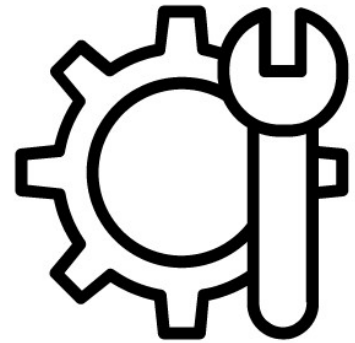


PMO 360

Govt. Project. Done.



RFI Response

**Response to RFI IDAS-2025-10715 from
Department Climate Change, Energy, the
Environment and Water – Water Group**

Document Quality Control

Document Number: DCCEEW01
Title: RFI Response
Project: Lithgow Mountain Bike Park, DA170/25
Author: Paul Smith (RPEng 918356-1758)

Endorsement



Director PMO 360 Pty Ltd

08 / 03 / 2026

Date

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Attachments to this report:

- **Attachment A - Site Photos**
- **Attachment B - Maps - Overview 1 to 5**
- **Attachment C - Lithgow Mountain Bike Park - Detailed Design Report Final 20250725 compressed**
- **Attachment D - COA Turbidity Readings 10 Feb & 4th Mar 26 Reports**
- **Attachment E - Geotechnical Mine Subsidence 17539-201r2 Report**
- **Attachment F - V3.1_Lithgow Mountain Bike Park_BDAR_August 2025**

1 Introduction

Central Tablelands Mountain Bike Club (CTMBC) has been requested by the Licensing and Approvals team within the Water Group of the Department of Climate Change, Energy, the Environment and Water (the Department) to provide further information about development application reference DA170/25 (DA) seeking consent for the construction and operation of the Lithgow Mountain Bike Park (Project), located at State Mine Gully, Lithgow (the Site).

The DA was submitted as integrated development, as it was identified that the DA included activities within 40m of the State Mine Gully Creek for which a controlled activity approval under s 91 of the *Water Management Act 2000* (NSW) (WM Act) may be required.

The requirement for a controlled activity approval in relation to other areas at the Site is unclear, as is explained further in this response.

The request for information dated 9 December 2025 (RFI) received from the Department requested the following information:

“Site plans with the demarcation of waterfront land designated riparian corridors, including any encroachments and offsets in accordance with the department’s guidelines for riparian corridors.

Clarification on works on waterfront land in relation to construction of the mountain bike tracks and the intersection of the watercourses.”

This report has been prepared in response to the RFI.

2 Overview of response

This report is intended to be used by the Department in its consideration of:

- areas within the Site that are waterfront land, within the meaning of the WM Act;
- areas within the Site where a controlled activity approval under s 91 of the WM Act is required; and
- for those areas where a controlled activity approval is required, the General Terms of Approval for the purposes of that approval and the DA.

As is demonstrated in this report, it is unclear whether a controlled activity approval is required in relation to all of the watercourses mapped at the Site. In particular:

- a) It appears that surface water flows on the Site have been impacted by the subterranean environment due to legacy mining activities.
- b) The Site has an existing (1500m) mountain bike trail which is understood to have been in place on one of the branches for at least 25 years. Little or no erosion appears to have taken place as a result, suggesting that there are very low and intermittent levels of flow (if at all) down that part of the creek in recent history.
- c) There are already areas on Site where there is extensive bare earth due to 4WD activity, which has not increased the turbidity readings or lowered the water quality after significant rain events (Attachment D).
- d) The NSW LiDAR data has been proven to be inaccurate in heavily vegetated areas of the Site, and is likely showing the ground level to be higher than it actually is, which has meant that physical measurements are also necessary in order to identify the location of the watercourses.
- e) Even then, it is questionable whether a number of these watercourses, and the surrounding areas, would meet the definition of waterfront land under the WM Act, given the lack of a defined bed or bank in some areas.

To the extent that an approval is required, it is considered that the grant of any controlled activity approval with respect to the proposed mountain bike park would be consistent with the Department's guidelines and would have minimal impact on any riparian corridors at the Site. In particular:

- a) The nature of the construction activities proposed are minor and will not affect stream flows.
- b) Extensive environmental assessments have been conducted during the 12-month period required for seasonal surveys in the development of the project's Biodiversity Assessment Report (Attachment F - V3.1_Lithgow Mountain Bike Park_BDAR_August 2025). This report has considered the effect of this development on riparian habitat, ground water dependent ecosystems and fish habitat and assessed the development to have no effect of these habitats. The BDAR identifies all streams within the Site including State Mine Creak as ephemeral streams.
- c) The mountain bike trails proposed are passive recreational activities and will have minimal impact on any watercourses in the area.
- d) The construction activities proposed are minor in nature and would not amount to a 'cycleway', within the meaning of that term in the Department's guidelines. Rather, the trails will be single, dirt track, with minimally invasive constructions over a number of gullies which, despite being mapped as hydrolines, appear to have been severely impacted by historical mining and have very low instances of flow.

3 The Site and the Project

The Site lies just to the south of the Gardens of Stone State Conservation Area (SCA) on the northern outskirts of Lithgow. The area was historically used for mining and, today retains many outstanding natural attributes making it suitable for development as a mountain biking destination.

The strategic location of the Site enables the proposed trails to connect into other trails and infrastructure which are completed, under construction and proposed to be constructed by NSW National Parks and Wildlife Services (NPWS) within the Gardens of Stone SCA. Crucially, this development shall provide a direct connection with the infrastructure being constructed by NPWS and the City of Lithgow.

The Project has been initiated to develop a community facility and provide the people of Lithgow with an opportunity to partake in passive recreational activities in the State Mine Gully.

The construction and operation of the Project has been carefully planned to minimise impacts on the environment, enabling the community to connect with nature and recreation in an environmentally responsible manner.

4 Approvals required under the WM Act

The requirement to obtain an approval to carry out an activity on waterfront land is contained in sections 91 and 91E of the WM Act. These provisions apply to activities on waterfront land, which is defined in the Dictionary to the Act as follows:

waterfront land means—

- (a) *the bed of any river, together with any land lying between the bed of the river and a line drawn parallel to, and the prescribed distance inland of, the highest bank of the river, or*

[...]

where the prescribed distance is 40 metres....

The term 'river' is defined in the WM Act to include any watercourse, whether perennial or intermittent, and any branch or other watercourse from which the first mentioned watercourse flows.

While it is clear that a watercourse which flows intermittently may still be a river for the purposes of identifying waterfront land, the definition of river seems to imply some level of intermittent flow needing to be present. Further, the definition of waterfront land also seems to imply the presence of a defined bed and bank from which the prescribed distance can be measured.

The Department has issued '[Controlled activities – Guidelines for riparian corridors on waterfront land](#)' (the Guidelines). The Guidelines state that '*where a watercourse does not exhibit the features of a defined channel with bed and banks, the department may determine that the watercourse is not waterfront land for the purposes of the WM Act.*'

While LiDAR mapping identifies watercourses across the Site, in many instances, it is difficult to visually identify a defined channel, with a bed and banks, for the purposes of identifying waterfront land. To assist in the Department's consideration of the Site, **Attachment B** to this report provides a series of maps, which shows the LiDAR mapping, adjustments to that mapping suggested as a result of on-site inspections and a number of photos (Attachment A) of various sections of the watercourses.

Based on the information compiled in this report, it appears that the top areas of the watercourses identified as 'Branches 2 and 3' (identified in section 11 of this response) do not meet the definition of waterfront land. There may also be other areas throughout the Site that are not waterfront land and we would welcome the Department's consideration of this.

In the event that the Department does consider all of the mapped watercourses on the Site and nearby areas to be waterfront land, this report maps on each watercourse:

- the waterfront land, by estimating the prescribed distance of 40m taking into account the topographical changes in the land (this approach is taken as, in some instance, the watercourses are in deep gullies and mapping based on an aerial view alone would be inaccurate);
- the estimated vegetated riparian zone (VRZ) identified in accordance with page 5 of the Guidelines (i.e. 10m for 1st order streams and 20m for 2nd order streams); and
- the estimated inner and outer 50% of the VRZ.

4.1 Application of the Guidelines

The RFI has also requested that encroachments and offsets of the VRZ in accordance with the Guidelines be provided.

The Guidelines (on page 6) state that cycleways and paths no wider than 4m can be built in the outer 50% of the VRZ and (on page 7) state that cycleways and paths do not need to be offset under the Guidelines.

On page 5, the Guidelines state that cycleways, pathways and road crossing can occur on waterfront land in riparian corridors (i.e. the channel and the VRZs) for 1st and 2nd order streams.

Page 4 of the Guidelines also states that the Department allows 'a range of works and activities on waterfront land and in riparian corridors to better meet the needs of the community, so long as they cause minimal harm' (as outlined in the table on page 5, noted above).

Furthermore, the objectives of the riparian corridors protected under the Guidelines are:

- providing bed and bank stability and reducing bank and channel erosion;
- protecting water quality by trapping sediment, nutrients and other contaminants;
- providing a diversity of habitats for terrestrial, riparian and aquatic plants (flora) and animals (fauna);
- providing connectivity between wildlife habitats;
- conveying flood flows and controlling the direction of flood flows;
- providing an interface or buffer between developments and waterways; and
- providing passive recreational uses.

As is set out in this report, the construction of the mountain bike trails proposed are of minimal impact (even less so than a cycleway or path). It is considered that the grant of any controlled activity approval required with respect to these activities would be consistent with the Department's Guidelines and would have minimal impact on any riparian corridors at the Site.

