soils and taller trees and are generally better suited to trail construction. The northwest heads of the valleys offer good conditions with wide gently sloping bowls with the valleys tending to become more incised and deeper towards the southeast. Finding routes down from the ridgetops into the valleys, was a challenging prospect and many trails traversing through such areas often used narrow ledges or benches, some of which may not be suitable for excavator construction.
- Sloping rock slabs – there are numerous locations where trails traverse along bare rock slabs. During ground-truthing, trail alignments were carefully chosen to avoid these rock slabs where possible, especially steep rock slabs. In some instances, rock slabs have been used to create short fall-line sections of trail – that is, sections where the trail goes straight up or straight down the slope – as they provide interesting and challenging features with good grip and excellent sustainability characteristics. In other instances, where the side slope was suitably gentle, or a small ledge or platform provided a corridor across the rock slab, the trails traverse or contour across sloping rock slabs. These sections will need to be carefully managed during construction to ensure safe passage of excavators across the slab and to ensure that the trail is positioned correctly to ensure it provides adequate traction for riders. Many of these sloping rock slab sections may not be suitable for Easy trails in their natural form – off-camber rock slabs can be intimidating to less experienced riders. The recommended solution is to construct a small rock wall (less than 500mm high) which would then be backfilled with fill materials until level with the top of the rock wall, to create the bench for the trail. Trail builders will need to determine the best method to ‘fix’ the rock retaining wall in place – methods could include the use of concrete/mortar, using steel rods and adhesives to pin into the rock slab, or other solutions.
- Property boundaries – the State Mine Gully MTB Trail Network is located across multiple land parcels and is surrounded by a number of blocks of private freehold land. During ground-truthing the design intent was, where possible, to ensure that all trails maintained a minimum buffer of 10m from any property boundary and avoid overlooking any houses or buildings. This was not always possible. Prior to construction commencing, CTMTBC should consider engaging surveyors to determine and mark the exact position of any property boundaries, in areas where trails are proposed to be located close to property boundaries.

5.1.6 Construction Opportunities

The topography, soils, geology and vegetation present in State Mine Gully also present some particular opportunities for MTB trail construction:

- Rocky landscape of ridges and valleys – the topography of ridges and valleys, while challenging for construction, is also one of the key opportunities. It is a beautiful and compelling landscape, delivering scenery that will be a major drawcard for the trail network. The ridgetops offer endless views and long forward sightlines and interesting technical, rocky terrain. The valleys offer shade, tall trees, ferns and deep soils enabling the construction of berms, rollers, jumps and other earthen features.
- Abundance of rock – There is an abundance of useful and available rock that can be used in the trail construction. Large flat plates can be used for rock armouring, jumps and other applications. Much of this rock can be sourced within the trail corridor, as construction progresses, without having to scout large distances to find suitable rock. It should also be soft enough to be broken or split by trail builders during construction, providing an excellent resource for trail construction.
- Construction access – construction access is generally good, with a network of management vehicle tracks, fire roads and 4WD tracks surrounding the trail network. In general, all points on the proposed trail network are less than 1km from the nearest vehicle access point, facilitating easy access for the construction crew, material importation (if required) and emergency access. Furthermore, the majority of the State Mine Gully MTB Trail Network is within close proximity to Lithgow - less than a twenty minute drive.

5.2 BILL OF QUANTITIES

Table 6 on the following page lists all the trails that have been ground-truthed and are presented in this report.

Note that the trails have been broken into sections (A, B, C etc.) to allow them to be split across the different land tenures, or to allow them to have different cost rates applied to them, where the style/construction type changes mid trail (for example, the climbing portion of a trail is built and costed differently to the descending portion). Section labels are applied in the intended direction of travel – section A is the first section, B the second, etc.

Table 6. Bill of Quantities – Trails

Land Tenure	Trail Number	Section	Trail Style	AusCycling Trail Difficulty Rating	Proposed MTB Trail (m)	Proposed Shared-use Trail (m)	Total Trail Length (m)
GOSSCA	01	A	Adventure	Easy	668	0	668
GOSSCA	02	A	Flow	Easy	1830	0	1830
GOSSCA	02	B	Flow	Easy	502	0	502
GOSSCA	03	A	Flow	Intermediate	2346	0	2346
GOSSCA	50	A	Flow	Easy	540	0	540
GOSSCA	51	A	Gravity	Intermediate	400	0	400
GOSSCA	52	A	Flow	Intermediate Difficult	467	0	467
GOSSCA	53	A	Flow	Intermediate	453	0	453
GOSSCA	54	A	Adventure	Intermediate	1025	0	1025
GOSSCA	55	A	Flow	Intermediate	914	0	914
GOSSCA	56	A	Flow	Easy	1181	0	1181
GOSSCA	57	B	Adventure	Easy	0	383	383
GOSSCA	57	D	Adventure	Easy	0	2382	2382
Sub-total					**10326**	**2765**	**13091**
SMG	02	C	Flow	Easy	1203	0	1203
SMG	02	D	Flow	Intermediate	32	0	32
SMG	02	E	Adventure	Easy	70	0	70
SMG	02	F	Flow	Easy	1162	0	1162
SMG	50	B	Adventure	Easy	2360	0	2360
SMG	51	B	Gravity	Intermediate	1109	0	1109
SMG	51	C	Gravity	Intermediate	221	0	221
SMG	51	D	Gravity	Intermediate	67	0	67
SMG	52	B	Flow	Intermediate Difficult	396	0	396
SMG	52	C	Flow	Intermediate Difficult	853	0	853
SMG	53	B	Flow	Intermediate	697	0	697
SMG	54	B	Adventure	Intermediate	1054	0	1054
SMG	54	C	Adventure	Difficult	63	0	63
SMG	54	D	Adventure	Difficult	43	0	43
SMG	54	E	Adventure	Intermediate	375	0	375
SMG	55	B	Flow	Intermediate	514	0	514
SMG	55	C	Flow	Difficult	111	0	111
SMG	56	B	Flow	Easy	285	0	285
SMG	57	A	Adventure	Easy	0	2907	2907
SMG	57	C	Adventure	Easy	0	1096	1096
SMG	58	A	Adventure	Intermediate	854	0	854
SMG	59	A	Adventure	Difficult	1757	0	1757
SMG	59	B	Gravity	Difficult	1273	0	1273
SMG	60	A	Adventure	Easy	307	0	307
SMG	61	A	Adventure	Easy	714	0	714
SMG	62	A	Adventure	Easy	546	0	546
SMG	63	A	Adventure	Intermediate	2269	0	2269
SMG	63	B	Adventure	Difficult	23	0	23
SMG	63	C	Adventure	Difficult	22	0	22
SMG	64	A	Adventure	Easy	142	0	142
SMG	65	A	Adventure	Easy	516	0	516
SMG	66	A	Flow	Intermediate	1083	0	1083
SMG	67	A	Adventure	Easy Intermediate	168	0	168
SMG	68	A	Flow	Easy Intermediate	248	0	248
Sub-total					**20537**	**4003**	**24450**
TOTAL					**30863**	**6768**	**37,631**

Table 7 on the following page lists all of the construction treatments that have been specified across the State Mine Gully MTB Trail Network. Again, the table is split to show the two land tenures separately.

The construction treatments that have been specified include:

- Bridges
    - Short (<8m), No handrail
    - Short (<8m), With Handrail
- Earthworks: Hand Construction
- Lookouts
- Rock Armour:
    - Adjustable Rock Matting
    - Standard Rock Matting
- Surfacing: Imported Deco/ Road base
- Rock Walling (up to 500mm): Onsite Materials
- Retaining Walls (up to 1000mm): Onsite Materials

For each included construction treatment, the number of sites (where the treatment has been specified) is provided followed by the total cumulative length of those treatments. For example, Trail 2 (within GOSSCA) has 3 bridges, totalling 16m in length.

Table 7. Bill of Quantities – Construction Treatments

		Bridges: Short (<8m) No handrail		Bridges: Short (<8m) With Handrail		Earthworks: Hand Construction		Lookouts	Rock Armour: Adjustable Rock Matting		Rock Armour: Standard Rock Armour		Surfacing: Imported Deco/ Road base		Rock Walling (up to 500mm): Onsite Materials		Retaining Walls (up to 1000mm): Onsite Materials	
Land Tenure	**Trail Name**	**No. of sites**	**Length (m)**	**No. of sites**	**Length (m)**	**No. of sites**	**Length (m)**	**No. of sites**	**No. of sites**	**Length (m)**	**No. of sites**	**Length (m)**	**No. of sites**	**Length (m)**	**No. of sites**	**Length (m)**	**No. of sites**	**Length (m)**
GOSSCA	01	0	0	0	0	0	0	0	1	10	0	0	0	0	0	0	0	0
GOSSCA	02	3	16	0	0	0	0	0	5	26	2	10	0	0	1	10	0	0
GOSSCA	03	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
GOSSCA	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GOSSCA	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GOSSCA	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	40
GOSSCA	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GOSSCA	54	0	0	0	0	0	0	0	3	12	0	0	0	0	0	0	0	0
GOSSCA	55	1	3	0	0	0	0	0	1	8	1	4	0	0	0	0	0	0
GOSSCA	56	2	9	0	0	0	0	0	1	10	4	20	1	10	1	10	0	0
GOSSCA	57	0	0	0	0	0	0	0	0	0	2	12	0	0	1	4	0	0
Sub-total		**6**	**28**	**0**	**0**	**0**	**0**	**3**	**11**	**66**	**9**	**46**	**1**	**10**	**3**	**24**	**1**	**40**
SMG	02	2	8	0	0	0	0	0	0	0	3	15	2	40	3	55	0	0
SMG	50	0	0	0	0	0	0	0	0	0	9	66	0	0	5	23	3	210
SMG	51	2	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SMG	52	0	0	0	0	0	0	0	0	0	3	17	0	0	1	6	0	0
SMG	53	0	0	0	0	0	0	0	0	0	0	0	2	20	2	20	0	0
SMG	54	0	0	0	0	1	150	1	0	0	0	0	1	150	1	150	0	0
SMG	55	0	0	0	0	0	0	0	0	0	6	30	0	0	0	0	0	0
SMG	56	1	4	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0
SMG	57	1	8	0	0	0	0	0	0	0	10	50	0	0	5	25	0	0
SMG	58	1	5	0	0	0	0	0	0	0	0	0	2	30	2	30	0	0
SMG	59	0	0	0	0	1	300	2	0	0	2	11	2	60	2	60	0	0
SMG	60	2	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SMG	61	0	0	1	8	0	0	0	0	0	0	0	0	0	1	20	0	0
SMG	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SMG	63	0	0	0	0	1	50	1	0	0	7	31	0	0	5	80	0	0
SMG	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SMG	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SMG	66	0	0	0	0	0	0	0	0	0	7	44	0	0	1	10	0	0
SMG	67	0	0	0	0	0	0	0	0	0	1	10	0	0	0	0	0	0
SMG	68	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	0	0
Sub-total		**9**	**52**	**1**	**8**	0	0	**4**	**0**	**0**	**49**	**277**	**9**	**300**	**29**	**484**	**3**	**210**
TOTAL		**15**	**80**	**1**	**8**	**3**	**500**	**7**	**11**	**66**	**58**	**323**	**10**	**400**	**32**	**508**	**4**	**250**

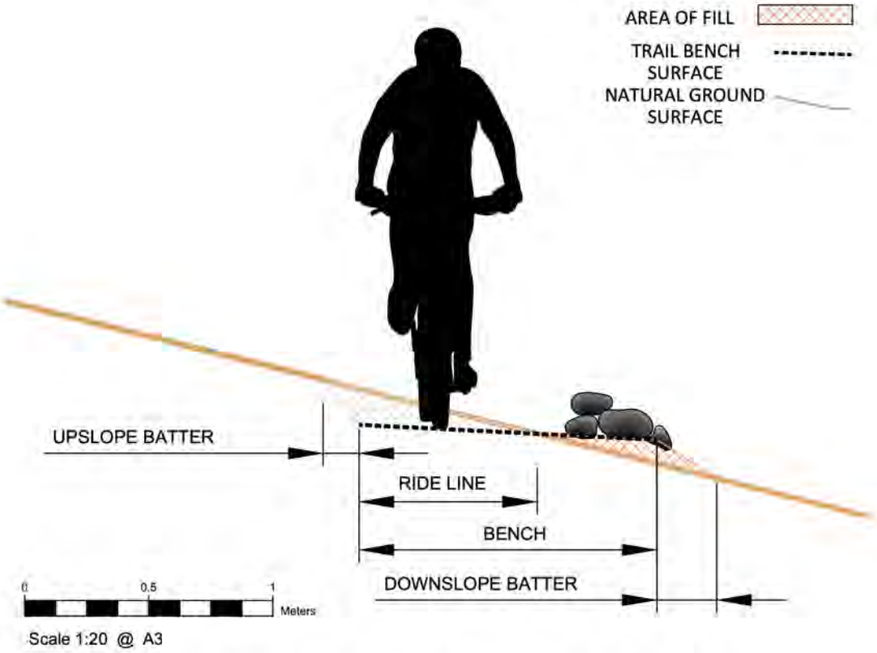
5.3 SPECIFICATIONS

The following pages provide indicative specifications for each of the main construction treatments described and costed in this report (except for bridges and lookouts which require further design work).

These specifications are intended to guide further detailed design or investigations, assist in obtaining relevant permits and approvals and may be used for tendering purposes.

Note that not all specifications may be relevant and not all construction treatments suggested in this report may be included in this section. These specifications are intended as a guide only and may need to be modified to reflect local conditions or approval requirements.

5.3.1 Trails – Standard Machine Bench Construction



TYPICAL SECTION - 4:1 (25%) CROSS SLOPE

NOTES:

GENERAL

- Standard bench construction is cut and fill. The cut material is used to create the outer edge of the bench.
- On very steep slopes, full bench construction can be used. In full bench construction, all spoil is removed from the trail. It is rarely used due to the logistical challenge and cost of removing the spoil. In some instances, the spoil can be used elsewhere along the trail to construct features such as berms or jumps.
- Standard bench construction is usually undertaken using a small (1.6-1.8T) rubber-tracked excavator. As the width of the tracks on these excavators is approx. 1m, the bench must be constructed to that width to allow the excavator to operate safely. This usually results in a bench width of 1m.
- Standard bench construction can be undertaken using hand construction. With hand construction techniques, the bench can be kept narrow, as it doesn't need to accommodate an excavator.
- The ride line is located on the inner side of the bench, where the soil is better compacted. The ride line is the part of the bench actually trafficked by riders. With usage, the ride line becomes well defined and parts of the bench outside of the ride line may be recolonised by plants. Ride line width varies along the trail - for example, it is often wider in corners than straight sections. Average ride line width is 600mm.
- Rocks and/or logs can be placed (or remain) on the outer edge of the bench to define the ride line and encourage riders away from the outer edge.
- Naturally occurring rock may be used to protect the upslope butter and downslope batter toe where available and appropriate. Rocks can be used in the toe of the downslope batter to provide additional stabilisation on steeper slopes.
- The angle of the upslope batter varies, but should be laid back the minimum amount to ensure batter stability, accounting for different soil types.
- The depth of excavation varies, depending primarily on the side slope - steeper side slopes require deeper excavation.
- Mountain bike trails are usually natural surface - that is, the 'tread' of the trail is the naturally occurring, in situ, soil. Imported materials such as gravel or crushed rock are occasionally used to improve grip or provide a more durable or uniform surface.
- Dimensions in millimetres unless otherwise noted.
- Drawing and dimensions are indicative only.
- Trail gradients and other elements should generally comply with the "Sustainability Guidelines" summarised below. These guidelines are adapted from the Australian Mountain Bike Guidelines 2019 and are to be treated as a guide only.

TRAIL SUSTAINABILITY GUIDELINES

THE HALF RULE:
- A trail's grade shouldn't exceed half the grade of the hill slope or sideslope that the trail traverses.
- Grades exceeding the half rule may cause water to flow along the trail causing erosion.

THE TEN PERCENT AVERAGE GUIDELINE:
- The overall grade of a trail should be 10% or less.
- Some sections may be steeper than 10% and some less steep.
- The ten percent average guideline may need to be adjusted to suit different soil types.

MAXIMUM SUSTAINABLE GRADE:
- The maximum sustainable grade is typically 15% to 20% but is dependent on a wide range of factors.
- These factors include soil type, annual rainfall, vegetation and topography constraints and the level of difficulty for users.

GRADE REVERSALS:
- Grade reversals are points at which the trail gradient changes from down to up (or up to down), creating a low point where water is pushed off the trail.
- The more frequent the grade reversals, the smaller the amount of water that needs to cross at each point thereby reducing the potential erosion and the need for drainage infrastructure.

OUTSLOPE:
- Outslope is the grading of the trail to a cross slope of 5% following the general slope direction of the local terrain.
- Outsloping enables stormwater to flow across the trail as a sheet rather than as concentrated flow.
- Outslopes will not be appropriate near berms or banked turns or in some loose soil types.

FOR INFORMATION

Rev.	Date	Revision Details	Drn.	Ver.	App.

WORLDTRAIL

Client:

Project:

Drawn	Signed	Date	
Designed	Signed	Date	
Verified	Signed	Date	
Approved	Signed	Date	

Drawing Title: MOUNTAIN BIKE TRAIL SECTIONS STANDARD BENCH CONSTRUCTION STANDARD DRAWING

Project No.

Scale: 1:20

Sheet Size: A3

Drawing No.

Rev.

5.3.2 Trails – Dual Use

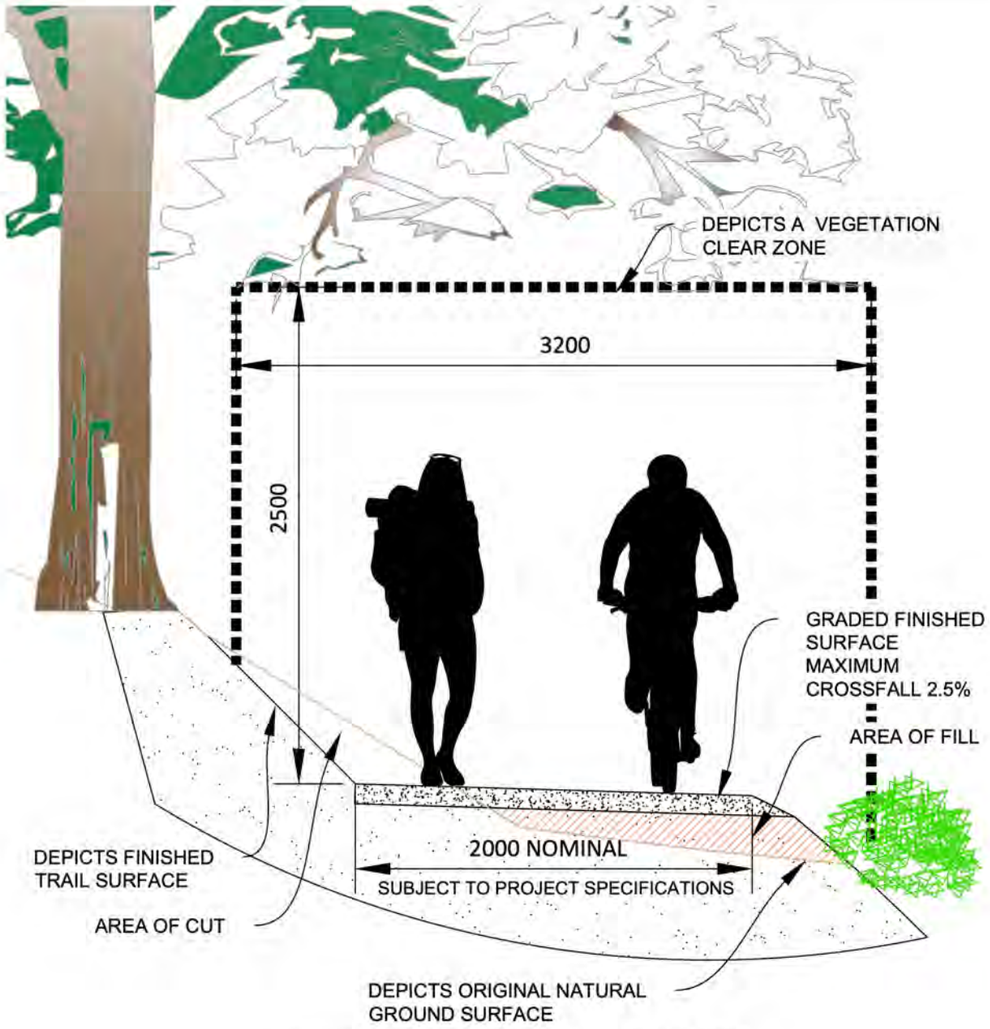
NOTES:

GENERAL:
- Dual direction (two way) trail.
- The trail will provide access along a slightly modified, natural environment alignment, with little provision of interpretive signage and few facilities.
- Users can expect few encounters with others.
- Locate and protect any underground or overhead services prior to commencement of works.
- Refer to project specific details for sub-grade preparation and surface finish methodologies and specifications.
- Trail excavation is to be cut and fill.
- Naturally occurring rock is to be used to protect the uphill cut and the downhill toe where available and appropriate.
- Dimensions in millimetres unless otherwise notated.
- Details shown are subject to final project specifications.

