

North West Bay River Multi-use Trail Feasibility Study



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Executive Summary

The feasibility of constructing a multi-use trail from Longley to Margate along the North West Bay River was assessed through trail route surveys, natural values surveys and preliminary community consultation.

The trail link has been identified as a priority trail under the *Kingborough Tracks and Trails Strategic Action Plan 2017–2022*. The assessment looked at the complete trail from Longley to Margate as well as linking existing trails and river access points such as Sandfly Reserve to Riverdale Road and Miandetta Drive to the Channel Highway or Hopfields Road.

The trail/s is to achieve the following broad objectives:

- A multi-use trail (bikes, horses, walkers)
- Predominantly on public land
- A focus on local community as opposed to tourists
- A whole of community focus (options for Landcare/Community working bees)
- Designed to minimise future maintenance costs (i.e. out of flood zones where possible)
- Protection of natural and cultural values

The feasibility study had the following findings:

- A trail from the Longley Reserve to Margate is feasible and can be constructed largely within public land. Significant sections will, however, need to traverse private land, requiring formal access or lease agreements to be negotiated.
- The trail can be routed and constructed to minimise impacts on natural values. Detailed flora and fauna details of trail routes will be required to avoid impacts to threatened flora and habitat elements such as den sites and trees with hollows.
- The completed trail should be located predominantly on the northern side of the river to minimise river crossings.
- There is broad in-principal support from the main landowners on the northern side of the river for a future trail link across their land.
- Constructing the trail to a standard that allows for horse access will require deviation from the river edge in some areas to avoid steep ground.
- Several potential locations for river crossings have been identified, however these will only be accessible during low flows periods unless bridges are constructed.
- Dog walking on the trail is not recommended given the abundance of wildlife occurring in the intact vegetation along the river and due to the proximity of the trail

to rural land and private residences. Decision on allowing or disallowing dogs on the trails would be declared pursuant to Council Dog Management Policy and following further consultation.

- Prior to any trail construction broad community consultation should be undertaken to gauge support for trail routes and to develop priorities. Direct consultation with landowners adjacent to trails and trail access points is necessary to identify and resolve any issues.
- The trail construction should be undertaken in sections as budget allows and as negotiations for access to private land and Crown Land are formalised. The staging suggested in this plan may alter as a result of negotiations.

Key considerations for specific trailheads and sections of the trail identified in this study:

- Links between Sandfly Reserve and Riverdale Road and from Miandetta Road to Margate can be constructed almost entirely on public land and have less restrictions than other sections. Lease arrangements with Crown Land Services will be required.
- Options for a trailhead or improved access at the Margate end of the river are limited due to lack of parking, and restricted pedestrian access to Margate along Channel Highway. Access off Hopfields Road and development of a small trailhead on private land at Channel Highway are discussed in the report.
- The Longley Reserve and the Sandfly Reserve provide potential locations for the development of formal trailheads, car parking and facilities. Currently, activities within the Sandfly Reserve are restricted to walking only.
- A link between Riverdale Road and Sandfly Reserve can be developed on public land without the need to traverse private land.
- There are no other river access or exit points suitable for future trailhead development due to lack of public land for parking or facilities and proximity to private residences.
- A trail linkage to the Allens Rivulet trails via Riverdale Drive is feasible but requires permission/agreement to traverse a section of private land to complete the link.
- Development of a trail link from Riverdale Road to Sandfly Reserve and from the formalisation of the link from Miandetta Drive to Channel Highway will need to consider increased demand for access and parking at the end of the roads. There is very limited capacity for parking at these locations and as such these trail links should be aimed at local use only rather than identified as trailheads.
- Increased usage of Riverdale Road as an access point to the river and a link to Allens Rivulet and Sandfly Reserve is not supported by some residents along the river and Riverdale Road.

1. Introduction

Kingborough has a significant network of recreation trails across the municipality. These provide essential recreational opportunities for residents and visitors alike.

With the Kingborough Municipality experiencing rapid growth, there is a strong demand for access to outdoor recreation areas, tracks, and trails for passive and active recreation.

The North West Bay River and broader catchment are regularly accessed by locals and visitors for recreational pursuits including bushwalking, bike riding, horse riding, swimming, fishing, kayaking and rock climbing.

The development of additional trails within the municipality and, in particular, the North West Bay River Catchment to provide linkages between towns and existing trails has been heavily advocated by the local community for many years through the Trail Riders Action Club (TRAC) and other residents.

In response to the increasing demand for recreational opportunities, the Kingborough Council developed the *Kingborough Tracks and Trails Strategic Action Plan 2017- 2022*. The plan identifies guiding principles to ensure track development is strategic and supported by the community.

There are two 'Priority 1' track proposals in the Action Plan which are of relevance to the North West Bay River Catchment.

1. Allens Rivulet – North West Bay River, via Riverdale Drive and public open space, Crown land
2. Longley – Margate link (via North West Bay River)

In addition to these, there are three 'Priority 2' track proposals which would link into the North West Bay River Catchment area from Kingston and surrounds.

1. Kingston/Mt Pleasant – Sandfly Road
2. Kingston – Sandfly Road via One Tree Hill
3. Sandfly – Longley

Enviro-dynamics in conjunction with Mtn Trails P/L was engaged by the Kingborough Council in 2019 to undertake a feasibility study of the North West Bay River multi-use trail link between Longley and Margate.

1.1. Project Objectives

The following project objectives for the trail were identified by Council and investigated as part of the feasibility study:

- A multi-use trail (suitable for bike riders, horses and walkers)
- Trail to be predominantly on public land
- A focus on local community as opposed to tourists
- A whole of community focus (options for Landcare/TRAC Community working bees)
- Designed to minimise future maintenance costs (i.e. out of flood zones where possible)
- Protection of natural and cultural values.

1.2. Study Approach

The feasibility study was undertaken using the following methodology:

- Assess the most practical and effective trail route, including side trips or linkages to other trail networks or diversion points for different users and suitable river crossings and access points.
- Assess the natural and cultural values (including Aboriginal Heritage Surveys) in the area and corridor of the preferred route to enable the route to avoid and/or minimise any impact on significant conservation and cultural values.
- Provide detailed staging options for the project and associated design, access, and construction costs.
- Consideration of the potential recreational impacts of overuse and the increased demand from visitors and how to manage multi-use.
- Undertake consultation with key stakeholders including, but not limited to, relevant landowners, Trail Riders Action Club, mountain bikers (e.g. Coningham MTB Club) and Kingborough Council employees with a vested interest in the project (including Property, Recreation, NRM department and Parks and Reserves Unit) as part of a Council Staff Working Group to identify their needs and any opportunities or concerns.
- Provide recommended options and locations for associated infrastructure – trailheads, picnic spots, waterhole access, car parking, interpretative signage, trail marking and etiquette signage, map boards, etc.
- Identify what the major issues are that would need to be resolved to move the project forward.

1.3. Community Consultation

As part of the feasibility study targeted community consultation was undertaken.

The following groups and individuals were consulted:

- Trail Riders Action Club (TRAC)
- Mountain bike riders
- Private landholders along the river who may be directly impacted by a future trail
- Kingborough Council staff
- Crown Land Services.

A summary of the initial community consultation is provided in Appendix 1.

A community consultation process was undertaken through the 'Our Say' platform on the Kingborough Council website over a 4-week period in June and July 2020. The plan received a strong response with over 2000 visits to the forum and 125 ideas, 474 votes and 25 comments received.

The feedback received showed strong support for a multi-use trail along the North West Bay River. There were several specific issues raised that will require further investigation and community consultation when the trail is developed. There were some aspects of multi-use that divided the community. These issues will be given further consideration through management policies. The plan has been amended to reflect the community feedback.

2. Site Description

The North West Bay River is the largest river system in the Kingborough Municipality with a catchment area of over 9,600 hectares and a length of approximately 25 km. It originates on the western side of Mount Wellington and winds its way through the landscape of mostly Jurassic dolerite geology to North West Bay at Margate. The river system is largely intact with the upper reaches within the Wellington Park and the lower reaches passing through private land, Crown land and Council Reserves (Figure 1).

Several tributaries and minor streams join the river between Longley and Margate including Coombes Rivulet, Quarry Creek, Leverts Rivulet, Cooke Rivulet, Allens Rivulet and Mafeking Creek.

The river has intact riparian vegetation for most of its length with only small areas of agricultural land adjacent to the river near Longley and at Margate. Given the location of the river within a highly developed area of Tasmania it is in good condition and provides an important example of an intact river system.

2.1. Current Usage and Access

The river is a popular recreation destination used by locals and visitors from Hobart and surrounds. The river provides for recreational pursuits including walking, bike riding, horse riding, swimming, picnicking, fishing, kayaking and rock climbing.

The river also provides an easily accessible location to appreciate the natural environment and relax without traveling long distances from where people live.

Walking/dog walking/horse riding

Formal walking trails to the river are located at the Sandfly Reserve (North West Bay River Track) and off the end of Miandetta Drive. The North West Bay River Track is a walking track only with no dog walking, bike riding or horse riding permitted. A partially formed trail now links Miandetta Drive to the Channel Highway at Margate via the northern side of the river. This trail is unformed in places and utilises a 4wd track for part of the lower section. Sections of this trail are suitable for bike riding and horse riding, although access from the Miandetta Drive end and river crossing can be challenging unless the river levels are low.

The broken weir area off the end of Hopfields Road has previously been accessed across private land, however this access is now closed off.

Mountain biking

There is limited opportunity for mountain bike riding along the river due to a lack of trails and connections to other trails. The recently marked and informally built trail from Miandetta Drive to Channel Highway is getting some use (source: strava.com), however the river crossing at the Miandetta Drive end is only possible during low flow periods.

Swimming holes/picnicking

There are several swimming holes and informal picnic areas on the river. Popular areas include the Sandfly Reserve, off Matthews Road; and off Miandetta Drive (multiple pools).

Kayaking

Kayaking is a popular activity on the river when there are high flows. Generally, the river is accessed below the bridge on the Huon Highway with kayakers exiting at the Bowls Club in Margate.

Rock climbing

Two popular climbing spots are accessed from the Sandfly Reserve (Sandfly Crag) and from the TasWater access road along Sandfly Road (Dog Leg Bend). The TasWater access is through private land and requires permission from landholder prior to access.

Fishing

Fishing can occur along all sections of the river, with a popular spot being near the bridge at the Channel Highway.

3. Trail Surveys

The proposed trail will follow a section of the North West Bay River from Longley (at the reserve) to Margate, with a distance of approximately 11 km plus up to 2 km of trail linkages. The river route has been divided into four sections for surveying based on access points along the river and linkages to existing trails (Figure 1). An assessment of physical feasibility of each trail section and the natural values and limitations is provided in separate tables for each section:

1. Longley Reserve to Sandfly Reserve
2. Sandfly Reserve to Riverdale Road and linkage with Allens Rivulet trail (2a)
3. Riverdale Road to Miandetta Drive
4. Miandetta Drive to Hopfields Road and Margate Bridge (4a)

3.1. Survey Methodology

On-ground surveys were undertaken along the length of the river to assess the terrain, natural values, access and location of features such as waterholes, potential crossing points and weeds.

Prior to the surveys all private landholders who own land along the river were contacted to seek permission to enter their land or cross their land to access the public land along the river.

Initial field surveys were undertaken to access the most suitable physical location for a multi-use trail with the primary objective to locate the trail predominantly on public land where possible and to minimise river crossings. To meet the objective of a multi-use trail suitable for horses, steep areas had to be avoided, which resulted in departing from the river in some areas.

Once the physical trail route and potential river crossing points were identified, the natural values along and surrounding the identified routes were assessed to identify any high conservation values. The natural values surveyed and mapped included vegetation communities, flora species of significance, important habitat features such as den sites and trees with hollows and environmental threats such as weed infestations.

Trail routes and important features were recorded using handheld GPS units. Photos of features such as potential crossing points, threatened flora and willow locations were also taken.

3.2. Physical Terrain

The trail from Longley to Margate will traverse a range of terrains including river flats, cleared land, rocky riverbanks, rocky slopes and cliffs and some rocky hilltops.

The trail will need to be routed away from the river in some locations to avoid steep riverbanks and rocky cliffs and to traverse the more significant tributaries that enter the river. The broad trail route was located to avoid rivers flats where possible, as they are likely to be subject to flooding. The visible river levels from the July 2018 floods (debris) was used as the indicator of the maximum river height. All broad trail routes attempted to stay above this level. Where possible the trail route attempted to remain within public land. Due to limitations of the terrain (steep riverbanks) and sections of the river not being bordered by any public land some sections of the trail will need to traverse private land.

The trail route was selected to allow for a wide multi-use trail. In some locations there may be a case for developing separate trails with a narrower single walking or bike trail able to be constructed closer to the river in many locations and a horse trail traversing more open ground with lower gradients. Alternative routes for separate walking and horse trails were not investigated as part of this initial feasibility study.

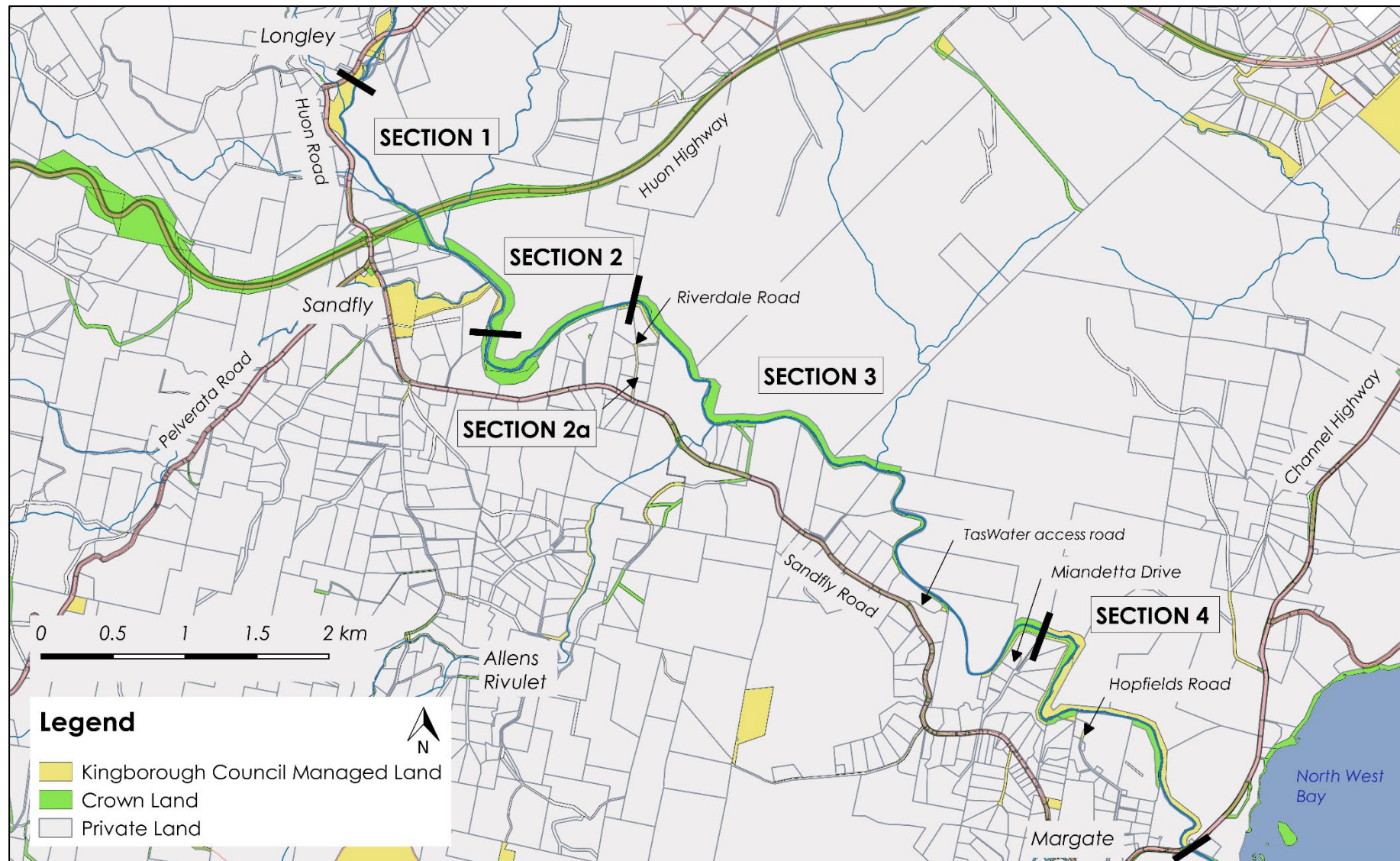


Figure 1 - Location of assessed trail sections and tenure of land along river.

3.3. Natural Values

The survey of the natural values along the proposed trail route was undertaken to identify any significant values or threats that should be avoided or mitigated. The assessment mapped broad vegetation communities within a trail corridor (approximately 20–30 m wide), documented significant flora and fauna species and habitat values and mapped threats such as weed infestations. The assessment aimed to determine if there are any areas where trails should be avoided or diverted.

3.3.1. Vegetation communities

Six vegetation communities were mapped along the proposed trail route between Longley and Margate as per the TASVEG (v3.0) vegetation classification system (Figures 2–5).

Vegetation mapping was restricted to the trail corridor (approximately 50–100 m wide) along the river. The following communities were mapped:

1. ***Eucalyptus obliqua* dry forest (DOB)** – dominant community along the river. Occurs in a narrow strip on northern side of the river with larger areas present in broader valleys.
2. ***Eucalyptus obliqua* wet forest (WOU)** – occurs on south-facing slopes and wetter areas.
3. ***Eucalyptus pulchella* forest and woodland (DPU)** – widespread on slopes and hilltops away from the river, generally adjacent to DOB.
4. ***Eucalyptus globulus* dry forest and woodland (DGL)** – localised patches where *E globulus* is the dominant tree species.
5. ***Eucalyptus ovata* forest (DOV)** – small patches on river flats north of Huon Highway.
6. ***Eucalyptus amygdalina* forest and woodland on dolerite (DAD)** – occurs on hilltops above river east of Mafeking Creek.