4.2 Application of the Crossing Guidelines

The Department has also published '[Controlled activities – Guidelines for watercourse crossings on waterfront land](#)' (Crossings Guidelines). The Crossings Guidelines state that such works should be designed and constructed to '*protect and enhance water flow, water quality, stream ecology and existing riparian vegetation*' and the impacts on '*hydrologic, hydraulic and geomorphic functions*' of a watercourse should be minimised. Furthermore, it states that bed level crossings or bridges which fully span the watercourse channel should be preferred.

Considerations for the design and constructing of crossing structures under the Crossings Guidelines include:

- minimising the design and construction footprint and extent of proposed disturbances within the watercourse and riparian corridor;
- maintaining existing or natural hydraulic, hydrologic, geomorphic and ecological functions of the watercourse;
- maintaining natural geomorphic processes, including:
 - accommodating natural watercourse functions;
 - maintaining the natural bed and bank profile;
 - ensuring the movement of sediment and woody debris is not inhibited;
 - not increasing scour and erosion of the bed or banks in any storm events;
 - avoid locating structures on bends in the channel;
 - where bed degradation has occurred, address bed degradation to protect the structure and restore channel and bed stability;
- maintaining natural hydrological regimes, including:
 - accommodating site hydrological conditions;
 - not altering natural bank full or floodplain flows or increase water levels upstream;
 - not changing the gradient of the bed except where necessary to address existing degradation;
 - not increasing velocities by constricting flows; and
- protect against scour, for example, by using rock rip-rap and vegetation.

The crossings proposed as part of the development are consistent with these principles and have been designed to maintain the natural attributes of the watercourses and their surrounding environments.

The proposed crossings are discussed at a high level in this response and set out in detail in the Lithgow Mountain Bike Park - Detailed Design Report produced by World

Trail, which was included in the DA and is included again as Attachment C to this response (Detailed Design Report).

Also, a 'basic plank crossing' (Section 12.3) has been designed specifically for this report in order to communicate the minimally invasive nature of this type of crossing.

5 Working with the Department

CTMB would welcome the opportunity to discuss the Project with the Department and answer any questions that the Department may have, once it has had the opportunity to consider this response.

The Site and the Project DA are considered unique, and CTMB would be open to discussing any questions or concerns that the Department may have in relation to the proposed Project.

6 Methods in Preparing the Information Requested

The information contained in this report has been prepared through a mix of desktop and site assessments/measurement with the intention to address the main objectives detailed within the Guidelines and the Crossing Guidelines.

NSW Spatial Services information was utilised to establish the site contours and assess existing hydroline data.

LiDAR data was utilised to establish the contours from the NSW Spatial Services, 1m Digital Elevation Model (DEM).

According to NSW Spatial Services website, *"These models generally provide a vertical accuracy of 0.15m to 0.3m (at 95% confidence) and a horizontal accuracy of roughly 0.45m to 0.8m in most areas."*

However, as shall be explained in this report, the extremely dense vegetation at the Site and particular within gullies has prevented the LiDAR penetration to clearly map accurate contours in certain areas. Furthermore, with some very wide and flat contours on State Mine Creek, the precise location of the creek was difficult to generate from the desktop analysis.

Accordingly, where possible, desktop data has been supplemented by on-site measurements and photos, as set out in this report. Photos are attached as Attachment A.

7 Site Inspection

A site inspection was undertaken over 2 days on 2 and 3 February 2026. The inspection covered 22km in 2 days and was completed by Paul Smith (Author) and a site assistant for safety in remote areas and tape measurements.

Weather conditions were cloudy and light to medium rain and drizzle persisted for both days which made inspection of crossings CR1 and CR2 not possible.

The objectives of the site inspection was to:

- 1) inspect all crossings to and photograph the areas where crossings are required, as set out in Section 14 of this report;
- 2) inspect and photograph key VRZ areas where the trails will be located that may be waterfront land; and
- 3) collect information and measurements for key features along the watercourses that can be checked against the desktop data for accuracy and also note any other features relevant to the application of the Guidelines and the definition of waterfront land under the WM Act.

8 The History of the Site

The Site is located in State Mine Gully just above Lithgow, NSW in the Sydney Water Upper Cox River sub-catchment area. The Site, especially in a sub-terranean context, is heavily disturbed from extensive historical coal mining activity.

The Site is sitting directly on top of an abandoned coal mine previously named the Lithgow State Coal Mine.

The figure below (extracted from the DA Mine Subsidence Report – Attachment E) shows the proposed trail alignments on the surface mapped against subterranean mining voids from past activities. This shows that the Site sits on top of legacy, heavily disturbed sub-terranean, mine interference.

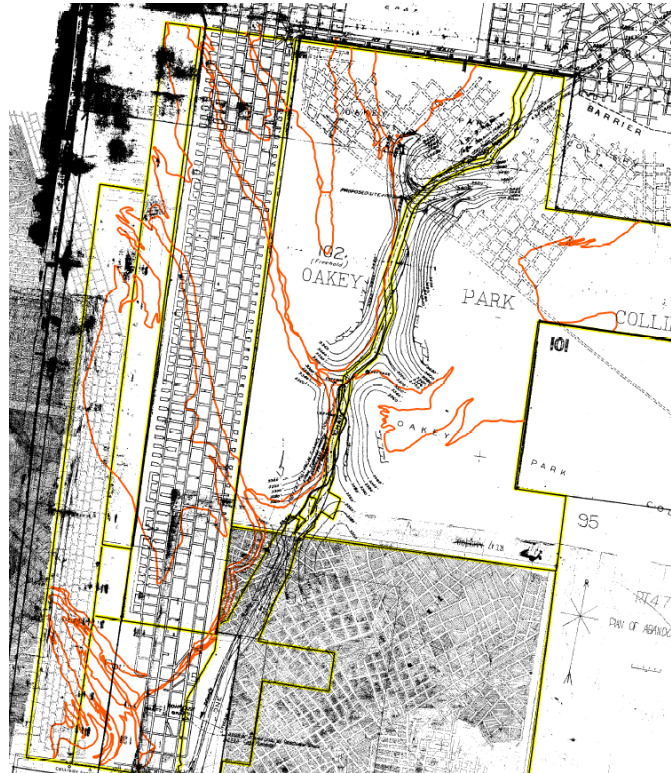


Figure 1: Mountain Bike Trails Sitting Directly Above Abandoned Lithgow State Mine.

It is understood that the Lithgow State Mine used the bord and pillar extraction method and explosives were used regularly in the mine's operations.

It is also understood that the mine was abruptly closed in 1964 due to catastrophic flooding. The 1964 floods saw Farmers Creek break into the Cobar Park Mine (adjacent to the Lithgow State Mine) which subsequently 'broke through' to Lithgow State Coal Mine, flooding and immediately causing abandonment of the mine. Farmer's creek then continued to run into the Cobar Park Mine ceasing downstream flows. Flow was re-established by installing concrete lining along 2.7km of Farmers Creek in the center of Lithgow (see Figure 2).

Figure 2: Extract from the Lithgow Mercury regarding the destruction of Farmers Creek (downstream of our proposed development.)



Lithgow State Mine was heavily mined for 48 years from 1916 to its abandonment after the flooding in 1964.

The bord and pillar mining technique, combined with the regular use of explosives, is known to have the potential to cause surface cracks and disturbances, such as the surface crack shown in the following picture adjacent to the Cobar Park Mine, which is located nearby to the Lithgow State Mine. (Extracted from 'history-of-bord-and-pillar-subsidence-damage-leg-2024')¹



Figure 3: Subsidence cracks above Cobar Park Colliery adjacent to Lithgow State Mine

Figure 3 was extracted from 'history-of-bord-and-pillar-subsidence-damage-leg-2024'.¹

Such cracking is also understood to cause the potential loss of surface water flows, as this can flow down into underground voids and cracks associated with historical mining (as is discussed further below).

Based on the above, and as detailed in the Mine Subsidence Report (**Attachment E**), the subterranean area below the Site is potentially heavily disturbed with underground voids and associated cracks.

As is discussed in the section below, this could contribute to a reduction in above ground stream flows in the watercourses identified on site.

¹ Available to download at: <<https://www.lithgowenvironment.au/docs/history-of-bord-and-pillar-subsidence-damage-leg-2024.pdf>>

9 Site Riparian Corridors, Current Conditions & WaterNSW

At the Site, hydroline mapping identifies 6 branches and systems of watercourses relevant to the proposed development.