CLASS 4 TRAIL AS DEFINED IN AS 2156.1-2001
- Trail will generally be distinct without major modifications to the ground.
- Encounters with fallen debris and other obstacles are likely.
- It will generally be less than 1200mm and be mostly clear of intrusions and obstacles..
- Trail gradient to be limited to environmental and maintenance considerations.
- Steps may be common in some steeper sections.
- Ensure sides are protected by backfilling with suitable local materials.
- Facilities will generally not be provided apart from some specific safety and environmental considerations
- Users require a moderate level of specialised skills such as navigation skills. Users may require maps and navigation equipment and need to be self-reliant, particularly in regard to emergency first aid and possible weather hazards.
- Users may encounter natural hazards such as steep slopes, unstable surfaces and minor water crossings and are responsible for their own safety.
- Storms may effect navigation and safety.

MTBA GREEN SQUARE DIFFICULTY RATING (EASY)
- Single trail with gentle gradients, smooth surface and relatively free of obstacles.
- Short sections may exceed these criteria.
- Trail width to be 900mm, or greater, with an allowance of plus or minus 300mm for tread areas or bridges.
- The trail surface should be mostly firm and stable.
- Average longitudinal grades are to be 7%. or less.
- May include steeper sections.
- Maximum trail grade to be 15%.
- Exposure to either side of trail corridor includes slopes of up to 10% (1 in 10).
- Trail may include avoidable, rollable, obstacles.
- Trail may have sections of rocky or loose tread and have unavoidable small obstacles (less than 50mm) such as logs, roots and rocks.
- Trail alignment may include unavoidable bridges at 900mm wide.
- Bridge deck width is to be half the bridge deck height.
- Short sections of the trail may exceed criteria.
- The trail is rated for beginner/novice cyclists with basic riding skills.
- Suitable for off-road bikes.
- Trailheads, route marking and intersections should be clearly signposted.

NOTE:
Some trail specifications have been extracted from AS 2156.1-2001 & the MTBA - Australia, Trail Difficulty Rating System, 2019, version 3.0.



TYPICAL CROSS SECTION DUAL USE
A.S. 2156.1-2001 CLASS 4 &
MTBA GREEN SQUARE RATING (EASY)

GENERAL ARRANGEMENT
SCALE 1:25

0 0.5 1 Meters
Scale 1:25 @ A3

FOR INFORMATION

Rev.	Date	Revision Details	Drn.	Ver.	App.

WORLDTRAIL

Client:

Project: WORLD TRAIL STANDARD DRAWING

Drawn	Signed	Date	
Designed	Signed	Date	
Verified	Signed	Date	
Approved	Signed	Date	

Drawing Title: TRAIL SECTIONS - DUAL USE CLASS 4 WALKING - GREEN SQ. RIDING STANDARD DRAWING

Project No.
Scale 1:25
Sheet Size A3
Drawing No.
Rev.

5.3.3 Trails – Easy Trail Difficulty Rating

NOTES:

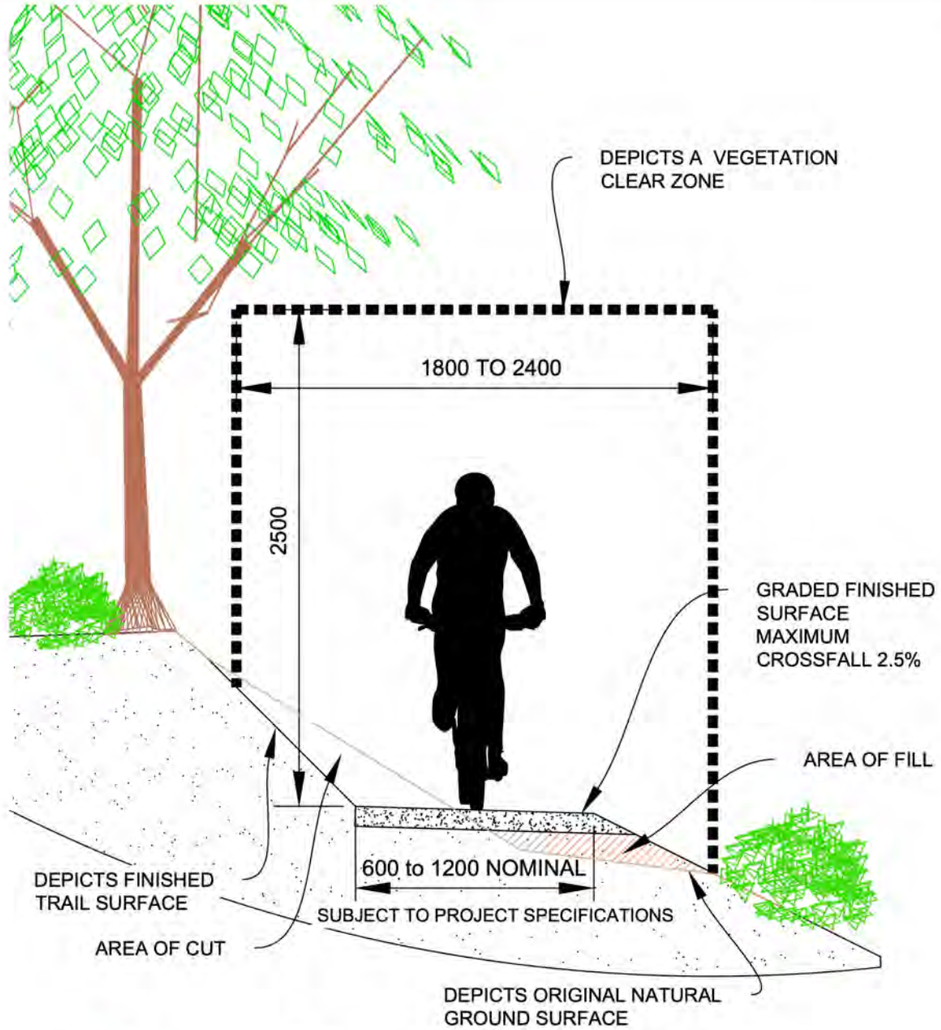
GENERAL:

- Single use and direction trail.
- The trail will provide access along a slightly modified, gentle natural environment alignment.
- Locate and protect any underground or overhead services prior to commencement of works.
- Refer to project specific details for sub-grade preparation and surface finish methodologies and specifications.
- Trail excavation is to be cut and fill.
- Naturally occurring rock is to be used to protect the uphill cut and the downhill toe where available and appropriate.
- Dimensions in millimetres unless otherwise notated.
- Details shown are subject to final project specifications.

MTBA EASY DIFFICULTY RATING

- Wide single trail and/or fire road with gentle gradients, smooth surface and relatively free of obstacles.
- Trail width to be 900mm, or greater, with an allowance of plus or minus 300mm for tread areas or bridges.
- The trail surface should be mostly firm and stable.
- Average longitudinal grades are to be 7%. or less.
- Maximum trail grade to be 15%.
- May include some moderately steeper sections.
- Short sections may exceed these grade criteria.
- Exposure to either side of trail corridor includes slopes of up to 30% (3.3:1).
- Trail may include avoidable, rollable, obstacles or jumps.
- Trail may have sections of rocky or loose tread and have unavoidable small obstacles up to 100mm high such as logs, roots and rocks.
- Trail alignment may include unavoidable bridges at 900mm wide or wider.
- Bridge deck width is to be half the bridge deck height.
- Short sections of the trail may exceed the bridge and obstacle criteria.
- The trail is rated for beginner/novice cyclists with basic riding skills.
- Suitable for off-road bikes.
- Trailheads, route marking and intersections should be clearly signposted.

NOTE:
Some trail specifications have been extracted from the MTBA - Australia, Australian Mountain Bike Guidelines, 2019 updated to the Trail Difficulty Rating System, October 2020.



TYPICAL CROSS SECTION - MTB TRAIL
MTBA EASY RATING

GENERAL ARRANGEMENT
SCALE 1:25

0 0.5 1 Meters
Scale 1:25 @ A3

FOR INFORMATION

Rev.	Date	Revision Details	Drn.	Ver.	App.

WORLDTRAIL

Client:

Project:

Drawn	Signed	Date	
Designed	Signed	Date	
Verified	Signed	Date	
Approved	Signed	Date	

Drawing Title: TRAIL SECTIONS – MTB TRAIL DIFFICULTY RATING SYSTEM EASY CLASSIFICATION STANDARD DRAWING

Project No.

Scale: 1:25 | Sheet Size: A3

Drawing No. | Rev.

5.3.4 Trails – Easy/Intermediate Trail Difficulty Rating

NOTES:

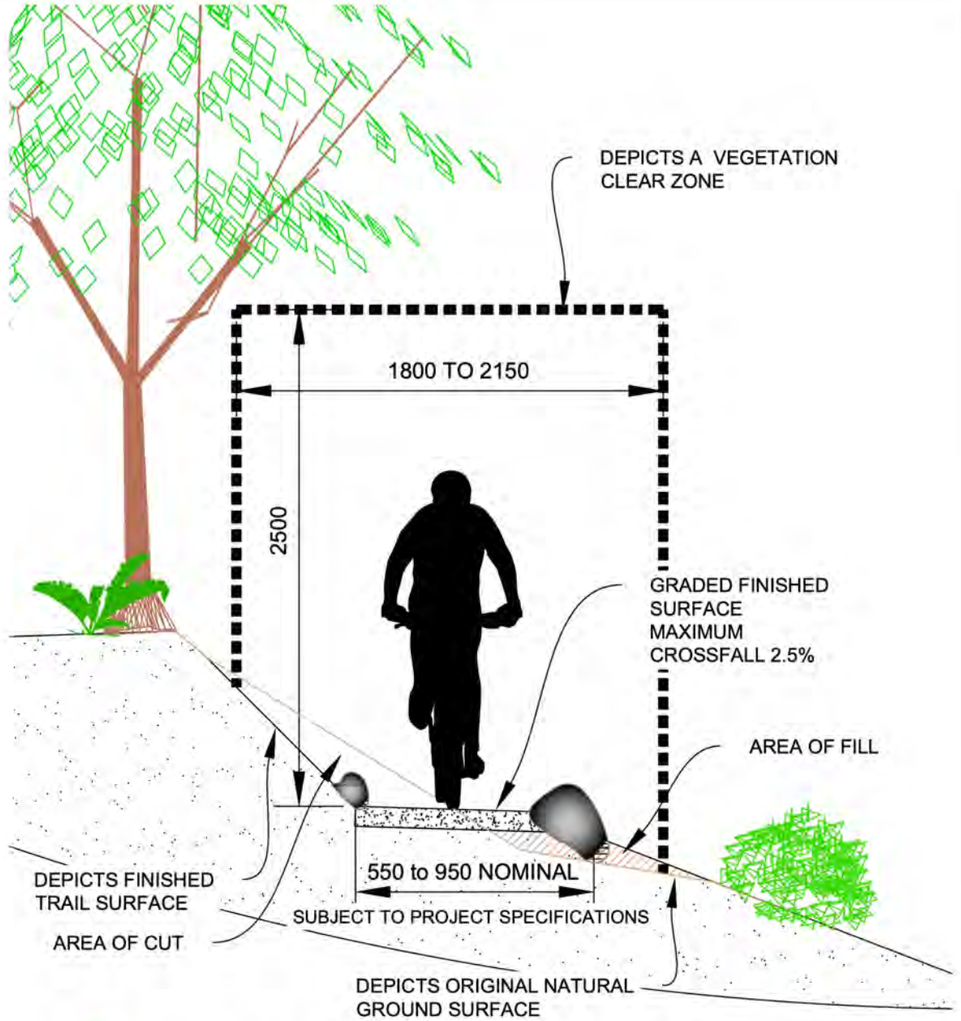
GENERAL:

- Single use and direction trail.
- The trail will provide access along a slightly modified, natural environment alignment, with a moderate gradient, variable surface and some obstacles.
- Locate and protect any underground or overhead services prior to commencement of works.
- Refer to project specific details for sub-grade preparation and surface finish methodologies and specifications.
- Trail excavation is to be cut and fill.
- Naturally occurring rock is to be used to protect the uphill cut and the downhill toe where available and appropriate.
- Dimensions in millimetres unless otherwise notated.
- Details shown are subject to final project specifications.

MTBA EASY/INTERMEDIATE DIFFICULTY RATING

- Likely to be a single trail with a moderate gradient, variable surface and possibly some obstacles.
- Trail width to be 750mm, or greater, with an allowance of plus or minus 200mm for tread areas or bridges.
- The trail surface should be mostly firm and stable.
- Average longitudinal grades are to be 7%. or less.
- Climbs and descents are mostly shallow, but trail may include some moderately steep sections.
- Maximum trail grade to be 20%.
- Short sections may exceed these grade criteria.
- Exposure to either side of trail corridor includes slopes of up to 30% (3.3:1).
- Trail may include avoidable, rollable, obstacles and jumps.
- Trail may have sections of rocky or loose tread and have unavoidable small obstacles up to 200mm such as logs, roots and rocks.
- Trail alignment may include unavoidable bridges at 900mm wide or wider.
- Short sections of the trail may exceed criteria for avoidable & unavoidable obstacles and bridges.
- The trail is suitable for beginner/novice cyclists with basic mountain bike skills.
- Suitable for off-road bikes.
- Trailheads, route marking and intersections should be clearly signposted.

NOTE:
Some trail specifications have been extracted from the MTBA - Australia, Australian Mountain Bike Guidelines, 2019 updated to the Trail Difficulty Rating System, October 2020.



TYPICAL CROSS SECTION MTB TRAIL
MTBA EASY/INTERMEDIATE RATING

GENERAL ARRANGEMENT
SCALE 1:25

0 0.5 1 Meters
Scale 1:25 @ A3

FOR INFORMATION

Rev.	Date	Revision Details	Drn.	Ver.	App.

WORLDTRAIL

Client:

Project:

Drawn	Signed	Date	
Designed	Signed	Date	
Verified	Signed	Date	
Approved	Signed	Date	

Drawing Title: TRAIL SECTIONS – MTB TRAIL DIFFICULTY RATING SYSTEM EASY/INTERMEDIATE CLASSIFICATION STANDARD DRAWING

Project No.

Scale 1:25

Sheet Size A3

Drawing No.

Rev.

5.3.5 Trails – Intermediate Trail Difficulty Rating

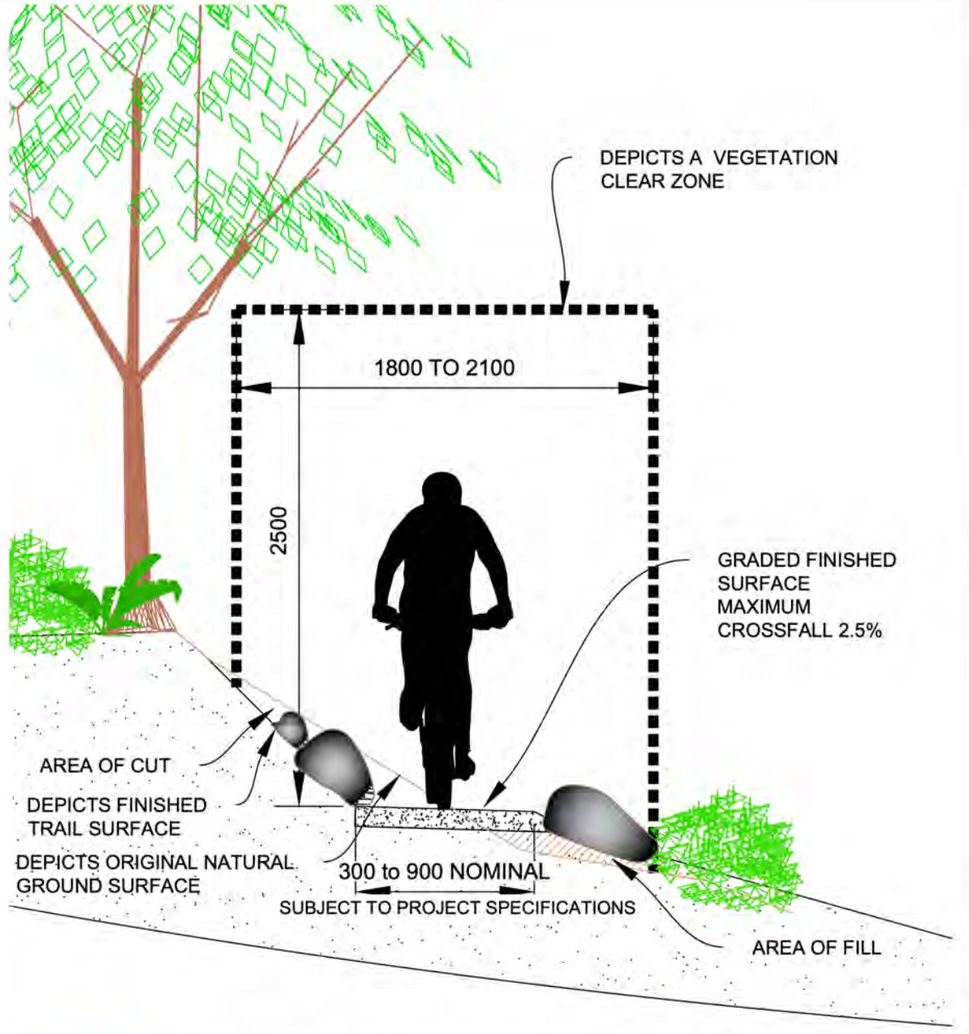
NOTES:

GENERAL:

- Single use and direction trail.
- The trail will provide access along a slightly modified, natural environment alignment, with moderate gradients and possibly occasional steep sections.
- Locate and protect any underground or overhead services prior to commencement of works.
- Refer to project specific details for sub-grade preparation and surface finish methodologies and specifications.
- Trail excavation is to be cut and fill.
- Naturally occurring rock is to be used to protect the uphill cut and the downhill toe where available and appropriate.
- Dimensions in millimetres unless otherwise notated.
- Details shown are subject to final project specifications.

MTBA INTERMEDIATE RATING

- Single trail with moderate gradients, varaible surface and possible obstacles.
- Trail width to be 600mm plus or minus 300mm for general trail, tread areas or bridges with handlebar clearance on both sides.
- The trail surface may include rocky or loose tread sections.
- Mostly moderate grades but may include steeper sections.
- Average longitudinal trail grades are to be 10% or less.
- Maximum trail grade to be 20%.
- Short sections may exceed the grade criteria.
- Exposure to either side of trail corridor includes slopes of up to 50% (2:1).
- Trail may include avoidable, rollable, obstacles.
- Trail may have sections of rocky or loose tread and have unavoidable small obstacles up to 350mm high such as logs, roots and rocks.
- Tabletop jumps to 1500mm high, rollable double jumps and avoidable gap jumps may exist along the trail.
- Trail may have sections with avoidable obstacles up to 600mm where the deck width must be greater than half the height of the obstacle.
- Trail alignment may include unavoidable bridges at 600mm wide, or wider.
- Short sections of the trail may exceed the obstacle criteria.
- The trail is suitable for skilled mountain bikers with basic riding skills.
- Suitable for mountain bikes.
- Trailheads, route marking and intersections should be clearly signposted.



TYPICAL CROSS SECTION MTB TRAIL
MTBA INTERMEDIATE RATING

NOTE:
Some trail specifications have been extracted from the MTBA - Australia, Australian Mountain Bike Guidelines, 2019 updated to the Trail Difficulty Rating System, October 2020.

GENERAL ARRANGEMENT
SCALE 1:25

0 0.5 1 Meters
Scale 1:25 @ A3

FOR INFORMATION

Rev.	Date	Revision Details	Drn.	Ver.	App.

Client:
Project:

Drawn	Signed	Date	
Designed	Signed	Date	
Verified	Signed	Date	
Approved	Signed	Date	

Drawing Title: TRAIL SECTIONS – MTB TRAIL DIFFICULTY RATING SYSTEM INTERMEDIATE CLASSIFICATION STANDARD DRAWING

Project No.
Scale 1:25
Sheet Size A3
Drawing No.
Rev.

