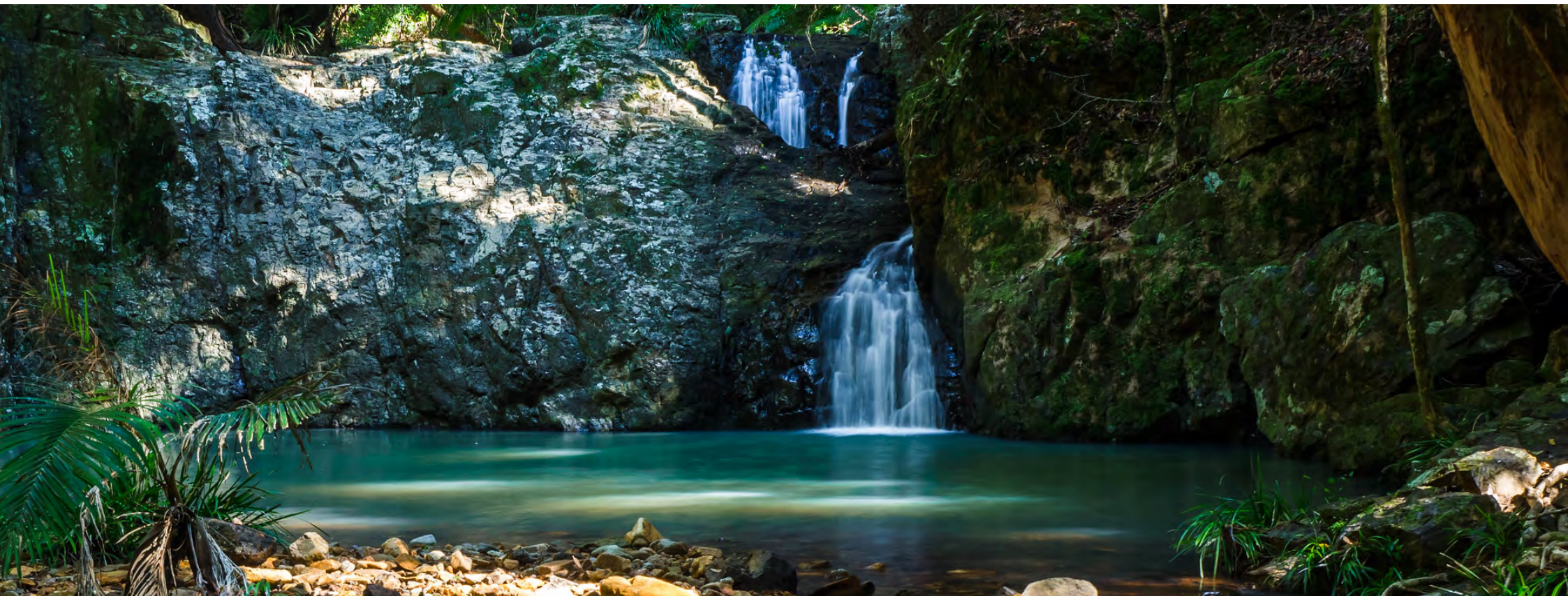




NSW NATIONAL PARKS & WILDLIFE SERVICE

Tweed Byron Hinterland Trails Mount Jerusalem National Park

Unicorn Falls Master Plan - final version



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All photos in master plan: Unicorn Falls and South Chowan Creek, Mount Jerusalem National Park. Dean Trezise.

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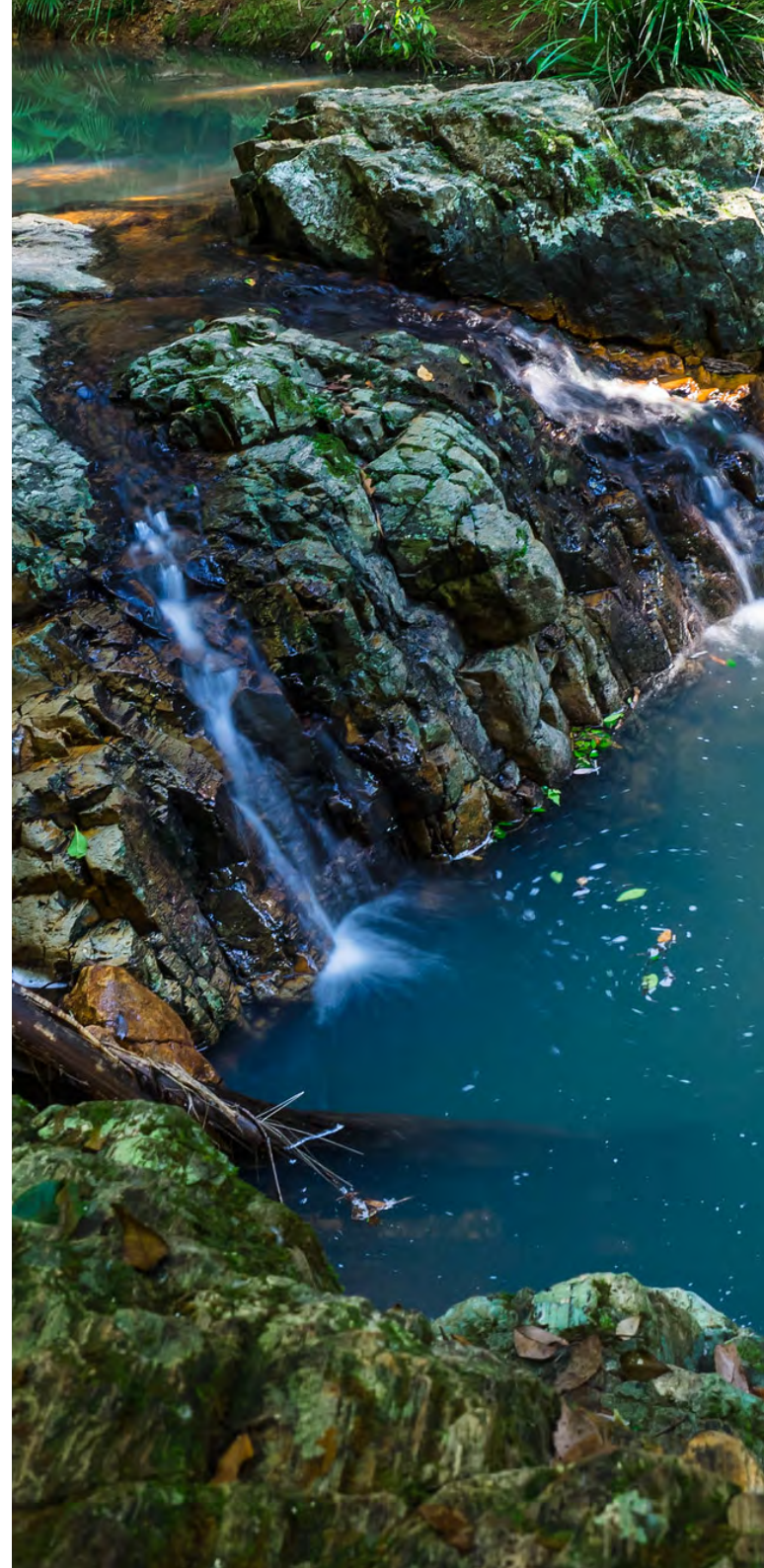
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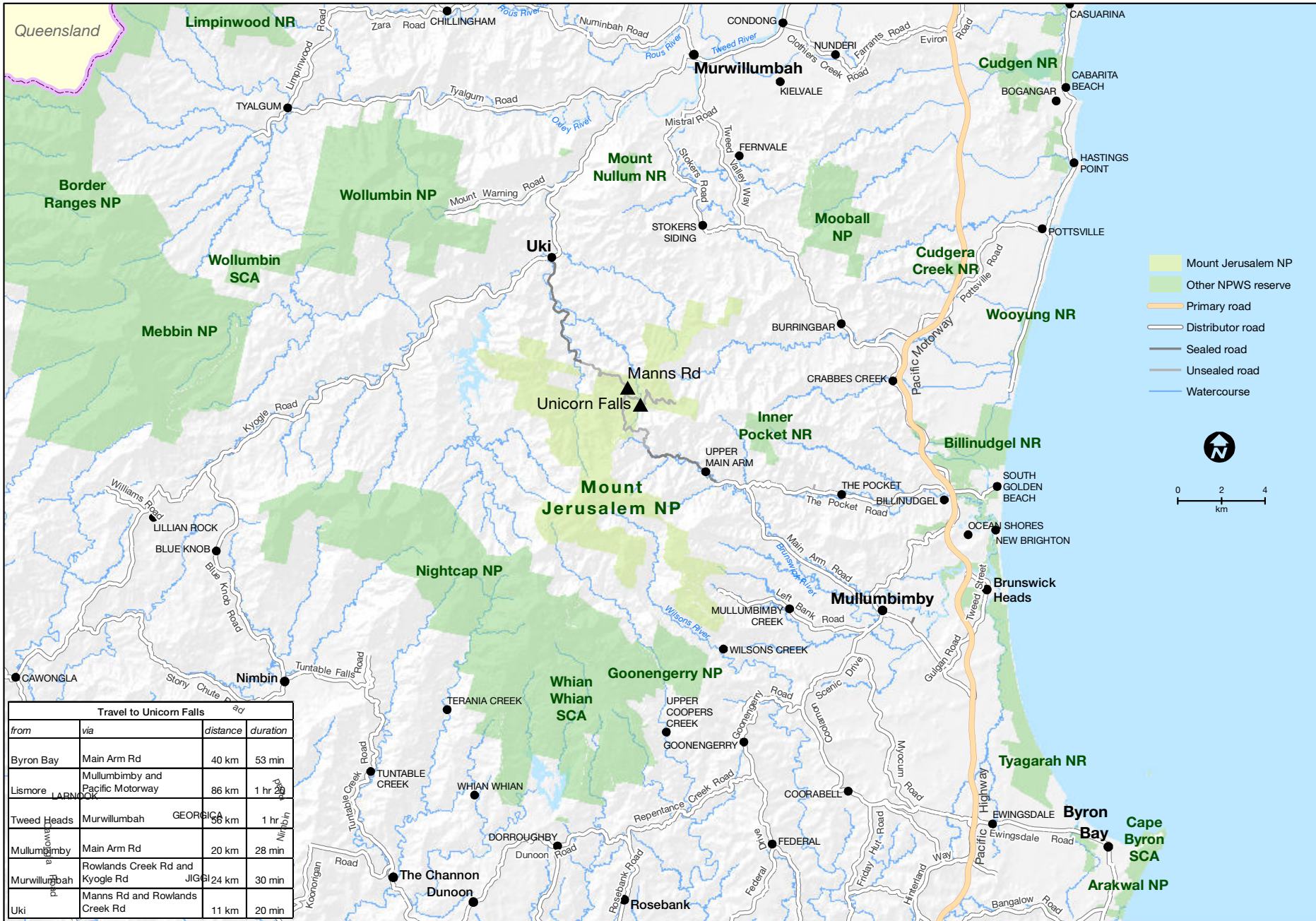


Figure 1.1 Unicorn Falls is located approximately 15 km south-east of the village of Uki on South Chowan Road within Mount Jerusalem National Park

1. Executive summary

This master plan outlines final plans for the upgrade of Unicorn Falls and the development of a trail head at nearby Manns Road, as part of the Tweed Byron Hinterland Trails project. The Project aims to deliver high-quality nature-based visitor experiences in the Tweed, Byron and Lismore region to boost regional visitor economies and improve community wellbeing.

