NSW NATIONAL PARKS & WILDLIFE SERVICE

Illawarra Escarpment Mountain Bike Project

Draft review of environmental factors

environment.nsw.gov.au

Cover photo: Illawarra Escarpment State Conservation Area. N. Cubbin/DPE

Published by:

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ISBN 978-1-922840-42-4
EHG 2022/0283
June 2022

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1. Brief description of the proposed activity

Proposal name	Illawarra Escarpment Mountain Bike Trail Network
Lands within proposal	Illawarra Escarpment State Conservation Area (SCA) Sydney Water lands South32 land (see Figure 1)
NPWS Area	Illawarra Highlands Area
Location of activity	Illawarra Escarpment between Mount Keira and Mount Kembla, henceforth referred to as the 'proposal area'
Council area	Wollongong City Council (WCC)
NSW State electorate	Wollongong
Proposed commencement date	December 2022
Proposed completion date	July 2024
Estimated duration of proposal	18 months for construction phase; perpetual operational phase.

2. Proponent's details

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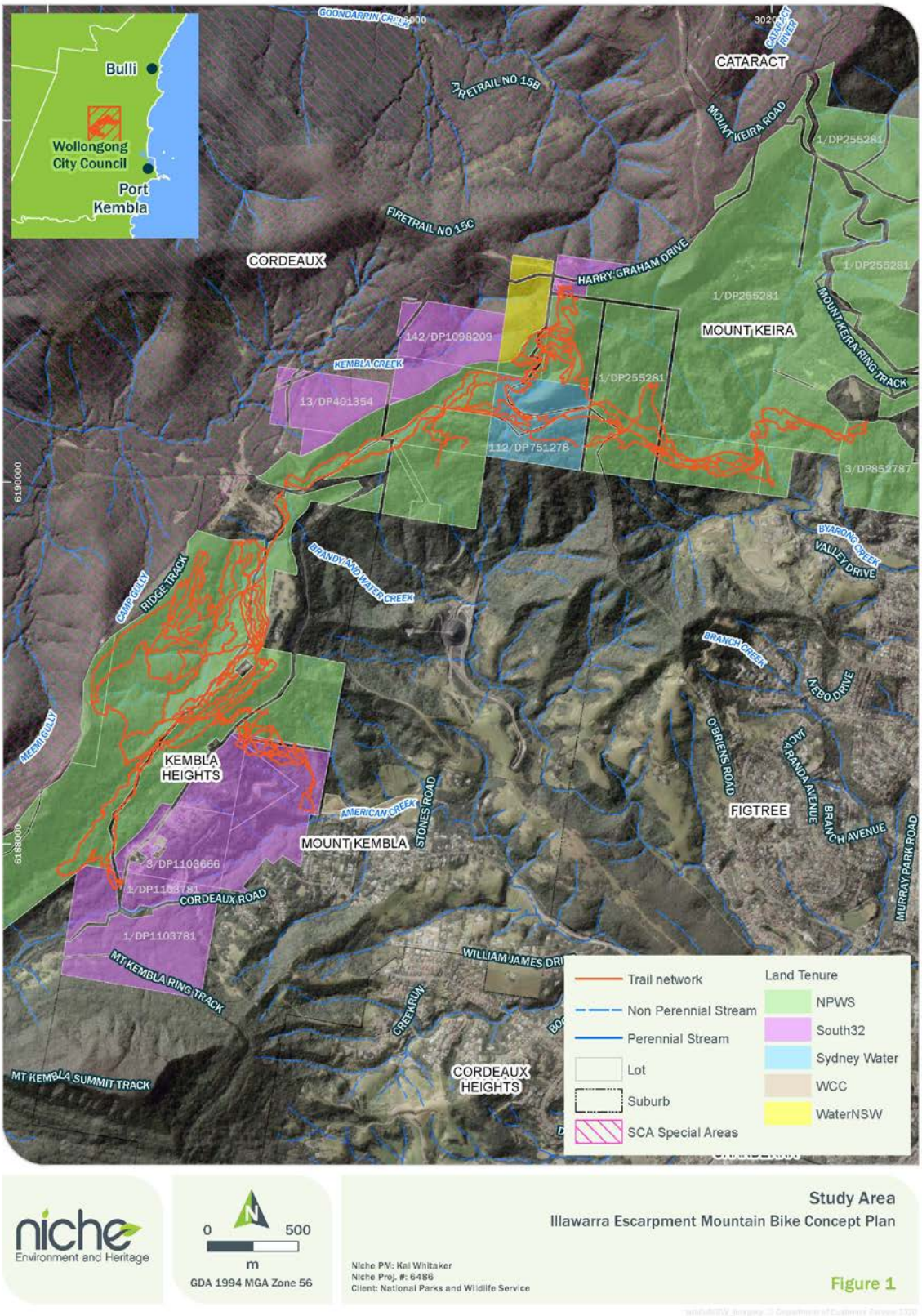


Figure 1 Location of proposed trail network

3. Permissibility and assessment pathway

3.1 Permissibility under NSW legislation

3.1.1 National Parks and Wildlife Act 1974

Objects of the National Parks and Wildlife Act (s 2A)

The *National Parks and Wildlife Act 1974* (NPW Act) seeks to conserve nature, including habitats, ecosystems and ecosystem processes, biodiversity, landforms, landscapes, wild rivers, and historic and cultural objects, places and features in New South Wales (NSW). It provides for the reservation of national parks and other places of natural, cultural and social value and specifies such areas are to be managed in accordance with the principles for each particular reserve type and a management plan. The Act specifies that the purpose of reserving land as a national park is to identify, protect and conserve areas containing outstanding or representative ecosystems, natural or cultural features or landscapes or phenomena that provide opportunities for public appreciation and inspiration, and sustainable visitor or tourist use and enjoyment. It provides for the legal protection of plants and animals. The Act is administered by the NSW National Parks and Wildlife Service (NPWS).

In accordance with section (s) 2A, the proposal is considered to have minimal impacts on the conservation of nature, objects, places or features of cultural value, or public appreciation of nature and cultural heritage; and the principles of ecologically sustainable development have been considered.

The proposal is generally consistent with s 2A(1)(a) and (1)(b) of the Act in relation to conservation of natural and cultural values. The proposed trail network has been designed to minimise environmental impacts by incorporating existing unsanctioned trails into the network where practicable, to minimise clearing from the creation of new trails. In this review of environmental factors (REF) the term ‘unsanctioned’ refers to trails that are not authorised or are otherwise not legal.

Potential impacts to biodiversity have been minimised by utilising existing unsanctioned trails. These existing trails already have a demonstrated value to the mountain biking community. By formalising these existing trails and incorporating them into the proposed network, the proposal would reduce the likelihood of new unsanctioned trails being created. By creating a formalised trail network, the proposal would enable NPWS to close and rehabilitate the remaining unsanctioned trails.

Impacts of new trails have been reduced by careful assessment and planning of trails to avoid areas of the highest ecological value.

The proposal will specifically meet s 2A(1)(c) of the Act to increase the public appreciation, understanding and enjoyment of the area’s natural and cultural heritage with provision of improved access and services.

Reserve management principles (s 30E to 30K)

The proposal is consistent with the reserve management principles for state conservation areas (s 30G), specifically, s 30G(2)(e) to provide for sustainable visitor or tourist use and

enjoyment that is compatible with the conservation of the state conservation area's natural and cultural values and with uses permitted under other provisions of this Act in such areas.

The proposed activity aims to:

- promote the public understanding and appreciation of the natural and cultural values of the state conservation area
- allow for sustainable tourist and visitor use and enjoyment, whilst protecting the natural and cultural heritage.

The *Illawarra Escarpment State Conservation Area plan of management* (PoM) (OEH 2018) applies to the proposal area. Section 3.2 of the PoM outlines management directions for the park, which includes the following:

Management direction	How the proposal is concordant
Protect the natural character, biodiversity and scenic qualities of the park.	By incorporating unsanctioned trails into a formal network, the proposal would allow NPWS to manage these trails by implementing environmental impact mitigation measures. Creation of a sustainable network of new and upgraded existing trails allowing closure of unsanctioned trails and reduced likelihood of new unauthorised trails being constructed.
Seek holistic management of the escarpment across land tenures to protect its important values.	The proposal has been carefully designed to encourage existing users of unsanctioned trails to use the formal network. This approach would shift usage from unmanaged and unsanctioned trails onto formalised trails, which have been sustainably designed to avoid and mitigate environmental impacts and can be managed as part of the wider NPWS asset base.
The PoM addresses the issue of cyclist forming numerous illegal tracks through the park, many of which are steep unstable slopes that are prone to erosion. An action in the PoM is for NPWS to develop a mountain bike strategy that provides a sustainable mountain bike single-track network in the park. Mountain bike tracks that are not included in the strategy are planned to be closed and rehabilitated.	The proposal has been designed in accordance with the *Draft Illawarra Escarpment mountain bike strategy* (NPWS 2018).
Conserve significant cultural heritage features and facilitate ongoing use of suitable sites.	The proposal seeks to conserve significant cultural heritage features by establishing a formal trail network and discourage future creation of unauthorised trails, which can have adverse cultural heritage impacts. The proposal has avoided culturally significant areas on Mount Kembla and Mount Keira based on feedback from the *Draft Illawarra Escarpment mountain bike strategy* (NPWS 2018). However, the proposal would still be conducted within the Djembla Djeera Cultural Landscape, which is regarded to be of very high significance for its social and spiritual value to past, present, and future generations

Management direction	How the proposal is concordant
	(Waters Consultancy 2022 at Appendix 4 of Attachment A). Management and mitigation measures, detailed in the *Aboriginal cultural heritage assessment report* (Niche Environment and Heritage 2022a at Attachment A), have been prepared in consideration of comments received from the registered Aboriginal parties during the consultation process. These comments include those related to cultural considerations surrounding salvage works and the handling of artefactual materials, as well as the cultural significance of all sites.
Provide for sustainable use that is compatible with the park's values and management purposes, integrated with facilities located on adjacent lands.	The proposal seeks to implement a pragmatic approach to addressing environmental impacts from the unsanctioned development of mountain bike trails, whilst also addressing the demand for legitimate mountain bike usage within the proposal area. It is considered that the proposal would have a net beneficial environmental and usage outcome, compared to the impacts from unsanctioned trails and the resources required to prevent and control illegal mountain bike trail use.
Recognise and respond to the proximity of urban populations, minimise conflict between park users and engage with new user groups.	It is recognised that there is a considerable demand for mountain bike trails within the proposal area (*Draft Illawarra Escarpment mountain bike strategy* NPWS and WCC 2018; Element Environment 2022 at Attachment B). The proposal seeks to establish a trail network large enough to accommodate existing and anticipated usage, whilst also focusing mountain bike usage onto well-designed trails that minimise conflict with other users of the Illawarra Escarpment SCA (for example, bushwalkers and surrounding community).

Leasing, licensing and easement provisions (Part 12)

There are no leases, licences or easements related to the proposal.

Part 12 of the NPW Act is not applicable to the proposal.

NPWS/Environment Heritage Group management powers and responsibilities (s 8 and s 12)

The proposal is concordant with s 12 in relation to NPWS management powers and responsibilities, specifically:

(b) the conservation and protection of wildlife (including threatened species, populations and ecological communities, and their habitats)

(f) the provision of facilities and opportunities for sustainable visitor or tourist use and enjoyment on land reserved under this Act.

3.1.2 Biodiversity Conservation Act 2016

The activity is consistent with the biodiversity conservation objectives of the *Biodiversity Conservation Act 2016* (BC Act).

The proposal would meet the objectives of the BC Act by maintaining a healthy, productive and resilient environment according to the principles of environmentally sustainable development.

Impacts to biodiversity have been avoided or mitigated during the design phase and as part of this REF by:

- detailed field investigations
- analysis of multiple mountain bike trail alignments with the aim of minimising environmental impacts
- upgrading existing trails where feasible
- incorporating trail design and features that minimise erosion and sedimentation impacts
- extensive on-ground micro-siting and trail alignment marking during pre-construction to avoid mature or hollow-bearing trees and other habitat features
- use of elevated structures to span sensitive terrestrial habitats
- pre-construction flagging of trails and micro-siting.

During construction, impacts will be minimised by confining construction activities to a clearly defined narrow corridor, using sensitive construction techniques, airlifting materials and equipment into the site, and storing construction materials within pre-surveyed laydown areas.

An ecological assessment – *Ecological assessment Illawarra Escarpment mountain bike concept plan planning and assessment services* (Niche Environment and Heritage 2022b at Attachment C) – was undertaken. Formal assessments of significance (tests of significance under s 7.3 of the BC Act) have been conducted as part of the ecological assessment to determine whether the proposal will have a significant impact on threatened biodiversity. These assessments have concluded that threatened ecological communities (TECs) and threatened fauna species listed under the BC Act are unlikely to be significantly affected by the proposal.

3.1.3 Rural Fires Act 1997

The proposed works are consistent with the provisions of the *Rural Fires Act 1997*. Under this Act, NPWS is a prescribed fire authority and is responsible for the control and suppression of all fires on lands that it manages. This management is subject to the *Illawarra Escarpment State Conservation Area fire management strategy* (DECC 2009a).

Part 4 of the Act deals with the prevention and minimisation of the spread of bushfires throughout the State. The potential for the proposal to be a bushfire risk is considered in Section 9.3 of the REF.

The proposed works are consistent with:

- the objectives of protecting life and property and protection of the environment
- the relevant reserve fire management strategy.

3.2 Assessment pathways

3.2.1 Environmental Planning and Assessment Act 1979

Explanatory note: Clause 2.73(1)(a) of the *State Environmental Planning Policy (Transport and Infrastructure) 2021* (Transport and Infrastructure SEPP) provides that development for any purpose may be undertaken within lands reserved or acquired under the NPW Act without consent. This removes the need for development consent under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) (for example, Council approval) for most activities within NPWS parks. However, proponents should still confirm that the Transport and Infrastructure SEPP is applicable, and that other SEPPs do not override this provision and instead require consent for the proposal.

Due to complexity and multi-tenure nature of the project, the Illawarra Escarpment Mountain Bike Trail Network (the trail network) is to be assessed under the EP&A Act in 2 separate components.

1. The first component, to be assessed under Part 5 of the EP&A Act, is comprised of NPWS land (i.e. the Illawarra Escarpment SCA), Sydney Water and South32 land; and encompasses the trail network.
2. The second component, also to be assessed under Part 5 of the EP&A Act, is comprised of Wollongong City Council and South32 land. This component covers ancillary features, such as parking and amenities. Wollongong City Council would be the lead proponent for this component.

NPWS and Wollongong City Council are acting as co-proponents for the proposal. Refer to Table 1 and Figure 1 for an overview of the tenures relevant to the proposal. The specialist assessments that have been prepared to support this REF have considered the whole of the proposed trail network. These assessments (including the REF) do not consider any ancillary features (such as amenities, parking etc.) of the project. Such features will be assessed in a separate Part 5 assessment.

The activity may be undertaken without development consent under the provisions of clause 2.73(1)(a) of the Transport and Infrastructure SEPP as it is:

- on land reserved under the NPW Act or acquired under Part 11 of the NPW Act, AND
- for a purpose authorised under the NPW Act.

The activity is not designated development under Schedule 3 of the Environmental Planning and Assessment Regulation 2000.

The activity is not ‘state significant infrastructure’ under the *State Environmental Planning Policy (Planning Systems) 2021*, and is not of a similar kind to such an activity.

The activity is not designated development under the *SEPP (Resilience and Hazards) 2021* as:

- it is not on land mapped as littoral rainforest or coastal wetland.

The activity is not declared to be exempt development under an environmental planning instrument or fails to fully meet the requirements for exempt development.

Table 1 Summary of assessment according to land tenure

Land tenure	Part 5 REF (NPWS lead proponent)	Part 5 REF (WCC lead proponent)
NPWS Illawarra Escarpment SCA	Yes	N/A
Sydney Water	Yes	N/A
South32	Yes	Yes
Wollongong City Council (WCC)	N/A	Yes
WaterNSW	N/A	Yes (within Schedule 1 land)

Written permission will be sought from Sydney Water and South32 following approval of the REF.

A separate Part 5 assessment under the Transport and Infrastructure SEPP would be submitted by Wollongong City Council as proponent for relevant land tenures indicated in Table 1. This would include all ancillary infrastructure.

3.2.2 Coal Mine Subsidence Compensation Act 2017

The activity involves the erection or alteration of an improvement within a mine subsidence district.

Not applicable.

3.2.3 Fisheries Management Act 1994

The activity involves the excavation of or deposition in 'water land', that is, land submerged by water (whether permanently or intermittently).

Under s 199 of the *Fisheries Management Act 1994* (FM Act), a public authority must, before it carries out or authorises the carrying out of dredging work or reclamation work, give the Minister written notice of the proposed work, and consider any matters raised by the Minister.

Dredging includes works that involve excavating water land, moving or removing material on to or from water land. Reclamation works means using materials, for example, sand, soil, gravel, timber or rocks to fill reclaim water land or depositing such material on water land to construct something over water land.

NPWS will provide written notification to the Minister and Department of Primary Industries (DPI) Fisheries will be issued with a copy of this REF; NPWS will consider the responses accordingly. Any recommendations made by DPI Fisheries will be incorporated into the construction environmental management plan for the proposal.

The proposal will not affect fish, fish habitat or marine vegetation. Refer to the ecological assessment (Attachment C) for further detail.

3.2.4 Heritage Act 1977

The activity is on land that contains:

- an item not listed on the State Heritage Register but identified by NPWS as being of potential state significance
- an item listed on the NPWS Heritage and Conservation Register under s 170 of the Heritage Act (contained in the Historic Heritage Information Management System)

- a place, building, landscape feature or moveable heritage item older than 25 years.

Four heritage items were identified that were either within or near the proposal area that were listed on the *Wollongong Local Environment Plan 2009*, 3 sites were listed in the s 170 asset register of Heritage Act, and 2 sites were unlisted but identified as having heritage values.

These sites were assessed in a historic heritage assessment (Niche Environment and Heritage 2022c at Attachment D) and statement of heritage impact (Niche Environment and Heritage at Attachment E), using the criteria outlined in *Assessing heritage significance* (Heritage Office 2000). Based on this assessment, the proposed works will likely have no or little impacts on the heritage items.

It is noted that the locally listed site, Mount Kembla Colliery, is currently being assessed for listing on the State Heritage Register.

3.2.5 Marine Estate Management Act 2014

The activity affects or directly adjoins a marine park or aquatic reserve, and works are likely to affect plants or animals within the marine park or aquatic reserve.

Not applicable. The proposal does not affect or directly adjoin a marine park or aquatic reserve.

Environment Protection and Biodiversity Conservation Act 1999

The activity is on land that contains the following, or the activity may affect:

- nationally listed threatened species and ecological communities, or listed migratory species.

Threatened species and ecological communities listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), that may be affected by the proposal, have been assessed in Section 9.7 and in the ecological assessment (Attachment C). Threatened species and ecological communities listed under the EPBC Act are unlikely to be significantly impacted by the proposal.

3.3 Consistency with NPWS policy

In relation to the Illawarra Escarpment SCA, the activity is consistent with NPWS policies as described below.

Policy name	How proposal is consistent
Cycling policy	The proposal is consistent with the NPWS *Cycling policy*. In accordance with the policy, cycling is generally permitted on park roads and management trails in state conservation areas. Cycling on walking tracks is prohibited for safety and environmental reasons. The proposal seeks to provide mountain bike experiences for a range of different skill levels in accordance with the *Draft Illawarra Escarpment mountain bike strategy* (NPWS and WCC 2018). The trail network has been designed to minimise environmental impacts and to foster user appreciation for the natural and cultural heritage values of the Illawarra Escarpment SCA. The proposal would also incorporate a large volume of existing unsanctioned trails with demonstrated value to the mountain biking community. Incorporating these trails into the proposed trail network would allow NPWS to

Policy name	How proposal is consistent
	mitigate environmental impacts, whilst retaining trails that are valued by the mountain bike community.
Landslides and rockfalls policy	The proposal is supported by a geotechnical assessment (GHD 2022 at Attachment F), which includes systematic identification of landslide and rockfall hazards, and assessment of risks. The proposed trail network has been designed to prioritise safety with regards to landslides and rockfalls.
Visitor safety policy	The proposal would seek to improve safety for users of the Illawarra Escarpment SCA by creating a formal single-use (i.e. cyclists only) trail network. The proposal would allow mountain bike usage to be focused on a purpose-built trail network, minimising the potential for park user conflicts. Rather than not permitting mountain bike activity in the Illawarra Escarpment SCA, the proposal takes a pragmatic approach to addressing increases in mountain bike riding with regards to the safety of both riders and other users (such as bushwalkers).

3.4 Type of approval sought

NPWS proponents:

- Internal NPWS approval or authorisation, including expenditure.

Other proponents:

- Wollongong City Council is a co-proponent for the proposal.

There any no existing approvals, such as permits, leases, licences or easements, which apply to part or all of the proposed activity.

4. Consultation – general

The proposal is the result of an iterative process and is multi-tenure in nature (Table 1 and Figure 1), requiring a broad range of collaboration and consultation.

A working group was established in 2015 to investigate mountain bike opportunities on the Illawarra Escarpment to address the growing demand, help protect environmental and cultural values and avoid conflicts with other users by guiding the sustainable development and use of approved trails. The working group originally included representatives from Wollongong City Council, Destination Wollongong, Illawarra Mountain Bike Alliance, University of Wollongong and NPWS.

The working group provided advice on an Illawarra Escarpment mountain bike feasibility study that Wollongong City Council commissioned in 2017. The desktop study was informed by constraints mapping, using information from environmental studies, and input from riders and other stakeholders.

Following the feasibility study, NPWS engaged a mountain bike trail planning and design firm (Dirt Art) to assist in the preparation of the *Illawarra Escarpment mountain bike concept plan* (Synergy Trails 2020). The plan was informed by environmental studies, field investigations and input from Wollongong City Council, the Illawarra Mountain Bike Alliance, Destination Wollongong and other stakeholders.

Informed by the *Illawarra Escarpment mountain bike concept plan* (Synergy Trails 2020), the *Draft Illawarra Escarpment mountain bike strategy* (NPWS 2018) was exhibited for public comment in December 2018. The draft strategy proposed the development of formal mountain bike networks at Balgownie, Mount Keira and Mount Kembla. Adverse environmental assessments, Aboriginal community feedback and general public feedback led NPWS and Wollongong City Council to develop a revised mountain bike strategy and trail networks.

Consultation feedback from the *Draft Illawarra Escarpment mountain bike strategy* (NPWS 2018) has been used to inform this proposal.

4.1 Consultation required under Transport and Infrastructure SEPP

4.1.1 Local council (clauses 13, 14, 15 and 15A)

The activity is on land that contains:

- local council infrastructure or services (such as stormwater, sewer, roads)
- heritage items listed under the local environmental plan (LEP).

Outcomes of consultation with the local council: The Wollongong City Council is a co-proponent of the project. Wollongong City Council is also a member of the NPWS Illawarra Mountain Bike Advisory Group for the project. In consultation with council, the design of the trail network was amended to accommodate a road crossing of Harry Graham Drive. The change in crossing location was required to enhance the safe crossing of riders at Harry Graham Drive. Further assessment of this crossing (and other off-park components of the proposal) will be included in the Part 5 assessment by Wollongong City Council.

4.1.2 National park or other E1-zoned land (clauses 16(2)(a)and 16(2)(b))

The activity is development on land zoned E1 or on or adjacent to land reserved or acquired under the NPW Act.

The proposal will be considered under the NPW Act. As NPWS is the proponent, NPWS will place the REF on public exhibition and consider submissions prior to finalising the REF.

The REF will be assessed by the Department of Planning and Environment – Biodiversity Conservation Division as per recommendation from NPWS.

4.1.3 Marine park or aquatic reserve (clause 16(2)(c))

The activity is on or adjacent to marine park or aquatic reserve.

Not applicable.

4.1.4 Sydney Harbour foreshore area (clause 16(d))

The activity is in the foreshore area (of Sydney Harbour) within the meaning of the *Place Management NSW Act 1998*.

Not applicable.

4.1.5 Roads or maritime (clause 16(e) or Schedule 3)

Not applicable. As stated previously, ancillary infrastructure such as parking and amenities will be assessed separately under a Part 5 assessment with Wollongong City Council as the lead proponent.

4.1.6 Siding Spring Observatory (clause 16(g))

The activity will increase the amount of artificial light in the dark night sky within 200 km of the Siding Spring Observatory.

Not applicable.

4.1.7 Mine subsidence area (clause 16(i))

The activity is on land in a mine subsidence district within the meaning of the *Coal Mine Subsidence Compensation Act 2017*.

Not applicable. The proposal does not involve development within a mine subsidence district. However, it is noted that previous mine workings are located within the proposal area. These mine workings are further described in Attachment F.

4.2 Consultation requirements under NPW Act for leases and licences

Not applicable. No leases or licences under the NPW Act are required as part of the proposed activity.

4.3 Targeted consultation

4.3.1 Public agencies

WaterNSW

An early version of the proposal included trails traversing through and adjacent to the Metropolitan Special Area, which is designated Schedule 1 land under the *Sydney Drinking Water Catchment SEPP*.

At the request of WaterNSW, a risk assessment workshop (facilitated by AXYS consulting) was held on 18 October 2021 between Niche Environment and Heritage, WaterNSW and NPWS. Following the risk assessment, alternative routes for the proposal were considered.

Exclusion of public access to protected drinking water supply catchments and storages is recognised as one of the primary control measures for the protection of water quality and public health. As such, an alternate route, avoiding the Metropolitan Special Area, was investigated during early 2022. Following additional geotechnical, ecological and Aboriginal cultural heritage assessments, the alternate route was adopted into the proposal.

The current proposal avoids traversing the Metropolitan Special Area. Nevertheless, NPWS recognises that the proposal would take place adjacent to the drinking water catchment. A neutral or beneficial effects assessment (Niche Environment and Heritage 2021 at Attachment G), has been prepared to support this REF.

Sydney Water

The proposal would traverse Sydney Water land (Lot 112 / DP751287) (Figure 1). Sydney Water has been a member of the advisory group for the proposal (Table 2). A formal agreement between NPWS and Sydney Water will be required.

4.3.2 Adjacent landowners

NPWS have contacted landholders immediately adjacent to the proposal.

4.3.3 Wider community consultation and/or notification of works

A social impact comment has been prepared (Attachment B) to support this REF. The impact comment has incorporated the outcomes of initial community consultation conducted by Wollongong City Council, random opt-out surveys within the locality of the proposal, and targeted surveys. This consultation has informed the proposal and the REF.

4.3.4 Interest groups and/or notification

As part of the consultation for the proposal, an advisory group was established, comprised of representatives from organisations listed in Table 2. The Illawarra Mountain Bike Advisory Group has held meetings at key stages throughout the development of the proposal. Meetings were held on the following dates:

- 31 October 2019, 12 November 2019, 10 December 2019, 11 February 2020, 25 February 2020, 07 October 2020, 17 November 2020, 1 October 2021, 21 October 2021, 26 June 2022.

Feedback on the environmental assessment process was provided by NPWS in the advisory group meetings. The advisory group will be consulted during the public exhibition of the REF.

Table 2 Illawarra Mountain Bike Advisory Group organisations

Advisory group organisations	
Destination Sydney Surround South	Destination Wollongong
Illawarra Escarpment Alliance	Illawarra Local Aboriginal Lands Council
Illawarra MTB Alliance	National Parks and Wildlife Service
National Parks Association	Office of Sport
South32	Sydney Water
Trail Care	WaterNSW
Wollongong City Council	

5. Consultation – Aboriginal communities

5.1 Native title consultation requirements

The land is not subject to an Indigenous land use agreement.

The South Coast People (NC2017/003) were the only native title claimants regarding the proposed activity. An invite to register for the proposal was sent to a representative of the South Coast People, however, they did not register (refer Attachment A for details).

5.2 Other parks

The Illawarra SCA is not under a joint management arrangement. In accordance with the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010a), the Aboriginal community were consulted as part of the *Aboriginal cultural heritage assessment report* (Attachment A) for the proposed activity. Consultation included notification to interested parties, providing information on the proposal, and seeking cultural advice. For more details, please see Attachment A.

Note that access to the cultural values assessment and Aboriginal cultural heritage assessment (Attachment A) is restricted to registered Aboriginal parties and nominated Knowledge Holders.

6. Proposed activity (or activities)

6.1 Location of activity

Lands within proposal	Illawarra Escarpment State Conservation Area (SCA) Sydney Water lands South32 land (see Figure 1)
Description of location	Area between Mount Keira and Mount Kembla referred to as the 'proposal area' in this REF
Site commonly known as	Mount Kembla Illawarra Escarpment
Lot/DP	Multiple (refer to Figure 1)
Street address	N/A
Site reference	Easting: 300019 Northing: 6190077 AMG zone: 56

The proposed Illawarra Escarpment Mountain Bike Trail Network (the proposal) is located along the Illawarra Escarpment, to the west of the Wollongong suburbs of Figtree and Cordeaux Heights and south-west of Wollongong and Mount Keira / Keiraville (Figure 1). The proposed mountain bike network is approximately 51 km in total length, spanning multiple land tenures. The majority of trails are located on NPWS land (Figure 1), including approximately 250 ha of the Illawarra Escarpment SCA, managed by NPWS. Other land tenures within the proposed Illawarra Escarpment Mountain Bike Trail Network include:

- Wollongong City Council
- Sydney Water
- South32 (private landholder).

However, as detailed in Section 3, only land within NPWS estate (i.e. Illawarra Escarpment SCA), Sydney Water and South32 land tenures is being included within this REF.

6.2 Description of the proposed activity

6.2.1 The proposed trail network

The proposed Illawarra Escarpment Mountain Bike Trail Network (the trail network) is 51.17 km in total length, including 28.61 km of new trails (Table 3). A number of existing unsanctioned trails (22.56 km in total length) are proposed to be incorporated into the trail network to minimise environmental impacts from creating new trails. The existing trails that have been incorporated into the network require modification to meet the International Mountain Bike Association (IMBA) trail standards as set out in the *Australian mountain bike trail guidelines* (MTBA 2019). The proposed upgrades would result in improved drainage and erosion control, safety and reduced edge impacts to ecology. The success of the proposed

trail network would allow unsanctioned trails within the proposal area, that do not form part of the proposed network, including Mount Keira, to be closed and rehabilitated by NPWS.

The proposed trail network is structured in 3 distinct interconnected tiers (Table 4). Each of the tiers can be ridden individually or as an interconnected network. The network is designed to enable a large variety of riding options and routes, with the possibility of creating unique loops that suit an individual rider's ability and/or preference.

The trail network includes a range of trail categories (Table 5 and Figure 3a–c) to provide for differing rider abilities. Each of the maps in Figure 2a–c shows a different section of the proposal area, running from east to west. Figure 3 shows the proposed new trails and the existing unsanctioned trails in the network.

Multiple network entry points and dispersed parking (details to be determined through Wollongong City Council traffic management study) will provide suitable access to the trail network and will enable riders to easily access the ride start point of their choice. Climbing trails enable riders to cycle into the network from surrounding suburbs including Mount Kembla and Mount Keira, Keiraville, Cordeaux Heights and Farmborough Heights.

Table 3 Comparison of existing unsanctioned trails and new proposed trails that will be included in the trail network

Trail types	Sum of length (km)	Percentage
Existing trail*	22.56	44
New trail	28.61	56
Total	**51.17**	**100**

*Includes existing unsanctioned trails and fire/access trails.

Table 4 Trail network sections

Trail network tiers	Description
Upper tier	O'Briens Drift trailhead with a short flowing cross-country network and descending trail to the mid tier. It is also the start location for the advanced full-length descents. The entire trail network can be accessed from the Mount Keira foothills in proximity to the Mount Keira Rural Fire Services (RFS) station. The entire network is therefore linked internally by climbing trail and management trails, minimising the need for mountain bikers to access trails via the road.
Mid tier	Located behind the motocross track in NPWS land above Kembla Heights and comprises the bulk of the trail network with a range of trails available for different riding genres and skill levels. This area has the greatest variety of trail types and is specifically designed to provide diversity of trail types and difficulty levels.
Lower tier	Descending trail network into Kembla Village for more experienced riders, including a return climb to Harry Graham Drive.

Table 5 Summary of trail categories included in the trail network

Trail type	Skill level	Number	Length (km)
Existing bike path	All	1	1.16
Existing fire/access trails	All	3	3.35
Black trails	Advanced	13	7.54
Blue trails	Intermediate	23	18.39
Green trails	Beginner	12	5.74
Red (climbing) trails	Intermediate to Advanced	13	14.50
Two-way trails	Various	4	0.49
Total		**69**	**51.17**

Trail colour grades have been defined as per *Illawarra Escarpment mountain bike concept plan* (Synergy Trail 2020). See also Figure 2.