5.3.6 Trails – Intermediate/Difficult Trail Difficulty Rating

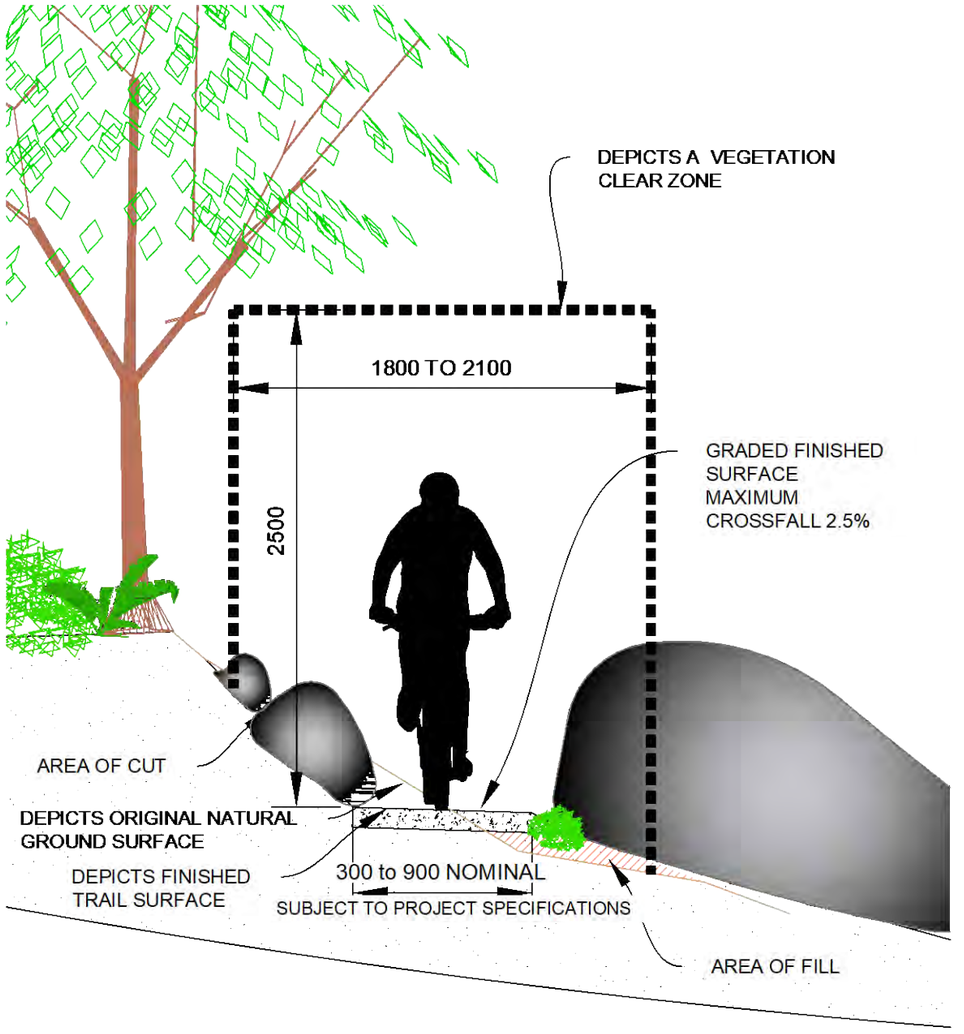
NOTES:

GENERAL:

- Single use and direction trail.
- The trail will provide access along a minimally modified, natural environment alignment, with a range of intermediate and difficult sections.
- It is suitable for competent mountain bikers, used to physically demanding routes.
- Locate and protect any underground or overhead services prior to commencement of works.
- Refer to project specific details for sub-grade preparation and surface finish methodologies and specifications.
- Trail excavation is to be cut and fill.
- Naturally occurring rock is to be used to protect the uphill cut and the downhill toe where available and appropriate.
- Dimensions in millimetres unless otherwise notated.
- Details shown are subject to final project specifications.

MTBA INTERMEDIATE/DIFFICULT RATING

- Single trail with moderate gradients, variable surface and possible obstacles.
- Consists of varying sections with either intermediate or difficult ratings.
- The trail is generally graded as intermediate but it may have difficult sections at stages.
- Trail width to be 600mm plus or minus 300mm for general trail, tread areas or bridges with handlebar clearance on both sides.
- The trail surface may include rocky or loose tread sections.
- Mostly moderate grades but may include steeper sections.
- Average longitudinal trail grades are to be 20% or less.
- Maximum trail grade to be 30%.
- Short sections may exceed these grade criteria.
- Exposure to either side of trail corridor includes slopes of up to 50%(2:1).
- Trail may include avoidable obstacles to 1000mm.
- The width of the deck is to be greater than half the height of the obstacle.
- Trail may have sections of rocky or loose tread and have unavoidable small obstacles up to 400mm, such as logs, roots and rocks.
- Tabletop jumps to 2000mm high, rollable double jumps and avoidable gap jumps may exist along the trail.
- Trail alignment may include unavoidable bridges at 600mm wide.
- Short sections of the trail may exceed these obstacle criteria.
- The trail is suitable for competent mountain bikers with good riding skills.
- Suitable for mountain bikes.
- Trailheads, route marking and intersections should be signposted.



TYPICAL CROSS SECTION MTB TRAIL
AUSCYCLING INTERMEDIATE/DIFFICULT RATING

NOTE:
Trail specifications have been extracted from the AusCycling, Australian Mountain Bike Trail Guidelines. Mountain Biking Australia (MTBA) became part of AusCycling in 2020.

GENERAL ARRANGEMENT
SCALE 1:25

0 0.5 1 Meters
Scale 1:25 @ A3

FOR CONSTRUCTION

Rev.	Date	Revision Details	Drn.	Ver.	App.

WORLDTRAIL

Client:

Project:

Drawn JR	Signed	Date 06/02/24	
Designed DJ	Signed	Date 06/02/24	
Verified DS	Signed	Date 06/02/24	
Approved	Signed	Date	

Drawing Title: TRAIL SECTIONS - MTB TRAIL DIFFICULTY RATING SYSTEM INTERMEDIATE/DIFFICULT CLASSIFICATION STANDARD DRAWING

Project No. WT2019-107
Scale 1:25
Sheet Size A3
Drawing No. WTSTD-060-YV
Rev. D

5.3.7 Trails – Difficult Trail Difficulty Rating

NOTES:

GENERAL:

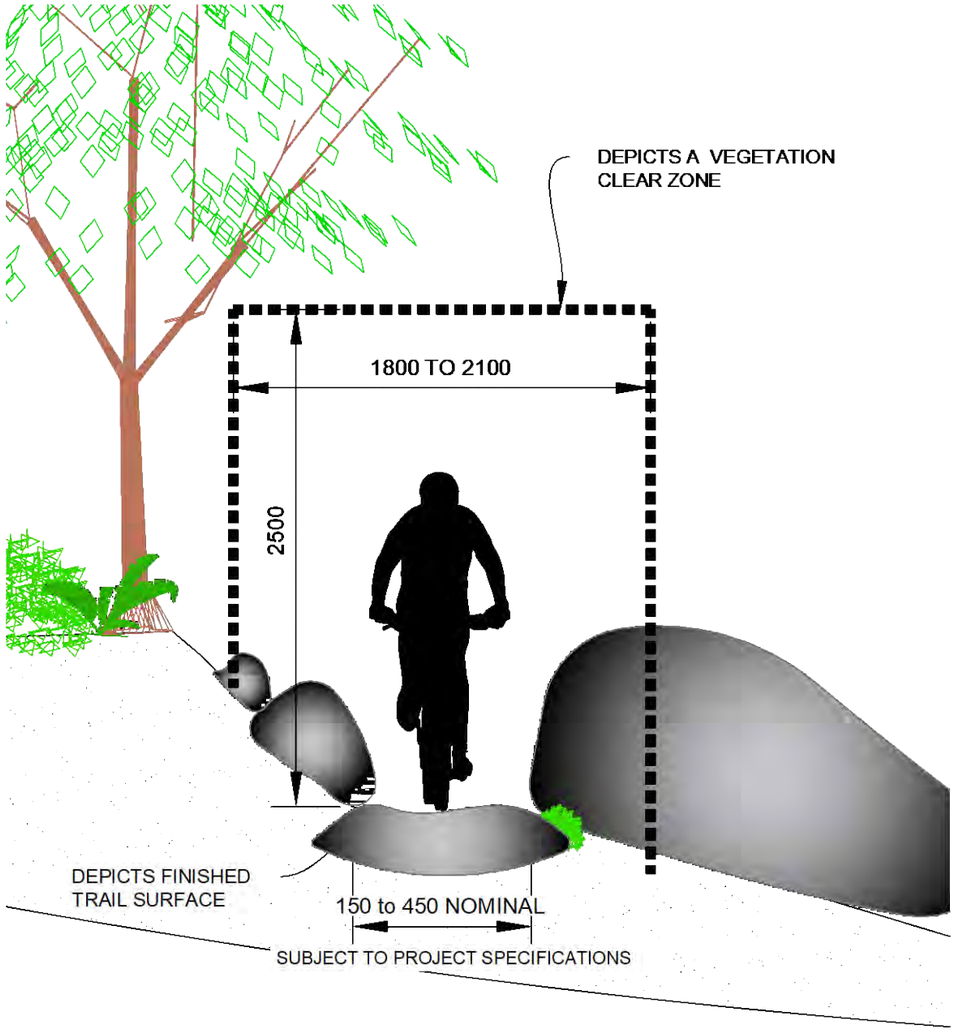
- Single use and direction trail.
- The trail will provide access along a minimally modified, natural environment alignment, with sections of difficult trail.
- Locate and protect any underground or overhead services prior to commencement of works.
- Refer to project specific details for sub-grade preparation and surface finish methodologies and specifications.
- Trail excavation is to be cut and fill.
- Naturally occuring rock is to be used to protect the uphill cut and the downhill toe where available and appropriate.
- Dimensions in millimetres unless otherwise notated.
- Details shown are subject to final project specifications.

MTBA DIFFICULT RATING

- Single trail with challenging steep gradients, variable surface and many obstacles.
- The Trail may consist of multiple optional lines.
- The trail is graded as difficult and should be suitable for cross country, airflow, adventure, wilderness, flow, gravity, downhill or trials.
- Trail width to be 300mm plus or minus 150mm for general trail, tread areas or bridges and may be less than handlebar width.
- The trail surface will be variable and challenging and may include optional lines.
- Longitudinal trail grades will include steep descents and climbs.
- Average trail grade to be 20%or less.
- Maximum trail grade to be 30%.
- Short sections may exceed the grade criteria.
- Exposure to either side of trail corridor includes slopes that may be steep downward slopes or even freefall.
- Trail may include avoidable obstacles to 1200mm.
- The width of the deck is to be greater than half the height of the obstacle.
- Trail may have sections of rocky or loose tread and have unavoidable small obstacles up to 500mm, such as logs, roots, rocks, drop off's or constructed obstacles.
- Tabletop jumps to 2500mm high, rollable double jumps and avoidable gap jumps may exist along the trail.
- Trail alignment may include unavoidable bridges at 600mm wide.
- Short sections of the trail may exceed the criteria for avoidable & unavoidable obstacles, tabletop jumps and bridges.
- The trail is suitable for experienced mountain bikers with good riding skills and are used to physically demanding routes.
- Some sections will be easier to walk.
- Navigation and personal survival skills are highly desirable.
- Suitable for better quality mountain bikes.
- Trailheads, route marking and intersections may have limited signage.

NOTE:

Trail specifications have been extracted from the AusCycling, Australian Mountain Bike Trail Guidelines. Mountain Biking Australia (MTBA) became part of AusCycling in 2020.



TYPICAL CROSS SECTION MTB TRAIL AUSCYCLING DIFFICULT RATING

GENERAL ARRANGEMENT
SCALE 1:25

0 0.5 1 Meters
Scale 1:25 @ A3

FOR CONSTRUCTION

Rev.	Date	Revision Details	Drn.	Ver.	App.

Client:

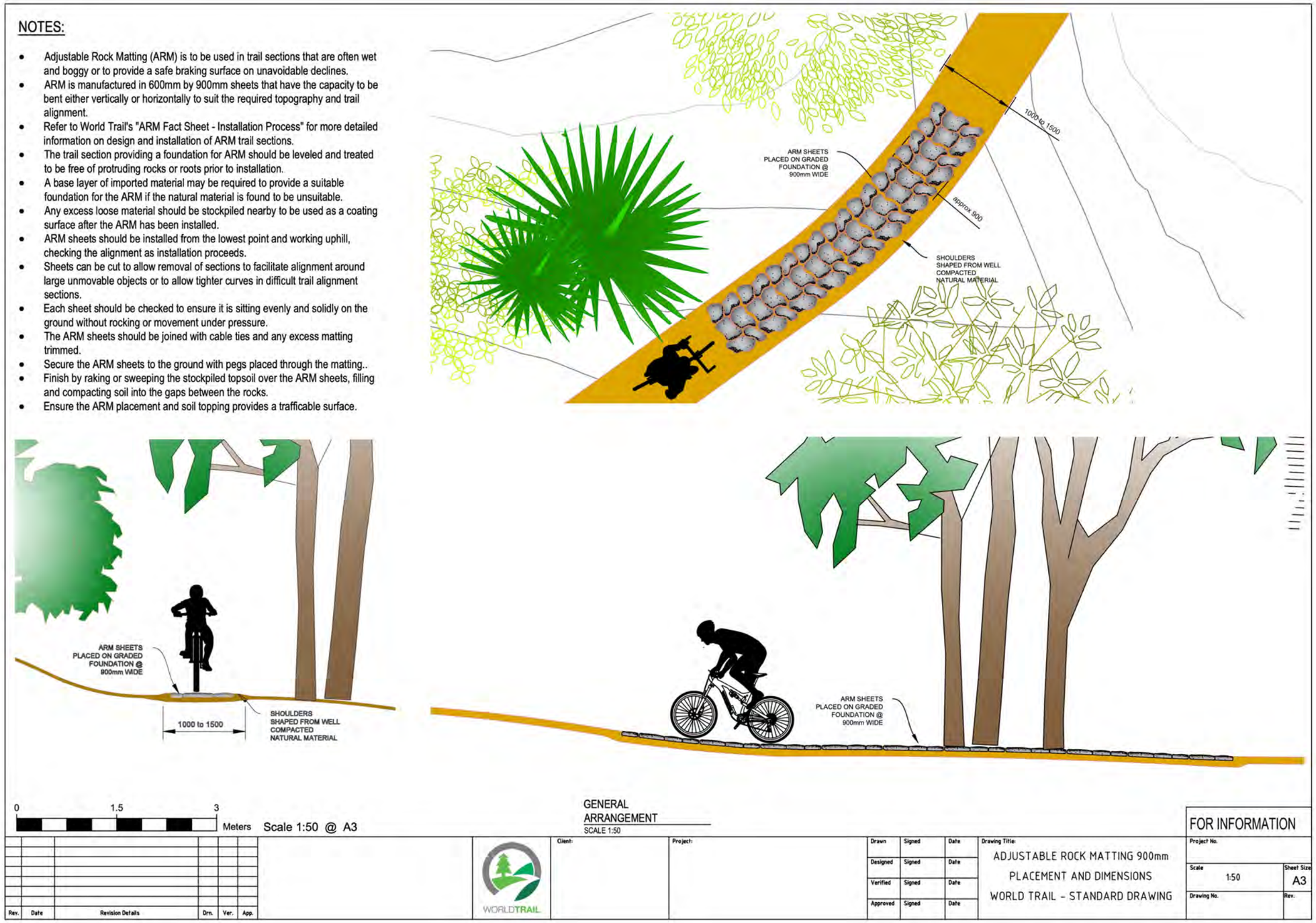
Project:

Drawn JR	Signed	Date 06/02/24	
Designed RJ	Signed	Date 06/02/24	
Verified DJ	Signed	Date 06/02/24	
Approved	Signed	Date	

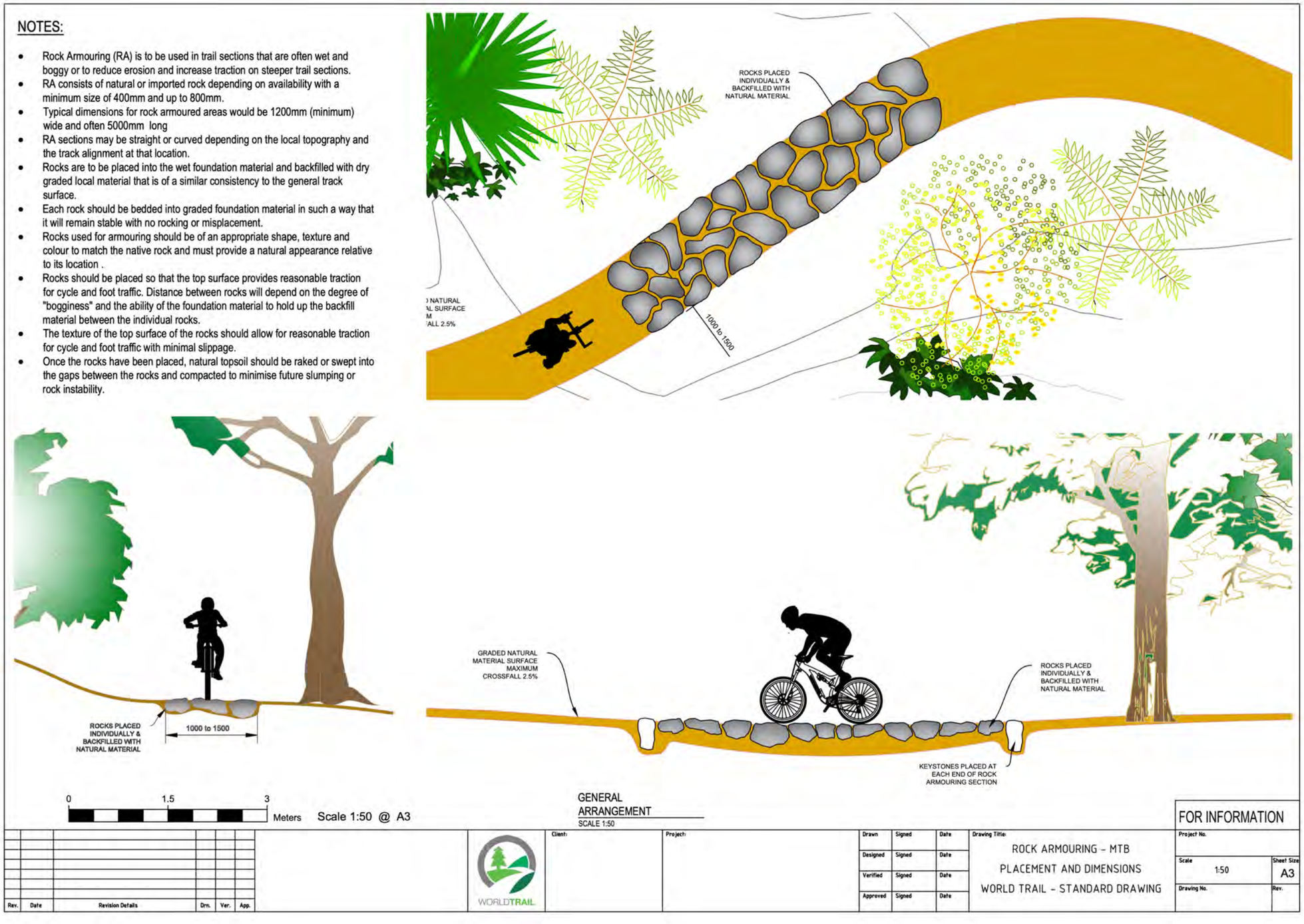
Drawing Title: TRAIL SECTIONS - MTB TRAIL DIFFICULTY RATING SYSTEM DIFFICULT CLASSIFICATION STANDARD DRAWING