The DOV and DGL communities are listed under Schedule 3A of the *Nature Conservation Act 2002* (NCA) and classified as 'High Priority Biodiversity Value' under Table E10.1 of the *Kingborough Interim Planning Scheme 2015* (KIPS). DOV has recently been listed as a 'threatened ecological community' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA).

The trail will avoid these communities where possible to minimise disturbance. By avoiding the DOV community, referral to the Commonwealth under the EPBCA will not be required.

All other communities are common and well represented in reserves and hence not listed under the NCA. Where these communities contain threatened flora species or threatened fauna habitat they are considered to have 'Moderate Priority Biodiversity Value' under the KIPS.

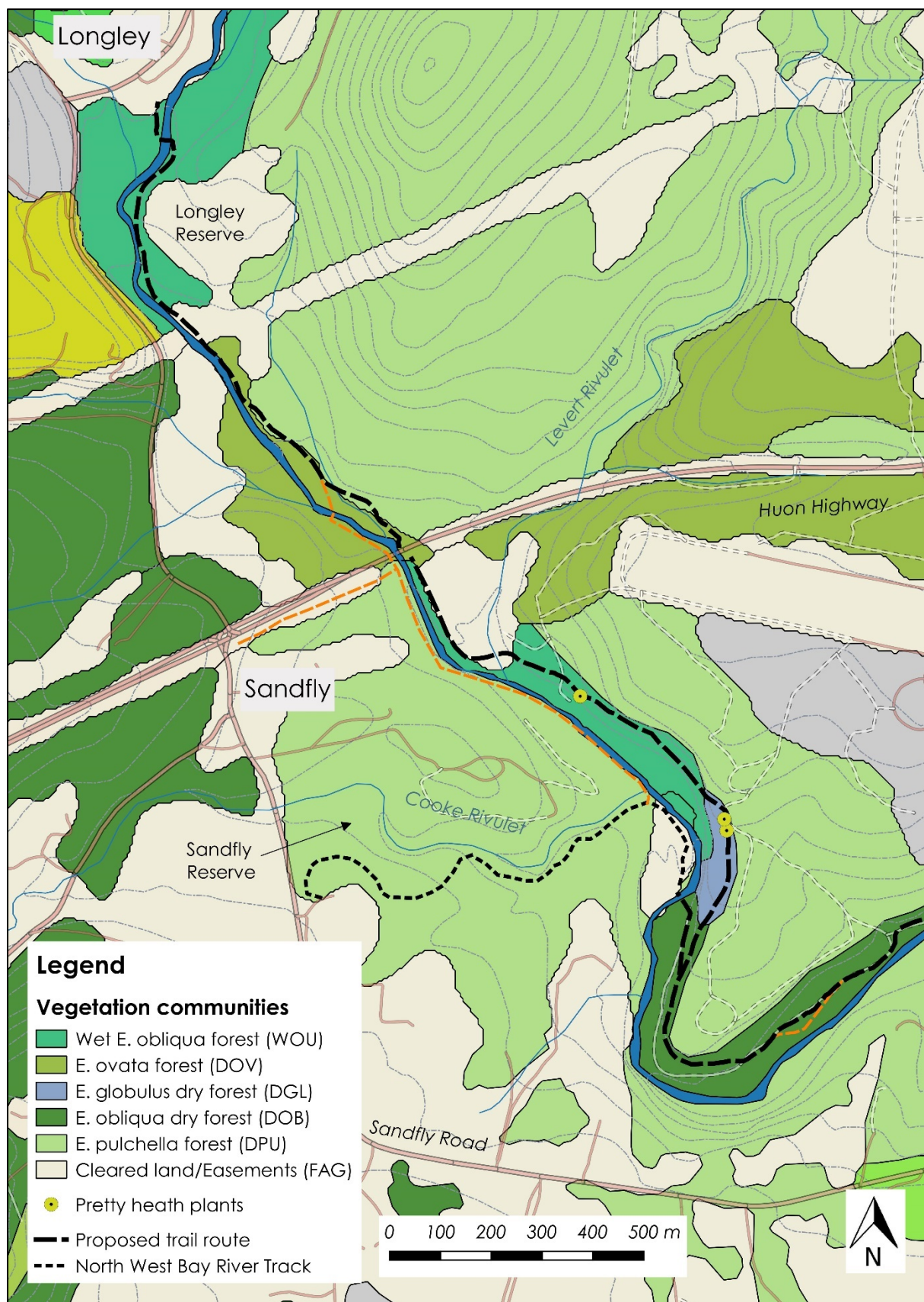


Figure 2. Natural Values - Longley to Sandfly Reserve.

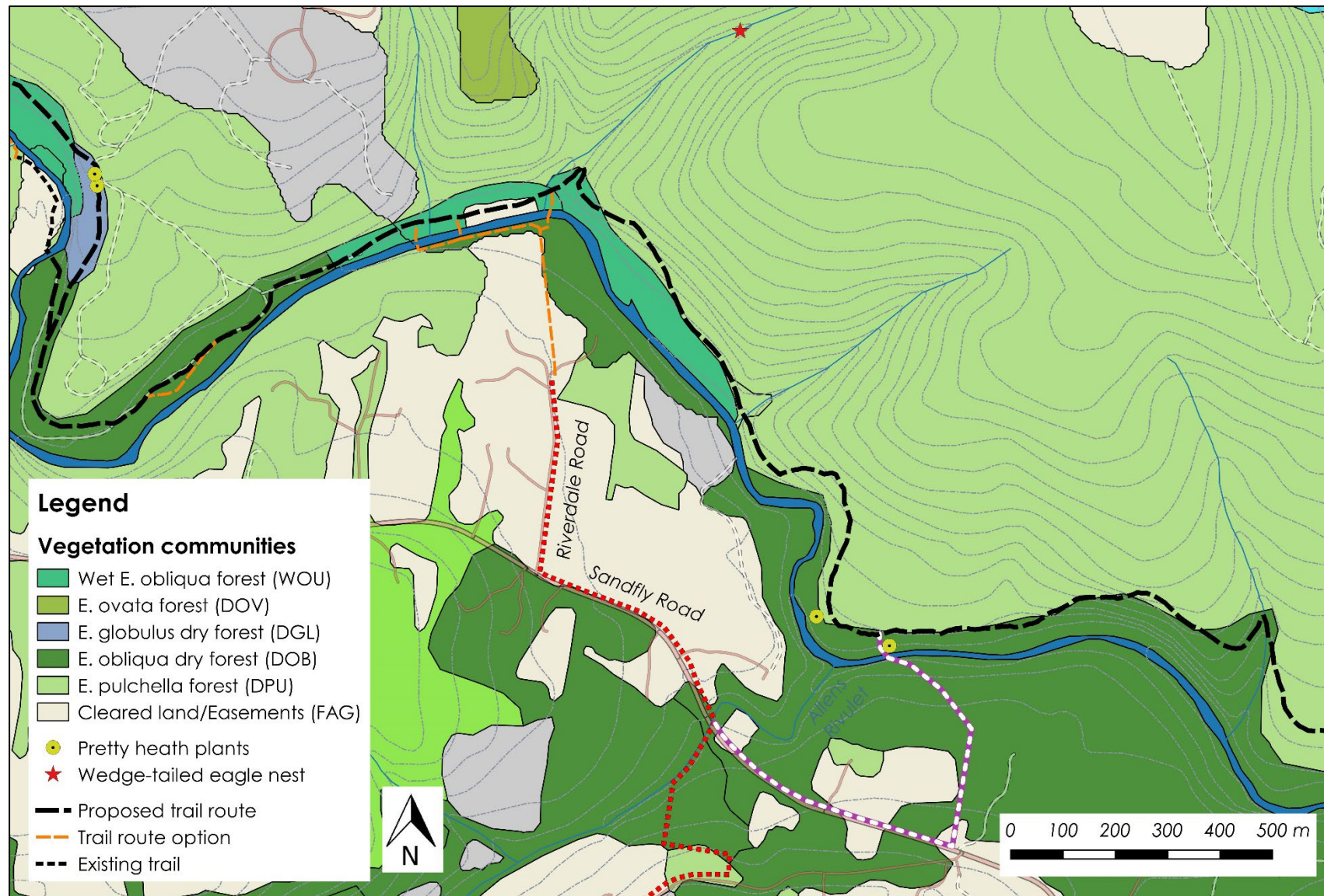


Figure 3. Natural Values- Sandfly Reserve to Riverdale Road/Allens Rivulet junction.

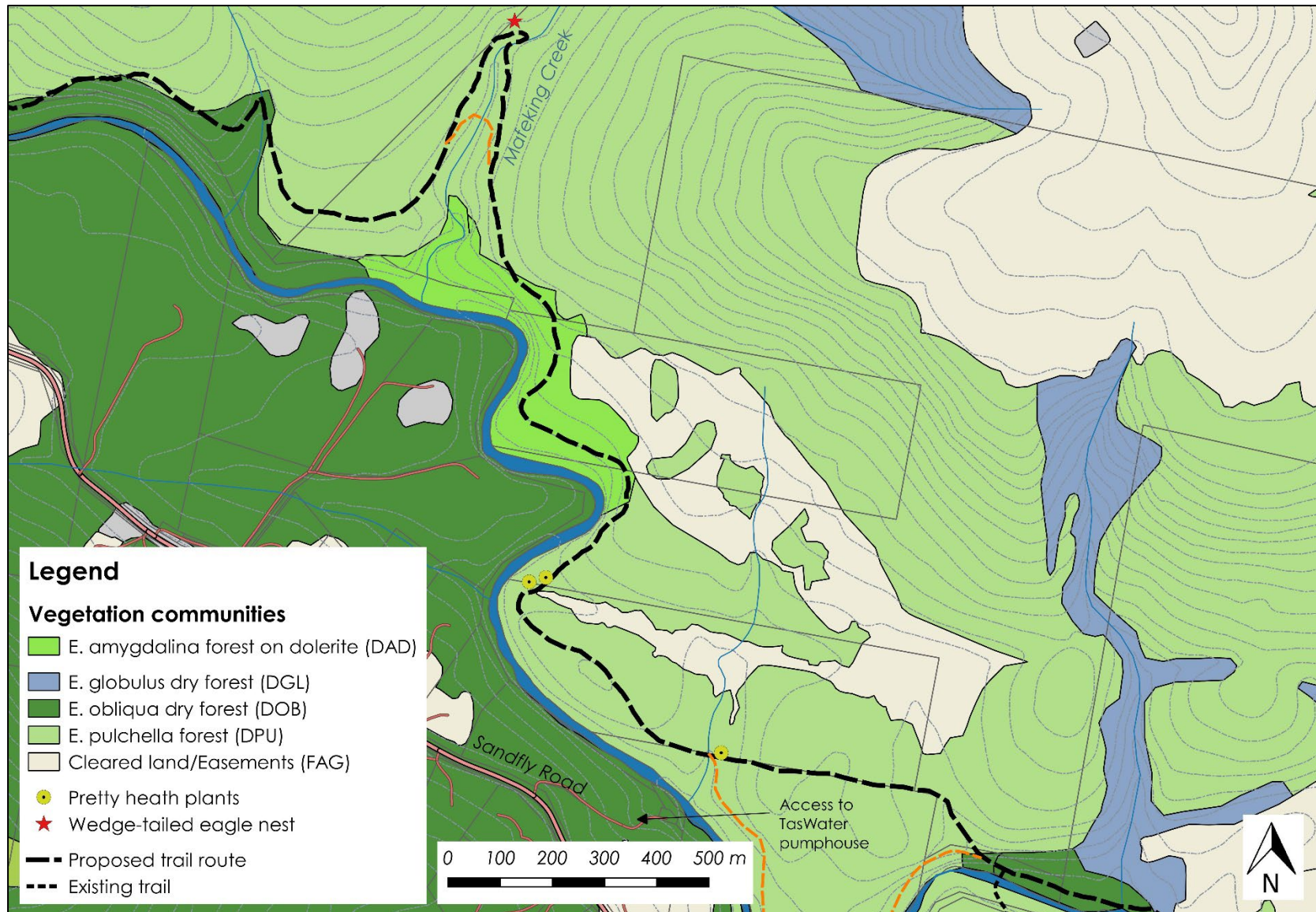


Figure 4. Natural Values – Mafeking creek to TasWater pumphouse access/Miandetta Drive.

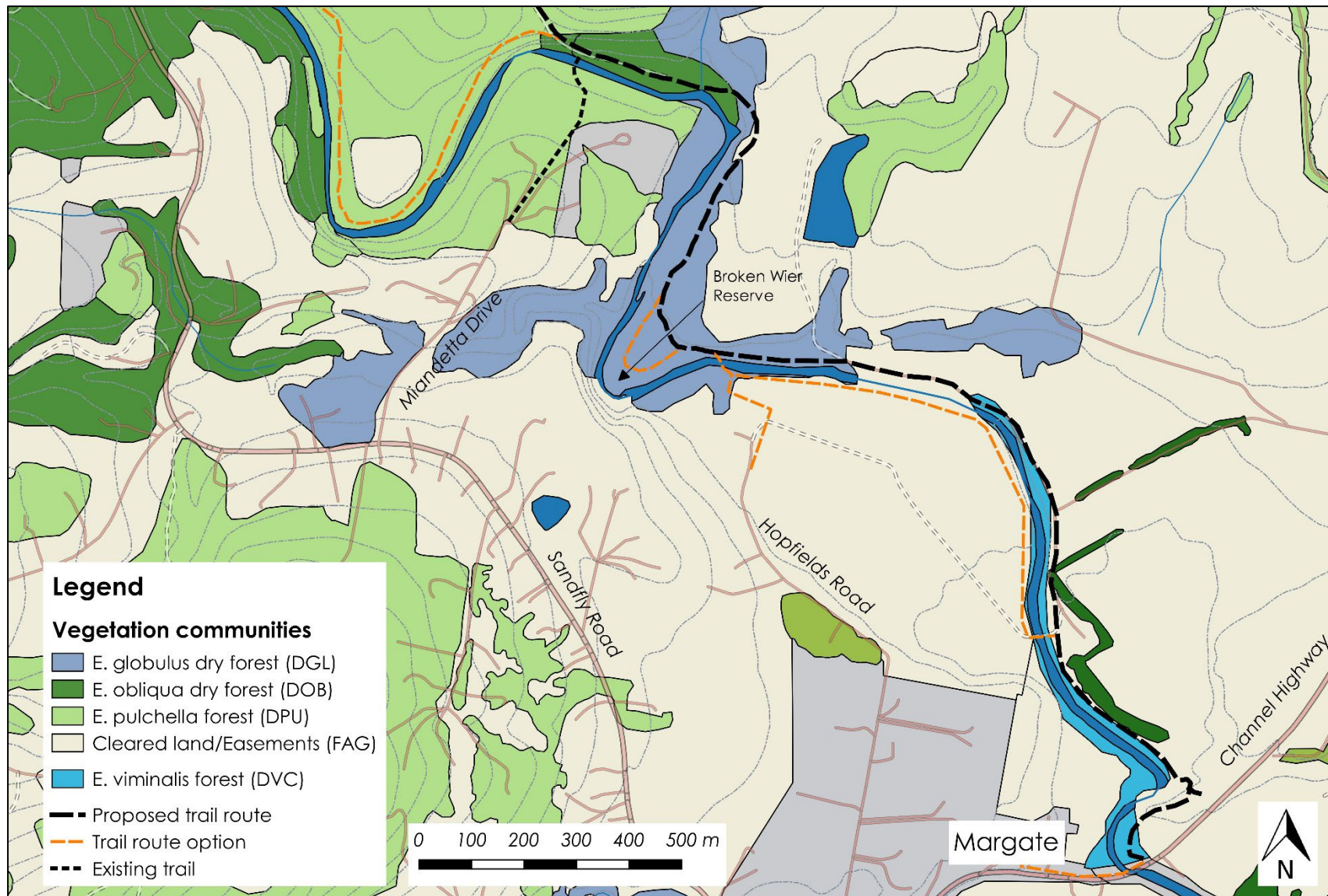


Figure 5. Natural Values – Miandetta Drive to Channel Highway.

3.3.2. Flora Values

A wide range of native plants were recorded in the vegetation communities along the trail corridor. A list of species is provided in Appendix 2.

One threatened species was recorded during site surveys:

- ***Epacris virgata* (pretty heath)** - found in several locations along the trail corridor on the northern side of the river (Figures 2–5).

A search of the Natural Values Atlas (DPIPWE database) revealed that nine threatened flora species have been recorded within 1000 m of the trail corridor. Table 1 outlines the species and the likelihood of them occurring within the corridor.

Table 1. Threatened flora species recorded within 1 km of trail corridor.

Scientific name	Common name	TSPA	EPBCA	Comments
<i>Diuris palustris</i>	swamp doubletail	e		Records from Sandfly area from late 1800s. Recent searches have not found species. Unlikely to remain in area due to disturbance.
<i>Epacris virgata</i> (Kettering)	pretty heath	v	EN	Endemic. Found in south-eastern Tas. Widespread in catchment, generally occurring in <i>E. pulchella</i> forest/woodland and <i>E. ovata</i> forest/woodland. Records in several locations in trail corridor
<i>Juncus amabilis</i>	gentle rush	r		Not recorded. Species in process of being delisted.
<i>Lepidosperma tortuosum</i>	twisting rapiersedge	r		Found on mainland Australia and in south-eastern Tasmania. Habitat is open heathlands and woodlands. Not recorded during surveys. Limited suitable habitat within corridor
<i>Poa mollis</i>	soft tussockgrass	r		Endemic to eastern Tas. Found on dry open hillsides and cliffs. Single record within catchment from 1913. Location is likely to be inaccurate. Not recorded during surveys. Limited suitable habitat within corridor.
<i>Pomaderris elachophylla</i>	small-leaf dogwood	v		Found on mainland Australia and in Tasmania in wet forests. Leslie Vale is a key site for this species. Records within 100 m are from 1800s and may be inaccurate. Not recorded during surveys.