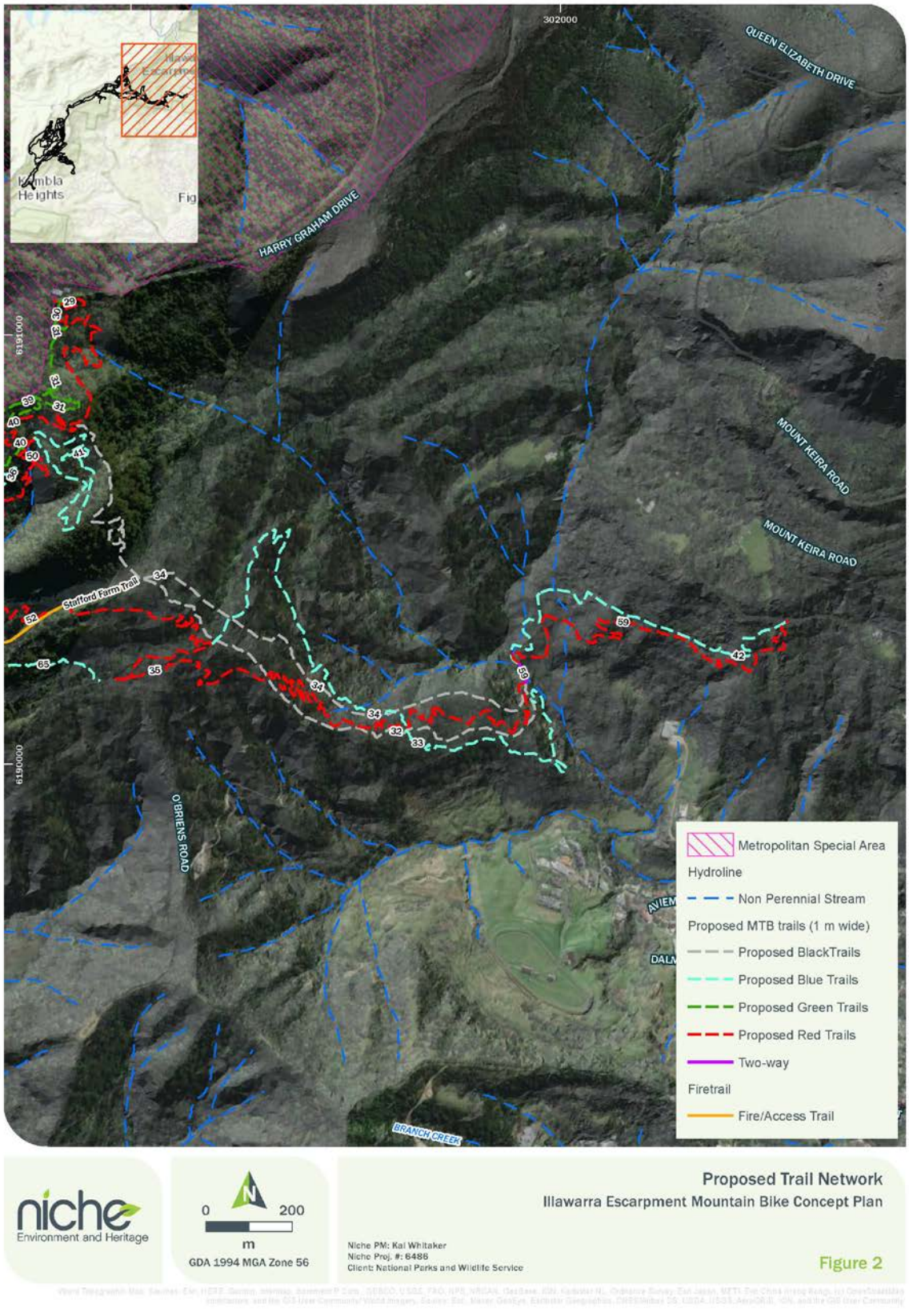


Figure 2a Proposed trail network design showing trail categories – eastern proposal area

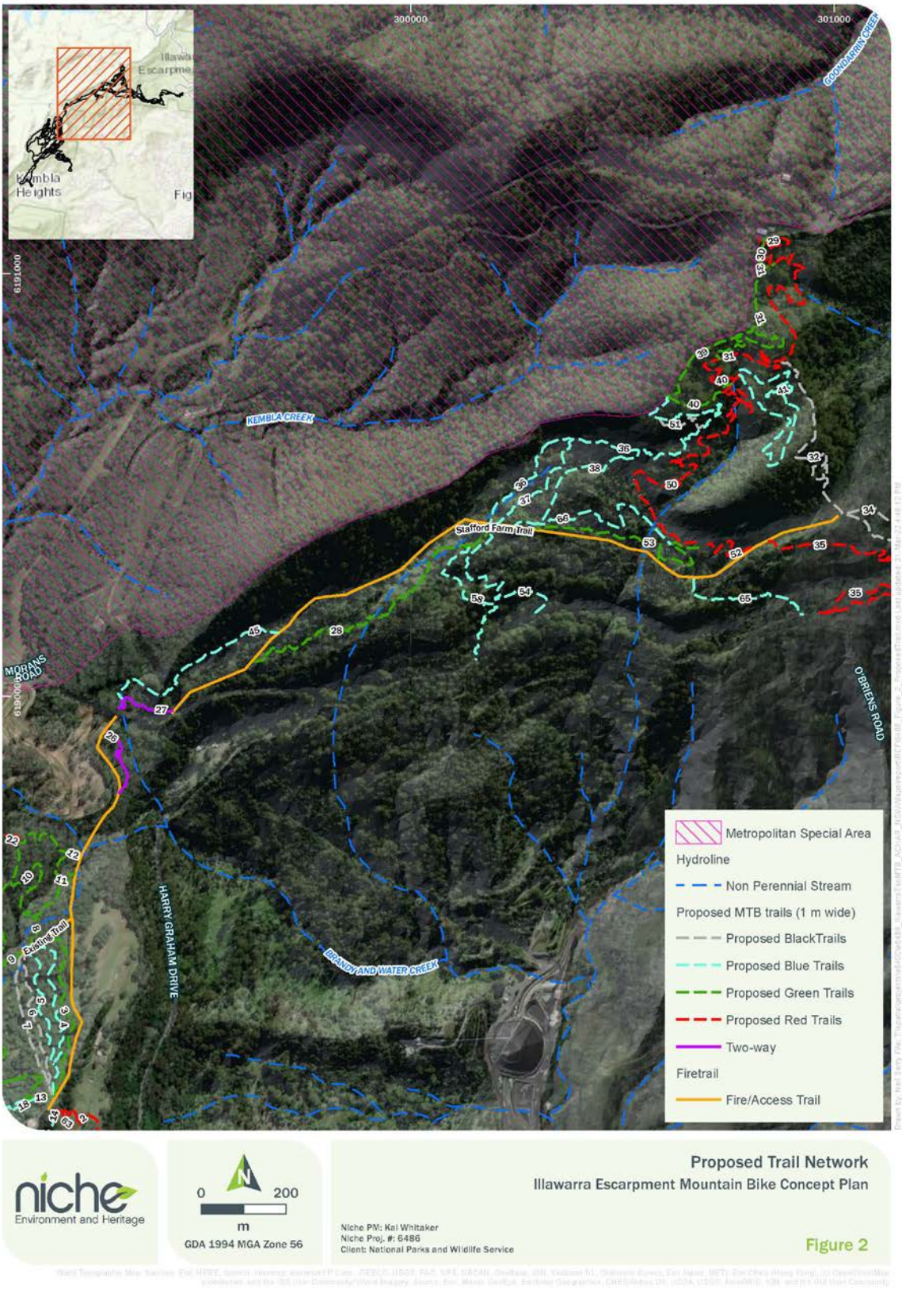


Figure 2b Proposed trail network design showing trail categories – central proposal area

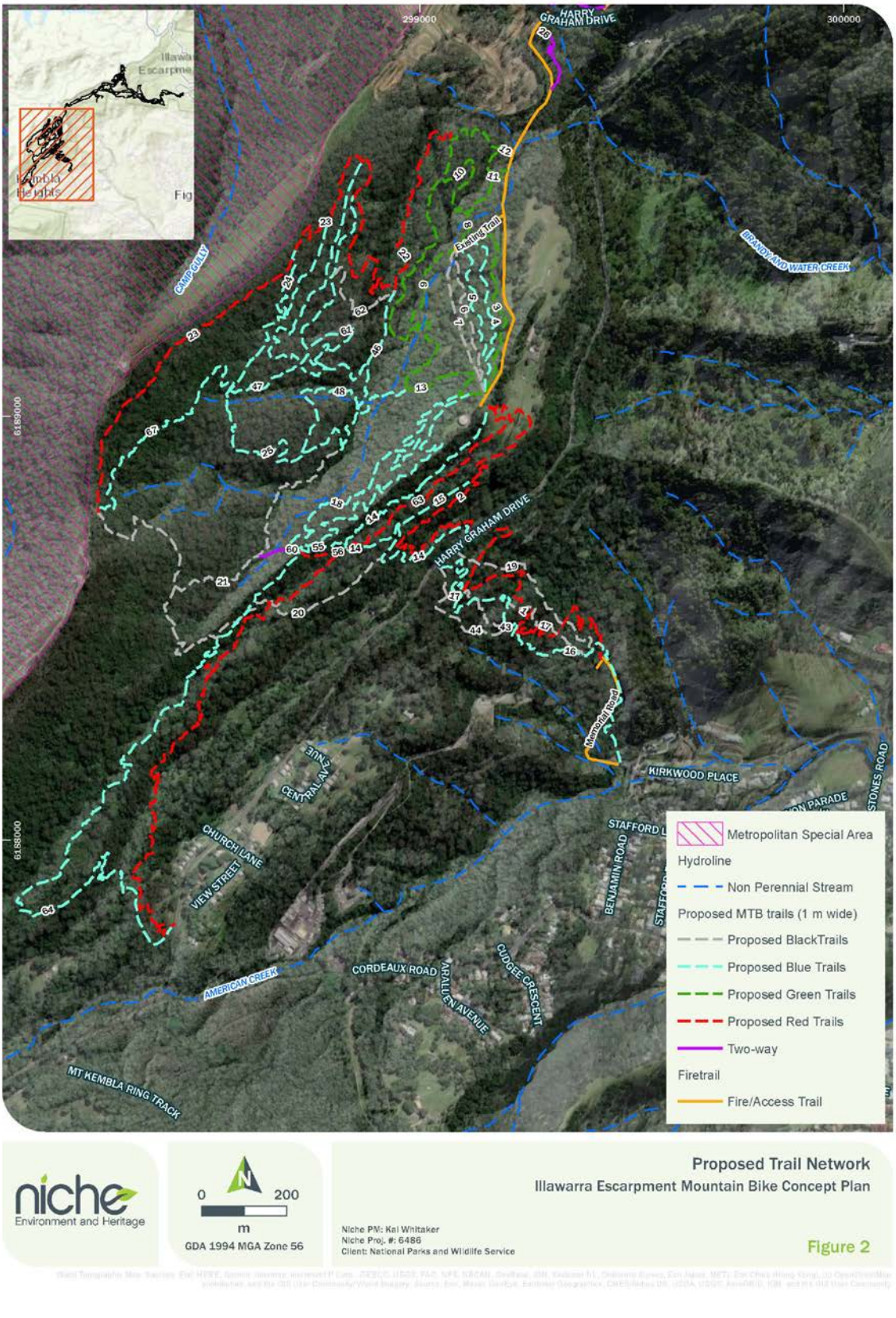


Figure 2c Proposed trail network design showing trail categories – western proposal area

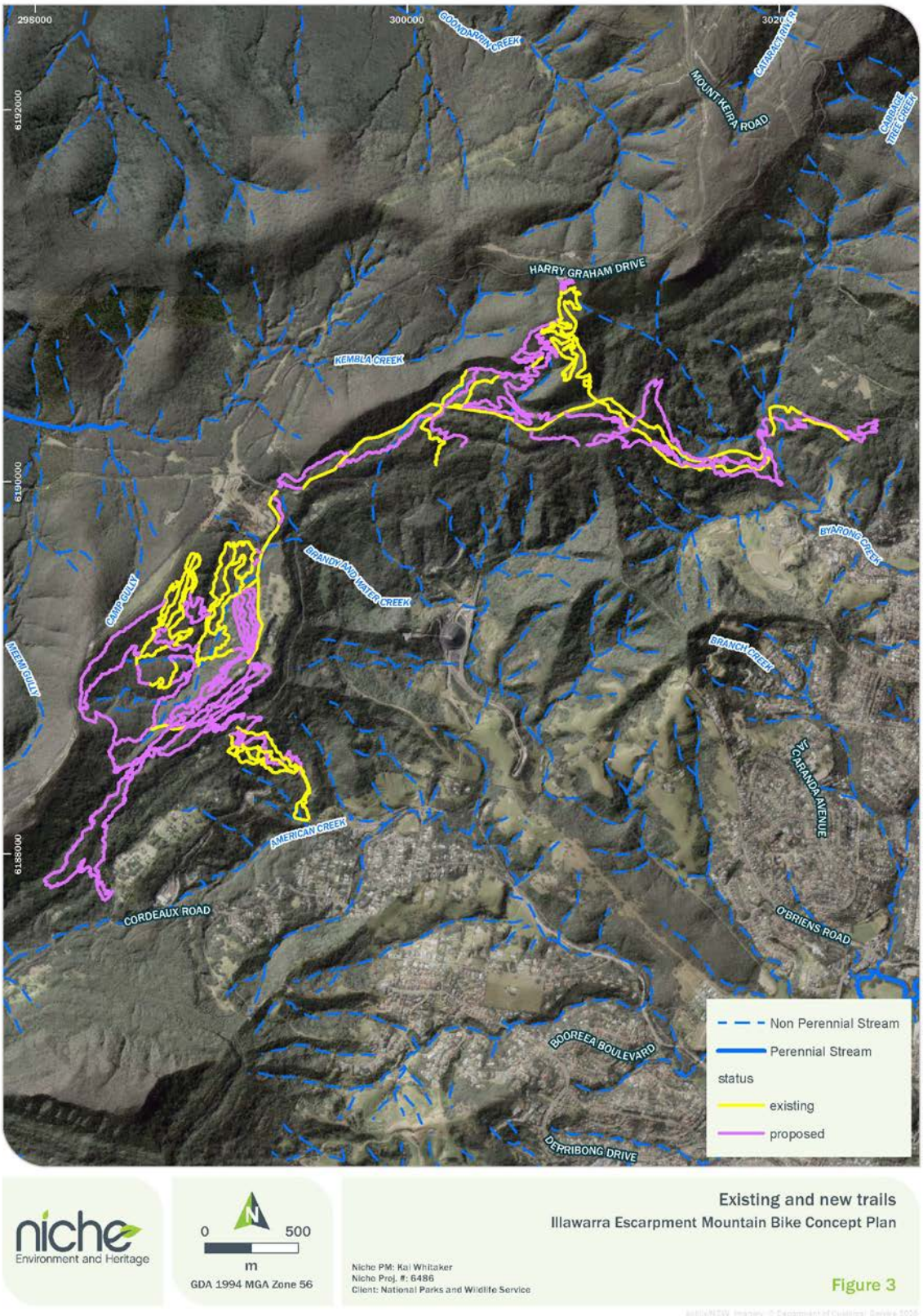


Figure 3 Proposed new trails and existing unsanctioned trails to be incorporated into the network

Preliminary assessment and trail network design

A preliminary assessment of the proposed trail network was conducted by NPWS (NPWS 2020). Existing unsanctioned mountain bike trails were initially mapped within the proposal area by NPWS, using the following data sources:

- NPWS GIS data
- published trail data (including Strava, Trail Forks and All Trails)
- Illawarra Mountain Bike Alliance (pers. comm. Geoff Parker, Gary Pesavento).

A desktop constraints assessment (NPWS 2020) was used to evaluate the proposal area for trail suitability and to inform field investigations.

Extensive field investigations were conducted by NPWS and Synergy Trails (Synergy) to map the proposed trail network by identifying existing trails that were suitable to be incorporated, and to identify where new trails would be required to create a functional trail network. Some of the field investigations were also attended by Illawarra Local Aboriginal Land Council and Wollongong City Council.

6.2.2 The activity footprint (size of the area of impact)

Different trail categories require different widths for construction and operation (Table 6). Construction categories in Table 6 are made up of a combination of the trail category (e.g. Black) and construction type (e.g. hand). The activity footprint for the project is comprised of the trail network footprint and the construction material laydown areas footprint (Table 7).

Table 6 Summary of trail construction categories and associated widths

Construction category	Length (km)	Construction width (m)	Operational width (m)
Black – hand	6.28	0.9	0.6
Black – machine	1.27	1.2	0.6
Blue – hand	6.14	1.1	0.9
Blue – machine	13.35	1.2	0.9
Green – hand	1.25	1.2	0.9
Green – machine	4.49	1.2	0.9
Red – hand	5.12	1.1	0.9
Red – machine	8.28	1.2	0.9
Two-way	0.49	2.5	2.0
Existing fire trail – machine	1.96	4	4
Existing – none required	2.55	N/A	N/A
Total	**51.17**	**–**	**–**

Table 7 Estimated activity footprint for the proposal

Sum of primary clearing (new trails) for construction (ha)	Sum of secondary clearing (existing trails) for trail construction (ha)	Sum of temporary disturbance from laydown areas (ha) (number of zones in italics)	Total impact area (ha)
6.56	4.32	0.175 *(70 zones)*	11

6.2.3 Proposed construction methods, materials and equipment

The proposed construction methodology would be based on the conditions of each section of trail. Different grades of trail require different degrees of construction (Table 6).

Ground truthing and detail design

- Ground truthing of a 20 m trail corridor (i.e. 10 m either side of trail) with NPWS staff to optimise trail design and alignment to minimise ecological disturbance.
- The trail would be marked with micro-flags at approximately 2 m intervals along the trail centreline.
- With the assistance of NPWS staff, or suitably qualified person, confirm fallen trees marked for cutting/removal from the trail alignment are not habitat for threatened fauna.

Clearing the trail alignment

- Hand clearing of the marked trail of vegetation with brush cutters and chainsaws.
- In areas that are free of weeds, cleared vegetation would be stockpiled off-trail within material laydown areas for use as brush matting to remediate access areas and degraded unsanctioned trails on completion. Where weeds are present, cleared vegetation will be bagged and removed from the site to be disposed of at a licensed facility.
- All trail corridors (new and existing) would be cleared to a height of 2.4 m. The trail corridors would also be checked for overhanging branches and hollows. An arborist would be consulted about any trees of concern. Overhanging vines that encroach on the trail corridor would be tied back (rather than trimmed).
- Fallen trees would be cut back between 0.5 and 1 m from the trail alignment.
- Any cut timber would be stockpiled for re-use in trail construction or habitat creation within the project area.
- Where required, rocks within the trail alignment would be relocated for use as technical trail features and filters (TTF) (see Bennett Murada Architects 2021 at Attachment H for detailed descriptions). The relocation of in situ rock will be subject to further habitat assessment and approval by NPWS.
- Organic material would be relocated for use in berms and other trail structures to encourage regrowth.

Materials deposition

- Where suitable, trail construction materials would be brought to the site by helicopter to designated material laydown areas (shown on Figure 4).
- Where practicable, construction materials would be brought to the laydown areas via access roads.
- Material laydown areas will be located in existing cleared areas.

Cutting the trail in

- Excavation would commence at critical surface water movement points. Machinery and techniques used for the excavation would depend on the trail category (and construction method), as per Table 8. Trail sections have been mapped as hand-built or machine-built (Figure 4 and Table 6).
- Machine excavation will start at the beginning of the trail and the critical surface water movement points will be marked. The excavator will be a zero-swing type, allowing for machinery excavation works to be confined within the marked trail corridor.
- Hand excavation will start at critical surface water movement points.
- Soil and rocks will then be dug and relocated to build the base trail between features. Table 9 lists proposed construction materials.
- Technical trail features and filters would be installed in locations along the trail that assist with surface water management (Figure 5a–j and Figure 6a–j). Each of the maps in Figure 5a–j show the bridges, drainage features and rock armouring for a different section of the proposal area, running from east to west. Figure 6 maps show the trail features and signage for these same sections of the proposal area.
- Technical trail features and filters would also be located in relation to natural rock formations and other landscape features.
- Soil and rocks would then be dug and relocated to build the base trail between features.
- Once the alignment is complete, the trail would be compacted by hand (shovel, rake-hoe) or plate compactor.
- Construction on existing fire/access trails would be within the existing corridor.

Finishing the trail

- Stockpiled organic material would be reinstated around the trail alignment.
- Signage would be installed at the entrance and exit of each trail; and at each trail junction (Figure 6a–j). Specifications and requirements for signage will be governed by a signage management plan to be developed by NPWS.
- Trails would be test ridden, and adjustments to geometry made to optimise the experience and meet standards, levels and criteria.
- There are sections within the trail network that have a relatively high proportion of weeds. Construction in these areas would require careful handling of weed material and may require revegetation. Such works will be in accordance with the construction environmental management plan.

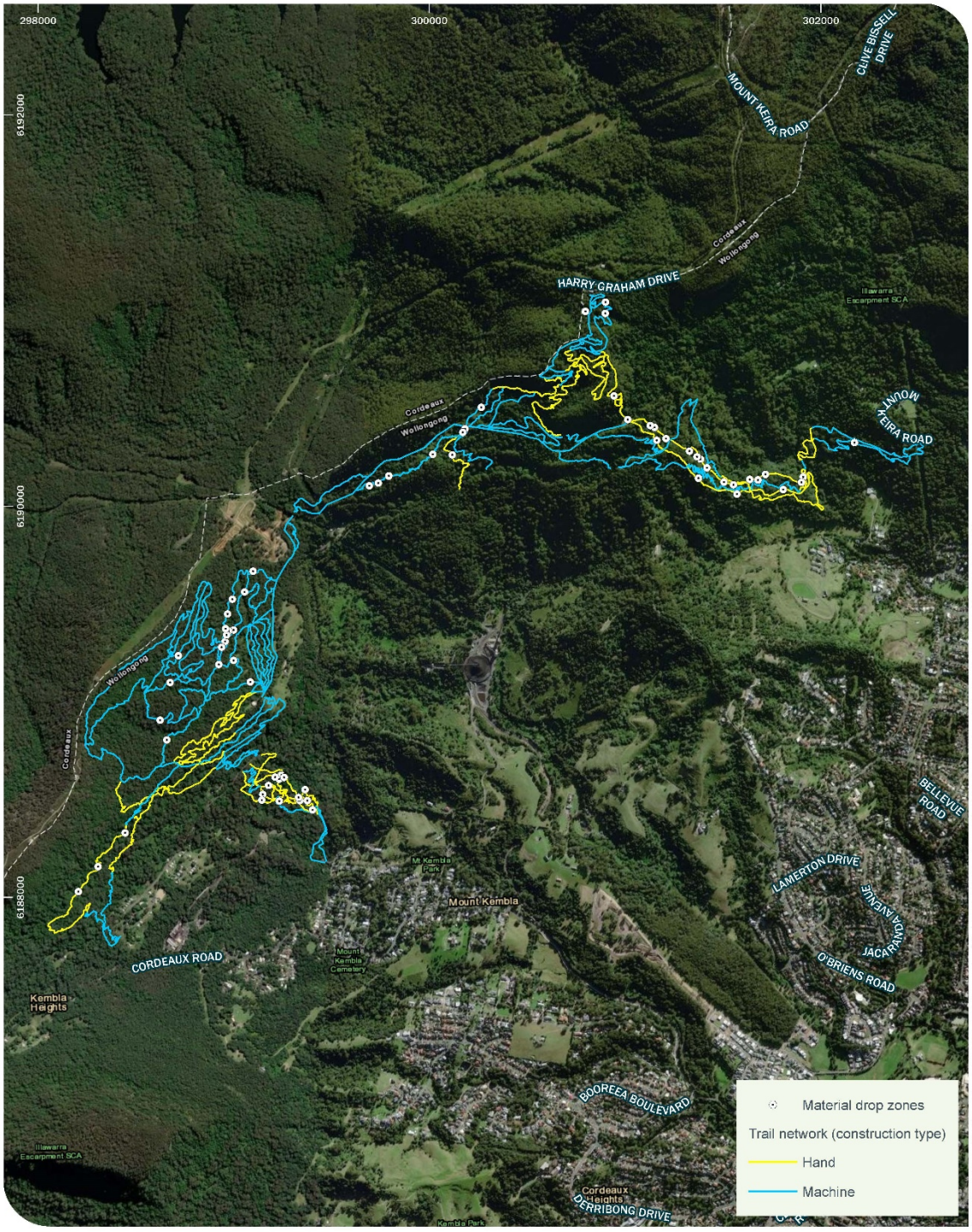


Figure 4 **Hand-built and machine-built trails, and location of helicopter drop zones (material laydown areas)**

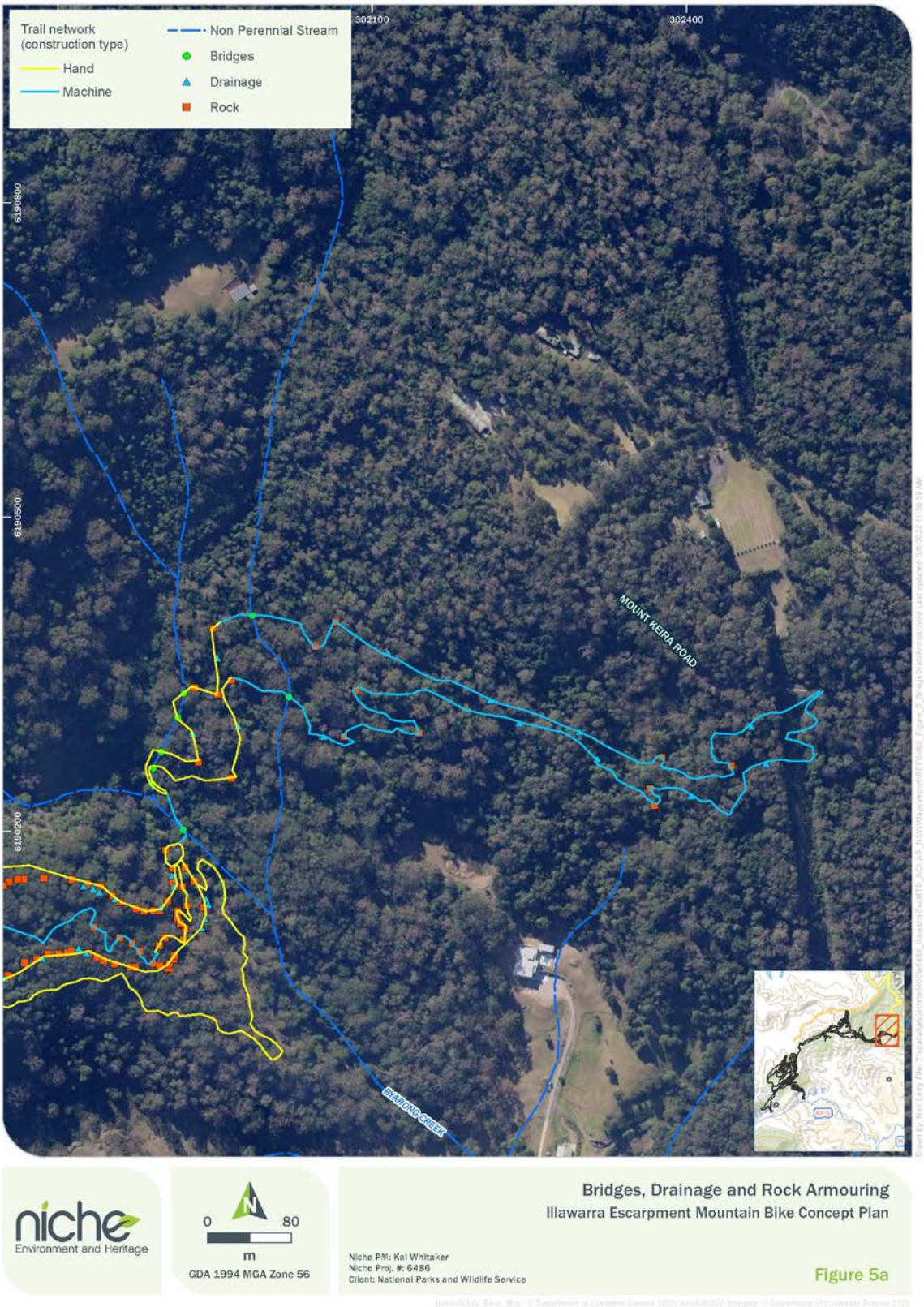


Figure 5a Locations of bridges, drainage features and rock armouring within the trail network

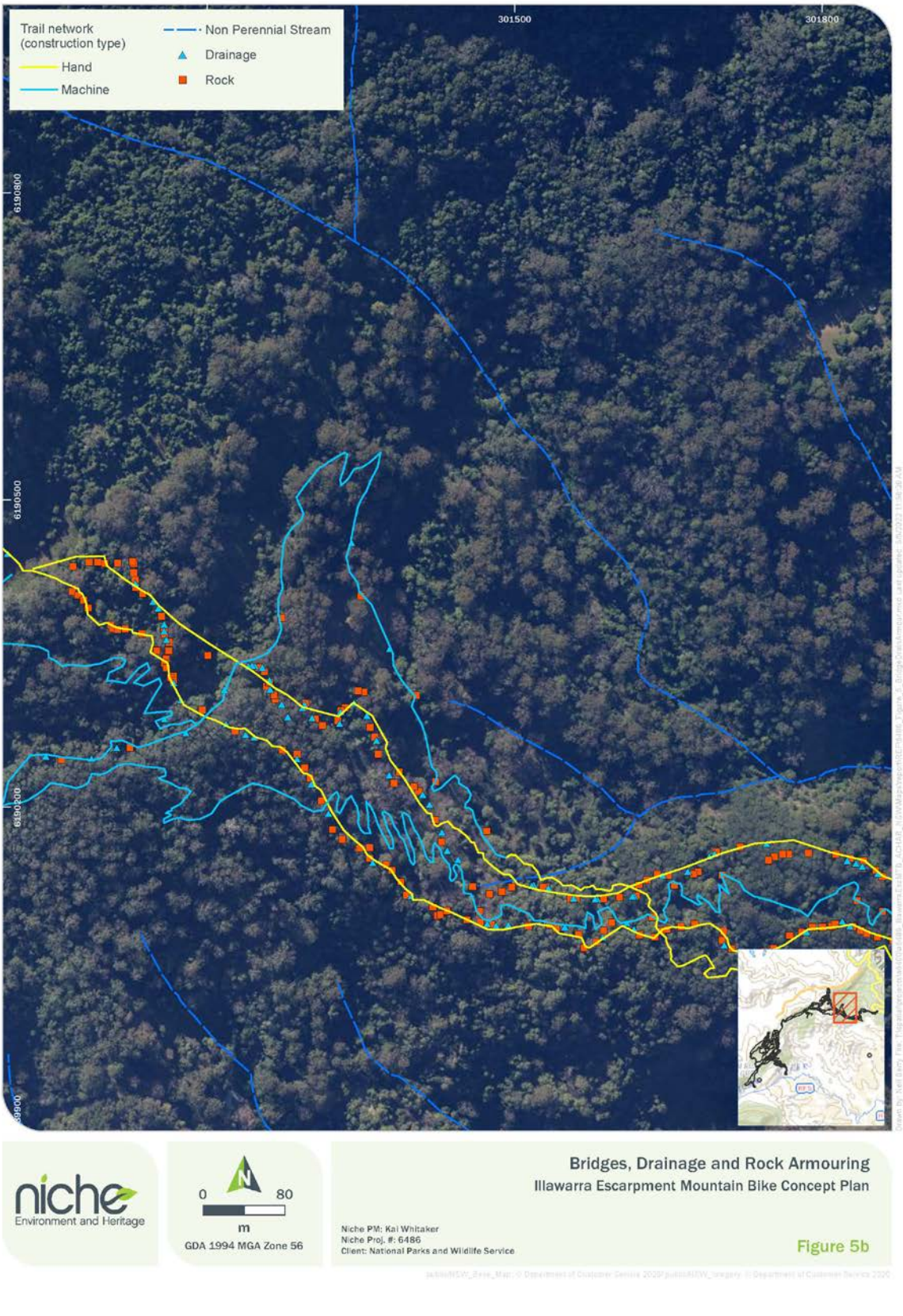


Figure 5b Locations of bridges, drainage features and rock armouring within the trail networ

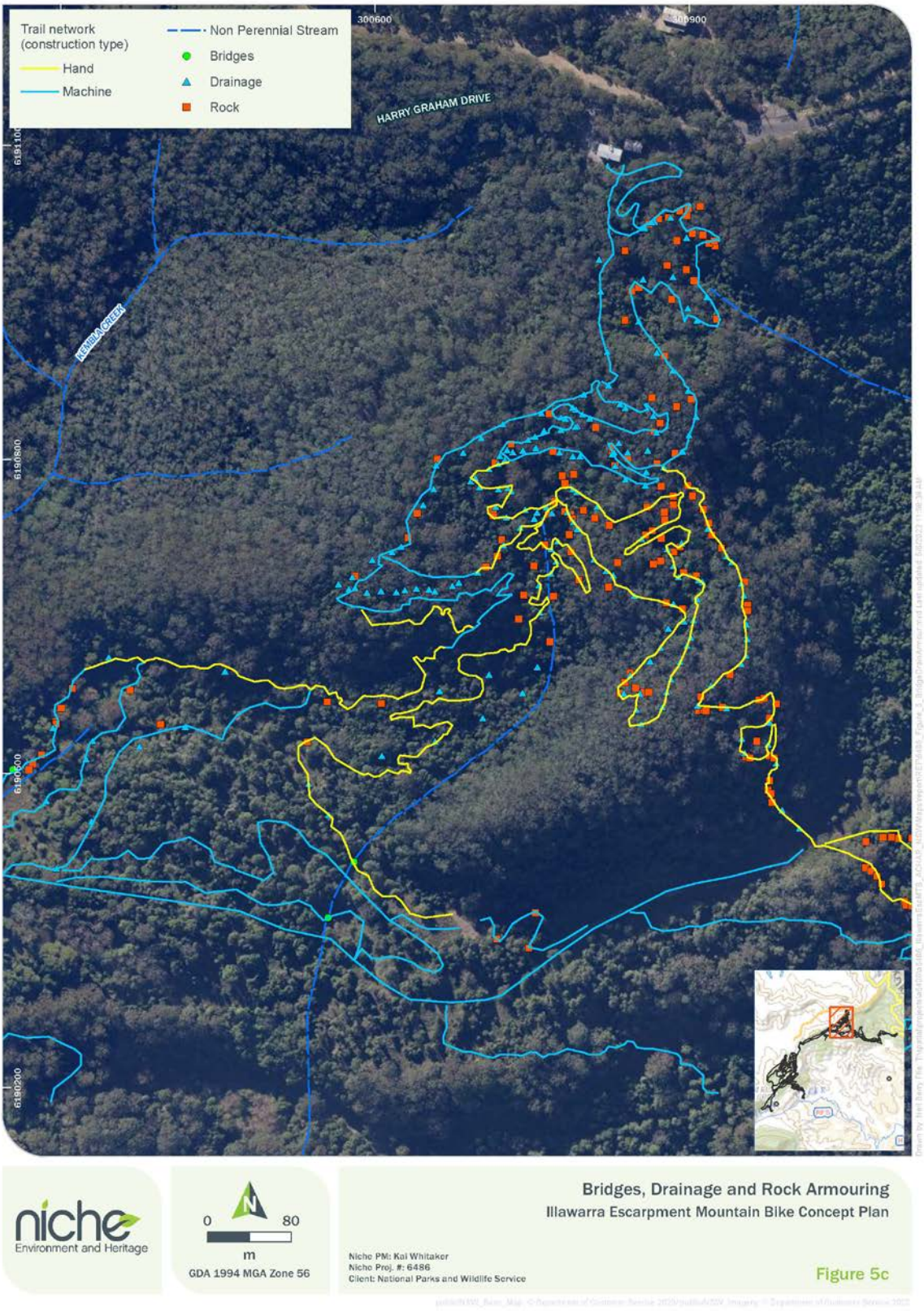


Figure 5c Locations of bridges, drainage features and rock armouring within the trail network

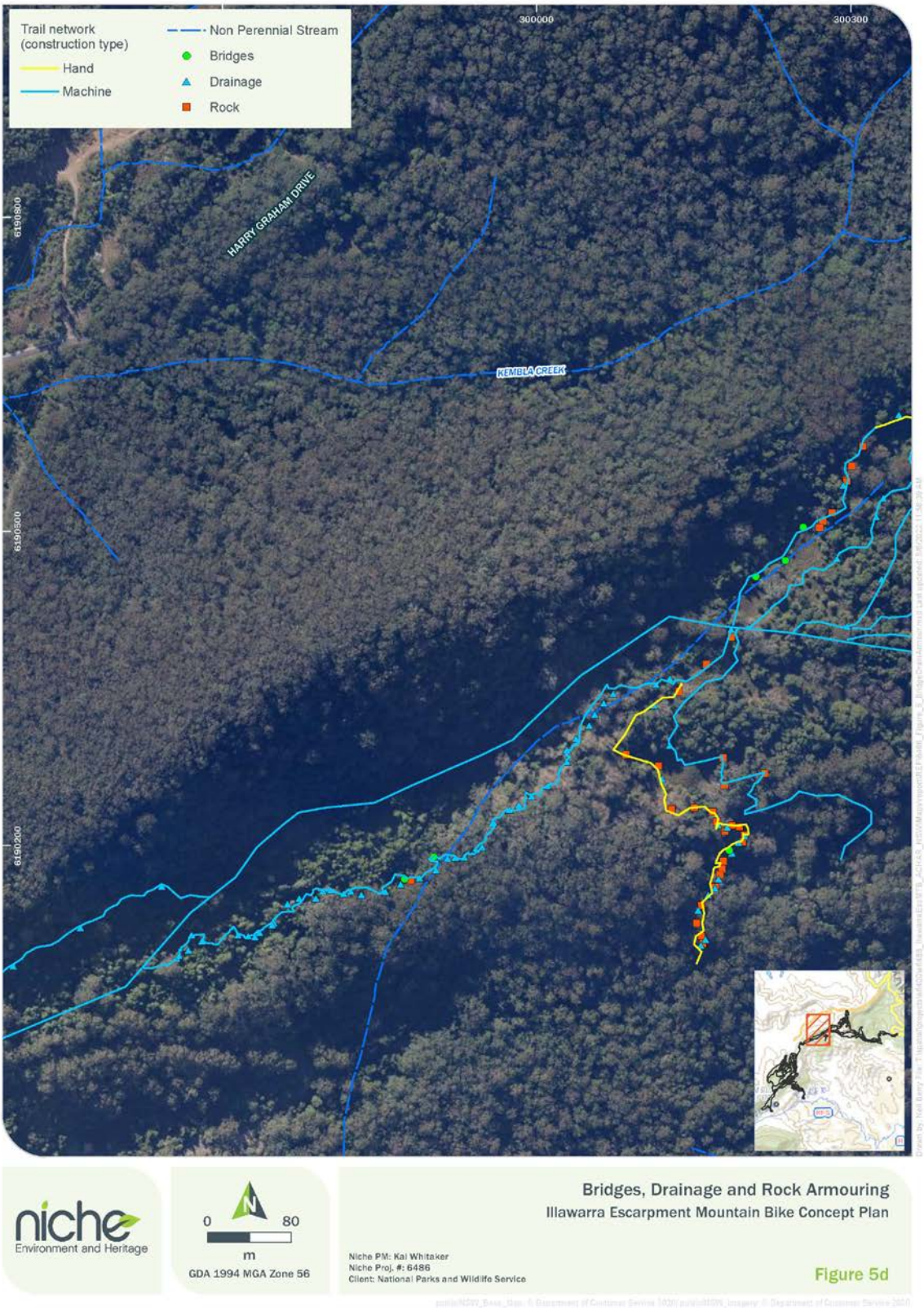


Figure 5d Locations of bridges, drainage features and rock armouring within the trail network