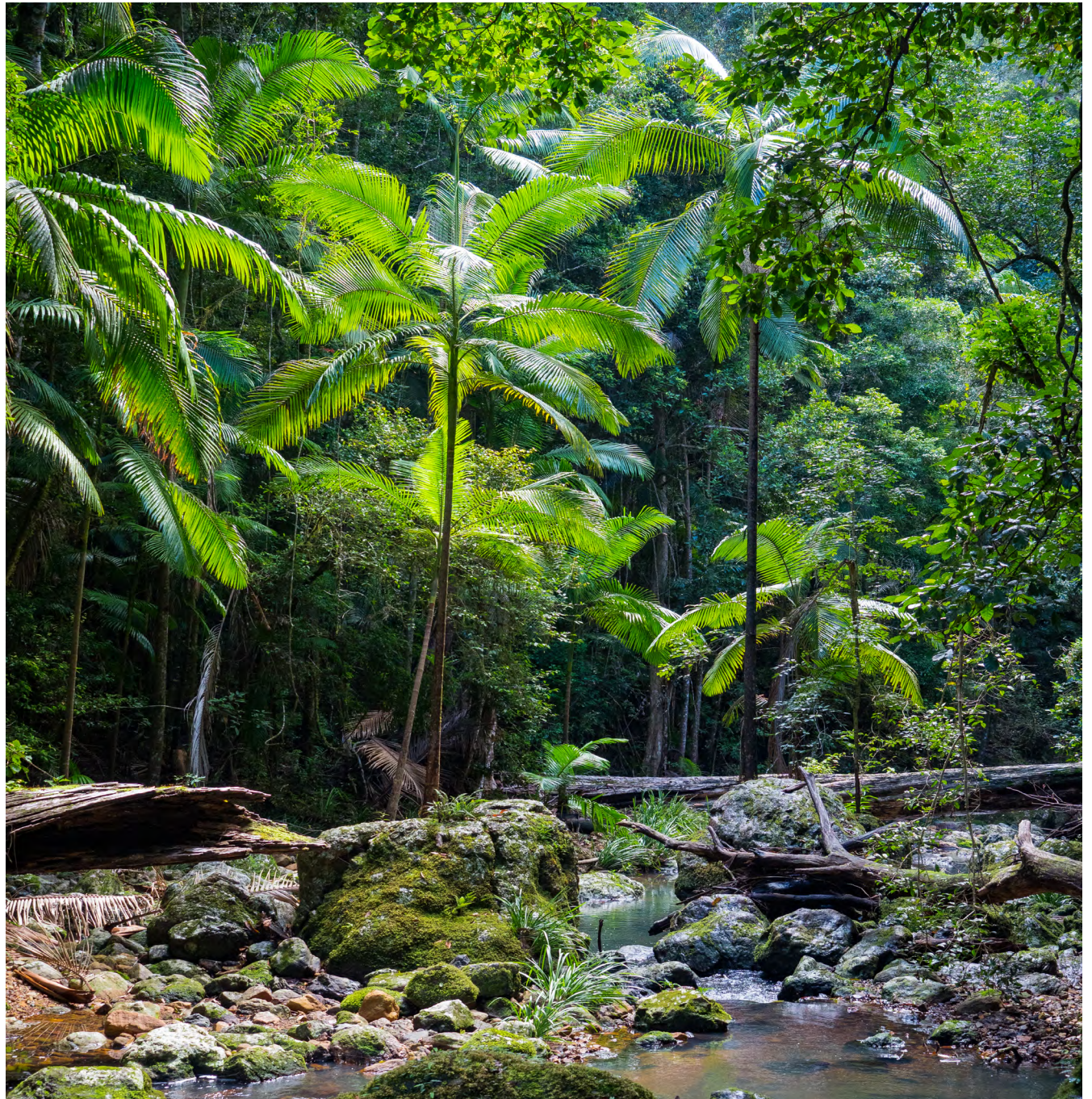
Unicorn Falls is located approximately 15 kilometres south-east of the village of Uki on South Chowan Road within Mount Jerusalem National Park (see Figure 1 Location map).

The Manns Road site will be the trail head for the Tweed Byron Hinterland Walk (working title), a 38 kilometre, four-day hiking trail that finishes at Minyon Falls in Nightcap National Park. As well as acting as the drop-off point for the walk, the trail head will feature visitor information, a toilet and parking for nineteen vehicles. A turning bay for a small mini bus will also be provided to allow commercial operators to transport walkers to the trail head.

The works at Unicorn Falls include pathways and steps to allow safe access to the pool at the base of the falls and enable visitors to enjoy the beauty of the falls and its rainforest environment. A small car park, visitor information and informal seating will be provided.

A new 2.1 kilometre walking track will link the two sites and provide an additional visitor experience.

Construction work will commence in spring 2021.



2. Background

2.1 Enhancing visitor amenities in national parks

In 2018, the NSW Government announced funding for a program of works to upgrade visitor facilities within NSW national parks aiming to increase nature-based tourism in NSW, boost regional visitor economies and improve community wellbeing.

These visitor infrastructure projects will significantly enhance visitor facilities and create new iconic experiences in NSW national parks including new walking trails, nature-based experiences and tourism partnerships. See [Enhancing visitor amenities in national parks](#) for more information.

The initiatives were proposed by the National Parks and Wildlife Service (NPWS) in response to the growing global popularity of nature-based walks. This funding provides an outstanding opportunity to strengthen the appeal of NSW as a walking destination and engage visitors with the values of NSW national parks by improving the quality and accessibility of walking tracks and trails.

National parks are for everyone and through these projects we aim to foster an appreciation and desire to protect the environment and our shared heritage; increase visitor numbers to support regional economic growth; create local employment opportunities and partnerships, and; inspire everyone to love their national parks.

2.2 Tweed Byron Hinterland Trails

[Tweed Byron Hinterland Trails](#) aims to create high quality nature-based visitor experiences focusing on a signature walk from Unicorn Falls, near the village of Uki, to Minyon Falls in the far north New South Wales hinterland. The project will provide alternative visitor experiences to the Wollumbin Summit walk and see new sustainable visitor infrastructure at Minyon Falls and Unicorn Falls.

Characterised by lush rainforests, mountain views, countless waterfalls and hidden rockpools set within the remnant caldera of an ancient shield volcano, this region has the potential for a range of new recreational opportunities. Unicorn Falls is at the northern end of a network of tracks and trails offering short to medium walks supported by visitor hubs with facilities for day use and overnight stays.

The project is part of a cohesive approach to market and enhance the tourism and local economies in the region, particularly in Tweed Shire. It will enable the development of strong partnerships with community members, including Aboriginal communities, and industry and government stakeholders.

This is the second of three separate master plans for different precincts within the Tweed Byron Hinterland Trails project. The final master plan outlines the planned visitor infrastructure improvements at these two sites. It will guide the enhancement of Unicorn Falls, and the development of a trail head and car park at nearby Manns Road in Mount Jerusalem National Park.

2.3 Project objectives

The objectives of the Tweed Byron Hinterland Trails project are:

- To create an iconic long-distance walk experience that is competitive at a national and international scale and complements and leverages existing nature-based tourism products and experiences in northern NSW.
- Identify opportunities for partnerships and supporting tourism products that will benefit the regional economy.
- Promote, protect, and respect the environmental and cultural heritage of the region and inspire future conservation advocacy and stewardship.
- Provide meaningful engagement with and opportunities for Aboriginal people.
- Disperse the high volumes of people from Wollumbin and Byron Bay by providing a compelling alternative experience.
- Achieve long-term sustainability through best practice design, choice of materials and construction techniques.

2.4 Why is it needed?

The Tweed Byron Hinterland multi-day walk commences at the Manns Road trail head and finishes 38 kilometres to the south at Mynyon Falls in Nightcap National Park. The developments at Manns Road will act as the northern visitor hub.

The Manns Road trail head acts as the northern drop-off and orientation point for walkers. It also provides parking for visitors to enjoy the short walk through rainforest to Unicorn Falls. No facilities are currently provided at the site.

The works at Unicorn Falls will allow safe access to the base of the falls and enable visitors to enjoy the beauty of the falls and its rainforest environment. There are currently no formal paths, and visitors often walk across the top of the falls to get to the pool below, presenting a significant safety hazard. Similarly, the steep descent to the pool is eroded and also hazardous. These works will also rehabilitate a degraded area above the falls.

The walk to Unicorn Falls will offer an additional recreational opportunity for the local community and park visitors. It will provide a safe option to walk to the falls and will reduce traffic on South Chowan Road, which currently gets congested in busy periods.

3. Public consultation

The Unicorn Falls master plan is the second of three separate master plans for different precincts within the Tweed Byron Hinterland Trails project. There are two areas covered by this master plan – access improvements at Unicorn Falls, and a trail head and car park on Manns Road just over a 1km to the north-west (see Figure 2.1 Locality map).

The Unicorn Falls draft master plan was placed on public exhibition from Friday 12 June to Monday 13 July 2020. This provided an important opportunity for people to review and comment on the draft proposals.

We received 51 submissions from various stakeholders, including individuals, residents, business operators, other government agencies, non-government organisations, Aboriginal organisations, park users and environmental groups.

Over 160 separate issues were raised in these submissions. See [Unicorn Falls Draft Master Plan Submissions Summary](#) for detail.

The revised master plan, with the proposed changes made in response to these submissions, was shared for further public comment from 12 to 26 July 2021 and 67 online survey responses were received from the community.

Additional changes to the final master plan have now been made, considering the feedback provided by both consultation opportunities.

We have taken all community views into account to help decide where changes could be made to propose a final master plan that improves outcomes for the park's natural and cultural heritage values and for visitors.

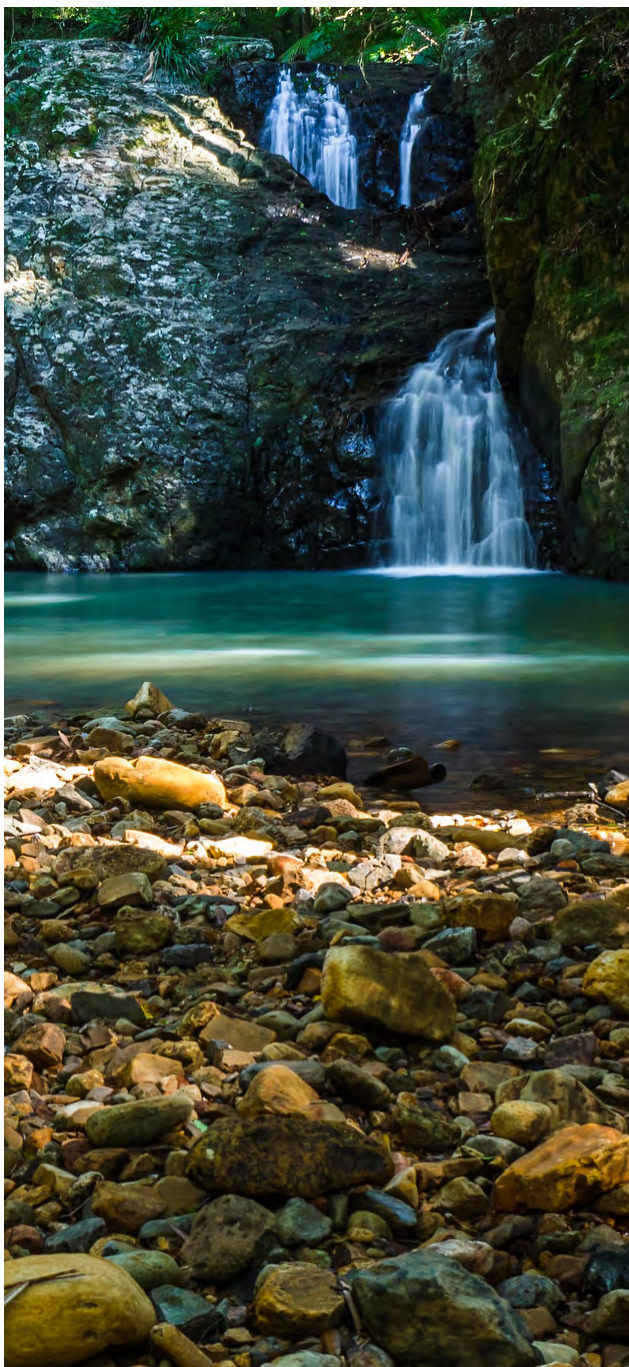
4. What is now proposed?

4.1 Manns Road trail head

- The site at Manns Road, formerly proposed as a small campground in the draft plan, will be the main car park and the trail head for the multi-day walk. A composting toilet with disabled access, a visitor information shelter and 19 vehicle bays (including a minibus drop-off point) will be provided at the Manns Road trail head.
- The multi-day walking track will depart the Manns Road trail head on a purpose-built track to the start of Whisky Creek Trail, approximately 600 metres away.
- The Manns Road site will also provide car parking for day visitors enjoying the new walking track to Unicorn Falls.

4.2 Unicorn Falls

- At Unicorn Falls, formed pathways and steps to the pool at the base of the falls will provide a safe access route and prevent further erosion. Visitor information and informal rock seating will be provided.
- South Chowan Road will remain open to vehicle traffic, cyclists and horse riders.
- A small car park at Unicorn Falls will provide up to seven car spaces using the existing disturbance footprint.
- Additional visitors will be required to park at the Manns Road trail head and walk to Unicorn Falls once this smaller car park reaches capacity. Signage will be provided to direct visitors to the car park.



Unicorn Falls contd.

- A short walking track (as proposed in the initial draft master plan) will link the Manns Road trail head to Unicorn Falls (approximately 2.1 kilometres each way) to provide a new visitor experience.
- The walk will follow part of the route of the Tweed Byron Hinterland Walk before it turns to the west to follow Whisky Creek Trail.
- BBQs will not be provided at either site to minimise fire risk.
- Camping is not permitted at Unicorn Falls.
- There will not be a campground provided in Mount Jerusalem National Park as part of this project. Cutters Camp in nearby Mebbin National Park has been upgraded to offer additional camping opportunities.