<i>Senecio squarrosus</i>	leafy fireweed	r		Found on mainland Australia and Tasmania in dry woodland communities. Single record within catchment in Margate area. Requires fire every 5-15 years. Not recorded during surveys. Suitable habitat within corridor and may occur.
<i>Thelymitra inflata</i>	Inflated sun-orchid	e		Population recorded northeast of Leslie Hill, at an altitude of 240 m in heathy-sedgy-grassy <i>Eucalyptus pulchella</i> open stands. Not recorded during surveys. Limited suitable habitat within corridor and unlikely to occur.
<i>Westringia angustifolia</i>	narrowleaf westringia	r		Tasmanian endemic. Occurs in dry eucalypt forests and is often associated with riverbanks. Scattered records from intact forest in upper catchment. Not recorded during surveys. Marginal habitat in trail corridor but unlikely to occur.

The trail corridor provides potential habitat for some of the species recorded within 1000 m and as such detailed surveys along trail alignments will be required as part of the trail development. Planned trails can be routed to avoid any impacts on threatened species if recorded during detailed surveys.

3.3.3. Fauna Values

Broad fauna habitat surveys were carried out along the trail routes to assess the likelihood that the trail will impact threatened fauna species.

A search of the Natural Values Atlas (DPIPWE database) revealed that ten threatened fauna species have been recorded within 1000 m of the trail corridor. The species recorded included swift parrot, wedge-tailed eagle, Tasmanian devil, eastern quoll, spotted-tailed quoll, grey goshawk, eastern barred bandicoot, azure kingfisher, Australian grayling and masked owl.

Habitat recorded.

The trail corridor contains a significant number of mature to old growth trees with hollows suitable for bird and mammal species such as swift parrot, masked owl and possums.

Potential denning habitat for species such as Tasmanian devils, eastern and spotted-tailed quolls occur within the corridor in fallen logs and rocky outcrops.

Eagle nests - Three wedge-tailed eagle nests have been recorded within 1000 m of the trail corridor on east-facing slopes on tributaries north of the river (Figures 3 and 4 plus one nest outside edge of Figure 4).

The initial surveyed location of the Mafeking Creek crossing was within 20 m of a known nest site. Any future trail would need to be a minimum 200 m from the nest and be out of the sight line of the nest. Additionally, any trail construction would need to occur outside the breeding season if the nest was found to be active during the construction period.

Mature black gum and blue gum trees occur within the trail corridor. These trees provide foraging habitat for the swift parrot, however all trees with a diameter at breast height of >30 cm will be avoided and as such there will be no impacts on swift parrot habitat.

The trail will also avoid any potential denning habitat for devils and quolls such as hollow logs by a minimum of 10–20 m to minimise potential impacts on fauna species.

A grey goshawk nest site has been recorded in vegetation at the end of Miandetta Drive. The exact location of the nest will need to be determined to ensure new trails in this area do not come within 50 m of the nest (D. Young, pers. comm).

The lower reaches of the river provide suitable habitat for the Australian grayling. The trail will not impact on the river itself or the water quality.

3.3.4. Weeds and Disease

Weed species including Spanish heath, canary broom, willow, blackberry, montbretia and foxglove were recorded during the surveys. Weeds were recorded predominantly along the river and on river flats where fine soil and seed has been deposited from upstream during flood events. The areas of intact vegetation away from the river and not adjacent to cleared land were generally free of weeds.

The construction of a trail along the river has the potential to spread weed seed and increase their distribution, although the threat can be managed. Weed control prior to any trail construction and adherence to weed and disease hygiene protocols during constructing are critical to ensure weeds are not spread. Monitoring and maintenance of the trails post-construction will also be critical for weed control.

There were no obvious signs of the plant pathogen *Phytophthora cinnamomi* (PC) recorded during the surveys. The dominant vegetation communities within the corridor are generally considered to be of moderate susceptibility to PC, with a limited number of highly susceptible plant species present. The limited risk of the spread of PC as a result of trail construction can be managed through the implementation of hygiene protocols for the use of equipment and importation of soils.

3.4. Aboriginal Heritage

A desktop search of the Aboriginal Heritage Register by Aboriginal Heritage Tasmania of the broader North West Bay River catchment revealed two registered sites close to the Channel Highway in Margate. The relative absence of registered Aboriginal sites within the North West River Bay catchment is not a reflection of the use of, or importance of North West Bay and the river for the Tasmanian Aboriginal people. The lack of known heritage sites within the catchment is more likely due to limited survey effort.

Aboriginal heritage site surveys will need to be undertaken prior to trail construction and costed as part of future trail development. Any recorded sites will be avoided, and future trail construction will adhere to the document '*Unanticipated Discovery Plan - Procedure for the management of unanticipated discoveries of Aboriginal relics in Tasmania*'.

4. Trail Impacts and Feasibility Assessments

4.1. Impacts on Natural Values

The construction of a multi-use trail along the river from Longley to Margate can be undertaken without significant impacts to important natural values. The proposed trail is predominantly located in common and well-reserved vegetation communities with only 0.3% of the trail within threatened vegetation communities. An estimated 1.7 ha of native vegetation will be cleared or modified to construct the trail, with all trees >30 cm diameter at breast height to be avoided. In many areas the open woodland structure of the vegetation will require removal of only a small number of understorey trees or shrubs. Limited numbers and extent of threatened flora species were recorded during the trail survey and all populations can be avoided. Significant fauna habitats such as nest sites, trees with hollows and potential den sites will be avoided to minimise fauna impacts.

Direct impacts on fauna species from the trail usage by riders and walkers will be minimal with most usage likely to occur during the day when many species are inactive. Due to the abundance of habitat for fauna species such as wallabies, bettongs, bandicoots and other mammal species and the number of fauna species observed during the surveys the trail is not suitable for dog walking. In addition, the trail will be in close proximity to a number of private residences and rural properties with stock.

The construction of a multi-use trail along the North West Bay River has the potential to spread weed species during the construction period and through usage once completed (including on bikes, shoes and in horse droppings). The spread of weeds during trail construction can be managed through control of weeds prior to works and adherence to machinery and person hygiene protocols during construction. The spread of weeds by trail users can be managed through installation of wash down stations at trailheads, educational signage, and monitoring of the trail for weed infestations.

Monitoring and maintenance of weed and disease along the trail will be required on an ongoing basis and must be appropriately funded.

Given the current spread of weeds along the river through natural processes (including movement in flood water and from roads and via animals) the development of a trail network along the river does not represent a significant increase in the risk to the natural values.

Improved access and increased visitation to the river may raise the profile of the threats of weed invasion on the natural and aesthetic values of the catchment and lead to increased weed control efforts amongst concerned or engaged members of the public with the support of the Council and the State.

4.2. Feasibility Assessments

The following tables and figures provide an assessment of the feasibility of each section of proposed trail with and some alternative options. Linkage sections are also outlined including links to the Sandfly Reserve and to Allens Rivulet via Riverdale Road.

The tables are divided into trail segments as outlined previously and then further divided into construction segments including notes on natural values, limitations or alternative trail route options. Photos of the proposed trail route and river crossing points, etc. are provided in Appendix 3.

4.2.1. Section 1 - Longley Reserve to Sandfly Reserve

Table 2. Section 1- Longley Reserve to Sandfly Reserve – Segments 1-5.

Segment #	Tenure	Notes	Natural Values	Limitations/alternatives
Segment 1 - Longley Reserve Trail through Council land Western side of river Length: 120 m	Kingborough Council	Large council managed area which provides potential location for trailhead with parking, horse yards, toilets, picnic facilities etc.	<ul style="list-style-type: none"> Remnant white gums in reserve Some erosion on riverbank adjacent to reserve Through <i>E. obliqua</i> forest No threatened flora recorded Mature trees with potential hollows to be avoided. Significant weed infestations along river. 	<ul style="list-style-type: none"> Trail could remain within the reserve for 400 m however this would require the crossing of three small tributaries. Requires river crossing to join to next segment
Segment 2 - Council Reserve to Huon Highway Eastern side of river Length: 1000 m	Private land	Trails will traverse section of intact vegetation and along edge of cleared land. Small tributary to be crossed near Huon Highway,	<ul style="list-style-type: none"> Through small area of <i>E. ovata</i> forest No threatened flora recorded. Mature trees with potential hollows to be avoided. Significant weed infestations along river. 	<ul style="list-style-type: none"> Requires river crossing – possible to cross river in low flows Requires bridge to cross during higher flow periods or in longer term. Requires lease agreement with landholder for trail.

Segment #	Tenure	Notes	Natural Values	Limitations/alternatives
				<ul style="list-style-type: none"> Trail end at Huon Highway requires access under road – limitation in flood events.
Segment 3 - Huon Highway junction to low lying area Length: 200 m	Crown Land Reserve/ Private Land	<p>Small existing parking area in Huon Highway Reserve. Access under bridge to northern side of highway.</p> <p>Adjoining riparian reserve narrow (<20m wide).</p>	<ul style="list-style-type: none"> Remnant white gums along river edge Some erosion on river bank adjacent to reserve Weeds along river edge 	<ul style="list-style-type: none"> Trail start here likely to require State Growth approval for access off Highway – not suitable for trail start Trail would not fit in the existing public reserve due to large trees and the proximity of the riverbank Trail segment will require agreement from Landholder
Segment 4 – Across low lying area and small tributary Length: 120 m	Crown Land Reserve/ Private Land	Section across low lying area with small tributary	<ul style="list-style-type: none"> Through <i>E. obliqua</i> forest No threatened flora recorded Mature trees with potential hollows to be avoided. Significant weed infestations along river 	<ul style="list-style-type: none"> Section crosses number of small tributaries Cross river at reserve and stay on eastern side of river – requires landholder approval
Segment 5 – to Sandfly Reserve. Length: 900 m	Crown Land Reserve	<p>Reserves widens – 50-60m wide. Steep in places with cliff opposite Sandfly Reserve.</p> <p>Trail has potential to stay in the public reserve, but terrain gets quite steep (cross slope). It would suit multi use better to climb higher (into private land) to reduce cross slope (this could also reduce cost slightly).</p> <p>Trail goes above Sandfly cliffs.</p>	<ul style="list-style-type: none"> Through <i>E. obliqua</i>, <i>E. globulus</i> forest <i>Epacris virgata</i> recorded, to be avoided All mature trees to be avoided. 	<ul style="list-style-type: none"> Sections with steep cross slope section less suited to multi-use trail. Expensive – requires extensive rock work. Less expensive route would require access to private land - requires landholder agreement.

Segment #	Tenure	Notes	Natural Values	Limitations/alternatives
Segment 5a – Link from Sandfly Reserve to new trail Length: 180 m	Council Reserve/Crown Land	Informal river crossing at location with low banks. Trail utilises section of existing 4WD trail.	<ul style="list-style-type: none"> Through riparian vegetation and <i>E. obliqua</i> forest. Scattered weeds in river and along 4WD track 	<ul style="list-style-type: none"> Section subject to flooding Requires weed control actions Walking use only permitted within Sandfly Reserve.
Segment 3 – Option B Sandfly Road/Huon Highway to Sandfly Reserve. Length: 970 m (+350m Sandfly Road to River)	Crown Land Reserve/Road Reserve/Council Land	<p>Access from road reserve adjacent to Huon Highway.</p> <p>Parking in carpark at Sandfly Road available.</p> <p>Route follows river along road reserve block and joins narrow Council Reserve. Reserve narrow to 2m wide in one section. Trail needs to cross Cookes Rivulet and will require small bridge.</p> <p>Would require an additional river crossing north of highway to join through to Longley Reserve under proposed route for Segment 2.</p>	<ul style="list-style-type: none"> Remnant white gums along river edge Some erosion on river bank adjacent to reserve Through <i>E. pulchella</i> forest Through small area of <i>E. ovata</i> forest north of highway Mature trees with potential hollows to be avoided. Significant weed infestations along river. 	<ul style="list-style-type: none"> Trail goes under Huon Highway – limitation in flood events. Requires crossing north of bridge to link to Longley Reserve. Council land may be too narrow for trail (would require survey info to determine) Requires bridge to cross Cookes Rivulet near Sandfly Reserve. Trail option would avoid wet section on other side of river and the need to divert trail from river to bypass cliffs. Also avoid negotiated access with landowner.

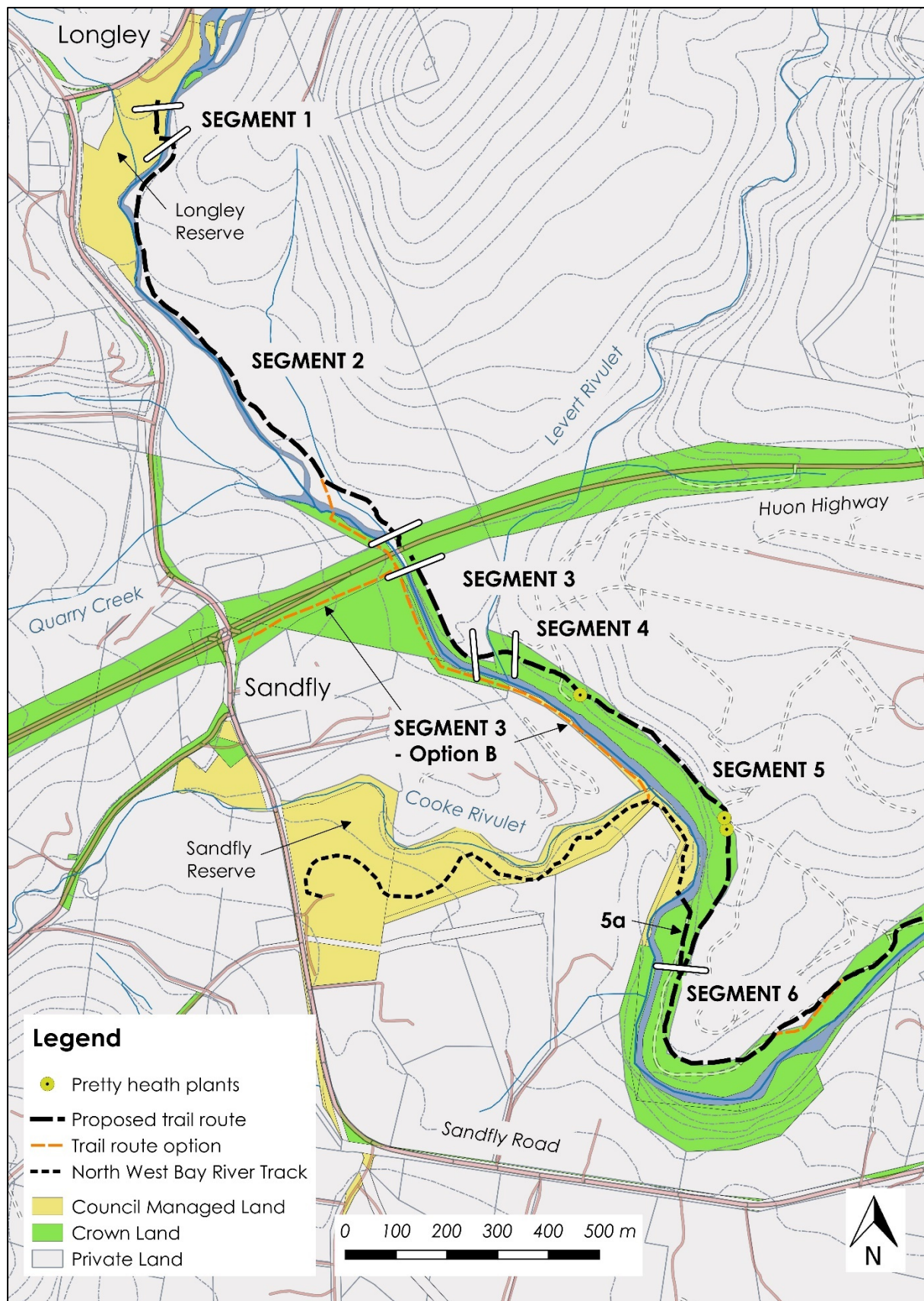


Figure 6. Trail segments - Longley Reserve to Sandfly Reserve.

4.2.2. Section 2 – Sandfly Reserve to Riverdale Road

Table 3. Section 2 – Sandfly Reserve to Riverdale Road – Segments 6-7.

Segment #	Tenure	Notes	Natural Values	Limitations/alternatives
Segment 6 – Sandfly Reserve link to Riverdale Road junction Length: 1300 m	Crown Land/Private Land	Possible to locate trail entirely within public land until private land lot at end of Riverdale Road. Partially follows existing 4WD track. Proposed trail includes new section around bend that is above flood plain	<ul style="list-style-type: none"> Remnant white gums Some erosion on riverbank adjacent to reserve Dense infestation of spanish heath and broom along 4WD trail on flood plain 	<ul style="list-style-type: none"> Sections of trail within flood plan and subject to flooding. Trail can follow existing 4WD track for entire segment but include short section on private land. Trail segment will require agreement from landholder Significant weed control required Last section of trail needs to traverse private land. Preferred option however requires negotiation with landholder (refer to 4.4).
Segment 7 – Crossing tributary opposite Riverdale Road entry Length: 50 m	Crown Land/Private Land	Trail to cross small tributary. Needs to cross onto private land to climb out of small gully	<ul style="list-style-type: none"> Through E. obliqua forest No threatened flora recorded. 	<ul style="list-style-type: none"> Trail crosses onto private land to climb out of gully. Trail segment will require agreement from landholder

4.2.3. Section 2a – Allens Rivulet - Riverdale Road trail junction

There are several options available to link Riverdale Road (and more broadly Allens Rivulet) with proposed new trails or section of trail to Sandfly Reserve. It should be noted that there is limited capacity for parking at the end of Riverdale Road and as such the river access is not suitable for use as a trailhead. There is opposition by residents to horse access along from Allens Rivulet along Riverdale Road to the river trail due to safety

concerns along Sandfly Road and lack of parking at end of the road. All options require consultation with landholders along Riverdale Road and those impacted by Allens Rivulet Link Option 2.