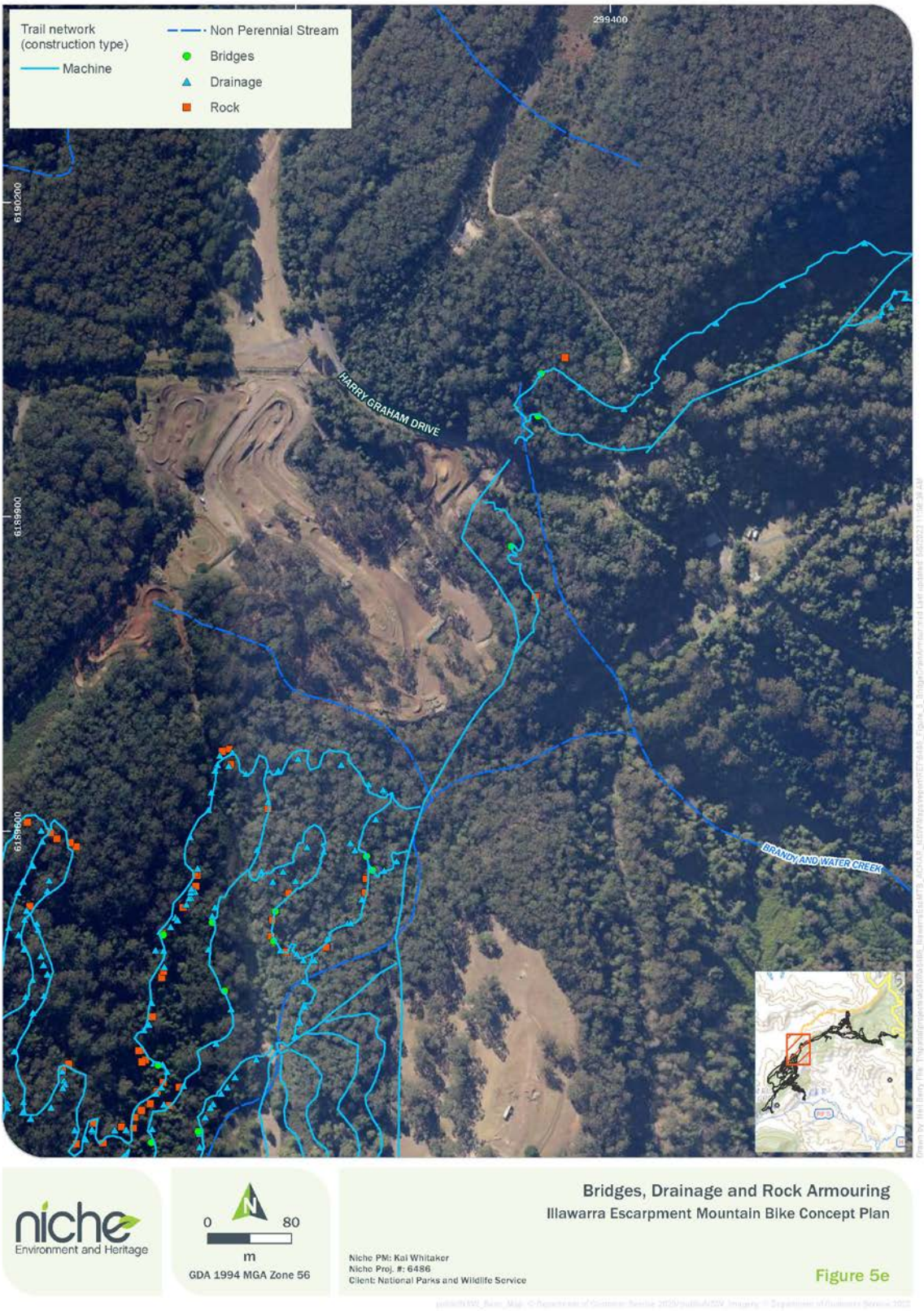


Figure 5e Locations of bridges, drainage features and rock armouring within the trail network

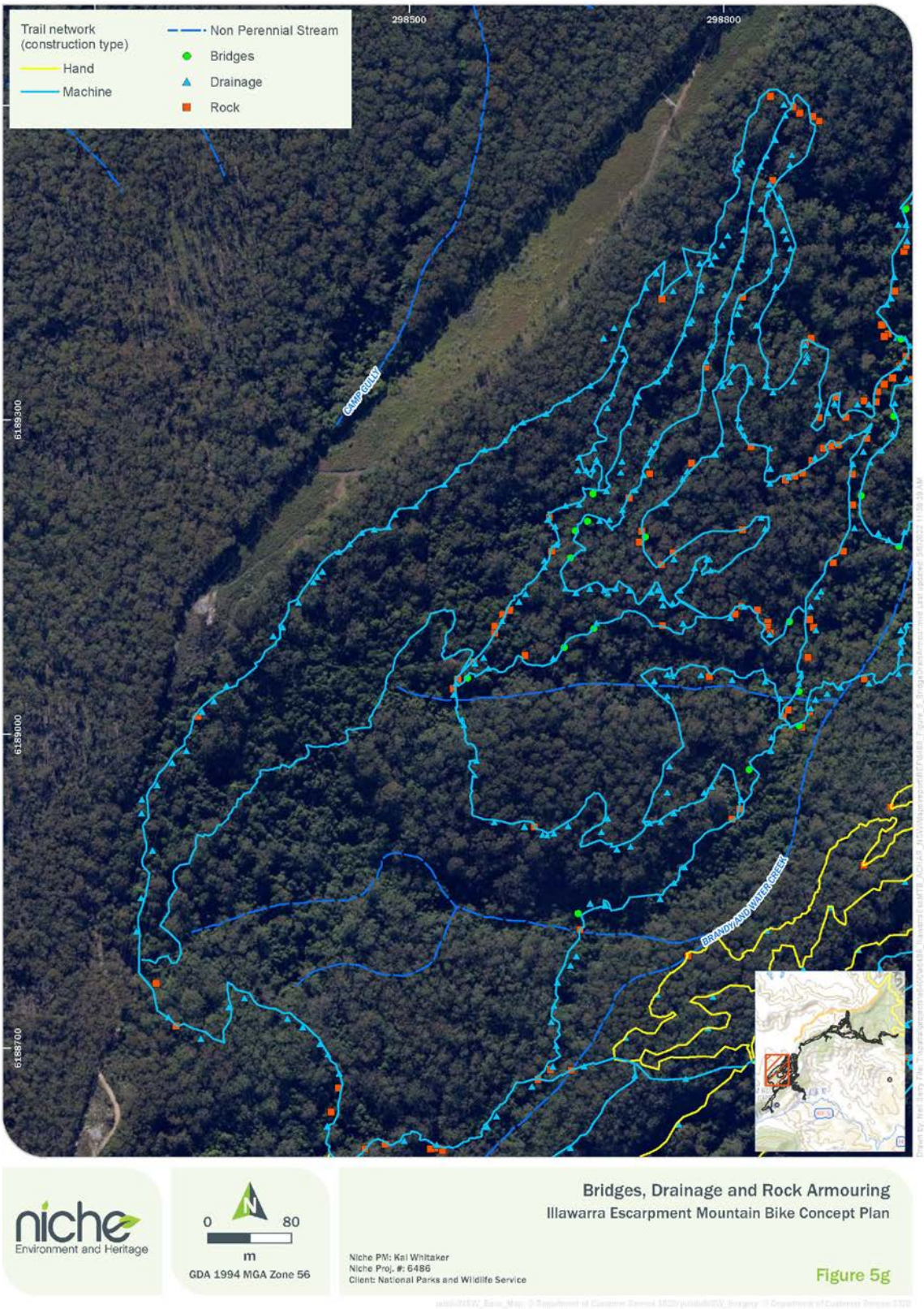


Figure 5f Locations of bridges, drainage features and rock armouring within the trail network

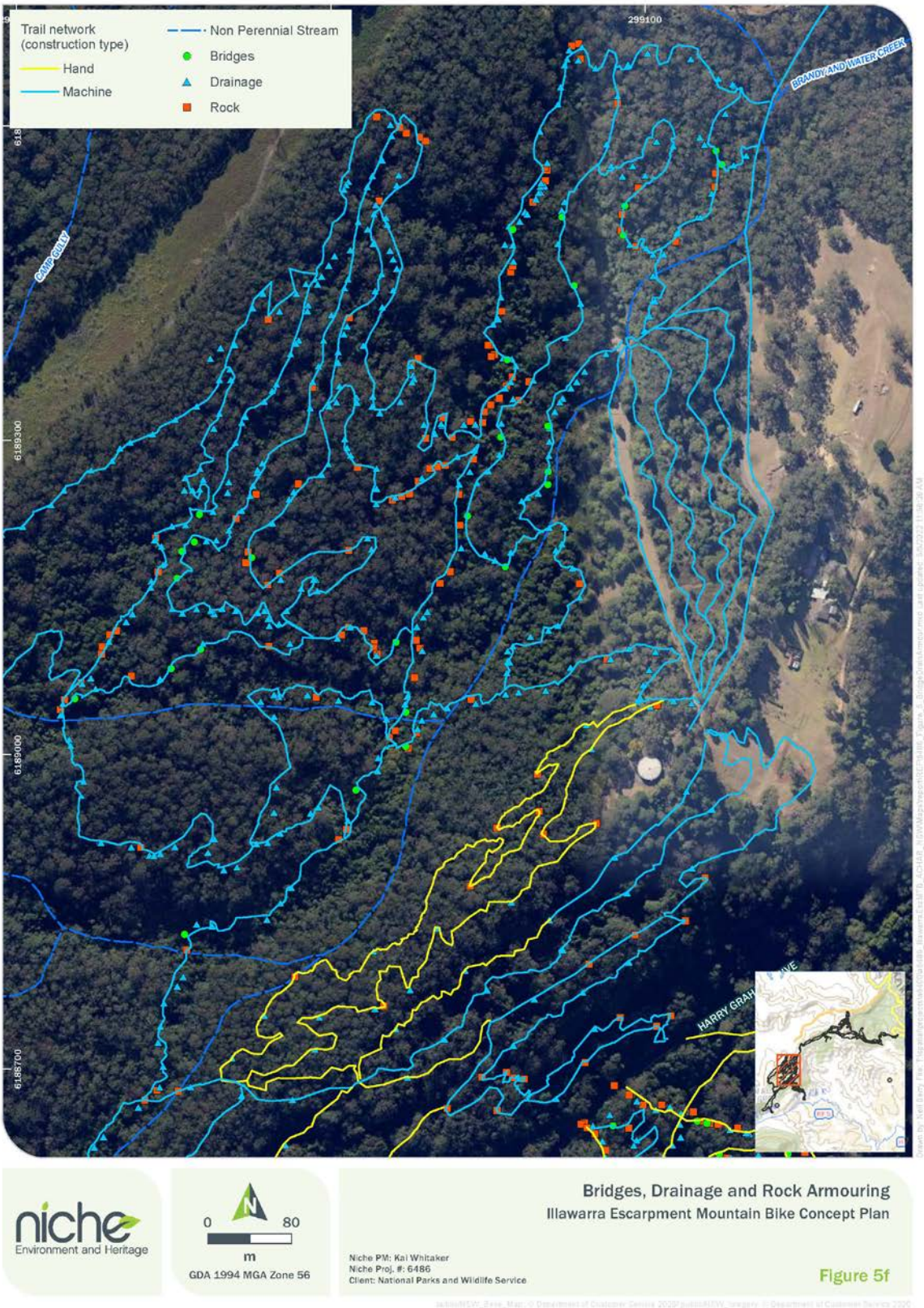


Figure 5g Locations of bridges, drainage features and rock armouring within the trail network

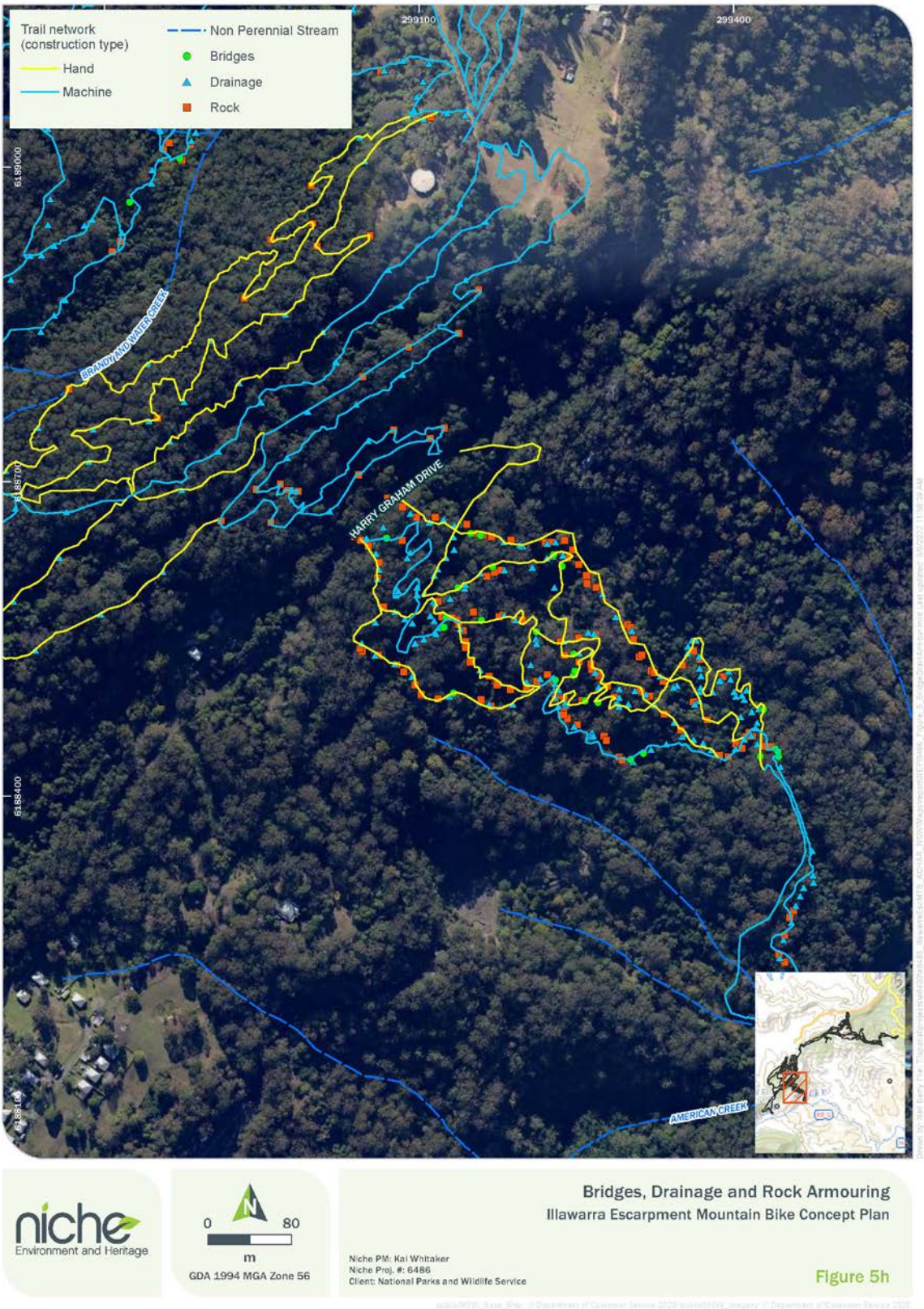


Figure 5h Locations of bridges, drainage features and rock armouring within the trail network

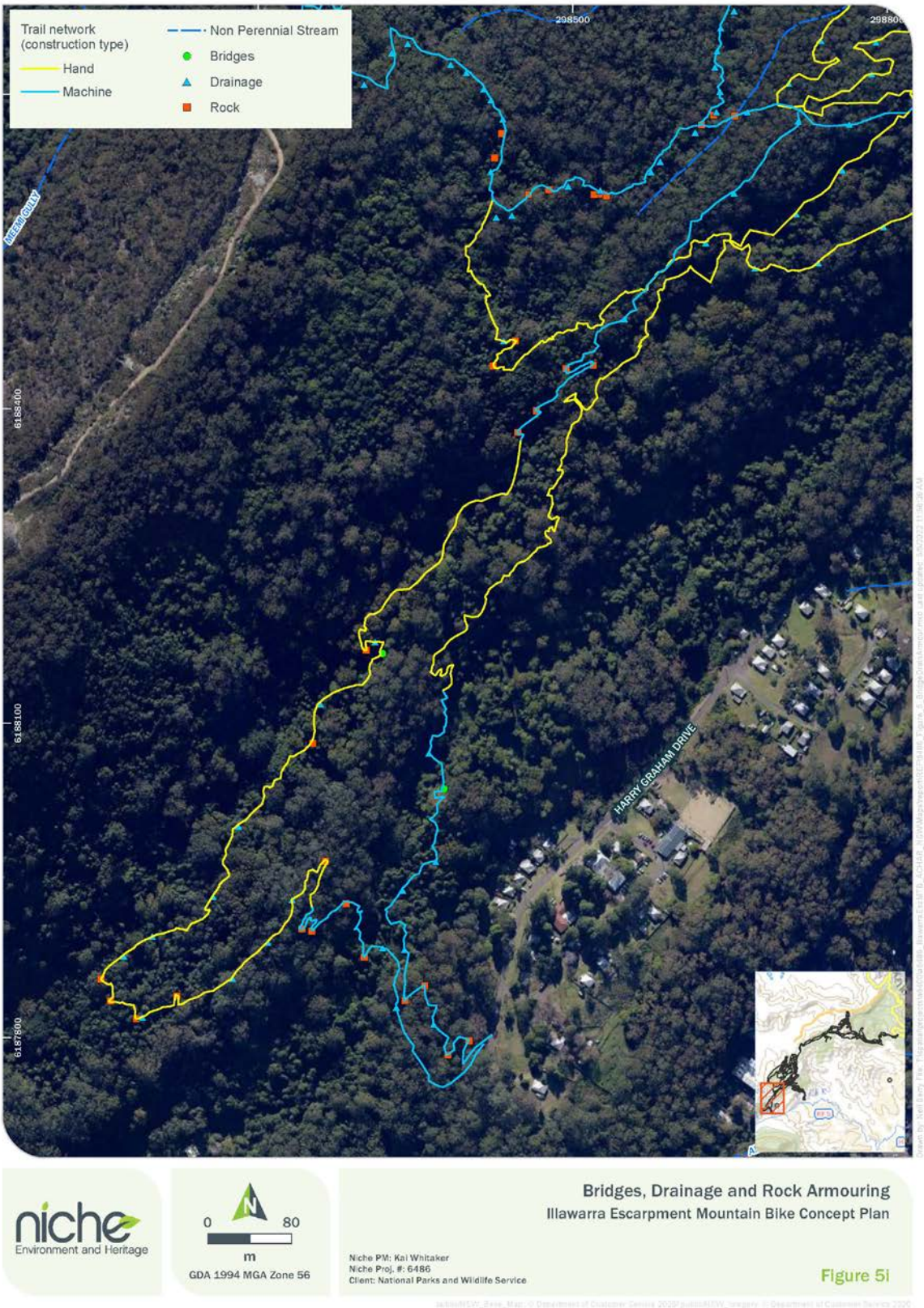


Figure 5i Locations of bridges, drainage features and rock armouring within the trail network

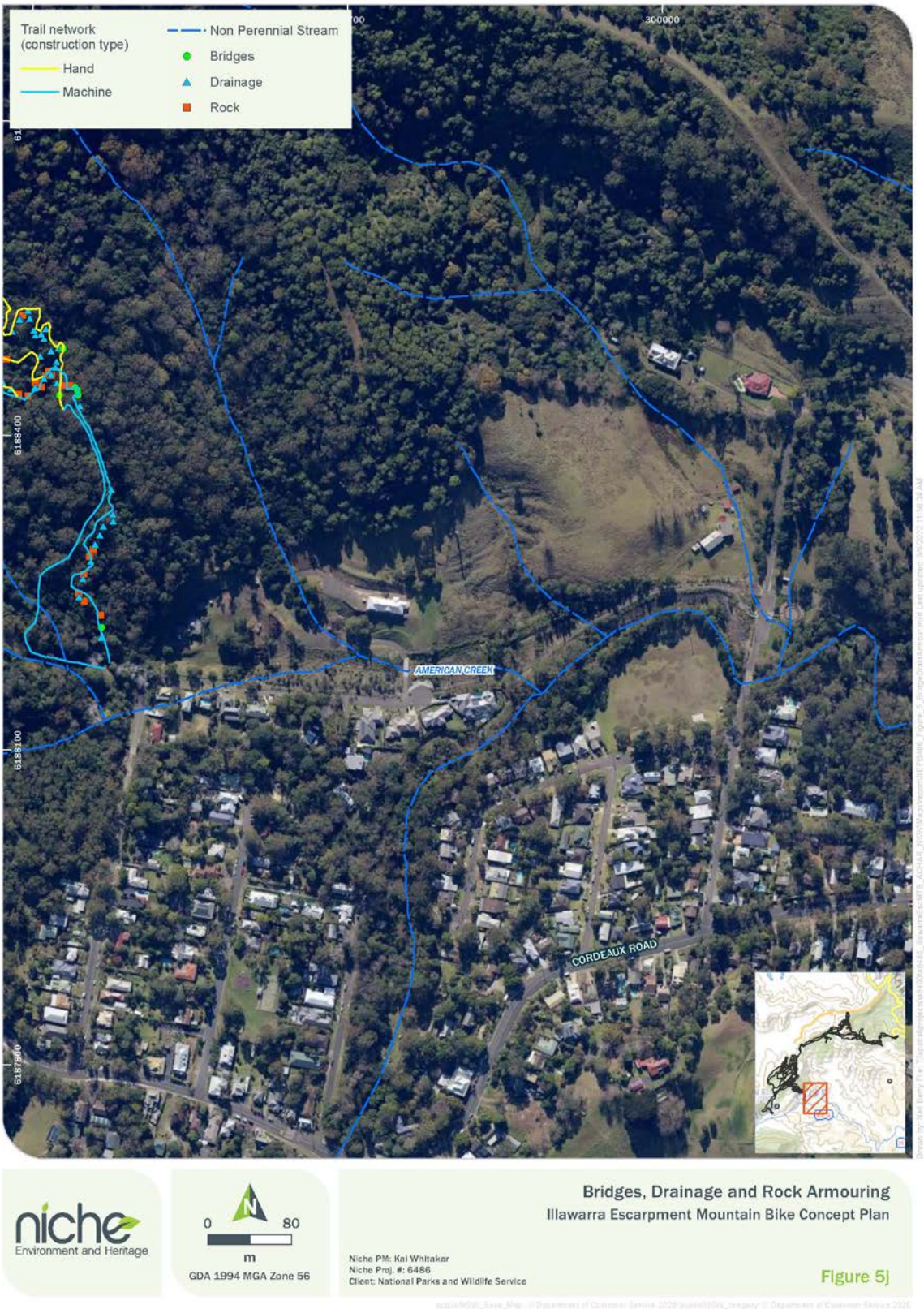


Figure 5j Locations of bridges, drainage features and rock armouring within the trail network