4.3 Plan of management amendments

Amendments to the Parks and Reserves of the Tweed Caldera Plan of Management (PoM) were adopted by the Minister in late 2019 to facilitate the Tweed Byron Hinterland Trails project. The proposed amendments were on public exhibition in January-March 2019. See [Tweed Byron Hinterland Trails amendments to plans of management](#).

The amended plan specifies that separate master plans are to be developed that will provide detailed information on the multi-day walk, Minyon Falls lookout and day use area in Nightcap National Park and Unicorn Falls in Mount Jerusalem National Park, and that all masterplans will be publicly exhibited.

4.4 Visitor access

Unicorn Falls is approximately 15 kilometres south-east of the village of Uki on South Chowan Road within Mount Jerusalem National Park.

Visitor access from Uki is via Rowlands Creek Road, Manns Road and South Chowan Road.



Figure 1.1 Locality map showing Unicorn Falls, proposed Manns Road trail head and walking track in Mount Jerusalem National Park.

4.5 The environment

Great care has been taken to ensure that the designs for both Unicorn Falls and the Manns Road trail head have minimal impact on natural and cultural values. Both areas take advantage of previously disturbed areas – a former log dump in the case of the trail head and a denuded informal picnic area.

Reports prepared by environmental and cultural heritage consultants (the latter included input from Aboriginal advisors) have greatly assisted with the design process in identifying sensitive areas and mitigation measures, and informed the preparation of a [Review of Environmental Factors](#).

The Review of Environmental Factors (REF) documents the environmental impact assessment of the proposed activities. It examines the significance of likely environmental impacts of the proposal and measures required to mitigate any adverse impacts to the environment. The REF helps to determine whether the activity can go ahead under the *Environmental Planning and Assessment Act 1979*.

The enhancements to Unicorn Falls commence in a level clearing in a stand of warm temperate/lowland subtropical rainforest adjacent to South Chowan Road. The rainforest extends along Chowan Creek where new paths and steps will be installed. The associated car park will be located on the disturbed edge of South Chowan Road.

The Manns Road trail head is proposed for a mainly level site, which is partly cleared within moist eucalypt forest dominated by Ironbark, Tallowood, Grey Gum and White Mahogany with a rainforest midstorey. Some native vegetation will be removed to construct the car park under strict conditions to minimise impacts.

The revised design and parking configuration have reduced the number of mature trees to be removed compared to earlier plans.

Threatened species assessments have been completed for eight fauna species, including the koala, and one ecological community. The assessments concluded that, if the recommended environmental safeguards, mitigation measures and a habitat compensation program are implemented, there is unlikely to be a significant impact on the threatened species and community.

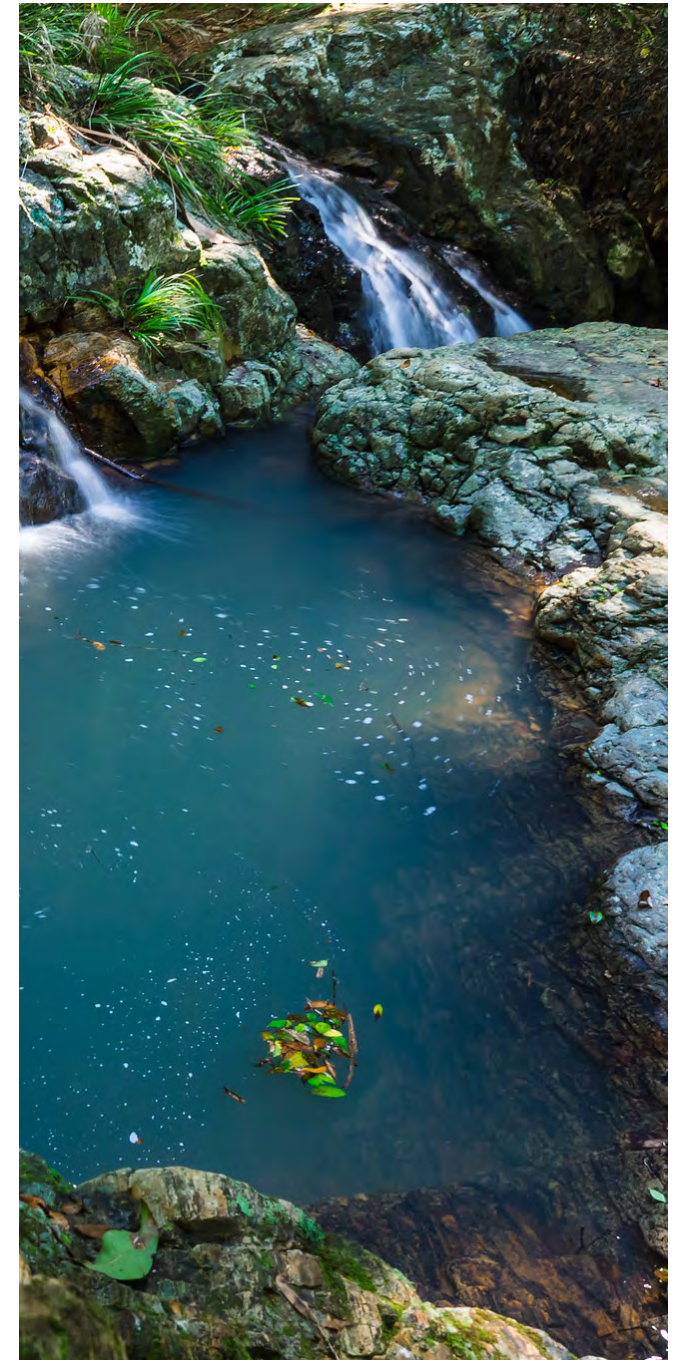
The proposed precincts, and buffers to these areas, have also been searched for threatened plants. Only two critically endangered rainforest trees were found at Manns Road. These will be protected during construction, and monitored regularly. Forest Sheoaks (*Allocasuarina torulosa*) will also be protected as feed trees for the threatened Glossy Black-cockatoo.

4.6 Construction

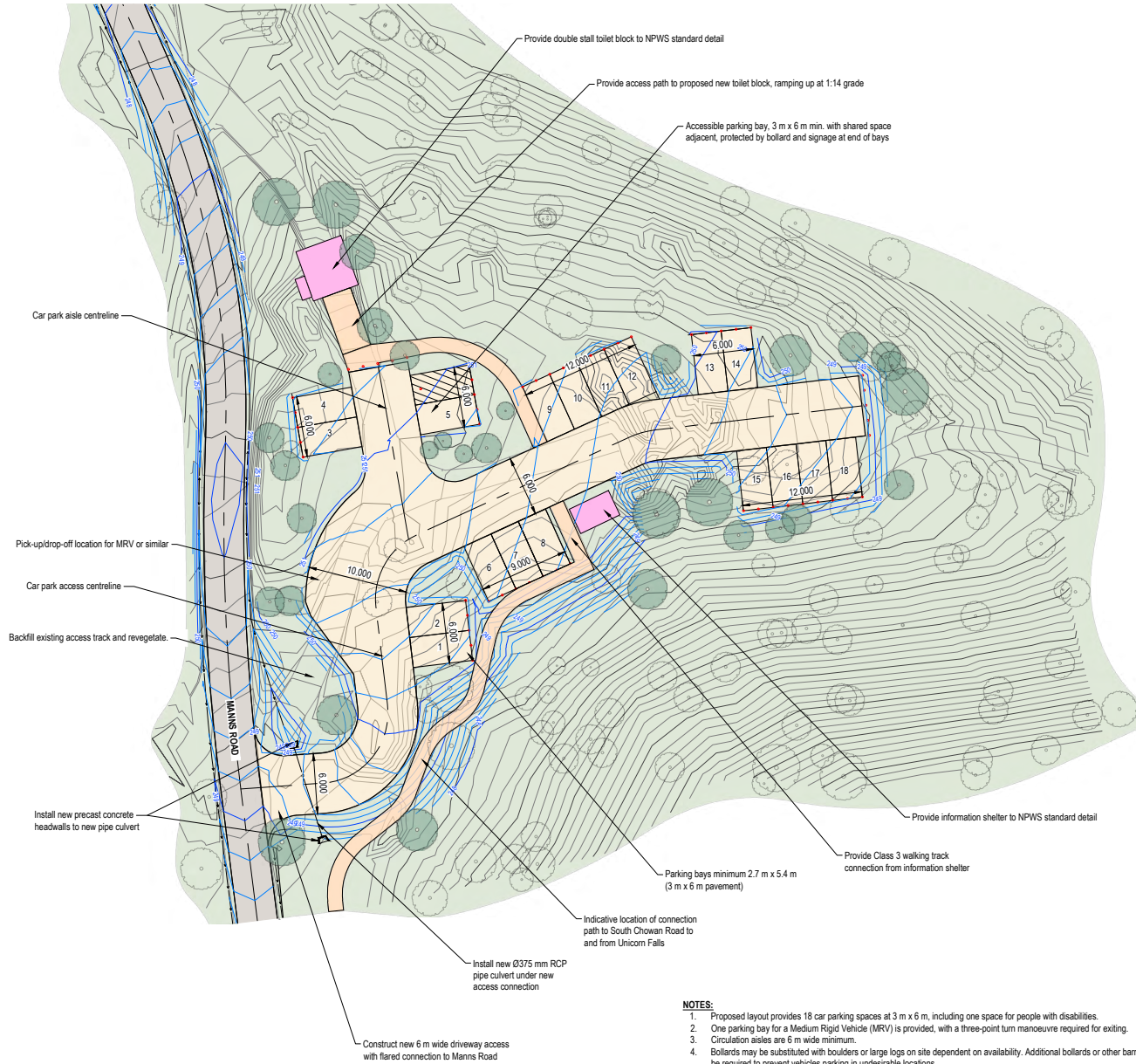
It is proposed to commence construction in spring 2021. Traffic management plans will be prepared for each site to respond to the different construction timeframes.

For road safety, heavy vehicles will not use Manns Road for construction purposes during school bus operation times and work will not occur at Unicorn Falls on weekends due to potential for conflict with existing visitor use. Access will be prohibited to Unicorn Falls during the construction period as necessary to minimise safety risks to the public.

Work undertaken for the project will be in accordance with NSW Government Procurement Policy Framework to ensure an equitable process that guarantees the best outcomes for the region and community.



5. Master plan drawings



- LEGEND**
- Major contour at 1m interval
 - Minor contour at 0.2m interval
 - Proposed major contour at 1m interval
 - Proposed minor contour at 0.2m interval
 - - - Proposed road centreline
 - Proposed pipe culvert
 - Proposed drainage swale
 - Proposed bollard
 - Existing tree
 - Trees requiring protection
 - Vegetation
 - Proposed pavement
 - Proposed footpath
 - Proposed roofed structure

Rev	Description	Date	Des.	App.	Chk.

Amendments

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Project Title

Tweed Byron Hinterland Trails

Client

NPWS

Designed	BRW	Drawn	KWG	Checked	RE
Approved	RE	Date	1/10/2021		

XREFs

Scale

metres 0 2 4 6 8 10

- NOTES:**
1. Proposed layout provides 18 car parking spaces at 3 m x 6 m, including one space for people with disabilities.
 2. One parking bay for a Medium Rigid Vehicle (MRV) is provided, with a three-point turn manoeuvre required for exiting.
 3. Circulation aisles are 6 m wide minimum.
 4. Bollards may be substituted with boulders or large logs on site dependent on availability. Additional bollards or other barriers may be required to prevent vehicles parking in undesirable locations.
 5. Pavement surfacing to be 150 mm deep wearing course material with minimum CBR of 40 and maximum particle size of 40 mm.