Trail options are outlined in Table 4 and indicated in Figure 7.

Table 4. Trail options for Section 2a.

Options	Tenure	Notes	Natural Values	Limitations/issues/benefits
Option A – Construct trail along newly acquired land to provide direct access to river and public land along river edge. Informal crossing to new trail.	Private Land	Some opposition from adjoining landowners to west due to impacts on privacy and lack of parking at end of Riverdale Road	<ul style="list-style-type: none"> Through cleared land and section of <i>E. obliqua</i> forest at river. 	<ul style="list-style-type: none"> Construction of trail to river edge cost effective due to cleared land and flat terrain. River crossing at this location dependent on access to private land on northern side of river to access Sandfly Reserve link. Construction of link to river may cause parking issues at end of Riverdale Road.
Option B – trail connection and river crossing to access new trail and Sandfly reserve	Council Land/Private Land/Crown Land	<p>Link to wider public reserve on northern side of river can be achieved on public land.</p> <p>Existing river crossing but only accesses private land on northern side.</p>	<ul style="list-style-type: none"> Remnant white gums along river edge. Scattered willows present along Crown reserve on southern side of river 	<ul style="list-style-type: none"> Requires use of narrow section of Crown land reserve. May require relocation of existing fences built on public land. Trail would traverse across front of two private lots (on public land). Opposition to option by landholders Option could use existing river crossing provided access to private land on northern side is negotiated. Trail could be constructed entirely on public land with informal crossing directly on public land. Construction of link to river may cause parking issues at end of Riverdale Road.

Allens Rivulet link Option 1	Council Land/Private Land/Crown Land	Access from Allens Rivulet via Council land, Crown road reserves and across private land to connect to Sandfly Road. Route would need to go under the road at Allens Rivulet and along wide road verge to Riverdale Road.	<ul style="list-style-type: none"> Limited natural values land predominantly managed land or agricultural land. Remnant <i>E. viminalis</i> forest along Allens Rivulet. 	<ul style="list-style-type: none"> Linkage may increase usage of Riverdale Road as launch point for walkers/horse riders which may impact landowners on Riverdale Road. Opposition for residents Agreement required to cross private land to complete the link. Linkage utilises public land for majority of route with limited trail building required.
Allens Rivulet link Option 2	Council Land/Private Land/Crown Land	Access to river via Council reserves to Sandfly Road then along road reserve and down Crown Reserve to river.	<ul style="list-style-type: none"> Remnant <i>E. viminalis</i> forest along Allens Rivulet. Native vegetation along Crown reserve to river (not surveyed) 	<ul style="list-style-type: none"> Road reserve along Sandfly Road to Crown reserve is narrow may not be suitable for horses. Link from Sandfly Road to river is through intact vegetation and would require trail to be constructed. Link from Sandfly Road to river would be directly adjacent to existing residence. Preferred link option for Riverdale Road residents

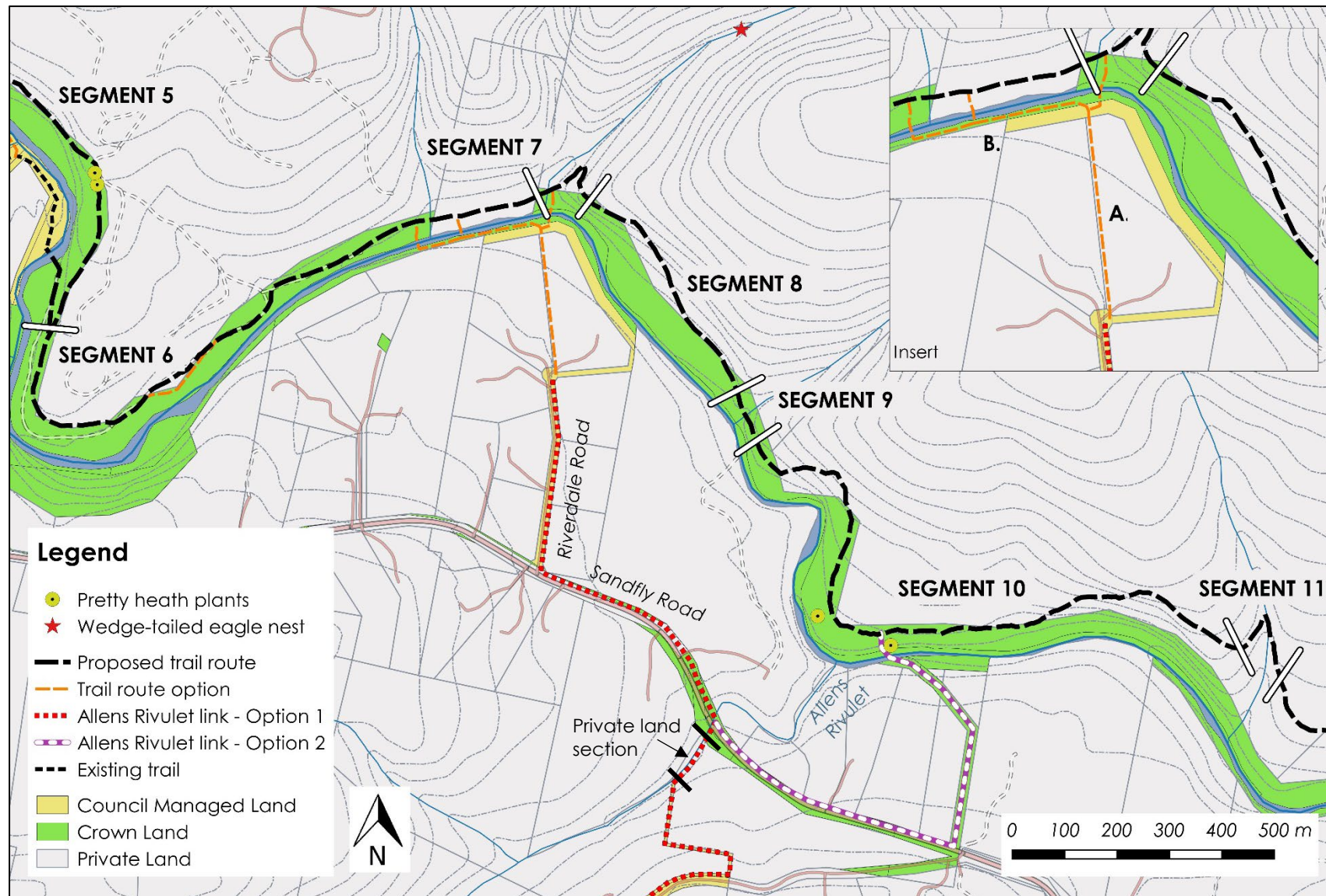


Figure 7. Trail Segment – Sandfly Reserve to Allens Rivulet junction (includes Riverdale Road linkage).

4.2.4. Section 3 – Riverdale Road to Miandetta Drive

Trail options are outlined in Table 5 and indicated in Figures 7 & 8.

Table 5. Section 3 – Riverdale Road to Miandetta Drive – Segments 8-17.

Location	Tenure	Notes	Natural Values	Limitations/alternatives
Segment 8 – Section between two tributaries Length: 620m	Crown Land/Private Land	Trail to climb out of tributary and run across slope to next tributary.	<ul style="list-style-type: none"> Through <i>E. obliqua</i> and <i>E. pulchella</i> forest Plants resembling <i>Allocasuarina duncanii</i> requires confirmation. 	<ul style="list-style-type: none"> Trail crosses onto private land to climb out of gully and traverses' steep slope. Trail steep and rocky in sections. Trail segment will require agreement from landholder
Segment 9 – Crossing tributary Length: 20m	Crown Land	Trail to cross small tributary.	<ul style="list-style-type: none"> Through <i>E. obliqua</i> forest No threatened flora recorded. 	<ul style="list-style-type: none"> Section within public land.
Segment 10 – Section between two tributaries Length: 1400m	Crown Land/Private Land	Trail to traverse steep and rocky ground predominantly above the river. Access to river limited to junction near Allens Rivulet.	<ul style="list-style-type: none"> Through <i>E. obliqua</i> and <i>E. pulchella</i> forest Isolated pretty heath plants recorded and to be avoided. Mature trees with hollows along river flats and lower slopes. 	<ul style="list-style-type: none"> Trail crosses onto private land in sections to avoid steep slopes and rocky sections. Trail will have sections with steep cross slope. Trail segment will require agreement from landholder
Segment 11 – Crossing tributary Length: 50m	Private Land	Trail to cross small tributary.	<ul style="list-style-type: none"> Through <i>E. obliqua</i> forest Mature trees with hollows in area. 	<ul style="list-style-type: none"> Crossing on private to reduce cross slope Trail segment will require agreement from landholder
Segment 12 – Across western slope of Mafeking Creek valley Length: 850m	Private Land	Trail segment located entirely on private land to reach suitable Mafeking crossing location	<ul style="list-style-type: none"> Through <i>E. obliqua</i> and <i>E. pulchella</i> forest Mature trees with hollows and blue gums in area. 	<ul style="list-style-type: none"> Trail segment on private land to cross Mafeking Creek. Trail segment will require agreement from landholder.

			<ul style="list-style-type: none"> Wedge-tailed eagle nest in close proximity 	<ul style="list-style-type: none"> Trail segment will need to be relocated to increase distance from eagle nest (min 200m)
Segment 13 – Mafeking Creek crossing Length: 50m	Private Land	Trail crossing high up in Mafeking Creek tributary to reduce slopes and enable creek crossing	<ul style="list-style-type: none"> Through <i>E. obliqua</i> and <i>E. pulchella</i> forest Mature trees with hollows and blue gums in area. Wedge-tailed eagle nest within 50m of surveyed route 	<ul style="list-style-type: none"> Trail segment on private land to cross Mafeking Creek. Trail segment will require agreement from landholder. Trail segment will need to be relocated downslope to increase distance from eagle nest to min. 200m. May require a bridge crossing due to steep slopes.
Segment 14 – Across eastern slope of Mafeking Creek valley. Length: 600m	Private Land	Trail segment located entirely on private land to reach suitable Mafeking crossing location	<ul style="list-style-type: none"> Through <i>E. obliqua</i> and <i>E. pulchella</i> forest Mature trees with hollows and blue gums in area. Wedge-tailed eagle nest in close proximity 	<ul style="list-style-type: none"> Trail segment on private land to cross Mafeking Creek. Trail segment will require agreement from landholder. Trail segment will need to be relocated to increase distance from eagle nest (min 200m)
Segment 15 – Traverses hilltop above North West Bay River. Length: 2000m	Private Land	<p>Trail segment traverse's hilltop above river due to unsuitable steep ground and cliffs along this segment.</p> <p>Route passes through some open ground.</p> <p>Eastern section of the segment goes inland to join 4WD trail that access river opposite Miandetta Drive.</p>	<ul style="list-style-type: none"> Through <i>E. amygdalina</i> and <i>E. pulchella</i> forest Mature trees with hollows in area. Isolated pretty heath plants recorded and to be avoided. Spanish heath recorded in some areas adjacent to cleared land. 	<ul style="list-style-type: none"> Entire trail segment on private land. Trail segment will require agreement from landholder.
Segment 15 – option Follow closer to river around large bend prior to Miandetta Drive.	Private Land	<p>There is an option to follow river through this section on private land.</p> <p>This route option goes closer to informal access to river via</p>	<ul style="list-style-type: none"> Through <i>E. pulchella</i> forest Area not surveyed for natural values. 	<ul style="list-style-type: none"> Trail route option on private land. Landowner is additional to other Segment 15 landowner. Trail segment will require agreement from landholder.

Length: 1200m		TasWater pumphouse access road from Sandfly Road.		<ul style="list-style-type: none"> • Could provide link to Sandfly Road via TasWater pumphouse road however landowner agreement required for formal use.
Segment 16 – Crossing small tributary Length: 50m	Private Land	Trail to cross small tributary.	<ul style="list-style-type: none"> • Through <i>E. pulchella</i> forest 	<ul style="list-style-type: none"> • Trail segment on private land • Trail segment will require agreement from landholder.
Segment 17 – Trail joins into Crown reserve and Council land opposite Miandetta Drive river access. Length: 300m	Private Land/Crown Land/Council Land	Trail segment can utilise existing 4WD track on private and public land.	<ul style="list-style-type: none"> • Through <i>E. pulchella</i> and <i>E. obliqua</i> forest although route already cleared of understorey vegetation. • Mature trees with potential hollows and blue gums in area. 	<ul style="list-style-type: none"> • Trail segment uses existing 4WD track on private and public land. • Trail segment on private land will require agreement from landholder. • Informal river crossing to Miandetta river trail possible for use in low flow conditions. • Portion of trail on public land has been partially formed by local community and is cleared of native vegetation.

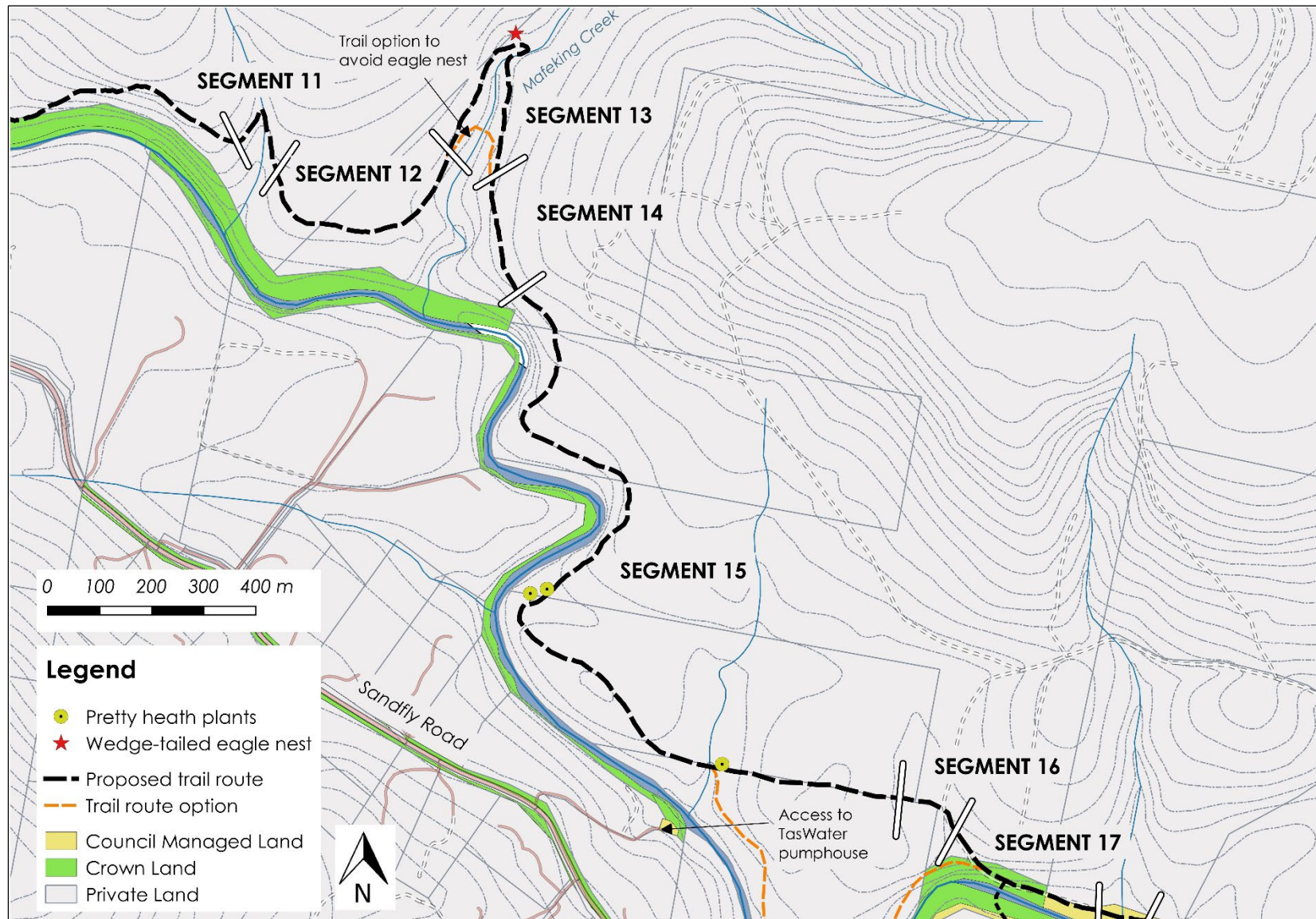


Figure 8. Trail segments Mafeking Creek to TasWater pumphouse.

4.2.5. Section 4 – Miandetta Drive to Margate

The section of the trail is currently flagged out and has been partially formed by the local community along the norther side of the river to Margate bridge within Council managed land. It utilises a gravel road for some of the segment between Hopfields Road and Margate Bridge which is also used for farming operations. Discussions with the landowner on an alternative option to avoid the use of the road have been undertaken. An alternative option has been suggested to form the trail from private land accessed off the Channel Highway to an existing crossing point then along the southern side of the river to the proposed crossing point at the end of Hopfields Road. This option may include the provision of an informal parking area on the private land to act a small trailhead.