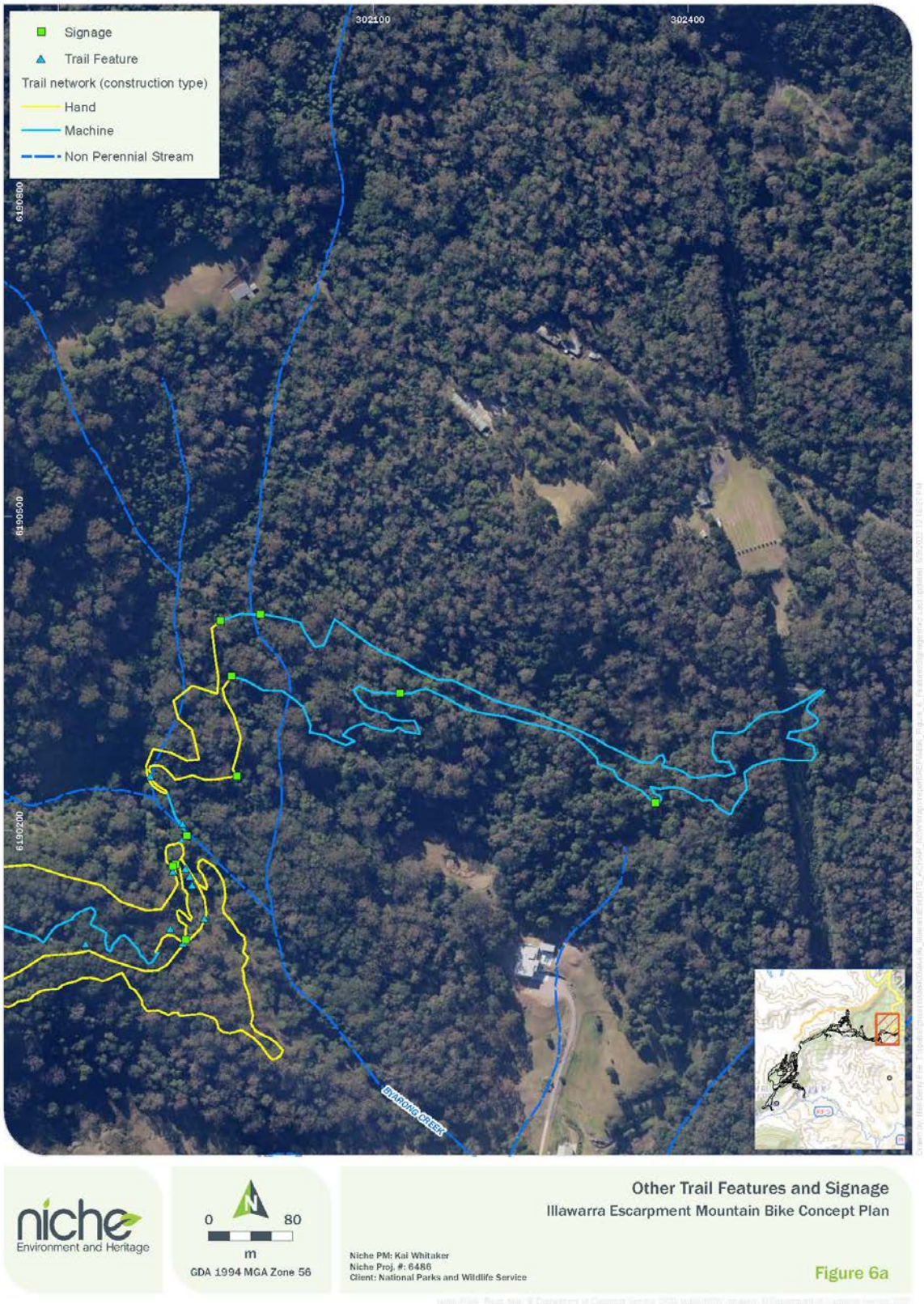


Figure 6a Trail features and signage

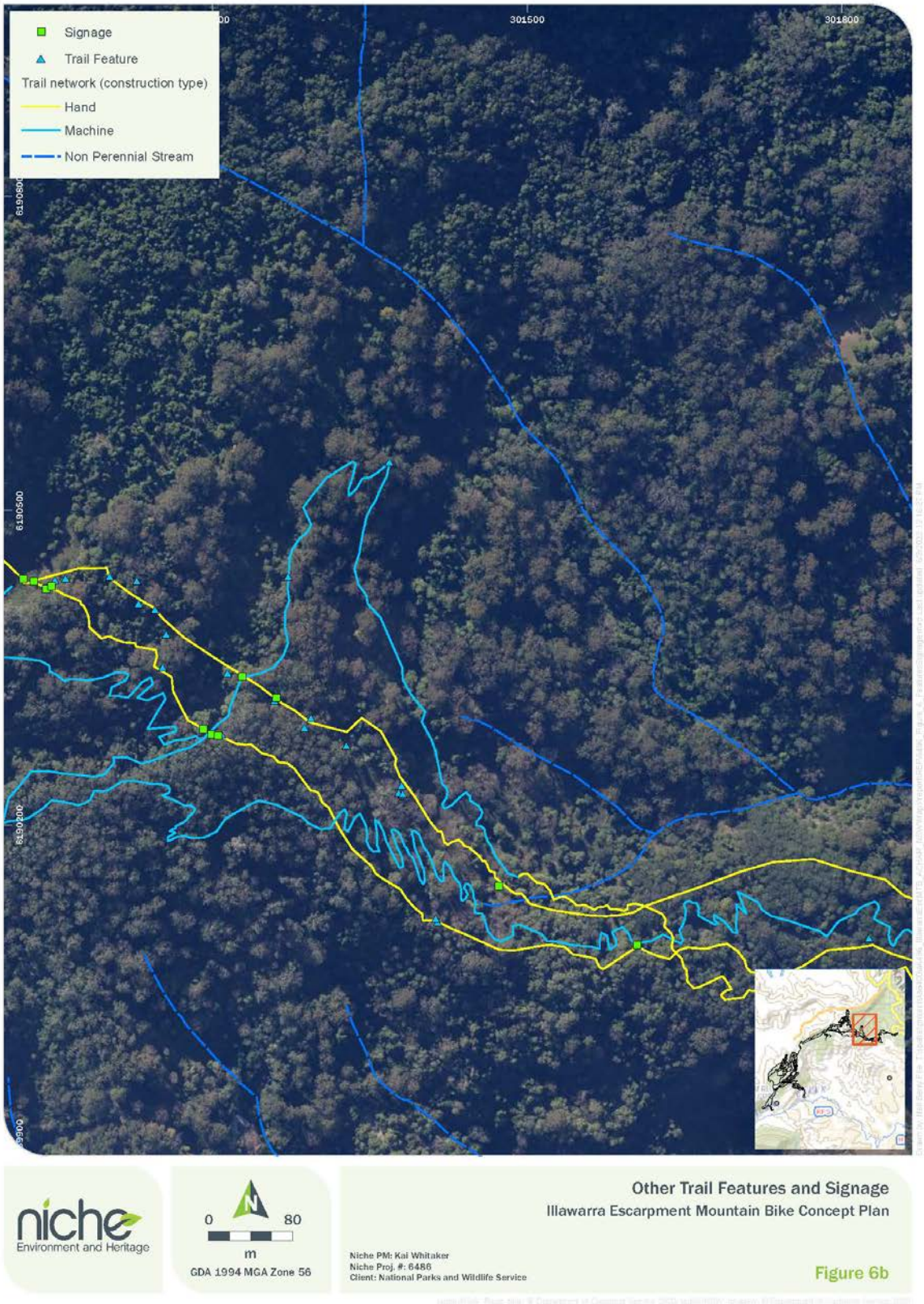


Figure 6b Trail features and signage

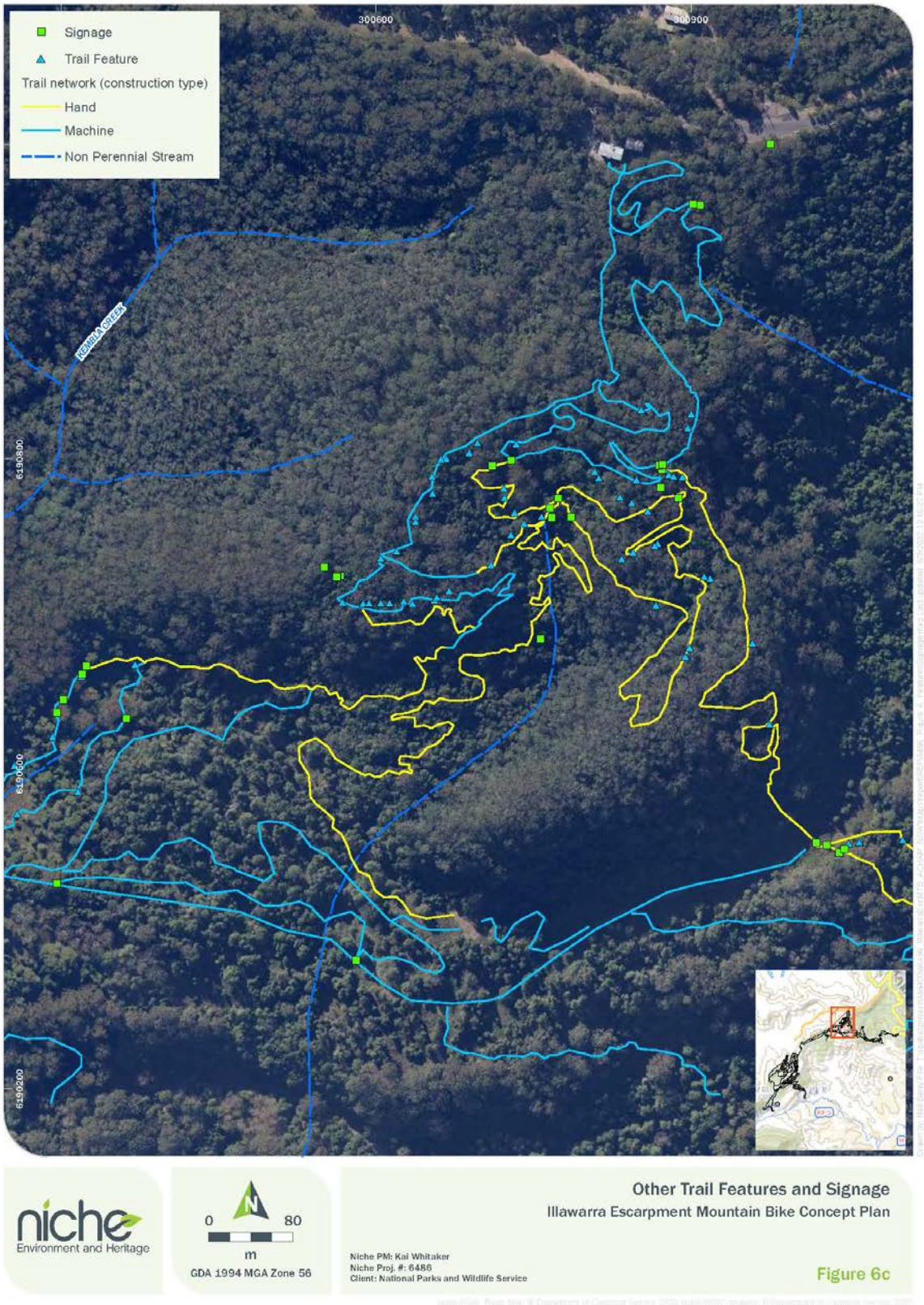


Figure 6c Trail features and signage

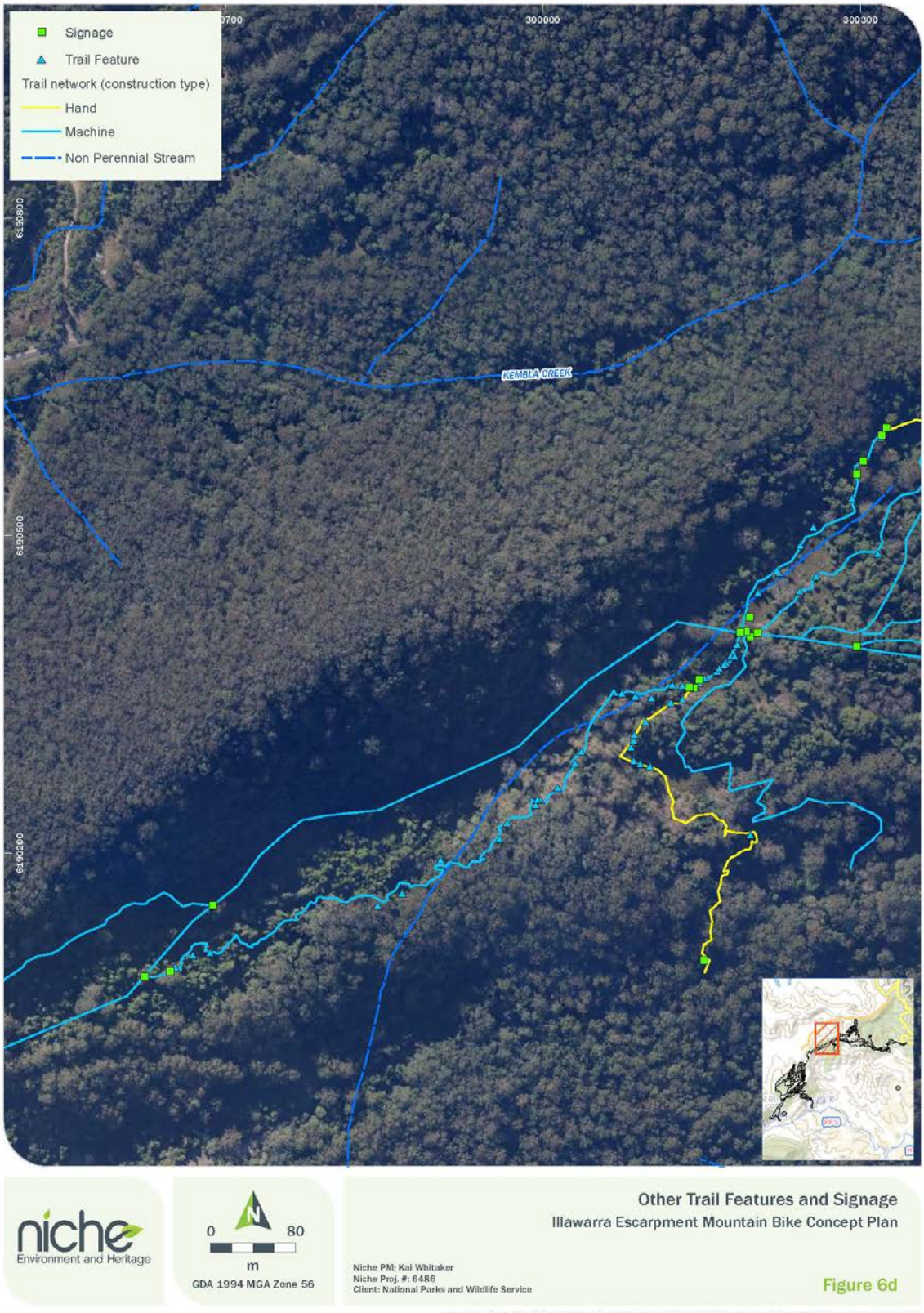


Figure 6d Trail features and signage

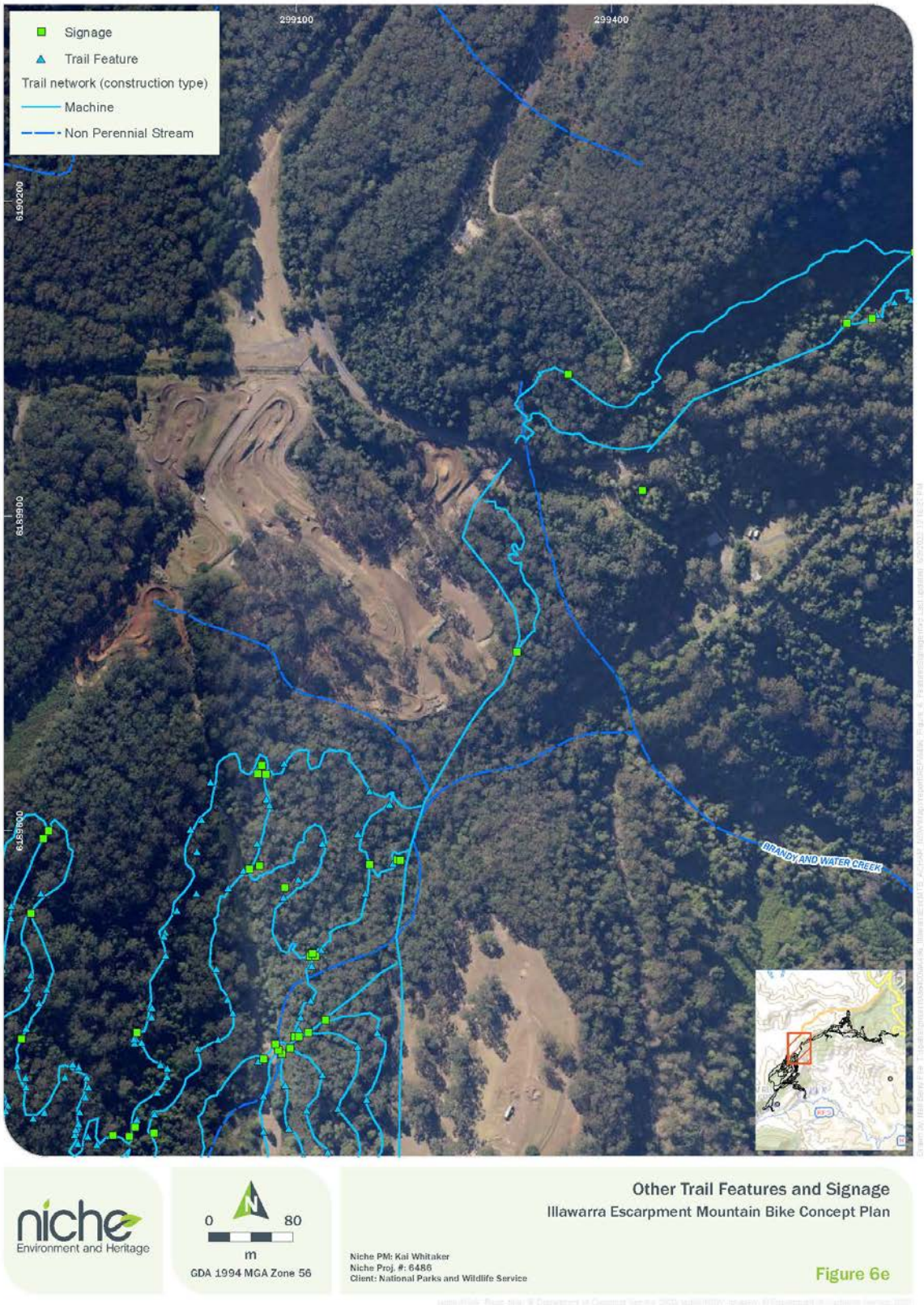


Figure 6e Trail features and signage

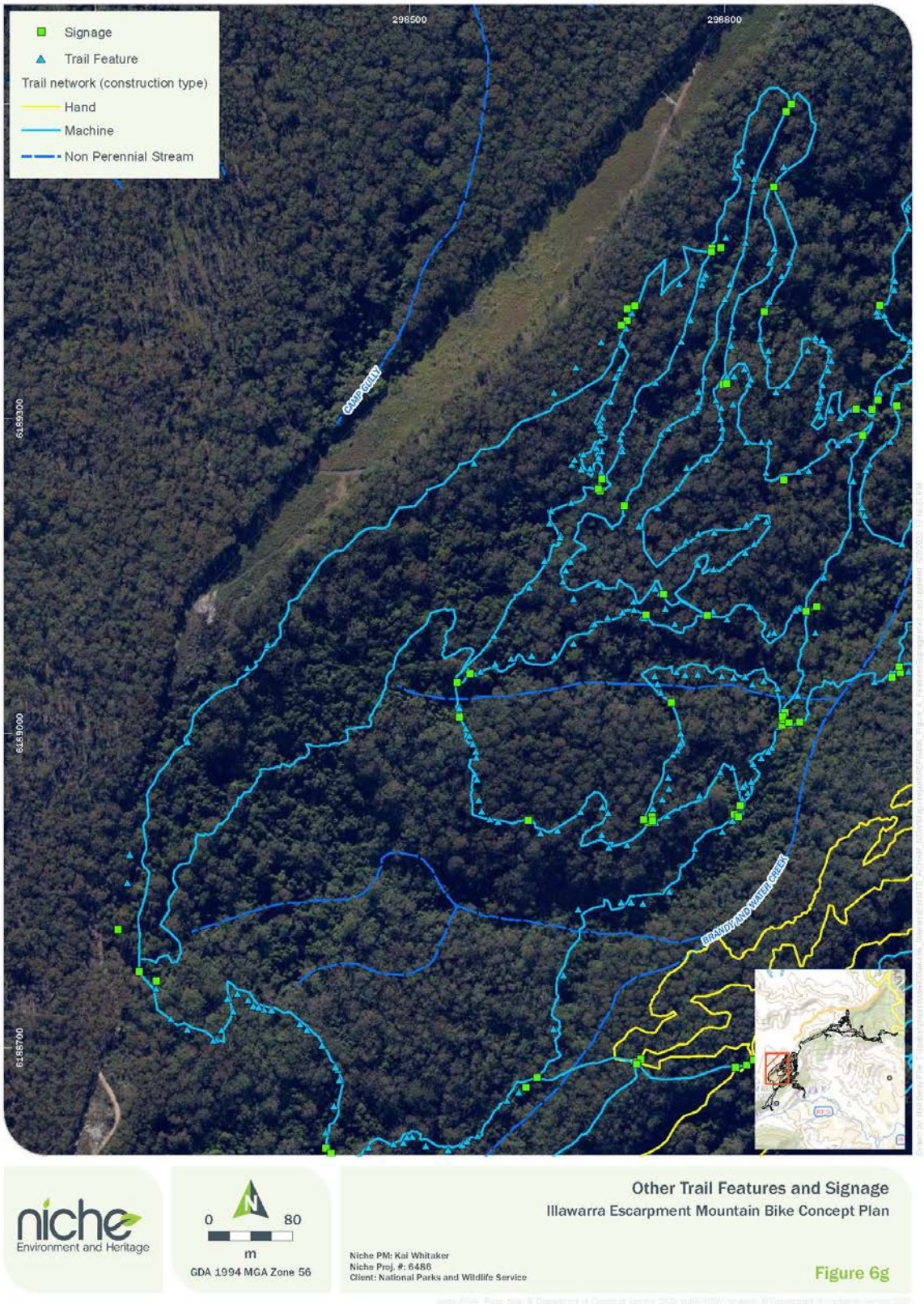


Figure 6f Trail features and signage

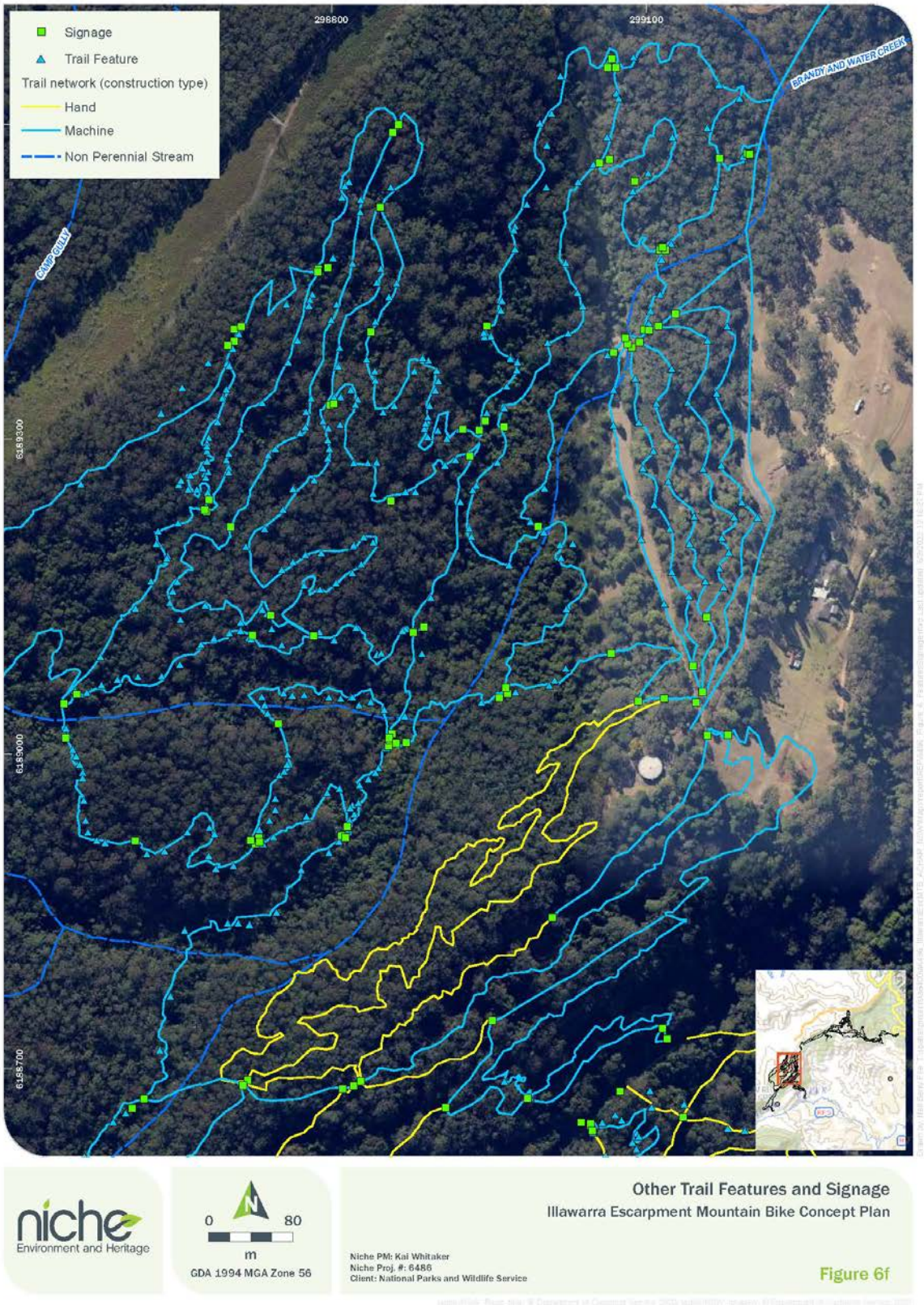


Figure 6g Trail features and signage

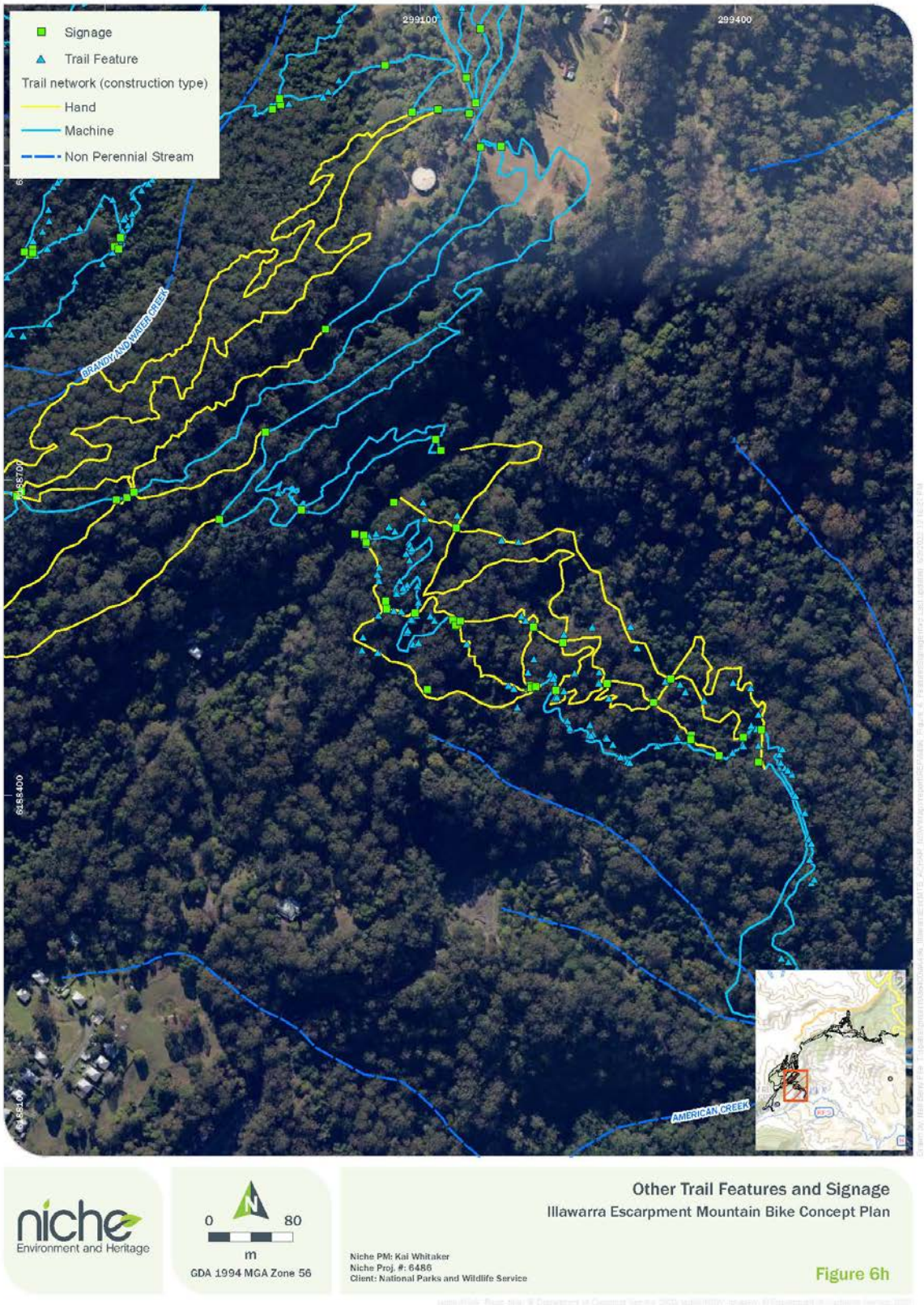


Figure 6h Trail features and signage

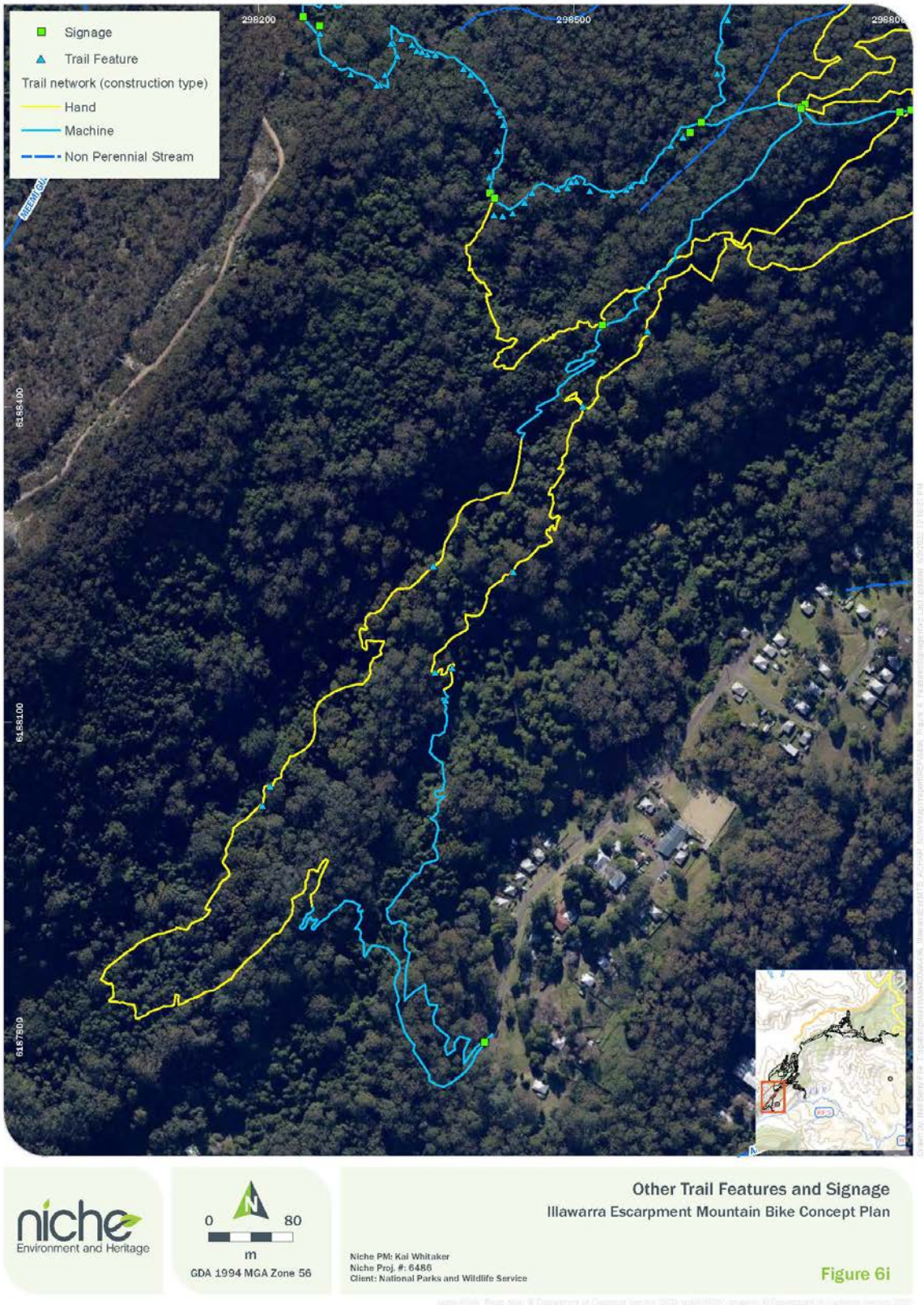


Figure 6i Trail features and signage

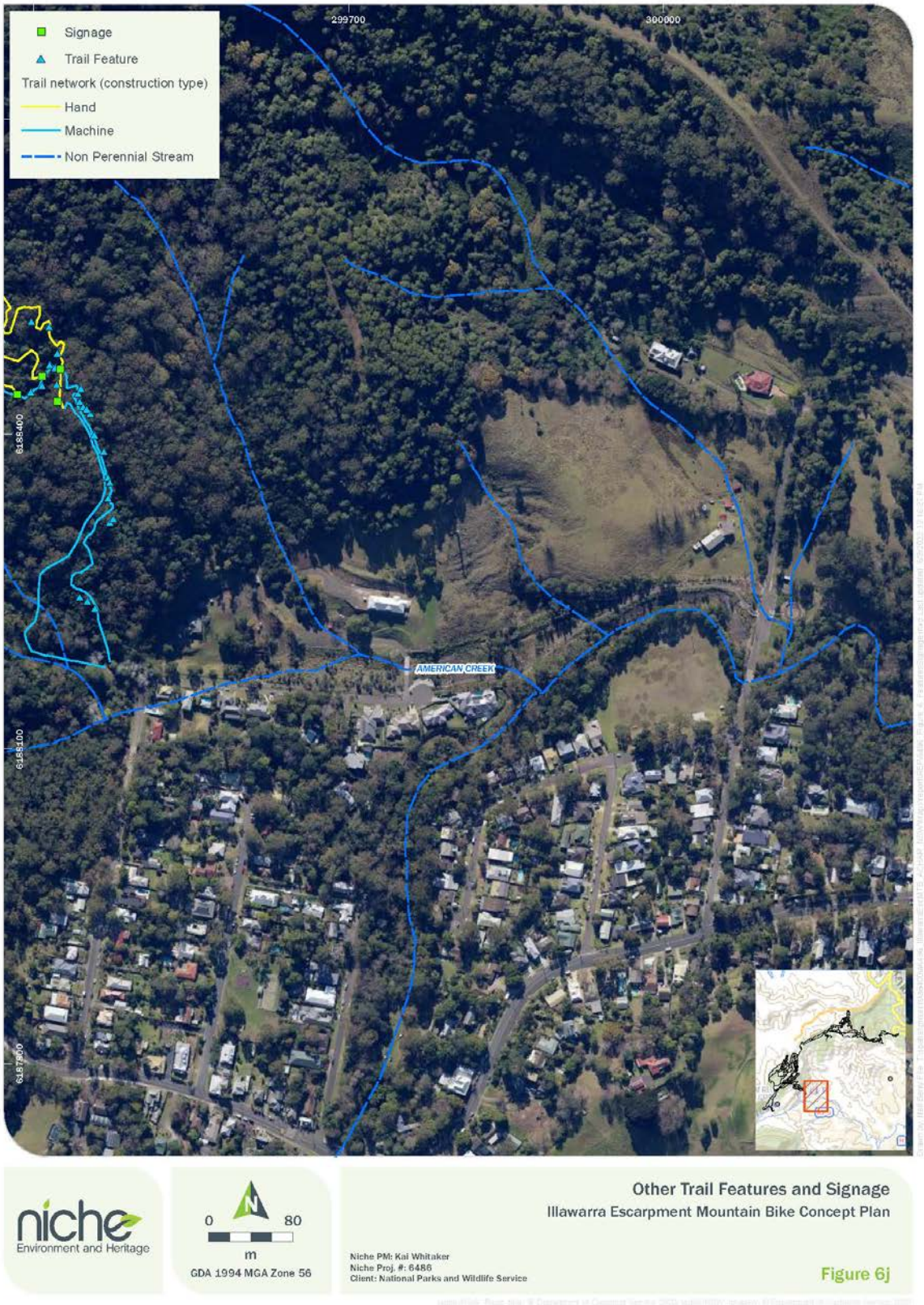


Figure 6j Trail features and signage

Table 8 Summary of proposed construction equipment, notes for safe usage and details of impact

Equipment	Description	Machine-built trails	Hand-built trails	Associated trail staff	Impact / Mitigation
Narrow track excavator	• 1.8 tonne mini-excavator • 1.2 m track width with overall width of 1.5 m	Yes	No	• Licensed operator • 2 trail crew on hand tools	• Trail crew hand finishing and compacting soil with machine to minimise potential for soil erosion • Fuel management – spill kits will be kept with machine at all times, and trail staff fully trained in use • Machine will be thoroughly washed down prior to use on the site to avoid bringing in contaminants
Power carrier	• Petrol engine • Payload capacity 500 kg • Maximum incline 25° with 350 kg payload • Overall dimensions 214 x 65 x 110 cm (LxWxH) • Weight 200 kg	Yes	No	• 1 operator (no licence required)	• Track tread minimises impact to ground surface • Spill kit and secure fuel storage nearby at all times
Plate compactor	• Petrol engine • Weight 56 kg	Yes	Yes	• 1 operator (no licence required)	• Spill kit and secure fuel storage nearby at all times
Brush cutter	• Petrol engine	Yes	Yes	• 1 operator (no licence required)	• Stockpile cut vegetation off-trail for use as brush matting • Clear all trail corridors (new and existing) to a height of 2.4 m • Stockpile or relocate cut timber for reuse in trail construction or habitat creation • Spill kit and secure fuel storage nearby at all times
Chain saw	• Petrol engine	Yes	Yes	• 1 operator (no licence required)	• Stockpile cut vegetation off-trail for use as brush matting • Fallen trees will be cut back between 0.5–

Equipment	Description	Machine-built trails	Hand-built trails	Associated trail staff	Impact / Mitigation
					1 m from the trail alignment • Spill kit and secure fuel storage nearby at all times
Portable generator	• Petrol engine	Yes	Yes		• Spill kit and secure fuel storage nearby at all times
Handheld power tools	• Hilti electrical power tools including angle grinders, drills, hammers • Run on generator power / battery	Yes	Yes	• 1 operator (no licence required)	• Battery tools preferred • Overnight recharge avoids need for generator on trail
Handheld power tools	• Electrical circular saw with vacuum collection attachment • Run on generator power	Yes	Yes	• Trail crew trained in safe and sustainable use	• Avoids spread of fibre-reinforced plastic dust while cutting
Hand tools	• Shovels • McCleod's (rakehoe) • Mattocks • Rock hammers • Rakes • Hand rock tools (chisels, hammers and scutches)	Yes	Yes	• Trail crew trained in safe and sustainable use.	

Table 9 Summary of proposed construction materials

Material type	Description
Rock	In situ rock would be used where available and permissible. Where permission for use of locally found rock is in place, it will be used. Otherwise, approved local sandstone will be imported where required
Structural steel	Hot dip galvanised steel elements with hot dip galvanised fixings
Fibre-reinforced plastic	Site cutting of this material will be undertaken with a vacuum-equipped circular saw to minimise spread of dust
Fall protection mesh	Safety netting for flyovers and bridges
Timber	All timber structure and decking will be H4 treated pine (with FSC compliance)
Powder-coated aluminium signage panels	In accordance with NPWS standard

6.2.4 Receival, storage and on-site management for materials used in construction

Materials handling and storage

Wherever practicable, equipment and materials would be delivered to one or more secure site compounds. Until required on the trail corridor, materials would be stored in this location. A location for the site compound(s) is yet to be determined, however, the site would be located within an existing cleared area, that is, an area where no disturbance would be required.

Material laydown areas would also be located on flat, existing cleared areas throughout the trail network (Figure 4). These sites would be suitable for helicopter delivery of construction materials. Tools and materials will be transferred from the site compound to the active work site or to laydown areas along the trail under construction by hand, electric bike and power carriers. Materials delivered this way will be used as quickly as practicable.

Where possible with minimal impact, vehicles (utes and SUVs) will transport tools and materials to the worksite, or designated areas close by.

Safety and security – public and contractors

Prior to the commencement of work, existing trails would be closed at the entrances and exits. Signage would be installed to notify the public of the works.

At each worksite along the trail alignment, the area will be fenced with temporary construction fencing.

All machinery, tools and associated items will be stored in secure locked toolboxes at strategic locations along the trail corridor, these can be helicopter dropped into location with materials.

All trail construction staff will have appropriate personal protective equipment (PPE), be appropriately trained in the work they are executing, be properly covered by appropriate workers compensation and other relevant insurances, and undertake all work in accordance with an approved safe work method statement.

The contractor will follow all current COVID-safe measures and procedures required by NSW Health and NPWS. The contractor will have an appropriate COVID safety plan in place.

Site compound – trail construction will be staged from a secured compound

The compound(s) will consist of:

- a relocatable site office building with site security, emergency response, meeting and telecommunications facilities
- portable toilet and wash facilities
- a lockable shipping container for tool, fuel and material storage
- staff parking for vehicles
- loading and unloading and stockpile areas for materials
- bin set for general office waste and recycling
- secured fencing for machinery storage.

One or more compounds may be used during trail construction, depending on construction program and construction requirements. Potential locations (subject to construction requirements) include:

- O'Brien's Drift trailhead
- Mount Kembla trailhead at Wollongong Motorcycle Club
- Kembla Village at Mount Kembla Bowling and Recreation Club
- Stafford's Farm.

Following the completion of works, each site compound will be decommissioned, and the sites will be rehabilitated.

6.2.5 Earthworks or site clearing including extent of vegetation to be removed

In this REF and supporting assessments, the proposed new trails have been assessed as 'primary clearing', whilst the existing trails incorporated into the network have been assessed as 'secondary clearing'. No mature trees will be removed during the construction work. The vegetation impacts from material laydown areas would be temporary disturbance (see Attachment C for more details). The construction techniques to be employed require a wider corridor than the operational width of each trail. Table 10 provides a breakdown of disturbance according to each plant community type (PCT) confirmed in the field surveys using the most recent available vegetation mapping for the proposal area: Illawarra PCT Vegetation Map (DPIE 2016) (see Section 2.3 of Attachment C for details on methodology). Table 11 shows the operational footprint of the proposal according to each PCT.

Table 10 Summary of construction impacts to each plant community type (PCT)

Plant community type	Sum of primary clearing (new trails) for construction (ha)	Sum of secondary clearing (existing trails) for construction (ha)	Sum of temporary disturbance from material laydown areas (ha) (Number of zones in italics)	Total impact area (ha)
878 Gully Gum – Sydney Peppermint – Yellow Stringybark moist open forest of coastal escarpments, southern Sydney Basin Bioregion	1.03	0.79	0.0225 (*9 zones*)	1.84
905 Lilly Pilly – Coachwood warm temperate rainforest on moist sheltered slopes and gullies, Sydney Basin Bioregion and South East Corner Bioregion	1.01	0.86	0.045 (*18 zones*)	1.92
906 Lilly Pilly – Sassafras – Stinging Tree subtropical/warm temperate rainforest on moist fertile lowlands, southern Sydney Basin Bioregion	0.43	0.13	0.015 (*6 zones*)	0.58
1156 Silvertop Ash – Red Bloodwood – Sydney Peppermint heathy open forest on moist sandstone plateaux, southern Sydney Basin Bioregion	0.01	Nil	Nil	0.01
1245 Sydney Blue Gum x Bangalay – Lilly Pilly moist forest in gullies and on sheltered slopes, southern Sydney Basin Bioregion	1.88	1.79	0.068 (*27 zones*)	3.74
1300 Whalebone Tree – Native Quince dry subtropical rainforest on dry fertile slopes, southern Sydney Basin Bioregion	Nil	Nil	Nil	Nil
Native vegetation total	**4.36**	**3.57**	**0.15**	**8.1**
Blank Unmapped PCT area inundated with invasive flora species (mapped as cleared NPWS 2002b)	2.2	0.75	0.025 (*10 zones*)	2.9
Grand total	**6.56**	**4.32**	**0.175**	**11**

Table 11 Summary of the operational footprint with regards to plant community type

Plant community type	Operational footprint (ha)
878 Gully Gum – Sydney Peppermint – Yellow Stringybark moist open forest of coastal escarpments, southern Sydney Basin Bioregion	1.12
905 Lilly Pilly – Coachwood warm temperate rainforest on moist sheltered slopes and gullies, Sydney Basin Bioregion and South East Corner Bioregion	1.27
906 Lilly Pilly – Sassafras – Stinging Tree subtropical/warm temperate rainforest on moist fertile lowlands, southern Sydney Basin Bioregion	0.42
1156 Silvertop Ash – Red Bloodwood – Sydney Peppermint heathy open forest on moist sandstone plateaux, southern Sydney Basin Bioregion	0.003
1245 Sydney Blue Gum x Bangalay – Lilly Pilly moist forest in gullies and on sheltered slopes, southern Sydney Basin Bioregion	2.57
1300 Whalebone Tree – Native Quince dry subtropical rainforest on dry fertile slopes, southern Sydney Basin Bioregion	Nil
Blank Unmapped PCT area inundated with invasive flora species (mapped as cleared, NPWS 2002b)	2.0
Grand total	**7.39**

6.2.6 Sustainability measures – including choice of materials and water/energy efficiency

The trail network has been designed to incorporate natural features as trail features (see Attachment H).

Where available and permitted by NPWS, in situ rock material would be used to construct trail features (such as rock armouring).

The trail network has been designed in accordance with IMBA trail standards as set out in the *Australian mountain bike trail guidelines* (MTBA 2019), with the aim of creating a sustainable trail network (Table 12). Design principles for the trail network are aimed at reducing erosion and sedimentation.

Table 12 Design features of the trail network

Design feature	Detail
Fully featured trail network	The trail network is designed to attract riders away from the unsanctioned and unsustainable trails along the Illawarra Escarpment. The trail network is designed to be fully featured to discourage the creation of new unsanctioned trails. The inclusion of advanced trails is particularly important to achieve this.
Interconnected network	The proposed trail network is designed to disperse riders through the network, spreading (rather than concentrating) and thereby reducing the severity of impacts in particular areas.
Linear design	The linear nature of the trails means impact can be minimised and limited in its extent. The trails have been designed to incorporate natural features where possible. The IMBA standards used to design the trail also require a relatively small corridor.

Design feature	Detail
Utilisation of existing trails	Incorporation of existing unsanctioned trails into the network, where suitable, would minimise the requirement for clearing and other environmental disturbances. These trails can be upgraded to meet sustainability and environmental requirements.
Sustainable trail grades	The trails have been designed at a sustainable grade to control rider and surface water runoff speed. Trail grade reversals would be used as drainage features; grade reversals are highly effective and low maintenance features.
Bridge	Used to cross drainage lines. Can be scaled as required. The proposed bridges are minimal in design (Attachment H).
Rock armouring	Used to mitigate erosion. Can be installed as bed-level crossings for small ephemeral drainage lines instead of raised bridges.
Rock-armoured culvert drain	Used to drain water from the trail surface and provide scour protection from drainage.
Waste management	All construction waste produced at the worksite including material offcuts, food scraps, packaging and other debris will be removed daily; or relocated daily to designated lift areas, stored in double layered heli-bags and secured for scheduled removal.
Weather	Daily reference will be made to weather risk and referred to a management process included in the safe work method statement.
Bushfire	Daily reference will be made to bushfire risk and referred to a bushfire management process included in the safe work method statement.
Active maintenance	An active maintenance program would be conducted in order to keep trails clear. Inspections would identify drainage problems causing muddiness or erosion. Such a maintenance program serves to keep riders on the trails and limit environmental impacts within the assessed corridor.
User involvement in maintenance	Mountain bikers can be included in the process of ongoing care and maintenance of the trail network. This helps generate ownership, responsibility and connection with both the land and the trails themselves.
Signage and education material	Signage throughout the network would provide information about the values of the surrounding environment and encourage users to not leave the trails.

6.2.7 Construction timetable and staging and hours of operation

Trail construction would be undertaken between 7:00 am and 5:30 pm on weekdays, and 7:00 am and 12:00 pm on Saturdays. No work will be undertaken on Sundays or public holidays. All activities will be undertaken in accordance with the *Interim construction noise guideline* (DECC 2009b) and the *Draft construction noise guideline* (EPA 2020).

Construction is expected to take place over 18 months.

Construction would be sequenced so that sections of trail are completed before progressing to the next section, following the methodology outlined in Section 6.2.3. Depending on conditions, multiple sections may be worked on simultaneously by different work crews. The sequencing of works would involve depositing materials at laydown areas on a sequential basis, minimising storage times.

6.2.8 Trail maintenance and renewal

Trail maintenance regime

To ensure the proposed trail network has a minimal impact on the environment, and to mitigate the impacts that arise from initial use of new trails, a regular professional maintenance regime is required to be prepared and implemented.

Maintenance impacts and impact mitigation

All work undertaken during the maintenance period will be undertaken to the same operational standards as the original construction. This is to ensure that ongoing impacts to the environment from noise, waste, habitat impact and erosion associated with trail operations are minimised.