Plan 5.1 Manns Road trail head - General arrangement plan 3706-SK001

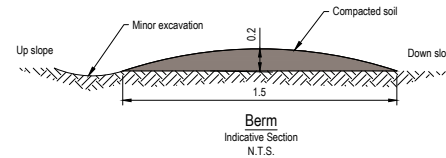
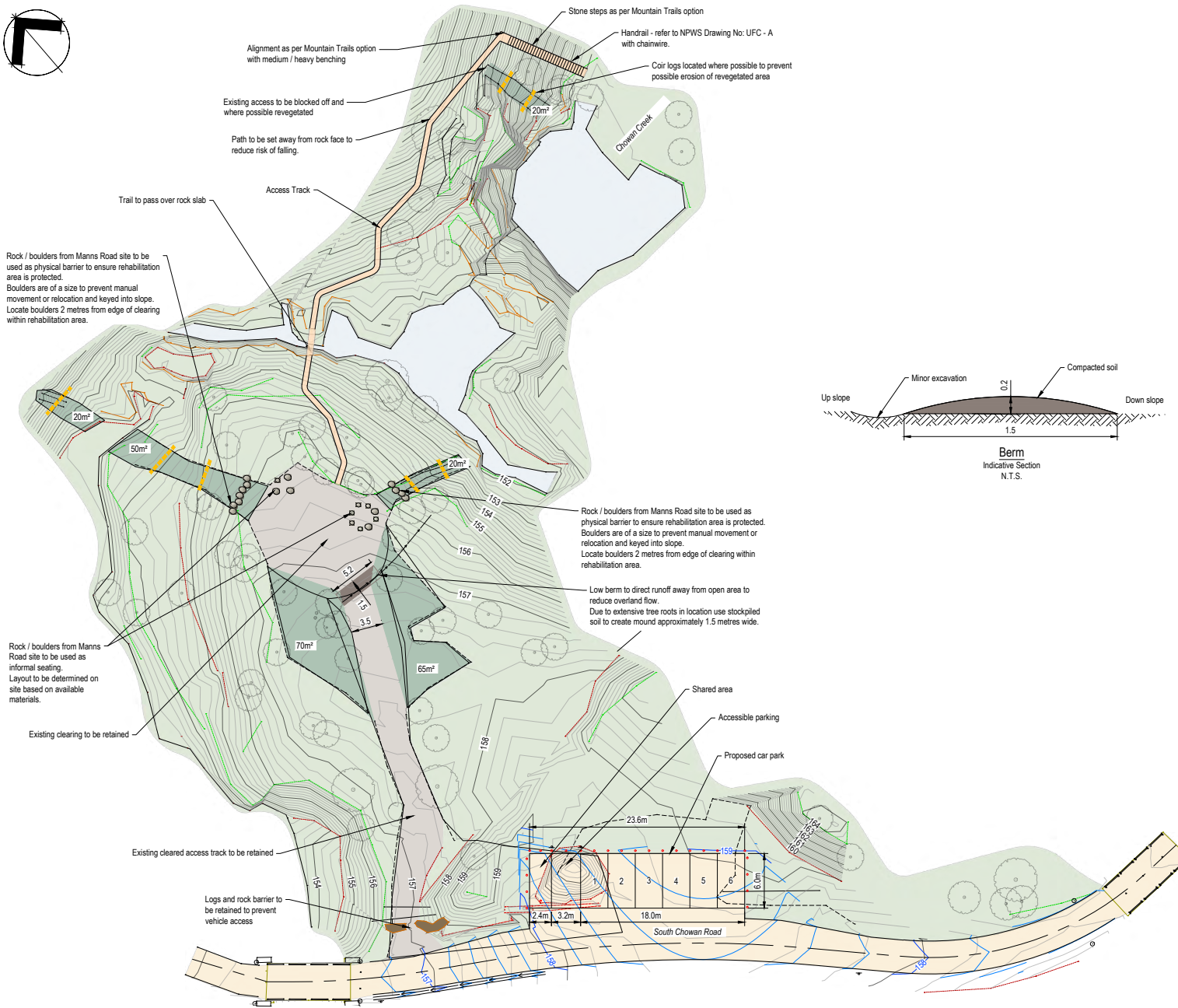
Drawing Title

**Manns Road Master Plan
Car Park Layout**

Drawing Number

3706/SK001

Revision



- LEGEND**
- Major contour at 1m interval
 - Minor contour at 0.2m interval
 - - - Edge of vegetation
 - Rock outcrop
 - Top of bank
 - Bottom of bank
 - Proposed major contour at 1m interval
 - Proposed minor contour at 0.2m interval
 - - - Proposed road centreline
 - ▲ Proposed sign
 - Proposed bollard
 - Existing tree
 - Water course
 - Revegetation area
 - Vegetation
 - Proposed path
 - Proposed unsealed pavement

Rev	Description	Date	Des.	App.	Chk.

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Project Title
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Client
NPWS

Designed	RE	Drawn	KWG	Checked	RE
Approved	RE	Date	1/10/2021		

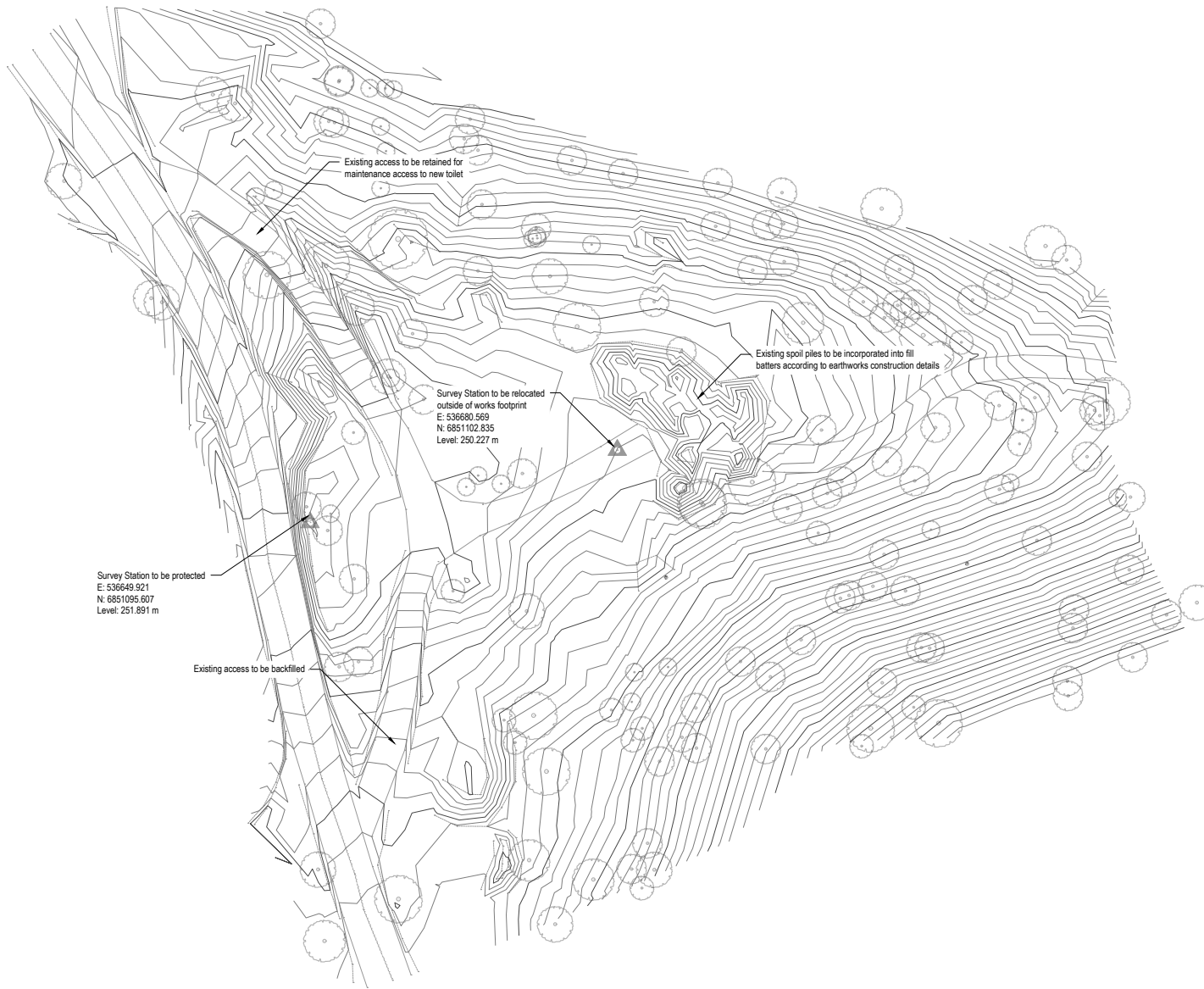
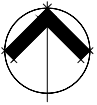
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Scale
metres 0 2 4 6 8 10

Drawing Title
Unicorn Falls Master Plan

3706-1042
 Drawing Number
3706/SK002
 Revision

Plan 5.2 Unicorn Falls - General arrangement plan 3706-SK002



FOR
CONSTRUCTION

Rev	Description	Date	Des.	Appr.	Chk.
1	Issue for Construction	10/02/2021	BWH	RE	
Amendments					

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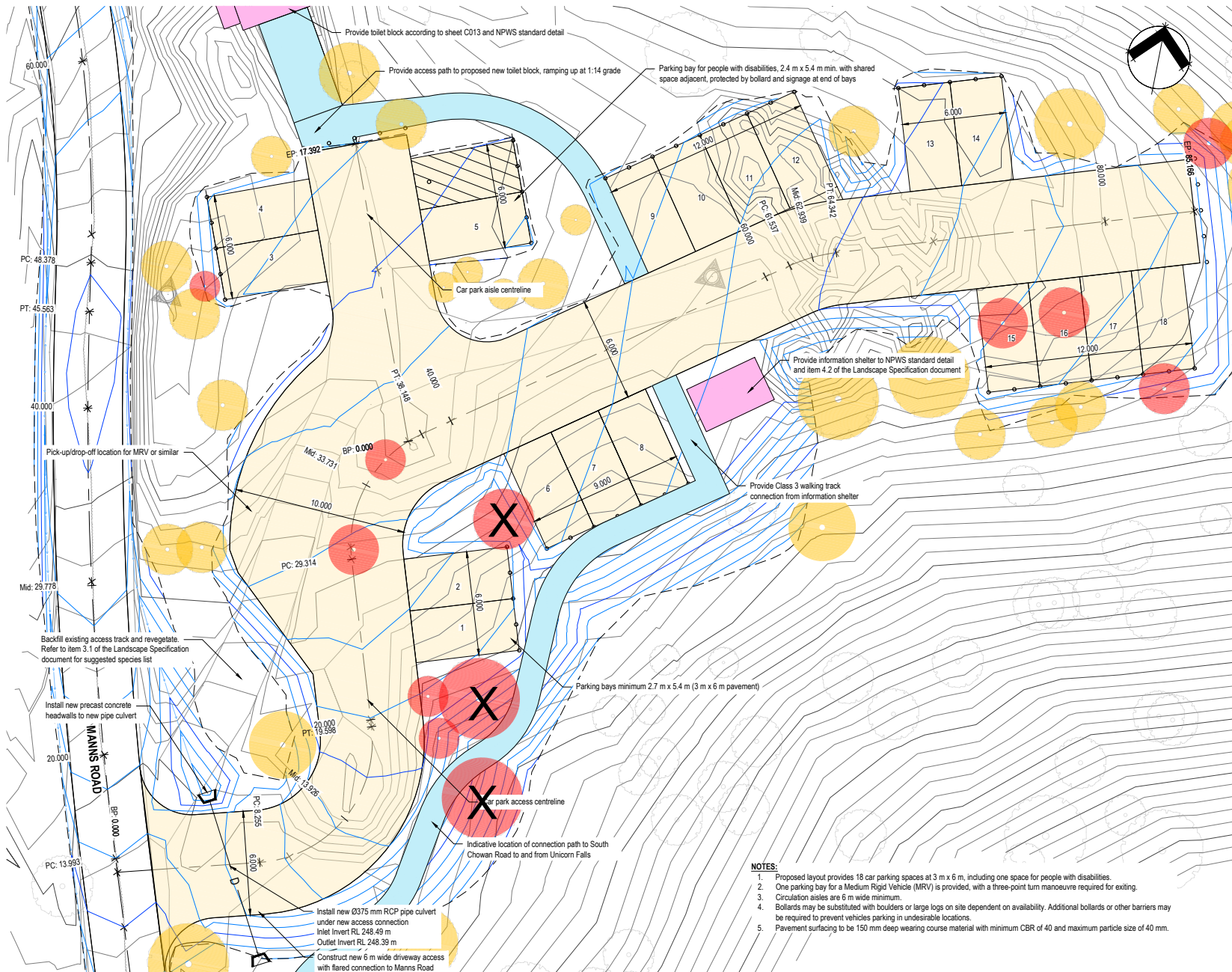
Designed	BWH	Drawn	BWH	Checked
Approved	RE	Date	5/11/2020	MVE

XREFs

Scale
metres 0 2 4 6 8 10

Drawing Title
Existing Site Layout

Drawing Number
3706/C001



LEGEND

- Existing contours (0.2 m interval)
- Proposed contours (0.2 m interval)
- Proposed Pavement
- Proposed roofed structure
- Proposed footpath
- Proposed road centreline
- Proposed limit of works
- Indicative bollard locations
- Proposed pipe culvert
- Proposed drainage swale
- Tree requiring protection
- Tree requiring removal
- Trees to be retained using methodology on GeoLINK 3706/C030

FOR CONSTRUCTION

2	Added tree details	12/05/2021	BWH	RE
1	Issue for Construction	10/02/2021	BWH	RE
Rev	Description	Date	Des.	Appr.

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Project Title
NPWS Unicorn Falls

Client
NPWS

Designed	BWH	Drawn	BWH	Checked	MVE
Approved	RE	Date	5/11/2020		

Scale
metres 0 1 2 3 4 5

- NOTES:**
- Proposed layout provides 18 car parking spaces at 3 m x 6 m, including one space for people with disabilities.
 - One parking bay for a Medium Rigid Vehicle (MRV) is provided, with a three-point turn manoeuvre required for exiting. Circulation aisles are 6 m wide minimum.
 - Bollards may be substituted with boulders or large logs on site dependent on availability. Additional bollards or other barriers may be required to prevent vehicles parking in undesirable locations.
 - Pavement surfacing to be 150 mm deep wearing course material with minimum CBR of 40 and maximum particle size of 40 mm.