The detailed maps in Attachment B and this report further defines the focus areas as follows:

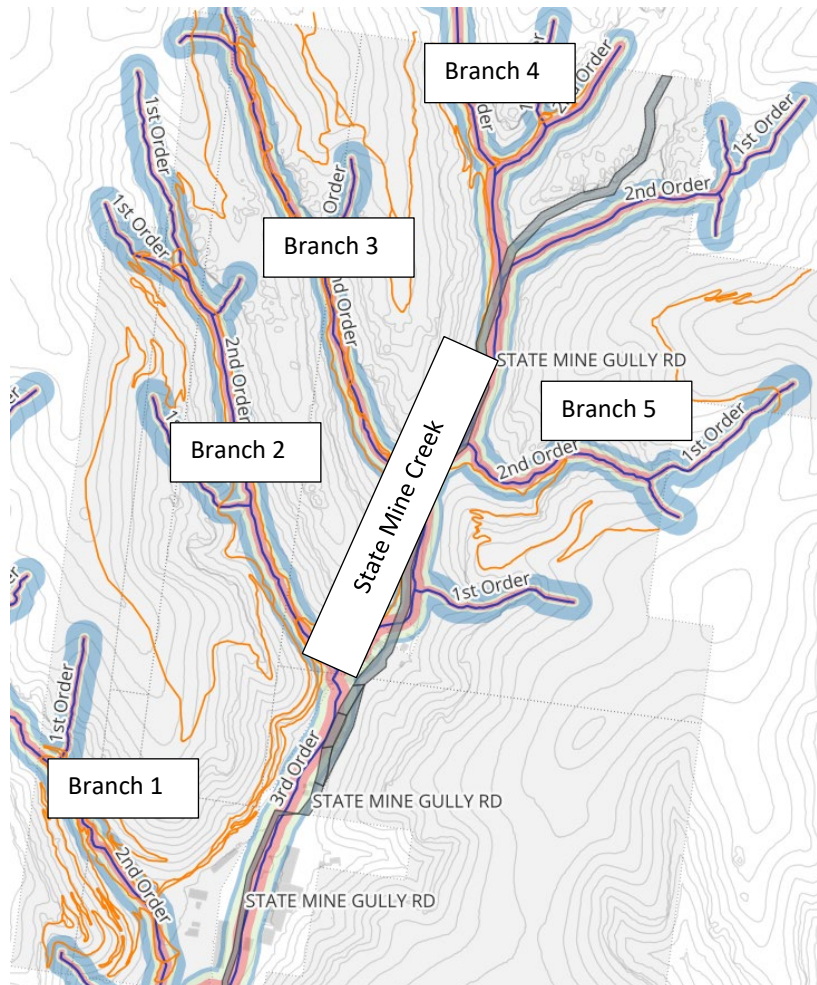


Figure 4. Riparian Corridor Branch & System locations

Based on anecdotal evidence collected during the site inspection, and through consultation with the land owner, it is understood that branches 1, 2, 3 and 5 are normally dry and do not usually flow (ephemeral streams) except in extreme flood conditions. Branch 1, 2, 3 and 5 are estimated to flow about once every 10 years according to the owners of the City of Lithgow State Mine Heritage Museum.

Branch 4 and State Mine Creek were flowing at the time of the inspection at low volumes. These 2 streams are listed in the Biodiversity Assessment Report (BDAR – Attachment F) as also being ephemeral.

At the time of the site inspection, Branch 4 was estimated to be flowing at 4l/s and State Mine Creek was estimated to be flowing at 6l/s.

The low flows of these systems is documented by WaterNSW, including in its Sydney Drinking Water Catchment Audit 2019-22² (Page 89) which also considers the likely consequences of sub-terranean coal mining in the catchment (as discussed above).

In particular, the report details the effects of mining operations on water courses across the Sydney Drinking Water Catchment on page 89 as follows:

- *Surface impacts from exploration and monitoring establishment activities such as clearing for boreholes.*
- *Surface effects from ground movements related to subsidence, including vertical subsidence, cracking and fracturing of streambeds and swamp bases, and diversion of surface water underground.*
- *Permanent changes to the flow regimes of stream reaches that substantially decrease stream flows and increase the number of low-and no-flow days under different rainfall scenarios.*
- *Major changes to water regimes and increases in drying severity in swamps.*
- *Increased vulnerability of swamps and their surrounding vegetation to irreversible damage or loss following extreme bushfires in a drier landscape.*
- *Irreversible loss of near-pristine swamps, in-stream and riparian habitats (including threatened species, populations and ecological communities), and their water-dependent processes.*
- *Reduced water quality and inflows to Sydney's drinking water storages.*
- *Unquantified long-term alterations to groundwater levels and water quality post-mining.*
- *Increased mine water outflows through portal(s) after mine closure and groundwater level recovery when controlled by bulkheads within the mine, including in-perpetuity requirements for water treatment prior to discharge.*

These effects are further reinforced by multiple peer reviewed studies which document the effects of coal mining on stream flows. See, for example, Luan J et al, 'Coal Mining Impacts on Catch Runoff', *Journal of Hydrology* 589 (2020)³.

Also see specific reference to effects on surface water from mining directly adjacent to the Site at Newnes Plateau in Ian R.C. Baird & D. Benson 'Severe impacts of longwall coal mining in endangered Newnes Plateau Shrub Swamps, exposed in December 2019 fires'⁴

State Mine Gully sits at the top of the Upper Cox River Catchment and has been identified as being affected by mining activities on page 92 of the 2022 Water NSW audit report.

Given the history of the Site (discussed above) and the impacts of mining on the catchment area detailed by WaterNSW, it appears that the watercourses identified at the Site may not flow as strongly or regularly as they could, as a result of historical sub-terranean mining activity beneath the streams. This has implications for reduced riparian habitat, vegetation and erosion potential on these riparian corridors and should be taken into account by the Department in their assessment of the Controlled Activities.

² Available to download at <<https://www.waternsw.com.au/documents/publications/water-services/catchment-audits/Drinking-Water-Catchment-Audit-2022-Main-Report.pdf>>.

³ Available at

<<https://www.sciencedirect.com/science/article/abs/pii/S0022169420305618#:~:text=Coal%20mining%20is%20one%20of,et%20al.%2C%202018>>.

⁴ Available to Download at

<https://www.researchgate.net/publication/343334733_Severe_impacts_of_longwall_coal_mining_in_endangered_Newnes_Plateau_Shrub_Swamps_exposed_in_December_2019_fires>

10 Production of the Maps in Mountainous Terrain

The maps attached to this report as 'Attachment B - Maps - Overview 1 to 5' were produced by Mr. Paul Smith, Registered Professional Engineer, 918356-1758.

The spatial data used to produce the maps was a combination of data downloaded from NSW Spatial Services and Lithgow City Council Spatial Services.

The projection (coordinate reference system) used was GDA94 / MGA zone 56.

The software used to produce the maps was QGIS mapping software.

Due to the size of the Site and inaccessibility of areas of the creeks, assumptions were made about the bank-to-bank width of 1st, 2nd and 3rd order streams as per their Strahler order (as referred to in the Guidelines), for the purposes of mapping the banks. In particular:

- 1st order streams were mapped as being 1m bank to bank.
- 2nd order streams were mapped as being 2m bank to bank.
- 3rd order streams (i.e. State Mine Creek) was mapped as being 5m bank to bank.

These average 'bank to bank' lengths were based on onsite measurements taken of the streams on site at crossing points 1 to 16. This made the mapped areas of waterfront land (including the watercourse) 81m, 82m and 85m wide respectively for 1st, 2nd and 3rd order streams.

As per the Guidelines, the inner 50% and outer 50% or the VRZs of the streams was also mapped.

Given the mountainous terrain of the Site, mapping was supplemented with measurements at certain locations along the ground, to estimate 40m from the top of the bank. These adjusted 'z' values were used for mapping the waterfront land and VRZs with reference to the top of the bank identified based on the above assumptions.

On site measurements were also utilised to supplement the NSW Spatial Services hydrolines and LiDAR data, which in many places were identified as being incorrect.

For example, in the following picture in the red circle, the green line is the NSW hydroline mapped against the LiDAR 1m DEM contours (which is generally understood to be more accurate). These contours appear to show the water flowing up hill. Accordingly, in the maps provided, the blue hydrolines were developed to match the contour low points and provide a more accurate representation of the actual stream locations inspected on Site:

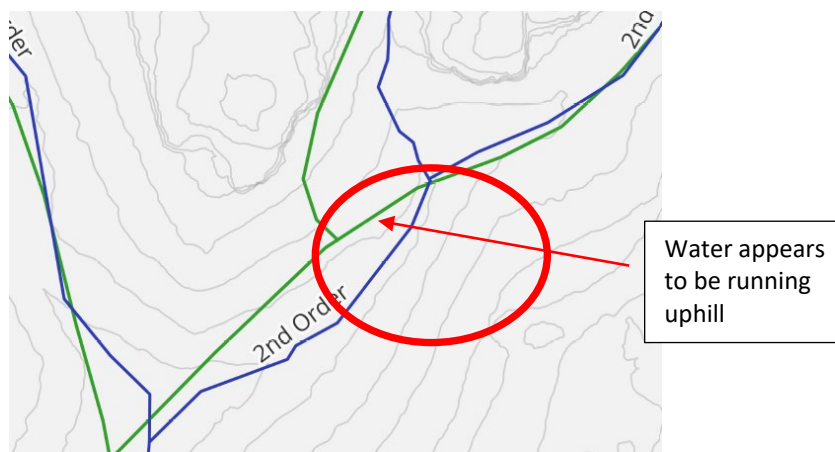


Figure 5: NSW Hydrolines Layer with Errors.

The new hydrolines were developed from the desktop and may contain errors introduced from the LiDAR or flat contours. The LiDAR data is reasonably accurate; however, it has

been proven to be erroneous in heavily vegetated areas around the bottoms of the gullies and crucially, at one location along State Mine Gully Road where the contours show 6m of vertical distance and this distance was measured during the site inspection to be 25m of sheer drop-off. Furthermore, Avenza maps noted the elevation on the orange line (below) to be 979m. The LiDAR data shows this to be 966m – 13m difference:

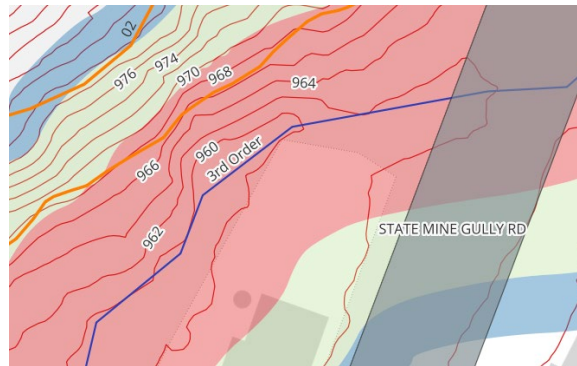


Figure 6. 2m contours - Creek to Orange Trail shows 6m of fall which is incorrect as it was measured as 25m

These flat, wide contours in Figure 6 may introduce errors to the actual stream location as it cannot be confidently determined (from the desktop) where the creek enters the flat, wide contour 962m, for instance.