Maintenance and replacement schedules are to take into account the life cycle of materials that may harm the environment prior to any obvious signs of decay, for example, fibre-reinforced plastic. These schedules will be incorporated into NPWS asset management systems.

Rehabilitation of unsanctioned trails

There are a number of existing unsanctioned trails within the proposal area that will not be incorporated into the trail network. These unsanctioned trails will be progressively rehabilitated by NPWS.

7. Reasons for the activity and consideration of alternatives

7.1 Objectives and reasons for the proposal

The proposed Illawarra Escarpment Mountain Bike Trail Network aims to provide safe, sustainable recreation for a broad range of mountain bike riders on a variety of trail types. The trail network has been designed with consideration to the physical, environmental, and cultural constraints identified by NPWS and stakeholder groups in response to the *Draft Illawarra Escarpment mountain bike strategy* (NPWS 2018) (refer to Table 13).

The project is likely to increase the number and type of visitors to the proposal area and the surrounding region and therefore increase the enjoyment and appreciation of national parks consistent with the objectives of the NPW Act. The trail network comprises all levels of the International Mountain Bike Association (IMBA) trail gradings, ensuring that the network would accommodate a broad range of rider skills levels.

A key goal of the Illawarra Escarpment Mountain Bike Trail Network is to provide a formal sustainable alternative to the building and use of unsanctioned mountain bike trails along the Illawarra Escarpment, particularly those at nearby Mount Keira. Without proper design features, unsanctioned trails are unsustainable and can cause adverse safety, environmental and cultural impacts.

The design of the proposed trail network considers both existing and new riders, and the future direction that mountain biking will take due to technological advances and the increasing popularity of the activity.

Table 13 Trail network design considerations

Category	Description
Environment	• Utilise existing trail corridors where feasible (Table 3) • Integration of bush regeneration as part of the trail network development • Environmental constraints mapping used to inform initial trail network • Trail corridors verified in-field with NPWS officers • Flexible trail corridors – allow micro-siting of trails to avoid mature trees • Well-designed trail network to keep riders on-trail, avoiding potential off-trail impacts • Trail features designed to remove water from the trail and minimise erosion – mitigation measures (such as rock armouring and raised trail) to be used where required • Extensive desktop mapping and field verification of trail features
Aboriginal cultural heritage	• No trails in network on Mount Keira or Mount Kembla • Access into proposed trail network from the foothills of Mount Keira to minimise unsanctioned riding on Mount Keira • Consultation with Aboriginal community, including extensive site surveys (Attachment A)

Category	Description
Physical constraints	• Fieldwork mapping viable trail corridors • Include a range of categories to accommodate different rider skill levels • Desktop assessment of physical constraints and landscape • Use of hardened trail for sustainability where required • Assessment of direction of travel (mountain bikers)
Land tenure	• Consultation with landholders • Avoiding WaterNSW Metropolitan Special Area – trails within Schedule 1 land have been removed from the proposal
Rider requirements and safety	• Design focus on removing riders from the road • Designed in accordance with IMBA standards • Geotechnical assessment (refer to Attachment F) to confirm trail alignment is at minimal risk of landslide or steep slope impacts. • Designed trail network to be single-use (i.e. cyclists only) to separate riders from walkers • Designed to accommodate a variety of riders, including an adequate volume of advanced trails to discourage future construction of unsanctioned trails • Consultation with Wollongong City Council for road safety • Appropriate signage to inform riders and Illawarra Escarpment SCA visitors • Trail network to meet community needs/expectations • Rerouting or closing existing trails that intersect with pedestrian pathways

7.2 Consideration of alternatives

7.2.1 Alternatives to the proposal

Do nothing

The option to not develop a formalised mountain bike network in the Illawarra Escarpment is considered to be unrealistic and environmentally negligent. There is a demonstrated demand for mountain bike trails within the region. This demand has led to the development of unsanctioned trails, which has resulted in environmental impacts.

The do nothing option would result in increased erosion of the existing trails leading to more environmental impacts. This would also result in ongoing safety concerns and fewer recreational opportunities. The do nothing option is inconsistent with the current PoM.

Close unsanctioned trails

This option would involve closing an extensive array of existing and widely used unsanctioned trails, without providing alternative options for riders. Although this option would allow for the rehabilitation of unsanctioned trails, it is unlikely that any environmental benefits would be sustained. Given the high demand for mountain bike trails in the area, it is likely that new unsanctioned trails would be built. This option is likely to be expensive and resource-intensive, whilst only providing short-term results. Furthermore, this option would most certainly have a negative social impact on mountain bike riders within the local area.

Formalise existing unsanctioned trails

This option would involve only upgrading and formalising suitable existing unsanctioned trails, without developing new trails. This option would allow only existing cleared areas to be utilised, reducing vegetation clearing requirements. However, excluding the creation of new trails would limit the functionality and interconnectivity of the trail network. Furthermore, such a limitation would result in a series of trails that are not commensurate with unsanctioned trails on Mount Keira, which NPWS has committed to closing and rehabilitating.

Aboriginal community members provided strong negative feedback on the *Draft Illawarra Escarpment mountain bike strategy* (NPWS and WCC 2018), particularly regarding unsanctioned trails on Mount Keira. This negative feedback has been reiterated within the Aboriginal cultural heritage assessment (Attachment A) and the cultural values assessment for the proposal (Appendix 4 of Attachment A). Thus, it is not considered appropriate to propose formal mountain biking trails on Mount Keira.

7.2.2 Justification for preferred option

The proposal allows for the closure of unsanctioned trails, whilst providing a fully featured trail network with environmental mitigation measures incorporated into the design. It represents a pragmatic approach in addressing the environmental and cultural impacts of unsanctioned mountain bike trails along the Illawarra Escarpment. The inclusion of new trails within the proposal, including the trails adjacent to Kembla Heights, is considered necessary to design a trail network commensurate with existing unsanctioned trails on Mount Keira, which NPWS have committed to closing and rehabilitating.

The proposal would meet the management directions of the Illawarra Escarpment SCA PoM (refer to Section 3.1 for more detail).

8. Description of the existing environment

8.1 Methods

Determining the existing environment of the proposal area involved the following methods:

- review of relevant literature
- search of government databases for listed natural and cultural heritage matters of conservation significance
- review mapping of vegetation, geology, soils and watercourses
- review of ecology and distribution of species within the bioregion
- conduct field surveys and analysis of results
- advice from the NPWS
- evaluate the likelihood of matters of conservation significance to occur.

This REF is supported by several specialist assessments (see Section 13), which include:

- Aboriginal cultural heritage assessment (Niche Environment and Heritage 2022a at Attachment A)
- cultural values assessment report (Waters Consultancy 2022 at Appendix 4 of Attachment A)
- social impact comment (Element Environment 2022 at Attachment B)
- ecological assessment (Niche Environment and Heritage 2022b at Attachment C)
- historic heritage assessment (Niche Environment and Heritage 2022c at Attachment D)
- statement of heritage impact (Niche Environment and Heritage 2022d at Attachment E)
- geotechnical and landslide risk assessment (GHD 2022 at Attachment F).

8.1.1 Proposal area orientation

Assessment of the trail network has been conducted as part of this REF. Initially, the proposal area was investigated over 3 days between 10 May to 14 May 2021 by:

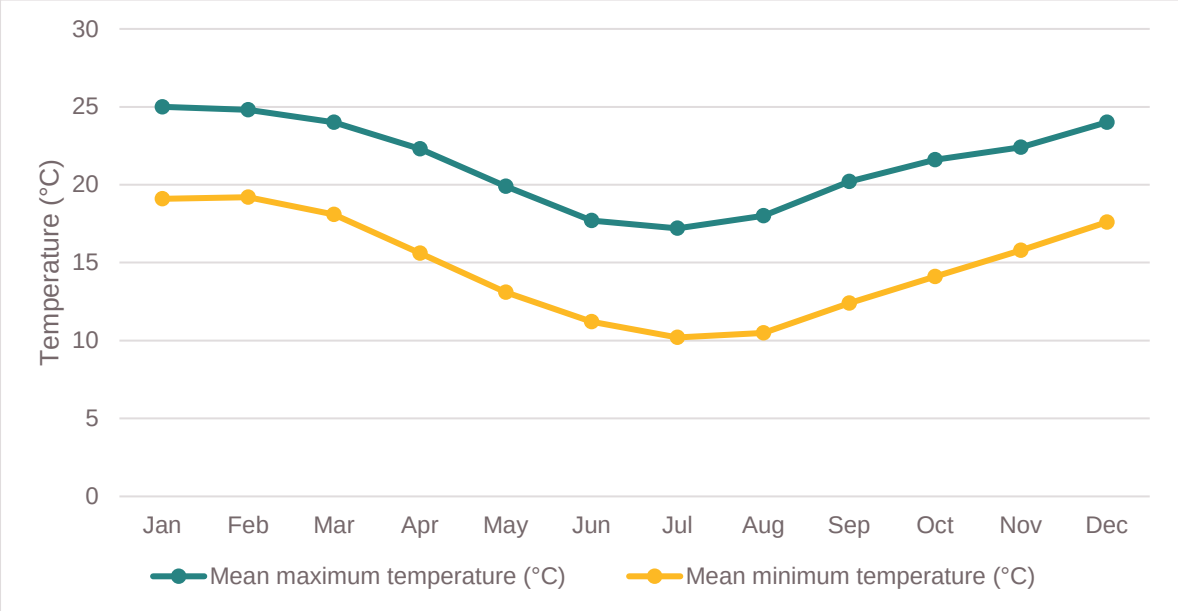
- Niche Environment and Heritage employees – Freya Gordon (Senior Ecologist), Sarah Hart (Ecologist), Kai Whitaker (Environmental Approvals) and Sarah McGuiness (Heritage)
- GHD employees – David Field (Geologist) and Jon Thompson (Senior Geologist)
- NPWS representative escort – Jamie Erskine
- Synergy Trails representative – Adrian Main.

The orientation survey was aimed at traversing the entire network to gain an in-depth understanding of the scope of works and to refine and inform further specialist assessments. The information collected during these 3 days has also been incorporated into the relevant specialist assessments.

The nominated helicopter drop zones and material laydown areas were identified by Synergy Trails during additional site assessments. Further verification of the sites was conducted by Niche Environment and Heritage (see Attachment C).

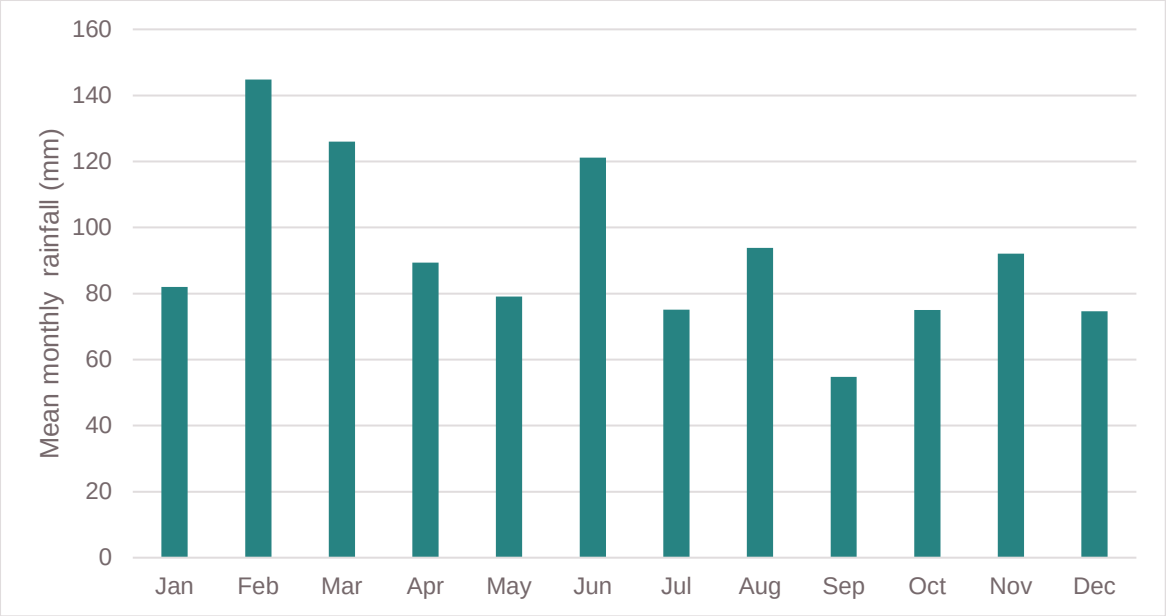
8.2 Climate

The climate in Wollongong is mild, and generally warm and temperate. In Wollongong, the mean annual maximum temperature is 21.4°C; the mean annual minimum temperature is 14.7°C (Graph 1). The mean annual rainfall in Wollongong is 1,127.9 mm (Bellambi automatic weather station [AWS]). Precipitation is the lowest in September, with a mean of 54 mm. In February, the precipitation reaches its peak, with an average of 144.8 mm. If practicable, construction for the project should be scheduled to avoid high rainfall months (February, March and June) (see Graph 2).



Source: Bureau of Meteorology August 2021.

Graph 1 Mean monthly temperatures for Wollongong (Bellambi AWS)



Source: Bureau of Meteorology August 2021.

Graph 2 Mean monthly rainfall for Wollongong (Bellambi AWS)

8.3 Natural values

8.3.1 Geology, geomorphology and topography

The topography the proposal area is situated within is characterised primarily by moderate to steep slopes (>35%), which are key features of the Illawarra Escarpment. There are differences identified within the geology and topography of the proposal area as the proposed trails span 4 different landscapes: Warragamba, Gwynneville, Hawkesbury and Illawarra Escarpment.

The geology of the Warragamba landscape consists primarily of the Narrabeen Group, which is fine-grained lithic sandstone occasionally interbedded with thin shale lenses. Its topography is characterised as narrow convex crests, ridges and steep colluvial side slopes on Narrabeen sandstone. Local reliefs are approximately 80 to 130 m with slopes generally higher than 35%. Tall open forest populates the area (wet sclerophyll forest). This soil landscape generally has slopes that are too steep for rock overhangs suitable for Aboriginal sites. On more moderately inclined slopes from 25 to 30%, Aboriginal sites may be located.

The geology of the Gwynneville landscape is characterised as Illawarra Coal Measures, resistant interbedded quartz lithic sandstone, grey siltstone and claystone, clay and laminite. Its topography consists of undulating to steep hills (3 to 25%). Landform elements include broad to moderate ridges, steeply inclined to moderately inclined foot slopes, and isolated rises on the coastal plain.

The geology of the Illawarra Escarpment landscape, of which a large percentage (>40%) of the proposal area is located, is characterised as Quaternary talus, blocks of sandstone, deep colluvial detritus and soil materials. The topography of the Illawarra Escarpment is mainly steep to very steep slopes (20 to 50%). Large landslips are common and are mostly populated by uncleared tall open forest (wet sclerophyll forest) and closed forest (rainforest). Refer to Attachment F for a detailed landslide assessment.

The Hawksbury landscape is the least prevalent landscape that the new proposed trails span across. The geology of the landscape consists of Hawkesbury sandstone, medium to coarse grained quartz sandstone with minor shale and laminite lenses. The topography is rugged with rolling to very steep hills on Hawkesbury sandstone (>25%). It features narrow crests and ridges, narrow incised valleys and steep side slopes. This soil landscape is archaeologically sensitive as the blocks and weathered scarps provide suitable overhangs to be used for shelter. Within these overhangs there is often suitable surfaces for art, as well as floor space for the accumulation of archaeological deposit.

The proposed trail network has been designed to follow the natural contours of the landscape, reducing potential impacts such as erosion and sedimentation. Advanced Black trails within the network have been designed to utilise steep sections within the proposal area.

Reference material

- Geotechnical and landslide risk assessment (GHD 2022 at Attachment F)
- Figure 7 Geology of the proposal area

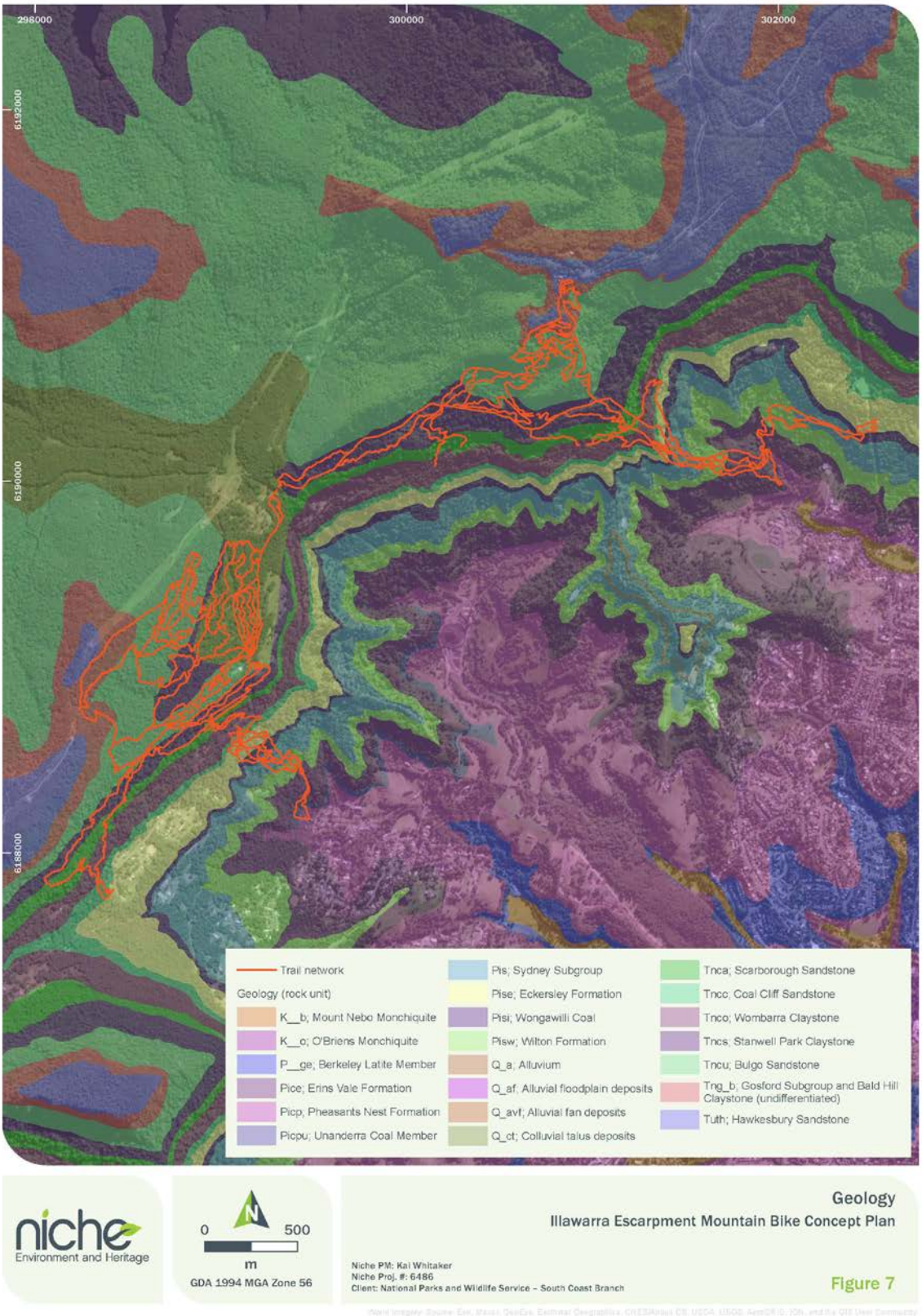


Figure 7 Geology of the proposal area

8.3.2 Soil types and properties (including contamination)

The proposal area spans 4 soil landscapes: Warragamba, Gwynneville, Hawkesbury and Illawarra Escarpment (Figure 8). The soil characteristics of each soil landscape is summarised in Table 14.

Table 14 Soil landscapes within the proposal area

Soil landscape	Characteristics
Warragamba	The Warragamba soil landscape is characterised by dark brown loamy sand, dark reddish-brown clayey sand and pedal clay.
Gwynneville	Soils are generally shallow (50–100 cm) brown podzolic soils and xanthozems on upper slopes, lithosols on simple slopes, and shallow brown earths on mid slopes and lower slopes.
Illawarra Escarpment	Soils consist of deep colluvial soils, red and brown podzolic soils on mid slopes. Siliceous sands occur along drainage lines and lithosols occur where the talus is recent.
Hawkesbury	Soils include lithosols/siliceous sands, earthy sands, yellow earths, yellow and red podzolic soils and siliceous sands.

The soils on the escarpment slopes are derived from the weathered shales and claystone and colluvium from landslides. They are typically nutrient-rich but rated an extreme erosion hazard and prone to mass movement (Hazelton and Tille 1990) owing to the high rainfall and steep gradients. Vegetation and plant roots enhance soil stability on the escarpment slopes, particularly in rainforest communities where the dense root systems are close to the surface. The retention of vegetation is critical to the retention of soils and land stability.

A key focus of the trail network design is erosion minimisation and mitigation. The network has been designed to follow the natural contours of the landscape, where possible, to minimise erosion and reduce drainage line crossings. The trail network is designed to efficiently drain water from the trail surfaces, minimising the potential for the proliferation of rill and gully erosion. Mitigation measures, such as rock armouring and raised trail, will be installed at targeted locations throughout the trail network (Figure 5).

Moist sections of trail are more susceptible to enhanced erosion, trail widening and rutting (Evju et al. 2021). Poorly drained or moist sections of trail may encourage riders to bypass the trail, causing further environmental impacts (Stavi and Yizhaq 2020). Thus, erosion mitigation measures such as trail hardening and raised trail will be focused on moist areas of the network.

Steep sections of trail are also more susceptible to erosion. In these sections, trail design will incorporate trail hardening measures mentioned above. Steep downhill sections will also be designed to control rider speed, which also serves to slow surface runoff.

The monitoring and maintenance of the trail network within the 12 months following construction will be particularly important to ensure the effectiveness of erosion mitigation measures, as the trail surface hardens due to compaction. During this period, additional resources such as rock or timber may be required to improve sections of trail.

Reference material

- Figure 8 Soils and hydrology of the proposal area
- Geotechnical assessment (GHD 2022 at Attachment F)

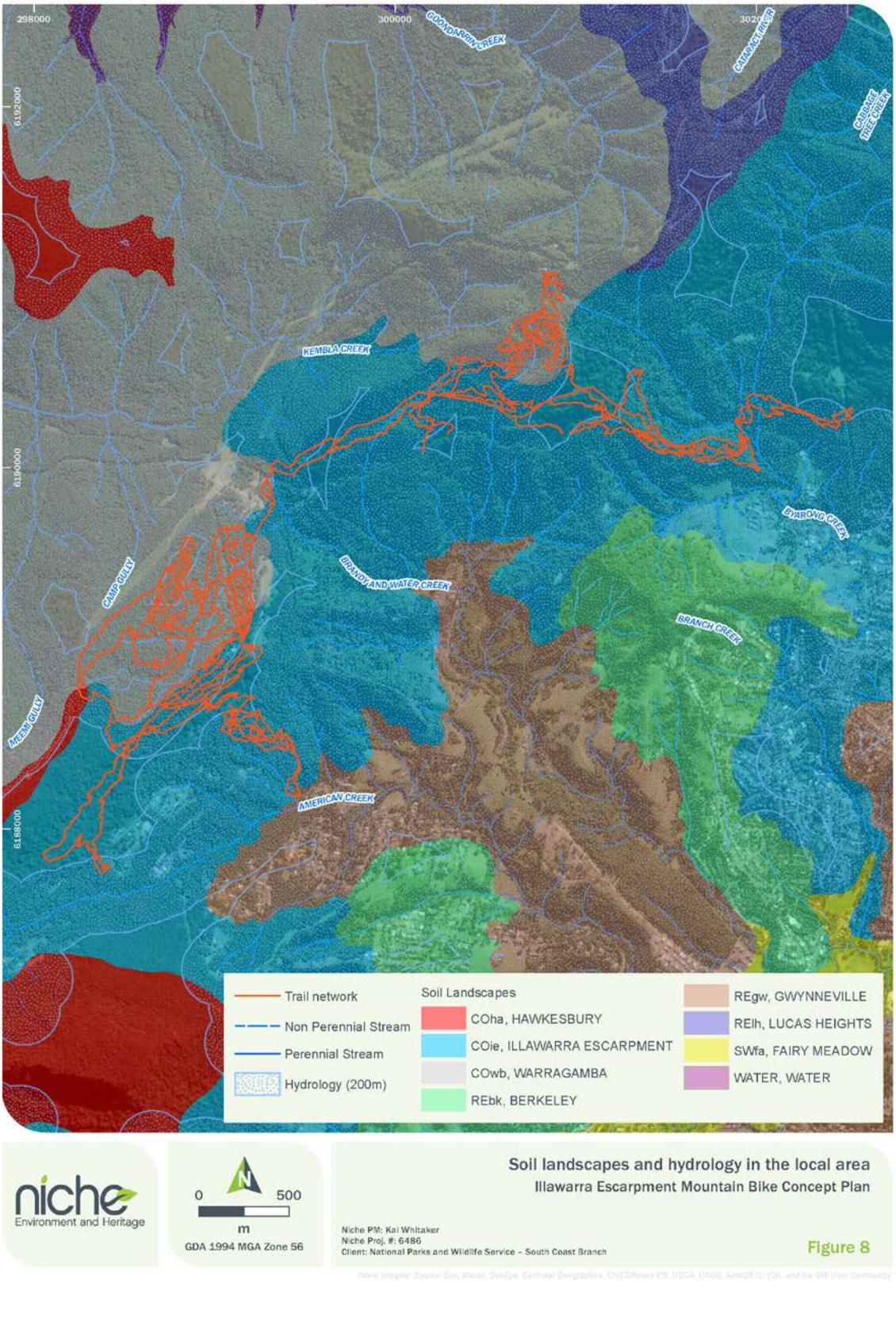


Figure 8 **Soils and hydrology of the proposal area**

8.3.3 Watercourses, waterbodies and wetlands (including their catchment values)

Major waterways (3rd order and higher) in the proposal area catchment include Byarong Creek, American Creek, and Brandy and Water Creek. Within the proposed trail network, a total of 56 watercourse crossings were identified. These crossings have been assessed for consideration of erosion controls and fauna habitat (including aquatic habitat) as part of the project (see Section 3.4 of the ecological assessment at Attachment C).

The proposed trail crossings are located on mostly 1st and 2nd order watercourses, which provided either little aquatic habitat (consisting of shallow pools) or were mostly dry at the time of the survey. These ephemeral watercourses are suitable for erosion control measures and most do not require culvert waterway crossings. Most of these crossings would consist of bed-level rock-armoured crossings or raised trail bridges (see Attachment H).

There are 5 locations where the proposed trail crosses a 3rd order stream (tributaries of American Creek and Byarong Creek), which are classed by the FM Act as key fish habitat and Class 2 – moderate key fish habitat for fish passage. In accordance with DPI guidelines (DPI 2013), a suitable crossing for these locations could include a bridge, arch structure or culvert. The 2 crossings along American Creek are on existing access paths outside of NPWS land. Currently, works are not proposed for these American Creek crossings. The 3 crossings over 3rd order sections of Byarong Creek would require construction of a small bridge to cross the creek (see Attachment H for detailed design). Bridge designs for the proposal are based on the designs outlined in Attachment H. Differences in bridge design relate to the size and scale of the structure, whilst the structures remain effectively the same. Bridge choices for each crossing would be finalised during the ground truthing and detailed design phase of the proposal.

All 3rd order sections of the creeks were flowing at the time of the survey, however, fish passage was limited as there were either dry sections fed by smaller tributaries or the water was flowing rapidly along a steep gradient.

For the installation of bridges over 3rd order streams, environmental safeguards (e.g. silt curtains, sediment fences, booms) are to be installed consistent with *Managing urban stormwater: soils and construction* (4th edition Landcom 2004, also known as the ‘blue book’) to ensure that there is no escape of turbid plumes into the adjacent aquatic environment.

Reference material

- Ecological assessment (Niche Environment and Heritage 2021b at Attachment C)
- Figure 8 Soils and hydrology of the proposal area

8.3.4 Coasts and estuaries

The proposal area spans an ecological transition zone near Mount Keira and Mount Kembla.

The zone contains the northern or southern distributional limits of many coastal plant communities and wildlife species (NPWS 2002a).

Although the proposal area is located within the Illawarra coastal region, coastal processes and estuaries are not relevant to the proposal area and are not considered in this REF.

8.3.5 Areas of outstanding biodiversity value or critical habitat

Areas of outstanding biodiversity value and critical habitat are declared under both the BC Act and EPBC Act. No critical habitat or areas of outstanding biodiversity value are relevant to the proposal area and would not be affected by the project.

8.3.6 Threatened ecological communities

There are 6 different plant community types (PCTs) that intersect with the proposal area. See Figure 9a–j. Each of the maps in Figure 9a–j show the PCTs for a different section of the proposal area, running from east to west. Two of these, PCTs 906 and 1300, comprise the threatened ecological community (TEC) Illawarra Subtropical Rainforest in the Sydney Basin Bioregion.

Approximately 0.361 ha of the Illawarra Subtropical Rainforest TEC intersects with the total construction footprint trail network (Table 10); and 0.27 ha of the operational footprint (Table 11).

This vegetation is considered part of the Illawarra Subtropical Rainforest TEC (see Figure 10), which is listed as endangered under the BC Act and forms part of Illawarra-Shoalhaven Subtropical Rainforest of the Sydney Basin Bioregion listed under the EPBC Act as critically endangered. PCTs 906 and 1300, which align with the both the state and Commonwealth listed TECs, would be directly impacted as a result of the project.

Where feasible, existing unsanctioned trails have been incorporated into the trail network. These trails would require ‘secondary clearing’ and have been utilised to limit the impact on areas of mature native vegetation. The proposed new trails would require ‘primary clearing’ within mature native vegetation, would generally require a construction clearing width between 0.9 m and 1.5 m, depending on the trail category (see Table 5). Only Trail 59 (two-way) would require a 2 m clearing width for a length of 61 m. The canopy layer would not be removed, and only the immediate groundcover and mid storey/shrub-layer would be affected.

Thurston and Reader (2001) showed that the impacts from both hikers and mountain bikers were spatially confined to the centreline of trails.

Table 15 Summary of plant community types (PCTs) and threatened ecological communities within the proposal area

PCT name	PCT #	Threatened ecological community	BC Act	EPBC Act	Extent within proposal area (ha)
Gully Gum – Sydney Peppermint – Yellow Stringybark moist open forest of coastal escarpments, southern Sydney Basin Bioregion	878	N/A	–	–	75.73
Lilly Pilly – Coachwood warm temperate rainforest on moist sheltered slopes and gullies, Sydney Basin Bioregion and South East Corner Bioregion	905	N/A	–	–	92.11
Lilly Pilly – Sassafras – Stinging Tree subtropical/warm temperate rainforest on moist	906	Illawarra Subtropical Rainforest in the	E	CE	44.74

PCT name	PCT #	Threatened ecological community	BC Act	EPBC Act	Extent within proposal area (ha)
fertile lowlands, southern Sydney Basin Bioregion		Sydney Basin Bioregion			
Silvertop Ash – Red Bloodwood – Sydney Peppermint heathy open forest on moist sandstone plateaux, southern Sydney Basin Bioregion	1156	N/A	–	–	5.97
Sydney Blue Gum x Bangalay – Lilly Pilly moist forest in gullies and on sheltered slopes, southern Sydney Basin Bioregion	1245	N/A	–	–	229.53
Whalebone Tree – Native Quince dry subtropical rainforest on dry fertile slopes, southern Sydney Basin Bioregion	1300	Illawarra Subtropical Rainforest in the Sydney Basin Bioregion	E	CE	0.048
Weeds and exotics	–	N/A	–	–	0.52

CE = critically endangered, E = endangered.