Project No. WT2019-107
Scale 1:25
Sheet Size A3
Drawing No. WTSTD-061-YV
Rev. D

5.3.8 Rock Armouring – Adjustable Rock Matting



5.3.9 Rock Armouring – Standard Rock Armouring



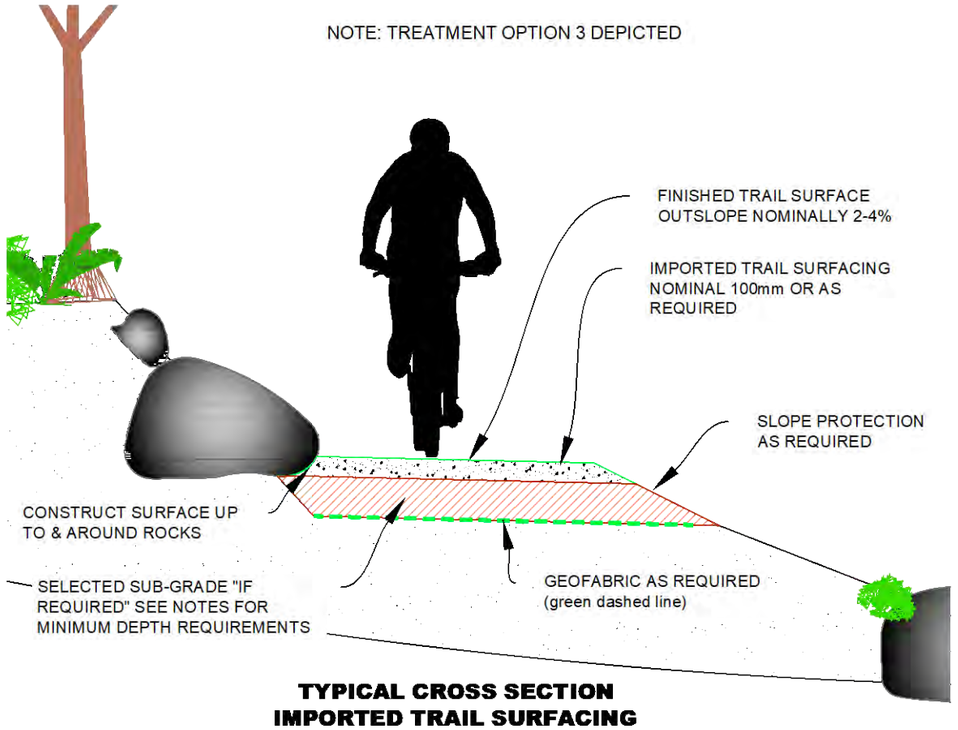
5.3.10 Surfacing

NOTES:

1. Ensure drainage is always correctly constructed and/or installed to manage water flows along or across the trail. surfacing is not a substitute for drainage.
2. Use surfacing when:
   a. *finished trail surface/soil type is susceptible to becoming boggy or soaked*
   b. *surface is susceptible to damage from tyres or footfall in all conditions*
   c. *project specifications include the need for specific surfacing (eg surfaced walking trail)*
3. Imported surfacing material will consist of either an application specific "trail mix" or a material that may be defined in the project requirements if specified.
4. Trail mix should consist of an aggregate base material mixed with a clay/loam binder as agreed with the project principle.
5. The selection of surfacing material will depend on:
   a. *application requirements (MTB, Walking or Dual Use Trail).*
   b. *compaction/hardness required for the trail.*
   c. *amount of "grip" the material provides.*
   d. *amount of rainfall likely in the trail location.*
6. The imported surfacing material should be placed on a prepared sub-grade surface.
7. Sub-grade material should be compacted and inspected for suitability by a qualified or experienced person prior to the placement of imported trail surfacing.
8. There are 4 treatment options depending on the results of this assessment.
9. Compaction should be achieved through track rolling or manual compaction with a ramming tamper.
10. All loose stones, tree roots, organic matter or other deleterious material should be removed from the subgrade surface.
7. Imported surfacing material is to be compacted to either a project specified compaction rate or to a level of compaction that allows the material to remain hard and intact during wet weather or normal trail usage.
8. Geofabric may be required to provide a separation between underlying highly plastic material and a bridging layer of sub-grade and trail surfacing.
9. Geofabric should be non-woven, strength class c & filtration class 3 or better. example - BIDIM A29 or equivalent.
10. Geofabric should have a minimum of 200mm of sub-grade and surfacing placed over the top of it for walking trails and 300mm for mtb trails.
11. In accordance with project CEMP, any fill material introduced to the site must be certified clean and be weed and pathogen free and exhibit similar properties to the natural soil e.g pH, drainage, texture. In addition, any fill material introduced to the State Forest will be undertaken according to DEECA FFM procedures.
12. Fill areas will be monitored for germination of weeds.
13. The type/source of selected sub-grade will be project and/or application specific.
14. Ballast fill or gabion edging may be required to treat the trail foundations in heavily boggy or highly plastic locations.
15. See standard drawings WTSTD-045 & WTSTD-017 for details.

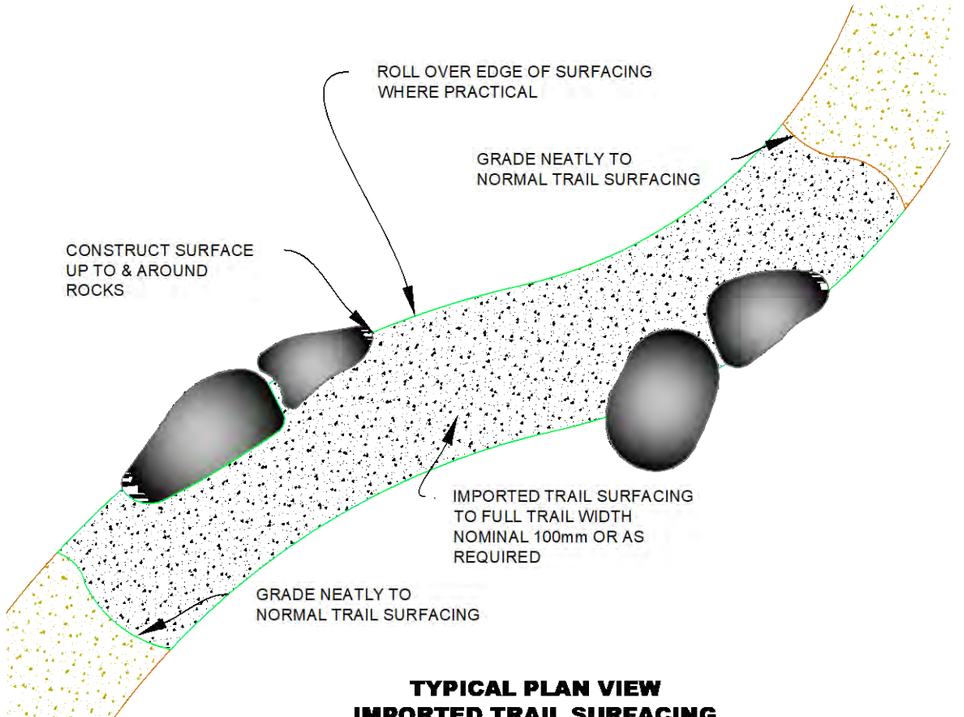
TREATMENT OPTIONS	
TREATMENT TYPE	TREATMENT
TYPE 1	SURFACE CAPPING
TYPE 2	SURFACE CAPPING WITH SELECTED SUB-GRADE
TYPE 3	SURFACE CAPPING WITH GEOFABRIC UNDERLAY AND SELECTED SUB-GRADE
TYPE 4	THICKER SURFACE CAPPING WITH GEOFABRIC UNDERLAY

NOTE: TREATMENT OPTION 3 DEPICTED



TYPICAL CROSS SECTION
IMPORTED TRAIL SURFACING

Scale 1:25 @ A3 (0, 0.5, 1 Meters)



TYPICAL PLAN VIEW
IMPORTED TRAIL SURFACING

GENERAL ARRANGEMENT
SCALE 1:25

Scale 1:50 @ A3 (0, 1, 2 Meters)

FOR CONSTRUCTION

Rev.	Date	Revision Details	Drn.	Ver.	App.

Client:
Project:

Drawn JR	Signed	Date 06/02/24	Drawing Title: IMPORTED TRAIL SURFACING TRAIL SURFACE TREATMENT STANDARD DRAWING
Designed DS	Signed	Date 06/02/24	
Verified DS	Signed	Date 06/02/24	
Approved	Signed	Date	

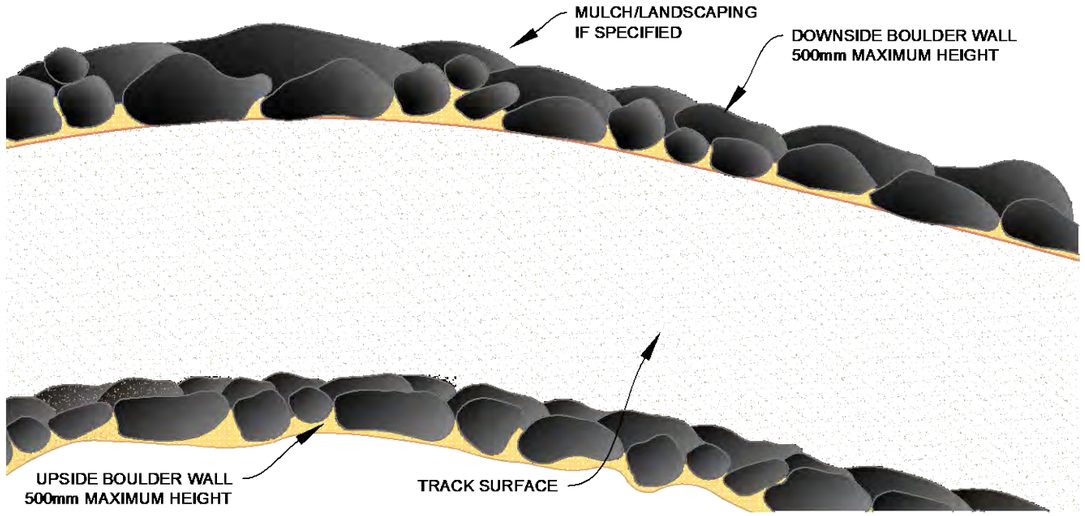
Project No. WT2019-107
Scale 1:25
Sheet Size A3
Drawing No. WTSTD-063-YV
Rev. C

5.3.11 Rock Walling (up to 500mm)

NOTES:

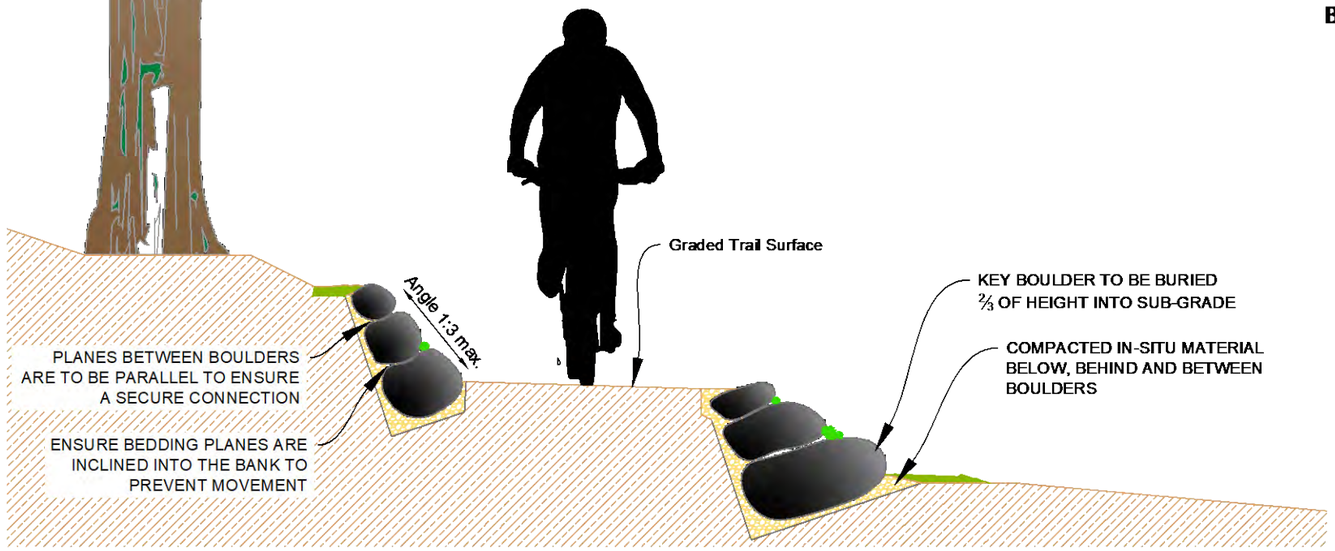
GENERAL:

- Boulders used for the retention wall to be a minimum size of 300mm * 300mm * 300mm.
- The approved boulder type used to form the wall shall be of one consistent type. Typically Granite, Sandstone, Volcanic Red Rock, Phorphyry or other Natural BushRock Boulders unless specified otherwise.
- Boulders as specified with the best and most natural surfaces exposed.
- Sharp / Angled edges are not acceptable.
- Boulder wall to be constructed by an experienced contractor and must not exceed 500mm in height.
- Refer to Standard Drawing WTMSTD-067-YV for locations where the rock wall needs to be over 500mm.
- Fill used under, behind and between boulders to be in-situ material or equivalent approved material.
- In-situ material is to be compacted to 90% Modified Maximum Dry Density to AS1289.5.4.1.
- This plan depicts boulder walls on both the upside and downside of the track.In many locations only the upside or the downside walls will be required. This plan is meant to be used for the construction of one or the other or both types of retention depending on the local topography.



PLAN VIEW - 500mm BOULDER RETAINING WALL BOTH SIDES

Scale 1:25 @ A3



LEGEND:

- GRADED TRAIL SURFACE
- IN-SITU MATERIAL
- NATURAL GROUND

0 0.5 1 Meters

Scale 1:25 @ A3

TYPICAL SECTION - 500mm BOULDER RETAINING WALL BOTH SIDES

GENERAL ARRANGEMENT
SCALE 1:25

FOR CONSTRUCTION

Rev.	Date	Revision Details	Drn.	Ver.	App.

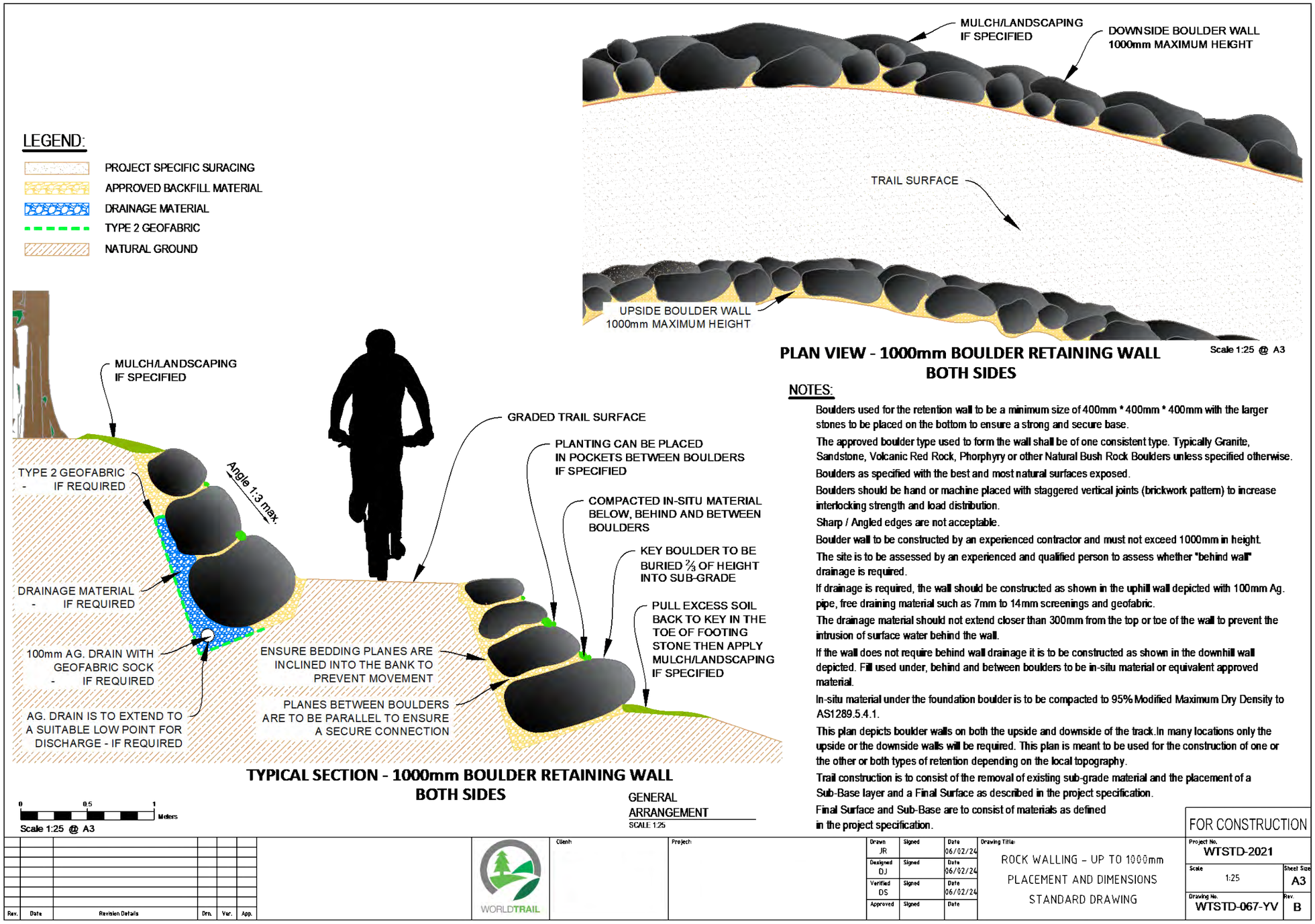
Client:

Project:

Drawn JR	Signed	Date 06/02/24	Drawing Title: ROCK WALLING - UP TO 500mm - MTB PLACEMENT AND DIMENSIONS WORLD TRAIL - STANDARD DRAWING
Designed DS	Signed	Date 06/02/24	
Verified DS	Signed	Date 06/02/24	
Approved	Signed	Date	

Project No. WT2019-107
Scale 1:25
Sheet Size A3
Drawing No. WTSTD-034-YV
Rev. B

5.3.12 Rock Retaining Walls (500 - 1000mm)



5.3.13 Bridges

Sixteen bridges, totalling eighty-eight metres in length, are required to cross the various small watercourses encountered throughout the trail network. Costs provided in the cost estimate section are indicative only and further design resolution and detail will be necessary.

Each bridge was measured in the field for approximate length (from end of deck to end of deck, with no accounting for footing locations or actual span lengths) and height. They were then classified as either short (less than 8m), medium (8 – 12m) or long (greater than 12m). If the deck height was measured to be over 1m at its highest point, the bridge would be noted as requiring a handrail. Table 8 below lists the different bridge types required, and the number of each.

Table 8. Bridge Summary

Bridge Type	No. of sites	Length (m)
Short Bridge (< 8m) – no handrail	15	80
Short Bridge (< 8m) – handrail	1	8
Medium Bridge (8 -12m) – no handrail	0	0
Long Bridge (> 12m) – no handrail	0	0
Total	**16**	**88**

Further work is required to determine the exact location and dimensions of each bridge and to determine an appropriate design. The specified width of each bridge should comply with the recommended width in the AusCycling Trail Difficulty Rating System. Where possible, bridges should be kept below 1m in height to avoid the need for handrails. While only one bridge specified has a handrail, it may be possible to avoid a handrail through minor alignment changes or through innovative design. Where handrails are required, the design must ensure that the handrails don't pose a hazard to riders – handrails are often at similar height to MTB handlebars and can pose a risk of causing hand injury.

Given the remote locations and construction challenges relating to access, design solutions should focus on lightweight and durable materials (such as fibre-reinforced plastic [FRP] mesh decking), minimalistic structures and be fit-for-purpose for mountain biking (i.e. riders travelling in single-file, generally spaced 5-10m apart). WT has worked with specialist engineering and construction firms to develop suitable designs for MTB bridges and may be able to provide further guidance moving forward.

Finally, although bridges have been specified for each of these sites, other solutions may be available for crossing these watercourses and should be further investigated. In particular, in any ephemeral or seasonal watercourses, rock armouring (i.e. the embedment of rocks into the trail tread, such that the surface of the rocks forms the 'tread' of the trail) could be used to create fords. When the water level rises, water flows over the top of the rock armouring. The rock armouring provides a firm base, allowing riders to ride through the water without damaging the stream bed.

The advantages of using this rock armoured ford technique described above are:
1. No introduced materials – uses locally available in situ materials;
2. Lower construction cost – per metre rates for rock armouring are significantly cheaper than bridge/boardwalk construction, although this depends on the design / specifications / materials.
3. No bushfire hazard;
4. Longer lifespan;
5. Less susceptible to flood damage.

The main disadvantage is that water crossings may become impassable after heavy rainfall.

5.3.14 Lookouts

Seven lookout sites were identified across the trail network. The visual impressiveness of these lookouts varies, but some are truly spectacular, providing views down into deep gorges and valleys.

Each lookout site will need to be separately assessed to determine the suitability, risk and infrastructure requirements for each one. Some will have minimal risk and infrastructure requirements, whereas others are located on the edge of large cliffs with significant safety risks, requiring the installation of safety barriers and other visitor infrastructure. Where trails pass close to cliff edges, they have generally been designed to maintain a buffer from the cliff edge itself. The intent is for the main trail to pass these features at a safe offset distance, with the option for riders to leave their bike and walk up/down to a lookout point that would include appropriate barriers, signage etc. No designs or specific advice in relation to these lookout areas is provided, and it is recommended that further risk assessments be undertaken prior to construction and designs be developed for any structures/barriers that may be required. As each lookout site has different infrastructure requirements, no specifications are provided in this report.