Drawing Title
Car Park Civil Works Layout

3706-1024
Drawing Number
3706/C011

Revision
2

Plan 5.4 Manns Road detailed design - Car park civil works layout and tree protection and removal plan 3706/C011

General

- Unless otherwise noted, all construction works associated with the provision of this project shall be carried out in accordance with the relevant design specifications and standard drawings of Tweed Shire Council.
- These drawings shall be read in conjunction with all other consultant's drawings and specifications. All discrepancies shall be referred to the supervising engineer before proceeding with the work.
- These drawings shall be read with full consideration of all the specifications, acts, regulations, standards, codes of practice and guidelines, both specifically referred to herein and implied, and with other such written instructions as may be issued during the course of the project. The contractor is responsible for ensuring they, and all site workers as necessary, have access to the relevant specifications, acts, regulations, standards, codes of practice and guidelines and are aware of the requirements and obligations set out therein.
- All materials and workmanship shall be in accordance with the relevant and current Australian Standards, by-laws and ordinances of the relevant building authorities, and local government specifications.
- All dimensions shown shall be verified by construction workers on site. The drawings shall not be scaled for dimensions.
- Unless otherwise noted all levels and dimensions are in metres.

General Erosion and Sediment Control Notes

- All erosion and sediment controls are to be in accordance with the *Soils and Construction Volume 1 - Managing Urban Stormwater 4th Ed.* (the 'Blue Book').
- These notes and accompanying plans are to be read in conjunction with any relevant engineering plans, and any other written instructions issued in relation to development on site.
- All sub contractors are to be informed of their responsibilities in relation to erosion and sedimentation.
- Accidentally disturbed areas would be stabilised and/or re-vegetated or secured with geotabric as soon as practical after the damage has occurred.
- Work are to cease if any pollution problems are suspected or detected.
- A spill containment kit, including equipment to address both terrestrial and aquatic spills, would be available at all times. Staff would be trained in the effective deployment of the spill containment kit.
- Safety issues must be considered at all times; incorporate traffic control devices to the satisfaction of the superintendent.

Timing of Works

- Works are to be carried out wherever possible during the cooler months, when rainfall events occur less frequently.
- The weather is to be monitored during the proposed period of works. Works would be scheduled outside of forecasted significant rain events and postponed during unforeseen rain events.
- Pavement formations and any excavation works are to be scheduled outside of average high rainfall periods.
- Works would cease and all sediment control measures checked and repaired or re-installed (if required) if heavy rainfall was forecast.
- Sediment control features would be checked as soon as practical (within 24 hours) after significant rainfall events.

Construction Staging

Works are to be undertaken in the following order. One stage must be complete prior to the next stage being commenced.

1. Site Establishment

- Prior to the commencement of any works on site, the following erosion and sediment control works must be carried out:
 - Construct a suitably stabilised site access comprising Alternative 1 or 2 from the details sheet, minimum 15 m in total length excluding grid, and a maximum of 3 m wide. The access is to be flanked with barrier fencing to ensure it is not bypassed during construction.
 - Install clearly visible barrier fencing to contain construction works and delineate no-go zones.
 - Construct the temporary and permanent clean water diversion drains and stabilise.
 - Establish stockpile areas for spoil material.

2. Site Preparation:

- Commencement of civil works may only begin when all erosion and sediment controls are correctly installed.
- Preparation works may then proceed, including approved cleaning of vegetation, stripping of topsoil, and stockpiling materials.
- Stockpiles are to be constructed in accordance with *The Blue Book* and these notes.

3. Civil Works:

- As much as possible, works are to be carried out in stages to minimise disturbed areas exposed to erosion.
- Only disturb land when it is absolutely necessary.
- Stabilise disturbed land as soon as practicable e.g. with grass seeding.
- Works shall include pavement preparation and construction, laying of pipes for services etc.
- Ongoing maintenance of all erosion and sediment controls shall extend for the duration of construction works.
- Ensure stormwater runoff from all disturbed construction areas drains to appropriate sediment control devices.
- As drainage inlet structures are constructed, they are to be protected with appropriate sediment control.

4. Site Decommission:

- On completion of works, completed areas are to be decommissioned. Only once the site is suitably stabilised and rehabilitated may the erosion and sediment controls be removed.
- Ensure stormwater drainage structures, are free of sediment and debris.
- Sediment and barrier fencing is to remain in place until a suitably qualified person deems the erosion and sedimentation risk is low enough to warrant its removal.
- All erosion and sediment controls are to be maintained in accordance with these notes for the full duration of their installation. Failure to do so may result in pollution of the receiving environment.
- For the purpose of these plans, stabilised shall be defined as 70% permanent soil coverage over all upstream disturbed land.**

Water Quality

To ensure the receiving sensitive environment is not adversely affected by the proposed works, the following measure shall be put in place:

- No cleaning of tools or equipment shall occur within any drainage line or creek.
- All equipment shall be maintained in good working order and operated according to manufacturer's specifications;
- An incident management and emergency response procedure shall be prepared detailing procedures to be followed in the event of a spill or release of waste.
- Vehicles, machinery and equipment shall be maintained in accordance with manufacturer's specifications in order to meet the requirements of the *Protection of the Environment Operations Act 1997* and associated regulations.
- Vehicles and equipment shall be switched off when not operating.
- No materials are to be placed within areas of potentially high velocity flow.

Waste

- No waste materials will be used in a manner that would pose a risk to public safety and waste generated from the proposed works will be recycled where possible.
- Any contaminated waste generated by the proposed works will be disposed of in accordance with the EPA approved methods of waste disposal.
- All materials, including waste and hazardous materials are to only be stored in approved containers. Regular clearing of waste from the site is to be scheduled.
- The quantity of plant and material kept on site is to be limited to only those immediately required. All plant and materials are to be removed from the site when practical, as soon as construction is complete. Unnecessary storage of fuels, lubricants or other compounds on-site would be avoided and required fuels and other liquids would be stored in small quantities.

Site Inspection and Maintenance

- A self-auditing checklist program will be established by the contractor prior to the commencement of any construction works. The checks will be performed at least weekly, as well as immediately before site closure and immediately after any rainfall even greater than 5 mm in any one 24-hour period.
- A suitably qualified person will oversee the installation and maintenance of all soil and water management works.
- Waste receptacles will be cleared at least weekly, and more frequently if required.
- Areas recently stabilised with grass species will be watered regularly until an effective cover has been established. Re-seed if vegetation growth is inadequate.
- All erosion and sedimentation controls are to be kept in good working order at all times, and repaired/replaced as required.
- Sediment build-up behind sediment fences, within drainage lines and within sediment basins shall be removed and spread on site in locations where further erosion and or sedimentation is unlikely to occur.
- Where practical, foot and vehicular traffic will be kept away from all recently stabilised areas.

Stockpiles

- Place stockpiles a min. of 2 m (preferably 5 m) from existing vegetation, concentrated water flow and roads etc.
- Construct on the contour as low, flat, elongated mounds, less than 2 m high (if possible)
- Earth banks shall be constructed on the upslope side, and sediment fences installed within 2 m downslope.

Check Dams

- Check dams may be used within diversion drains to control velocity. Sediment collection is a secondary purpose.
- Catchment area will be limited to 4 ha.

Sediment Fences

- Shall not to be located in areas of concentrated flow.
- Are to be installed along the contour with a max. catchment area 0.6 ha per 100 m length of fence.
- Woven fabrics are to be used.
- Where fences need to be located across the contour the layout shall conform to 'typical layout across grade'.
- Fences are required 2 m min. from toe of cut or fill batters, where not practical, one fence can be at the toe with a second fence 1 m min. away. Fence should not be located parallel with toe if concentration of flow will occur behind the fence.
- Wherever possible, construct the sediment fence from a continuous roll. To join fabric, either: a) attached each end to individualisation stakes, hold the stakes together, rotate the stakes 180°, then drive the two stakes into the ground or b) overlap the fabric to the next support post.
- Both ends of the fence should be turned up the slope a minimum of 1.5 m to minimise the risk of flow bypassing around the ends of the fence.
- Returns are to be spaced at 20 m (max.) if fence is located along the contour, otherwise 5 to 10 m depending on the upstream slope.
- At least 300 mm of fabric must be buried in either a 200 mm deep trench or under a continuous 100 mm high layer of sand or aggregate (not soil).
- Sediment fences are to be braced for long-term stability. Spill-through weirs are to be incorporated at intervals of 20 - 30 m with rock rubble scour protection on the down stream side to control overflow.
- Barrier and sediment fencing are to be located no more than 5 m (2 m desirable) from construction activities, to ensure disturbed land is minimised.
- Captured sediment is to be removed and spread on site in locations where further erosion and or sedimentation is unlikely to occur.

Variations in Construction Process

As per *The Blue Book*, a revised Soil and Water Management Plan might be required where:

- Changes occur in slope gradients and drainage paths, with their exact form frequently unpredictable before works start;
- Works continue over an extended period, with revisions being required at the beginning of the second year of operations and further revisions at two-yearly intervals after that. Any revised plans should reflect reasonable new standards applying to them; or
- The desired outcome (e.g. protection of receiving environments) is clearly not being achieved. This plan is only part of the strategy, with other aspects being appropriate implementation, monitoring and corrective action.

Stormwater Drainage

- All stormwater drainage construction shall be in accordance NRLG Specifications C221.
- Drainage pipe 375 diameter and larger shall be precast reinforced concrete supplied and manufactured by an approved pipe manufacturer. Unless otherwise noted on the drawings or specified by the Superintendent concrete pipes shall be a minimum of Class 3.
- Stormwater pipes to be installed in accordance with NRLG standard drawing SW-06, H2 support.
- Unless otherwise noted and detailed on the design drawings drainage structures such as headwalls shall be supplied and constructed by an approved concrete manufacturer specialising in drainage components.
- Should the contractor undertake to construct headwalls in situ, that have not been detailed, before undertaking any construction the contractor shall submit to the Superintendent engineering drawings endorsed by a suitably qualified engineer detailing the proposed construction details.

Services

- Existing underground facilities may not be shown on the drawings or may be in locations or levels different from those shown on the drawings.
- The contractor shall be responsible for ascertaining the exact location of each underground facility prior to undertaking any work that may damage such facility.

Protection of Existing Vegetation

- Trees and vegetation to be retained within the construction site shall be protected by a fence to minimise disturbance to existing ground conditions within the dripline of the vegetation. The fence shall be constructed as follows:
 - with a minimum height of 1.2 metres,
 - outside the dripline of the tree or vegetation,
 - of steel star pickets at a maximum spacing of 2.0 m with a minimum of 3 strands of plain steel wire.
 - to completely enclose the tree or vegetation, or attached to existing permanent fencing to effectively enclose the tree's and / or vegetation, except where the trees and / or vegetation are a continuous edge where the fence shall be constructed to encompass the length of the entire continuous edge and be located such as to exclude access to the vegetated area.
 - with orange barrier mesh or similar, attached to the outside of the fence and continuing around it's perimeter.
- The fence's shall be erected prior to the commencement of any works within 50 metres of vegetation or trees to be retained. The fence's shall remain and be maintained for the duration of the site clearing and construction works.
- No filling is to be placed within the dripline of a tree's or vegetation to be retained, so as to cause changes in surface level by more than 100 mm from the existing level except where specific details are provided. Such placed soil / fill shall be finer than that being covered in-situ.