Reference material

- Ecological assessment (Niche Environment and Heritage 2021b at Attachment C)
  - see also ‘Appendix 1 – Likelihood of occurrence table’ in Attachment C
- Figure 9a–j Vegetation (plant community types) within the proposal area
- Figure 10 Threatened ecological communities in the proposal area

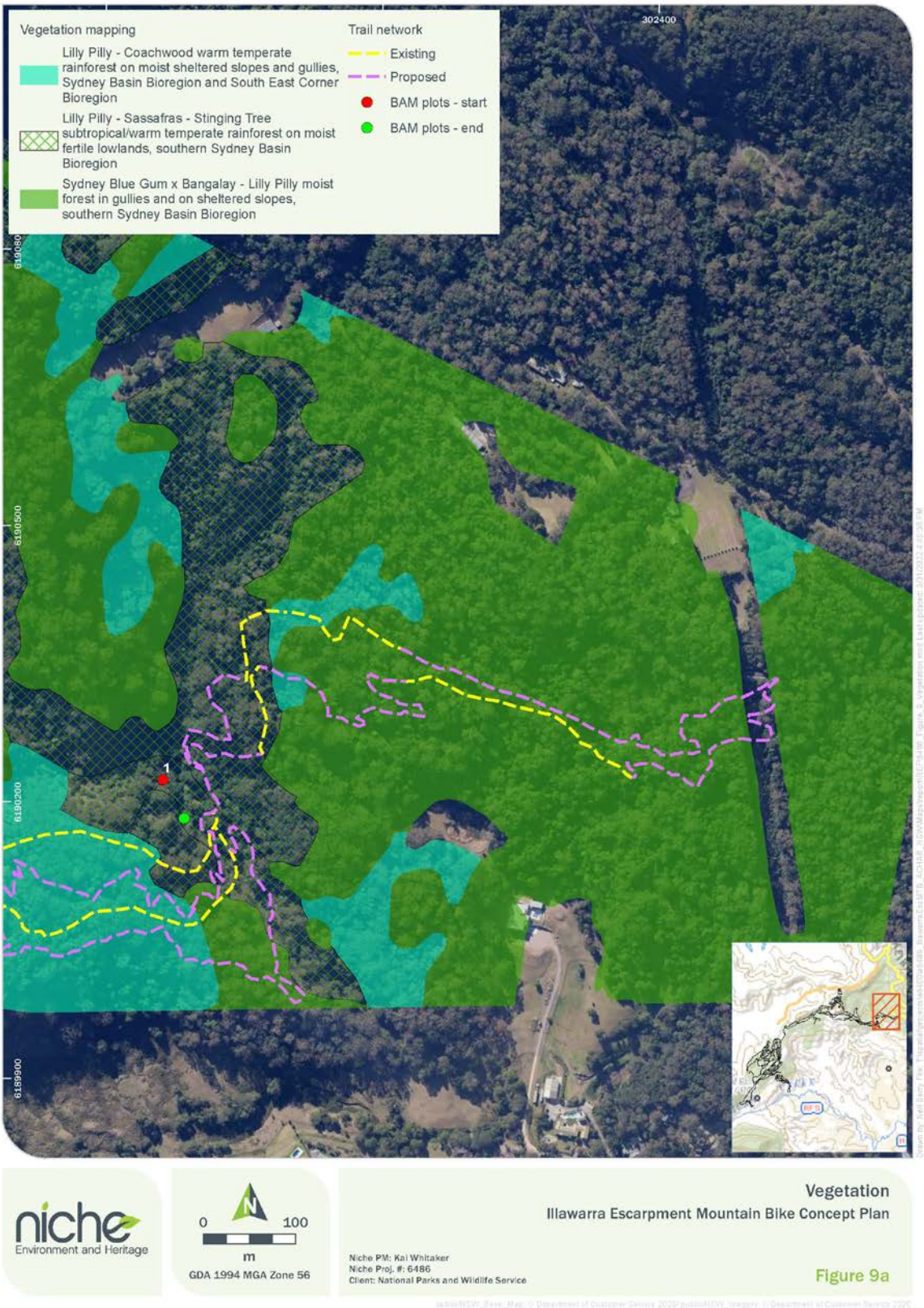


Figure 9a Vegetation (plant community types) within the proposal area

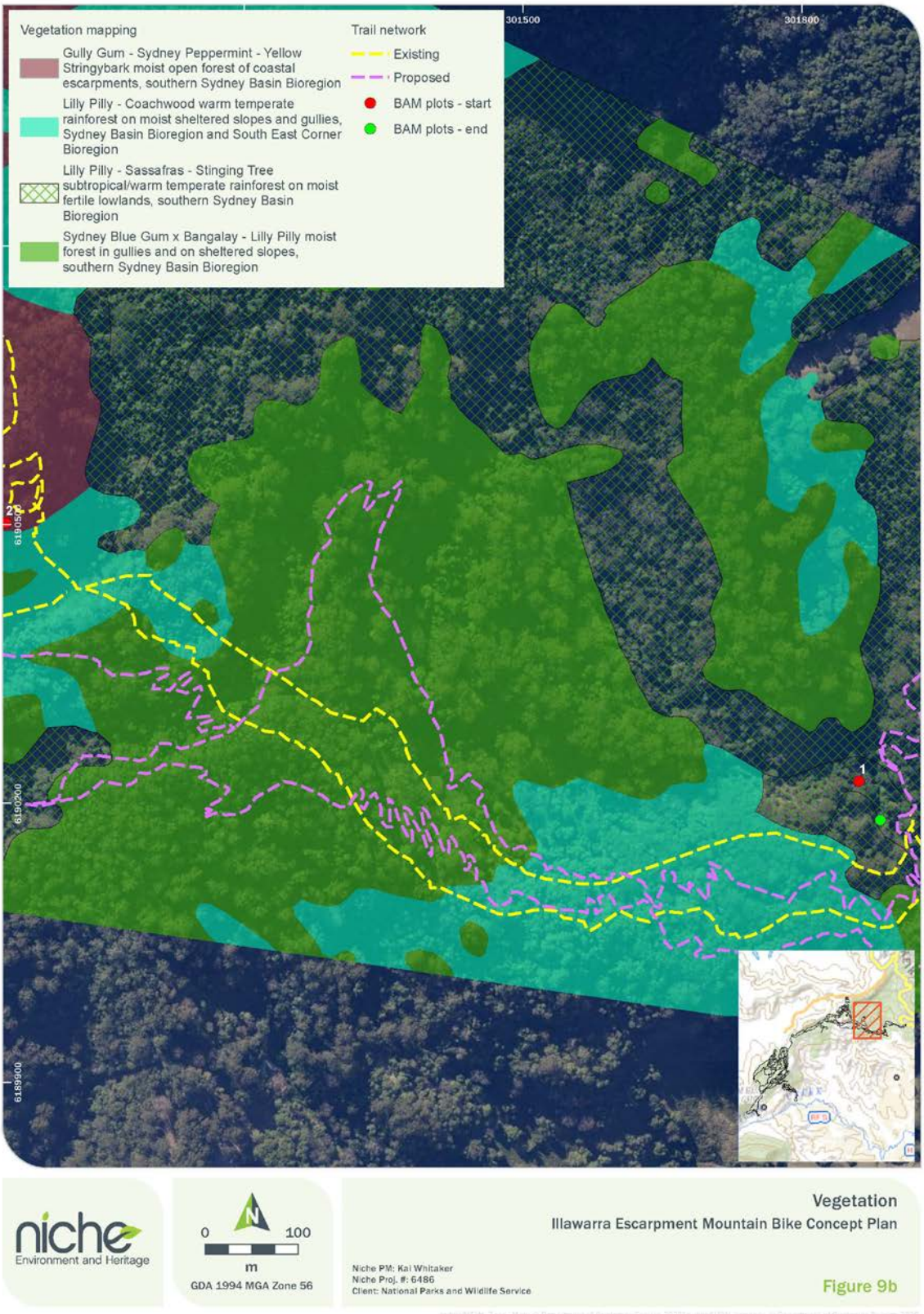


Figure 9b Vegetation (plant community types) within the proposal area

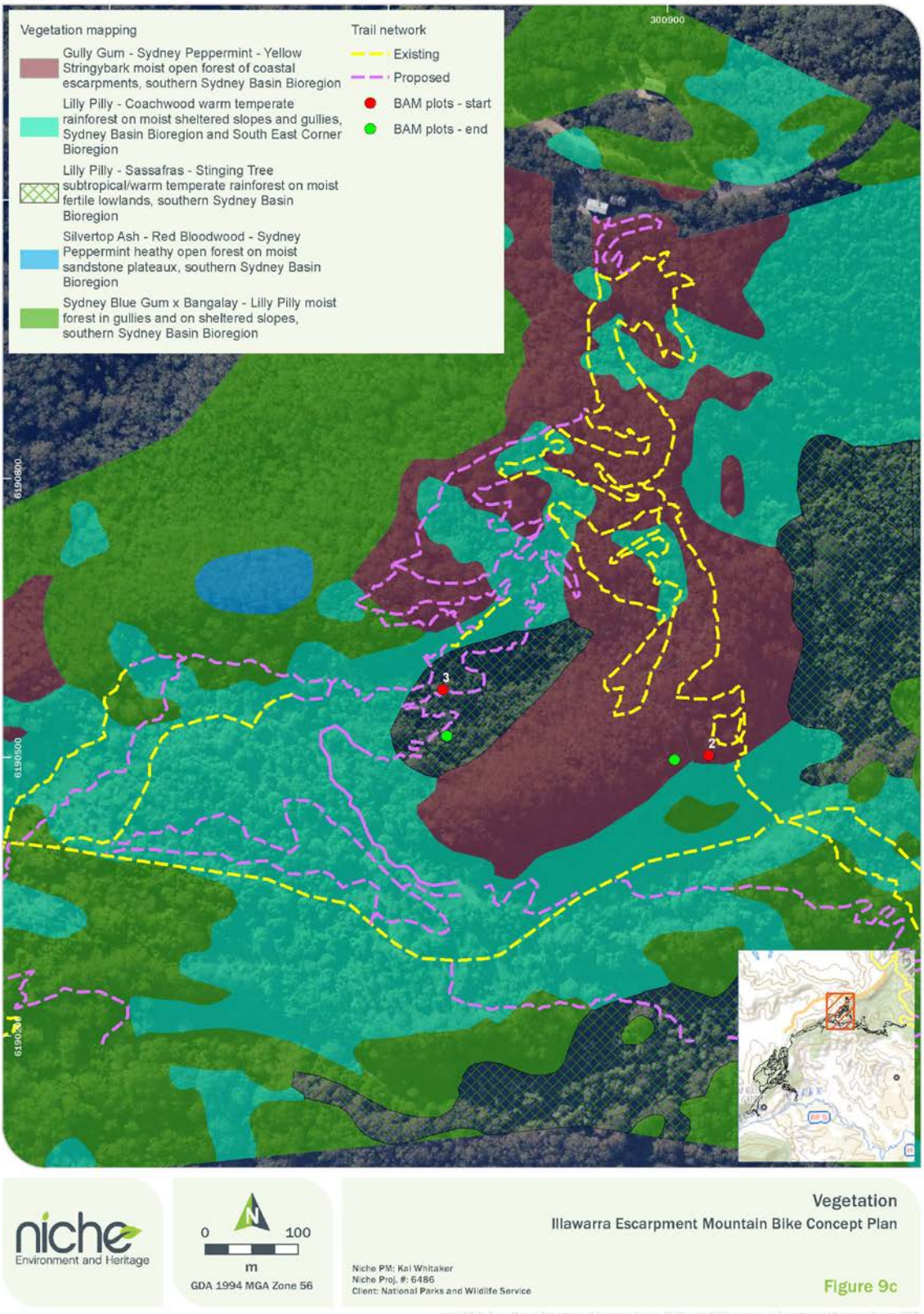


Figure 9c Vegetation (plant community types) within the proposal area

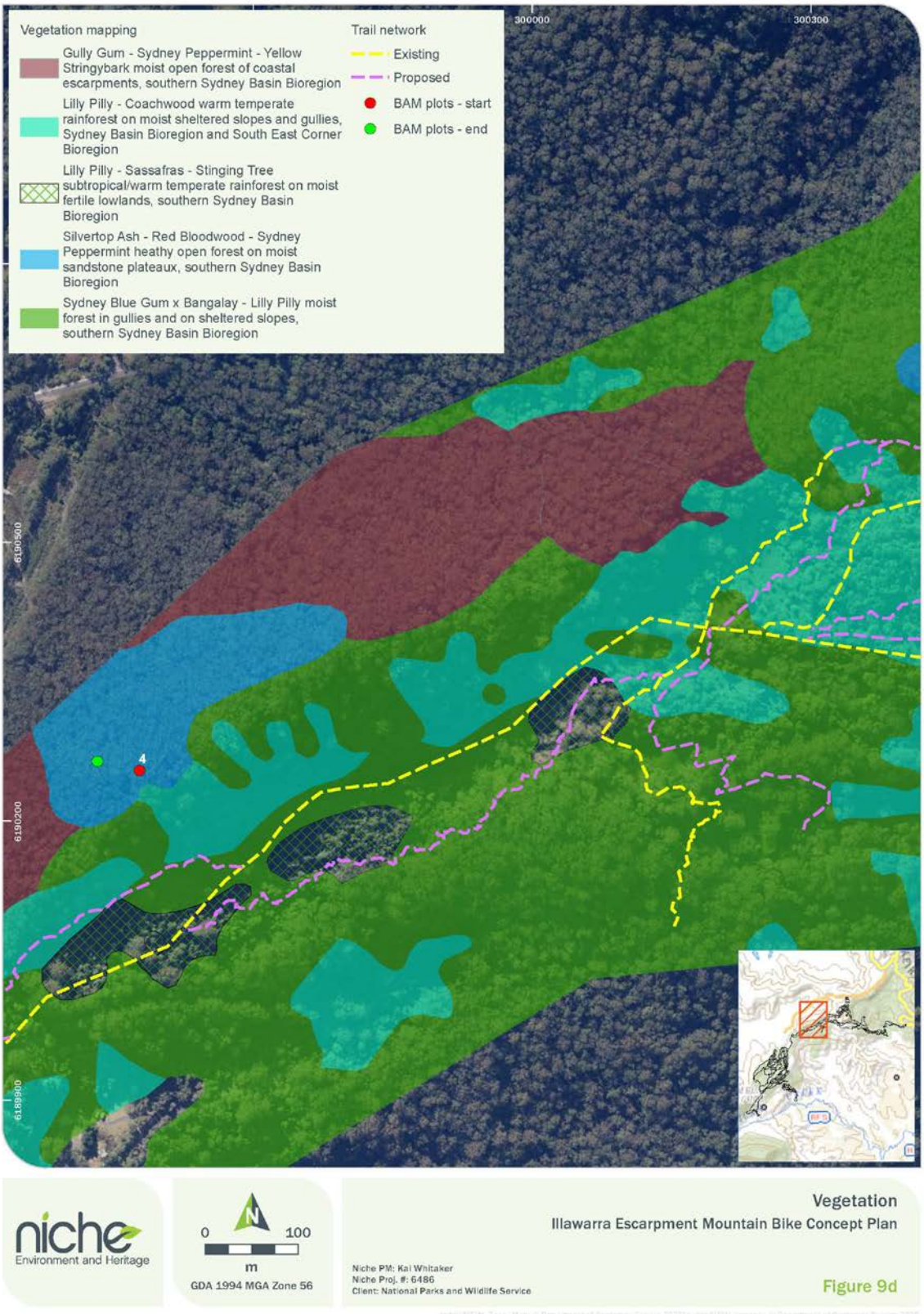


Figure 9d Vegetation (plant community types) within the proposal area

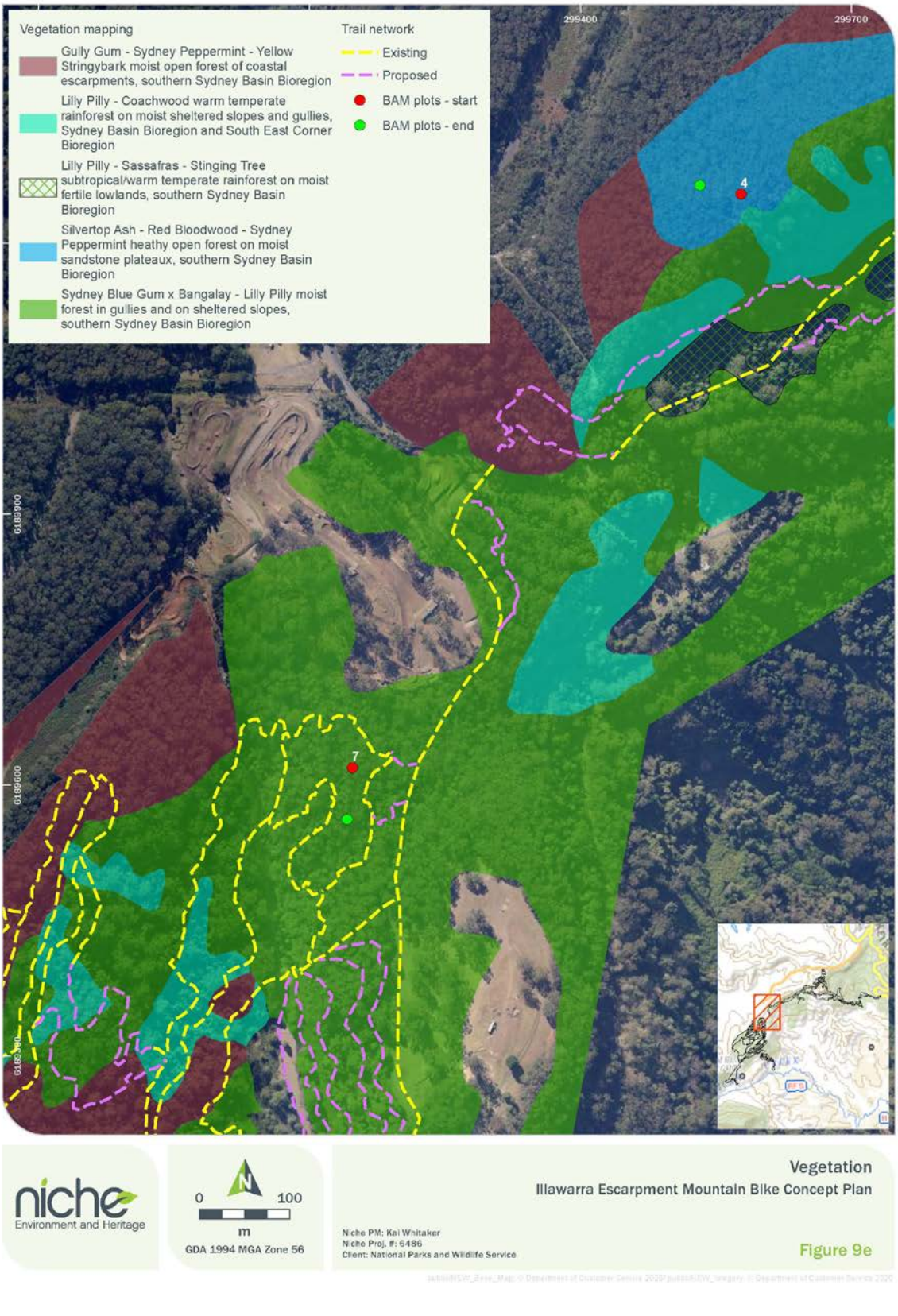


Figure 9e Vegetation (plant community types) within the proposal area

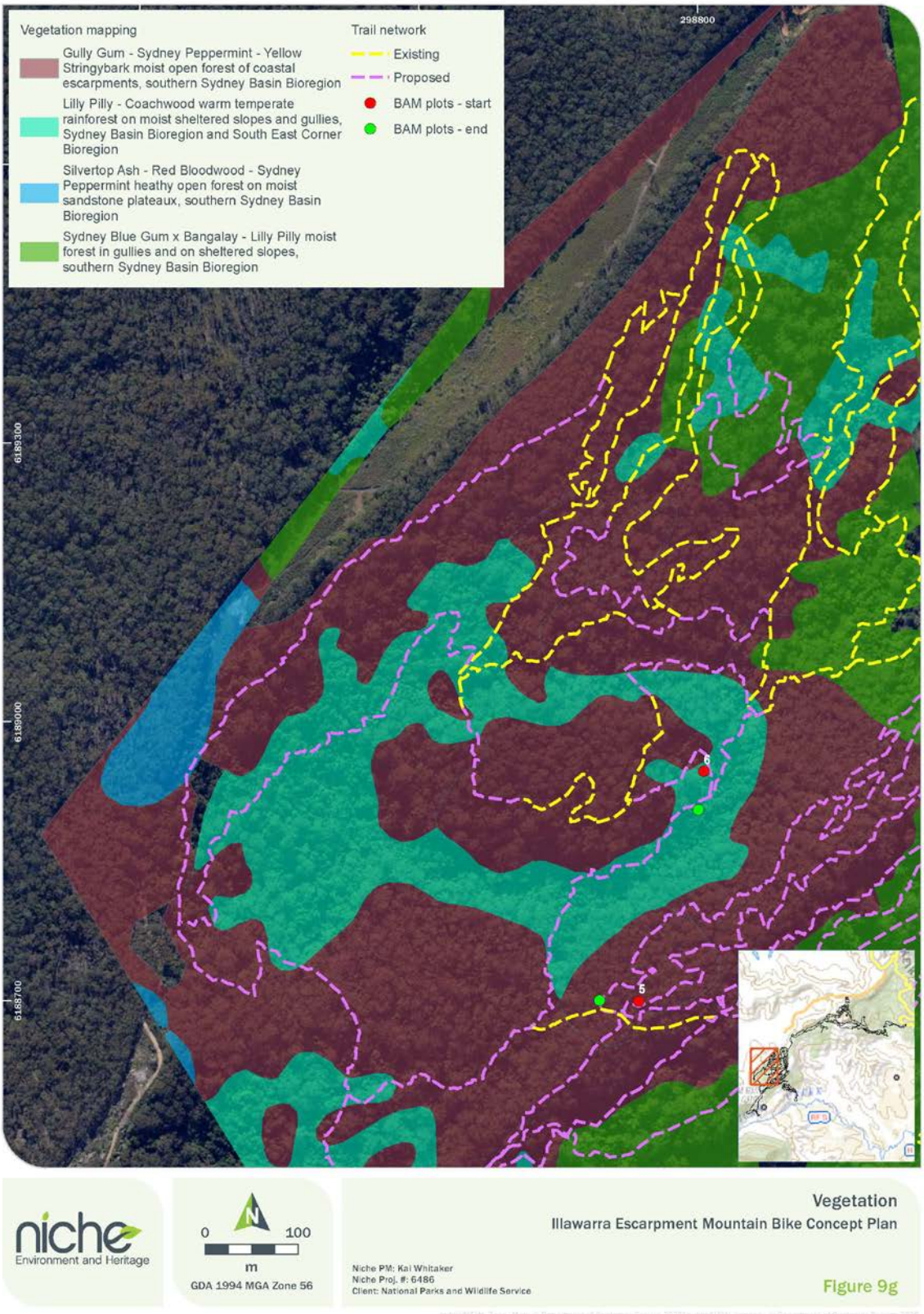


Figure 9f Vegetation (plant community types) within the proposal area

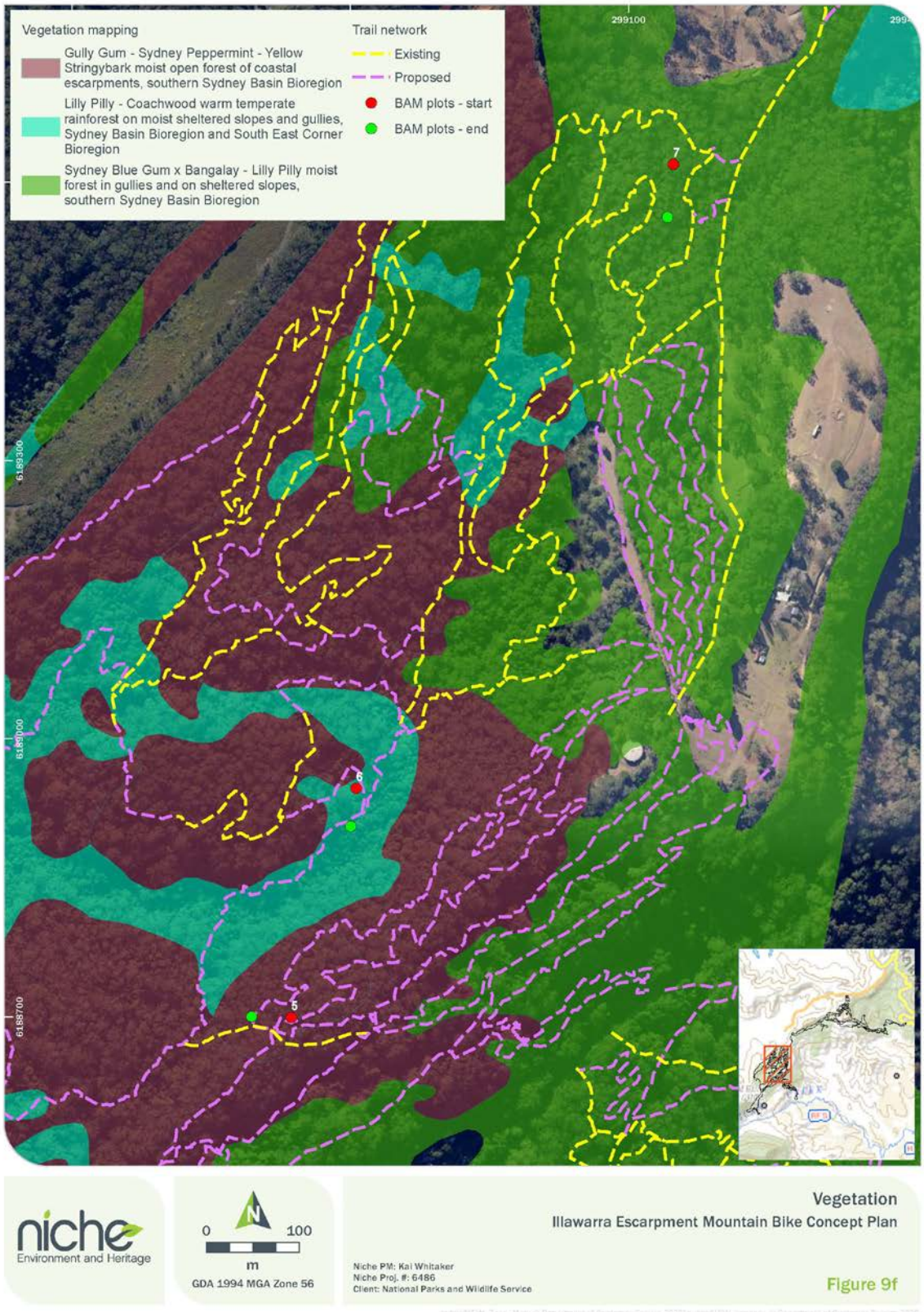


Figure 9g Vegetation (plant community types) within the proposal area

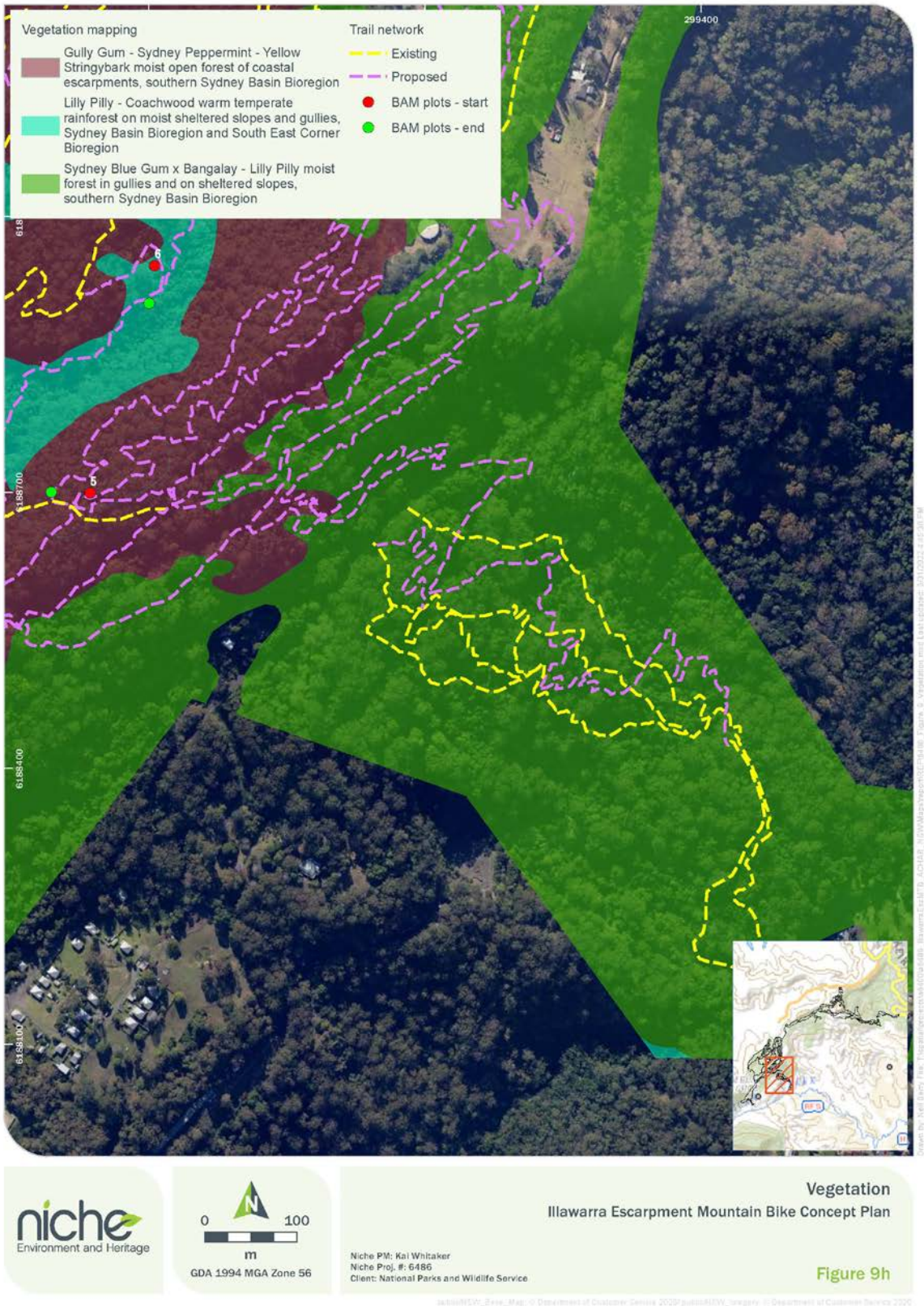


Figure 9h Vegetation (plant community types) within the proposal area

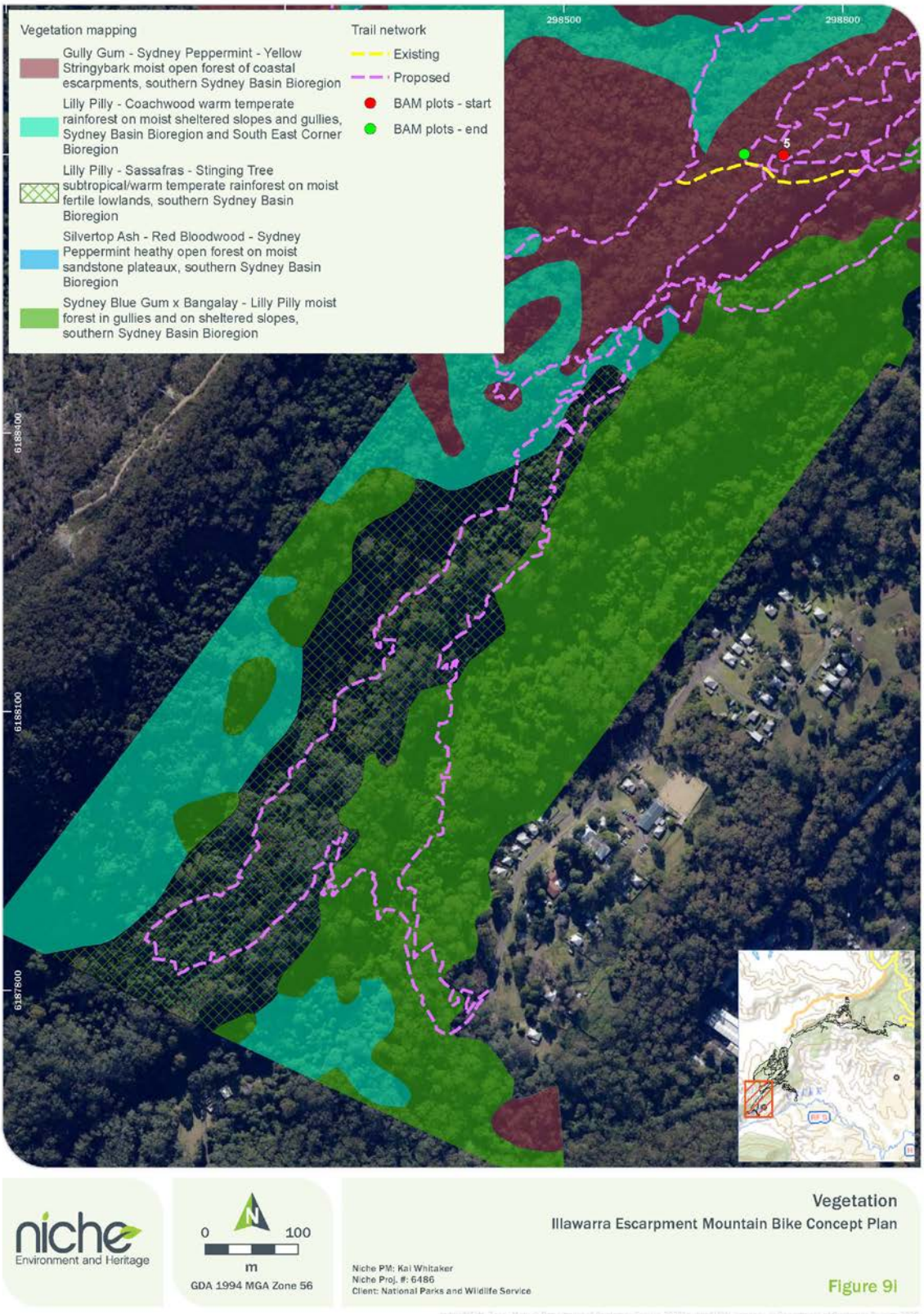


Figure 9i Vegetation (plant community types) within the proposal area

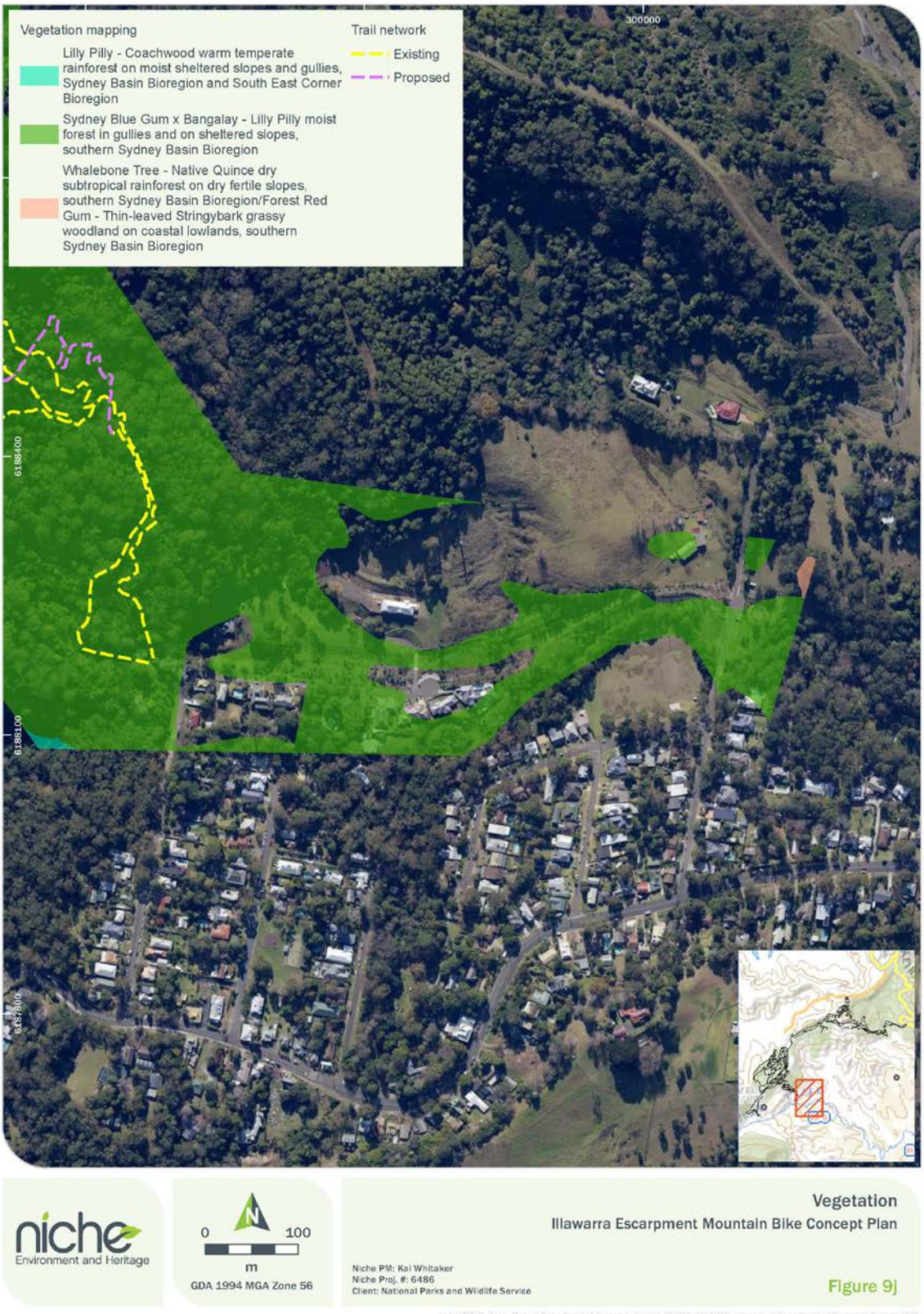


Figure 9j Vegetation (plant community types) within the proposal area

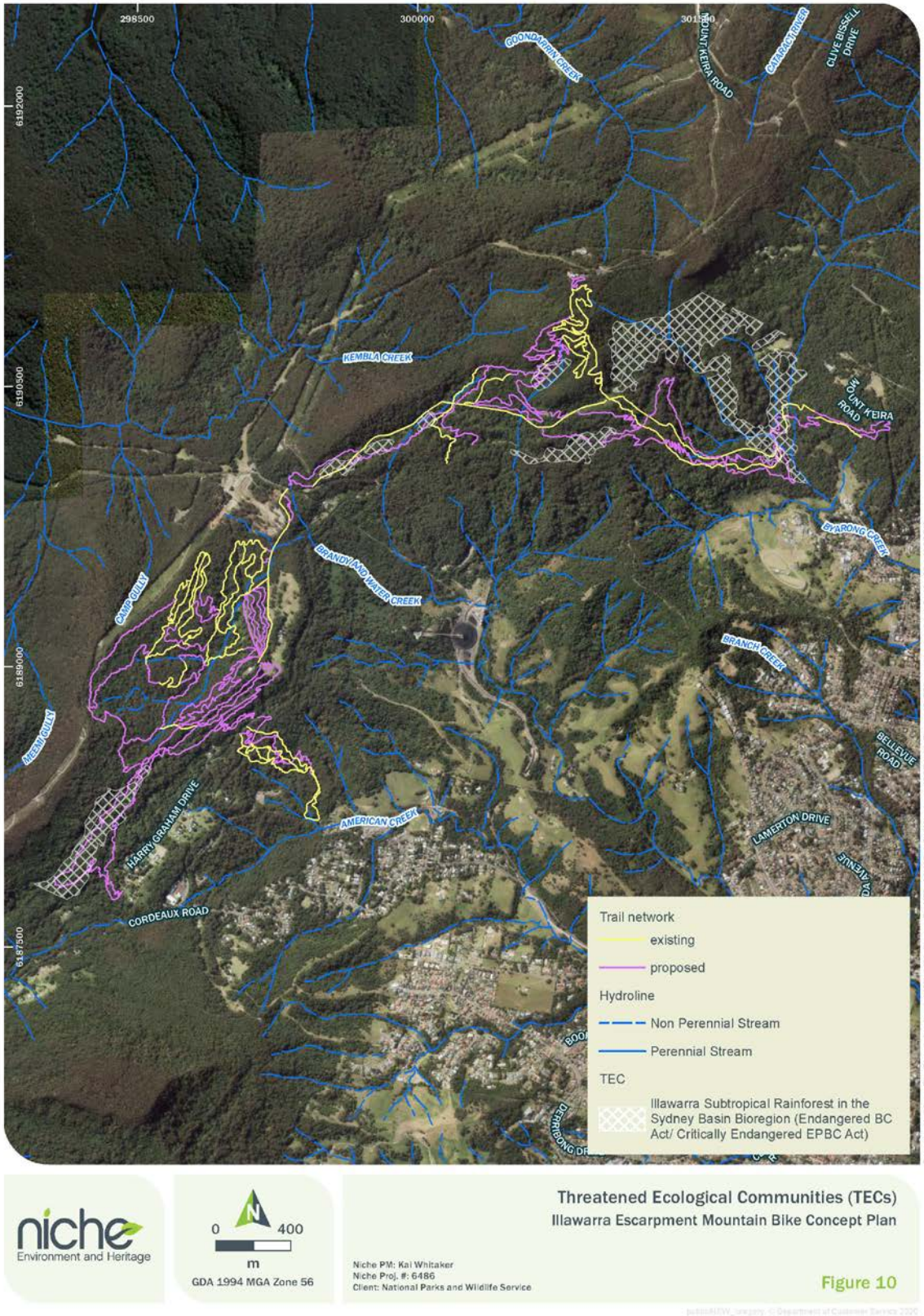


Figure 10 Threatened ecological communities within the proposal area

8.3.7 Threatened species and populations

Threatened flora

A total of 35 subject threatened flora, as listed under the BC Act and/or EPBC Act, were considered in this assessment (refer to Appendix 1 in the ecological assessment at Attachment C). This list was derived from the database searches outlined in Section 2.1 of Attachment C. There were 4 threatened flora that were considered to have a high or moderate likelihood of occurrence in the proposal area:

- white-flowered wax plant (*Cynanchum elegans*)
- Illawarra socketwood (*Daphnandra johnsonii*),
- Sublime Point pomaderris (*Pomaderris adnate*)
- scrub turpentine (*Rhodamnia rubescens*).