Figure 10 below shows Lookout LO 63.1 which has a significant and sheer drop from atop a large rock formation, that will potentially require barriers, signage and other infrastructure. Figure 11 on the next page shows Lookout LO 3.2, which is located atop a gentle, rounded hilltop, requiring minimal infrastructure.

Figure 10. Lookout LO 63.1

Figure 11. Lookout LO 3.2

5.4 CONSTRUCTION COST ESTIMATE

This section presents the overall cost estimate for the construction of the trail network, including all the trail features and trail treatments identified during the ground-truthing of the GOSCCA MTB Trail Network.

Table 9 below presents the schedule of rates for each of the cost items identified in this report. Note that these rates are estimates only, based on previous projects of a similar nature and taking into consideration local conditions and circumstances.

As described in the previous specifications section, bridges and lookouts require further investigation and design work before accurate cost estimates can be made. While rates have been provided for these items for overall budgeting purposes, further works to design and refine the cost estimates for these items are strongly recommended. Lookouts have been allocated a nominal allowance based on approximately 100 hours of labour, but no allowance has been made for any built structures, imported or precast materials, barriers or signage.

Note that the construction cost estimates provided in this section only include trails and construction treatments within the State Mine Gully land tenure, excluding all trails and construction treatments within the GOSSCA land tenure (as these are being constructed and funded from NPWS funding).

Table 9. Schedule of Rates

Item Type	Item Sub-Type	Rate
Trail	Adventure	$62.50 / m
	Gravity	$70.00 / m
	Flow	$70.00 / m
Bridges	Short Bridge (<8m) – no handrail	$5,000.00 / m
	Short Bridge (<8m) – handrail	$6,500.00 / m
Earthworks	Hand Construction	$100.00 / m
Rock Armour	Adjustable Rock Matting	$340.00 / m^2
	Standard Rock Armour	$400.00 / m^2
Surfacing	Imported Deco / Road base	$175.00 / m
Rock Retaining Walls	0 – 500mm	$300.00 / m
	500mm – 1000mm	$550.00 / m
Lookouts	-	$10,000.00 / each site

Table 10 below provides Base Trail Cost Estimate. Base trail is the standard earthen bench, including all earthen features such as switchbacks, grade reversals, berms, rollers, jumps etc. constructed by the excavator as part of standard bench construction.

Table 10. Base Trail Cost Estimate

Land Tenure	Trail Number	Section	Trail Style	Length (m)	Rate / m	Section Cost	Trail Cost
SMG	02	C	Flow	1203	$70.00	$84,210.00	$172,165.00
SMG	02	D	Flow	32	$70.00	$2,240.00	
SMG	02	E	Adventure	70	$62.50	$4,375.00	
SMG	02	F	Flow	1162	$70.00	$81,340.00	
SMG	50	B	Adventure	2360	$62.50	$147,500.00	$147,500.00
SMG	51	B	Gravity	1109	$70.00	$77,630.00	$97,790.00
SMG	51	C	Gravity	221	$70.00	$15,470.00	
SMG	51	D	Gravity	67	$70.00	$4,690.00	
SMG	52	B	Flow	396	$70.00	$27,720.00	$87,430.00
SMG	52	C	Flow	853	$70.00	$59,710.00	
SMG	53	B	Flow	697	$70.00	$48,790.00	$48,790.00
SMG	54	B	Adventure	1054	$62.50	$65,875.00	$95,937.50
SMG	54	C	Adventure	63	$62.50	$3,937.50	
SMG	54	D	Adventure	43	$62.50	$2,687.50	
SMG	54	E	Adventure	375	$62.50	$23,437.50	
SMG	55	B	Flow	514	$70.00	$35,980.00	$43,750.00
SMG	55	C	Flow	111	$70.00	$7,770.00	
SMG	56	B	Flow	285	$70.00	$19,950.00	$19,950.00
SMG	57	A	Adventure	2907	$62.50	$181,687.50	$250,187.50
SMG	57	C	Adventure	1096	$62.50	$68,500.00	
SMG	58	A	Adventure	854	$62.50	$53,375.00	$53,375.00
SMG	59	A	Adventure	1757	$62.50	$109,812.50	$198,922.50
SMG	59	B	Gravity	1273	$70.00	$89,110.00	
SMG	60	A	Adventure	307	$62.50	$19,187.50	$19,187.50
SMG	61	A	Adventure	714	$62.50	$44,625.00	$44,625.00
SMG	62	A	Adventure	546	$62.50	$34,125.00	$34,125.00
SMG	63	A	Adventure	2269	$62.50	$141,812.50	$144,625.00
SMG	63	B	Adventure	23	$62.50	$1,437.50	
SMG	63	C	Adventure	22	$62.50	$1,375.00	
SMG	64	A	Adventure	142	$62.50	$8,875.00	$8,875.00
SMG	65	A	Adventure	516	$62.50	$32,250.00	$32,250.00
SMG	66	A	Flow	1083	$70.00	$75,810.00	$75,810.00
SMG	67	A	Adventure	168	$62.50	$10,500.00	$10,500.00
SMG	68	A	Flow	248	$70.00	$17,360.00	$17,360.00
TOTAL				**24540**		**$1,603,155.00**	**$1,603,155.00**

Note that Trail 51 is an existing trail (Left Hand Gully). It is costed in the table above as though it is a new trail, but it is likely that this cost item could be reduced significantly, based on the fact that it exists and that any works required to improve the trail should be undertaken at a lesser cost, as there would be less labour involved.

Table 11 below provides the Construction Treatments Cost Estimate for all construction treatments that were specified during ground-truthing. Construction treatments are the additional works that need to be undertaken to improve sustainability, improve stability or width, or that require imported materials. Construction treatments include items such as rock walling, rock armouring, bridges, surfacing, etc.

Table 11. Construction Treatments Cost Estimate

Land Tenure	Trail Name	Bridges: Short (<8m) No handrail		Bridges: Short (<8m) With Handrail		Earthworks: Hand Construction		Lookouts		Rock Armour: Adjustable Rock Matting		Rock Armour: Standard Rock Armour		Surfacing: Imported Deco/ Road base		Rock Walling (up to 500mm): Onsite Materials		Retaining Walls (up to 1000mm): Onsite Materials		Trail Total
		Length (m)	Cost ($)	Length (m)	Cost ($)	Length (m)	Cost ($)	No. of sites	Cost ($)	Length (m)	Cost ($)	Length (m)	Cost ($)	Length (m)	Cost ($)	Length (m)	Cost ($)	Length (m)	Cost ($)	
SMG	02	8	$40,000.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	15	$6,000.00	40	$7,000.00	55	$16,500.00	0	$0.00	$69,500.00
SMG	50	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	66	$26,400.00	0	$0.00	23	$6,900.00	210	$115,500.00	$148,800.00
SMG	51	12	$60,000.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	$60,000.00
SMG	52	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	17	$6,800.00	0	$0.00	6	$1,800.00	0	$0.00	$8,600.00
SMG	53	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	20	$3,500.00	20	$6,000.00	0	$0.00	$9,500.00
SMG	54	0	$0.00	0	$0.00	150	$15,000.00	1	$10,000.00	0	$0.00	0	$0.00	150	$26,250.00	150	$45,000.00	0	$0.00	$96,250.00
SMG	55	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	30	$12,000.00	0	$0.00	0	$0.00	0	$0.00	$12,000.00
SMG	56	4	$20,000.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	3	$1,200.00	0	$0.00	0	$0.00	0	$0.00	$21,200.00
SMG	57	8	$40,000.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	50	$20,000.00	0	$0.00	25	$7,500.00	0	$0.00	$67,500.00
SMG	58	5	$25,000.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	30	$5,250.00	30	$9,000.00	0	$0.00	$39,250.00
SMG	59	0	$0.00	0	$0.00	300	$30,000.00	2	$20,000.00	0	$0.00	11	$4,400.00	60	$10,500.00	60	$18,000.00	0	$0.00	$82,900.00
SMG	60	15	$75,000.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	$75,000.00
SMG	61	0	$0.00	8	$52,000.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	20	$6,000.00	0	$0.00	$58,000.00
SMG	62	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	$0.00
SMG	63	0	$0.00	0	$0.00	50	$5,000.00	1	$10,000.00	0	$0.00	31	$12,400.00	0	$0.00	80	$24,000.00	0	$0.00	$51,400.00
SMG	64	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	$0.00
SMG	65	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	$0.00
SMG	66	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	44	$17,600.00	0	$0.00	10	$3,000.00	0	$0.00	$20,600.00
SMG	67	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	10	$4,000.00	0	$0.00	0	$0.00	0	$0.00	$4,000.00
SMG	68	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	5	$1,500.00	0	$0.00	$1,500.00
TOTAL		**52**	**$260,000.00**	**8**	**$52,000.00**	**500**	**$50,000.00**	**4**	**$40,000.00**	**0**	**$0.00**	**277**	**$110,800.00**	**300**	**$52,500.00**	**484**	**$145,200.00**	**210**	**$115,500.00**	**$826,000.00**

Table 12 below combines the Base Trail and Construction Treatments to provide the overall total cost per trail.

Table 12. Total Trail Cost

Land Tenure	Trail Name	Base Trail Cost	Construction Treatments Cost	Total Trail Cost	Total Trail Cost plus Contingency (20%)
SMG	02	$172,165.00	$69,500.00	$241,665.00	$289,998.00
SMG	50	$147,500.00	$148,800.00	$296,300.00	$355,560.00
SMG	51	$97,790.00	$60,000.00	$157,790.00	$189,348.00
SMG	52	$87,430.00	$8,600.00	$96,030.00	$115,236.00
SMG	53	$48,790.00	$9,500.00	$58,290.00	$69,948.00
SMG	54	$95,937.50	$96,250.00	$192,187.50	$230,625.00
SMG	55	$43,750.00	$12,000.00	$55,750.00	$66,900.00
SMG	56	$19,950.00	$21,200.00	$41,150.00	$49,380.00
SMG	57	$250,187.50	$67,500.00	$317,687.50	$381,225.00
SMG	58	$53,375.00	$39,250.00	$92,625.00	$111,150.00
SMG	59	$198,922.50	$82,900.00	$281,822.50	$338,187.00
SMG	60	$19,187.50	$75,000.00	$94,187.50	$113,025.00
SMG	61	$44,625.00	$58,000.00	$102,625.00	$123,150.00
SMG	62	$34,125.00	$0.00	$34,125.00	$40,950.00
SMG	63	$144,625.00	$51,400.00	$196,025.00	$235,230.00
SMG	64	$8,875.00	$0.00	$8,875.00	$10,650.00
SMG	65	$32,250.00	$0.00	$32,250.00	$38,700.00
SMG	66	$75,810.00	$20,600.00	$96,410.00	$115,692.00
SMG	67	$10,500.00	$4,000.00	$14,500.00	$17,400.00
SMG	68	$17,360.00	$1,500.00	$18,860.00	$22,632.00
TOTAL		**$1,603,155.00**	**$826,000.00**	**$2,429,155.00**	**$2,914,986.00**

This table includes a contingency amount of 20% to allow for additional construction treatments (rock armouring, bridges, surfacing etc.) that become apparent during construction, but were not identified during ground-truthing. This is a commonplace occurrence in trail construction – it is simply not possible to identify every single trail construction treatment during the ground-truthing stage. Furthermore, there can be significant deviation from the ground-truthed alignment during construction, which can affect the lengths and number of different treatments that end up being required.

In relation to these cost estimates, please note:

1. The rates and cost estimates provided in this section may not fully represent the entire construction scope and that quantities for trail treatments such as rock armouring and trail surfacing may exceed the quantities estimated in this report.
2. The following items are excluded from the cost estimate:
    a. Engineering solutions, certification or advice;
    b. Community consultation;
    c. Signage and wayfinding, including design, fabrication and installation;
    d. Trailhead (and all other associated items such as car parks and toilets) design and construction;
    e. Approvals and permits and any other studies or investigations required;
    f. Cultural heritage monitoring, if required;
    g. Contractor mobilisation and demobilisation expenses;
    h. Helicopter transport of materials, if required;
    i. Construction management documentation;
    j. Project management;
    k. GST.

6 APPENDICES

6.1 TRAIL DIFFICULTY RATING SYSTEM

Difficulty Symbol	Short Description
	**Very easy** Wide trail with a gentle gradient smooth surface and no obstacles Suitable for beginner cyclists with basic bike skills, and most bikes
	**Easy** Wide trail with a gentle gradient smooth surface Some obstacles such as roots, logs and rocks Suitable for beginner cyclists with basic mountain bike skills, and off-road bikes
	**Easy with Intermediate Sections** Likely to be single track with a moderate gradient, variable surface and some obstacles Some obstacles such as roots, logs and rocks Suitable for mountain bikers with mountain bikes
	**Intermediate** Single trail with moderate gradients, variable surface and obstacles May include steep sections Suitable for skilled mountain bikers with mountain bikes
	**Intermediate with Difficult Sections** Suitable for competent mountain bikers, used to physically demanding routes Expect large and unavoidable obstacles and features Challenging and variable with some steep climbs or descents and loose surfaces
	**Difficult** Suitable for experienced mountain bikers, used to physically demanding routes Navigation and personal survival skills are highly desirable Expect large, dangerous and unavoidable obstacles and features Challenging and variable with long steep climbs or descents and loose surfaces Some sections will be easier to walk
	**Extreme** Suitable for highly experienced mountain bikers, used to physically demanding routes Navigation and personal survival skills are highly desirable Severe constructed trails and/ or natural features, all sections are challenging Includes extreme levels of exposure and / or risk Expect large and unavoidable obstacles and features Some sections will be easier to walk

Trail Classification Matrix

The Trail Classification Matrix incorporates the Trail Difficulty Rating System and provides detailed information to use when planning, designing, constructing and maintaining mountain bike trails to ensure a consistent classification standard is applied.

Very easy mountain bike trail / Fire trail

	○				
	Grade of trail	Very easy			
	Description	Likely to be a fire road, rail trail or wide single track with a gentle gradient, smooth surface and free of obstacles	Likely to be a fire road, rail trail or wide single track with a gentle gradient, smooth surface and free of obstacles	Wide trail with a gentle gradient smooth surface and no obstacles Suitable for beginner cyclists with basic bike skills, and most bikes	Wide trail, gentle gradient smooth surface, no obstacles For beginner cyclists with basic bike skills
Guiding Criteria	**Trail Width**	2100 mm plus or minus 900 mm	Two riders can ride side by side		
Guiding Criteria	**Trail Surface**	Hardened or smooth	Hardened with no challenging features on the trail		
Guiding Criteria	**Trail Gradient**	Climbs and descents are mostly shallow Ave. trail grade – 7% or less Max. trail grade – 15%	Climbs and descents are mostly shallow		
Guiding Criteria	**Quality of Markings**	Trailhead signs and route markers at intersections	Clearly signposted		
Risk Assessable Criteria	**Level of Trail Exposure**	Exposure to either side of the trail corridor includes downward slopes of up to 30%	Minimal exposure on either side of the trail corridor		
Risk Assessable Criteria	**Natural Obstacles and Technical Trail Features (TTFs)**	Unavoidable bridges 2100mm or wider	No obstacles		
	Experience Required	Suitable for beginner / novice cyclists with basic bike riding skills Suitable for most bikes	Suitable for beginner / novice cyclists with basic bike riding skills Suitable for most bikes		

Easy mountain bike trail

	●				
	Grade of trail	Easy			
	Description	Likely to be a combination of fire road or wide single track with a gentle gradient, smooth surface and relatively free of obstacles Short sections may exceed these criteria	Likely to be a combination of fire road or wide single track with a gentle gradient, smooth surface and relatively free of obstacles Short sections may exceed these criteria	Wide trail with a gentle gradient smooth surface Some obstacles such as roots, logs and rocks Suitable for beginner cyclists with basic mountain bike skills, and off-road bikes	Wide trail, gentle gradient, some obstacles For beginner mountain bikers with basic mountain bike skills
Guiding Criteria	**Trail Width**	900 mm plus or minus 300 mm	Handlebar width or greater		
Guiding Criteria	**Trail Surface**	Mostly firm and stable	Mostly firm and stable		
Guiding Criteria	**Trail Gradient**	Climbs and descents are mostly shallow, but trail may include some moderately steep sections Ave. trail grade – 7% or less Max. trail grade – 15%	Climbs and descents are mostly shallow, but trail may include some moderately steep sections		
Guiding Criteria	**Quality of Markings**	Trailhead signs and route markers at intersections	Clearly signposted		
Risk Assessable Criteria	**Level of Trail Exposure**	Exposure to either side of the trail corridor includes downward slopes of up to 30%	Minimal exposure on either side of the trail corridor		
Risk Assessable Criteria	**Natural Obstacles and Technical Trail Features (TTFs)**	Unavoidable obstacles to 100mm high, such as logs, roots and rocks Avoidable, rollable obstacles or jumps may be present Unavoidable bridges 900mm or wider Short sections may exceed these criteria	Trail may have obstacles such as logs, roots, rocks and jumps		
	Experience Required	Suitable for beginner / novice mountain bikers with basic mountain bike skills Suitable for off-road bikes	Suitable mountain bikers with basic mountain bike skills Suitable for most bikes		

Easy / Intermediate mountain bike trail

		Technical Description	Trail Description	General Description	Short Classification Key
	Grade of trail	Easy with Intermediate Sections			
	Description	Likely to be single track with a moderate gradient, variable surface and some obstacles Short sections may exceed these criteria	Likely to be single track with a moderate gradient, variable surface and some obstacles Short sections may exceed these criteria	Likely to be single track with a moderate gradient, variable surface and some obstacles Some obstacles such as roots, logs and rocks Suitable for mountain bikers with mountain bikes	Single track, moderate gradient and some obstacles For beginner mountain bikers with basic mountain bike skills
Guiding Criteria	**Trail Width**	750 mm plus or minus 200 mm	Handlebar width		
Guiding Criteria	**Trail Surface**	Mostly firm and stable	Mostly firm and stable		
Guiding Criteria	**Trail Gradient**	Climbs and descents are mostly shallow, but trail may include some moderately steep sections Ave. trail grade – 7% or less Max. trail grade – 20%	Climbs and descents are mostly shallow, but trail may include some moderately steep sections		
Guiding Criteria	**Quality of Markings**	Trailhead signs and route markers at intersections	Clearly signposted		
Risk Assessable Criteria	**Level of Trail Exposure**	Exposure to either side of the trail corridor includes downward slopes of up to 30%	Minimal exposure on either side of the trail corridor		
Risk Assessable Criteria	**Natural Obstacles and Technical Trail Features (TTFs)**	Unavoidable obstacles to 200mm high, such as logs, roots and rocks Avoidable, rollable obstacles and jumps may be present Unavoidable bridges 900mm or wider Short sections may exceed these criteria	Trail may have obstacles such as logs, roots, rocks and jumps		
	Experience Required	Suitable for beginner / novice mountain bikers with basic mountain bike skills Suitable for off-road bikes	Suitable mountain bikers with basic mountain bike skills Suitable for most bikes		

Intermediate mountain bike trail

		Technical Description	Trail Description	General Description	Short Classification Key
	Grade of trail	Intermediate	Intermediate	Intermediate	Intermediate
	Description	Single trail with moderate gradients, variable surface and obstacles Dual use or preferred use	Single trail with moderate gradients, variable surface and obstacles	Single trail with moderate gradients, variable surface and obstacles May include steep sections Suitable for skilled mountain bikers with mountain bikes	Single trail, moderate gradients, obstacles and some steep sections For skilled mountain bikers
Guiding Criteria	**Trail Width**	600 mm plus or minus 300 mm	Handlebar width or greater		
Guiding Criteria	**Trail Surface**	Possible sections of rocky or loose tread	Possible sections of rocky or loose tread		
Guiding Criteria	**Trail Gradient**	Mostly moderate gradients but may include steep sections Ave. trail grade – 10% or less Max. trail grade – 20% Short sections may exceed these criteria	Mostly moderate gradients but may include steep sections		
Guiding Criteria	**Quality of Markings**	Trailhead signs and route markers at intersections	Signposted		
Risk Assessable Criteria	**Level of Trail Exposure**	Exposure to either side of the trail corridor includes downward slopes of up to 50%	Sections of trail will include moderate exposure on either side of the trail corridor		
Risk Assessable Criteria	**Natural Obstacles and Technical Trail Features (TTFs)**	Unavoidable obstacles to 350 mm high, such as logs, roots and rocks Avoidable, obstacles to 600 mm may be present, width of deck is greater than half the height of the obstacle Tabletop jumps to 1500mm high, rollable double jumps and avoidable gap jumps Unavoidable bridges 600mm or wider Short sections may exceed these criteria	Trail will have obstacles such as logs, roots, rocks and jumps		
	Experience Required	Suitable for skilled mountain bikers with basic mountain bike skills Suitable for mountain bikes	Suitable for skilled mountain bikers with basic mountain bike skills Suitable for mountain bikes		