Earthworks and Pavement

- All earthworks are to be carried out in accordance with AS3796, Tweed Shire Council C213 and the conditions contained in the geotechnical report for the site.
- All pavement works to be carried out in accordance with Tweed Shire Council C242, C244 and C245 or NPWS Facilities Manual as appropriate.
- Any minor concrete works to be carried out in accordance with Tweed Shire Council C271
- All works are to be carried out in accordance with other consultants' documentation. Where discrepancies exist they shall be referred to the supervising engineer.
- Strip minimum 100 mm topsoil from all areas prior to filling and stockpile for reuse
- Trim and compact subgrade to min. 95% standard compaction and proof roll to the satisfaction of the supervising engineer prior to undertaking filling
- Any changes in surface condition of subgrade should be gradual, with existing and imported subgrade material ripped and blended prior to compaction to achieve a smooth transition.
- Fill is to be benched into the existing batter with a minimum 0.5 m overlap.
- Topsoil and grass seed or turf as required to be applied to all finished surface batters.

Structures

- Toilet and information shelter structures to be in accordance with NPWS standard drawings TSD-A - TSD-D, FTRS-A - FTRS-D and T17-A - T17-E and Landscape Specification document *Manns Road Car Park & Unicorn Falls Day Use Area*.
- Structural footings for toilet and information shelter to be designed and certified by a practicing structural engineer.
- Allowable bearing pressure for design of footings to be 200kPa.



Rev	Description	Date	Des	App	Chk
1	Issue for Construction	10/02/2020	BWH	RE	

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Project Title
NPWS Unicorn Falls

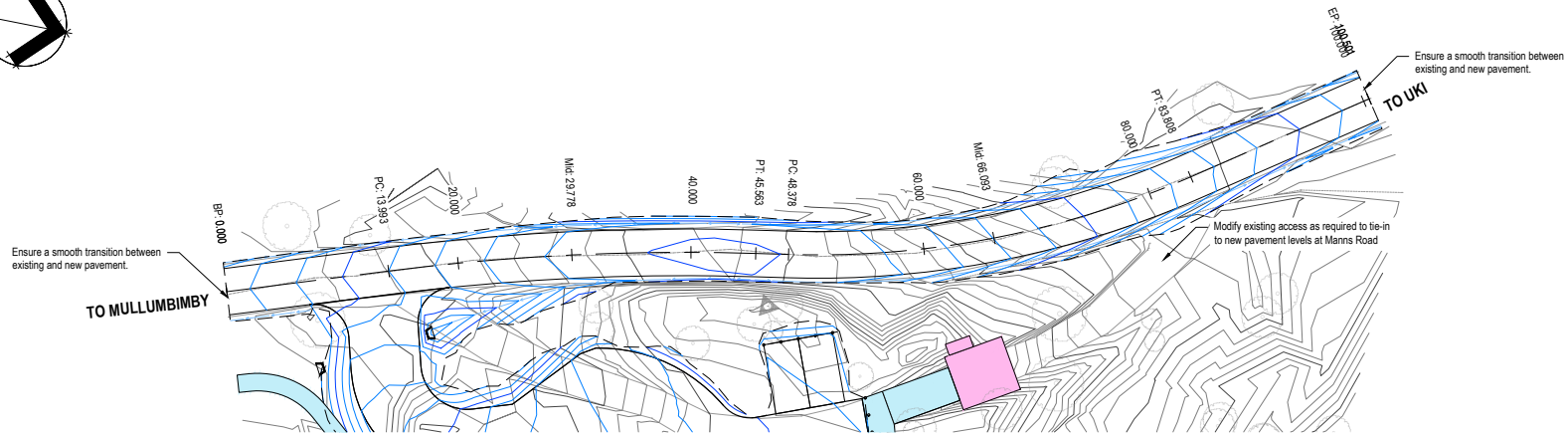
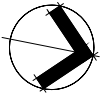
Client
NPWS

Designed	BWH	Drawn	BWH	Checked	
Approved	RE	Date	5/11/2020	MVE	

Scale
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Drawing Title
Construction Notes

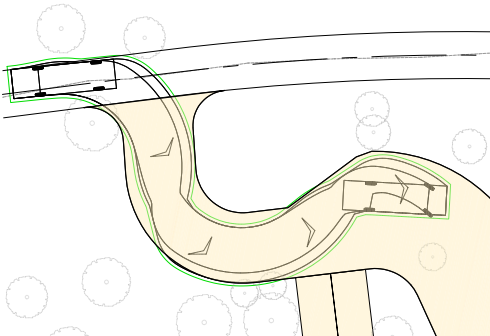
3706-1014
Drawing Number
3706/C003
Revision



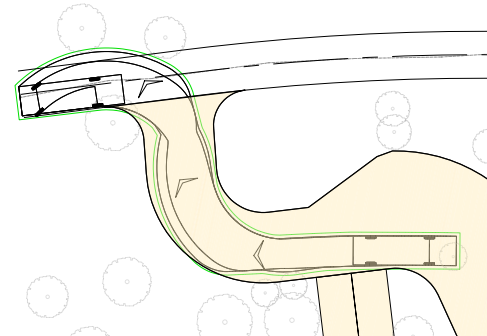
LEGEND

- Existing contours (0.2 m int)
- Proposed contours (0.2 m int)
- Proposed Pavement
- Proposed roofed structure
- Proposed footpath
- Proposed limit of works
- Indicative bollard locations
- Proposed pipe culvert

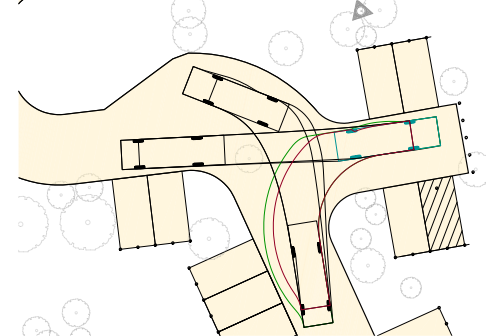
Medium Rigid Vehicle (MRV) Entry Manoeuvre



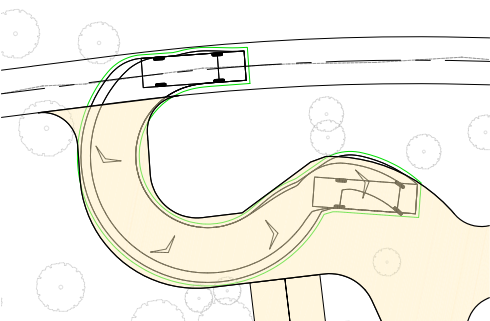
Medium Rigid Vehicle (MRV) Exit Manoeuvre



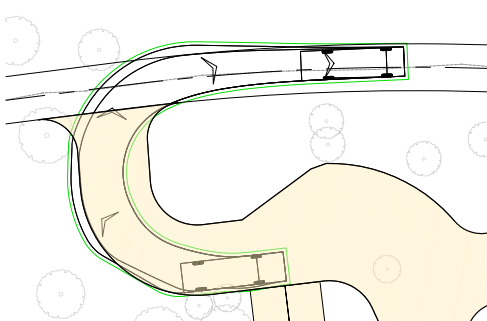
Medium Rigid Vehicle (MRV) Three-Point Turn Exit Manoeuvre



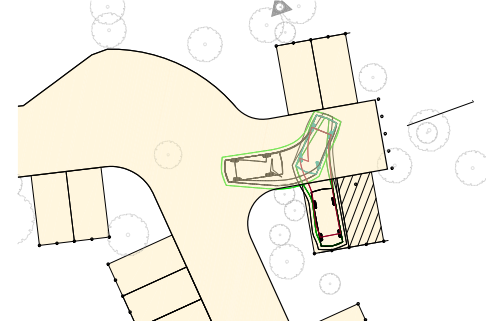
Medium Rigid Vehicle (MRV) Entry Manoeuvre



Medium Rigid Vehicle (MRV) Exit Manoeuvre



85th percentile Vehicle (B85) Parking Exit Manoeuvre



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CONSTRUCTION**

1	Issue for Construction	10/02/2021	BWH	RE	P
Rev	Description	Date	Des.	App.	C

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Approved	RE	Date	5/11/2020		

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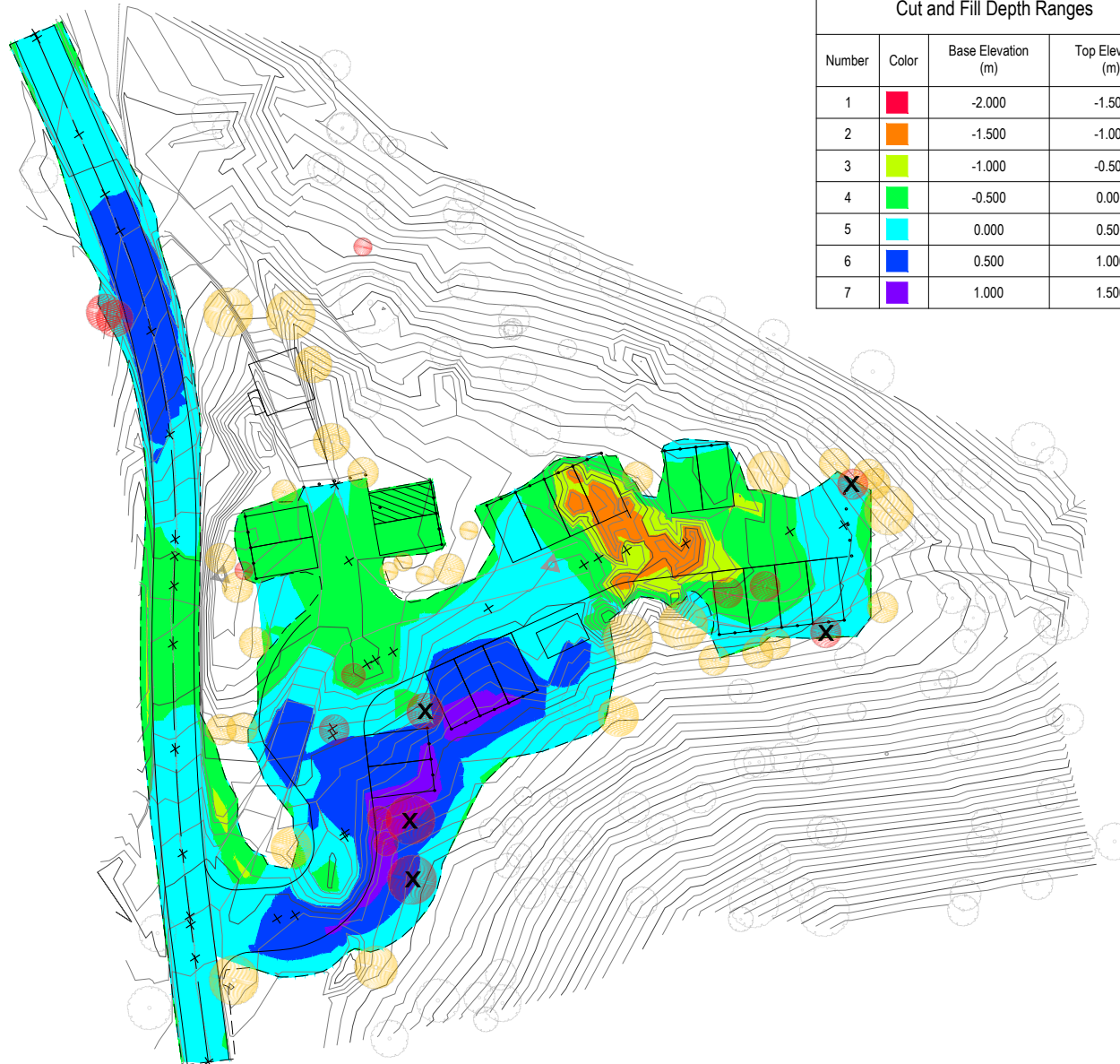
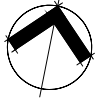
Drawing:

**Manns Road Civil Works Layo
and Manoeuvring Pla**

3706-1
Drawing Number

3706/C010

Plan 5.6 Manns Road detailed design - Civil works layout and manoeuvring plan 3706/C010



Cut and Fill Depth Ranges			
Number	Color	Base Elevation (m)	Top Elevation (m)
1	Red	-2.000	-1.500
2	Orange	-1.500	-1.000
3	Yellow	-1.000	-0.500
4	Green	-0.500	0.000
5	Cyan	0.000	0.500
6	Blue	0.500	1.000
7	Purple	1.000	1.500

LEGEND

- Existing contours (0.2 m interval)
- Proposed contours (0.2 m interval)
- Proposed limit of works
- Tree requiring protection
- Tree requiring removal
- Trees to be retained using methodology on GeoLINK 3706/C030