During the field surveys no threatened flora were recorded in the proposal area. Affected threatened flora and their habitats are assessed in Section 4.3 of Attachment C.

Threatened fauna

A total of 89 subject threatened fauna have previously been recorded (BioNet Atlas of NSW Wildlife) or are predicted to have habitat (EPBC Act / Biodiversity Assessment Method calculator PCT habitats) within the locality (see Appendix 1 of the ecological assessment at Attachment C). There were 15 threatened fauna that were considered to have a high or moderate likelihood of occurrence in the proposal area:

- giant burrowing frog (*Heleioporus australiacus*)
- red-crowned toadlet (*Pseudophryne australis*)
- Rosenberg's goanna (*Varanus rosenbergi*)
- olive whistler (*Coracina lineata*)
- pink robin (*Petroica rodinogaster*)
- powerful owl (*Ninox strenua*)
- large-eared pied bat (*Chalinolobus dwyeri*)
- spotted-tailed quoll (*Dasyurus maculatus*)
- eastern false pipistrelle (*Falsistrellus tasmaniensis*)
- eastern freetail-bat (*Micronomus norfolkensis*)
- little bentwing-bat (*Miniopterus australis*)
- eastern bentwing-bat (*Miniopterus orianae oceanensis*)
- southern myotis (*Myotis macropus*)
- grey-headed flying-fox (*Pteropus poliocephalus*)
- greater broad-nosed bat (*Scoteanax rueppellii*).

During the field survey there were 2 threatened fauna species recorded: grey-headed flying-fox and powerful owl. Multiple (>10) grey-headed flying-foxes were recorded within the proposal area, roosting in the trees in the vicinity of American Creek (at the beginning of the Memorial Pathway in Kembla Grange). One individual was also recorded roosting at the edge of the transmission line easement near Mount Keira Road. Grey-headed flying-foxes are listed as vulnerable under both the BC Act and EPBC Act. One powerful owl was also heard whilst doing amphibian surveys at American Creek, calling from a significant distance to the north-west. There were also 3 other threatened fauna recorded at a nearby previous Niche Environment and Heritage project along Harry Graham Drive and in the proposal area (see Appendix 4 in Attachment C).

Affected threatened fauna and their habitats are assessed in Section 4.4 of Attachment C.

Reference material

- Ecological assessment (Niche Environment and Heritage 2021b at Attachment C)

8.4 Cultural values

8.4.8 Aboriginal cultural heritage

The project is located specifically within the Djembla Djeera Cultural Landscape, the core elements of which are Djembla (Mount Kembla), Djeera (Mount Keira), and the Dreaming Track that connects the two. The Djembla Djeera Cultural Landscape is located primarily within the Illawarra Escarpment SCA. The Djembla Djeera Cultural Landscape can be understood as a sacred landscape that embodies Dreaming Stories, Dreaming Tracks and Ceremony Places and is an important Teaching Place. The Djembla Djeera Cultural Landscape is of very high significance for its social and spiritual value to past, present and future generations (Waters 2022 at Appendix 4 of Attachment A). It is also noted that there is a pending proposal for Mount Keira area to be declared an Aboriginal place under the NPW Act. This is addressed further in the Aboriginal cultural heritage assessment (Attachment A).

Due to the low number of surveys and archaeological studies completed primarily within the proposal area, an extensive search of the NPWS Aboriginal Heritage Information Management System (AHIMS) identified a total of one Aboriginal cultural heritage site located within 250 m of the proposal area. This does not necessarily reflect the distribution of Aboriginal cultural heritage sites within the area, but is instead a result of the lack of archaeological surveys conducted within the Illawarra Escarpment landscape due to the difficulty of the steep terrain and/or lack of previous development within the area necessitating development-driven Aboriginal heritage assessments.

The character of the escarpment landscape within the proposal area (which experiences frequent landslips and extreme soil erosion), combined with the character of the land use within the proposal area (namely its long association with coal mining, cedar-getting, pastoral and agricultural practices, and unsanctioned mountain biking trails) has likely impacted the integrity of the soil profile and consequently the likelihood of finding in situ artefacts and/or stratified deposits. There is also potential for displaced artefacts to have been washed/eroded from the upper lip of the escarpment downslope, especially from sites such as Mount Kembla; O'Brien's Gap (AHIMS ID#52-2-0859). Thus, while the likelihood of finding Aboriginal objects in the proposal area is considered moderate, the integrity of such objects is likely to be low depending on the level of past disturbance associated with certain areas within the proposal area.

The proposed works will involve varying levels of ground disturbance within the proposal area associated with the construction of the new tracks, formalisation and upgrade of existing tracks and the construction of supporting infrastructure and services. The proposed works therefore have the potential to directly harm Aboriginal objects and/or sites located within the proposal area. It is anticipated that the proposed development of the mountain bike trails through the proposal area (including future usage of the trails) may result in the harm of several Aboriginal cultural heritage sites (refer to Section 8.3 of the Aboriginal cultural heritage assessment at Attachment A).

During the consultation process the NPWS and Niche Environment and Heritage provided the opportunity for the registered Aboriginal parties to provide cultural information, including a statement of the value of identified sites and other matters. The input points were listed within the survey methodology that has been included in Appendix 2 of the Aboriginal

cultural heritage assessment (Attachment A), and information will be accepted at any point during the project prior to the finalisation of the Aboriginal cultural heritage assessment.

Registered Aboriginal parties were made aware that the proponent, Waters Consultancy and Niche Environment and Heritage staff would seek cultural information and supporting evidence in regard to matters of cultural value.

In the event that a stakeholder had sensitive or restricted public access information it was proposed that the proponent and Niche Environment and Heritage would manage this information (if provided by the Aboriginal community) in accordance with a sensitive cultural information management protocol. It is anticipated that the protocol will include making note of and managing the material in accordance with key limitations as advised by Aboriginal community members at the time of the information being provided (see Section 3.2 of the Aboriginal cultural heritage assessment at Attachment A).

No sensitive or restrictive material provided by the registered Aboriginal parties to Niche Environment and Heritage during the site inspection is to be included within the Aboriginal cultural heritage assessment or archaeological report.

The Aboriginal cultural heritage assessment presents the detailed results of an Aboriginal cultural heritage site inspection completed by Niche Environment and Heritage and representatives of the registered Aboriginal parties in compliance with the requirements of the *Code of practice for archaeological investigation of Aboriginal objects in New South Wales* (DECCW 2010b). A total of 5 Aboriginal cultural heritage sites were recorded during the field survey (refer to Attachment A for details).

Recommendations as a result of consultation completed during the Aboriginal cultural heritage assessment and the cultural values assessment are presented in Section 10 of Attachment A. A key recommendation from the 2 cultural assessments is that an Aboriginal heritage impact permit will be required for the proposal to proceed as described in Section 6.

Note that access to the cultural values assessment and Aboriginal cultural heritage assessment (Attachment A) is restricted to registered Aboriginal parties and nominated Knowledge Holders.

Reference material

- Aboriginal cultural heritage assessment (Niche Environment and Heritage 2022a at Attachment A)
- Cultural values assessment (Waters Consultancy 2022 at Appendix 4 of Attachment A)

8.4.9 National/State/local historic heritage values

The proposal area has a long post-European settlement history dating to early settlement of NSW and early industrialisation of the region, with the longest period of industrial activity being from the coal mining phase.

Much of the proposal area is undeveloped, however, it does form a significant part of NSW and Australia's historical development. This is due to the wider historical cultural landscape of industrial coal processes and timber-getting industry, which forms part of the historical development of much of the greater area as well as the site of Australia's worst industrial disaster, the Mount Kembla mine disaster of 1902.

Although the historical development can be said to be constrained to 2 phases, the proposal area also has heritage values due to its scenic, social (including tourist and recreational), visual, and natural history. The proposal area was likely explored in the early 19th century by European settlers and its natural and scenic values were described as exceptional. Tourists and visitors continue to visit the area for similar values.

The historic heritage assessment (Attachment D) determined that there is a low to moderate chance of archaeological resources across the proposal area. The area comprising additional site items to the south-west of the timber yard and mine outbuildings have been assessed as having a moderate to high archaeological potential (refer to Section 6 of the historic heritage assessment at Attachment D).

Four heritage items were identified that were either within or in the near vicinity to the proposal area that were listed on the Wollongong LEP 2009, 3 sites were listed in the s 170 asset register of Heritage Act and 2 sites were unlisted but identified as having heritage values (Table 16). These sites were assessed using the criteria outlined in *Assessing heritage significance* (Heritage Office 2000).

Table 16 Summary of historic heritage items within the proposal area.

Item #	Item name	Statutory listing	Location	Level of significance
6480	Illawarra Escarpment Landscape Conservation Area	Wollongong LEP 2009	Macquarie Pass, NSW 2577	Local
6409	Kembla Heights Mining Village Heritage Conservation Area	Wollongong LEP 2009	Kembla Heights, NSW 2526	Local
7105	Mount Kembla Colliery including site of mine workings, portal, mine air shaft and pit pony stables	Wollongong LEP 2009	Harry Graham Drive Kembla Heights, NSW 2526	Local (Endorsed. State assessed) SHR nomination pending
11950	House remains	s 170	56 299142 E 618875 N	Local
2147	Remnants Of Original O'Brien's Road	Potential s 170	56 300124 E 619007 N	Local

On the basis of the statement of heritage impact (Attachment E), the proposed works will likely have no or little impacts on the heritage items.

Mitigation measures, detailed in Section 8 of the statement of heritage impact (Attachment E), should be taken to ensure the significance of these sites is protected.

Reference material

- Historic heritage assessment (Niche Environment and Heritage 2022c at Attachment D)
- Statement of heritage impact (Niche Environment and Heritage 2022d at Attachment E)

8.5 Social values

8.5.1 Recreation values

The Illawarra Escarpment SCA is located adjacent to a large population in the Wollongong area and the coastal communities to the north and south, as well as being easily accessed from Sydney and elsewhere via main roads and public transport. It forms part of a system of protected lands and open space that cater for a wide spectrum of outdoor recreation in the Illawarra.

The Illawarra Escarpment SCA provides a strong contrast to the urban attractions of Wollongong and other coastal communities, and its facilities complement those on adjacent or nearby lands. Attractions include the escarpment's spectacular scenery and rainforests, the plateau's diversity of wildflowers and native birds, the variety of cultural and historic heritage, a network of walking tracks, trails for cycling, picnic facilities, scenic views and lookouts. These attractions provide local recreational opportunities and have the potential to be important for ecotourism in the Illawarra.

Mountain biking has grown in popularity in the Illawarra and across NSW over the last decade with a strong interest in mountain bike single-tracks emerging near urban and regional centres. Single-tracks are narrow, often winding tracks only wide enough to accommodate riders in single file.

Over recent years the demand for mountain bike single-tracks has resulted in cyclists riding on walking tracks in the Illawarra Escarpment SCA and forming numerous illegal, unsanctioned tracks throughout the proposal area.

The Illawarra Escarpment SCA is subject to heavy recreational pressure owing to the large neighbouring population, but is fragile because of its steep slopes, erodible soils, considerable cultural heritage and significant moist forests. It is vital for use to be sustainable in order to protect the area's important conservation, recreation and educational values. Hazards, such as cliffs, instability and disused mines, also limit the types and extent of recreational opportunities that can be provided. The proposed trail network has been designed to mitigate erosion impacts and to provide separation of users for safety and amenity. This REF is also supported by a geotechnical and landslide risk assessment (Attachment F).

8.5.2 Scenic and visually significant areas

The main escarpment lookouts are outside the Illawarra Escarpment SCA, between Mount Keira and Sublime Point. Within the park, there are lookouts at Longview Lookout (Stanwell Tops), Robertson Lookout (south of Mount Keira), and Mount Kembla Lookout. The Mount Kembla Lookout is located beneath a major overhead powerline that limits the aesthetic values of the site. The former Woodward Lookout (on the Woodward Track) has been closed owing to concerns about the stability of the site.

8.5.3 Education and scientific values

The wide range of natural and cultural attributes, and close proximity to educational institutions, including the University of Wollongong, offer unique opportunities for education and research.

Research into the park's natural and cultural features have provided a wealth of scientific and other information but large gaps in knowledge remain. A better understanding of Aboriginal use and heritage values, biodiversity, fire ecology, landforms, historical land use, natural hazards and human impacts would improve conservation and sustainable use.

8.5.4 Interests of external stakeholders

The proposal would be located in land adjacent to the Metropolitan Special Area Catchment. It is noted that the intended and projected increase in recreational use as part of the proposal poses a risk to the Metropolitan Special Area. This REF is supported by a neutral or beneficial effects assessment (Attachment G).

8.6 Matters of national environmental significance

Matters of environmental significance under the EPBC Act that are likely to be affected by the proposal include nationally listed threatened species and ecological communities, and migratory species.

The following species and communities have been recorded or are considered to have a moderate or greater likelihood of occurring within the proposal area:

Table 17 Matters of national environmental significance with moderate or higher likelihood of occurrence within the proposal area

Common name	Scientific name	EPBC Act status	Likelihood of occurrence within the proposal area
Giant burrowing frog	*Heleioporus australiacus*	Vulnerable	Moderate
Large-eared pied bat	*Chalinolobus dwyeri*	Vulnerable	Moderate
Spotted-tailed quoll	*Dasyurus maculatus maculatus*	Endangered	Moderate
Grey-headed flying-fox	*Pteropus poliocephalus*	Vulnerable	Present
White-flowered wax plant	*Cynanchum elegans*	Endangered	High
Illawarra socketwood	*Daphnandra johnsonii*	Endangered	Moderate
Illawarra Subtropical Rainforest in the Sydney Basin Bioregion threatened ecological community		Critically endangered	Present

Reference material

- Matters of national environmental significance assessment (DAWE 2021 at Attachment I)
- Ecological assessment (Niche Environment and Heritage 2022b at Attachment C)

9. Impact assessment

9.1 Physical and chemical impacts during construction and operation

Is the proposed activity likely to…	Applicable?*	Impact level (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	Safeguards/mitigation measures
1. Impact on soil quality or land stability?	☒	Low; negative	The construction phase of the proposed activity will result in minor and temporary disturbance to the soil structure/land stability with: vegetation clearing for development of new trails, upgrading sections of existing trails, installation of trail features, and installation of drainage features. During the operational phase, it is considered that the design features of the Illawarra Escarpment Mountain Bike Trail Network (the trail network) would provide adequate mitigation of any potential soil erosion impacts from trail usage. A maintenance regime would aid in identifying any dysfunctional drainage features requiring repair, especially following major rainfall events. Considering these factors, it is likely that where existing unsanctioned trails would be upgraded, soil quality and land stability would be improved. This would be a positive impact. Furthermore, the geotechnical assessment (Attachment F) has indicated that there were no specific geotechnical hazard features necessitating deviation or re-routing of trails. The geotechnical assessment recognised that the occurrence of rapid landslides such as debris flows that are typically associated with intense rainfall events could locally damage trail infrastructure. It is likely that some of the trails traverse slow moving landslides exhibiting creep behaviour, however these	**Construction phase** Sediment control measures are to be in place prior to any vegetation clearing and trail works and shall be maintained until runoff catchments are stabilised. Sediment controls are to be inspected regularly by the relevant contractor and by NPWS staff. Sediment control measures will also be implemented for the storage of any spoil as required in accordance with 'the blue book', *Managing urban stormwater, soils and construction vol 1 and 2A* (Landcom 2004). The proposed construction works would largely be carried out by hand, using handheld tools and plant (e.g. chainsaws and brush cutters). A mini-excavator would also be used, however, this would be the largest on-ground machine used for construction. Soil disturbance will be minimised by clearly demarcating the trail alignments during the ground truthing stage of the proposal. All machinery is to be free from any fuel and other pollutant residues, with connections and hoses inspected regularly. Contractors are to have, and be competent in the use of, petrochemical spill kits for use of any spillage during the construction. NPWS is to be notified of any spills and the action taken to contain them. Clearing and excavation works will not be conducted during high rainfall periods. The weather will be monitored during the

Is the proposed activity likely to…	Applicable?*	Impact level (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	Safeguards/mitigation measures
			features are unlikely to result in damage to the trails that could affect serviceability. Periodic inspection and maintenance of the trails will be required to manage these hazards. A geohazard risk assessment is included in the geotechnical assessment (Attachment F). Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall low impact on soil quality and/or land stability as a result of the proposed activity.	proposed works period and works will cease, and open areas stabilised, if heavy rainfall is forecast. Erosion and sediment control measures are to be implemented and maintained to: • prevent sediment moving off-site and sediment-laden water entering any watercourse, drainage lines or drain inlets • reduce water velocity and capture sediment on site • minimise the amount of material transported from site to surrounding pavement surfaces • if required, divert clean water around the site, in accordance with the blue book (Landcom 2004). A construction environmental management plan (CEMP) will be prepared by the construction contractor and to the satisfaction of NPWS. The CEMP will detail all safeguards and mitigation measures related to the construction phase of the proposal. **Operational phase** Drainage features, rock armouring and other trail features have been integrated into the design of the trail network (see Attachment H for details and Figure 5a–j for indicative locations) to minimise the potential for erosion and sedimentation. Entries and exits of drainage features will be rock armoured to minimise potential soil erosion and runoff. Crossings will be positioned perpendicular to drainage lines. The proposed trail network is designed to disperse riders through the network, spreading (rather than concentrating) and thereby reducing potential soil impacts. Regular inspections of the trail network will be implemented to ensure all drainage features are functioning correctly.

Is the proposed activity likely to…	Applicable?*	Impact level (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	Safeguards/mitigation measures
				Long-term maintenance schedules are to take into account the life cycle of materials that may harm the environment (e.g. fibre-reinforced plastic). A rehabilitation management plan will be developed for the closure and rehabilitation of unsanctioned trails (not included in the trail network) within the Illawarra Escarpment SCA.
2. Affect a waterbody, watercourse, wetland or natural drainage system – either physically or chemically (e.g. due to runoff or pollution)?	☒	Low; negative	The proposed trail network is designed to follow the landscape contours. Drainage line crossings have been minimised, with only three 3rd order (or higher) crossings proposed. All other drainage line crossings are 1st or 2nd order ephemeral watercourses, requiring either raised trail or rock-armoured crossings. These types of crossings would involve minimal physical alteration of the drainage line and are not likely to alter flow characteristics. Taking the above reasons into account and the proposed safeguards and mitigation measures, it is unlikely that the project would have more than a negligible impact on waterbodies, watercourses, wetlands or natural drainage systems as a result of the proposed activity.	As above The trail network is designed to efficiently drain water from the trail surface onto armoured or vegetated areas off-trail (see Attachment H and Figure 5a–j). Drainage features, rock armouring and other trail features have been integrated into the design of the trail network (see Attachment H for details) to minimise the potential for erosion and sedimentation. These features would have rock-armoured entries and exits to minimise potential sediment runoff. Bridges and raised trail would be installed in sections of trail that cross drainage features or where pooling occurs (see Attachment H for details). Track mats or similar will be utilised for machinery access over sensitive areas; machinery to cross perpendicular to drainage lines if required.
3. Change flood or tidal regimes, or be affected by flooding?	☒	Negligible	The trail network has been designed to minimise drainage line crossings where possible. Where required, drainage crossings have been designed to minimise impacts to the aquatic environment. Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall negligible impact to flood and/or tidal regimes as a result of the proposed activity. Decommissioning of unsanctioned trails is likely to improve downslope impacts of concentrated water flow along unsanctioned trails.	Trail structures such as bridges or raised trail are designed to not alter flow regimes. Bed-level rock crossings to be installed where appropriate. Sediment control measures will be installed prior to any trail works. These controls will be maintained until runoff catchments are stabilised. Sediment controls will be inspected regularly by the relevant contractor and by NPWS staff. Trails have been designed to minimise increases in runoff velocity and concentration.

Is the proposed activity likely to…	Applicable?*	Impact level (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	Safeguards/mitigation measures
4. Affect coastal processes and coastal hazards, including those under climate change projections (e.g. sea level rise)?	☐	NA	Coastal processes are not relevant to the proposal, including climate change or sea level rise projections.	
5. Involve the use, storage or transport of hazardous substances, or use or generate chemicals which may build up residues in the environment?	☒	Negligible	The proposed activity would not involve the use and transport of hazardous substances and the use of chemicals that may build up residues in the environment, including waterways, and potentially harm fauna. The hazardous substances and chemicals to be used in the construction and maintenance of the trail network include fuels and oils for machinery use. Fibre-reinforced plastic can also release hazardous material into the environment when it degrades, which can affect soil and water quality. Given the limited use of hazardous substances and the control measures to be implemented, it is likely that the proposal would have a negligible impact through the generation and transportation of hazardous substances.	The proposed construction works would largely be carried out by hand, using handheld tools and plant (e.g. chainsaws and brush cutters). A mini-excavator would also be used, however, this would be the largest on-ground machine used for construction. Maintenance will be scheduled to account for the lifespan of trail materials such as fibre-reinforced plastic. All machinery is to be free from any fuel and other pollutant residues, with connections and hoses inspected regularly. Re-fuelling will be undertaken at least 40 m away from 3rd order streams. Contractors are to have, and be competent in the use of, petrochemical spill kits for use of any spillage during the construction. The NPWS is to be notified of any spills and the action taken to contain them. Construction works will not be carried out during or within 2 days of heavy rainfall. The maintenance schedule will consider the lifespan of trail materials such as fibre-reinforced plastic, ensuring that they are replaced before expiry.
6. Involve the generation or disposal of gaseous, liquid or solid wastes or emissions?	☒	Negligible	The proposal is likely to involve the generation of gaseous, solid wastes and emissions. Gaseous emissions would be generated during construction and maintenance from the use of the machinery and equipment, although this is expected to be minor. During the operational phase, human waste would be generated. Toilet facilities will be provided outside of the	As above During the construction phase, human faecal waste will be completely containerised in portable toilets, subject to regular servicing to empty and prevent overflow, and disposed of off-site as per legislative requirements.

Is the proposed activity likely to…	Applicable?*	Impact level (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	Safeguards/mitigation measures
			proposal area so will be assessed in a separate Part 5 assessment. The proposal would generate vegetation and excavated fill waste. This type of waste will be minimised through reuse during the construction phase where appropriate. Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall negligible impact by the generation or disposal of gaseous, liquid or solid wastes or emissions as a result of the proposed activity.	
7. Involve the emission of dust, odours, noise, vibration or radiation?	☒	Negligible	Dust and other airborne fine particles may result from the trail construction works. However, given the relatively small construction footprint, dispersed over a large area, it is likely that dust generation would be negligible. Helicopter activity during the construction phase would involve the generation of noise. However, helicopter operations would be spread out over the entire duration of the construction schedule to deliver materials progressively as required. This type of schedule is also designed to limit the amount of materials stored at the site.	The trail network has been designed to minimise new clearing by utilising existing unsanctioned trails. Construction methodology would largely be by hand and small excavator, reducing noise. Helicopter delivery of material would be scheduled over the entire course of the construction schedule to limit periods of intense helicopter activity. All activities will be undertaken in accordance with the *Interim construction noise guideline* (DECC 2009b) and the *Draft construction noise guideline* (EPA 2020).

9.2 Biodiversity impacts during construction and operation

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
1. Affect any declared area of outstanding biodiversity value (under the BC Act) or critical habitat (under the FM Act)?	☐	NA	NA	
2. Result in the clearing or modification of vegetation, including ecological communities and plant community types of conservation significance?	☒	Low; negative	The proposed new trails have been assessed as 'primary clearing', whilst the existing trails incorporated into the network have been assessed as 'secondary clearing'. The proposal would result in unavoidable and direct impacts on native vegetation (see Table 10), namely the removal of approximately 4.36 ha of native vegetation for primary clearing, 3.57 ha of native vegetation for secondary clearing, and 0.15 ha of temporary impacts to native vegetation at material laydown areas. An additional 2.2 ha of cleared or exotic land would be subject to primary clearing and 0.75 ha subject to secondary clearing. All areas disturbed temporarily will be regenerated post-works. There will be no clearing of any canopy trees throughout the entire proposal area, allowing for many of the direct impacts such as loss of shade and shelter or breeding opportunities to be avoided. A test of significance (BC Act) and assessment of significance (EPBC Act) for the Illawarra Subtropical Rainforest TEC were conducted and are presented in Attachment C (see Appendix 2 and Appendix 3, respectively). The assessments conclude that the proposal is unlikely to have a significant impact on the TEC due to the linear clearing of understorey vegetation only, which is unlikely to lead to fragmentation or isolation	Only ground cover and understory vegetation will be modified or removed for the proposed activity. No mature or hollow-bearing trees will be removed. Prior to the clearing works, each trail will be clearly marked out. Such marking may comprise star pickets with bunting or flagging to clearly demarcate the limit.

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
			of the TEC. The proposal is unlikely to place the Illawarra Subtropical Rainforest TEC at risk of extinction.	
3. Endanger, displace or disturb terrestrial or aquatic fauna, including fauna of conservation significance, or create a barrier to their movement?	☒	Low; negative	All 15 threatened fauna species with potential or known occurrence in the proposal area may have potential foraging habitat within the proposed trail corridors, however, the extensive areas of vegetation immediately adjacent to the proposal area are likely to provide a variety of habitat features, such as hollow-bearing trees, stags, termite mounds, dense shrubs and mature trees. Furthermore, the proposal would not remove any hollow-bearing trees, stags, mature trees or termite mounds by utilising existing trails or avoiding these features when creating new sections of trail. Therefore, it is unlikely that the proposal would result in a significant loss of critical habitat features or direct impacts to any threatened fauna species. On the basis of having a high likelihood to occur within the proposal area and also the proximity of the proposed works to ephemeral drainages or potential impacts due to construction works, a test of significance (BC Act) was conducted for both the red-crowned toadlet and giant burrowing frog (see Appendix 2 in Attachment C). An assessment of significance (EPBC Act) was also conducted for giant burrowing frog, which is listed under the EPBC Act (see Appendix 3 in Attachment C). Given the avoidance of high-quality habitat and minimal impacts to aquatic habitat through construction design, these assessments concluded that the proposal is unlikely to have a significant impact on these species.	Where possible the trail network has been designed to incorporate existing trails. There will be no clearing of any canopy trees throughout the entire proposal area, allowing for many of the direct impacts such as loss of shade and shelter or breeding opportunities to be avoided. Removal of logs and tree stumps will be avoided. Prior to construction, the trail alignment will be sited to avoid mature trees (including the threatened subject flora) and significant habitat features. A rehabilitation management plan will be developed for the closure and rehabilitation of unsanctioned trails (not included in the trail network) within the Illawarra Escarpment SCA.
4. Have a significant effect on protected flora, including conservation significance?	☒	Negligible	Four threatened subject flora are considered to have potential habitat (or known presence) within the proposal area: • white-flowered wax plant (*Cynanchum elegans*)	Prior to construction, the trail alignment will be sited to avoid mature trees (including the threatened subject flora). A suitably qualified ecologist or NPWS personnel will be present during the trail alignment siting to ensure that protected flora are avoided.

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
			• Illawarra socketwood (*Daphnandra johnsonii*) • Sublime Point pomaderris (*Pomaderris adnate*) • scrub turpentine (*Rhodamnia rubescens*). Given that they can be detected at any time of year (and they were not detected during site surveys), it is considered unlikely that these species are present within the corridor of the proposed trails, however, there is potential for them to occur in the broader proposal area. It is considered unlikely that the threatened subject flora would be impacted by the proposal.	A rehabilitation management plan will be developed for the closure and rehabilitation of unsanctioned trails (not included in the trail network) within the Illawarra Escarpment SCA.
6. Contribute to a key threatening process to biodiversity or ecological integrity as listed under the BC Act or FM Act?	☒	Low; negative	The 39 key threatening processes (KTPs) that are listed on the BC Act and/or EPBC Act as of June 2021 and are applicable to terrestrial environments, are shown in Table 17 of Attachment C. Of these, 10 KTPs relate to invasive ecological processes that have the potential to be transported by works plant and machinery. The proposed works would avoid all possible invasive processes by the quarantining and cleaning of plant and machinery prior to entry to the escarpment area. Once present within the proposal area, machinery would stay at site until the proposed works are completed. The only KTP that would occur as a result of the proposal is the removal of 2.98 ha of native vegetation for primary clearing and 1.98 ha of native vegetation for secondary clearing. Considering the linear nature of the trails, and the incorporation of existing trails into the network, it is likely that the contribution of the proposal to KTPs would be low. Furthermore, the proposal would potentially reduce the creation of illegal mountain bike trails along the Illawarra	There will be no clearing of any canopy trees throughout the entire proposal area, allowing for many of the direct impacts such as loss of shade and shelter or breeding opportunities to be avoided. Prior to construction, the trail alignment will be sited to avoid mature trees (including the threatened subject flora) and to clearly define the trail footprint. Where required, vines (e.g. wWonga Vvine [*Pandorea pandorana*] and Sscrambling Llilly [*Geitonoplesium cymosum*]) would be tied back using suitable materials as to not harm the individual plants. A rehabilitation management plan will be developed for the closure and rehabilitation of unsanctioned trails (not included in the trail network) within the Illawarra Escarpment SCA.

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
			Escarpment and allow NPWS to rehabilitate unsanctioned trails.	
7. Introduce priority weeds, vermin, feral species (*Biosecurity Act 2015*) or genetically modified organisms into an area?	☒	Low; negative	The proposal would increase the potential for the introduction of weeds in the proposal area (and adjacent areas) during the construction and operational phases. The importing of materials for the construction and ongoing maintenance of the proposed activity has the potential to introduce species, pathogens or disease. Although this is partly avoided by using in situ materials where possible. Taking the above reasons into account and the proposed safeguards and mitigation measures, it is likely that the proposal would result in an overall negligible impact with the introduction of noxious weeds, vermin, feral species and genetically modified organisms as a result of the proposed activity.	Use of in situ rock material where possible and authorised by NPWS. Materials used in the construction and ongoing maintenance stages of the proposed activity are to be free of any potential invasive species, pathogens or diseases. A weed management plan will be developed for use in the construction phase of the proposal. The plan will need to consider the clearing of trails in areas where exotic species are present and the sequencing of works to not enhance the spread of weeds. Any cleared material from exotic species will be removed from the proposal area and disposed of appropriately. Weed and pest management for the proposed track is to be carried out in accordance with the NPWS standard policy and procedures, as part of routine operations. Vehicles and machinery will be checked and cleaned prior to moving between sites.
9. Affect any joint management agreement (including stewardship site) under the BC Act or FM Act?	☐	NA	NA	

9.3 Community impacts during construction and operation

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or N/A)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
1. Affect community services or infrastructure?	☒	Medium; positive	The proposed trail network would provide high-quality mountain biking infrastructure for visitors to the proposal area. The implementation of the trail network would ultimately result in unsanctioned trails (those not being incorporated into the network) being closed and rehabilitated, including those at Mount Keira. Considering that the proposal would provide additional recreational infrastructure, it is likely that the proposal would, overall, improve community services and infrastructure. A detailed assessment of social impacts is provided in the social impact comment (Attachment B).	Mitigations measures from Section 5 of the social impact comment (Attachment B) should be implemented.
2. Affect sites of importance to local or the broader community for their recreational or other values or access to these sites?	☒	Medium; positive	The proposed trail network would affect the Illawarra Escarpment SCA, which is an important site to the local and broader community. The trail network would provide enhanced recreational access and opportunities to the area for all levels of mountain biking. It is understood that the Illawarra Escarpment SCA is a valued site for bushwalking. The trail network is designed to keep riders on the network, and minimising rider and walker interaction. The project is not designed or expected to discourage walking within the Illawarra Escarpment SCA. Given the current level of mountain bike riding on unsanctioned trails, it is likely that the trail network will provide better certainty for walkers regarding where mountain biking will be taking place. The trail network is expected to result in an increase of visitors to the Illawarra Escarpment SCA.	Trail network designed to be single-\use (i.e. cyclists only) to avoid impacts to bushwalkers. Trail network is designed to keep riders on the network rather than on other trails (such as walking tracks). Adequate signage to notify both walkers and riders of nearby trails and intersections.

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or N/A)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
			Taking the above reasons into account there may be an overall medium positive impact to the broader community in relation to recreational and other values as a result of the proposed activity.	
3. Affect economic factors, including employment, industry and property value?	☒	Low; positive	The trail project is likely to have a significant positive impact on the Wollongong economy (PPM Economics 2021 at Appendix G of Attachment B). The benefits will likely accrue from users in the form of additional recreation opportunities. Benefits are also likely to accrue from the broader economy and society through increased spending by mountain bike riders, increased health, increased productivity, increased human capital, and better criminal and social justice outcomes. The project is also likely to result in benefits from increased tourism. The initial social impact comment is based on an estimate of 175,000 visitors utilising the network per year. NPWS is currently undertaking data collection and modelling to qualify projected numbers to inform the final social impact assessment and Wollongong City Council's infrastructure assessments. The updated data will be incorporated into the final REF and assessments updated where appropriate.	None required.
4. Have an impact on the safety of the community?	☒	Low; negative	There is an inherent risk with mountain biking as an activity. The trail network will be constructed to IMBA standards to maximise the safety of riders. The closure and rehabilitation of unsanctioned trails has the potential to improve safety outcomes, as the majority of riders can use formalised trails with known access points and routes for emergency and first aid response.	Trail network designed to IMBA standards. Trail network designed to be single-use (for mountain biking) to avoid impacts to bushwalkers. Trail network is designed to keep riders on the network rather than on other trails (such as walking tracks). Adequate signage to notify both walkers and riders of nearby trails and intersections. Signage will also inform users of hazards along the trail. Regular trail inspections and maintenance schedule will ensure trail features are functioning correctly.

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or N/A)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
				The NPWS will develop a notification procedure prior to any works commencing, and such procedures will be reviewed as required. The proposed activity will comply with the NPWS safety procedures.
5. Cause a bushfire risk?	☒	Negligible	The proposed activity is likely to result in an increase in visitors to the area, which would increase the potential bushfire risk. However, this risk is minimised with smoking being prohibited in NPWS reserves and bushfire plans with strategies incorporating visitor activity restrictions during periods of high fire danger. The use of machinery during the construction phases of the project would pose a bushfire risk. However, these risks would be mitigated by following NPWS construction procedures regarding bushfire risk. These procedures will be incorporated into the CEMP.	Daily pre-work checks of bushfire risk rating, to be incorporated into the CEMP. No work will be conducted on total fire ban days. Construction machinery and equipment are not to be stored in areas of high fuel loads (e.g. long grass). Interpretive material will include information about bushfire risk.
6. Affect the visual or scenic landscape?	☒	Low; negative	During the construction phase, there would be a temporary visual impact from the activity of work crews, helicopter material drops and storage of materials. Temporary signage would also be used to notify the public of the works. The trail network is designed to enhance the rider experiences through immersion in the natural environment. As such, the network has been designed to have a minimal footprint, with operational widths for each trail predominately under 1 m. The trail network includes at least 211 signs throughout the network (Figure 6a–j). However, this signage would not obstruct any views and would be designed to have a low visual impact. The trails are not likely to be visible in views of the escarpment.	Low-impact design principles, including minimal footprint, and incorporation of natural features as trail features. Trail network signage designed to have low visual impact.