Intermediate / Difficult mountain bike trail

		Technical Description	Trail Description	Generic Description	Short Classification Key
	Grade of trail	Intermediate with Difficult Sections			
	Description	Likely to be a challenging single trail with moderate gradients, variable surface and obstacles Dual use or preferred use	Likely to be a challenging single trail with moderate gradients, variable surface and obstacles	Suitable for competent mountain bikers, used to physically demanding routes Expect large and unavoidable obstacles and features Challenging and variable with some steep climbs or descents and loose surfaces	For competent mountain bikers Large, unavoidable obstacles and features Some steep climbs or descents and loose surfaces
Guiding Criteria	**Trail Width**	600 mm plus or minus 300 mm	Handlebar width or greater		
Guiding Criteria	**Trail Surface**	Possible sections of rocky or loose tread	Possible sections of rocky or loose tread		
Guiding Criteria	**Trail Gradient**	Mostly moderate gradients but may include steep sections Ave. trail grade – 20% or less Max. trail grade – 30% Short sections may exceed these criteria	Mostly moderate gradients but may include steep sections		
Guiding Criteria	**Quality of Markings**	Trailhead signs and route markers at intersections	Signposted		
Risk Assessable Criteria	**Level of Trail Exposure**	Exposure to either side of the trail corridor includes downward slopes of up to 50%	Sections of trail will include moderate exposure on either side of the trail corridor		
Risk Assessable Criteria	**Natural Obstacles and Technical Trail Features (TTFs)**	Unavoidable obstacles to 400 mm high, such as logs, roots and rocks Avoidable, obstacles to 1000 mm may be present, width of deck is greater than half the height of the obstacle Tabletop jumps to 2000mm high, rollable double jumps and avoidable gap jumps Unavoidable bridges 600mm or wider Short sections may exceed these criteria	Trail will have obstacles such as logs, roots, rocks and jumps		
	Experience Required	Suitable for competent mountain bikers with good mountain bike skills Suitable for mountain bikes	Suitable for competent mountain bikers with good mountain bike skills Suitable for mountain bikes		

Difficult mountain bike trail

		Technical Description	Trail Description	Generic Description	Short Classification Key
	Grade of trail	Difficult			
	Description	Likely to be a challenging single trail with steep gradients, variable surface and many obstacles Single use and direction Optional lines Suitable for cross country, downhill or trials	Likely to be a challenging single trail with steep gradients, variable surface and many obstacles	Suitable for experienced mountain bikers, used to physically demanding routes Navigation and personal survival skills are highly desirable Expect large, dangerous and unavoidable obstacles and features Challenging and variable with long steep climbs or descents and loose surfaces Some sections will be easier to walk	For experienced mountain bikers Challenging trail Large, unavoidable obstacles and features Long, steep climbs or descents and loose surfaces
Guiding Criteria	**Trail Width**	300 mm plus or minus 150 mm for tread and bridges	Can be less than handlebar width		
Guiding Criteria	**Trail Surface**	Variable and challenging	Variable and challenging		
Guiding Criteria	**Trail Gradient**	Contains steep descents and climbs Ave. trail grade – 20% or less Max. trail grade – 30% Short sections may exceed these criteria	Contains steep descents and climbs		
Guiding Criteria	**Quality of Markings**	Trailhead signs and route markers may be limited	Limited signs		
Risk Assessable Criteria	**Level of Trail Exposure**	Exposure to either side of the trail corridor includes steep downward slopes or freefall	Exposure to either side of the trail corridor includes steep downward slopes or freefall		
Risk Assessable Criteria	**Natural Obstacles and Technical Trail Features (TTFs)**	Unavoidable obstacles to 500 mm high, such as logs, roots, drop off's or constructed obstacles Avoidable, obstacles to 1200 mm may be present, width of deck is greater than half the height of the obstacle Tabletop jumps to 2500mm high, rollable double jumps and avoidable gap jumps Unavoidable bridges 600mm or wider Short sections may exceed these criteria	Unavoidable obstacles such as logs, roots, drop off's, jumps or constructed obstacles		
	Experience Required	Suitable for experienced mountain bikers with good skills, used to physically demanding routes Navigation and personal survival skills are highly desirable Suitable for better quality mountain bikes	Suitable for experienced mountain bikers with good skills, used to physically demanding routes Navigation and personal survival skills are highly desirable Suitable for better quality mountain bikes		

Extreme mountain bike trail

		Technical Description	Trail Description	Generic Description	Short Classification Key
	Grade of trail	Extreme			
	Description	Extremely difficult trails incorporating very steep gradients, highly variable surface and unavoidable, severe obstacles Single use and direction Optional lines Cross country, downhill or trials	Likely to be a challenging single trail with steep gradients, variable surface and many obstacles	Suitable for highly experienced mountain bikers, used to physically demanding routes Navigation and personal survival skills are highly desirable Severe constructed trails and/or natural features, all sections are challenging Includes extreme levels of exposure and / or risk Expect large and unavoidable jumps, obstacles and features Some sections will be easier to walk.	For highly experienced mountain bikers All sections extremely challenging Large, unavoidable jumps, obstacles and severe features
Guiding Criteria	**Trail Width**	150 mm plus or minus 100 mm for tread and bridges Structures can vary	Can be less than handlebar width		
Guiding Criteria	**Trail Surface**	Widely variable and challenging	Widely variable and challenging		
Guiding Criteria	**Trail Gradient**	Expect prolonged steep, loose and rocky descents or climbs Average trail grade – 20% Max. trail grade – 40% Short sections may exceed these criteria	Expect prolonged steep, loose and rocky descents or climbs		
Guiding Criteria	**Quality of Markings**	Trailhead signs and route markers may be limited	Limited signs		
Risk Assessable Criteria	**Level of Trail Exposure**	Exposure to either side of the trail corridor includes steep downward slopes or freefall	Exposure to either side of the trail corridor includes steep downward slopes or freefall		
Risk Assessable Criteria	**Natural Obstacles and Technical Trail Features (TTFs)**	Unavoidable obstacles over 1000mm Avoidable, obstacles may be present Unavoidable gap jumps and doubles Unavoidable bridges 600mm or narrower Width of bridges is unpredictable Short sections may exceed these criteria	Unavoidable obstacles such as gap jumps, logs, roots, drop off's or constructed obstacles		
	Experience Required	Suitable for highly experienced mountain bikers with excellent skills, used to physically demanding routes Navigation and personal survival skills are highly desirable Suitable for quality mountain bikes	Suitable for highly experienced mountain bikers with excellent skills, used to physically demanding routes Navigation and personal survival skills are highly desirable Suitable for quality mountain bikes		

6.2 TRAIL STYLES

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

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

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

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

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

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

6.3 ADJUSTABLE ROCK MATTING


THE
HISTORY
World Trail developed the idea of an artificial rock armouring solution after years of strenuous manual handling to harvest boulders and install rock armour, a challenging and often dangerous task in remote terrain.
Different prototypes were successfully trialed including individual rocks carved from lightweight Hebel in Mt Buller, Victoria in 2011. These products have been tested over many years on the popular Copperhead flow trail, withstanding the harsh climate and heavy usage by mountain bikers.
The idea of a flexible, linked artificial rock mat was brought to life in Tasmania with the help of local fabricator Richard Goodsell in 2015.
The initial products performed very well in the field, yet needed some refining to suit World Trail's high performance standard. The new redesigned units were installed at Falls Creek in Victoria, Smithfield's World Championship 2017 course in Queensland and the highly successful Blue Derby trail network in Tasmania. Ongoing monitoring of these units have proven their longevity, durability and strength under the pressure of thousands of riders a month on these trails.
ARM
ADJUSTABLE ROCK MATTING
ARM is a strong, natural looking, flexible, cost effective and consistent product for hardening trail surfaces successfully in all conditions.
WORLDTRAIL


WORLD-TRAIL

THE PRODUCT

WHAT IS ARM?

ARM is a modular, natural looking, multi-boulder solution, interconnected via a strong linked mesh which can be interlaced with other units resulting in a hardened surface anchored to the ground.

The product allows treatment within fragile or sensitive environments or high use impact zones, resulting in a long-lasting and sustainable trail surface.

ARM is easily transportable, manageable, cost-effective and is extremely efficient as an alternative in areas where water is an ongoing problem and useable natural rock is sparse.

The unique design allows for flexibility over undulating terrain, including berms, rollers and drops while imitating and adapting to the existing ride surface.

HOW STRONG IS ARM?

Our product is made from a unique concrete mix, rated in excess of 50MPa compressive strength at 28 days, which is well above the industry standard, plus the tensile strength (breaking load) rating is in excess of 7.2 KN at 40mm thickness.

WHAT DOES THE MESH ACHIEVE?

The mesh acts as reinforcement and allows the sheets to be easily handled and fixed into the ground. The commercial marine grade Nylon mesh provides maximum flexibility over undulating terrain and is incredibly durable.

Over the years different mesh materials were trialed to find the perfect combination of strength, durability and flexibility.

The mesh sits 15mm from the base of the unit. The unit's maximum thickness is 60mm. The commercial marine grade 4mm Nylon 100mm x100mm mesh adds reinforced strength and allows the sheets to be flexible.

WORLDTRAIL

WHY THE SHAPE?

The shape has evolved to its current pattern after trialing different styles and sizes while refining the pattern to offer an ideal mix of natural look and ride texture.

The pattern allows the sheets to seamlessly interlock with each other but also allows an amount of flexibility for arcs and direction changes.

WHAT IS THE WEIGHT?

Each sheet weighs in at approximately 36kg.

It was important to keep the weight down, yet ensure each unit is sturdy enough to maintain its structural integrity in the field. When interlocked together, this amplifies the total weight and strength on the ground.

The 36kg weight helps with transport and installation. The lightweight design is due to the unique mix of raw materials and superior cement type used.

WHY THE SIZE?

The size was determined for ease of transport – two sheets fit side by side on a regular hardwood pallet making it cost-effective to transport and handle. Each pallet can hold 26 units of ARM weighing in at 970kg per pallet.

The shape is an evolution of designs tried and tested by World Trail to provide ideal rider feel, durability and a natural look.

HOW IS ARM SECURED?

Depending on the soil in which the product is installed, there are a few options for securing. Soft sandy or moist muddy areas require small pegs such as sand pegs, 100-250mm long. Areas with a firmer base requires a hook peg 250-400mm long. Heavy-duty ties are ideal for fixing sheets together via the nylon mesh matting.

PROS & CONS

PROS

- Lightweight
- Easy install
- Does not require skilled tradesman to install
- Sizing allows for accurate quoting
- Transportable
- Durable
- Bendable, moulds over rollers, berms etc
- Abrasion resistant
- Soft ground solution
- Boggy area solution
- Textured tread
- Cut to fit

CONS

- Not suitable for flowing streams

WORLDTRAIL


ARM

www.WORLD-TRAIL.com

WHY ARM?

TRANSPORTATION

- ARM has been developed to allow 26 sheets at 900mm x 600mm per pallet, at 970kg
- Transportation on to the trail can be done via a wheel barrow or power carrier

TOOLS/ITEMS REQUIRED

- Shovel, rake hoes, plastic rake, hammer, scissors, snips
- Metal or plastic pegs
- Metal or Plastic cable ties

WHERE TO INSTALL

- Soft unstable ground, sand or problematic soils
- Boggy areas
- Unavoidable steep declines
- Creative steep inclines
- Problematic abrasive braking sections
- Water seepage or soakage areas
- Braking bumps or whoops
- Ruts and unavoidable fall-line sections
- Stabilising entry/exit of rock armoured water crossings

STEP 1

SET UP

- Determine the size of the area to be treated. Ensure correct measuring of the area for installation, allowing for extra moisture seepage at the entry and exit of the required area
- Determine layout pattern for the sheets of ARM – i.e. either landscape or portrait
- Calculate ARM sheet quantities
- Determine required mounting system – i.e. pegs, cable ties
- Never install in flowing streams or potential high-flow water courses
- Advise public when and how long the trail is closed
- Close trail with bunting and signage during installation process
- Transport ARM via safe and manageable means to ensure no damage to ARM during transport
- Stockpile sheets close to the area to be treated at a safe height
- Ensure there is no damage to surrounding vegetation
- PPE required - gloves, glasses, steel cap boots

STEP 2

PREPARE TRAIL SURFACE

- Use excavator or rake hoe to level the area to be treated
- Shape the base trail to mimic the natural trail shape, taking into account grade reversals and berms
- Any soil removed should be stockpiled nearby for a coating surface after the ARM has been installed
- Trail surface must be free of protruding rocks or roots. Protruding rocks or roots will result in unstable installation and potential future failure
- If required, install a base layer of imported soil to improve stability
- Check the depth of the cut is suitable for ARM installation
- Adjust the ride line using chokes to align riders in the centre of the ARM, to prevent short-cutting or riding off the edge
- Portions of the ARM sheet can be removed to fit around large unmovable roots or rocks

WORLDTRAIL

STEP 3

INSTALLATION

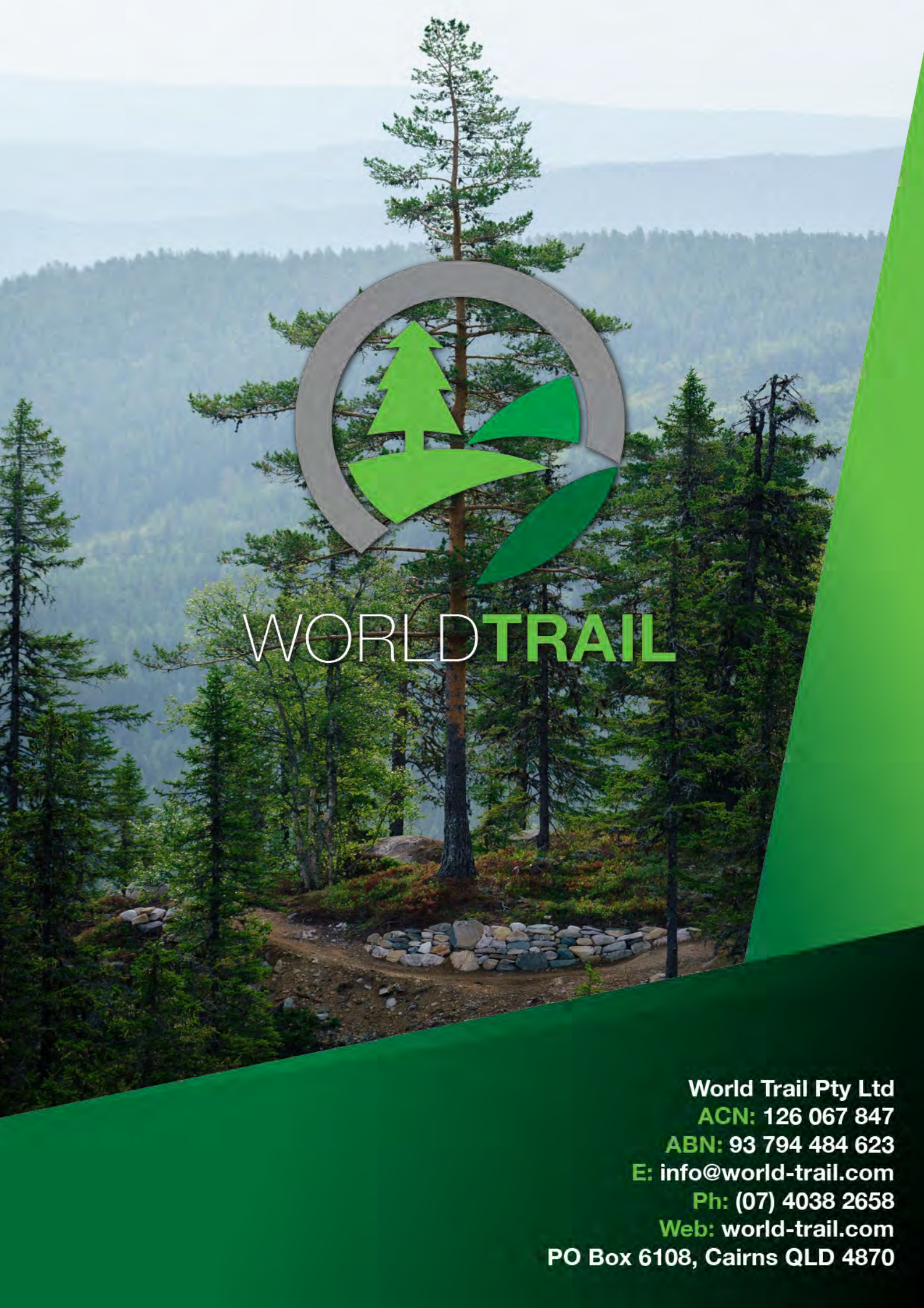
- Install first sheet, starting from the lowest point and working uphill
- Once the sheet is in place on the ground, stand back and check the trajectory and alignment with the rest of the trail
- Check ARM is sitting evenly and solidly on the ground without rocking or movement under pressure
- Before securing the first sheet lay the second sheet and line them both up
- Join the sheets with cable ties
- Trim off excess matting
- Secure ARM to the ground by placing the pegs through the matting
- Repeat the process of placing the next ARM sheet, lining up, cable tying, trimming and pegging

STEP 4

FINISHING TOUCHES

- Spread stockpiled topsoil over ARM product, raking or sweeping it into the gaps between the individual rocks
- Compact soil in the gaps between the rocks


ARM
ADJUSTABLE ROCK MATTING
SOLD IN PACKS OF 26
Various sizes and models available.
NOTE: Size, colour & style of ARM represented in images may differ.
WORLDTRAIL
P.O. Box 6108
Cairns, Queensland 4870
www.WORLD-TRAIL.COM



WORLDTRAIL

World Trail Pty Ltd
ACN: 126 067 847
ABN: 93 794 484 623
E: info@world-trail.com
Ph: (07) 4038 2658
Web: world-trail.com
PO Box 6108, Cairns QLD 4870

Appendix C

Biodiversity Development Assessment Report

View of sandstone pagodas adjacent to the proposed trail.

BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

LITHGOW MOUNTAIN BIKE PARK

CITY OF LITHGOW LOCAL GOVERNMENT AREA

AUGUST 2025

Report prepared by

OzArk Environment & Heritage

for Central Tablelands Mountain Bike Club

OzArk
Environment & Heritage

145 Wingewarra St
(PO Box 2069)
Dubbo NSW 2830

Phone: (02) 6882 0118
Fax: (02) 6882 0630
enquiry@ozarkehm.com.au
www.ozarkehm.com.au

Executive summary

The Central Tablelands Mountain Bike Club (CTMBC) proposes to develop 25 km of single-track mountain bike path on Lot 11 DP1240259, Lot 1 DP1110346, Lot 2 DP1110346, Lot 3 DP1110346, Lot 1 DP965231, Lot 2 DP787403, and Lot 2 DP876025, adjacent to State Mine Gully in Lithgow, New South Wales. OzArk Environment & Heritage (OzArk) was engaged to prepare the biodiversity assessment for the proposal. The proposal would occupy up to 2.92 ha, of which 2.36 ha possesses remnant native vegetation. The remaining extent of the subject land consists primarily of existing tracks and other infrastructure. The proposal triggers entry into the NSW Biodiversity Offsets Scheme (BOS) under the NSW *Biodiversity Conservation Act* 2016 (BC Act) by virtue of exceeding the maximum allowable clearing threshold for the relevant lots and by impacting areas included in the Biodiversity Values (BV) Map. Therefore, a Biodiversity Development Assessment Report (BDAR) must be prepared for this proposal and the proponent must offset impacts to biodiversity. This report documents this assessment, which has been completed in accordance with the Biodiversity Assessment Method 2020 (BAM 2020) and details the proponent's biodiversity offset requirement (measured by the number of ecosystem and species credits). Owing to the small area of impact to native vegetation, the proposal has been assessed using the streamlined small-area module.

The native vegetation present in the disturbance footprint consists of four Plant Community Types (PCTs):

- 3687 – Newnes Plateau Peppermint-Ash Tall Forest.
- 3688 – Newnes Plateau Silvertop Ash Woodland.
- 3696 – Western Blue Mountains Rocky Scribbly Gum Woodland.
- 3862 – Newnes Plateau Rockplate Heath.

The small-area module requires only the dominant PCT to be assessed. In this case, PCT 3687 was identified as dominant and assigned to two vegetation zones: 3687_Good and 3687_Moderate. Up to 1.77 ha of this PCT would be impacted by the proposal, chiefly through the removal of understorey vegetation and immature trees. CTMBC has indicated that the project funding does not allow for the removal of trees; therefore, mature trees shall be retained and the bike trails shall work around the existing large trees.