The LiDAR data has been proven to be correct where the vegetation is low. For example, a topographical survey completed by Integrated Consulting (qualified surveyor) shows that at the proposed car park at the Site, the AHD measurements match the NSW Special Services LiDAR:

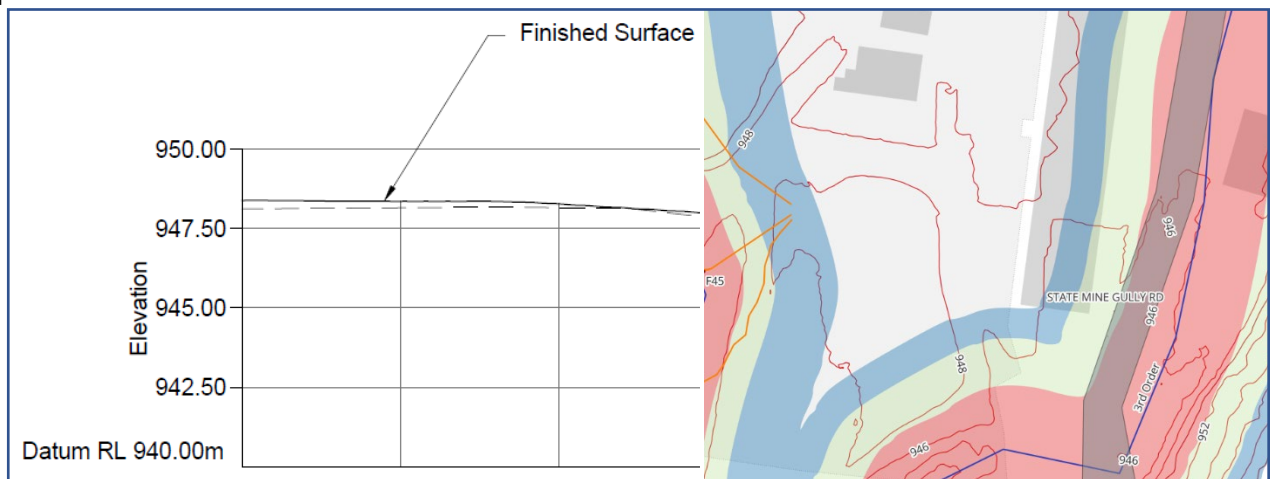


Figure 7: Surveyed AHD matches LiDAR AHD (948m) – likely consistent in low vegetation areas

However, for the reasons discussed above, there is some potential for inaccuracy in the mapping of the watercourses at **Attachment B**, given the highly vegetated and undulating nature of the Site.

Five sets of maps were produced and attached as 'Attachment B – Maps – Overview 1 to 5' as follows:

- 1) Overview 1 - NSW hydrolines mapped against new hydrolines – produced to show the potential inaccuracies in the NSW official hydroline layer.
- 2) Overview 2 - Stream Order & Trail Alignments – produced to show the proposed development and location and Strahler order of streams (as a best estimate given LiDAR potential inaccuracies).

- 3) Overview 3 - Waterfront land & VRZs Mapped (with 'z' value adjustments) with Trail Alignments – produced to show interactions of proposed trails with waterfront land and VRZs.
- 4) Overview 4 - Crossings – Produced to show location and ID of 16 crossings proposed in the DA.
- 5) Overview 5 - Features – Produced to show features of the Site that may affect interpretation and compliance with the Guidelines and their objectives. Only selected features and associated photos are summarised in this report due to the vast nature of the site data collected. The data presented is limited to features that may affect the Department's decision regarding any controlled activity approvals and conditions required.

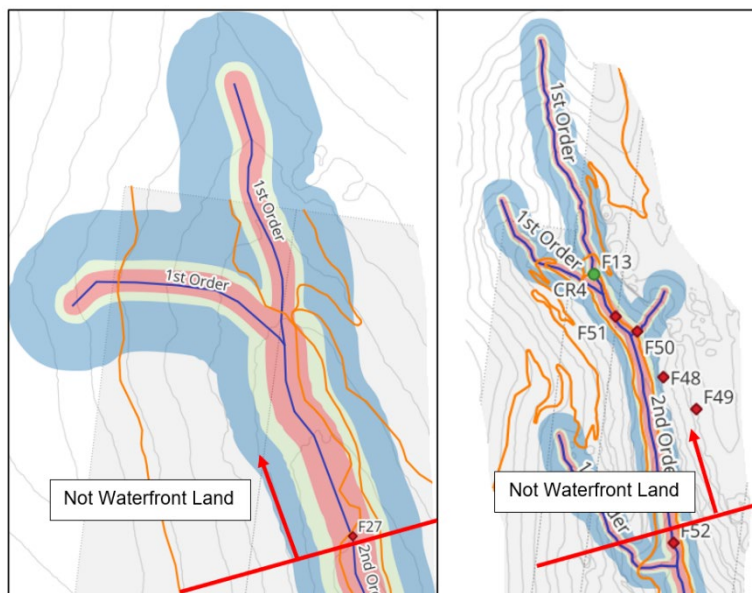
The potential inaccuracy of the LiDAR data due to heavy vegetation and subsequently developed hydrolines and 'z' adjusted buffers should be carefully considered by the Department, as heavy vegetation is more likely to show a proposed trail as being closer to a watercourse. For example, Photo F41a (Attachment A) shows an existing trail which was mapped as being 2m from a watercourse using LiDAR data, although was estimated (visually due to safety reasons) to be at least 12 meters away from the watercourse during the site visit.

The effect of dense vegetation on the accuracy of LiDAR data is discussed, for example, in Coveney et al, 'Terrestrial laser scan error in the presence of dense ground vegetation' *The Photogrammetric Record* (14 September 2011)⁵.

11 Watercourse features

Photos of a number of features at the Site, taken during the inspection, have been collected in the photo series (Attachment A) F1 to F54. These photos show:

- a lack of flow visible in streams, possibly due to mining activity;
- 4WD damage;
- an existing 1500m trail on Branch 3;
- areas where it is unclear whether it meets the definition of waterfront land; and
- areas where measurements were taken



Based on these observations, there are a number of areas at the Site where, despite watercourses being identified on the NSW hydrolines, it is unclear whether these watercourses and the surrounding area would meet the definition of waterfront land under the WM Act. In particular, the adjacent 2 areas on Branch 2 and 3 do not appear to be waterfront land, as no bed or bank for the watercourse was visible – please refer to detailed features summary and photos.

Figure 8. Areas that are not waterfront land as per photos.

⁵ Available at <<https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1477-9730.2011.00647.x>>.

The following table lists the features of the site as inspected with reference to the photos:

Features Summary

ID	Lat	Long	Reason for Feature being noted	Photo reference	Civil Engineering Assessment and Comment
F1	-33.446713	150.175912	4WD Damage directly in perennial stream	F1a, F1b, F1c, F1d	Recent rail fall and 4wd activity on old mining assets indicated turbidity should be much more than what has been recorded
F2	-33.446938	150.175762	4WD Damage	F2	Extensive 4WD damage above perennial stream
F3	-33.455017	150.17293	Landslide observed on cliff face adjacent to State Mine Creek	F3	This landslide is new and will need to be assessed during Detailed Design. The top of the landslide is approximately 25m above the creek on a sheer cliff face. Heavy vegetation has potentially caused inaccurate LiDAR data
F4	-33.447137	150.175695	Not Waterfront Land?	F4a, F4b, F4c, F4d	The Hydroline layer shows this to be a stream. The stream passes under the area as a legacy of mining activities
F5	-33.450787	150.175217	Trail alignment measured to top of bank on State Mine Creek	F5a, F5b	Measurement found to be 17.7m not completely along the ground so 18.5m would be more accurate.
F6	-33.449838	150.172458	Existing trail 2m to bank of creek	F6	This trail has been in place for 25 years and this bank is steep. Trail only 2 m from steep bank.
F8	-33.447155	150.171388	Improvised creek crossing on unapproved trail built by locals.	F8	2nd order stream with 150mm blue brute pipe. Bank to bank width 1.5m. Top of blue brute pipe heavily scratched and it has been in place for some time. The Project will repair these improvised crossings with ideally, a basic plank crossing of 1.5m.
F9	-33.447722	150.172000	1st order creek crossing with improvised, unapproved jump.	F9	1st order creek bank to bank width 1m.
F10	-33.444565	150.175463	Cannot reach CR1 or CR2 as can be seen from these photos	F10a, F10b	Heavily vegetated, steep country. Not safe to continue onto CR1. Assume CR1 and CR3 (downstream) have the same qualities. As they are only 150m from each other conveying the same water.
F11	-33.446262	150.175655	Picture looking towards Crossing 2	F11	Too dangerous to get to. With wet and slippery site conditions. Crossing 2 is on waterfront land but does not cross a hydroline.
F26	-33.458933	150.166492	Proposed Trail follows existing heavily disturbed cutting	F26	This photo shows the trail alignment following an old coal cutting through the bush. While the Trail may enter the inner 50% VRZ, it follows an established, heavily disturbed cutting.
F27	-33.444855	150.170422	Existing 2nd order Creek Crossing	F27a, F27b	Cannot distinguish bed and banks of 2nd order creek. Propose that this is not waterfront land at this elevation and above.
F28	-33.446230	150.176308	Extensive 4wd damage	F28a, F28b	Directly adjacent to perennial 2nd order stream. Length approximately 350m, 6-8m wide. Bare earth
F29	-33.445350	150.170567	Improvised Creek Crossing - 2nd order	F29	150mm blue brute pipe used again by unauthorised trail builders. Trail has been in place 25 years and shows how well the soil resists erosion. Minimal flows are controlled here by a small improvised pipe. The project shall repair these crossings ideally with a 1m basic plank crossing. Bank to Bank width 800mm.
F30	-33.448147	150.172045	Trail directly adjacent to creek	F30	Trail is 2.5m from creek bank. Creek is to the left. This is another example of how well the 25YO trail is holding up with minimal erosion.
F31	-33.446808	150.171183	2nd order creek existing bed-level crossing	F31	Man is standing in middle of creek bed approximately 2m wide. Creek has not run for a very long time. Heavy vegetation upstream and downstream.
F32	-33.446038	150.170708	Improvised trail and creek crossing.	F32	Man is standing in creek bed. No erosion or recent evidence of flow.
F33	-33.446220	150.170870	Improvised trail and creek crossing.	F33a, F33b	Man is standing in creek bed. No erosion or recent evidence of flow. Waterfront land? No obvious bed or banks
F34	-33.460037	150.167383	Trail on inner 50% VRZ	F34a, F34b	As can be seen from photo, the area is an old mining transport corridor. Very unlikely that the trail will cause erosion in this location. Lots of room to move the trail if required but strongly suggest this is unnecessary.
F35	-33.448608	150.175812	Measurement of Trail to State Mine Creek	F35a, F35b, F35c	Length to top of bank 20.1m. Estimated to be 22.5 adjusted for 'along the ground' measurement. This photo shows how State Mine Gully Road is between the trails and State Mine Creek. Therefore the table drains on the Road assets control flow off the trails on much of the State Mine Creek Section
F36	-33.452088	150.174413	Dense bush next to creek on trail alignment	F36a, F36b	Adjacent to CR8, this dense bushland is on the trail alignment.
F37	-33.452088	150.174422	Dense bush next to creek on trail alignment	F37a, F37b	Adjacent to CR8, this dense bushland is on the trail alignment.
F38	-33.450795	150.172667	Existing improvised Trail within 50% VRZ	F38a, F38b	This trail is 25 years old, not constructed to modern best practice techniques and has held up extremely well without erosion. Unauthorised trail has improvised jump.
F39	-33.449455	150.172280	Existing improvised Trail within 50% VRZ	F39	This trail is 25 years old, not constructed to modern best practice techniques and has held up extremely well without erosion.
F40	-33.454942	150.172925	Trail adjacent to Cliff Height	F40a, F40b	This location conforms to VRX requirements. The distance to cliff edge is 10m. Then 25m sheer drop. Furthermore, the state LiDAR contours have the elevation from the creek listed as 6m. This is vastly different to site conditions. Our trail alignment complies in this location to the requirements of the Guidelines. Photo 40b shows extent of extreme drop off.
F41	-33.448672	150.172195	Existing trail close to 2nd order stream	F41a, F41b	Trail is 2m from bank. This trail has been in place for 25 years. No erosion and not constructed to best practice methods i.e. The proposed development will have very little impact on riparian values.

F42	-33.448203	150.175917	Location 42 shown trail on inner 50% VRZ	F42a, F42b	With road in-between trail and creek, there is no issue with the Guidelines as the road table drains shall deliver the water. Also Distance measured to top of bank is 25m from trail. This shows further errors in LiDAR Data which suggests trail is 14m from centre of creek.
F44	-33.457442	150.165545	Crossing of 1st order creek	F44	Creek seems to flow during storms. No impedence to riders. No work required to cross 1st order creek.
F45	-33.461370	150.167930	2nd order stream?	F45	There are no bed or banks in this location. Furthermore, site is surveyed in this location and the top of the grassed area is at 948m AHD. The LiDAR data shows this location also at 948m AHD.
F46	-33.461747	150.167795	2nd order stream?	F46	There are no bed or banks in this location.
F47	-33.454122	150.171055	Trail close to outer edge on inner 50% VRZ	F47	Trail follows existing disused mining track.
F48	-33.450153	150.169770	Waterfront Land?	F48	No obvious stream or bed and banks. Suggest locations higher than this contour and even F52 are not waterfront land. Also look at F49, F50 and F51.
F49	-33.449028	150.169567	Waterfront Land?	F49a, F49b	No obvious stream or bed and banks.
F50	-33.448872	150.169483	Waterfront Land?	F50	No obvious stream or bed and banks. Suggest locations higher than this contour are not waterfront land.
F51	-33.448645	150.169133	Waterfront Land?	F51	No obvious stream or bed and banks.
F52	-33.452203	150.170042	Waterfront Land?	F52a, F52b	No obvious stream or bed and banks. This is lower than F48
F53	-33.459313	150.166747	Trail on inner 50% VRZ	F53a, F53b	As can be seen from photo, the creek is dry and does not flow often. While the trail is inside the 50% VRZ as per software calculations, the LiDAR, new creek lines and low impact activity, combined with soil conditions at Branch 3 with the existing trails and lack of erosion
F54	-33.447092	150.175888	Not Waterfront Land	F54a, F54b	Pipe is taking water under surface to State Mine Creek. This whole section from pipe entry (F4c) to State Mine Creek is not waterfront land and cannot be affected by the proposed trails.

12 Construction Methods

This section describes the construction methods for the proposed trails and their associated crossings to be constructed over the watercourses.

This section is supplemental to the Detailed Design Report (**Attachment C**) and sets out at a high level:

- how the trails will be constructed, including proposed rock armouring;
- the proposed design for a bed level crossing;
- the proposed design for a 'basic plank crossing'; and
- the proposed design for high, long bridges which are required in 5 locations that bridge a series of rocks above a creek bed 8 - 12 meters below the bridge structures.

Due to the nature of mountain bike parks being large and topographically challenging, the DA seeks only to build infrastructure that is minimally invasive and light and easy to maintain. Protection of the area's natural attributes has also been one of the main objectives in developing these construction methods.

12.1 Trail Construction

The proposed trails will be a width of 600mm to 800mm and will be bear earth trails. The nature of these trails appears to differ from a 'Cycleway', which is considered in the Guidelines, as a cycleway could potentially be up to 4m wide and concrete and with a handrail. In this instance, simple, well-constructed and properly drained, single track mountain bike trails are proposed, which will be low impact construction.

The majority of trail construction nearby to watercourses will be on alignments with a slope of 25% or less. The cross section of this construction is shown in Figure 9 as follows:

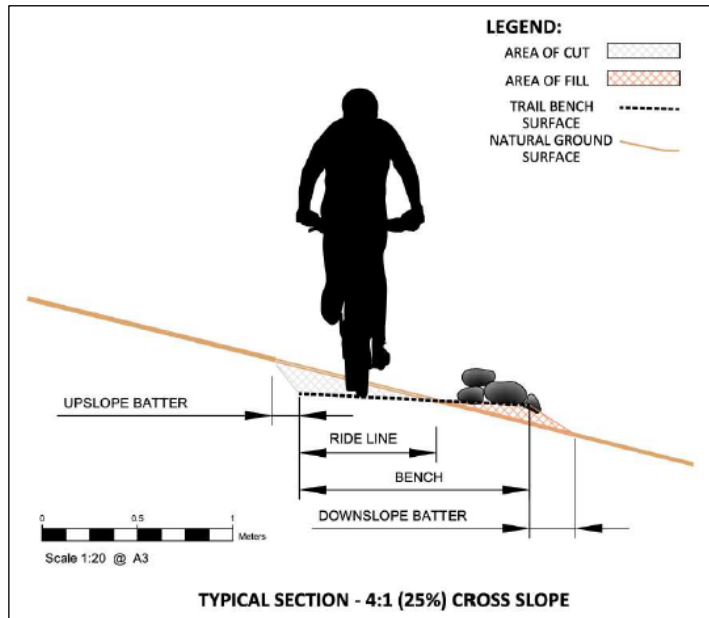


Figure 9. Trail Construction on shallow slopes.

On steeper ground, construction of the trails shall be as per Figure 10 with rock armoring to fortify the trail, assist with drainage and prevent erosion:

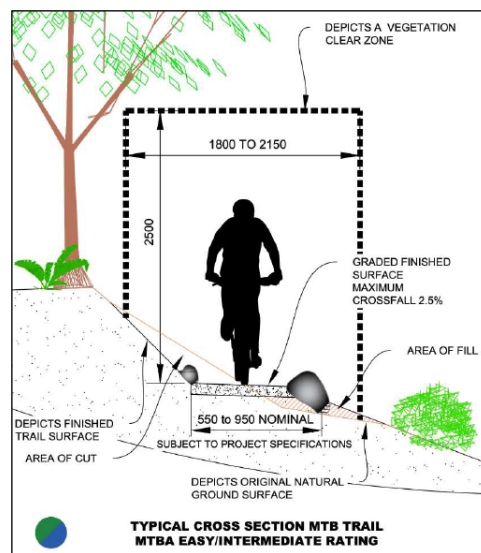


Figure 10. Trail Construction on steeper slopes.

Please refer to the Detailed Design Report at **Attachment C** for further information on the proposed construction methods.

12.2 Bed Level Crossings

Should they be required, the proposed bed level crossings have been designed to protect the banks and bed of 1st and 2nd order streams while protecting the original alignment and flow capacity of the watercourse.

The approaches to, and also over the banks shall be protected from erosion as per Figure 11. The bed shall be protected as per Figure 12.