There is no safe pedestrian access across the bridge (no footpath) on the Channel Highway to link a trail to the Margate township. There is currently a consultation process being undertaken by the Department of State Growth regarding the upgrade of the Channel Highway from Kingston to Margate to provide a safe cycle lane. Through this process there is scope to upgrade the Margate Bridge to provide safe pedestrian access from the Margate Township to the start of the trail.

An alternative option for the end of the trail at Margate is to connect with to the end of Hopfields Road. There is currently no public access to the river at the end of Hopfields Road and as such a connection here would require negotiations and licence agreement with a private landholder and consultation with residents along Hopfields Road. This option provides a better long-term trailhead location as there is enough space to develop additional parking areas and facilities. There is limited scope for this to occur at the Channel Highway junction.

Other potential carparking options at the Margate end could involve negotiations with 'Brookfield' or the Margate Bowls Club however no approach has been made as part of the plan development.

Table 6. Section 4 – Miandetta Drive to Margate (and Hopfields Road) – Segments 18-23.

Segment	Tenure	Notes	Natural Values	Limitations/alternatives
Segment 18 – Crossing small tributary and low-lying area	Private Land	Trail segment cross small tributary and low-lying section.	<ul style="list-style-type: none"> Through <i>E. obliqua</i> forest. Route already cleared of understorey vegetation. 	<ul style="list-style-type: none"> Trail segment on public land. Informal trail partially constructed by local community.

Length: 40m				
Segment 19 – Section up around cliff and to bend at Broken Weir Reserve and near Hopfields Road. Length: 700m	Council Land/Private Land	Trail segment up around cliff at bend in river and down to low-lying bend at Broken Weir. Route already partially formed and utilises section of 4WD track. Route across the bend in river goes onto private land inside a fenced off area of native vegetation.	<ul style="list-style-type: none"> Through <i>E. globulus</i> forest. Route open and partially cleared of understorey vegetation up to river bend. Spanish heath scattered around at river bend. 	<ul style="list-style-type: none"> Trail segment predominantly on public land. Informal trail marked and partially constructed by local community to river bend. Section of trail on private land.
Segment 19a – Option River crossing to Crown Land on south side. Length: 30m	Crown Land	Trail segment across North West Bay River. Requires rock works to allow crossing.	<ul style="list-style-type: none"> Willows in river at bend near Hopfields Road. Minimise disturbance in river and on banks 	<ul style="list-style-type: none"> Informal river crossing to reserve off end of Hopfields Road. Can only be used in low flow conditions. Would require a bridge for access in all conditions.
Segment 20 - Trail along Council land on northern side of River. Utilises existing road. Length: 1000m	Council Land	Trail through open paddock for 250m then follows gravel road for 750m.	<ul style="list-style-type: none"> Remnant white gums and blue gums nearby to be avoided. 	<ul style="list-style-type: none"> This section is largely existing and requires formation of section at western end only through open paddock area. Gravel road used for farm operations.
Segment 20a – Option River Crossing to Council Land Length: 40m	Crown Land	Utilise existing ford to cross river. May require minor rock works to improve crossing.	<ul style="list-style-type: none"> Minimise disturbance in river and on banks 	<ul style="list-style-type: none"> Can only be used in low flow conditions. Would require a bridge for access in all conditions.
Segment 20b- Option Southern side of river through paddocks to existing crossing point. Length: 900m	Private Land/Crown Land	Trail segment through open paddock to existing ford crossing point	<ul style="list-style-type: none"> No values – traverses cleared land only 	<ul style="list-style-type: none"> Requires lease agreement with landowner to link to Crown Land Requires lease agreement with Crown Land Services.

Segment 20c – Option River to end of Hopfields Road. Length: 300m	Council Land/Private Land	Trail segment to access the end of Hopfields Road through cleared land and private land.	<ul style="list-style-type: none"> Trail segment through cleared land. Willows in river at bend near Hopfields Road. 	<ul style="list-style-type: none"> There is no public access to river from end of Hopfields Road. There is not enough public land at the end of Hopfields Road for a trailhead or any parking area. The public land at end of Hopfields Road is not publicly accessible. Any trail access via the end of Hopfields Road will need to be for local use only unless an area suitable for a trailhead can be negotiated with private landholders. The use of Hopfields Road as a trailhead will impact on residents living on the road.
Segment 21 – Along gravel road to bend in river then above river to potential rail head off Channel Highway. Length: 250m	Council Land/Private Land	Trail segment up bank and then through open area to bridge or potential trail head on private land.	<ul style="list-style-type: none"> Weeds scattered around river bend at Highway. Remnant white gums and blue gums nearby to be avoided. 	<ul style="list-style-type: none"> May required relocation of some fences. Joins to area on private land that could be developed as a small trail head. Safe access to private land off Highway required.
Segment 21a – Option Link from northern bank at Channel Highway across river to footpath in front of Brookfield site. Length: 300m	Crown Land	Requires river crossing at high energy location with steep banks.	<ul style="list-style-type: none"> Weeds scattered around river bend at Highway and along roadside. Remnant white gums nearby to be avoided. 	<ul style="list-style-type: none"> Would require a pedestrian bridge to be constructed or for the road bridge to be upgraded to include pedestrian access. May require upgrade of pedestrian crossing at Sandfly Road junction if foot traffic increases.

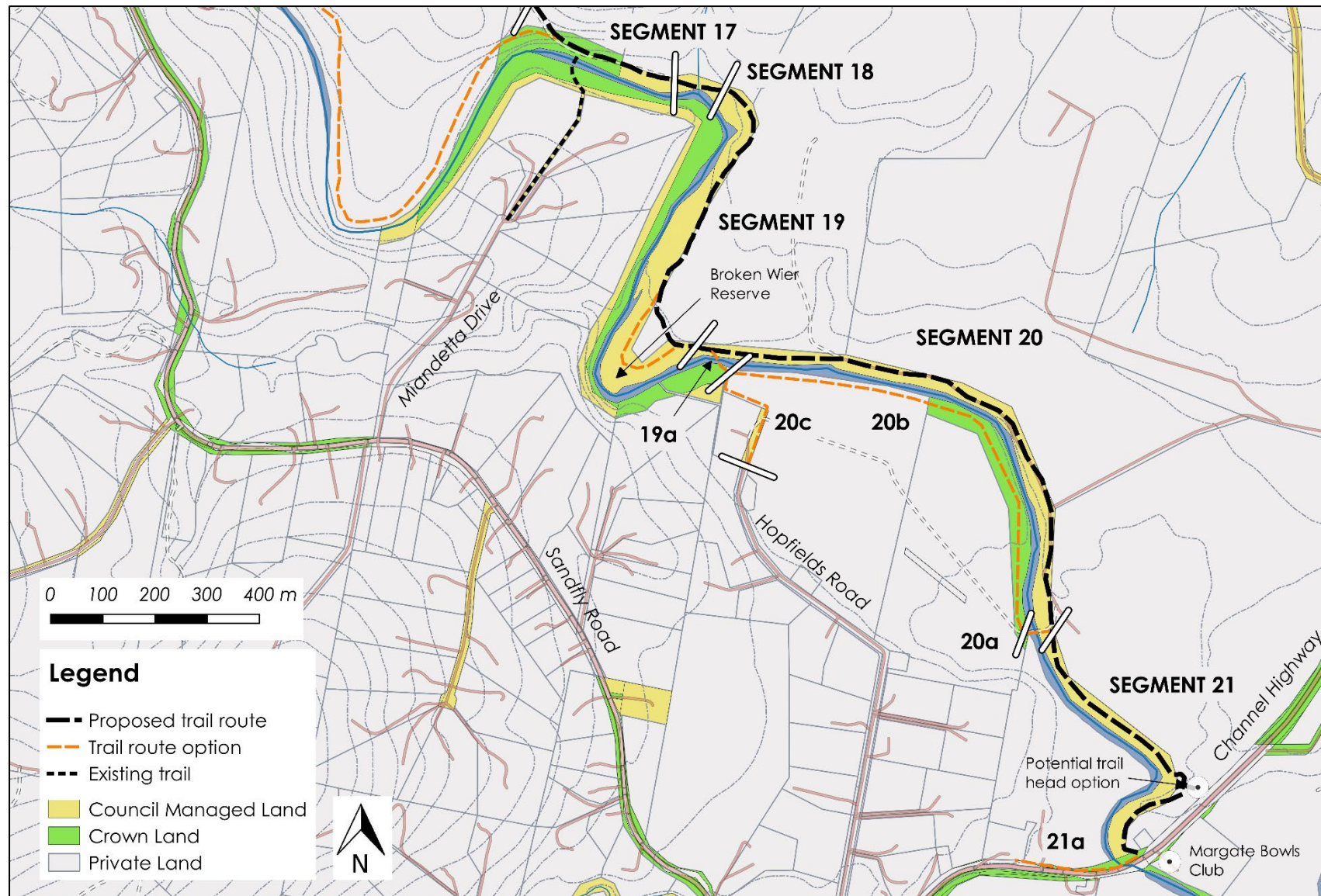


Figure 9. Trail segments Miandetta Drive to Channel Highway (includes Hopfields Road link).

5. Trail Development

5.1. Trail Construction Standard and Methodology

The trail assessments and costings are based on the development of a multi-use trail suitable for walkers, horse riders and mountain bike riders as per the brief. The construction method used to build the trail will vary based on the terrain, substrate, and slope. In general, a full bench construction method with a rolling contour profile is recommended.

The construction of a multi-use trail will require the clearance of an estimated 1.0 ha of native vegetation based on a trail width of 1.2 m. The trail width will vary and in more open areas can be wider to allow users to pass, however much of the trail is likely to require other users to step off the trail to allow horses to pass. The trail can be constructed to avoid threatened flora species and significant habitat such as trees with hollows and as such the construction of a multi-use trail can occur with limited environmental impacts.

Due to the terrain encountered along the river some sections of the proposed trail route have been diverted away from the river to accommodate a multi-use trail with gradient suitable for use by horses. In some locations a trail suitable for walkers and/or bikes only could be constructed closer to the river and therefore remain within public land. These narrower trail sections could incorporate broad steps and wind around features to traverse steeper rockier areas. Alternative routes suitable for horse riders could be provided around these sections (as per the plan) to allow access for all users. The use of alternative walking and bike riding routes was not investigated during the surveys. In several cases it is possible to route the proposed trail to avoid areas with significant cross slope by choosing a route on private property with shallower slopes.

It is anticipated that the IMBA TDRS (International Mountain Bicycling Association, Trail Difficulty Rating System) Land Managers Guide, and the *Australian Walking Track Standards* (AS2156.1-2001 and AS2156.2-2001) would guide the final design and construction standards for the new trail.

It is expected that contractors would employ the services of mechanised equipment such as mini excavators and power carriers which is standard practice for track construction of this nature.

A range of construction methods that may be used are provided in Appendix 3.

5.1.1. River Crossings

The trail will need to cross the North West Bay River and tributaries in several locations to develop a link from Longley to Margate and to provide connections to existing river access points.

The main trail will need to cross the North West Bay River in several locations subject to landowner negotiates and final route of the trail. The following locations were identified as possible river crossing points:

- Longley Reserve – to connect to eastern side of the river
- Huon Highway – above or below bridge if trail Segment 3 -Option B is developed.
- Sandfly Reserve – to connect to North West Bay River Track
- Riverdale Road junction – to connect trail to Riverdale Road (several options)
- Miandetta Road – to connect to existing trail off the end of Miandetta Drive
- Hopfield Road – to connect to the end of Hopfields Road (Figure 10)
- Between Hopfields Road and Channel Highway – across existing ford to reconnect with trail on Council reserve
- At Channel Highway to access Crown Land and join footpath to Margate township – pedestrian bridge or upgrade of the Channel Highway bridge.

Suitable crossing points have been identified at low-energy areas with stable riverbeds and where there are lower riverbanks. The aim is to provide crossings that can be traversed by walkers, horse riders and mountain bikers during periods of low flow. The constriction of any crossing would require specific hydraulic engineering advice. Users groups including canoeists and horse riders would need to be consulted on crossing design to ensure they are suitable. The crossings will not however be accessible during periods of higher flow and they will be subject to damage during flood events and hence will require periodic maintenance.

Providing access across the river during periods of high flow would require bridges to be constructed. A crossing at the Channel Highway to access Crown Land and join to the footpath access to Margate would require a bridge (or upgrade of the Channel Highway bridge) as the river bend at this point is a high-energy location during high flow events.

The completed trail would need to cross up to ten smaller tributaries between Longley and Margate (depending on which route options are developed). The creek crossings have been located to enable culvert crossings to be used rather than bridges.



Figure 10. Potential points for river crossings - Hopfields Road (L), Sandfly Reserve (R)

5.2. Trail Infrastructure

The following provides suggestions and options for the development of trailheads, picnic spots, waterhole access, car-parking, and signage associated with the trail development.

5.2.1. Trailheads and Parking Areas

The development of the overall trail network will require trail launch points which provide for car parking with potential for picnic facilities, toilets and educational and directional signage.

The range of facilities provided at a trailhead will be determined by the desired usage profile of a trail – local use vs broader visitor use; physical constraints; budget and adjoining land use. All trailheads are to be designed to allow access for desired user groups and prevent unwanted access for vehicles or motorbikes

The overall objective for the trail was to provide a multi-use trail for the local community rather than a visitor or tourist trail. As such requirements for facilities at trail entrance points may be limited.

Longley Reserve – This existing reserve provides car parking, a picnic area and access to the river. This location would provide a suitable trailhead for the completed trail link.

Sandfly Reserve – Provides current walking trail to river, picnic location and access to a water hole. Also provides access to rock climbing site. Limited car parking at the Sandfly Oval. Further development of a trailhead at this location would require negotiation with cricket club and other users of the reserve. Good location for signage and trail maps as trail network developed. Horse riding and bike riding are currently prohibited in the Sandfly Reserve

Riverdale Road – There is currently no public access from this location. A future trail to access river and link to Sandfly Reserve or downstream to Miandetta Drive would require basic signage.

This location is not suitable for development as a formal trailhead as there is no capacity for car parking or other facilities and Riverdale Road provides access for several private residences. Development of a picnic spot on river is not recommended at this location due to lack of parking at trailhead.

Miandetta Drive – Current trail to river which provides access to several waterholes. Basic directional signage at this location would be required if the trail network is developed.

This location is not suitable for development as a formal trailhead as there is no capacity for car parking or other facilities and Miandetta Drive provides access for several private residences.

Hopfields Road – Currently there is no public access at this location. Provides a suitable location for a major trailhead at the Margate end of the route but will require negotiation with private landholders to formalise link to river reserve and to provide land for development of parking areas and facilities. Hopfields Road provides a safer pedestrian/riding link to Margate than the current Channel Highway option.

Development of a trailhead at this location would require consultation with residents along this road.

Channel Highway – There is currently informal pedestrian access to the River reserve from the Channel Highway at the Margate bridge, however the parking area on the eastern side is owned by the Margate Bowls Club. There is no pedestrian access to Margate from this location as the bridge has no footpath. As such this location has limited potential for a formal trailhead.

There is some private land adjacent to the river reserve and a dwelling on the western side of the Channel Highway. The landowner has indicated that the development of a small informal parking area (2–3 cars) may be feasible here to provide a trailhead. Pedestrian access to this area is limited and development of the trailhead would ultimately require access to Margate either by a separate pedestrian bridge adjacent to the highway bridge or the upgrade of the bridge to a safe pedestrian crossing.

As there is an informal trail connection from this point to Miandetta Drive there is likely to be some usage of the access point currently. If the trail is to be endorsed by Council, it will at minimum require negotiations with the landowner or the Margate Bowls Club to provide some car parking or access. This may provide a temporary option while formal access from Hopfields Road is negotiated or feasibility of a pedestrian bridge at this location is investigated.

5.2.2. Waterhole Access

Access to waterholes is already provided from the Sandfly Reserve and Miandetta Drive. There are additional waterholes along the river that may be accessed as the trail is constructed. Any new access to waterholes will be via public land to prevent unauthorised access to the river through private land.

5.2.3. Seating and Picnic Sites

There is existing seating and a picnic area at the Longley Reserve. The Sandfly Reserve at the river provides a suitable location for new picnic areas as there is open ground there and good access to the river for swimming.

The other trail connection points at Riverdale Road and Miandetta Drive may also be suitable locations for the development of these facilities, subject to community consultation.

The installation of seating along the undeveloped sections of the trail to take advantage of views can be determined as the trail is developed. Community feedback should also guide the location of such infrastructure.

5.2.4. Emergency Access Points

Due to the relative isolation of parts of the river, emergency access points will need to be considered in the development of the trail network. Accidents associated with mountain bike riding and horse riding may occur that require emergency evacuation and evacuation may be required during natural disasters such as wildfires or floods.

Current access point close to the proposed trail include the Longley Reserve, Huon Highway, Sandfly Reserve, Riverdale Road, the TasWater pump house on Sandfly Road, Miandetta Drive, Hopfields Road and the Channel Highway. There is no access between Riverdale Road and the TasWater pump station and planning around evacuation in this section of the trail needs to be considered.

6. Recreational Impacts

The development of the multi-use trail from Longley to Margate has the potential to attract users from outside the local area as it will provide an attractive route along a very scenic river. Whilst the trail is to be developed for local use it will undoubtedly attract more attention and increased usage as it becomes more well known.

Increased usage has the potential to:

- Increase trail maintenance costs
- Increase demand for parking at trailheads.
- Increase potential for weed seed and disease to spread on boots, bikes and by horses
- Increase number of people at waterholes during hot days
- Impacts on local residents through increased traffic and parking and loss of privacy for some adjoining landowners

Increased usage issues are likely to develop over time and impacts will need to be monitored and responded to.