**FOR
CONSTRUCTION**

2	Added tree details	12/05/2021	BWH	RE
1	Issue for Construction	10/02/2021	BWH	RE
Rev	Description	Date	Des.	App.
			Chk.	Amendments

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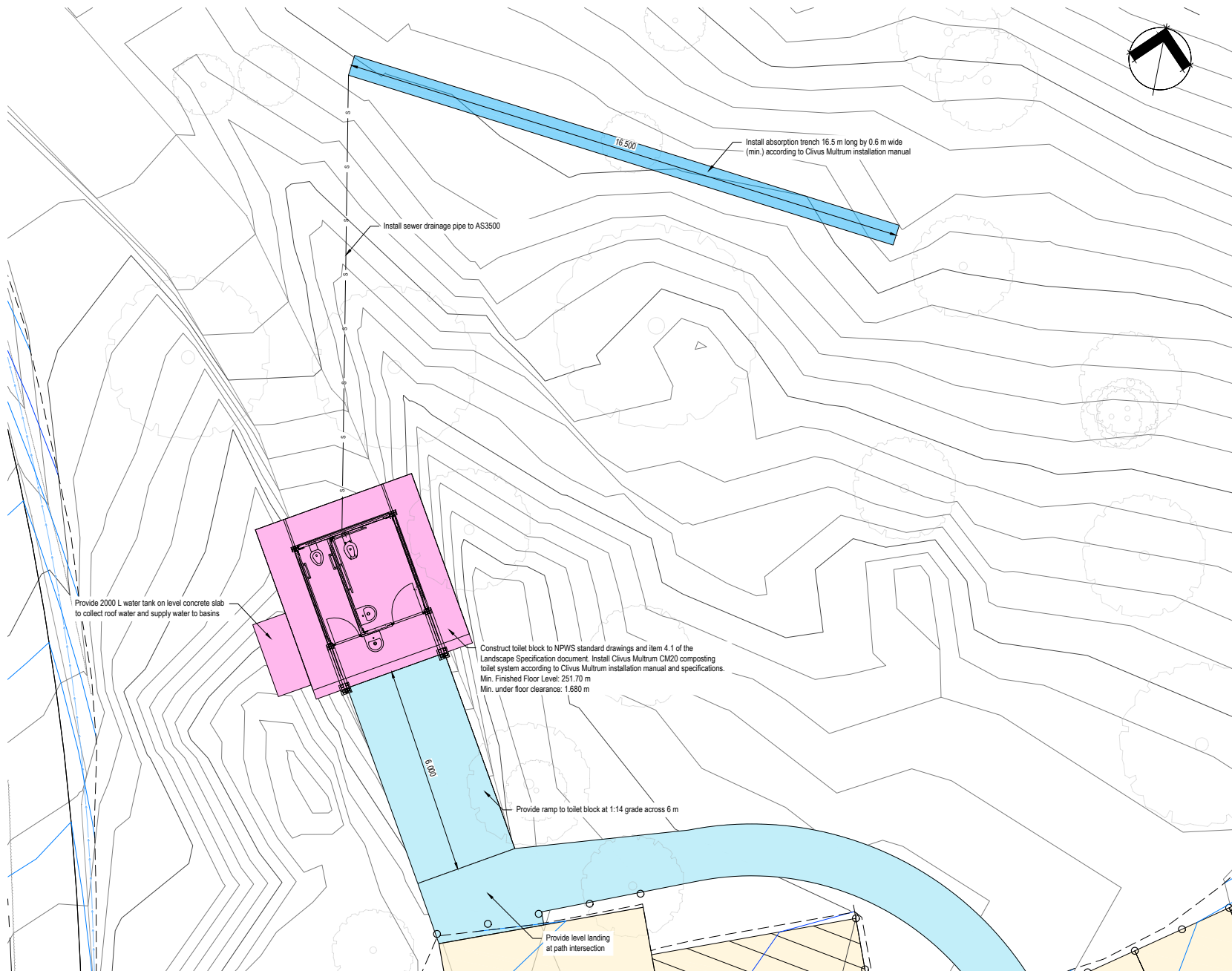
Designed	BWH	Drawn	BWH	Checked	MVE
Approved	RE	Date	5/11/2020		

XREFs

Scale
metres 0 1 2 3 4 5

Drawing Title
Earthworks Cut and Fill Plan

3706-1024
Drawing Number Revision
3706/C012 2



- LEGEND**
- Existing contours (0.2 m interval)
 - Proposed contours (0.2 m interval)
 - Proposed Pavement
 - Proposed roofed structure
 - Proposed footpath
 - Proposed absorption trench
 - Proposed sewerage
 - Indicative bollard locations
 - Proposed drainage swale

**FOR
CONSTRUCTION**

1	Issue for Construction	10/02/2021	BWH	RE
Rev	Description	Date	Des.	App/Chk

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Approved	RE	Date	10/02/2021	RE

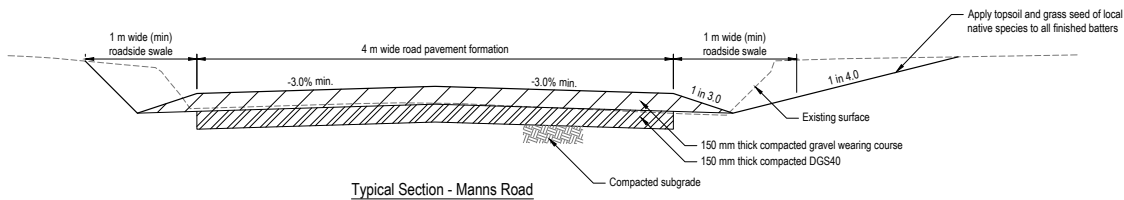
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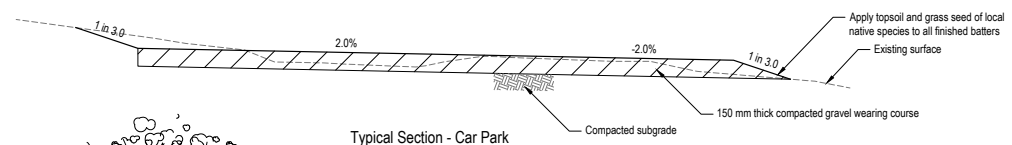
Drawing Title
Toilet Layout

3706-1015
 Drawing Number
3706/C013
 Revision

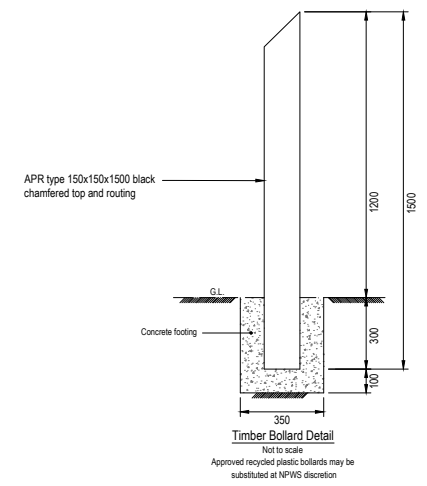
Plan 5.8 Manns Road detailed design - Toilet layout 3706/C013



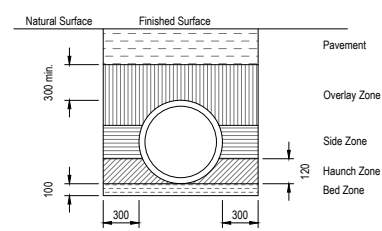
Typical Section - Manns Road



Typical Section - Car Park



Timber Bollard Detail



Typical Pipe Installation Conditions

FOR
CONSTRUCTION

Rev	Description	Date	Des.	App.	Chk.	Amendments
1	Issue for Construction	10/02/2021	BWH	RE		

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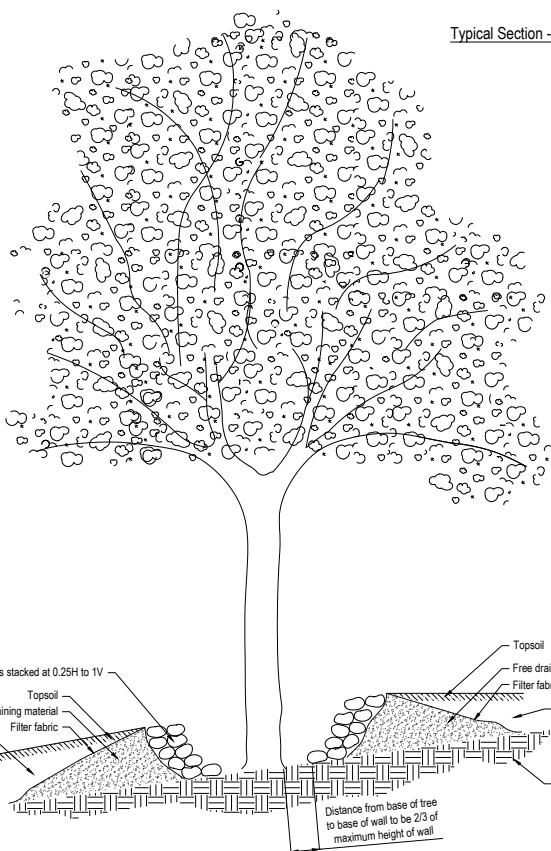
Designed	Drawn	Checked
BWH	BWH	RE
Approved	Date	Revision
RE	10/02/2021	

XREFs
Scale
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Drawing Title
**Road and Car Park
Construction Details**

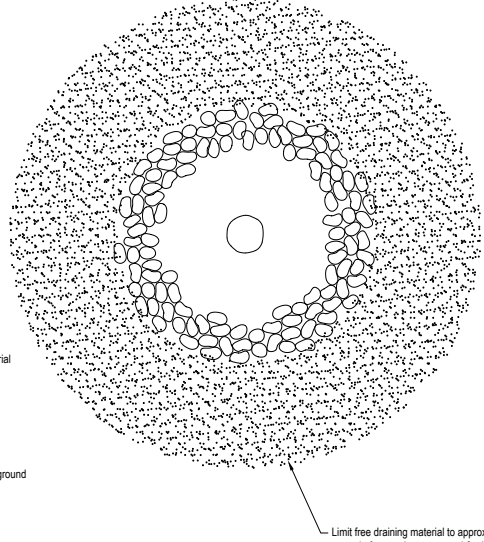
Drawing Number
3706/C030

Revision
1



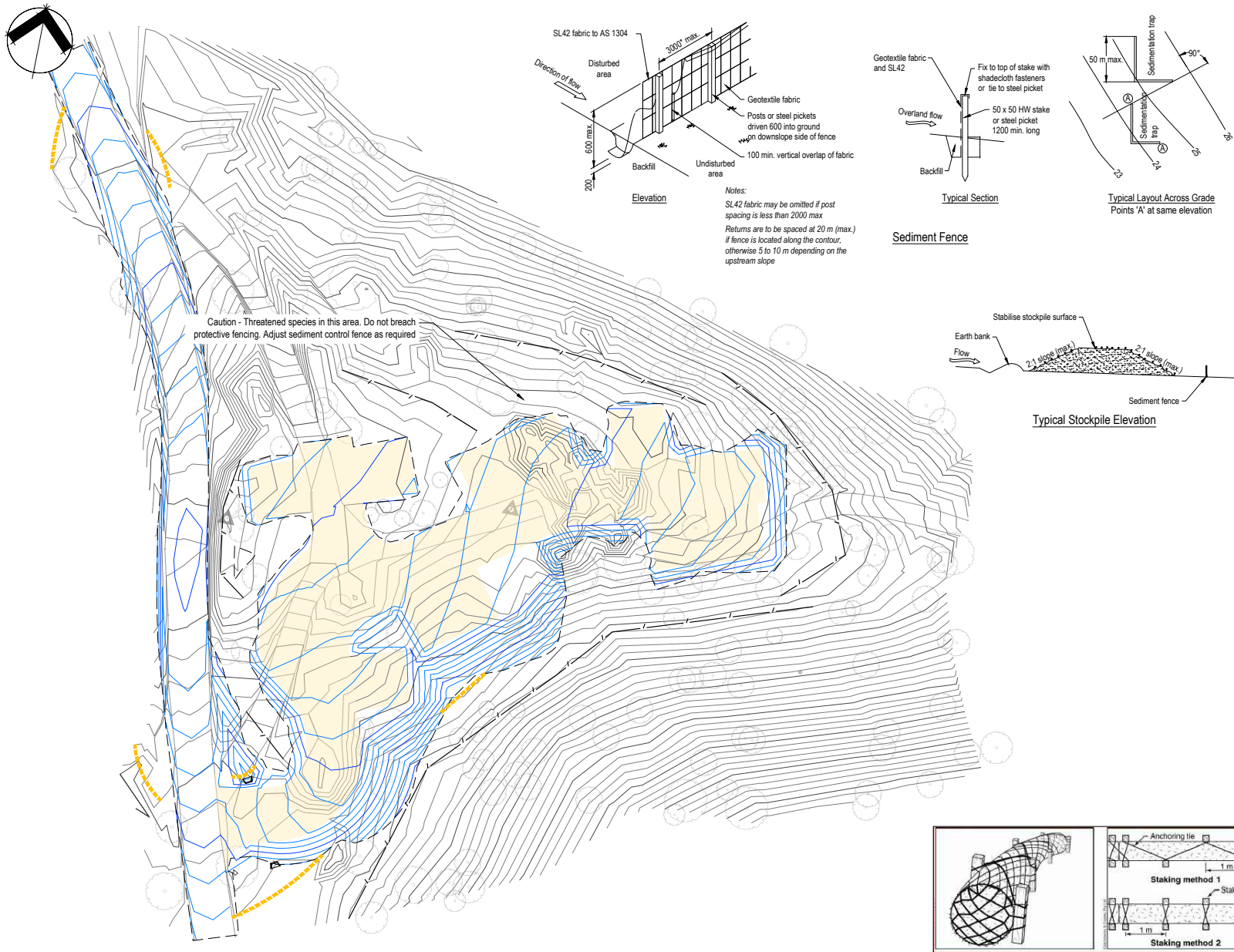
Tree Protection Detail: Section

Not to Scale



Tree Protection Detail: Plan

Not to Scale



LEGEND

- Existing contours (0.2 m interval)
- Proposed contours (0.2 m interval)
- Proposed limit of works
- Proposed sediment fence
- Proposed coir log