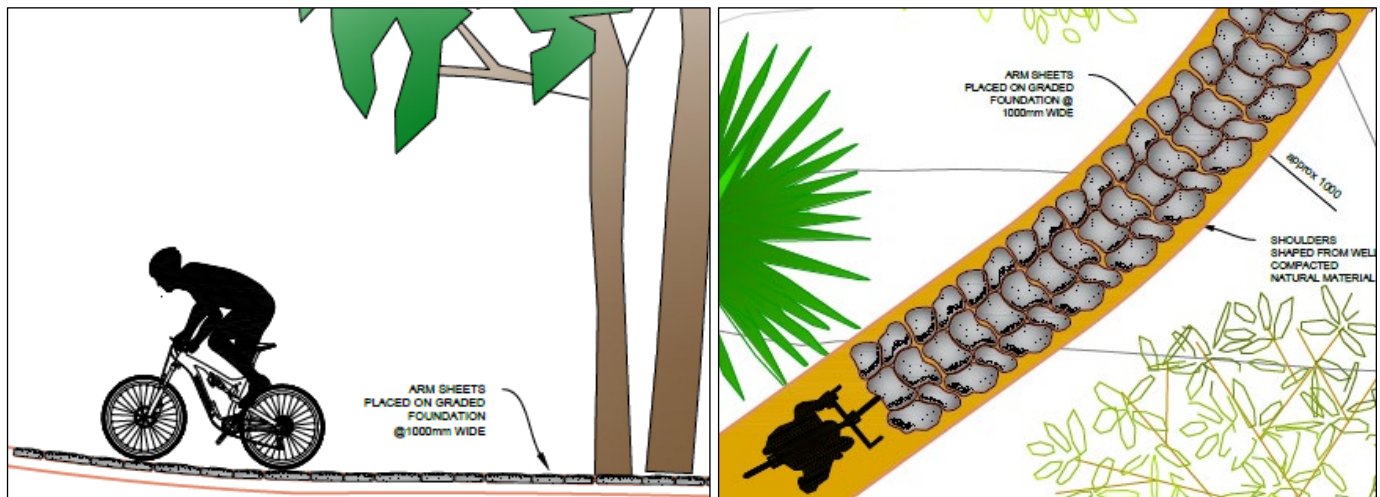


Figure 11. Bank protection for the Approaches to Bed Level Crossings (1st and 2nd order only)

In creek beds, rock armoring will also be placed (as per the below):

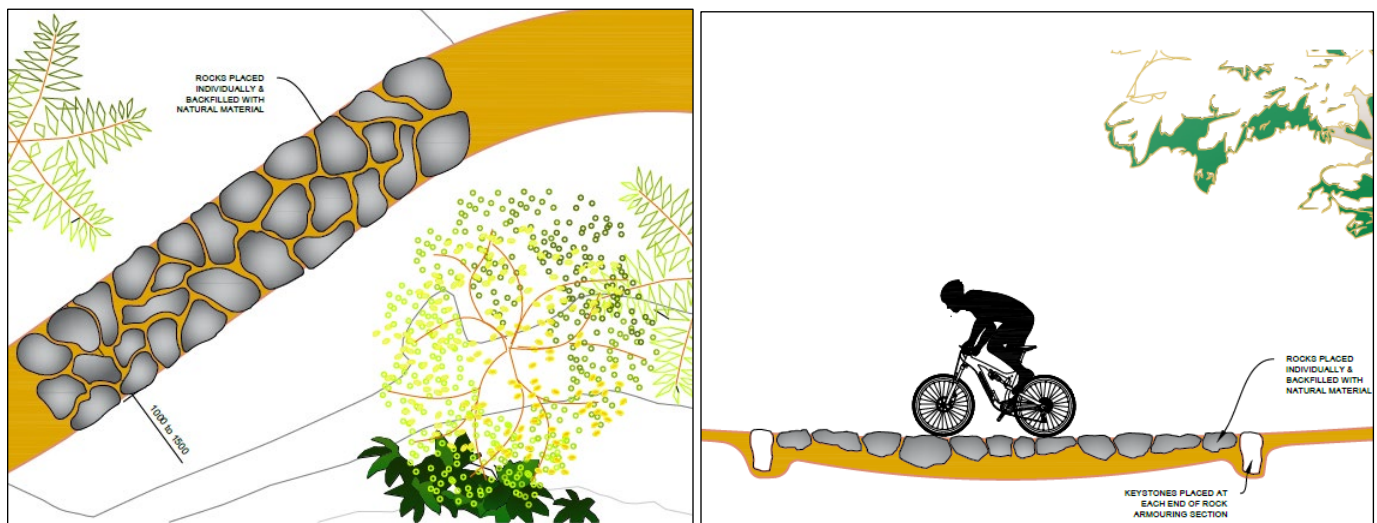


Figure 12. Creek bed protection for Bed Level Crossings (1st and 2nd order only)

No construction work is proposed as part of the bed level crossing for State Mine Creek. As pictured in the photos (Attachment A) of Crossing CR8, which is the planned crossing of State Mine Creek, it is already a natural and sturdy crossing point and no further construction work is required

12.3 Basic Plank Crossing

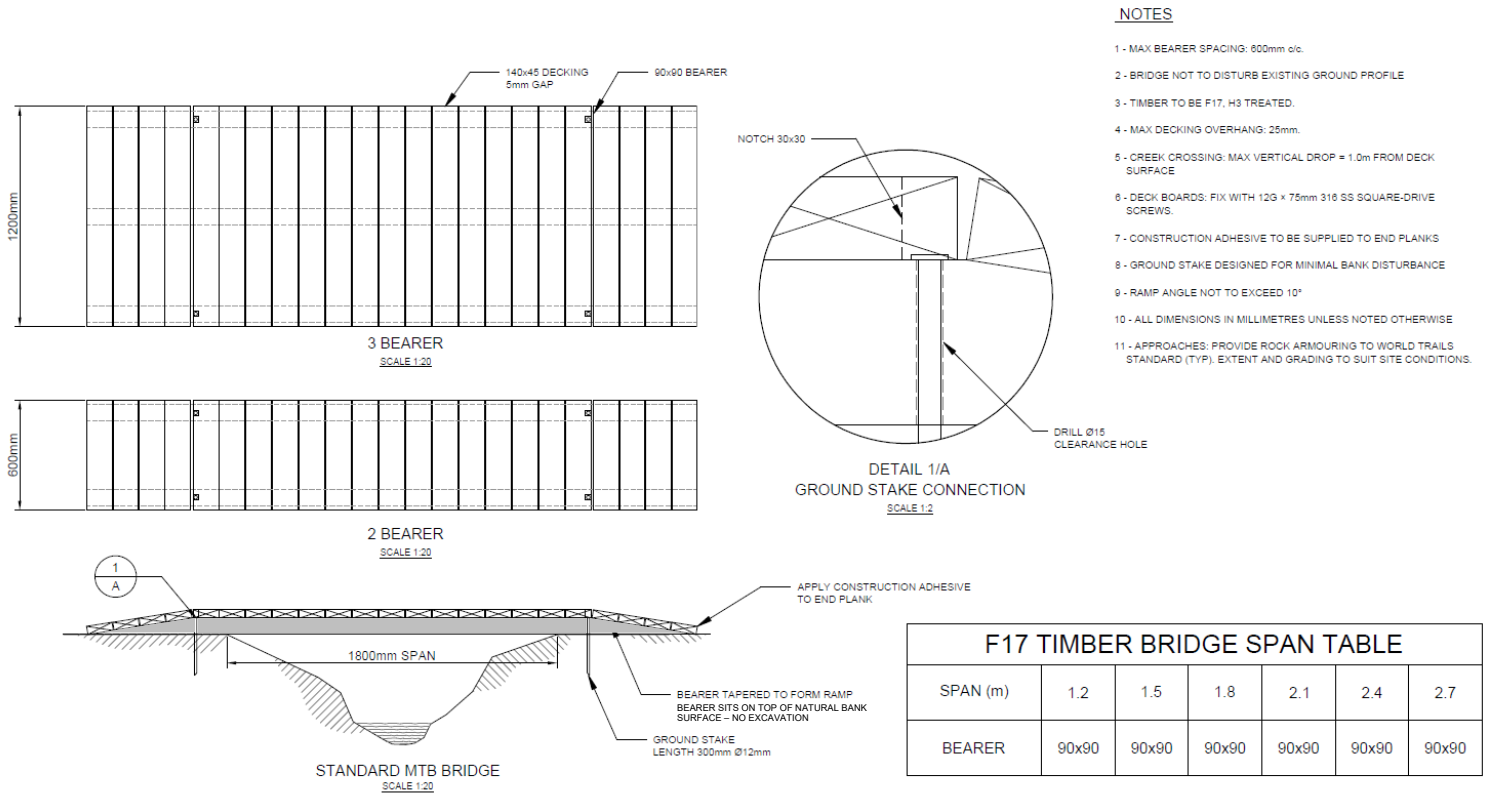
Crossing CR3 was the only crossing observed during the site visit to have water flowing, which was estimated to be at approximately 4l/s. This crossing is not traversable without a basic plank crossing arrangement.

CR1 is directly up stream of CR3 and therefore likely requires a basic plank crossing also.

The DA seeks approval to place these basic plank crossings at CR1 and CR3 and at other locations deemed necessary by the construction contractors as required. Relevantly, these are basic constructions that are pinned into the ground at either side of

the watercourse and avoid any disturbance of the area within the banks of the watercourse.

This design is minimally invasive and sits on top of the creek banks with a basic 'pinned in' footing and which is designed to hold the weight of a single rider. It can be constructed up to lengths of 2.7m but is only required at a length of 1.5m at crossing CR3 and likely the same at CR1.