Possible solutions include:

- Improving or upgrading facilities/parking at main trailheads
- Restricting parking at smaller local use trailheads to prevent overuse
- Signage to direct users to main trailheads

Conflicts between users on multi-use trails is a common issue associated with the development and use of such trails. Measures to manage this conflict include the following:

- Develop adequate sightlines, particularly on shared use and dual-directional sections
- Speed management: design trails to passively reduce mountain bike rider speed by incorporating grade reversals and chokes
- Developing separate trails in some areas
- Use trailhead signage and promotional material to inform all user groups of multi-use nature of the trail and shared use etiquette.
- Develop and promote a 'Riders Code of Conduct'

7. Staging of Trail Development

This trail feasibility study has determined that a trail from Longley to Margate is physically possible, however several sections require access across private land. The overall trail development is dependent on several factors including negotiations with private landholders regarding access to private land; negotiation with Crown Land Services to allow for trail development on Crown Land; community consultation, in particular with landholders that may be impacted by new trails; and budget constraints.

The following staged approach is recommended for the development of the trail. It is based around the increased certainty of development in terms of use of existing public land versus reliance on lease arrangements over private land, provision of links to existing trails and costs.

Stage 1 – Develop link from Sandfly Reserve to Riverdale Road/Allens Rivulet.

- Potential to join Allens Rivulet trail with existing Sandfly Reserve trail and achieve a priority action of the *Kingborough Tracks and Trails Strategic Action Plan 2017- 2022*.
- Trail route is predominantly on public land except link at end of Riverdale Road.
- Can use section of existing 4wd track to reduce costs.
- Requires agreement with landholder for new access to river.
- Requires formal agreement with Crown Land Services to construct a trail on public land. Process requires the development of a management plan for track development, evidence of public consultation and formal agreement regarding ongoing management and maintenance of trail.
- Local residents oppose trail link at this location and trail access along front of land.

Stage 2 – Link from Longley Reserve to Sandfly Reserve

- Provides link between two existing larger Council reserves.
- Provides trailhead from a location where facilities can be developed.
- Requires formal agreement to cross private land (2 landholders).
- Requires formal agreement with Crown Land Services to construct section of trail on public land.
- Cost – trail across steep rocky areas with number of creek crossings.

Stage 3 – Link Miandetta Drive to Margate/Channel Highway

- Needs to secure public access across private land at end of Hopfields Road initially.
- Requires formal agreement with Crown Land Services to construct section of trail on public land.
- Requires negotiation with private landowner regarding parking area/trailhead at Channel Highway (Bowls Club or individual landowner).

- Investigate pedestrian access across river/Channel Highway to access footpath to Margate.
- Longer term alternative trailhead could be developed at end of Hopfields Road. Requires agreement with landholder. Local residents along Hopfields Road to be consulted; there may be opposition to trailhead at Hopfields Road due to increased road usage as a result of trailhead.

Stage 4 – Link from Riverdale Road to Miandetta Drive to complete trail.

- Negotiation for lease arrangement across private land to be secured initially.
- Requires formal agreement with Crown Land Services to construct section of trail on public land.
- Will provide final link between Longley Reserve and Margate.
- Cost – trail across steep rocky areas with number of creek crossings.

As all links depend on access across private land the order of development of trail stages may change dependent on success of these negotiations.

8. Trail Costings

Table 7 provides a costing guide for the proposed trail, linkages and alternative options.

Table 7. Trail Costings.

Segment #	Length of Trail	Cost per lm	Total cost	Comment
1	120 m	\$10-\$20/m	\$1,200-\$2,400	Includes river crossing
2	1000 m	\$20-\$30/m	\$20,000-\$30,000	Includes creek crossing
3	200 m	\$20-\$30/m	\$4,000-\$6,000	Across open ground
3 - A	970 m	\$40-\$60/m	\$38,800-\$58,200-	Plus bridge of Cookes Rivulet – not costed
4	120 m	\$600-\$700/m	\$72,000-\$84,000	Crossing low-lying area
5	800 m	\$140-\$160/m	\$112,000-\$128,000	Requires extensive rock work
5a	180 m	\$20-\$30	\$3,600-\$5,400	Includes river crossing
Total Cost Section 1			\$212,900-\$255,800 or \$63,600-\$96,000	Segments 1,2,3,4,5, 5a Segments 1,2, 3a,5a
6	1400 m	\$10-\$30/m	\$14,000-\$42,000	Follows 4wd track
7	50 m	\$300-\$500/m	\$15,000-\$25,000	Includes creek crossing
RR -A			Not costed	Trail along boundary + river crossing
RR -B			Not costed	Trail across front of private land, utilise existing crossing or form new crossing
AR1			Not costed	
AR2			Not costed	
Total Cost Section 2			\$29,000-\$67,000	
8	620 m	\$140-\$160	\$19,000-\$99,000	Steep rocky sections
9	25 m	\$600-\$700/m	\$15,000-\$17,500	Includes creek crossing
10	1400 m	\$140-\$160/m	\$196,000-\$224,000	Contains steep and rocky sections
11	25 m	\$600-\$700/m	\$15,000-\$17,500	Includes creek crossing
12	850 m	\$300-\$500/m	\$255,000-\$425,000	Contains steep cross slopes
13	50 m	\$300-\$500/m	\$15,000-\$25,000	Includes Mafeking Creek crossing

14	600 m	\$140-\$160/m	\$84,000-\$96,000	Rocky with cross slope
15	2000 m	\$40-\$60/m	\$80,000-\$120,000	Mostly open with some rocky sections
16	10 m	\$600-\$700/m	\$6,000-\$7,000	Includes creek crossing
17	300 m	\$10-\$30/m	\$3,000-\$9,000	Section mostly along old 4WD track
Total Cost Section 3			\$418,000-\$1,049,000	
18	40 m	\$300-\$500/m	\$12,000-\$20,000	Includes creek crossing
19	700 m	\$40-\$60/m	\$28,000-\$42,000	Traverses mostly open ground
19a	30 m	\$300-\$500/m	\$9,000-\$15,000	River crossing
20	1000 m	\$10-\$30/m	\$10,000-\$30,000	Through flat open ground
20a	40 m	\$100-\$300	\$4,000-\$12,000	River crossing – existing ford
20b	900 m	\$10-\$30/m	\$9,000-\$27,000	Through flat open ground
20c	300 m	\$10-\$30/m	\$3,000-\$9,000	Through flat open ground
21	250 m	\$40-\$60/m	\$10,000-\$15,000	Mostly open with some rocky sections
21a	300 m		Not costed	Bridge and 250 m trail on uneven ground
Total Cost Section 4			\$60,000-\$107,000 or \$75,000-\$140,000	Segments 18,19, 20,21 Segments 18,19,19a,20a-c,21

*Costings provided in Table 7 are construction costs only and do not include other costs associated with the overall trail development. Furthermore, delays in the trail approval and construction may lead to an increase in these cost estimates.

Other costs of the trail construction will include (but are not limited to):

- Surveying to accurately identify title boundaries for lease agreements with landholders and Crown Land Services (CLS).
- Legal costs of formalising lease agreements with private landholders and CLS.
- Additional detailed route surveying – for trail construction, natural values, aboriginal heritage.
- Costs for construction or replacement of fences in sections bordering private land.
- Weed control costs associated with trail construction.
- Bridge across river at Channel Highway (similar to pedestrian/bicycle bridge at Derby) – estimated cost for similar bridge is \$350,000 (+GST) based on ground conditions being suitable for strip footing installation (50 metre span x 1.8m trafficable width & 2 X 4.5m approach ramps). Additional costs for geotechnical Investigation, hydrological survey and field survey.

- Signage – interpretive, educational, directional, shared use etiquette, cultural heritage, prevent access to private land.
- Ongoing trail maintenance cost including weed monitoring and control

The costs provided in Table 7 are to construct a multi-use standard trail to comply with minimum trail standards. There is some scope for trails to be marked out and roughly formed by local groups and individuals to establish links prior to formal trail development. The section of trail from Miandetta Drive to Channel Highway was marked out and partially formed in this manner. This approach may be used to establish trails at minimal costs but can only be undertaken on Council land or Crown Land with permission of the governing body (i.e. Kingborough Council or Crown Land Services). Informal track marking and formation has the potential to impact significant natural values, spread weeds, cause erosion, encroach on private land and create injury risks.

Ongoing maintenance costs must be budgeted into any new trail development. However, if the trail is constructed to a high standard initially, it is generally accepted that the on-going maintenance costs will be reduced significantly. Costs to repair river crossing following high flow events will also need to be factored into budgeting. Trail development will require an increase to the track maintenance budget to the municipal trail network.

Appendix 1 – Community Consultation

The following is a summary of consultation undertaken during the development of the Feasibility Study.

Table 8. Community Consultation Summary.

Contact	Notes
Su Sprott – Recreation Officer Kingborough Council	Project officer for study. Provided information about the process re tracks and trails strategy and review of draft plan.
Sean Kerr – Property Officer/Governance and Community Services Kingborough Council	Discussion re negotiations with landholders regarding access to public land on river via Allens Rivulet and Riverdale Road. Land lease negotiations and agreements.
Liz Quinn – NRM Coordinator Kingborough Council	Discussion regarding potential impacts on natural and cultural values. Initial review of draft plan.
Trail Riders Action Club (TRAC)	Provided background of groups long term advocacy for trail and discussions with landholders. Provide information re access points, water holes, natural values along river.
Coningham Mountain Bike Club	Members consulted re section of trail between Miandetta Drive and Margate they worked on during working bee. Provided feedback re use of a trail by mountain bikers and support of overall link.
Crown Land Services	Consult re development of trails on Crown Land during development of North West Bay River Catchment Management Plan (2017). Provided feedback that Crown Land sections are currently unmanaged, however management plan will be developed for areas if proposal for usage is presented.
<u>Landholders</u> HBMI – major landowner north side of river.	Permission given for survey of trail route on their land where trail cannot be contained on public land. Broadly supportive. Further consultation about future trail on their land required.
Westwood - Channel Highway, Hopfields Road	Permission given to survey trail route on their land. Broadly supportive. Further consultation about future trail on their land required.
End of Hopfields Road	Spoke to landholder re access from end of Hopfields Road.

	Further consultation about future trail on their land required.
Riverdale Road residents (3)	Expressed strong concerns regarding trail development along river adjacent to their properties and impacts of access point at end of Riverdale Road. Consult before any decisions made on trail locations or access.
Huon Road resident	Permission given to survey trail route on their land along river. Further consultation about future trail on their land required.
Huon Highway resident	Permission given to survey along boundary of their land and Crown Land where exact location of boundary hard to determine. Further consultation about future trail on their land required.
Broken Weir Landcare Group – John Cox	Discussion re access to river from Hopfields Road.

Appendix 2 – Plant species recorded in trail corridor.

Species recorded during surveys undertaken by A. Welling and N. Fitzgerald, November 2019.

e = endemic

i = introduced

v = vulnerable (under TSPA)

Dicotyledons

ASTERACEAE

e	<i>Bedfordia salicina</i>	Tasmanian Blanket Leaf
i	<i>Bellis perennis</i>	English Daisy
	<i>Cassinia aculeata</i>	Dolly Bush
i	<i>Cirsium vulgare</i>	Spear Thistle
i	<i>Dimorphotheca fruticosa</i>	Trailing daisy
	<i>Lagenophora stipitata</i>	Blue bottledaisy
	<i>Olearia argophylla</i>	Musk
	<i>Olearia lirata</i>	Snowy daisy bush
	<i>Olearia viscosa</i>	Viscid Daisy Bush
	<i>Ozothamnus ferrugineus</i>	Tree Everlasting
	<i>Senecio</i> sp.	Groundsel
i	<i>Sonchus</i> sp.	Sow Thistle

BORAGINACEAE

i	<i>Myosotis sylvatica</i>	Forget-me-not
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CAMPANULACEAE

	<i>Wahlenbergia</i> sp.	Bluebell
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CASUARINACEAE

	<i>Allocasuarina littoralis</i>	Bulloak
e	<i>Allocasuarina monilifera</i>	Necklace Sheoak

CRASSULACEAE

	<i>Crassula sieberiana</i> subsp. <i>sieberiana</i>	Austral Stonecrop
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CUNONIACEAE

	<i>Bauera rubioides</i>	Wiry Bauera
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DILLENIACEAE

	<i>Hibbertia appressa</i>	Southern guineaflower
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DROSERACEAE

	<i>Drosera auriculata</i>	Tall sundew
ERICACEAE		
	<i>Astroloma humifusum</i>	Native Cranberry
	<i>Epacris impressa</i>	Common Heath
e, v	<i>Epacris virgata</i>	Pretty or Drumstick Heath
i	<i>Erica lusitanica</i>	Spanish Heath
e	<i>Leptecophylla divaricata</i>	Spreading pinkberry
	<i>Leucopogon collinus</i>	White Beard-heath
	<i>Lissanthe strigosa</i> subsp. <i>subulata</i>	Peachberry heath
EUPHORBIACEAE		
	<i>Beyeria viscosa</i>	Pinkwood
	<i>Poranthera microphylla</i>	Small poranthera
FABACEAE		
	<i>Bossiaea prostrata</i>	Creeping Bossiaea
	<i>Daviesia sejugata</i>	Native Gorse
	<i>Daviesia ulicifolia</i> subsp. <i>ulicifolia</i>	Yellow spiky bitterpea
	<i>Pultenaea juniperina</i>	Prickly Beauty
i	<i>Trifolium</i> sp.	Clover
i	<i>Vicia</i> sp.	Vetch
GENTIANACEAE		
i	<i>Centaurium erythraea</i>	Common centaury
GERANIACEAE		
	<i>Geranium potentilloides</i>	Mountain cranebill
GOODENIACEAE		
	<i>Goodenia lanata</i>	Native Primrose
	<i>Goodenia ovata</i>	Parrot's Food
HALORAGACEAE		
	<i>Gonocarpus teucrioides</i>	Raspwort
LAMIACEAE		
	<i>Prostanthera lasianthos</i> var. <i>lasianthos</i>	Christmas mintbush
LAURACEAE		
	<i>Cassytha glabella</i>	Slender Dodder-laurel
MIMOSACEAE		
	<i>Acacia dealbata</i> subsp. <i>dealbata</i>	Silver Wattle
	<i>Acacia genistifolia</i>	Spreading wattle

	<i>Acacia melanoxylon</i>	Blackwood
	<i>Acacia myrtifolia</i>	Myrtle wattle
	<i>Acacia verticillata</i> subsp. <i>verticillata</i>	Prickly Mimosa
MYRTACEAE		
e	<i>Eucalyptus amygdalina</i>	Black peppermint
	<i>Eucalyptus globulus</i> subsp. <i>globulus</i>	Tasmanian Blue Gum
	<i>Eucalyptus ovata</i>	Black Gum
e	<i>Eucalyptus pulchella</i>	White Peppermint
	<i>Eucalyptus viminalis</i> subsp. <i>viminalis</i>	White Gum
	<i>Leptospermum lanigerum</i>	Woolly Tea-tree
	<i>Leptospermum scoparium</i>	Manuka
	<i>Melaleuca pallida</i>	Lemon Bottlebrush
	<i>Melaleuca squarrosa</i>	Scented Paperbark
OLEACEAE		
	<i>Notelaea ligustrina</i>	Native Olive
OXALIDACEAE		
	<i>Oxalis perennans</i>	Native Oxalis
PITTOSPORACEAE		
	<i>Bursaria spinosa</i> subsp. <i>spinosa</i>	Prickly Box
	<i>Pittosporum bicolor</i>	Cheesewood
PLANTAGINACEAE		
	<i>Plantago varia</i>	Variable Plantain
POLYGALACEAE		
	<i>Comesperma volubile</i>	Blue Love Creeper
PRIMULACEAE		
i	<i>Lysimachia arvensis</i>	Scarlet Pimpernel
PROTEACEAE		
	<i>Banksia marginata</i>	Silver Banksia
	<i>Hakea lissosperma</i>	Needle Bush; Mountain Needlewood
e	<i>Lomatia tinctoria</i>	Guitar Plant
RANUNCULACEAE		
	<i>Clematis</i> sp.	Clematis
RHAMNACEAE		
	<i>Pomaderris apetala</i> subsp. <i>apetala</i>	Dogwood
e	<i>Pomaderris elliptica</i> var. <i>elliptica</i>	Yellow Pomaderris
ROSACEAE		

	<i>Acaena novae-zelandiae</i>	Buzzy
i	<i>Rubus fruticosus</i>	Blackberry
RUBIACEAE		
	<i>Coprosma quadrifida</i>	Native Currant
i	<i>Galium aparine</i>	Sticky Weed
	<i>Galium australe</i>	Tangled Bedstraw
RUTACEAE		
e	<i>Correa reflexa</i> var. <i>reflexa</i>	Common Correa
e	<i>Nematolepis squamea</i> subsp. <i>squamea</i>	Lancewood
SANTALACEAE		
	<i>Exocarpos cupressiformis</i>	Native Cherry
	<i>Exocarpos strictus</i>	Dwarf Cherry
SALICACEAE		
i	<i>Salix caprea</i>	Pussy willow
i	<i>Salix fragilis</i>	Crack willow
SCROPHULARIACEAE		
i	<i>Digitalis purpurea</i>	Foxglove
THYMELAEACEAE		
	<i>Pimelea humilis</i>	Dwarf Rice-flower
e	<i>Pimelea nivea</i>	Round-leaf Rice-flower
TREMADRACEAE		
	<i>Tetradlea pilosa</i> subsp. <i>pilosa</i>	Hairy Pink-bells
VIOLACEAE		
e	<i>Viola hederacea</i> subsp. <i>hederacea</i>	Native Violet