Zones 3687_Good and 3687_Moderate did not meet the thresholds to be considered an example of any Threatened Ecological Community (TEC) listed under the BC Act or the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act).

In total, 25 ecosystem credit species were generated by the Biodiversity Assessment Method Calculator (BAM-C). The habitat suitability of the subject land for these species was assessed.

Three species were removed from the list due to habitat constraints; consequently, 22 species were assumed present as ecosystem credit species, generating a total of 35 Ecosystem Credits.

Application of the small-area assessment module in the BAM-C returned five species credit species considered to be at risk of a Serious and Irreversible Impact (SAII). One species – the Swift Parrot (*Lathamus discolor*) – could be excluded from consideration as the site does not fall within the area mapped as important habitat for the species. Three further species were eliminated by targeted surveys. The Large-eared Pied Bat (*Chalinolobus dwyeri*) was detected during targeted surveys and is considered present for the purposes of determining offsets. One additional non-SAII species – the Southern Greater Glider (*Petauroides volans*) – was detected during surveys and was added to the offset calculations for the proposal. These two species would generate a total of 115 species credits, comprising 69 credits for the Large-eared Pied Bat and 46 credits for the Southern Greater Glider.

The proponent intends to satisfy their offset obligations by buying and retiring the necessary credits from the open market or, if appropriate credits are not available, by paying directly into the Biodiversity Conservation Fund.

The significance of the proposed impact to EPBC Act-listed threatened, migratory, wetland and marine species, populations and communities predicted to occur within a 10 km search area was assessed. No significant impact to any threatened entity likely to result in the extinction of a local population was identified. The residual ecological impacts of the proposal would be adequately mitigated and offset using the management actions recommended and the offset requirements detailed within this BDAR. Therefore, a referral of the proposal to the Federal Department of Climate Change, Energy, the Environment and Water (DCCEEW) for these matters is not considered necessary.

This assessment covers the current form of the proposal. Any change to the scope of work may require re-assessment.

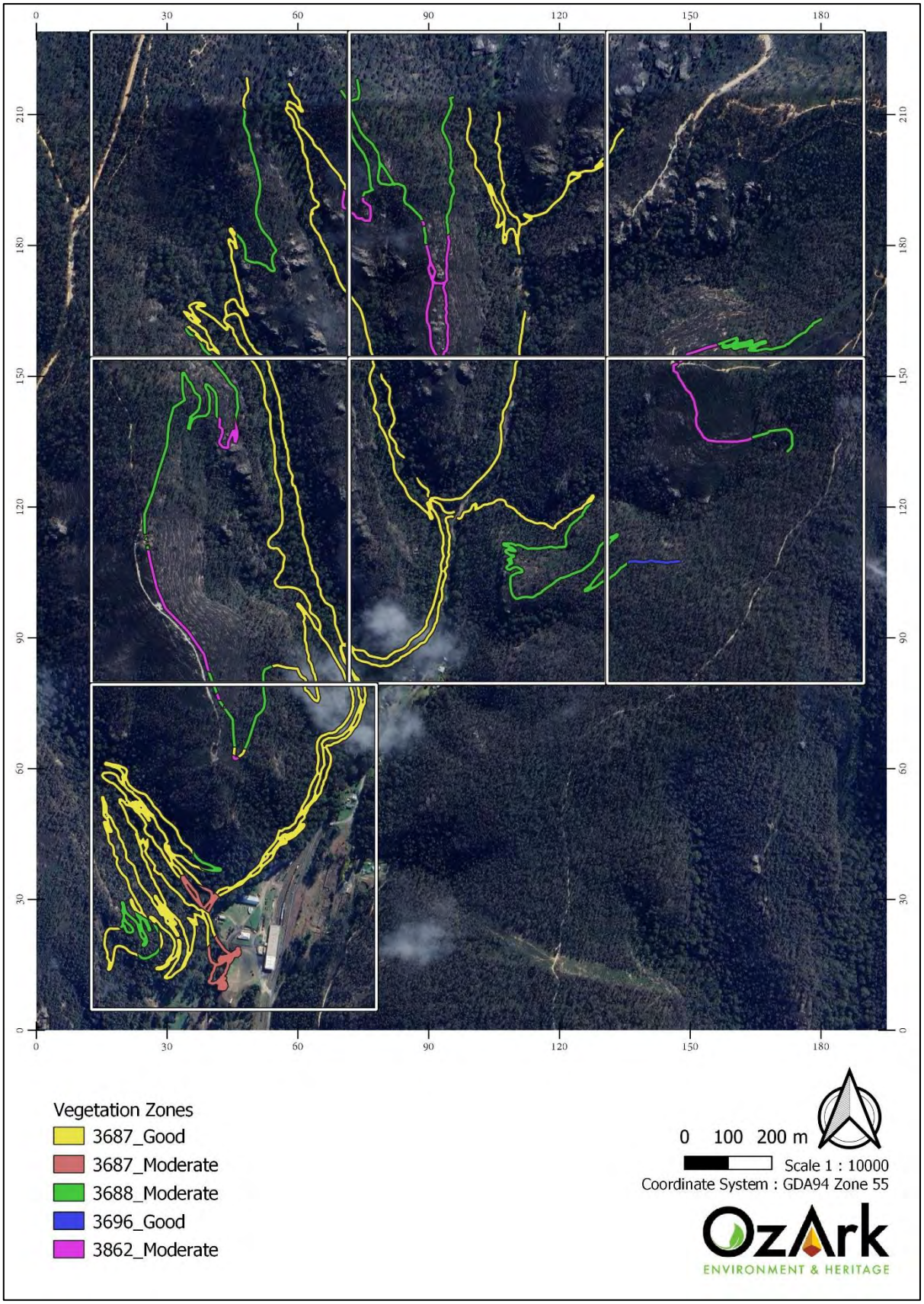


Figure 4-1. Vegetation zones along the proposed trail alignment.

The eight inset maps outlined in white are provided in **Figures 4-2** to **4-8**. Mapping of vegetation zones has been buffered for legibility.

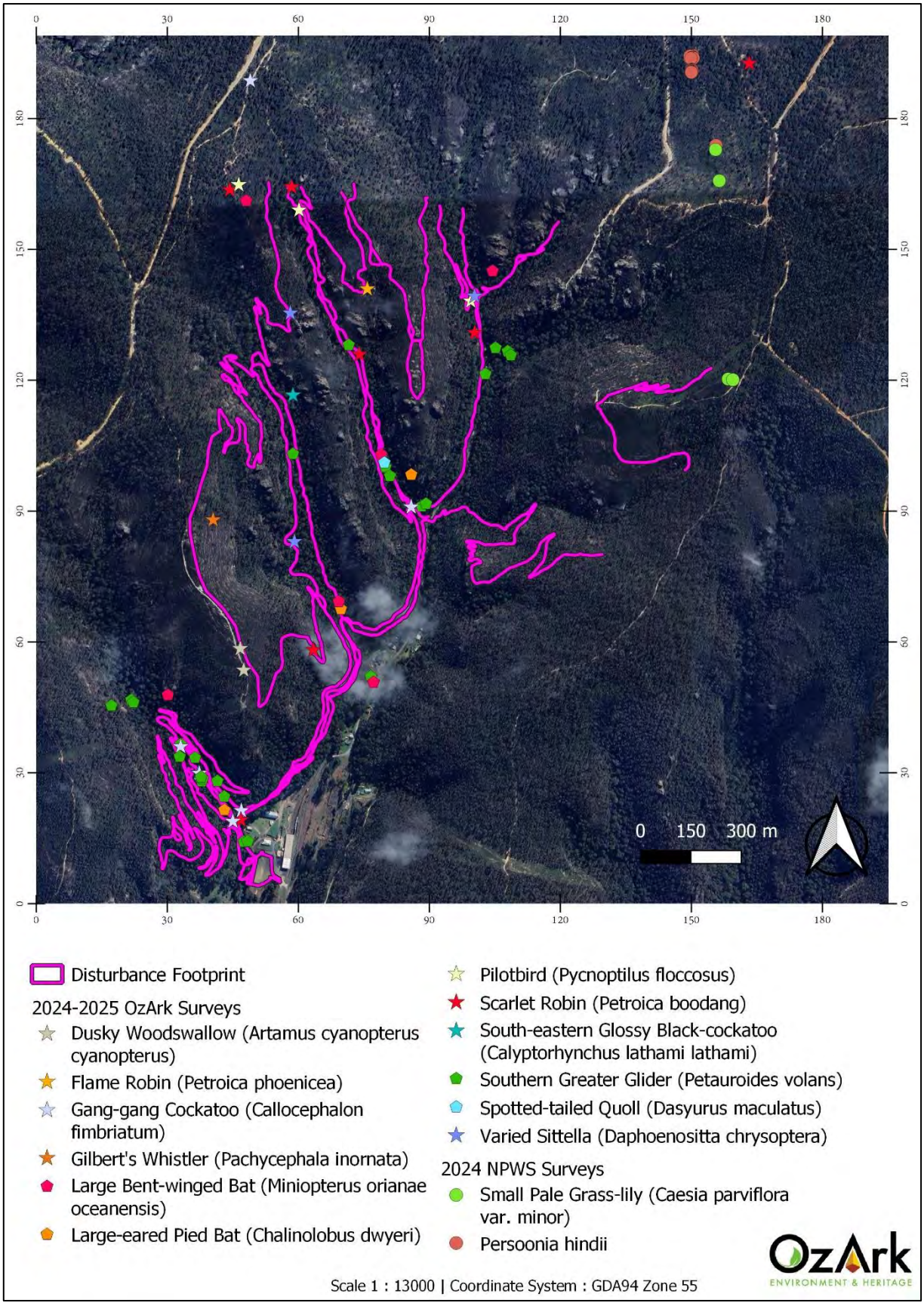


Figure 4-11. Threatened species recorded during OzArk (2024-2025) and NPWS (2024) surveys.

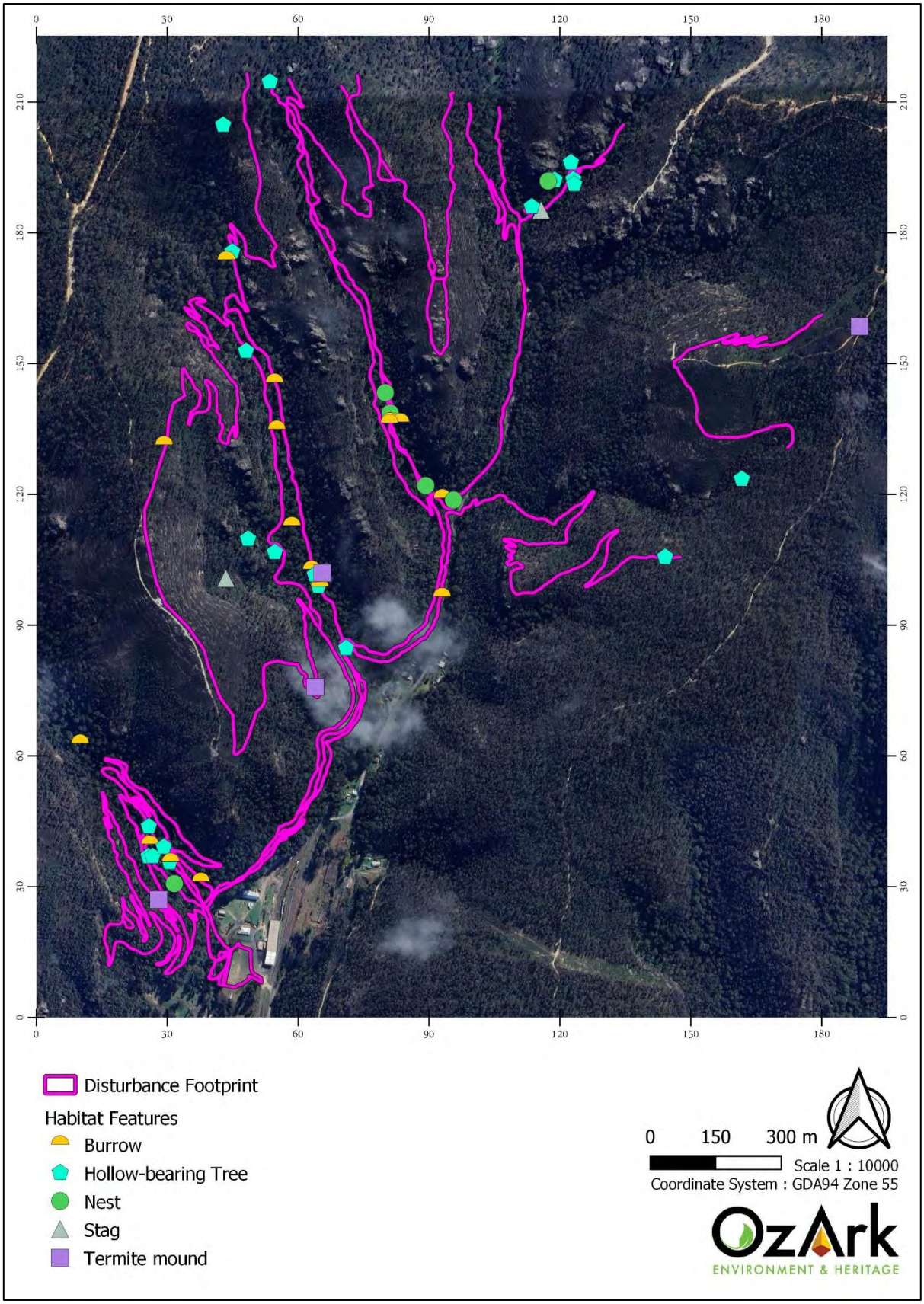


Figure 5-1. Habitat features recorded within the initial assessment area.

This mapping omits rocky habitat (caves, outcrops, loose surface rock and similar) as this would apply to the majority of the site. Sphagnum bogs are similarly omitted owing to their small size.

Appendix D

Aboriginal Heritage Assessment

View east across one of the gullies at the study area.

ABORIGINAL DUE DILIGENCE ASSESSMENT REPORT

LITHGOW MOUNTAIN BIKE PARK

LITHGOW LOCAL GOVERNMENT AREA

AUGUST 2025

Report prepared by

OzArk Environment & Heritage

for Central Tablelands Mountain Bike Club

OzArk
Environment & Heritage

145 Wingewarra St
(PO Box 2069)
Dubbo NSW 2830

Phone: (02) 6882 0118
Fax: (02) 6882 0630
enquiry@ozarkehm.com.au
www.ozarkehm.com.au

EXECUTIVE SUMMARY

OzArk Environment & Heritage (OzArk) has been engaged by Central Tablelands Mountain Bike Club (the proponent) to complete an Aboriginal due diligence heritage assessment for the proposed Lithgow Mountain Bike Park (the project). The project comprises the construction of a 62 kilometre (km) network of mountain bike trails across the State Mine Heritage Park precinct and within Gardens of Stone State Conservation Area (GOSSCA). The southern boundary of the project is on the northern outskirts of Lithgow and includes the State Mine Heritage Park.

The current assessment includes the portion of the project outside of GOSSCA, which is managed by the National Parks and Wildlife Service, within the area referred to as the State Mine Heritage Park precinct. The proposed mountain bike trails at State Mine Heritage Park total approximately 25 km in length. The disturbance area for the proposed tracks is to be between 1–3.3 metres (m) in width, with a variety of construction methods required to complete the track on different slope gradients. The study area for the assessment comprises a 10 m corridor within which the alignment of the proposed trails will be constructed. The landforms of the study area are mostly steep slopes with smaller sections of ridgeline and plateau.

The Aboriginal Heritage Information Management System has a record for one Aboriginal site that plots within the study area, a rock shelter with artefact deposit registered as State Mine Creek 1 (SMC1, 45-1-0200).

The visual inspection of the study area was undertaken by OzArk Project Archaeologist, Harrison Rochford, over three days from 17–19 July 2024. One Aboriginal site was identified during the visual inspection: State Mine Heritage Park Shelter with Artefact Site 1. Five areas of archaeological sensitivity were identified: State Mine Heritage Park PAD 1, and State Mine Heritage Park Shelters with PAD 2, 3, and 4. The visual inspection also determined that site SMC1 (45-1-0200) is 30 m to the southwest of the study area and will not be harmed.

The project can avoid impact to the one Aboriginal site and the five identified areas of archaeological sensitivity if the management measures provided in **Section 4** are followed.

Therefore, the undertaking of the due diligence process results in the conclusion that the proposed works will have an impact on the ground surface, however, no Aboriginal objects or intact archaeological deposits will be harmed. This moves the project to the following outcome:

> *Aboriginal Heritage Impact Permit (AHIP) application not necessary. Proceed with caution. If any Aboriginal objects are found, stop work, and notify Heritage NSW on 131 555 (info@environment.nsw.gov.au). If human remains are found, stop work, secure the site, and notify NSW Police and Heritage NSW.*

To ensure the greatest possible protection to the area's Aboriginal cultural heritage values, the following recommendations are made:

1. The proposed work may proceed at the study area without further archaeological investigation provided that the management measures in **Section 4** are followed.
2. This report and the accompanying GIS data should be provided to the trail designers for the project to ensure that the buffer areas surrounding the identified site and the five areas of archaeological sensitivity are avoided in the final track alignment and construction methodology.
3. All land and ground disturbance activities must be confined to within the study area, as this will eliminate the risk of harm to Aboriginal objects that may be in adjacent landforms. Should the parameters of the project extend beyond the assessed areas, then further archaeological assessment may be required.
4. This assessment has concluded that there is a low likelihood that the proposed work will adversely harm Aboriginal cultural heritage items or sites. If during works, however, Aboriginal artefacts or skeletal material are noted, all work should cease and the procedures in the *Unanticipated Finds Protocol* (**Appendix 2**) should be followed.
5. Inductions for work crews should include a cultural heritage awareness procedure to ensure they recognise Aboriginal artefacts (see **Appendix 3**) and are aware of the legislative protection of Aboriginal objects under the *National Parks and Wildlife Act 1974* and the contents of the *Unanticipated Finds Protocol.*
6. The information presented here meets the requirements of the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*. It should be retained as shelf documentation for five years as it may be used to support a defence against prosecution in the event of unanticipated harm to Aboriginal objects.

Appendix E

RFS Consultation

Outlook

Risk/Response Considerations - State Mine Gully MTB Park

From Ross Argent <Ross.Argent@rfs.nsw.gov.au>
Date Fri 2025-06-13 14:32
To Erika Dawson <erika@integratedconsulting.com.au>
Cc Scott Hoy <Scott.Hoy@rfs.nsw.gov.au>

Hi Erica,

Following our call last week, in consultation with the team here and after short discussions with NPWS, we (RFS) have some considerations in regard to risk and response.

If you would like clarification on any of the considerations I am happy to answer any questions, please see below;

- A pre-incident plan (PIP) be formulated with the Land Managers (council/NPWS/mountain bike assoc) for enacting should a fire or risk of fire threaten the Park. Outline who is the responsible agency/land manager required to close the park from the Lithgow end in the event of an emergency or operationally planned closures.
- Recommendation is to close the park on the same operational/safety risk measures as NPWS as to be consistent and eliminate confusion.
- There are a number of pre-existing trails intersecting or running parallel to the proposed tracks, a consideration should be made for possible escape routes.
- There are shuttle points mentioned, could these be evacuation points also?
- Considerations be made for cleared vegetation zones in the event that the escarpment areas are cut off from fire. The same considerations could be made for rescue capability as injured riders may require heli access for treatment and med-evac.
- Trail markers be implemented so in the event of accident, injury or emergency riders can relay their position to emergency services.
- A sign be put at the carpark or main trail entrance as an information point, including a phone number/website address for NSW RFS, Council and NPWS. Possible to include reference to the Hazards Near Me App. All emergencies call 000
- Trail access keys be made available to all agencies of the Lithgow LGA LEMC.

Please also note, the RFS will respond to all emergencies within its operational capabilities, response times can vary due to location and volunteer availability.

If you have additional questions or queries please let me know and I can direct you to the relevant/responsible agencies.

Kind Regards

Ross Argent
A/Operational Officer L2 – Chifley Lithgow

RFS

P 1300 258 737 **M** 0439 364
353 **E** ross.argent@rfs.nsw.gov.au
27 Hampden Park Rd, Kelso NSW 2795
PO Box 1488 Bathurst NSW 2795
www.rfs.nsw.gov.au

Appendix F

APZ & Landscaping Measures

APPENDIX 4

ASSET PROTECTION ZONE REQUIREMENTS

In combination with other BPMs, a bush fire hazard can be reduced by implementing simple steps to reduce vegetation levels. This can be done by designing and managing landscaping to implement an APZ around the property.

Careful attention should be paid to species selection, their location relative to their flammability, minimising continuity of vegetation (horizontally and vertically), and ongoing maintenance to remove flammable fuels (leaf litter, twigs and debris).