**PRELIMINARY
NOT FOR CONSTRUCTION**

Figure 13. Basic Plank Crossing

The following picture is an example of a basic plank crossing, to put into context the practical and minimally invasive extent of the structure.

It is anticipated to have minimal effect on the watercourses and is substantially different to what could be considered a 'cycleway' under the Guidelines.



Figure 14. Example Photo of an example of Basic Plank Crossing – low impact construction

12.4 Proprietary Fiber Reinforced Plastic Height Safety Bridge (FRP)

The proprietary bridges will resemble commonly available FRP type walkway bridges such as those available from FRP suppliers in the following picture:



Figure 15. Example proprietary FRP Height Safety Bridge

These bridges are a major engineering construction from the perspective of:

- a) isolated site;
- b) height safety;
- c) rock bolting to sandstone; and
- d) engineering detailed design.

These bridges are proposed for CR12-CR16 (photos of which are attached as Attachment A), where the trails intersect with natural rock formations. The bridges will be located at a height of at least 12m above the watercourse (similar to the scale shown in the photos in CR12-CR16), which minimizes the risk of any impact on bank stability, erosion flow impedance, pollution, turbidity, or alteration of the watercourse.

As is also shown in the photos for CR12-CR16, the watercourse in these photos was dry and barely distinguishable visibly. Even pooled water was not observed, despite the site visit taking place 11 days after a significant rain event.

13 Topography, Geology, Turbidity, Existing MTB Trail & 4WD Damage

The topography of the Site is mountainous terrain and the geotechnical Mine subsidence report (**Attachment E**) notes that *“the majority of the site is expected to compromise sandstone rock outcrop or shallow soil over sandstone bedrock. Areas of colluvium and/or alluvium are present within the site gullies.”*

In other words, the gullies where the branches and State Mine Creek reside have alluvial (sandy/rocky/gravelly) soils mixed with rock fragments which is consistent with the Site photographs and do suggest that any surface water is draining to the mines beneath.

As evidenced by the site photographs (F1a, F1b, F1c, F1d, F2, F28a & F28b), the watercourses have been impacted in some areas by 4WD activity. This damage consists of 4 to 8 meters wide, unsealed and illegal roads that have been pushed through bushland directly in and adjacent to the creeks over decades (Particularly Branch 4). It is noteworthy that despite this illegal activity, turbidity measurements have remained low. Development of the Site as a mountain bike trail site could also assist in deterring the continuation of illegal 4WD activity.

Some aerial shots of upstream 4WD damage can be seen in Figure 16 as follows:

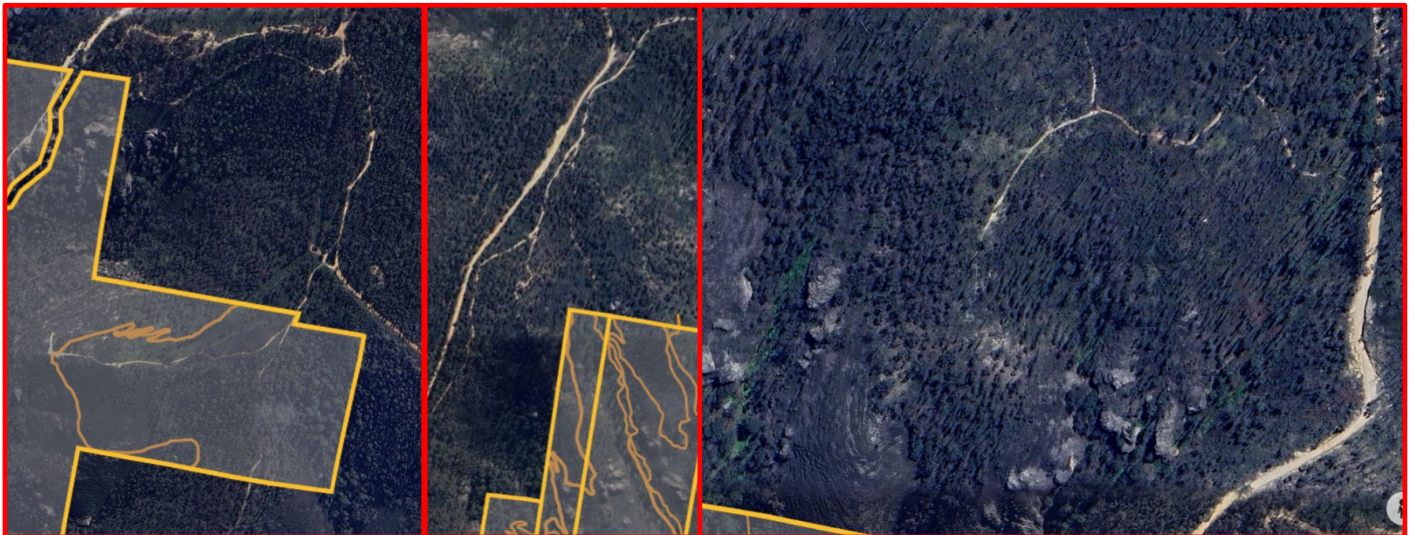


Figure 16. Extensive Upstream Illegal 4WD Damage

Branch 3 has an existing mountain bike trail on it named Trail 51 in the Detailed Design Report at **Attachment C**. This existing trail is understood to be at least 25 years old and crosses the hydrolines in numerous places. It was not observed at the site inspection to have caused erosion. This suggests that low stream flows, caused by historical mining activities, combined with favorable soil conditions have prevented erosion of this watercourse (Branch 3), despite the existing trail - Refer photos CR5a, F6, F8, F9, F27a & F41a.

Branch 4, which was flowing at the time of inspection, has historically been tested for turbidity by the Lithgow Environment Group, who have collected turbidity data over a substantial historical period available at the following link:

<https://www.lithgowenvironment.au/docs/leg-streamwatch-database-sep24.pdf>.

This turbidity data was taken in State Mine Creek at the base of Branch 4. The readings taken from 2006 to 2010 (apart from 1 outlying event) consistently show turbidity under 10NTU.

Further to this turbidity data, a 43mm rain event occurred in Lithgow early February and a 48mm event in early March. CTMBC arranged for a NATA accredited organisation to take 5 samples from Dobbs Drift to Farmers Creek on each occasion and record the turbidity results directly after these large rain events.

This data is reported and attached as 'Attachment D - COA Turbidity Readings 10 Feb & 4th Mar 26 Reports' and aligns with the historical readings taken by the Lithgow Environment Group. The turbidity results were very low with a maximum of 3.4NTU recorded on Location 1 (4WD Damage). This indicates that the catchment, even with an existing 1500m mountain bike trail over Branch 3 and extensive 4wd damage in and around the watercourses, is highly resistant to turbidity.

These turbidity readings were taken in the following areas (Coordinates are in the report – Attachment D):

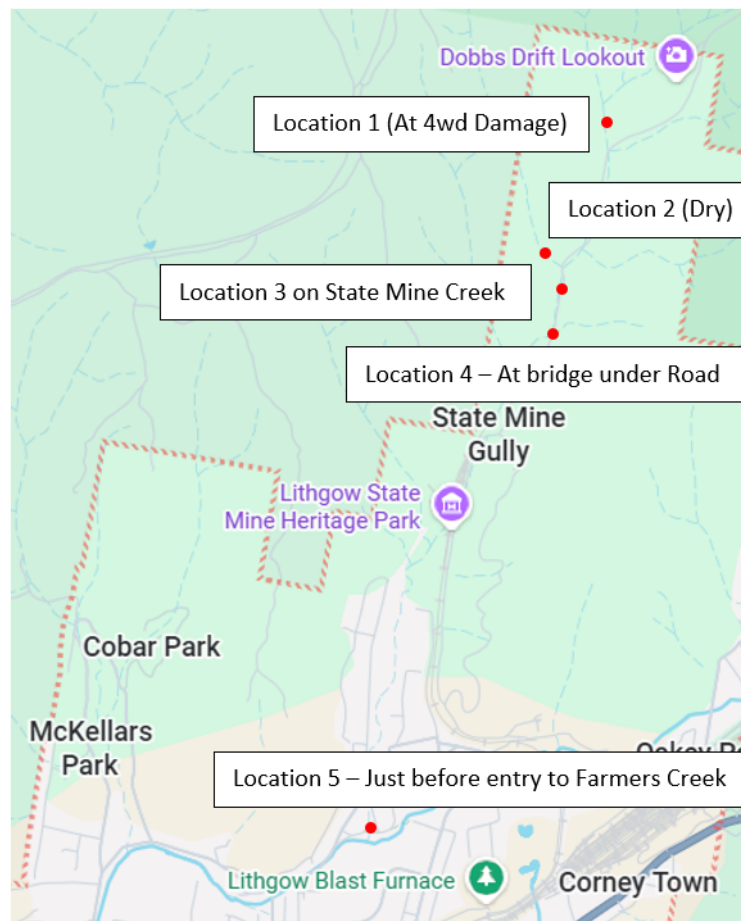


Figure 17. Turbidity Sampling Locations after rain event

Lithgow, New South Wales February 2026

Date	Day	Temps		Rain	Evap	Sun	Max wind		
		Min	Max				Dir	Spd	T
		°C	°C	mm	mm	hours		km/h	
6	Fr	11.0	32.0	2.8					
7	Sa	15.2	31.2	13.8					
8	Su	14.5	19.0	20.6					
9	Mo	15.3	24.3	5.6					

Lithgow, New South Wales March 2026

Date	Day	Temps		Rain	Evap	Sun	Max wind		
		Min	Max				Dir	Spd	T
		°C	°C	mm	mm	hours		km/h	
1	Su	15.2	18.6	1.4					
2	Mo	15.1	24.3	1.6					
3	Tu	16.5	21.9	36.0					
4	We	16.7	26.2	9.0					

Figure 18. Rain data for NATA turbidity analysis February and March (BOM).