Monocotyledons

ASPARAGACEAE		
	<i>Lomandra longifolia</i>	Sagg
CYPERACEAE		
	<i>Carex appressa</i>	Common Sedge
	<i>Gahnia grandis</i>	Cutting Grass
	<i>Lepidosperma ensiforme</i>	Two Handed Sword
e	<i>Lepidosperma inops</i>	Fan Sedge
	<i>Schoenus apogon</i>	Common Bog-rush
HEMEROCALLIDACEAE		
	<i>Dianella revoluta</i>	Spreading flaxlily

	<i>Dianella tasmanica</i>	Forest flaxlily
IRIDACEAE		
	<i>Diplarrena moraea</i>	White Flag Iris
i	<i>Watsonia</i> sp.	
JUNCACEAE		
	<i>Juncus pallidus</i>	Pale rush
	<i>Juncus procerus</i>	Great rush
	<i>Juncus</i> sp.	Rush
	<i>Luzula</i> sp.	Woodruff
LUZURIAGACEAE		
	<i>Dryophila cyanocarpa</i>	Turquoise Berry
ORCHIDACEAE		
	<i>Corybas</i> sp.	Helmet Orchid
	<i>Thelymitra</i> sp.	Sun Orchid
POACEAE		
i	<i>Aira</i> sp.	Hairgrass
i	<i>Anthoxanthum odoratum</i>	Sweet vernal
	<i>Austrostipa</i> sp.	Speargrass
i	<i>Dactylis glomerata</i>	Cock's Foot
i	<i>Lolium</i> sp.	Ryegrass
	<i>Poa hookeri</i>	Hooker's tussockgrass
	<i>Poa tenera</i>	Scrambling tussockgrass
	<i>Tetrarrhena distichophylla</i>	Hairy Rice-grass
	<i>Themeda triandra</i>	Kangaroo Grass

Pteridophytes

ADIANTACEAE		
	<i>Adiantum aethiopicum</i>	Common maidenhair
ASPLENIACEAE		
	<i>Asplenium flabellifolium</i>	Necklace Fern
BLECHNACEAE		
	<i>Blechnum nudum</i>	Fishbone Water-fern
	<i>Blechnum wattsi</i>	Hard Water-fern
DENNSTAEDTIACEAE		

<i>Histiopteris incisa</i>	Batwing fern
<i>Pteridium esculentum</i>	Bracken
DICKSONIACEAE	
<i>Dicksonia antarctica</i>	Tree-fern
DRYOPTERIDACEAE	
<i>Polystichum proliferum</i>	Mother Shield Fern

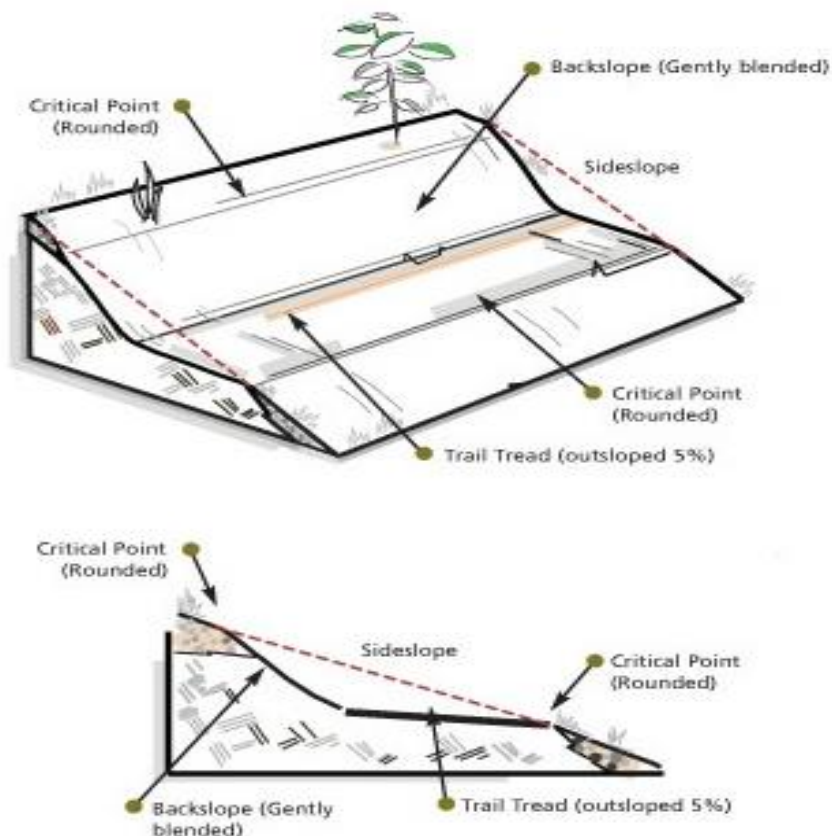
Appendix 3 – Explanation of Track Construction Work Types

Full Bench Construction

A full bench is where the track surface has been excavated completely into the hill side (as opposed to a half bench or cut and fill method – see below). The fill (spoil) excavated from the benched cut is moved to the downhill side of the track. The amount a track benched into the slope depends on the steepness of the hill side. Where the route traverses steep slopes more/deeper excavation is necessary (heavy benching).

A full bench track results in the track surface being completely on solid ground and is less prone to compaction or the outside edge giving way. Where bedrock or large tree roots prohibit a full bench, a retaining wall may be necessary to retain the track surface, resulting in a partial bench.

The upslope batter or backslope requires 'rounding off' to reduce soil creep onto the track tread. Vegetation should be cleared from above the batter to reduce long term maintenance. All exposed root material should be trimmed flush with the batter. The down slope batter (excavated fill and spoil) should have cut vegetation and organic matter pulled over it to reduce erosion and assist in vegetation re-establishing itself.



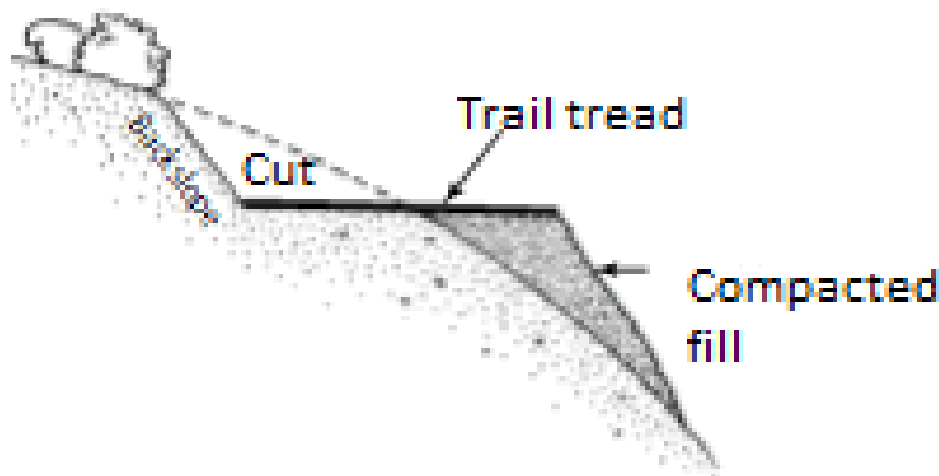
FULL BENCH TRACK CONSTRUCTION (*TRAIL SOLUTIONS*, IMBA 2001)

Half Bench Construction

A half bench or cut and fill is where the track surface has been constructed by cutting a narrow bench and using the fill on the downhill side to complete the width of the tread. The amount a track is benched into the slope depends on the steepness of the hill side (cross or side slope). Where the route traverses steep slopes, more/deeper excavation is necessary (heavy benching).

A half bench track results in only part of the track surface being completely on solid ground. If the excavated fill is not compacted sufficiently, the outside edge may give way. Where bedrock or large tree roots prohibit a cut, a retaining wall or edging may be necessary to retain the track surface.

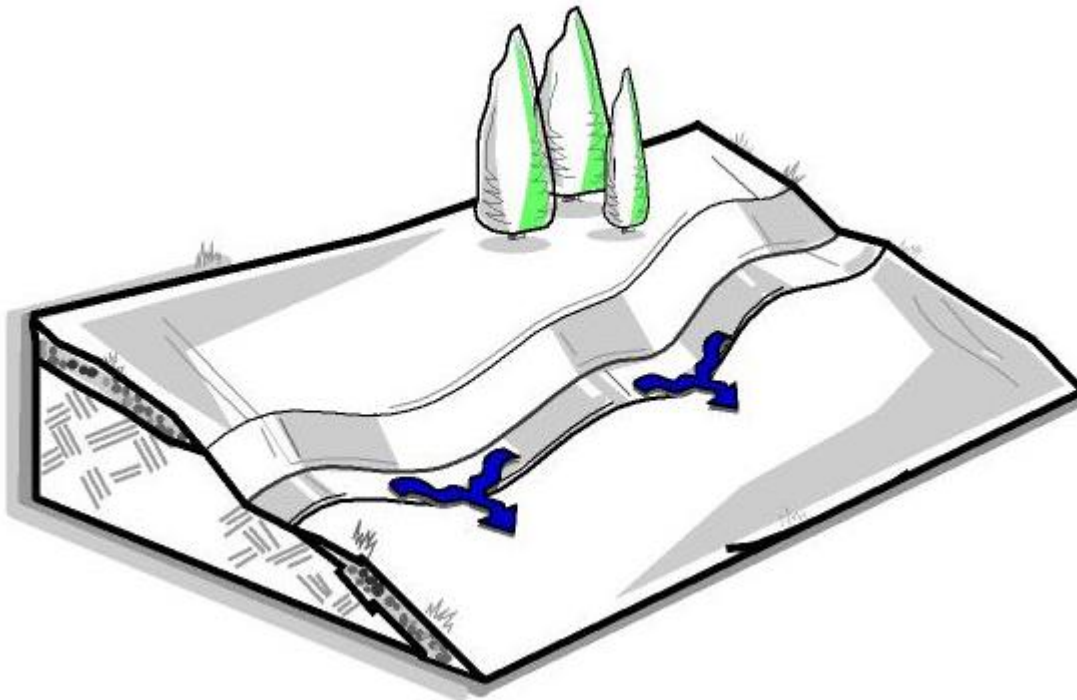
The upslope batter or backslope requires 'rounding off' to reduce soil creep onto the track tread. Vegetation should be cleared from above the batter to reduce long term maintenance. All exposed root material should be trimmed flush with the batter. The down slope batter (compacted fill) should have cut vegetation and organic matter pulled over it to reduce erosion and assist in vegetation re-establishing itself.



<http://woodlandstewardship.org>

Rolling Contour Trail

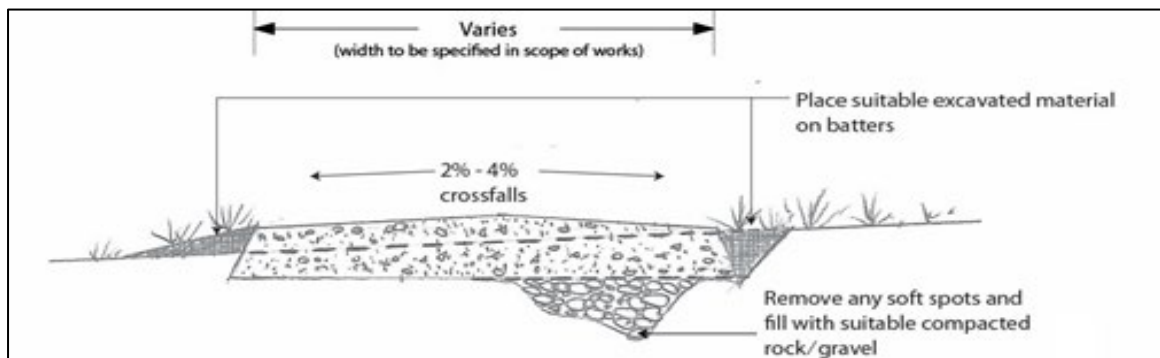
A rolling contour trail is characterised by many changes in gradient or grade reversals. These help to remove water from the trail tread while also controlling rider speed. The trail will also traverse across the general slope of the land therefore avoiding the fall line.



ROLLING CONTOUR TRAIL (*TRAIL SOLUTIONS*, IMBA 2001)

Low Benching (LB)

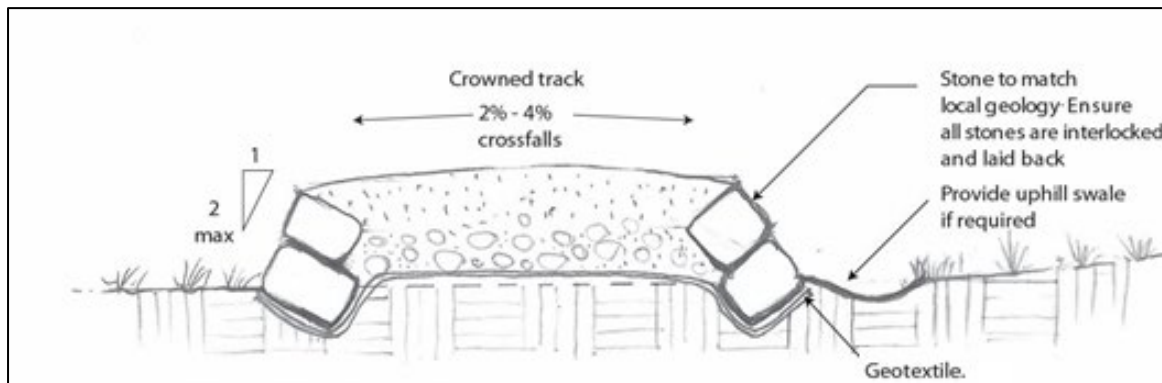
Generally specified where the side slope is 0°-5°. Track has minimal crowning and no or minimal edging with natural, excavated spoil used to provide batter.



LOW BENCHING (HCC 2011)

Double Edge (DE)

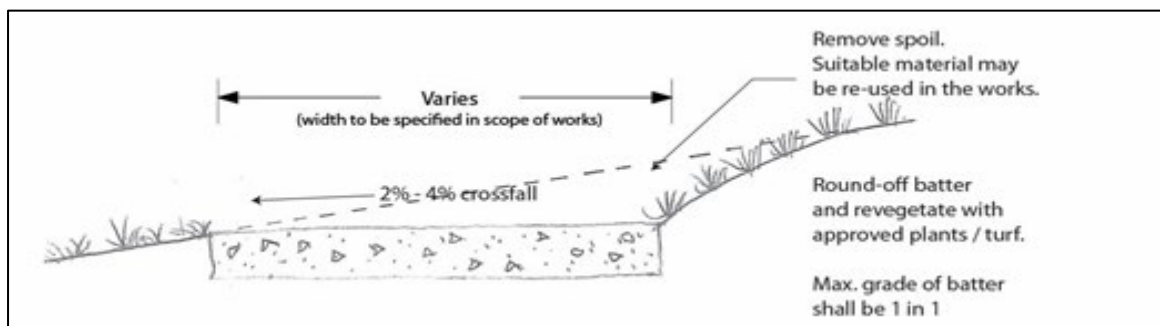
Specified where the side slope is 0°-5° and the track is being constructed through areas of poor drainage. The track tread is raised above natural ground level with rock edging to both sides to contain the track surface and has a crown. Cross drainage in the form of paved sections or culverts may be necessary if water volumes warrant.



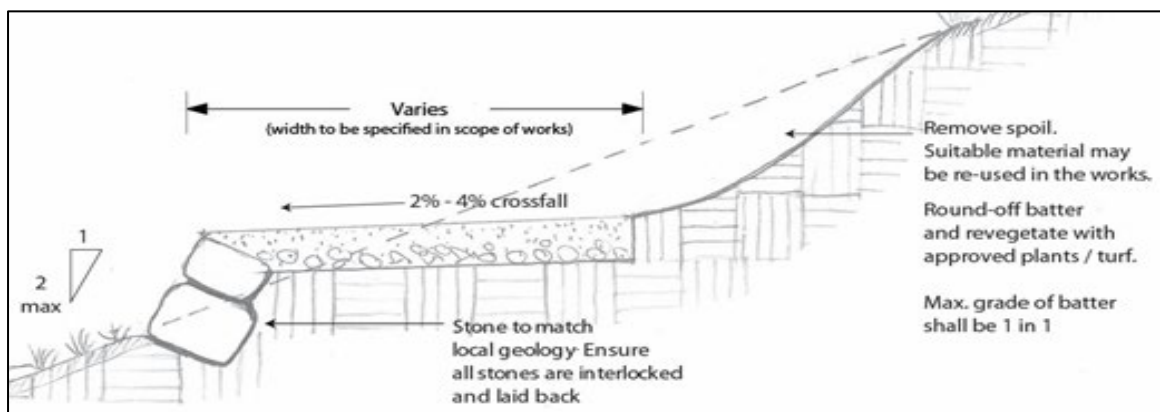
DOUBLE EDGE TRACK (HCC 2011)

Medium Benching (MB)

Generally specified where the side slope is 6°-20°. Full bench construction is preferable (Medium Benching Earth Batter Top & Bottom, MBEBT&B) but a rock wall of up to 500mm in height may be required on the lower side of the track (Medium Benching Earth Batter Top Only, MBEBT). Generally an earth batter on the topside of the track is sufficient but if required to retain loose soil, a top wall may be necessary. Maximum grade of batter to be 2:1. Track surface usually has a 2-5% out-slope to aid drainage.