This Appendix sets the standards which need to be met within an APZ.

A4.1 Asset Protection Zones

An APZ is a fuel-reduced area surrounding a building or structure. It is located between the building or structure and the bush fire hazard.

For a complete guide to APZs and landscaping, download the NSW RFS document *Standards for Asset Protection Zones* at the NSW RFS Website www.rfs.nsw.gov.au.

An APZ provides:

- a buffer zone between a bush fire hazard and an asset;
- an area of reduced bush fire fuel that allows for suppression of fire;
- an area from which backburning or hazard reduction can be conducted; and
- an area which allows emergency services access and provides a relatively safe area for firefighters and home owners to defend their property.

Bush fire fuels should be minimised within an APZ. This is so that the vegetation within the zone does not provide a path for the spread of fire to the building, either from the ground level or through the tree canopy.

An APZ, if designed correctly and maintained regularly, will reduce the risk of:

- direct flame contact on the building;
- damage to the building asset from intense radiant heat; and
- ember attack.

The methodology for calculating the required APZ distance is contained within Appendix 1. The width of the APZ required will depend upon the development type and bush fire threat. APZs for new development are set out within Chapters 5, 6 and 7 of this document.

In forest vegetation, the APZ can be made up of an Inner Protection Area (IPA) and an Outer Protection Area (OPA).

A4.1.1 Inner Protection Areas (IPAs)

The IPA is the area closest to the building and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and act as a defendable space. Vegetation within the IPA should be kept to a minimum level. Litter fuels within the IPA should be kept below 1cm in height and be discontinuous.

In practical terms the IPA is typically the curtilage around the building, consisting of a mown lawn and well maintained gardens.

When establishing and maintaining an IPA the following requirements apply:

Trees

- tree canopy cover should be less than 15% at maturity;
- trees at maturity should not touch or overhang the building;
- lower limbs should be removed up to a height of 2m above the ground;
- tree canopies should be separated by 2 to 5m; and
- preference should be given to smooth barked and evergreen trees.

Shrubs

- create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided;
- shrubs should not be located under trees;
- shrubs should not form more than 10% ground cover; and
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

Grass

- grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and
- leaves and vegetation debris should be removed.

A4.1.2 Outer Protection Areas (OPAs)

An OPA is located between the IPA and the unmanaged vegetation. It is an area where there is maintenance of the understorey and some separation in the canopy. The reduction of fuel in this area aims to decrease the intensity of an approaching fire and restricts the potential for fire spread from crowns; reducing the level of direct flame, radiant heat and ember attack on the IPA.

Because of the nature of an OPA, they are only applicable in forest vegetation.

When establishing and maintaining an OPA the following requirements apply:

Trees

- tree canopy cover should be less than 30%; and
- canopies should be separated by 2 to 5m.

Shrubs

- shrubs should not form a continuous canopy; and
- shrubs should form no more than 20% of ground cover.

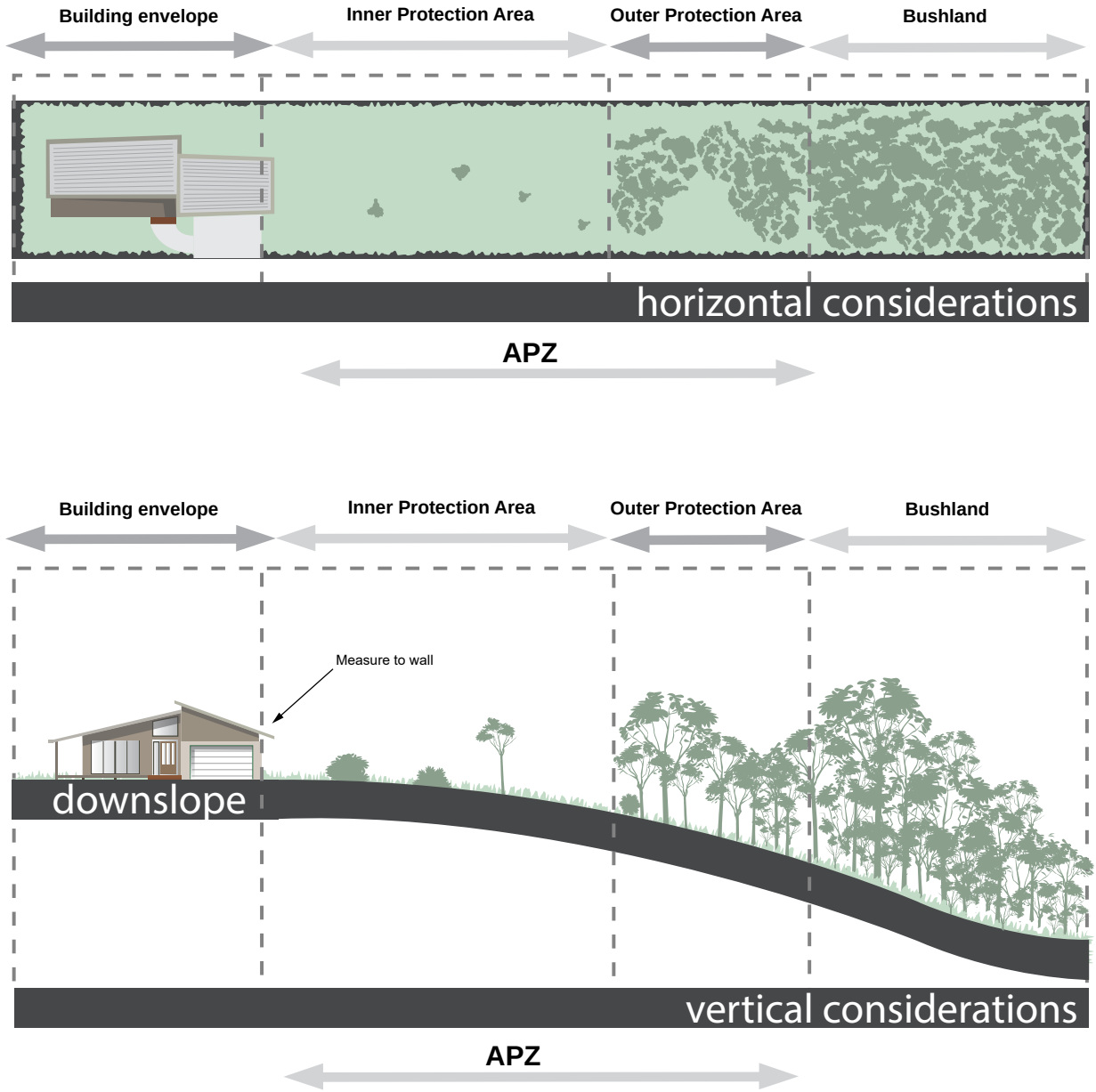
Grass

- grass should be kept mown to a height of less than 100mm; and
- leaf and other debris should be removed.

An APZ should be maintained in perpetuity to ensure ongoing protection from the impact of bush fires. Maintenance of the IPA and OPA as described above should be undertaken regularly, particularly in advance of the bush fire season.

Figure A4.1

Typical Inner and Outer Protection Areas.



Appendix G

Access Specification

APPENDIX 3

ACCESS

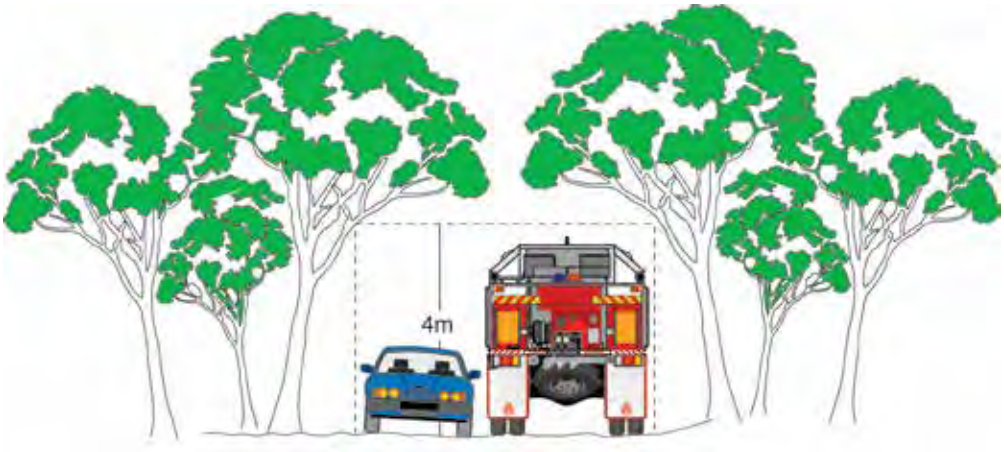
This appendix provides design principles for emergency service vehicle access.

A3.1 Vertical clearance

An unobstructed clearance height of 4 metres should be maintained above all access ways including clearance from building construction, archways, gateways and overhanging structures (e.g. ducts, pipes, sprinklers, walkways, signs and beams). This also applies to vegetation overhanging roads.

Figure A3.1

Vertical clearance.



A3.2 Vehicle turning requirements

Curved carriageways should be constructed using the minimum swept path as outlined in Table A3.2.

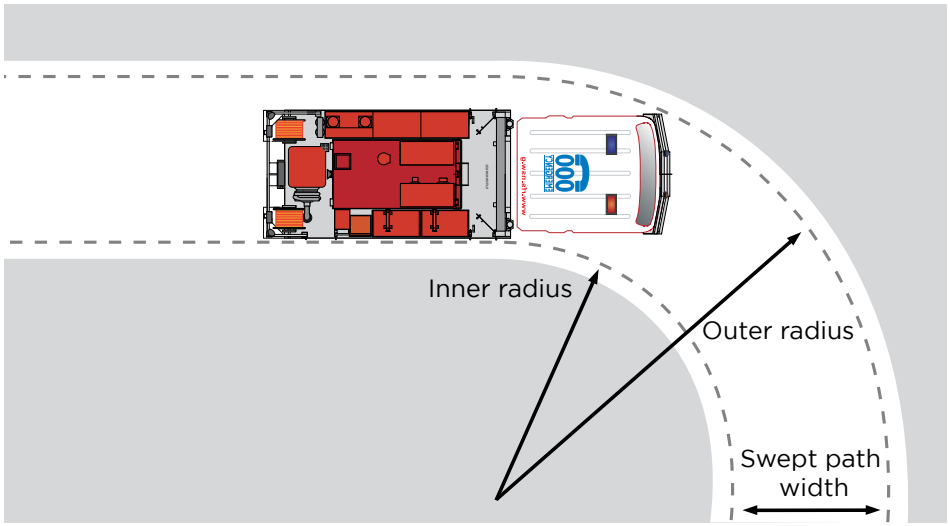
Table A3.2

Minimum curve radius for turning vehicles.

Curve radius (inside edge in metres)	Swept path (metres width)
< 40	4.0
40 - 69	3.0
70 - 100	2.7
> 100	2.5

Figure A3.2a

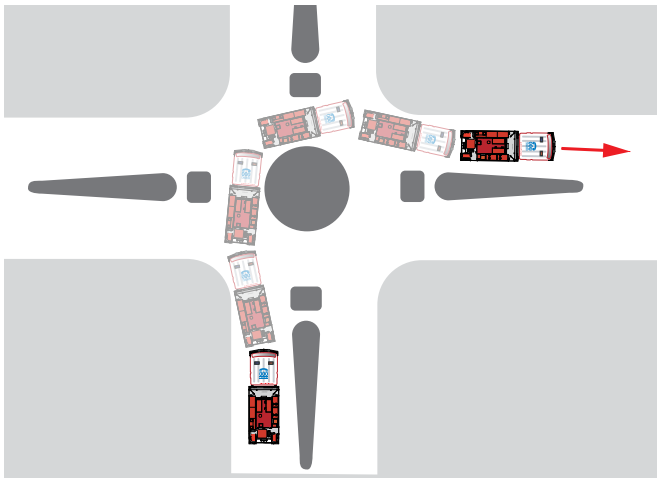
Swept path width for turning vehicles.



The radius dimensions given are for wall to wall clearance where body overhangs travel a wider arc than the wheel tracks (vehicle swept path). The swept path shall include an additional 500mm clearance either side of the vehicle.

Figure A3.2b

Roundabout swept path.



Example of a swept path as applied to a roundabout. The distance between inner and outer turning arcs allows for expected vehicle body swing of front and rear overhanging sections (the swept path).

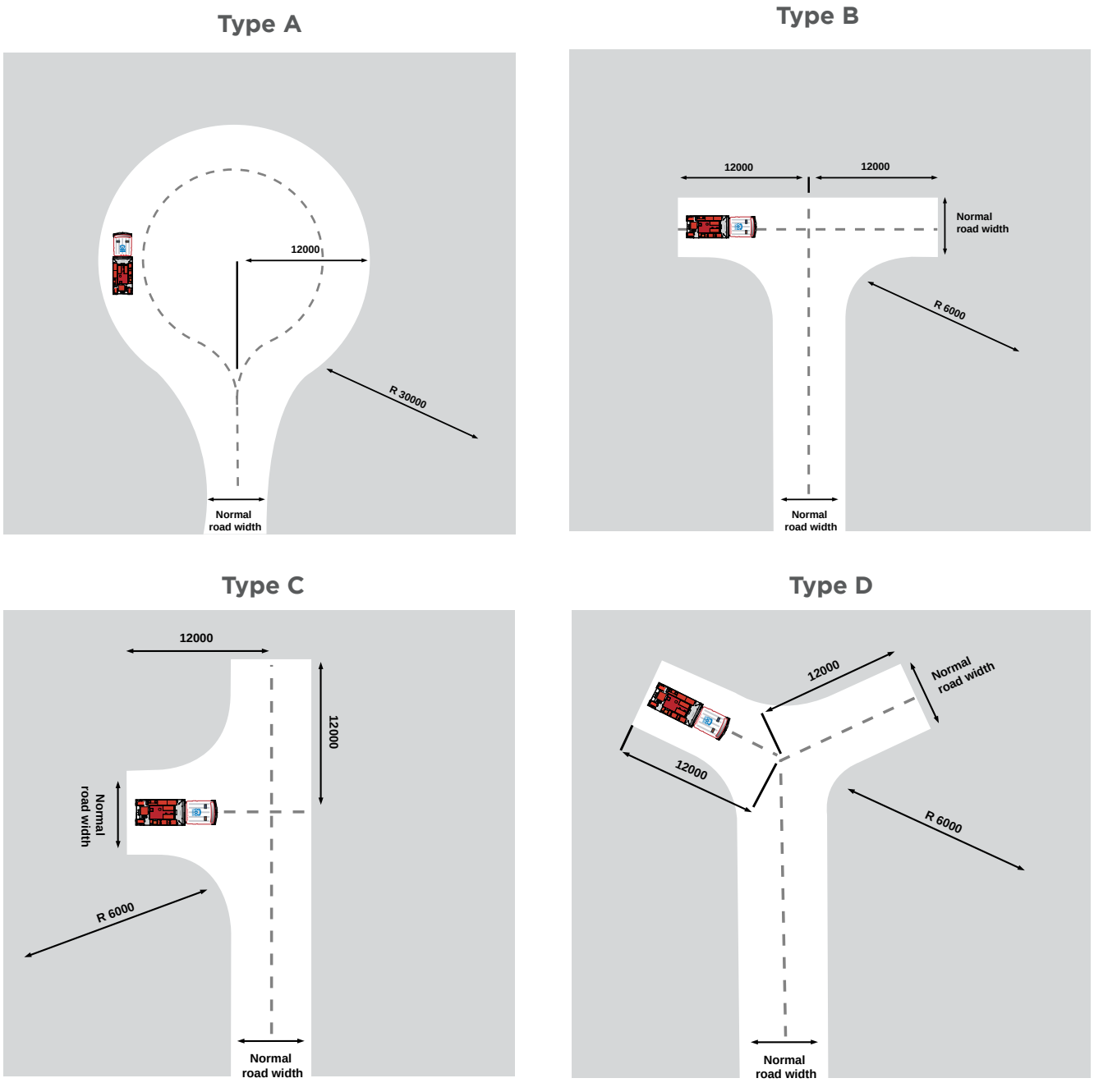
A3.3 Vehicle turning head requirements

Dead ends that are longer then 200m must be provided with a turning head area that avoids multipoint turns. “No parking” signs are to be erected within the turning head.

The minimum turning radius shall be in accordance with Table A3.2. Where multipoint turning is proposed the NSW RFS will consider the following options:

Figure A3.3

Multipoint turning options.



A3.4 Passing bays

The construction of passing bays, where required, shall be 20m in length and provide a minimum trafficable width at the passing point of 6m.

Figure A3.4

Passing bays can provide advantages when designed correctly. Poor design can and does severely impede access.

A3.5 Parking

Parking can create a pinch point in required access. The location of parking should be carefully considered to ensure fire appliance access is unimpeded. Hydrants shall be located outside of access ways and any parking areas to ensure that access is available at all times.

Figure A3.5

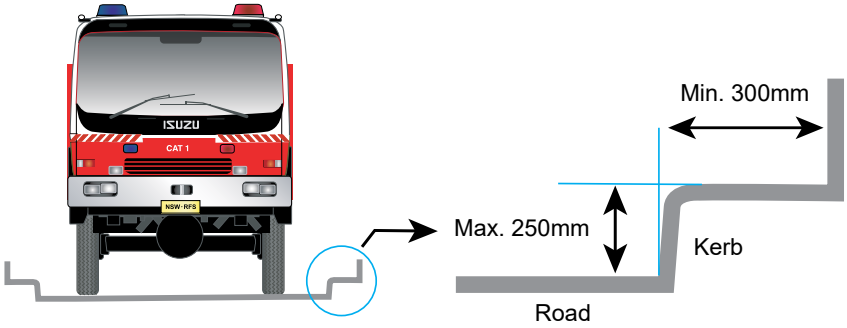
Hydrants and parking bays.

A3.6 Kerb dimensions

All kerbs constructed around access roads should be no higher than 250mm and free of vertical obstructions at least 300mm back from the kerb face to allow clearance for front and rear body overhang.

Figure A3.6

Carriageway kerb clearance dimensions.



A3.7 Services

Hydrant services should be located outside the carriageway and parking bays to permit traffic flow and access. Setup of standpipes within the carriageway may stop traffic flow. Hydrant services shall be located on the side of the road away from the bush fire threat where possible.

A3.8 Local Area Traffic Management (LATM)

The objective of LATM is to regulate traffic an acceptable level of speed and traffic volume within a local area.

Traffic engineers and planners should consider LATM devices when planning for local traffic control and their likely impact on emergency services. LATM devices by their nature are designed to restrict and impede the movement of traffic, especially large vehicles.

Where LATM devices are provided they are to be designed so that they do not impede fire vehicle access.

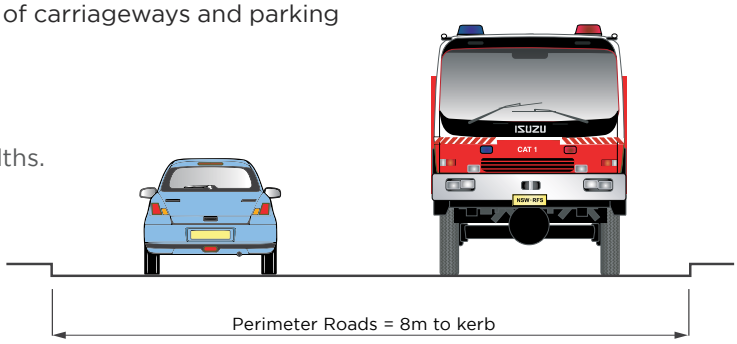
A3.9 Road types

A3.9.1 Perimeter Roads

Perimeter roads are to be provided with a minimum clear width of 8m. Parking and hydrants are to be provided outside of carriageways. Hydrants are to be located outside of carriageways and parking areas.

Figure A3.9a

Perimeter road widths.

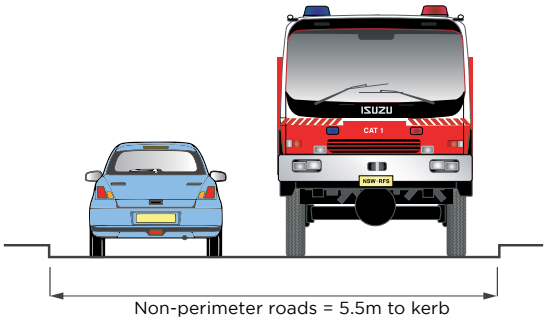


A3.9.2 Non-perimeter Roads

Non-perimeter roads shall be provided with a minimum clear width of 5.5m. Parking is to be provided outside of the carriageway and hydrants are not to be located in carriageways or parking areas.

Figure A3.9b

Non-perimeter road widths.



A3.9.3 Property access

Property access roads are to be a minimum of 4m wide.

Figure A3.9c

Property access road widths.