This data indicates that the Site has favorable, low erosion soil conditions. This combined with documented sub-terranean disturbance and other surface damage indicate that the proposed development will have a neutral effect on water quality in the Sydney Water Catchment and is unlikely to contribute to erosion and turbidity.

Furthermore, the proposed trails construction and management, combined with increased visitation by the public, could assist in reducing illegal 4WD activity and improve the existing damage this has caused.

14 Crossings Summary

The crossing identified in the Detailed Design Report were identified by the bike park designers as potentially requiring some level of treatment or construction.

Please refer to 'Attachment B - Maps - Overview 1 to 5' for locations of identified crossings.

Two crossings, CR1 and CR2, were not accessible at the date of the site inspection due to wet conditions and extremely dense bushland. CR2 is nearby to, but does not cross a hydroline. CR1 is upstream of CR3, so the attributes of CR3 have been extrapolated to CR1 as it is directly up-stream of CR3.

It is intended that the crossing type to be installed where possible is a 'basic plank crossing' as detailed in section 12.3. This crossing will be minimally invasive when compared to a bed level crossing and may introduce favorable environmental improvements such as roosting habitat for micro bats.

Crossings CR16 (20m), CR15 (20m), CR14 (8m), CR13 (12m) and CR12 (12m) will all require proprietary height safety bridges with handrail. With a total length of 72m this network of bridges will form an elevated boardwalk approximately 12m above the creek on Branch 1. These constructions will also introduce favorable roosting habitat for micro bats.

The bridges will be bolted into sandstone and sit on top of large boulders. Refer to Photo series CR12, CR13, CR14, CR15 and CR16 in Attachment 1 Photos. These photos show multiple opportunities for anchoring directly into the sandstone rocks on site and also show the height above the creek.

While these constructions will be directly over the watercourse, the elevation and bolting directly into sandstone with the bridge type shown in Section 12.4 will minimise the potential for any impacts on the watercourse.

As previously noted, these photos were taken 11 days after heavy rain (45mm in 48hrs), and indicate that Branch 1 (as well as others) have an extremely ephemeral nature.

Lithgow, New South Wales January 2026

Date	Day	Temps		Rain	Evap	Sun	Max wind		
		Min	Max				Dir	Spd	T
		°C	°C					km/h	
18	Su	14.2	16.0	32.8					
19	Mo	12.6	18.8	10.0					
20	Tu	11.7	21.7	1.8					
21	We	9.9	25.6	0.1					

Figure 19. Rain data 11 days prior to site inspection

The system of bridges at CR12 to CR16 shall take the form approximately as per the following diagram following the red line:

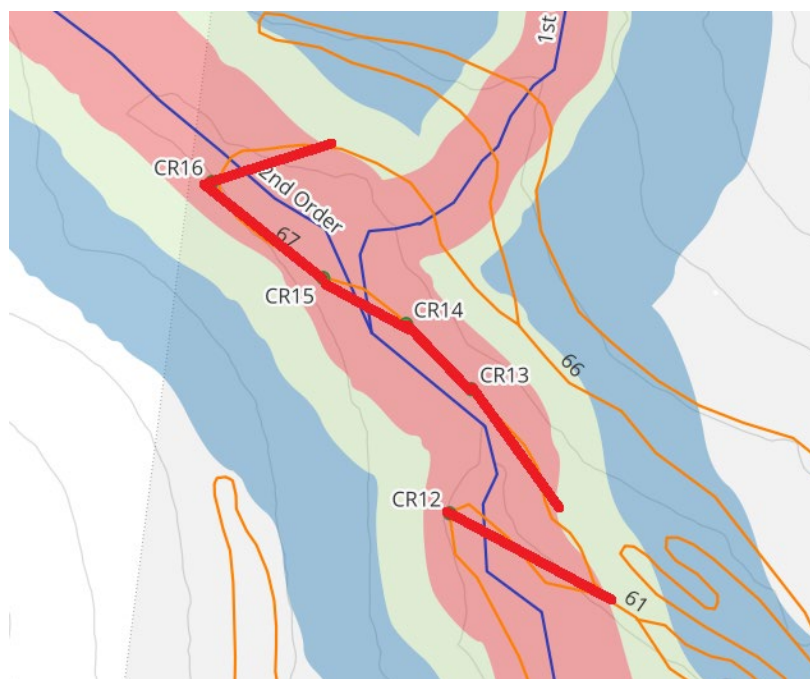


Figure 20. System of Height Safety Bridges Bolted to Rock Approximately 72m in Length.

The following table provides the details of inspections at each crossing location:

Crossings Summary										
ID	Design Report ID	Lat	Long	Creek Type	Crossing Type As Assessed on 2nd February 2026	Bed and Bank	Relevant Photo Reference	Crossing Construction Treatment Options	Bank to Bank Length (m)	bed width (m)
CR1	56.3	-33.444938	150.175383	Likely Perennial	Crossing points too difficult to get to in wet conditions. Site is heavily vegetated and too dense to navigate to crossing site. Refer Feature Point F10 for photos of difficulty	No Accessible	F10a, F10b	Likely Basic Plank Crossing	Likely 1.5m based on CR3	Likely 800mm based on CR3 (Downstream)
CR2	55.6	-33.4446068	150.175435	No Creek, but on Waterfront Land	Crossing points too difficult to get to. Site is heavily vegetated and too dense to navigate to crossing site. Refer Feature Point F10 for photos of difficulty. Does not cross a creek and is likely a land feature only.	no - not on creek	F10a, F10b	CR2 is on waterfront land, but does not cross a stream. Likely Basic Plank Crossing	N/A	N/A
CR3	2.6	-33.446203	150.175964	Perennial	crossing at meeting of 2 creeks across 1st order stream directly up stream of 2 creeks meeting. Minor plank structure or bridge required. Screwed into dirt	yes	CR3a, CR3b	Basic Plank Crossing	1.8	800mm
CR4	58.1	-33.447936	150.168722	Ephemeral	no need for bridge. Bed level crossing will be fine. Crossing wide and dry. No obvious bed or banks.	no	CR4a, CR4b	Bed level Crossing or Basic Plank Crossing	N/A	N/A
CR5	51.1	-33.45022	150.1725	Ephemeral	bed level crossing already exists. Trail already exists.	yes	CR5a, CR5b, CR5c	No construction required	1.09	2.06
CR6	51.2	-33.45091	150.17285	Ephemeral	bed level crossing already exists. Trail already exists.	yes	CR5a, CR6b	No construction required	4.7	3.5
CR7	2.7	-33.145183	150.17338	Ephemeral	bed level crossing already exists. Trail already exists.	yes	CR7a, CR7b	No construction required	1.54	0.66
CR8	57.1	-33.45214	150.17424	Perennial	bed level crossing already exists	yes	CR8a, CR8b, CR8c, CR8d, CR8e	No construction required. Bed level crossing already exists due to man made road verge providing access to creek.	5	2.92
CR9	2.8	-33.454869	150.171152	Ephemeral	Dry creek bed. Simple plan crossing arrangement required	yes	CR9a, CR9b	Bed level Crossing or Basic Plank Crossing	1.4	0.57
CR10	60.2	-33.461305	150.167722	Ephemeral	Bed Level Crossing. Hard to see defined bed and banks. No water flowing. Heavily disturbed land	no	CR10a, CR10b, CR10c	No construction required	not obvious, 12m sheer height	2.5
CR11	60.1	-33.460229	150.167541	Ephemeral	Very deep and sheer gully. Not obvious where top of bank is due to rocks and very steep land	yes	CR11a, CR11b	Bed level Crossing or Basic Plank Crossing	not obvious, 12m sheer height	2.5
CR12	61.1	-33.457916	150.165562	Ephemeral	Very deep and sheer gully. Not obvious where top of bank is due to rocks and very steep land	yes	CR12	Proprietary FRP Height Safety Bridge	not obvious, 12m sheer height	2.5
CR13	67.1	-33.457715	150.165611	Ephemeral	Very deep and sheer gully. Not obvious where top of bank is due to rocks and very steep land	yes	CR13a, CR13b, CR13c, CR13d	Proprietary FRP Height Safety Bridge	not obvious, 12m sheer height	2.5
CR14	67.2	-33.547622	150.165474	Ephemeral	Very deep and sheer gully. Not obvious where top of bank is due to rocks and very steep land	yes	CR14a, CR14b, CR14c	Proprietary FRP Height Safety Bridge	not obvious, 12m sheer height	2.5
CR15	67.3	-33.457529	150.165361	Ephemeral	Very deep and sheer gully. Not obvious where top of bank is due to rocks and very steep land	yes	CR15a, CR15b, CR15c	Proprietary FRP Height Safety Bridge	not obvious, 12m sheer height	2.5
CR16	67.4	-33.457395	150.165252	Ephemeral	Very deep and sheer gully. Not obvious where top of bank is due to rocks and very steep land	yes	CR16a, CR16b	Proprietary FRP Height Safety Bridge	not obvious, 12m sheer height	2.5

15 Conclusion

As is demonstrated in this report, it is unclear whether a controlled activity approval is required for a number of the watercourses mapped at the Site. To the extent that an approval is required, it is considered that the grant of any controlled activity approval with respect to the proposed bike park would be consistent with the Department's Guidelines and would have minimal impact on any riparian corridors at the Site.