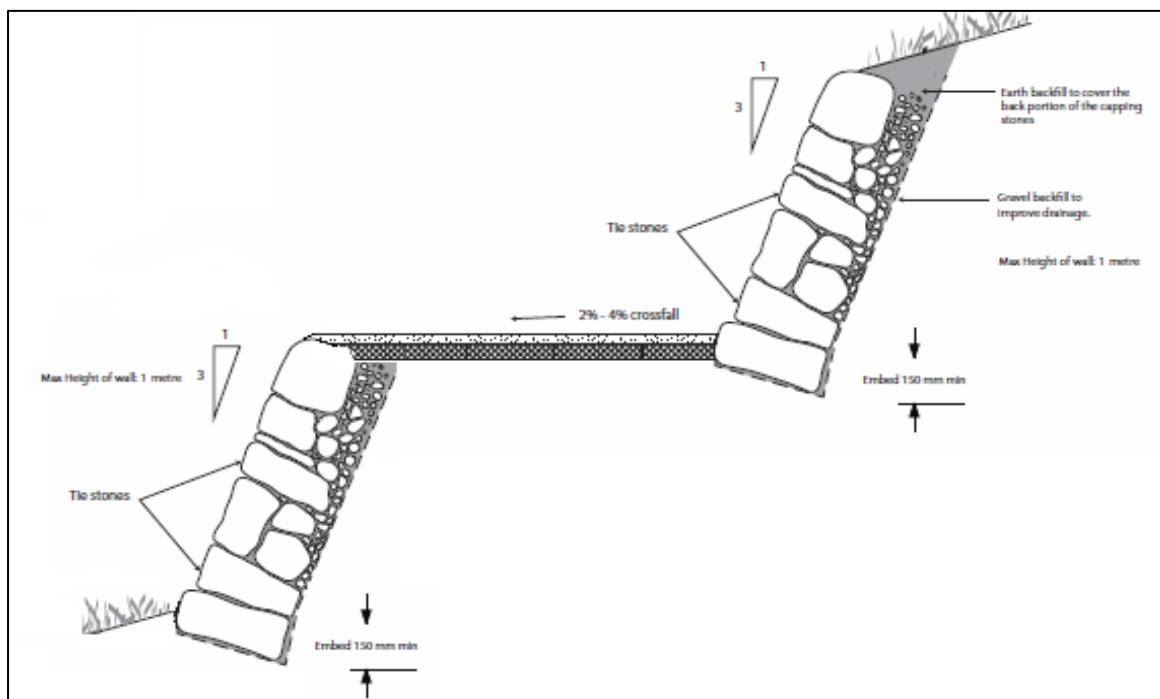
MEDIUM BENCHING - FULL BENCH - MBEBT&B (HCC 2011)



MEDIUM BENCHING - PARTIAL BENCH - MBEBT (HCC 2011)

Heavy Benching (HB)

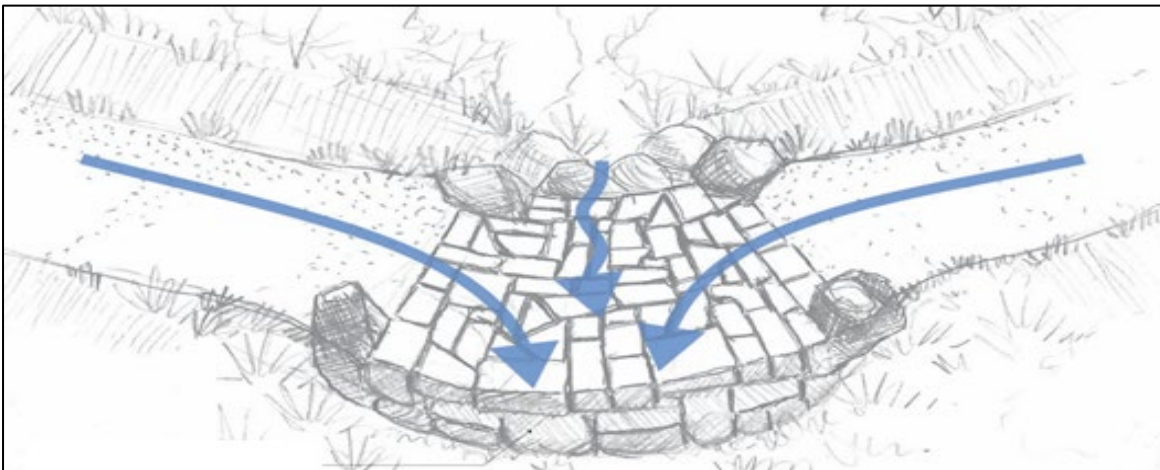
Generally specified where the side slope is greater than 20°. Full bench construction is preferable, (Heavy Benching Earth Batter Top & Bottom, HBEBT&B) but a rock wall of up to 1m in height may be required on the lower side of the track (Heavy Benching Earth Batter Top Only, MBEBT). Generally an earth batter on the topside of the track is sufficient but if required to retain loose soil, a top wall may be necessary. Maximum grade of batter to be 3:1. Track surface usually has a 2-5% out-slope.



HEAVY BENCHING - PARTIAL BENCH - HB

Rock Armouring / Paving (PAVE)

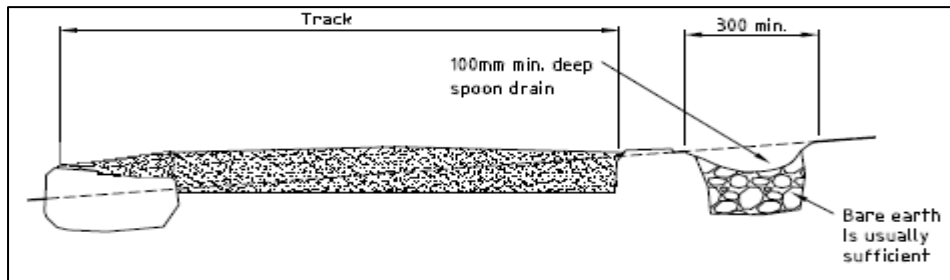
Generally specified where low to medium volumes of water intermittently cross the track surface. May also be constructed on steeper gradients as a hard wearing tread surface. Can be uneven in nature to add technicality to a mountain bike trail (ie. a rock garden technical trail feature).



ROCK ARMOURING / PAVING (HCC 2011)

Top Drain / Side Drain (TD / SD)

Generally specified to intercept low to medium volumes of water flowing across the track surface. Minimum 300mm wide and 100mm deep. Can be lined with select rock on steeper slopes (>5%) to prevent erosion and washouts. Paved areas or culverts are required to move the water across/under the track surface and downslope.

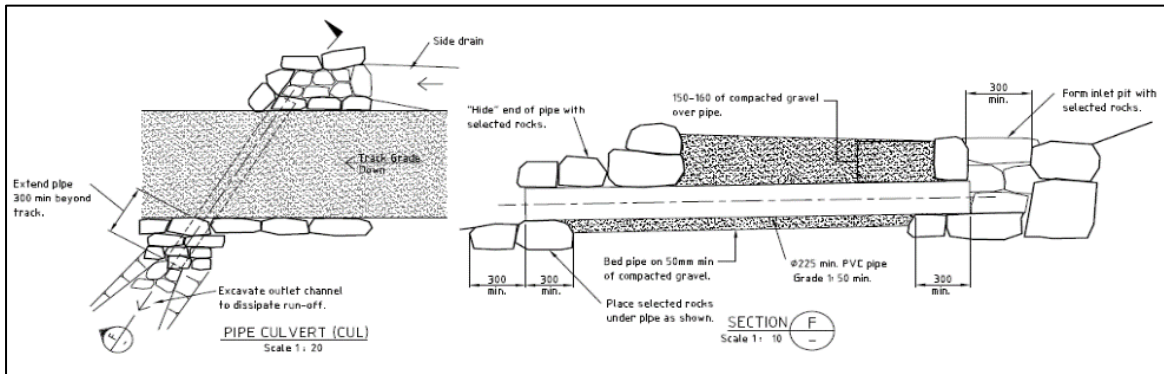


TOP DRAIN / SIDE DRAIN (SKM 2012)

Culvert (Cul)

Generally specified to move water from upslope of the track to downslope. Can be constructed in lieu of a bridge across small water courses. Also used in conjunction with top drains / side drains to control the flow of water that would normally flow onto the track surface. For medium to high flow areas, paving over the top of the culvert can be added to mitigate washouts of the track surface in case the culvert blocks during high intensity flows. Minimum recommended diameter 150mm.










CULVERT DETAIL (SKM 2012)

Horse Rider – Vegetation clearance guidelines



International Mountain Bicycling Association, Trail Difficulty Rating System - User Guide and Land Managers Guide

Trail Difficulty Rating System - User Guide

	 Very easy White Circle	 Easiest Green Circle	 More Difficult Blue Square	 Very Difficult Single Black Diamond	 Extremely Difficult Double Black Diamond
Description	<p>Likely to be a fire road or wide single track with a gentle gradient, smooth surface and free of obstacles.</p> <p>Frequent encounters are likely with other cyclists, walkers, runners and horse riders.</p>	<p>Likely to be a combination of fire road or wide single track with a gentle gradient, smooth surface and relatively free of unavoidable obstacles.</p> <p>Short sections may exceed these criteria.</p> <p>Frequent encounters are likely with walkers, runners, horse riders and other cyclists.</p>	<p>Likely to be a single trail with moderate gradients, variable surface and obstacles.</p>	<p>Likely to be a challenging single trail with steep gradients, variable surface and many obstacles.</p>	<p>Extremely difficult trails will incorporate very steep gradients, highly variable surface and unavoidable, severe obstacles.</p>
Suitable for	<p>Beginner/ novice cyclists. Basic bike skills required.</p>	<p>Beginner/ novice mountain bikers. Basic</p>	<p>Skilled mountain bikers. Suitable for mountain</p>	<p>Experienced mountain bikers with good skills.</p>	<p>Highly experienced mountain bikers with</p>






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	Suitable for most bikes.	mountain bike skills required. Suitable for off-road bikes.	bikes.	Suitable for better quality mountain bikes.	excellent skills. Suitable for quality mountain bikes.
Fitness Level	Most people in good health.	Most people in good health.	A good standard of fitness.	Higher level of fitness.	Higher level of fitness.
Trail Width	Two riders can ride side by side.	Shoulder width or greater.	Handlebar width or greater.	Can be less than handlebar width.	Can be less than handlebar width.
Trail Surface and obstacles	Hardened with no challenging features on the trail.	Mostly firm and stable. Trail may have obstacles such as logs, roots and rocks.	Possible sections of rocky or loose tread. Trail will have obstacles such as logs, roots and rocks.	Variable and challenging. Unavoidable obstacles such as logs, roots, rocks drop-offs or constructed obstacles.	Widely variable and unpredictable. Expect large, committing and unavoidable obstacles.
Trail Gradient	Climbs and descents are mostly shallow.	Climbs and descents are mostly shallow., but trail may include some moderately steep sections.	Mostly moderate gradients but may include steep sections.	Contains steeper descents or climbs.	Expect prolonged steep, loose and rocky descents or climbs.

Trail Difficulty Rating System - Land Managers Guide

	 Very easy White Circle	 Easiest Green Circle	 More Difficult Blue Square	 Very Difficult Single Black Diamond	 Extremely Difficult Double Black Diamond
Description	<p>Likely to be a fire road or wide single track with a gentle gradient, smooth surface and free of obstacles.</p> <p>Frequent encounters are likely with other cyclists, walkers, runners and horse riders.</p>	<p>Likely to be a combination of fire road or wide single track with a gentle gradient, smooth surface and relatively free of obstacles.</p> <p>Short sections may exceed these criteria.</p> <p>Frequent encounters are likely with other cyclists, walkers, runners and horse riders.</p>	<p>Likely to be a single trail with moderate gradients, variable surface and obstacles.</p> <p>Dual use or preferred use</p> <p>Optional lines desirable</p>	<p>Likely to be a challenging single trail with steep gradients, variable surface and many obstacles.</p> <p>Single use and direction</p> <p>Optional lines XC, DH or trails</p>	<p>Extremely difficult trails will incorporate very steep gradients, highly variable surface and unavoidable, severe obstacles.</p> <p>Single use and direction</p> <p>Optional lines XC, DH or trails</p>
Trail Width	2100mm plus or minus 900mm	900mm plus or minus 300mm for tread or bridges.	600mm plus or minus 300mm for tread or bridges.	300mm plus or minus 150mm for tread and bridges.	150mm plus or minus 100mm for tread or bridges.

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				Structures can vary.	Structures can vary.
Trail Surface	Hardened or smooth.	Mostly firm and stable.	Possible sections of rocky or loose tread.	Variable and challenging.	Widely variable and unpredictable.
Average Trail Grade	Climbs and descents are mostly shallow. Less than 5% average.	Climbs and descents are mostly shallow, but may include some moderately steep sections. 7% or less average.	Mostly moderate gradients but may include steep sections. 10% or less average.	Contains steeper descents or climbs. 20% or less average.	Expect prolonged steep, loose and rocky descents or climbs. 20% or greater average
Maximum Trail Grade	Max 10%	Max 15%	Max 20% or greater	Max 20% or greater	Max 40% or greater
Level of Trail Exposure	Firm and level fall zone to either side of trail corridor	Exposure to either side of trail corridor includes downward slopes of up to 10%	Exposure to either side of trail corridor includes downward slopes of up to 20%	Exposure to either side of trail corridor includes steep downward slopes or freefall	Exposure to either side of trail corridor includes steep downward slopes or freefall
Natural Obstacles and Technical	No obstacles.	Unavoidable obstacles to 50mm (2") high, such as logs, roots and rocks.	Unavoidable, rollable obstacles to 200mm (8") high, such as logs, roots and rocks.	Unavoidable obstacles to 380mm (15") high, such as logs, roots, rocks,	Large, committing and unavoidable obstacles to 380mm (15") high.

Trail Features (TTFs)		Avoidable, rollable obstacles may be present. Unavoidable bridges 900mm wide. Short sections may exceed criteria.	Avoidable obstacles to 600mm may be present. Unavoidable bridges 600mm wide. Width of deck is half the height. Short sections may exceed criteria.	drop-offs or constructed obstacles. Avoidable obstacles to 1200mm may be present. Unavoidable bridges 600mm wide. Width of deck is half the height. Short sections may exceed criteria.	Avoidable obstacles to 1200mm may be present. Unavoidable bridges 600mm or narrower. Width of bridges is unpredictable. Short sections may exceed criteria.
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<http://www.imba-au.com/imba-trails/resources/design-and-construction-guidelines>

**AS 2156.1-2001 Australian Standard, Walking Tracks Part 1:
Classification and Signage**

	1	2	3	4	5	6
Overview	<i>High use, easy access, suitable for wheelchair use, interpretation provided</i>	<i>High use, easy access, interpretation provided</i>	<i>Slightly modified environments, moderate numbers</i>	<i>Slightly modified environments, moderate numbers</i>	<i>Minimal facilities, few encounters</i>	<i>Often indistinct tracks in remote areas.</i>
Terrain	<i>No previous experience required.</i>	<i>No previous experience required.</i>	<i>No bushwalking experience required. May encounter steep slopes, water crossings, etc. Users responsible for own safety.</i>	<i>Users need to be self-reliant.</i>	<i>Users need to be self-reliant.</i>	<i>Users need to be self-reliant.</i>
Width	<i>>1.2m.</i>	<i>>900mm.</i>	<i>Generally <1.2m, variable.</i>			
Surface & drainage	<i>Broad, surfaced track suitable for wheelchairs.</i>	<i>Generally a modified or hardened surface.</i>	<i>Generally a modified surface, sections may be hardened.</i>	<i>Generally distinct without major modification.</i>	<i>Limited modification to natural surfaces. Alignment may be indistinct in places.</i>	<i>No modification of the natural environment.</i>
Gradient	<i>As per AS 1428; <1:14 (or 4° or 7%). Steps only with alternate ramp access.</i>	<i>Generally <1:10 (or 6° or 10%), minimal steps.</i>	<i>Generally <1:10 (or 6° or 10%), but may exceed 1:10 for short sections.</i>	<i>Limited to environmental and management considerations</i>	<i>May include steep sections of unmodified surfaces</i>	<i>May include steep sections of unmodified surfaces</i>
Infra-structure	<i>May include platforms, seats and barrier rails.</i>	<i>May include platforms, seats and barrier rails.</i>	<i>Generally only for specific safety and environmental considerations.</i>	<i>Generally only for specific safety and environmental considerations.</i>	<i>Generally only for specific safety and environmental considerations.</i>	<i>Generally not provided</i>
Signs	<i>Frequent.</i>	<i>Frequent.</i>	<i>OK for direction, management and interpretation purposes.</i>	<i>Minimal, for management and directional purposes.</i>	<i>Limited, for management purposes.</i>	<i>Not provided</i>
Weather	<i>Not applicable</i>	<i>Not applicable</i>	<i>Severe weather may affect navigation and safety.</i>	<i>Severe weather may affect navigation and safety.</i>	<i>Severe weather may affect navigation and safety.</i>	<i>Severe weather may affect navigation and safety.</i>
Risk management	<i>Tracks and built facilities managed for public risk and inspected at 30 day intervals.</i>	<i>Tracks and built facilities managed for public risk and inspected at 3 month intervals.</i>	<i>Built facilities managed for public risk and inspected at 6 month intervals.</i>	<i>Built facilities managed for public risk and inspected at 6-12 month intervals.</i>	<i>Built facilities managed for public risk and inspected at 6-18 month intervals.</i>	<i>Not be managed for public risk. Users responsible for personal safety.</i>
Management intervention	<i>High</i>	<i>Moderate to high</i>	<i>Moderate</i>	<i>Low to moderate</i>	<i>Low</i>	<i>Negligible</i>
Publicity	<i>Will normally appear on maps.</i>	<i>Will normally appear on maps.</i>	<i>Will normally appear on maps.</i>	<i>May be shown on maps</i>	<i>May be shown on maps</i>	<i>Will not be marked on maps</i>