Is the proposed activity likely to…	**Applicable?***	**Likely impact** (negligible, low, medium or high; negative or positive; or N/A)	**Reasons** (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	**Safeguards/mitigation measures**
			Therefore, it is unlikely that the project would have more than a low negative visual or scenic impact.	
7. Cause noise, pollution, visual impact, loss of privacy, glare or overshadowing to members of the community, particularly adjoining landowners?	☒	Negligible	Through an anticipated increased visitation to the proposal area, the project is likely to cause increased noise and visual impact to landowners at Kembla Heights Village and Mount Kembla. There may also be a loss of privacy to the immediate neighbours of the trail network. However, there is ample evidence from NPWS (reports) to indicate that the Illawarra Escarpment SCA is already a popular site for visitors, including mountain bike riders using existing unsanctioned trails. By creating a formal trail network, the project is likely to create more certainty to the local community about where mountain biking is permitted and can be expected. The signage used throughout the network would be designed to reduce glare for non-intended viewers.	The NPWS will develop a notification procedure prior to any works commencing to inform the local community about the construction for the proposal. Trail construction would be undertaken between 7:00 am to 5:30 pm on weekdays, and 7:00 am to 12:00 pm on Saturdays. No work will be undertaken on Sundays or public holidays.

9.4 Natural resource impacts during construction and operation

Is the proposed activity likely to…	**Applicable?***	**Likely impact** (negligible, low, medium or high; negative or positive; or N/A)	**Reasons** (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	**Safeguards/mitigation measures**
1. Result in the degradation of the park or any other area reserved for conservation purposes?	☒	Low; negative	The trail network has been designed to have minimal impact on the natural resources of the proposal area. The proposed alignment of the network trails has been designed to minimise vegetation clearing. Initial field surveying and mapping of the proposed network has identified alignments that avoid ecological constraints. During the construction phase, the alignment of the trails would be micro-sited to avoid mature and hollow-bearing trees. The proposal would involve the removal of approximately 4.36 ha of native vegetation for primary clearing, and 3.57 ha of native vegetation for secondary clearing.	Trail alignments identified through extensive field reconnaissance with NPWS to avoid ecological and landscape constraints. Trail network designed to follow natural landscape contours to reduce erosion potential. Trail network has been designed to be sustainable, including the installation of rock armouring and drainage features to mitigate erosion and soil degradation. Trail network design has incorporated existing unsanctioned trails into the network where feasible to reduce the clearing requirements for new trails. Materials used in the construction and operational maintenance phases are to be free of any potential invasive species, pathogens or diseases. For example, any fill for the proposed activity is to be certified free from contaminates or weed propagules that could negatively affect adjacent habitats. All imported materials for the proposed activity are to be in accordance with NPWS biosecurity management procedures. A weed management plan would be developed by NPWS for the construction phase. The weed management plan would be incorporated into the CEMP.
2. Affect the use of, or the community's ability to use, natural resources?	☒	Medium; positive	The project would ultimately enhance the local and broader community's ability to use and experience the Illawarra Escarpment SCA. The trail network is designed to provide trails for a variety of mountain bike rider skill levels. The trail network has been designed to minimise potential interaction between riders and walkers. The proposal would be partially located adjacent to the Metropolitan Special Area (see Figure 1). As per requests	The trail network has been designed as single-use to avoid potential impacts with walkers. Signage will be installed throughout the network to indicate trail usage type. The trail network has been designed to reduce rider speed where trails approach their terminus or where trails intersect.

			from WaterNSW, a neutral or beneficial effects (NorBE) assessment has been prepared in support of this REF (Attachment G). The project is likely to have a neutral effect on water quality within the Kembla Creek Catchment, considering the design standards of the trail network, which are designed to reduce erosion potential and soil degradation.	
3. Involve the use, wastage, destruction or depletion of natural resources including water, fuels, timber or extractive materials?	☒	Negligible	The proposal would involve the removal of approximately 4.36 ha of native vegetation for primary clearing, 3.57 ha of native vegetation for secondary clearing. The trail network has been designed to incorporate existing unsanctioned trails where suitable. Where NPWS approves, rock would be sourced from the proposal area for use as trail features, such as rock armouring. This would reduce the amount of rock that would be imported for the project. Milled timber will be required to be used for some trail features. The project is also designed to discourage and prevent the future development of unsanctioned mountain bike trails. The project would also involve the rehabilitation of the unsanctioned trails that are not incorporated into the trail network, including those at Mount Keira. This would constitute a positive impact. Considering the above reasons, it likely that the project would have a negligible impact on natural resources.	The trail network has been designed to incorporate suitable existing trails to avoid new vegetation clearing. Cleared vegetation that is free of weeds, will be stockpiled off-trail for use as brush matting to remediate access areas and degraded unsanctioned trails on completion. Imported rock would be sourced from a certified supplier and would be consistent with the geology of the proposal area.
4. Provide for the sustainable and efficient use of water and energy?[2]	☒	Negligible	The project would require the use of machinery during the construction phase. During the operational phase, energy use would be limited to the maintenance of the trail network.	All machinery will be in good working condition.

9.5 Aboriginal cultural heritage impacts during construction and operation

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or N/A)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
1. Disturb the ground surface or any culturally modified trees?	☒	Low; negative	The proposed works will involve varying levels of ground disturbance within the proposal area associated with the construction of the new tracks, formalisation and upgrade of existing tracks and the construction of supporting infrastructure and services. The proposed works therefore have the potential to directly harm Aboriginal objects and/or sites located within the proposal area. It is anticipated that the proposed development of the mountain bike trails through the proposal area (including future usage of the trails) may result in the harm of the following Aboriginal cultural heritage sites: • Mount Kembla; O'Briens Gap (AHIMS ID# 52-2-0859) • MK 1 (AHIMS ID# pending) • MK 2 (AHIMS ID# pending) • MK 3 (AHIMS ID# pending) • MK 7 (AHIMS ID# 52-2-4740). Where harm cannot be avoided, management measures are warranted to mitigate the loss of values to Aboriginal sites, objects and values that would result from the proposed activity. Management and mitigation measures are also warranted to ensure continued compliance with the NPW Act. Consideration and discussion of management and mitigation options are provided in Table 34 of the Aboriginal cultural heritage assessment (Attachment A). Where harm to Aboriginal sites and objects cannot be avoided, an Aboriginal heritage impact permit (AHIP) in accordance with the NPW Act 1974 will be required.	No culturally modified trees would be removed or trimmed as part of the proposal. Implement the recommendations in the Aboriginal cultural heritage assessment and cultural values assessment (Attachment A). Recommendations in the Aboriginal heritage assessment include the avoidance of Aboriginal sites through minor adjustments to the alignment where practicable. If any Aboriginal sites are observed during the construction phase of the proposed activity, then work is to cease immediately and NPWS is to be notified. A thorough assessment is to be carried out in accordance with the *Guide to investigating, assessing, and reporting on Aboriginal cultural heritage in NSW* (OEH 2011), and the *Code of practice for archaeological investigation of Aboriginal objects in New South Wales* (DECCW 2010b). A rehabilitation management plan will be developed for the closure and rehabilitation of unsanctioned trails (not included in the trail network) within the Illawarra Escarpment SCA.

Is the proposed activity likely to…	**Applicable?***	**Likely impact** (negligible, low, medium or high; negative or positive; or N/A)	**Reasons** (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	**Safeguards/mitigation measures**
2. Affect or occur in close proximity to known Aboriginal objects or Aboriginal places?	☒	Low; negative	The proposal would increase visitation to the proposal area for activities that are discordant with the cultural values of the Djembla Djeera Cultural Landscape. The proposed trail alignments have been sited to avoid Mount Keira and the Mount Kembla summit. The development of the proposal would allow NPWS to close unsanctioned trails on Mount Keira. Should the Aboriginal place nomination of Djeera Mount Keira and Five Islands be gazetted by Heritage NSW, then the works for the Illawarra Escarpment Mountain Bike Trail Network project that fall within the boundaries of the Aboriginal place will require an AHIP in accordance with the NPW Act 1974.	Implement the mitigation measures and recommendations in the Aboriginal cultural heritage assessment and cultural values assessment (Attachment A).
3. Affect areas: - within 200 m of waters - within a sand dune system - on a ridge top, ridge line or headland - within 200m below or above a cliff face - within 20m of or in a cave, rock shelter or a cave mouth? If so, can impacts be avoided? How?	☒	Low; negative	The proposal would affect areas within 200 m of waters; on a ridge top or ridge line; and within 200 m below or above a cliff face. There will be disturbance to the ground surface in these areas. Taking the above reasons into account and the proposed safeguards and mitigation measures, there may be an overall low negative impact to these areas as a result of the proposal.	Implement the mitigation measures and recommendations in the Aboriginal cultural heritage assessment and cultural values assessment (Attachment A).
4. Affect wild resources which are used or valued by the Aboriginal community or affect access to these resources?	☒	Low; negative	The proposal would increase visitation to the proposal area for activities that are discordant with the cultural values of the Djembla Djeera Cultural Landscape. This could negatively impact the access to wild resources valued by the Aboriginal community.	Implement the mitigation measures and recommendations in the Aboriginal cultural heritage assessment and cultural values assessment (Attachment A).

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, low, medium or high; negative or positive; or N/A)	Reasons (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	Safeguards/mitigation measures
			As the proposed trails are single-use riding trails, this may negatively impact access to sites within the Djembla Djeera Cultural Landscape.	
5. Affect access to culturally sensitive locations?	☒	Low; negative	The proposal would increase visitation to the proposal area for activities that are discordant with the cultural values of the Djembla Djeera Cultural Landscape. As the proposed trails are single-use riding trails, this may negatively impact access to sites within the Djembla Djeera Cultural Landscape.	Implement the mitigation measures and recommendations in the Aboriginal cultural heritage assessment and cultural values assessment (Attachment A).

9.6 Other cultural heritage impacts during construction or operation

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, maintenance, minor, major, contentious; or NA)	Reasons (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	Safeguards/mitigation measures
1. Impact on places, buildings, landscapes or moveable heritage items?	☒	Low; negative	On the basis of the statement of heritage impact (Attachment E), the proposal works will likely have no or little impacts on the heritage items.	Any approvals required under the Heritage Act will be obtained. Implement the mitigation measures and recommendations in the statement of heritage impact (Attachment E). If any historic heritage items or places are observed during the construction phase of the proposed activity, then work is to cease immediately and the NPWS is to be notified and appropriate measures are to be implemented.
2. Impact on vegetation of cultural landscape value (e.g. gardens and settings, introduced exotic species,	☐	NA	NA	

Is the proposed activity likely to…	Applicable?*	Likely impact (negligible, maintenance, minor, major, contentious; or NA)	Reasons (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	Safeguards/mitigation measures
or evidence of broader remnant land uses)?				

9.7 Matters of national environmental significance under the EPBC Act

Is the proposal likely to impact on matters of national environmental significance, including:	Applicable?*	Impact level (negligible, low, medium or high; negative or positive; or NA)	Reasons (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	Safeguards/mitigation measures
1. Listed threatened species or ecological communities)?	☒	Low; negative	There is one TEC (Illawarra Subtropical Rainforest) and one threatened fauna species (giant burrowing frog) listed under EPBC Act with the potential to be impacted by the proposal. The proposal would not result in an increase in the level of fragmentation for the existing remnant Illawarra Subtropical Rainforest patch. The increased fragmentation within the midstory and understory layers of the vegetation via the introduction of narrow mountain bike trails (generally 0.9 m) is unlikely to reduce seed dispersal and animal dispersal for some species that are currently able to move between patches of the TEC. The EPBC Act assessment concludes that the Illawarra Subtropical Rainforest habitat to be impacted is classed as habitat critical to the survival of the TEC (Attachment C). There will be a small impact in the extent of Illawarra Subtropical Rainforest TEC from the proposal (0.56 ha) (<0.01% in the locality) through primary and secondary clearing and the use of one helicopter drop zone. All other areas of the TEC have been avoided, therefore based on EPBC Act guidelines, the proposal is not likely	The canopy layer and any large shrubs will be left intact. A weed management plan will be developed and implemented for the construction phase of the proposal. Trail network has been designed to incorporate existing trails where feasible. Following the construction phase, material drop zones and laydown areas will be left to regenerate.

Is the proposal likely to impact on matters of national environmental significance, including:	**Applicable?***	**Impact level** (negligible, low, medium or high; negative or positive; or NA)	**Reasons** (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	**Safeguards/mitigation measures**
			to have a significant impact on the Illawarra Subtropical Rainforest TEC. The proposal would remove up to 7.93 ha of native vegetation through both primary and secondary clearing, some of which may provide habitat for the giant burrowing frog. However, given that impacts are relatively minor, the proposal area is likely to continue to provide habitat for the species. The proposal is considered unlikely to have a significant impact on the giant burrowing frog.	
2. Listed migratory species?	☐	NA	NA	
3. The ecology of Ramsar wetlands?	☐	NA	NA	
4. Commonwealth marine environment?	☐	NA	NA	
5. World Heritage values of world heritage properties?	☐	NA	NA	
6. The national heritage values of national heritage places?	☐	NA	NA	

10. Proposals requiring additional information

Under the Guidelines for preparing a review of environmental factors, no additional information is required.

11. Threatened species tests of significance

11.1 Species listed under the BC Act

A test of significance is provided as part of the ecological assessment (see Appendix 2 in Attachment C) for the following BC Act listed threatened biodiversity in relation to the proposal:

- threatened ecological communities
  - Illawarra Subtropical Rainforest in the Sydney Basin Bioregion
- threatened fauna
  - red-crowned toadlet
  - giant burrowing frog
  - grey-headed flying-fox.

11.2 Species listed under the FM Act

There were no subject threatened aquatic fauna, as listed on the FM Act, to be considered in this assessment. This list was derived from the database searches outlined in Section 2.1 of Attachment C.

12. Summary of impacts and conclusions

Table 18 Summary of impacts

Category of impact	Significance of impacts		
	Extent of impact	Nature of impact	Environmentally sensitive features
Physical and chemical	Low; negative	Soil disturbance/Sourcing rock	Highly erodible soils
	Low; negative	Anthropogenic/sedimentation	
	Negligible	Minor flooding	
	Negligible	Fuels and oils	
	Negligible	Waste from machinery and humans	
	Negligible	Dust, odours, noise	
Biological	Low; negative	Vegetation modification or clearing	TECs, threatened flora and fauna
	Low; negative	Ongoing disturbance	
	Low; negative	Vegetation modification or clearing	
	Low; negative	Weed introduction	
Natural resources	Low; negative	Vegetation modification or clearing/Ground disturbance	Conservation area Conservation area/local community TECs and threatened flora and fauna
	Medium; positive	Increased and improved visitor use	
	Low; negative	Vegetation modification or clearing	
	Low; negative	Water and energy efficiency	
Community	Medium; positive	Improved infrastructure	Visual amenity Conservation area Local economy Park visitors Park visitor/Neighbours Visual and scenic amenity Neighbours
	Medium; positive	Improved access/Increased visitor use	
	Medium; positive	Increased opportunities	
	Low; negative	Cliff lines and other hazards	
	Low; negative	Fire risk	
	Low; negative	Amenity	
Cultural heritage	Low; negative	Ground disturbance	Aboriginal objects Djembla Djeera Cultural landscape of high significance
	Low; negative	Increased visitation and ground disturbance	
	Low; negative	Affect access to wild resources which are used or valued by the Aboriginal community	
	Low; negative	Affect access to culturally sensitive locations	

In conclusion there is not likely to be a significant effect on the environment and an environmental impact statement is not required:

- In accordance with subdivisions 2 and 3 of the EP&A Act in relation to NPWS considering the environmental impact of the proposed activity and determining if an environmental impact statement is required, this REF has taken into account the matters affecting or likely to affect the environment.
- There is unlikely to be a significant effect on the environment and based on the summary of impacts in Table 18 an environmental impact statement is not required.

There is not likely to be a significant effect on threatened species, populations, ecological communities or their habitats, within the meaning of the BC Act, and a species impact statement is not required:

- Formal assessments of significance, tests of significance under s 7.3 of the BC Act, have been conducted as part of the ecological assessment (Attachment C) to determine whether the proposal will have a significant impact on threatened biodiversity.
- Formal assessments concluded that TEC and threatened fauna and flora species are unlikely to be significantly affected by the proposal.

The activity is not likely to have a significant impact on matters of national environmental significance listed under EPBC Act:

- Formal assessments of significance, under the EPBC Act's significant impact criteria, have been conducted as part of the ecological assessment (Attachment C).
- Formal assessments concluded that TEC and threatened fauna species are unlikely to be significantly affected by the proposal.

The activity will not require certification to the *Building Code of Australia*, *Disability (Access to Premises – Buildings) Standards 2010* or Australian Standards in accordance with the NPWS Construction Assessment Procedure.

13. Supporting documentation

Documentation supporting this application is detailed below, including attachment number. Access to the cultural values assessment and Aboriginal cultural heritage assessment (Attachment A) is restricted to registered Aboriginal parties and nominated Knowledge Holders.

Attachments A to F and H have been provided as separate documents. Attachments G and I are in the Attachments section of this document.

Attachment	Document title	Author	Date
A	Aboriginal cultural heritage assessment	Niche Environment and Heritage	June 2022a
B	Social impact comment	Element Environment	June 2022
C	Ecological assessment	Niche Environment and Heritage	October 2022b
D	Historic heritage assessment	Niche Environment and Heritage	June 2022c
E	Statement of heritage impact	Niche Environment and Heritage	June 2022d
F	Geotechnical assessment and landslide risk assessment	GHD	March 2022
G	Neutral or beneficial effects (NorBE) assessment	Niche Environment and Heritage	October 2021
H	Trail network built features guide	Bennett Murada Architects	August 2021
I	Matters of national environmental significance search report	Department of Agriculture Water and the Environment	June 2021

14. Signature of proponent

By signing the REF, the proponent confirms that the information in the REF is accurate and adequate to ensure that all potential impacts of the activity can be identified.

Signature	Signature
Name (printed)	Name (printed)
Position	Position
Date	Date

Seal (if signing under seal):

References

DECC (Department of Environment and Climate Change NSW) (2009a) 'Illawarra Escarpment State Conservation Area fire management strategy', DEC, Sydney.

DECC (2009b) *Interim construction noise guideline* [PDF 1.2MB], DECCW, Sydney South.

DECCW (Department of Environment, Climate Change and Water NSW) (2010a) 'Aboriginal cultural heritage consultation requirements for proponents 2010', DECCW, Sydney South.

DECCW (2010b) 'Code of practice for archaeological investigation of Aboriginal objects in New South Wales', DECCW, Sydney South.

DPI (Department of Primary Industries NSW) (2013) 'Policy and guidelines for fish habitat conservation and management' (update 2013), NSW DPI.

DPIE (Department of Planning, Industry and Environment NSW) (2016) *Bionet Vegetation Classification, Illawarra Plant Community Type Vegetation Map, 2016*. VIS_ID 4678.

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More information

- Indigenous land use agreements
- NPWS policies and procedures:
  - Cycling policy
  - Landslides and rockfalls policy
  - Visitor safety policy
- Acts, regulations and environmental planning instruments:
  - Biodiversity Conservation Act 2016
  - Biosecurity Act 2015
  - Environmental Planning and Assessment Regulation 2000, Schedule 3
  - Fisheries Management Act 1994 No 38
  - National Parks and Wildlife Act 1974
  - State Environmental Planning Policy (Coastal Management) 2018
  - State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011
  - State Environmental Planning Policy (Transport and Infrastructure) 2020, clause 2.73(1)(a)

Abbreviations

Abbreviation	Term
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal heritage impact permit
CEMP	Construction environmental management plan
DPE	Department of Planning and Environment
DPI	Department of Primary Industries
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
FM Act	*Fisheries Management Act 1994*
IMBA	International Mountain Bike Association
KTP	Key threatening processes
LEP	Local environmental plan
NorBE	Neutral or beneficial effects
NPW Act	*National Parks and Wildlife Act 1974*
NPWS	National Parks and Wildlife Service
NSW	New South Wales
PCT	Plant community type
PoM	Plan of management
PPE	Personal protective equipment
REF	Review of environmental factors
RFS	Rural Fire Services
SCA	State Conservation Area
SEPP	State Environmental Planning Policy
SHR	State Heritage Register
TEC	Threatened ecological communities

Attachments

Attachments A to F and H have been provided as separate documents. Links are on the Illawarra Escarpment Mountain Bike Project webpage.

Attachments G and I are below.

Attachment G

Neutral or Beneficial Effects Assessment

As the proposal is being assessed under Part 5 of the EP&A Act, this Neutral or Beneficial Effects (NorBE) assessment has been completed in consideration with the WaterNSW *NorBE Assessment Guideline 2021.* As detailed in Section 3 of the REF, a separate Part 5 (prepared by WCC) assessment will be prepared for the ancillary components of the proposal that are not on NPWS land. The Part 5 assessment will include a NorBE assessment in accordance with the WaterNSW *NorBE Assessment Guideline 2021.*

Table 1 Identifiable potential impact on water quality checklist (sourced from *NorBE Assessment Guideline 2021*)

Criteria for identifiable water quality impact	Relevant to the project	Comments
Flow of water is concentrated on part of the site during construction or operation	Yes	The trail network will be built to IMBA standards, which included are designed to efficiently disperse water from trail surfaces. However, there is potential for runoff to concentrate along the trails.
Flow of water is impeded on part of the site during construction or operation	Yes	The trail network is designed to follow the natural contours of the landscape, minimising the need for drainage line crossings. Where required, drainage line crossings would include rock armoured bed level crossings or raised trail bridges. These features are not likely to impede the flow of water. Note that the trail network would only cross two ephemeral 1st order tributaries of Kembla Creek within Schedule 1 land.
Proposed development during construction or operation will discharge effluent (including to sewer), dust, stormwater or other pollutants	No	Human faecal waste will be completely containerised in portable toilets, subject to regular servicing to empty and prevent overflow, and disposed of off-site as per legislative requirements. Whilst this is not relevant to this Part 5 proposal, this will be further assessed in the Part 5 development application referred to in Section 3 of the REF.
Any other matter considered to result in an identifiable impact on water quality	No	

NorBE assessment – will there be a neutral or beneficial effect on water quality? **(Assessment must consider surface and ground water and must consider construction and operational phases)**	
Are there any identifiable potential impacts on water quality?	
What pollutants are likely during construction or operational phase Major potential pollutants are sediments (fine & coarse), nitrogen, phosphorus, pathogens and hazardous chemicals and contaminants such as oil/fuel.	Potential pollutants that may be derived from the project during the construction and operational phases include the following: • Sediments • Hydrocarbons (equipment fuel) • Weeds and soil pathogens • Waste including ablution and toilet waste (construction phase).
For each pollutant list the safeguards needed to prevent or mitigate potential impacts on water quality (these may be WaterNSW endorsed current recommended practices (CRPs) and/or equally effective other practices)?	
Sediments	During the construction phase, sediment controls will follow the Landcom (2004) Soils and Construction guidelines and will include: Sediment Fabric or EcoLog™ Coir Fibre Logs used as sediment barriers or controls. These features will be installed prior to any clearing works commencing. The trail alignments will be clearly demarcated to ensure that the approved construction footprint is adhered to. A best practice (Landcom 2004) self-auditing program for site stabilisation and erosion controls will be implemented for the site. The timing of the site inspections will be on a periodic basis and at opportunistic times such as during and immediately following rainfall events that cause run-off. The following elements would be inspected: • condition of stockpiles and rehabilitation areas (including records of any slumping). • Condition of sediment and erosion control structures. • Whether sediment or other pollutants are leaving the site or have the potential to do so. • Maintenance requirements, and locations where sediment is disposed. Following completion of each audit, records will be provided to the site manager for further planning and implementation of appropriate controls. The trail network is designed to follow the natural contours of the landscape, minimising the need for drainage line crossings, and reducing the protentional for erosion. Where required, rock armouring would be installed along the trails to mitigate erosion.
Hydrocarbons	All major refuelling (>200 L) exercises will be undertaken outside of Schedule 1 lands. Spill kits are located at each work site to manage minor spills. All equipment will be fit for purpose and in good working order.
Weeds and soil pathogens	A Weed Management Plan (WMP) will be developed prior to the construction phase of the proposal. Any weeds removed during the construction phase will be disposed appropriately outside the study at an authorised facility.
Human Faecal Waste	Human faecal waste will be completely containerised in portable toilets, subject to regular servicing to empty and prevent overflow, and disposed of off-site as per legislative requirements.

	Any permanent facilities are to be subject to a separate Part 5 assessment (see REF document for details).
General	Entry to any Schedule 1 land will be in accordance with a WaterNSW access agreement, including restrictions due to rainfall.
Environmental Safeguards	
Will the safeguards be adequate for the time required? How will they need to be maintained?	Yes – all safeguards proposed for the construction phase will be installed and maintained for the duration of construction activities. During the operational phase, regular inspections and maintenance would be employed, as per Section 6.2 of the REF, to ensure all drainage features and erosion mitigation measures are functioning correctly.
Will all impacts on water quality be effectively contained on the site by the identified safeguards (above) and not reach any watercourse, water body or drainage depression? Or will impacts on water quality be transferred outside the site for treatment? How? Why?	Yes – any potential impacts on water quality would be effectively contained at the site by the above safeguards.
Is it likely that a neutral or beneficial effect on water quality will occur? Why?	Yes – it is likely that the proposal would have a neutral effect on water quality.
Prepared by / Date	Kai Whitaker - Niche Environment and Heritage – February 2022

Australian Government
Department of Agriculture, Water and the Environment

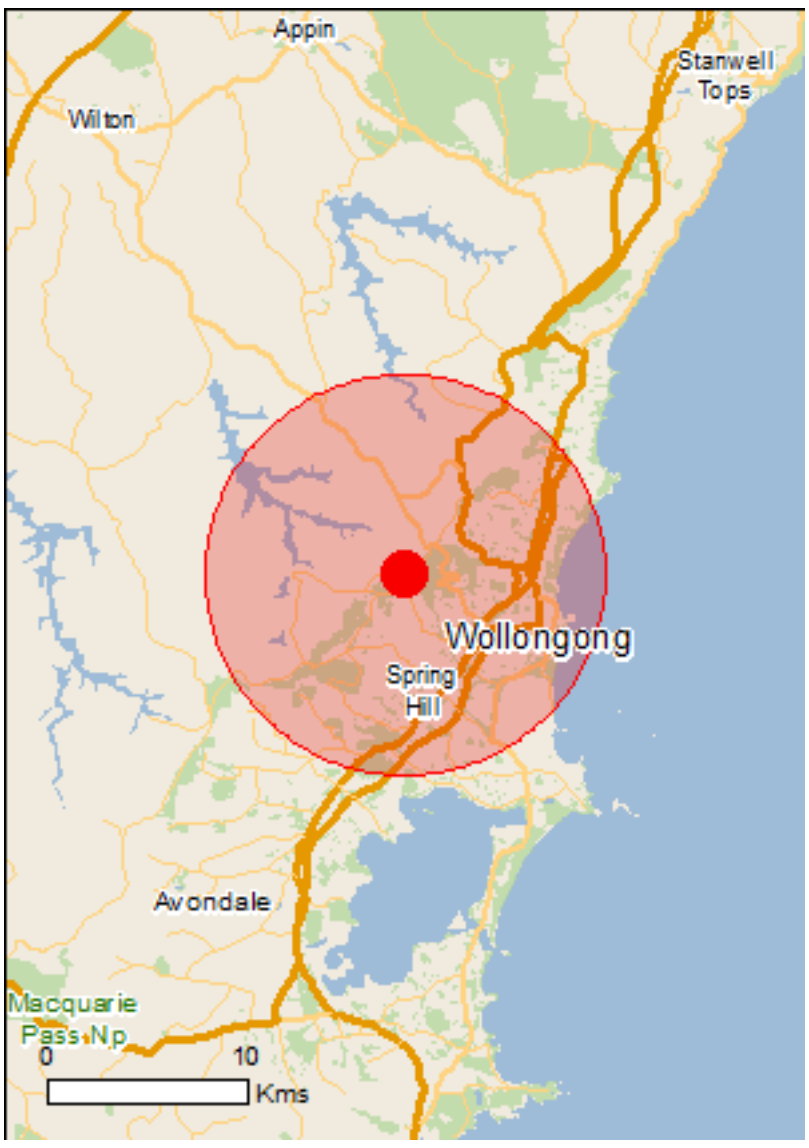
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 23/06/21 16:57:53



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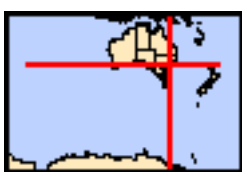

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	21
Listed Threatened Species:	95
Listed Migratory Species:	55

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	13
Commonwealth Heritage Places:	None
Listed Marine Species:	76
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	2
Regional Forest Agreements:	None
Invasive Species:	48
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community likely to occur within area
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community likely to occur within area
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community likely to occur within area
Coastal Upland Swamps in the Sydney Basin Bioregion	Endangered	Community likely to occur within area
Coastal Upland Swamps in the Sydney Basin Bioregion	Endangered	Community likely to occur within area
Coastal Upland Swamps in the Sydney Basin Bioregion	Endangered	Community likely to occur within area
Illawarra and south coast lowland forest and woodland ecological community	Critically Endangered	Community likely to occur within area
Illawarra and south coast lowland forest and woodland ecological community	Critically Endangered	Community likely to occur within area
Illawarra and south coast lowland forest and woodland ecological community	Critically Endangered	Community likely to occur within area
Illawarra-Shoalhaven Subtropical Rainforest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Illawarra-Shoalhaven Subtropical Rainforest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Illawarra-Shoalhaven Subtropical Rainforest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Community likely to occur within area
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Community likely to occur within area
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion	Endangered	Community likely to occur within area
Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion	Endangered	Community likely to occur within area
Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion	Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		

Name	Status	Type of Presence
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis cucullatus cucullatus Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat likely to occur within area
Fish		
Bidyanus bidyanus Silver Perch, Bidyan [76155]	Critically Endangered	Translocated population known to occur within area

Name	Status	Type of Presence
Epinephelus daemelii		
Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Hippocampus whitei		
White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]	Endangered	Species or species habitat likely to occur within area
Maccullochella peelii		
Murray Cod [66633]	Vulnerable	Translocated population known to occur within area
Macquaria australasica		
Macquarie Perch [66632]	Endangered	Species or species habitat known to occur within area
Prototroctes maraena		
Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Heleioporus australiacus		
Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat known to occur within area
Litoria aurea		
Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area
Litoria littlejohni		
Littlejohn's Tree Frog, Heath Frog [64733]	Vulnerable	Species or species habitat known to occur within area
Mixophyes balbus		
Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat may occur within area
Chalinolobus dwyeri		
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat known to occur within area
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Isoodon obesulus obesulus		
Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Petauroides volans		
Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area
Petrogale penicillata		
Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)	Vulnerable	Species or species habitat known to occur

Name	Status	Type of Presence
[85104]		within area
Potorous tridactylus tridactylus		
Long-nosed Potoroo (SE Mainland) [66645]	Vulnerable	Species or species habitat likely to occur within area
Pseudomys novaehollandiae		
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
Acacia bynoeana		
Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat may occur within area
Allocasuarina glareicola		
[21932]	Endangered	Species or species habitat may occur within area
Caladenia tessellata		
Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area
Cryptostylis hunteriana		
Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area
Cynanchum elegans		
White-flowered Wax Plant [12533]	Endangered	Species or species habitat known to occur within area
Genoplesium baueri		
Yellow Gnat-orchid, Bauer's Midge Orchid, Brittle Midge Orchid [7528]	Endangered	Species or species habitat likely to occur within area
Grevillea parviflora subsp. parviflora		
Small-flower Grevillea [64910]	Vulnerable	Species or species habitat may occur within area
Grevillea raybrownii		
[65665]	Vulnerable	Species or species habitat likely to occur within area
Haloragis exalata subsp. exalata		
Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat known to occur within area
Leucopogon exolasius		
Woronora Beard-heath [14251]	Vulnerable	Species or species habitat likely to occur within area
Melaleuca biconvexa		
Biconvex Paperbark [5583]	Vulnerable	Species or species habitat may occur within area
Melaleuca deanei		
Deane's Melaleuca [5818]	Vulnerable	Species or species habitat may occur within area
Persicaria elatior		
Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat likely to occur within area
Persoonia acerosa		
Needle Geebung [7232]	Vulnerable	Species or species habitat may occur within area
Persoonia hirsuta		
Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
Persoonia nutans Nodding Geebung [18119]	Endangered	Species or species habitat known to occur within area
Pimelea spicata Spiked Rice-flower [20834]	Endangered	Species or species habitat likely to occur within area
Prasophyllum affine Jervis Bay Leek Orchid, Culburra Leek-orchid, Kinghorn Point Leek-orchid [2210]	Endangered	Species or species habitat may occur within area
Pterostylis gibbosa Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat likely to occur within area
Pterostylis saxicola Sydney Plains Greenhood [64537]	Endangered	Species or species habitat may occur within area
Pultenaea aristata [18062]	Vulnerable	Species or species habitat likely to occur within area
Rhizanthella slateri Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat known to occur within area
Rhodomyrtus psidioides Native Guava [19162]	Critically Endangered	Species or species habitat may occur within area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat known to occur within area
Thelymitra kangaloonica Kangaloon Sun Orchid [81861]	Critically Endangered	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area
Xerochrysum palustre Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat likely to occur within area
Zieria granulata Hill Zieria, Hilly Zieria, Illawarra Zieria [17147]	Endangered	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
[Hoplocephalus bungaroides](#) Broad-headed Snake [1182]	Vulnerable	Species or species habitat known to occur within area
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Sharks		
[Carcharias taurus (east coast population)](#) Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat likely to occur within area
[Carcharodon carcharias](#) White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
[Rhincodon typus](#) Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
[Anous stolidus](#) Common Noddy [825]		Species or species habitat likely to occur within area
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Ardenna carneipes](#) Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
[Ardenna grisea](#) Sooty Shearwater [82651]		Species or species habitat likely to occur within area
[Calonectris leucomelas](#) Streaked Shearwater [1077]		Species or species habitat known to occur within area
[Diomedea antipodensis](#) Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Diomedea epomophora](#) Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Diomedea exulans](#) Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Diomedea sanfordi](#) Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
[Fregata ariel](#) Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
[Macronectes giganteus](#) Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
[Macronectes halli](#) Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
[Phoebetria fusca](#) Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
[Sternula albifrons](#) Little Tern [82849]		Species or species habitat may occur within area
[Thalassarche bulleri](#) Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
[Thalassarche cauta](#) Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
[Thalassarche eremita](#) Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
[Thalassarche impavida](#) Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
[Thalassarche melanophris](#) Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
[Thalassarche salvini](#) Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Thalassarche steadi](#) White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
[Balaena glacialis australis](#) Southern Right Whale [75529]	Endangered*	Species or species habitat known to occur within area
[Balaenoptera edeni](#) Bryde's Whale [35]		Species or species habitat may occur within area
[Balaenoptera musculus](#) Blue Whale [36]	Endangered	Species or species habitat may occur within area
[Caperea marginata](#) Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
[Carcharhinus longimanus](#) Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
[Carcharodon carcharias](#) White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur

Name	Threatened	Type of Presence
		within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area
Limosa lapponica		
Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat likely to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Australian Postal Commission
Commonwealth Land - Australian Postal Corporation
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Commonwealth Trading Bank of Australia
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Defence Service Homes Corporation
Commonwealth Land - Telstra Corporation Limited
Defence - AIRTC WOLLONGONG
Defence - Graovac House
Defence - HYDROGRAPHIC OFFICE
Defence - TS ALBATROSS-WOLLONGONG
Defence - WOLLONGONG MULTI-USER DEPOT

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Puffinus griseus Sooty Shearwater [1024]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Thalassarche cauta		
Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita		
Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida		
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini		
Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov.		
Pacific Albatross [66511]	Vulnerable*	Species or species habitat may occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis rubricollis		
Hooded Plover (eastern) [66726]	Vulnerable*	Species or species habitat likely to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		
Acentronura tentaculata		
Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Festucalex cinctus		
Girdled Pipefish [66214]		Species or species habitat may occur within area
Filicampus tigris		
Tiger Pipefish [66217]		Species or species habitat may occur within area
Heraldia nocturna		
Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippichthys penicillus		
Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus abdominalis		
Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus whitei		
White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]	Endangered	Species or species habitat likely to occur within area
Histiogamphelus briggsii		
Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Lissocampus runa		
Javelin Pipefish [66251]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Solenostomus paradoxus Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata		
Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata		
Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Delphinus delphis		
Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Grampus griseus		
Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus		
Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca		
Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Tursiops aduncus		
Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str.		
Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Berkeley	NSW
Illawarra Escarpment	NSW

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat may occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Lake Illawarra	NSW

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-34.40526 150.83362

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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