**FOR
CONSTRUCTION**

Rev	Description	Date	Des	App	Chk
1	Issue for Construction	10/02/2021	BWH	RE	

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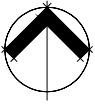
Client
NPWS

Designed	BWH	Drawn	BWH	Checked	RE
Approved	RE	Date	10/02/2021		

Scale
 metres 0 1 2 3 4 5

Drawing Title
**Erosion and Sediment Control
 Plan**

3706-1019
 Drawing Number Revision
3706/C040 1



- LEGEND**
- Major contour at 1m interval
 - Minor contour at 0.2m interval
 - - - Edge of vegetation
 - Water course
 - Existing tree
 - Rock outcrop
 - Top of bank
 - Bottom of bank

FOR
CONSTRUCTION

Rev	Description	Date	Des	App	CHK

Amendments

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Project Title
Tweed Byron Hinterland Trails

Client
NPWS

Designed	Drawn	Checked	By
RE	RE	RE	BW1
Approved	Date	Date	

XREFs

Scale

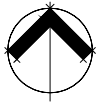
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Drawing Title
**Unicorn Falls
 Existing Survey**

Drawing Number
UF-02

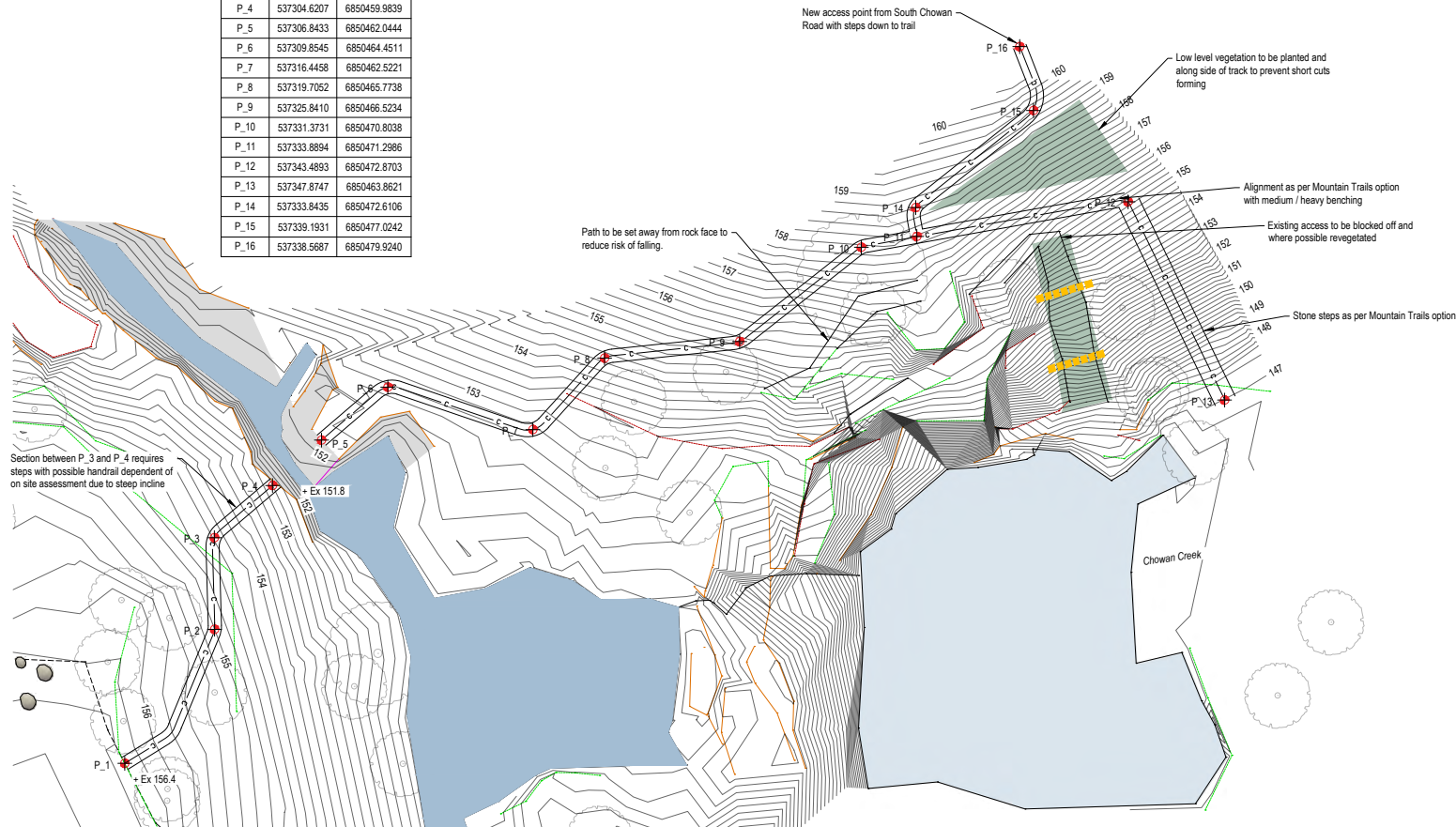
3706 1010
 Revision

Plan 5.11 Unicorn Falls detailed design - Existing site survey UF/02



Set Out
 Due to the natural location the alignment of paths, infrastructure and furniture is to be confirmed on site by the Principal.

ID	Position X	Position Y
P_1	537297.9082	6850447.3535
P_2	537301.9843	6850453.4464
P_3	537301.9794	6850457.6102
P_4	537304.6207	6850459.9839
P_5	537306.8433	6850462.0444
P_6	537309.8545	6850464.4511
P_7	537316.4458	6850462.5221
P_8	537319.7052	6850465.7738
P_9	537325.8410	6850466.5234
P_10	537331.3731	6850470.8038
P_11	537333.8894	6850471.2986
P_12	537343.4893	6850472.8703
P_13	537347.8747	6850463.8621
P_14	537333.8435	6850472.6106
P_15	537339.1931	6850477.0242
P_16	537338.5687	6850479.9240



NOTE
 Handrail - refer to NPWS Drawing No: UFC - A with chainwire.

- LEGEND
- Major contour at 1m interval
 - Minor contour at 0.2m interval
 - - - Edge of vegetation
 - Water course
 - Revegetation area
 - Coir log
 - Existing tree
 - Proposed path
 - c — Centre line of path
 - Rock outcrop
 - Top of bank
 - Bottom of bank

FOR CONSTRUCTION

Rev	Description	Date	Des	App	CHK
A	Rock crossing handrail removed	18/01/2021	RE	RE	RE

Amendments

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Project Title
Tweed Byron Hinterland Trails

Client
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Designed	RE	Drawn	RE	Checked	
Approved		Date			

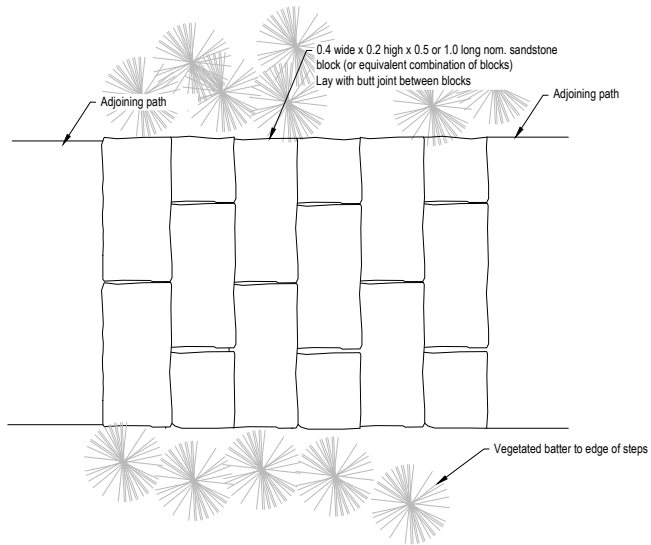
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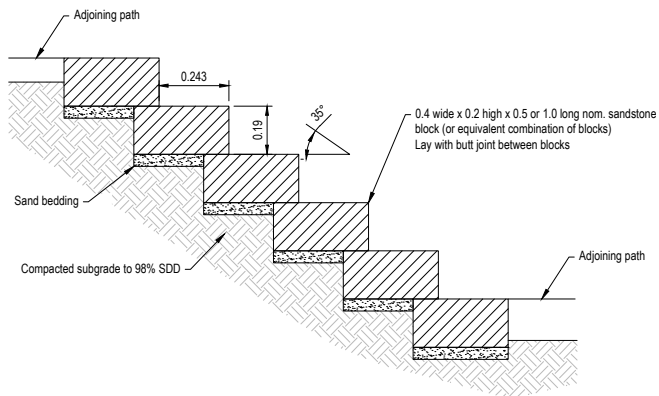
Drawing Title
Unicorn Falls Path Set Out

3706 1011
 Drawing Number Revision
UF-04 A

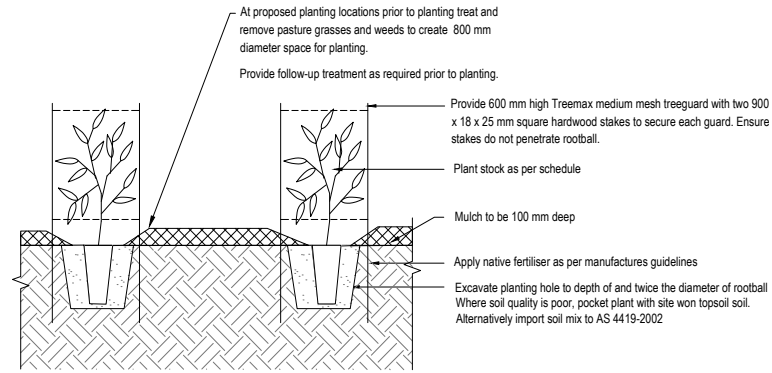
Plan 5.12 Unicorn Falls detailed design - Path set out UF/04



Stone Steps Indicative Detail
Plan



Stone Steps Indicative Detail
Cross Section



Bush Regeneration

PLANTING NOTES

- plants are to be removed from containers with minimum disturbance to the root ball;
- ensure that the root ball is moist;
- where possible, species to be planted in species groups of 3 to 15 with spacing centres as per species list;
- excavate hole twice the width of the Forest and Viro Tube;
- insert plant in its final position in the centre of the hole with the surface flush with surrounding finished ground levels and backfill with soil. Soil should create a dish to the base of the tree to assist in water retention;
- native tree fertiliser to be applied at the required rate in accordance with the manufacturers recommended rate and method;
- water plants thoroughly prior to and immediately after planting, and as required to maintain growth rates free of stress throughout the establishment period, and

FOR
CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

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quality solutions sustainable future

Project Title
Tweed Byron Hinterland Trails

Designed		Drawn		Checked	
RE	RE	RE	RE	BWH	BWH
Approved		Date			
RE	RE	24/02/2021			
XREFs					

Scale
metres Not To Scale

Drawing Title
**Unicorn Falls
Details**
3106-1023

Drawing Number
UF-05

